LOWER MANHATTAN DEVELOPMENT CORPORATION

INVITATION TO BID

for

EXTERIOR SCAFFOLDING IN CONNECTION WITH DECONSTRUCTION OF 130 LIBERTY STREET

The Lower Manhattan Development Corporation, a subsidiary of the New York State Urban Development Corporation d/b/a Empire State Development Corporation, seeks bids for exterior scaffolding relating to the deconstruction of the building at 130 Liberty Street, New York, New York.

Lower Manhattan Development Corporation

John C. Whitehead, Chairman
Stefan Pryor, President

May 31, 2005

MANDATORY Pre-bid conference: June 8, 2005, 9:00 AM EST
Deadline for submission of Bids: June 27, 2005, 5:00 PM EST

Project Number:

A MANDATORY pre-bid conference will be held on June 8, 2005 at 9:00 AM at LMDC's offices located at 1 Liberty Plaza, 20th Floor, New York, NY 10006. Questions must be submitted in writing no later than June 15, 2005 to David Ridley by email at dridley@renewnyc.com. Addenda to this Invitation to Bid, including responses to any questions, will be posted on the LMDC web site www.renewnyc.com by June 21, 2005. LMDC will not accept, and cannot respond to, questions via other methods.

Dated: 5/27/2005

LOWER MANHATTAN DEVELOPMENT CORPORATION

DECONSTRUCTION OF
130 LIBERTY STREET NEW YORK, NEW YORK

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6. Attachments
    a. **Attachment 1**: Initial Building Characterization Study Report
    Prepared by the Louis Berger Group, Inc. 9/14/04.
    b. **Attachment 2**: Supplemental Investigation Summary Reports
    Prepared by TRC Environmental Corp.
    c. **Attachment 3**: NYSDOL Variance Decision File No. 05-0427 dated 5/11/05
    d. **Attachment 4**: Deliverables and Contract Milestones – Scaffolding Contract

I. GENERAL INFORMATION

A. Mission and Structure of the Lower Manhattan Development Corporation

The Lower Manhattan Development Corporation ("LMDC") was established in late 2001 to develop and revitalize Lower Manhattan in the aftermath of the September 11, 2001 terrorist attacks. LMDC defines Lower Manhattan to mean all areas in Manhattan south of Houston Street.

LMDC is a subsidiary of the New York State Urban Development Corporation, doing business as Empire State Development Corporation ("ESDC"), a political subdivision and public benefit corporation of the State of New York, created by Chapter 24 of the Laws of New York, 1968, as amended. LMDC is governed by a 16-member Board of Directors, of which half was nominated by the Governor of the State of New York and half by the Mayor of the City of New York.

LMDC is funded by federal appropriations administered by the United States Department of Housing and Urban Development ("HUD") through its Community Development Block Grant ("CDBG") program. To date, approximately $2.783 billion has been allocated to LMDC. (*See* Defense Appropriations Act of 2002, Public Law 107-117 and Supplemental Appropriations Act of 2002 for Further Recovery from and Response to Terrorist Attacks on the United States, Public Law 107-206).

B. Overview of the Work and the Submission Process

In fulfilling its responsibility of revitalizing Lower Manhattan, including the cleaning and deconstruction of the building at 130 Liberty Street, LMDC will need to obtain the services of a firm to provide exterior scaffolding and installation (the "Work"). Firms interested in submitting a bid to provide the Work are required to follow the guidelines and instructions contained in this Invitation to Bid. In the event it becomes necessary to revise any part of this Invitation to Bid, revisions will be provided by addenda posted on the LMDC web site: http://www.renewnyc.com.

(Please respond in writing if you do not intend to submit a proposal for this project and also return the bid documents.)

Bid proposals should provide a straightforward, complete and concise description of the firm's capabilities and qualifications to perform the Work. Please prepare eight (8) copies of your bid proposal. Each copy of the bid proposal should be bound in a single volume and include any documentation you may wish to submit.

Any firm submitting a bid proposal in response to this Invitation to Bid may be required to give an oral presentation of its qualifications to LMDC. This oral presentation may provide an opportunity for the firm to clarify or elaborate on its qualifications but will in no way change the original submission. Engagement staff should be present at the oral presentation. LMDC's request for an oral presentation shall not constitute retention of the firm for this Work or for future services.

Bid proposals must be received no later than 5:00 PM EST, June 27, 2005. Deliver all bid proposals to:

RFP/RFQ Processor
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor
New York, NY 10006
Attn: 130 Liberty Street Exterior Scaffolding

Proposals are considered confidential. Your proposal, properly executed, should be prepared and submitted in a sealed envelope clearly identified on the outside that it is a proposal, stating the project name, trade and the LMDC Project Number. Original bid proposals rendered in the form of a telegram, telephone, or electronic transmission will not be accepted. Changes to bid proposals will be accepted if received in a sealed envelope marked as above at the location specified before the bid due time and due date. Any proposal received after the above stipulated time and date may be returned to you unopened.

We welcome suggestions regarding changes in specifications and/or modifications in design or production methods which will aid in reducing costs without impairing quality or safety, or which will improve the quality, safety, schedule and/or performance of the Work. However, your base bid price must be submitted on the basis of the bid documents. All voluntary alternates are to be presented as a separate deduction from or addition to the base bid price.

LMDC shall have no obligation to disclose to any firm the results of the bid process or of LMDC's determinations (including any information as to the bids furnished by any other bidder), except that LMDC shall notify the firm in writing if such firm is not awarded the contract.

The award of the contract shall not be construed as a guarantee by LMDC that the amount of the bid, the plant, equipment and the general scheme of operations and other data submitted by bidder with or after its bid proposal is either adequate or suitable for the satisfactory and timely performance of the Work.

LMDC reserves the right to cancel this Invitation to Bid at any time, to reject any bid or all bids, to negotiate with any or all bidders, to waive any informality or irregularity in any bid received or to afford any bidder an opportunity to remedy any deficiency resulting from any informality or irregularity. LMDC assumes no obligation, no responsibility and no liability for costs incurred by the responding firms prior to the issuance of a contract.

LMDC may at its election deny permission to modify, explain, withdraw or cancel any bid or part thereof after the time designated for the opening of bids.

The current schedule for this effort is as follows:

- May 31, 2005 – Invitation to Bid Issued
- June 27, 2005 – Responses Due
- June 28 – June 30, 2005 – Interviews of Finalists/Oral Presentations Conducted (if necessary)

• July 1, 2005 – Qualified Firm Selected

C. Pre-Bid Meeting and Site Visit

You are requested to attend a **MANDATORY**[1] pre-bid meeting and site visit scheduled for:

Time:	9:00 AM EST
Day:	Wednesday
Date:	June 8, 2005
Location:	LMDC offices, One Liberty Plaza, 20th Floor, New York, New York 10006

The firm should take extreme care during the site visit. The firm shall be prepared with own safety equipment such as hard hats, boots, flash lights, etc. during visit to the site. The firm shall comply with all site-access requirements imposed by LMDC, including but not limited to execution of a waiver and release and compliance with any health and safety plan (or "HASP") which LMDC has adopted.

Arrangements can be made for later walk-throughs and site visits with LMDC.

II. ANTICIPATED SCOPE OF WORK

LMDC requests bid proposals for one or more firms to perform the Work, which will include, but will not be limited to the items identified below.

A. Categories of Work

Exterior scaffolding planning, engineering, furnishing, installation and removal, and other Work as referenced in the Scope of Work and as otherwise described in the Specifications.

III. SUBMISSION REQUIREMENTS

Interested firms are invited to submit bid proposals that contain the following information:

A. Experience, Structure, and Personnel (ten-page limit)

1. A history of the firm's experience performing projects similar to the Work, including the specifics outlined in Section II (A) above, to economic development organizations, municipalities, other governmental entities, private developers, not-for-profits and civic organizations.

[1] Attendance at the Mandatory pre-bid conference is a condition to submission of a bid.

2. A description of the firm's organizational structure, including resumes of the principals, project manager(s), superintendents and professional staff who would work directly with LMDC.

3. Descriptions of up to five (5) major projects that the firm has completed that are comparable to the Work-- specifically on projects with a high level of public scrutiny. Include the client, the name of a contact person who is able to provide a reference, a description of the nature of the work, the size and complexity of the project, and the original contract sum and final sum including change order payments.

4. Any other information that you believe would make the firm's work on behalf of LMDC superior to that of other firms or information about your firm's specialty or particular skill to perform the Work.

B. Bid Form (Attachment 4)

Complete the Bid Form (Attachment 4), including:

1. The lump sum price for the Work, per the Bid Form attached as Attachment 4 (Bid Form).

2. For work added by change order, the current hourly rates the firm pays under its union agreements for labor, along with the percentage mark-up for the firm's entire costs of administration, profit, general conditions and overhead associated with change orders. (That percentage will be a factor in LMDC's analysis of the competitiveness of your firm's proposal.)

3. Any reduced prices offered to other municipalities, governmental entities, economic development or nonprofit organizations, and civic organizations.

4. Unit prices, alternate prices, and/or allowances required in Attachment 4(Bid Form).

NOTE: Although the proposed lump sum price will be taken into account, LMDC reserves the right to negotiate a lower or different compensation structure with any firm that is selected.

C. Contact Information

On a single cover sheet in your statement of qualifications, please provide:

1. The lead firm or individual name;

2. The lead firm's contact person;

3. License or certification information of lead firm principal(s) or individual(s) that are anticipated to work on a LMDC project;

4. Telephone, fax, and cell phone numbers for firm principal(s) or individual(s) that are anticipated to work on a LMDC project;

5. E-mail address for firm principals or individuals that are anticipated to work on an LMDC project;

6. The street address of lead firm or individual;

7. The year the firm or individual practice established;

8. The M/WBE status of the firms (Minority-owned Business Enterprise or Women-owned Business Enterprise, as certified by New York State);

9. The type of work or specialty and size of firm; and

10. The signature of the lead individual, and the date of the signature.

D. Conflicts of Interest

1. Submit a statement describing any potential conflict of interest or appearance of impropriety, relating to other clients of the firm (including, but not limited to, projects located in Lower Manhattan), or officers, directors, and employees of LMDC, that could be created by working for LMDC.

2. Indicate what procedures will be followed to detect and notify LMDC and to resolve any conflicts of interest.

3. Indicate any pending litigation and/or regulatory action by any oversight body or entity that could have an adverse material impact on the firm's ability to serve LMDC.

4. Indicate if the firm has ever had a prior contract with any governmental entity terminated for any reason, and provide a detailed explanation.

5. Submit a completed Standard Business Background Questionnaire (Attachment 3).

6. Submit a completed Contractor Disclosure Contracts Form and the Contractor Disclosure of Prior Non-Responsibility Determinations Form (Attachment 6) in compliance with New York State Executive Order 127.

7. Identify the firm's proposed insurance carriers.

8. Provide information for any other Lower Manhattan projects (and/or projects for Deutsche Bank) or work related to 130 Liberty Street.

E. Nondiscrimination Policy and M/WBE

1. Firms with fifty (50) or more employees shall submit a copy of their nondiscrimination or affirmative action plan.

2. Firms with less than fifty (50) employees shall submit a statement of their commitment to equal opportunity and affirmative action from their chief executive officer.

3. Each responding firm must also complete and submit both (a) Attachment 1 (Workforce Employment Utilization Report) relating to the anticipated workforce to be utilized on the project, and (b) Attachment 2 (MBE/WBE Compliance Report) relating to the anticipated participation of minority and women-owned business enterprises as subcontractors, if any. Please provide a detailed M/WBE plan and a plan for utilizing minorities and women on this Project, as required by the Opportunity Downtown Plan (see Schedule "F" of the General Conditions).

F. Proposed Subcontractors

1. Each responding firm shall submit a list of any proposed subcontractors, and the amounts of each such subcontractor proposal, along with a completed Standard Business Background Questionnaire (Attachment 3) for each such proposed subcontractor.

2. Firms are cautioned that all proposed subcontractors must meet all the requirements set forth in the form of contract accompanying this Invitation to Bid. If a proposed subcontractor, submitted with your bid, is disapproved, the successful bidder must provide an alternate subcontractor, acceptable to the LMDC, at no additional cost to the LMDC.

G. Bid Bond

1. Each responding firm must submit two originals of the Bid Bond in the form set forth in Attachment 6 (Bid Bond).

H. Evidence of Insurance.

1. Each responding firm must submit evidence of their ability to secure the insurance required by LMDC, as set forth in Schedule I of the General Conditions.

I. Project Approach and Methodology

1. Each responding firm must submit Attachment 7 (Project Approach and Methodology).

J. Bidder Prequalification Application/Team Structure Schedule

1. Each responding firm must submit Attachment 8 (Bidder Prequalification Application/Team Structure Schedule).

K. Comments on Contract

1. The firm should indicate what amendments, if any, it would request in the form of contract accompanying this Invitation to Bid.

All information and documents described in subsections A through K above must be included or addressed in the submission.

IV. CRITERIA FOR SELECTION

Because of the special complexity and coordination requirements of this Project, LMDC will select the Contractor based on factors demonstrating such Contractor's responsibility and experience with large, difficult projects involving compliance with strict Legal Requirements. For this reason, LMDC expressly reserves the right to award to other than the low bidder. Among the factors which LMDC will apply in making its final selection, not necessarily in order of importance, are the following.

1. Experience on complex, large scale projects.

2. Number, complexity, and nature of projects in New York City similar to the Project handled by the firm.

3. Familiarity with local, state, and federal environmental regulations and other Legal Requirements applicable to the Project.

4. Experience of the firm with comparable governmental organizations in New York City and comparable qualification requirements.

5. Demonstrated knowledge of the environmental issues facing Lower Manhattan, 130 Liberty Street, and the WTC Site.

6. Experience of firm and employees to be assigned to this Project, and in performance on similar projects for municipalities, economic development organizations, or other governmental entities.

7. Approaches in proposed methodology that demonstrate maximum comprehension of and ability to provide first class work for LMDC.

8. Work on at least 5 major high rise projects in New York City.

9. Demonstrated record of safety and safe performance.

10. Quality of work product as demonstrated through examples of work on other projects.

11. Selected firm's staff ability, experience, availability and facility for working with LMDC directors, officers, staff and consultants.

12. Innovative or outstanding work by firm that demonstrates the firm's unique qualifications to perform the Work.

13. Amount of Lump Sum bid and also amounts and rates for other dollar factors required by this Invitation to Bid.

14. Experience with large-scale demolition projects containing Hazardous Materials.

15. Conformity with or exceeding applicable LMDC policies as set forth in the Contract, including specific policies relating to nondiscrimination, affirmative subcontracting goals, and Opportunity Downtown Plan.

16. The degree of the firm's willingness to accept the form of the Agreement, General Conditions, and other Contract Documents set forth in the attached Schedule A without material amendment.

V. CONTRACT REQUIREMENTS

Selected firm(s) will be required to enter into a formal Agreement (including General Conditions, Specifications, and other Contract Documents) with LMDC in the forms accompanying this Invitation to Bid, subject to addenda or amendments issued by LMDC.

VI. MISCELLANEOUS CONDITIONS

A. Obligation Only on Formal Agreement

The issuance of this Invitation to Bid and the submission of a response by any candidate firms or the acceptance of such response by LMDC do not obligate LMDC in any manner. Legal obligations will only arise on the execution of the formal Agreement by LMDC and the firm selected by LMDC. Responses to this Invitation to Bid will be prepared at the sole cost and expense of the candidate firms. No materials submitted in response to this Invitation to Bid will be returned.

B. LMDC Reservation of Rights

LMDC may (i) amend, modify, or withdraw this Invitation to Bid, (ii) revise requirements of this Invitation to Bid, (iii) require supplemental statements or information from any firm, (iv) accept or reject any or all responses hereto, (v) extend the deadline for submission of responses thereto, (vi) negotiate or hold discussions with any respondent and to waive defects and allow corrections of deficient responses which do not completely conform to the instructions contained herein, and (vii) cancel this Invitation to Bid, in whole or in part, if LMDC deems it in its best interest to do so. LMDC may exercise the foregoing rights at any time without notice and without liability to any proposing firm or any other party for their expenses incurred in the preparation of the responses hereto or otherwise.

C. Nondiscrimination and Affirmative Action Policies; Opportunity Downtown Plan

It is the policy of the State of New York, ESDC, and LMDC to comply with all federal, state and local laws, policies, orders, rules and regulations which prohibit unlawful discrimination because of race, creed, color, national origin, sex, sexual orientation, age, disability or marital status, and to take affirmative action in working with contracting parties to ensure that Minority and Women-owned Business Enterprises ("M/WBEs"), Minority Group Members and women share in the economic opportunities generated by LMDC's participation in projects or initiatives, and/or the use of LMDC funds. LMDC is a subsidiary of ESDC and its non-discrimination and affirmative action policy will apply to this Invitation to Bid and any resulting contract(s). LMDC has established a 20% M/WBE participation goal for the entire redevelopment project. The selected firm shall be required to use its best efforts to provide for the meaningful participation of United States M/WBEs, Minority Group Members and women in the execution of this contract. A copy of each responding firm's equal employment opportunity policy statement, Attachment 1 (Workforce Employment Utilization Report) relating to the anticipated workforce to be utilized on the contract and Attachment 2 (MBE/WBE Compliance Report) relating to the anticipated participation as subcontractors of M/WBEs, shall be included as part of the response to the Invitation to Bid. The ESDC Affirmative Action Unit ("AAU") is available to assist you in identifying M/WBEs certified by the State of New York that can provide goods and services in connection with the contract. If you require M/WBE listings, please call the AAU at (212) 803-3224. The selected firm must also participate in LMDC's Opportunity Downtown Plan.

Please refer to Article 20 of the General Conditions and Schedules C and F to the General Conditions for additional requirements relating to the foregoing.

CHECKLIST OF REQUIRED ATTACHMENTS FOR BIDDER TO COMPLETE

Attachment 1	Workforce Employment Utilization Report
Attachment 2	MBE/WBE Compliance Report
Attachment 3	Standard Business Background Questionnaire
Attachment 4	Bid Form
Attachment 5	Contractor Disclosure Contracts Form and the Contractor Disclosure of Prior Non-Responsibility Determinations Form
Attachment 6	Bid Bond
Attachment 7	Project Approach and Methodology
Attachment 8	Bidder Prequalification Application/Team Structure Schedule

Workforce Employment Utilization Report

[attached]

MONTHLY EMPLOYMENT UTILIZATION REPORT

(See next page for instructions)

PROJECT NAME:

PROJECT LOCATION:

COUNTY: _____ ZIP:

REPORTING PERIOD: Month

Year

CONTRACTOR START DATE: _____

ESTIMATED COMPLETION DATE:

PERCENT OF JOB COMPLETED *(for reporting period)*:

CONTRACT NO.:

CONTRACT AMOUNT: $

COMPANY EMPLOYMENT DATA

A. TOTAL COMPANY EMPLOYEES *(at the Beginning of project)*

Male	Female

B. TOTAL COMPANY EMPLOYEES *(at the end of project)*

Male	Female

C. NET INCREASE *(applies only to changes, if any, in Company's Employee makeup at the end of project)*

TOTAL MALE		TOTAL FEMALE	
C1. EMPLOY-EES	C2. OCCUPA-TIONAL CODES/# OF EMPLOYEES	C3. EMPLOY-EES	C4. OCCUPA-TIONAL CODES/# OF EMPLOYEES

1. WORKER HOURS OF EMPLOYMENT

2. NUMBER OF WORKERS

BLACK (Not of Hispanic Origin)		1c. HISPANIC		1d. ASIAN or PACIFIC ISLANDER		1e. NATIVE AMERICAN/ ALASKAN NATIVE		2a. ALL		2b. MINORITY		3. CONSTRUCTION TRADES	
LE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE		

	TOTAL MALE	TOTAL FEMALE
TOTAL WHITE		
TOTAL BLACK		
TOTAL HISPANIC		
TOTAL ASIAN		
TOTAL NATIVE AMERICAN		

_____ (Print Name), the _____ (Title), do certify that (i) I have read this Monthly Employment Utilization Report and (ii) to the best of my knowledge, information and belief the information contained herein is complete and accurate.

___ DATE

MONTHLY EMPLOYMENT UTILIZATION REPORT

Instructions for Completion

The Monthly Employment Utilization Report ("MEUR") is to be completed by each subject contractor (both Prime and Sub) and signed by a responsible official of the company. The reports are to be filed by the 5th day of each month during the term of the project, and they shall include the total work-hours for each employee classification in each trade in the covered area for the monthly reporting period. The prime contractor is responsible for submitting its subcontractors report, along with its own. Additional copies of this form may be obtained from Lower Manhattan Development Corp. ("LMDC").

Minority: Includes Blacks, Hispanics, Native Americans, Alaskan Natives, and Asian and Pacific Islanders, both men and women.

1. *Worker Hours of Employment (a-e)*:
   - *a) All Worker Hours*: The total number of male hours, the total number of female hours, and the total of both male and female hours worked under each classification.
   - *b) through e) Minority Worker Hours* The total number of male hours and the total number of female hours worked by each specified group of minority worker in each classification.

2. *Number of Workers (a-b)*:
   - *a) All Workers* Total number of males and total number of females working in each classification of each trade in the contractor's aggregate workforce during reporting period.
   - *b) Minority Workers* Total number of male minorities and total number of female minorities working in each classification, in each trade in the contractor's aggregate workforce during reporting period.

3. *Construction Trade*: Only those construction crafts which contractor employs in the covered area. *Construction Trades include:* Field Office Staff (Professionals and Office/Clerical), Laborers, Equipment Operators, Surveyors, Truck Drivers, Iron Workers, Carpenters, Cement Masons, Painters, Electricians, Plumbers and Other.

Note: LMDC may demand payroll records to substantiate work hours listed on the Monthly Employment Utilization Report, if discrepancies should arise.

OCCUPATIONAL CODES

Officials/Administrators	100
Professionals	110
Technicians	120
Sales Workers	130
Office & Clerical	140
Craft Workers	150
Operatives	160
Laborers	170
Service Workers	180

FORWARD TO:

[insert LMDC's contact person]

Attachment 2

MBE/WBE Compliance Report

[attached]

SCHEDULE C, Attachment C-2

MBE/WBE COMPLIANCE REPORT
CONSTRUCTION
(to be filed monthly)

PROJECT SPONSOR/DEVELOPER: _____

ADDRESS: _____

_____

TELEPHONE: _____

CONTACT PERSON: _____

LMDC AA REPRESENTATIVE: David Ridley

PROJECT NAME: _____

PROJECT START DATE: _____ PERCENT COMPLETE:

ACTUAL COMPLETION: _____

Attach M/WBE contract documentation, i.e. executed contracts, signed purchase orders or canceled checks. This report should be completed by an officer of the reporting company, and forwarded to the LMDC with the appropriate documentation.

PRIME CONTRACTOR (Name, Address, Contact Person and Phone)	TYPE OF CONTRACT (Trade/Service)	CONTRACT AMOUNT	SUB CONTRACTOR NO. & AMT.	MBE/WBE SUBCONTRACTOR (Name, Address, Contact Person and Phone)	SCOPE OF SERVICES	AMOUNT CONTRACTED TO MBE/WBE

CERTIFICATION:

I, _____ (Print Name), the _____ (Title), do certify that (i) I have read this Compliance Report and (ii) to the best of my knowledge, information and belief the information contained herein is complete and accurate.

SIGNATURE _____ DATE

Forward to:

[insert LMDC's contact person]

Attachment 3

Standard Background Questionnaire

[attached]

LMDC
Remember Rebuild Renew

LOWER MANHATTAN DEVELOPMENT CORPORATION
STANDARD BUSINESS BACKGROUND QUESTIONNAIRE

INSTRUCTIONS

- **This Questionnaire shall be completed on behalf of the Firm by an individual who is knowledgeable about the past and present operations of the firm and its policies.**
- **Firms intending to bid as joint venturers should submit a separate Questionnaire for each joint venturer.**
- **Whenever more space is needed to answer any question, or you wish to give further explanation, complete by attaching extra pages.**
- **All questions must be answered. If a particular question does not apply, the response must state "Not Applicable" ("NA").**
- **Any suits, liens, judgments, litigation, violations, and administrative or court actions under appeal must be disclosed.**

NOTE: Please indicate whether you believe that any of the information supplied herein is confidential and should be exempt from disclosure under the New York Freedom of Information Law: _____yes, _____no. If you checked "yes" you must identify the information you feel is confidential by placing an asterisk in front of the appropriate question number(s) and attach an additional sheet(s) explaining the basis for such claim(s).

DEFINITIONS

For purposes of this Questionnaire, the following terms shall have the following meanings:

A. "Affiliate" shall mean any person or entity that is directly or indirectly controlled by the person or entity to which the question relates, or any person or entity that directly or indirectly controls such person or entity. For purposes of this definition, control means the power to direct the management of the firm, person or other entity, whether through ownership of shares, the right to designate the Board of Directors, contract or otherwise.

B. "Principal" shall mean any person who is or has been, within the past five (5) years, either an owner of five percent (5%) or more of the firm's shares, one of the firm's five (5) largest shareholders or a director, officer, partner or proprietor of the Firm.

C. "Key Person" shall mean any individual, not identified in this Questionnaire as a Principal, who participates in policy making, financial decisions, or the Firm's operations in relation to the LMDC project.

GENERAL INFORMATION

1. LEGAL NAME OF FIRM (hereafter, the "Firm")_____

EMPLOYER IDENTIFICATION NUMBER _____

DBA NAME, IF ANY_____

MAILING ADDRESS_____PHONE NO. (____)_____

CITY_____COUNTY_____STATE_____ZIP_____FAX NO. (____)_____

ACTUAL LOCATION_____

FIRM HEADQUARTERS (if different)_____

E-MAIL ADDRESS_____WEB SITE_____

2. CONTACT NAME FOR QUESTIONNAIRE_____TITLE_____PHONE NO._____

3. TYPE OF FIRM (check only one) ___CORPORATION ___PARTNERSHIP ___PROPRIETORSHIP ____JOINT VENTURE ___LLC ____LLP

4. HOW MANY YEARS HAS THE FIRM BEEN IN BUSINESS?_____UNDER THE SAME NAME?_____FORMER NAME(S):_____

4a. WAS THE FIRM PURCHASED AS AN EXISTING BUSINESS BY ITS PRESENT OWNER(S) NO___ YES___(IF YES PROVIDE INFORMATION)
DATE PURCHASED___/___/___ PREVIOUS OWNER(S) NAME(S):_____

5. WHAT IS THE FIRM'S BONDING RANGE? $_____SINGLE PROJECT $_____AGGREGATE (ALL PROJECTS)

6. ARE YOU CERTIFIED MBE_____ WBE_____ IF SO, BY WHOM?_____

OWNERSHIP, MANAGEMENT, AFFILIATION

7. **Principals**: Identify each person who is, or has been within the past five (5) years, an owner of five percent (5.0%) or more of the Firm's shares, or one of the five (5) largest shareholders or a director, an officer, a partner or a proprietor. Fill in name, % owned, office held and indicate by Y or N whether the individual is a director, officer, partner or Key Person:

FIRST NAME	MI	LAST NAME	DATE OF BIRTH	% OWNED	DIRECTOR (Y OR N)	OFFICER (Y OR N)	TITLE	PARTNER (Y OR N)	KEY PERSON (Y OR N)

8. **Key Persons**: Identify any individual, not listed in your answers to question 7 and identified as a Principal, who participates in policy making, financial decisions or the Firm's operations in relation to the LMDC project:

FIRST NAME	MI	LAST NAME	DATE OF BIRTH	TITLE

9. **Ownership of Other Firms:** Identify any other firms in which, now or in the past five (5) years, the Firm or any Principals or Key Persons, either owned or owns five percent (5.0%) or more of the shares of, or was or is one of the five (5) largest shareholders, a director, officer, partner or proprietor of such other firm:

FEDERAL ID NO.	% OWNED	FIRM/COMPANY NAME	FIRM/COMPANY ADDRESS

10. **Affiliates:** Identify any Affiliate not listed in your answers to question 9.

FEDERAL ID NO.	COMPANY NAME	ADDRESS

11. Identify the name and types of any professional or occupational license(s) (e.g., attorney, CPA, architect, engineer, securities, insurance, etc.) ever held by the Firm, Principal or Key Person and provide the information below.

TYPE OF LICENSE	LICENSING AUTHORITY	INDIVIDUAL NAMED ON LICENSE	LICENSE NUMBER	DATE HELD FROM (MO/YR TO MO/YR)

12. Are any persons identified in your answers to questions 7, 8, or 10:

    (a) Present or past employees of the LMDC No_____ Yes_____
    (b) Related by kinship or marriages to any present or past employees of the LMDC? No_____ Yes_____

If you answered "yes" to questions 12(a) or 12(b), provide name(s) of such individual(s) and indicate his or her relationship to the current/former LMDC employee.

_____

_____

_____

_____

D. FINANCIAL INFORMATION

13. Attach a copy of the Firm's most recent audited annual financial statement, include (if any) the auditor's report and accompanying footnotes.

14. For the purpose of this contract, is any other person or entity guaranteeing the performance of, or otherwise providing financial assistance to, your Firm? If so, describe the form of assistance and list the name(s) and federal tax identification number(s) ("TIN") of each person or entity:

FORM OF ASSISTANCE	INDIVIDUAL	COMPANY NAME	FEDERAL TIN	ADDRESS

OTHER INFORMATION

15. For the Firm or any individual, firm or Affiliate identified in questions 7 through 10 above; (a) list and describe all judgments, liens or claims over $25,000 filed against the Firm, individual, firm or Affiliate and remaining undischarged or unsatisfied for more than ninety (90) days; and (b) list and describe all liquidated damages assessed. Also list any litigation currently pending against the Firm, individual, firm, or Affiliate, if the judgment sought relates to the type of work to be performed for the LMDC, or could have a material adverse financial impact on the Firm, individual, firm or Affiliate.

INDIVIDUAL, FIRM OR AFFILIATE	LIENS, CLAIMS, LITIGATION INDEX/DOCKET NO.	LIQUIDATED DAMAGES

16. Within the past five (5) years has the Firm, Principal, Key Person, or Affiliate been the subject of any of the following (respond to each question and describe in detail the circumstances of each affirmative answer; attach additional pages if necessary):

(a) a judgment of conviction for any business-related conduct constituting a crime under state or Federal law? No_____ Yes_____

(b) a criminal investigation or indictment for any business-related conduct constituting a crime under state or Federal law? No_____ Yes_____

(c) a grant of immunity for any business-related conduct constituting a crime under state or Federal law? No_____ Yes_____

(d) any felony or misdemeanor charges pending that were filed either before or during their employment or affiliation with the Firm? No_____ Yes_____

(e) a Federal or state suspension or debarment? No_____ Yes_____

(f) a finding of non-responsibility by any government agency? No_____ Yes_____

(g) a denial or revocation of prequalification? No_____ Yes_____

(h) a voluntary exclusion from bidding/contracting agreement? No_____ Yes_____

(i) any administrative or civil action seeking specific performance or restitution on any public works contract except any disputed work proceeding? No_____ Yes_____

(j) an OSHA Citation and Notification of Penalty containing a violation classified as serious? No_____ Yes_____

(k) an OSHA Citation and Notification of Penalty containing a violation classified as willful? No_____ Yes_____

(l) a prevailing wage or supplement payment violation? No_____ Yes_____

(m) a state labor law violation deemed willful? No_____ Yes_____

(n) any other federal or state citations, notices, violation orders, pending administrative hearings or proceedings or determinations of a violation of any labor law or regulation? No_____ Yes_____

(o) any criminal investigation, felony indictment or conviction concerning formation of, or any business association with, any allegedly false or fraudulent women's, minority or disadvantaged business enterprise? No_____ Yes_____

(p) any denial, decertification, revocation or forfeiture of Women's Business Enterprise, Minority Business Enterprise or Disadvantaged Business Enterprise status? No_____ Yes_____

(q) rejection of a low bid on a local, state or federal contract for failure to meet statutory affirmative action or M/WBE requirements? No_____ Yes_____

(r) consent order with the NYS Department of Environmental Conservation, or a federal, state or local government enforcement determination involving a violation of federal or state environmental laws? No_____ Yes_____

(s) any citations, notices, violation orders, pending administrative hearings or proceedings or determinations for violations of:

- Federal, state or local health laws, rules or regulations? No_____ Yes_____
- Federal, state or local environmental laws, rules or regulations? No_____ Yes_____
- unemployment insurance or workers compensation coverage or claim requirements? No_____ Yes_____
- ERISA (Employee Retirement Income Security Act)? No_____ Yes_____
- Federal, state or local human rights laws? No_____ Yes_____
- Federal or state security laws? No_____ Yes_____
- a request to withdraw a bid submitted to a public owner or any claim of an error on a bid submitted to a public owner? No_____ Yes_____

(t) any bankruptcy or reorganization proceeding? No_____ Yes_____

(u) any suspension or revocation of any business or professional license, certificates or certifications? No_____ Yes_____

(v) a denial of application an for a professional or trade license? No_____ Yes_____

17. Within the past five (5) years has the Firm, Principal, or Key Person (respond to each question and detail the circumstances of each affirmative answer; attach additional pages if necessary):

(a) filed or submitted to any government agency, employee or representative any document that the Firm, Affiliate, Principal or Key Person knew to contain a false statement or false information? No___ Yes___

(b) falsified any business record? No___ Yes___

(c) given or offered to give money or any thing of value or any benefit to any labor official or public servant with intent to influence that person with respect to his or her official acts, duties or decisions as a labor official or public servant? No___ Yes___

(d) given or offered to give money or any thing of value or any benefit to any official or employee of a business with intent to induce that person or employee to engage in unethical or illegal business practices? No___ Yes___

(e) agreed with any person to submit a proposal, price or bid below prevailing market rate? No___ Yes___

(f) been sued or paid a settlement of claim related to the performance of professional services? No___ Yes___

18. Within the past five (5) years, has the Firm ever:

(a) failed to file any required tax returns or failed to pay any applicable Federal, state or New York City taxes, or other assessed New York City charges including, but not limited to, water and sewer charges? No___ Yes___

(b) had, or does it presently have, any delinquent Federal, state or New York City taxes outstanding? No___ Yes___

If you answered "yes" to questions 18(a) or 18(b), supply details.

_____

_____

_____

19. Provide any supplemental information the Firm desires to have considered as part of its response to this Questionnaire.

_____

_____

_____

_____

CERTIFICATION

The undersigned recognizes that this Questionnaire is submitted for the express purpose of inducing the LMDC to award a contract or approve a subcontract; acknowledges that the LMDC may in its discretion, by means which it may choose, determine the truth and accuracy of all statements made herein; authorizes the LMDC, the United States Department of Housing and Urban Development, or their agents to contact any entity named in this Questionnaire and any attachments for the purposes of verifying the information supplied; acknowledges that the intentional submission of false or misleading information may constitute a felony under New York Penal Law Section 210.40 or a misdemeanor under Penal Law Section 210.35 or Section 210.45, and may also be punishable by a fine of up to $10,000 or imprisonment of up to five years under 18 U.S.C. Section 1001; represents that the information submitted in this Questionnaire and any attached pages is true, accurate and complete, and agrees to notify LMDC in writing of any change in circumstances occurring after the submission of this questionnaire and during the performance of any contract awarded.

Sworn to before me this_____ day of _____, _____ .

_____
Signature of Officer

_____
Notary Public

_____
Title

_____
Commission Expiration Date

Attachment 4

Bid Form

[URS to attach]

130 LIBERTY STREET DECONSTRUCTION

SCAFFOLDING CONTRACT

BID SUBMISSION CHECKLIST

- Workforce Employment Utilization Report (Attachment 1)
- M/WBE Compliance Report (Attachment 2)
- Standard Business Background Questionnaire (SBBQ) (Attachment 3)
- Bid Form **In Quadruplicate** (Attachment 4)
- Contractor Disclosure Contracts form and the Contractor Disclosure of Prior Non-Responsibility Determinations Form. (Attachment 5)
- Bid Bond (2 Originals) (Attachment 6)
- Experience, Structure, and Personnel Documentation (Invitation to Bid Part III-A)
- Contact Information (Invitation to Bid Part III-C)
- Conflicts of Interest (Invitation to Bid Part III-D)
- Nondiscrimination/ Affirmative Action Plan (Invitation to Bid Part III-E)
- Evidence of Insurance (Invitation to Bid Part III-H)
- Project Approach and Methodology (Attachment 7)
- Prequalification Application (Attachment 8)

BID FORM
FOR
LOWER MANHATTAN DEVELOPMENT CORPORATION
EXTERIOR SCAFFOLDING OF
130 LIBERTY STREET NEW YORK, NEW YORK
PROJECT #

Bid of _____(hereinafter "BIDDER") a corporation organized under the laws of the State of New York.

Submitted to Lower Manhattan Development Corporation (hereinafter "LMDC").

I. The undersigned BIDDER proposes and agrees, if this Bid is accepted to enter into an agreement with LMDC in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Bid Price and within the Bid Times indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

II. BIDDER accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for sixty days after the day of Bid opening. BIDDER will sign and deliver the required number of counterparts of the Agreement with the Bonds and other documents required by the Bidding Requirements within five days after the date of Owner's Notice of Award.

(A) BIDDER has examined and carefully studied the Bidding documents and the following Addenda, receipt of which is hereby acknowledged: (List Addenda by Addendum Number and Date):

_____

_____

_____

_____

(B) BIDDER has attended the mandatory site visit and become familiar with and is satisfied as to the general, local and site conditions that may affect cost, progress, performance and furnishing of the Work;

(C) BIDDER is familiar with and is satisfied as to all Legal Requirements that may affect cost, progress, performance and furnishing of the Work.

(D) BIDDER has carefully studied all available reports of explorations and tests of subsurface conditions at or contiguous to the site(s) and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site. BIDDER acknowledges that such reports and drawings are not contract Documents and may not be complete for BIDDER's purposes. BIDDER acknowledges that LMDC and Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bidding Documents with respect to Underground Facilities at or contiguous to the site(s). BIDDER has obtained and carefully studied (or

Submitted by_____ Bidder_____

assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site(s)or otherwise which may affect cost progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by BIDDER and safety precautions and programs incident thereto. BIDDER does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the times, price and other terms and conditions of the Contract Documents.

(E) BIDDER is aware of the general nature of the Work to be performed by the owner, Owner's Representative(s), and other contractors at the site that relates to Work for which this Bid is submitted as indicated in the Contract Documents.

(F) BIDDER has correlated the information known to BIDDER, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.

(G) BIDDER has given Owner written notice of all conflicts, errors, ambiguities or discrepancies that BIDDER has discovered in the Contract Documents and the written resolution thereof by Owner is acceptable to BIDDER, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

(H) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

(I) Words and phrases as defined elsewhere in these bid documents have the same meaning in this Bid Form.

Submitted by_____ Bidder_____

III. BIDDER will complete the Work in accordance with the Contract Documents for the following amounts:

1. Mobilization (Not to Exceed 4% of Subtotal Contract Amount – Line 15)	$_____
2. Bonds & Insurance (N.T.E. 1 ½% of Subtotal Contract Amount – Line 15)	$_____
3. Engineering/ Plans/ Permits	$_____
4. General Conditions (N.T.E. 7% of Subtotal Contract Amount – Line 15)	$_____
5. Scaffold Erection (Including Rental through January 1, 2007)	$_____
6. Scaffold Removal (After Dismantle by Deconstruction Contractor)	$_____
7. Hoist Erection (Including Rental through January 1, 2007)	$_____
8. Hoist Dismantle	$_____
9. Sidewalk Bridging Erection (Including Rental through January 1, 2007)	$_____
10. Sidewalk Bridging Dismantle	$_____
11. Exterior Building Washdown	$_____
12. Exterior Netting Removal (Including Hauling & Disposal of all Materials)	$_____
13. Hauling & Disposal of all Materials	$_____
14. *Forced Bid Closeout, Punchlist, Demobilization	$ **250,000.00**
15. .....SUBTOTAL	$_____
16. Allowance for Additional Hoists	$ **1,500,000.00**
17. Allowance for Additional Sidewalk Bridging	$ **200,000.00**
18. Allowance for Reinforced Concrete	$ **75,000.00**
19. Contingency Allowance	$ **225,000.00**
20. .....GRAND TOTAL	$_____

GRAND TOTAL SCAFFOLDING CONTRACTOR

_____ Dollars

Total Amount Written in Words
Includes all Items above

***Forced bid is the amount assigned by the owner as a line item for closeout. It is inclusive of the Contractor's base bid costs for the project.**

Submitted by_____ Bidder_____

UNIT COST BID AMOUNTS (Do not include in totals above)

These bid unit costs will be used in the event work is added or deleted and includes all labor, supervision, management, material, equipment, incidental work and all mark-ups necessary to fully execute the work to its completion. The Owner reserves the right to reject any unit price.

1. **Unit Price for Erection and Dismantling of an Additional Hoist Equivalent to Champion 6000** $_____

2. **Unit Price for Monthly Rental of Scaffolding after 12/31/06 (Per SF)**
(Scaffolding then remaining will be assessed on a monthly basis) $_____

3. **Unit Price for Monthly Rental of Hoist (Per Month)** $_____

4. **Unit Price for Monthly Rental of Sidewalk Bridging All Sizes (Per LF)** $_____

5. **Unit Price for Heavily Reinforced Concrete Crane Pad – Estimated at 5' Thick x 25' Wide, by 25' Wide (Per CY)** $_____

6. **Unit Price for Additional Levels of Protection Platform All Elevations Supported Independent of Scaffold System (Per Level)** $_____

7. **Unit Price for Additional Levels of Planking on Scaffold – All Elevations (Per Level)** $_____

8. **Additional Sidewalk Bridge**

   a. 8' High x 0'- 12' Wide (per LF) $_____

   b. 10'-12' High x 0'-12' Wide (per LF) $_____

   c. 14'-20' High x 0'-12' Wide (per LF) $_____

   d. 8' High x 12'-24' Wide (per LF) $_____

   e. 10'-12' High x 12'-24' Wide (per LF) $_____

   f. 14'-20' High x 12'-24' Wide (per LF) $_____

   g. Dismantle/Remove/Demobilize 0'-12' Wide (Per LF) $_____

   h. Dismantle/Remove/Demobilize 12'-24' Wide (Per LF) $_____

   i. Monthly Rental All Sizes (Per LF) $_____

   j. Lighting Maintenance Per Visit (Each) $_____

Submitted by_____ Bidder_____

7. **Emergency Work**

   a. Straight Time for emergency work, field directives, etc. (Per Man-Hour) $_____

   b. Premium Time for emergency work, field directives, etc. (Per Man-Hour) $_____

All bid amounts must be held by the Contractor for 120 days from the date of the bid.
In the event of a conflict in the Total Bid Amount between the written amount and the numerical amount, the actual total of the individual Bid Items shall take precedence.

Note 1: Unit Prices will be subject to negotiations.
Note 2: Unit prices are to remain in effect for the length of the contract.

Submitted by_____ Bidder_____

IV. The Contractor shall identify below the applicable subcontractors, consultants, etc.

LICENSED ASBESTOS ABATEMENT CONTRACTOR

State here the name, address, and telephone and New York license numbers of the asbestos removal Contractor.

_____

_____

_____

LICENCED ASBESTOS TRANSPORTER

State here the name, address, telephone number and registration number of the asbestos transporter.

_____

_____

_____

LICENSED ASBESTOS SUBTITLE D DISPOSAL FACILITY

All bidders are informed that the contractor must use a subtitle D landfill (Maximum of 3) for all asbestos containing materials. This contractor must coordinate all efforts for bidding purposes.

_____

_____

_____

STRUCTURAL ENGINEER (LICENSED IN NEW YORK STATE)

State here the name, address, and telephone number of the structural engineer who will provide professional engineering services for design of temporary shoring and bracing, concrete formwork and demolition operations in removing structures.

_____

_____

_____

Submitted by_____ Bidder_____

OTHER SUBCONTRACTORS, CONSULTANTS, ETC., INCLUDING M/W BE

WORK ITEM	SUBCONTRACTOR'S NAME
_____	_____
_____	_____
_____	_____

TRANSPORTER FOR TRASH/DEBRIS

State here the name, address, telephone number and state registration of the transporter.

_____

_____

_____

SUBTITLE D DISPOSAL FACILITY FOR TRASH/DEBRIS

State here the name, address, telephone number and state registration of the disposal facility.

_____

_____

_____

ALL ENTITIES LISTED IN SECTION IV ARE SUBJECT TO LMDC APPROVAL

V. BIDDER accepts the provisions of the contract including all terms and conditions in the event of failure to complete the Work within the times specified.

VI. Communications concerning this Bid shall be addressed to:

Mr. Luis Mendes,
Director of Construction, Memorial, Cultural, & Civic Development
Lower Manhattan Development Corporation
1 Liberty Plaza, 20th Floor
New York, NY 10006

Submitted by_____ Bidder_____

With copies to:
Mr. Jaime Daniels, Project Manager
URS Corporation/ LMDC
Lower Manhattan Development Corporation
1 Liberty Plaza, 20th Floor
New York, NY 10006

IX. PRICE GUARANTEE

The price stated in this proposal is guaranteed for 120 (ninety) days from the bid due time, and if authorized to proceed within that period, we will agree to complete the work covered by this proposal at said price.

Submitted on_____, 2005.

Name of Bidder:_____ (SEAL)

By:_____
Signature

Name and Title:_____

Contractor's License No.:_____

Contractor's Federal ID No.:_____

Telephone No. _____

Fax No. _____

Dunn and Bradstreet No. _____

Submitted by_____ Bidder_____

Attachment 5

Contractor Disclosure Contracts Form
and the Contractor Disclosure of Prior Non-Responsibility Determinations Form

New York State Executive Order Number 127 (EO 127) provides for increased disclosure in the public procurement process through identification of persons or organizations whose function is to influence procurement contracts, public works agreements and real property transactions.

A procurement is any contract, agreement or subsequent amendment involving an annualized expenditure in excess of $15,000.00, but does not include those contracts that by law must be awarded to the lowest responsible bidder or based on the lowest price.

LMDC is obligated to obtain identifying information on every person or organization retained, employed or designated by or on behalf of the contractor to attempt to influence the procurement process. LMDC is obligated to collect information on whether such person or organization has a financial interest in the procurement. This obligation is on-going, and survives the awarding of the contract.

In addition, EO 127 mandates consideration of whether a contractor has intentionally provided false or incomplete information under such Order within the last five years, and whether a contractor has failed to timely disclose accurate and complete information or otherwise cooperate in the implementation of the Order. LMDC is precluded from awarding a procurement contract to a contractor with a finding of non-responsibility under the Order unless it makes a finding, on the record, that such contract is in the best interests of the State, notwithstanding the prior finding of non-responsibility.

Please complete and submit the attached Contractor Disclosure of Contracts Form and Contractor Disclosure of Prior Non-Responsibility Determinations with your proposal.

Attachments
Contractor Disclosure of Contracts Form
Contractor Disclosure of Prior Non-Responsibility Determinations

Contractor Disclosure of Contracts Form

This form shall be completed and submitted with your bid/proposal or offer in accordance with Executive Order Number 127 (EO 127). Failure to complete and submit this form shall result in a determination of non-responsiveness and disqualification of the bid, proposal or offer. If at the time of submission of this form, the specific name of a person authorized to attempt to influence a decision on your behalf is unknown, you agree to provide the specific person's information when it is available. You also agree to update this information during the negotiation or evaluation process of this procurement, and throughout the term of any contract awarded to your company pursuant to this bid/proposal or offer.

****

RFP / RFQ (title): _____

Name of Contractor: _____

Address: _____

_____

Name and Title of Person Submitting this Form: _____

Signature: _____ Date: _____

Indicate below if this is an initial filing in accordance with Section II, paragraph 1 of EO 127 or an updated filing in accordance with Section II, paragraph 2 of EO 127? (Please circle):

Initial filing Updated filing

The following person or organization was retained, employed or designated by or on behalf of the Contractor to attempt to influence the procurement process:

Name: _____

Address: _____

_____

Telephone Number: _____

Place of Principal Employment: _____

Occupation: _____

Does the above named person or organization have a financial interest in the procurement? (Please circle) yes no

Attach and label additional sheets with detail if necessary.

Contractor Disclosure of Prior Non-Responsibility Determinations

RFP / RFQ (Title): _____

Name of Contractor: _____

Address: _____

_____

Name and Title of Person Submitting this Form: (Print / Type) _____

Signature: _____ Date: _____

Has any covered agency or authority made a finding of non-responsibility regarding the Contractor in the last five years? (Please circle):

No Yes

If yes, was the basis for the finding of the Contractor's non-responsibility due to the intentional provision of false or incomplete information required by Executive Order Number 127? (Please circle):

No Yes

If yes, please provide details regarding the finding of non-responsibility below.

Covered Agency or Authority: _____

Month and Year of Finding of Non-responsibility: _____

Basis of Finding of Non-Responsibility: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Has any covered agency or authority terminated a procurement contract with the Contractor due to the intentional provision of false or incomplete information required by Executive Order Number 127? (Please circle):

No Yes

Attach and label additional sheets with detail if necessary.

Attachment 6

Bid Bond

(attach two originals)

BIDDER *(Name and Address)*:_____
_____
_____

SURETY *(Name and Address of Principal Place of Business)*:_____
_____
_____

OWNER *(Name and Address)*: Lower Manhattan Development Corporation
_____
_____

PROJECT TO BE BID: [insert trade scope]

BID DUE DATE: _____ ___, 2005 at _____

BOND

BOND NUMBER: _____
DATE: *(Not later than Bid Due Date)*: _____
PENAL SUM: (10% of Bid Amount)

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to LMDC upon default of Bidder any difference between the total amount of Bidder's bid and the total amount of the bid of the next lowest, responsible and responsive bidder as determined by LMDC for the Work required by the Contract Documents, provided that:

   1.1 If there is no such next lowest, responsible bidder, then Bidder and Surety shall pay to LMDC the penal sum set forth on the face of this Bond, and

   1.2 In no event shall Bidder's and Surety's obligations hereunder exceed the penal sum set forth on the face of this Bond.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Invitation to Bid (or any extension thereof agreed to in writing by LMDC) the executed contract required by the Invitation to Bid and any performance and payment bonds required by the contract.

3. This obligation shall be null and void if:

   3.1 LMDC accepts Bidder's bid and bidder delivers within the time required by the Invitation to Bid (or any extension thereof agreed to in writing by LMDC) the executed contract required by the Invitation to Bid and any performance and payment bonds required by the contract, or

   3.2 All bids are rejected by LMDC, or

   3.3 LMDC fails to issue a notice of award to Bidder within the time specified in the Invitation to Bid (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from LMDC, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of and any and all defenses based on or arising out of any time extension to issue notice of award agreed to in writing by LMDC and Bidder, provided that the total time for issuing notice of award including extensions shall not in the aggregate exceed 120 days from the date of the bid without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in paragraph 4 above is received by Bidder and Surety and in no case later than one year after due date for the bid as set forth in the Invitation to Bid.

7. Any suit or action shall be heard and determined only in a court of competent jurisdiction located in the City and County of New York.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier or by United States Registered or Certified Mail, Return Receipt Requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent or representative who executed this Bond on behalf of Surety to execute, seal and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable provision of any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "bid" as used herein includes a bid, offer or proposal, as applicable.

IN WITNESS WHEREOF, Surety and Bidder, intending to be legally bound hereby, subject to the terms on the following page, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER

_____ (Seal)
Bidder's Name and Corporate Seal

By:_____
Signature and Title

Attest:_____
Signature and Title

SURETY

_____ (Seal)
Surety's Name and Corporate Seal

By:_____
Signature and Title
(Attach Power of Attorney)

Attest:_____
Signature and Title

Note:
(1) Above addresses are to be used for giving required notice.
(2) Any singular reference to Bidder, Surety, or other party shall be considered plural where applicable.

ACKNOWLEDGMENT OF PRINCIPAL, IF A CORPORATION

STATE OF)
) ss:
COUNTY OF)

On this _____ day of _____, 2005, before me personally came _____, to me known, who, being by me duly sworn, did depose and say that he resides at _____, that he is the _____ of _____, the corporation described in and which executed the foregoing instrument; that he signed his name thereto by order of the directors of said corporation.

Notary Public or Commissioner of Deeds

ACKNOWLEDGMENT OF PRINCIPAL, IF A PARTNERSHIP

STATE OF)
) ss:
COUNTY OF)

On this _____ day of _____, 2005, before me personally came _____, to me known, who, being by me duly sworn, did depose and say that he resides at _____, that he is the _____ of _____, the partnership described in and which executed the foregoing instrument; that he signed his name thereto by order of said partnership.

Notary Public or Commissioner of Deeds

ACKNOWLEDGMENT OF PRINCIPAL, IF AN INDIVIDUAL

STATE OF)
) ss:
COUNTY OF)

On this _____ day of _____, 2005, before me personally came _____, to me known, who, being by me duly sworn, did depose and say that he resides at _____, that he is the individual who executed the foregoing instrument, and that he signed his name thereto.

Notary Public or Commissioner of Deeds

AFFIX ACKNOWLEDGMENTS OF BID BOND, JUSTIFICATION OF SURETIES AND/OR COPIES

Attachment "7"

Project Approach and Methodology

[URS to attach]

Attachment 7 – Project Approach and Methodology

As part of the bid submission it is mandatory that each contractor provide a detailed Project Approach and Technical Methodology in narrative form with accompanying sketches, site logistics plans, etc. and protocols and procedures to be used for penetrations at anchoring locations, netting removal, and façade washdown, that will depict the contractor's knowledge and understanding of the work scope and project requirements.

Careful consideration will be given to this technical submission as well as the bidder pre-qualification questionnaire (Attachment 8) during the bid evaluation process.

Contractor to provide the project approach attachment here for submission with the bid.

Attachment "8"

Bidder Prequalification Application/Team Structure Schedule

[URS to attach]

Business Applicant Name _____ TIN_____

_____ _____ _____

Name of person completing this application | Title | Date Completed

1. **Licenses**: If the work of this subcontract requires a New York City, State or Federal license or certification under governing law, provide copies of all required licenses. Attached____ NA____

2. **Labor Agreements**: Does this business have any collective bargaining labor agreements with New York City labor organizations? If yes, provide additional information on attached sheet Yes _____ No _____

3. **Apprenticeship Programs:**
   (a) Firm must demonstrate participation in a New York State approved apprenticeship program that has been in successful operation for a period of not less than three years. Successful operation shall be defined as placement of all graduates in an appropriate trade, the majority of who remain continuously employed in the trade for a period of at least two years. If yes, provide additional information. Yes _____ No_____
   (b) If awarded a subcontract, will this business participate in an apprenticeship program as approved by the NY State Commissioner of Labor? Yes _____ No _____

4. **Not Applicable**

Provide a response to all questions. Attach additional sheet(s) of paper to this application as needed to respond fully to all questions.

Business Applicant Name _____ TIN _____

5. **Personnel:** Indicate the number of full-time employees in the NY metropolitan area at this time in the chart below:

Executive	Managerial	Technical	Clerical	Skilled Tradespersons	Unskilled Labor
#	#	#	#	#	#

6. **Financial:**

(a) With this application, submit certified financial statements for the last three years to demonstrate the following criteria:

- Current ratio (current assets/ current liabilities) at least 1.0
- Debt to equity ratio less than or equal to 4.0 to 1.

(b) Pre-qualification requires a Dun and Bradstreet satisfactory overall rating of 3 with no adverse findings: Duns # _____

ONLY Businesses that are not rated by D&B must list ten construction material or equipment vendors/suppliers below. Three vendor/suppliers will be contacted to verify that the applicant business is currently paying in 90 days or less.

	Vendor/Supplier Company Name	Contact Name	Contact Phone #
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Provide a response to all questions. Attach additional sheet(s) of paper to this application as needed to respond fully to all questions.

Business Applicant Name _____ TIN _____

(c) Pre-qualification requires business credit lines with a minimum total of $1,000,000, with 50% unused/available. Provide details below for each line of credit, or loan provided by a lending institution. If none, please indicate.

Name and address of lending institution	Amount of Credit Line	% Credit Remaining

7. **Not Applicable**

8. **Safety:**

(a) Workers Compensation Experience Information: List the Interstate Workers Compensation Experience Modification Rate (EMR) for this business for the last three full years below:

Year	Workers Compensation Insurance Carrier	Policy Number	EMR
2003			
2002			
2001			

We require verification of your EMR. Please attach the endorsement page from your policy showing your EMR, or have your insurance carrier or broker provide this information on their letterhead. Verification Provided Yes _____ No _____

Provide a response to all questions. Attach additional sheet(s) of paper to this application as needed to respond fully to all questions.

Business Applicant Name _____ TIN _____

(b) **Workplace Injuries and Illnesses**

Provide the following information for the last three years (if none enter zero):	2003	2002	2001
A. Number of Fatalities (Attach description of Event(s))			
B. Number of cases that involved days away from work and or days of restricted work activity			
C. Number of cases involving Recordable cases without lost or restricted workdays			
D. Total OSHA Recordable Cases			
E. Total hours worked			

	Not Used

9. Not Applicable

10. Staffing Qualification:

As part of this pre-qualification application, complete the attached Team Structure Schedule and submit the completed form to URS along with this application.

Team Structure Schedule Submitted: Yes _____ No _____

Provide a response to all questions. Attach additional sheet(s) of paper to this application as needed to respond fully to all questions.

Business Applicant Name _____ TIN_____

11. Manpower: List projects where your average payroll or crew size exceeded 30 men within the last 3 years.

	Client	Project	Prime contractor or Subcontractor?	Average Crew Size	Client Reference Contact Name & Title	Reference Contact Telephone #
1	- -					( )
2	- -					( )
3	- -					( )
4	- -					( )
5	- -					( )

Provide a response to all questions. Attach additional sheet(s) of paper to this application as needed to respond fully to all questions.

Business Applicant Name _____ TIN _____

12. Current Projects: Provide information about five current contracts in the following chart.

	Client Company/Agency/Authority and Project Name	Prime contractor or Subcontractor?	Your Contract value $	Size / Square Footage	Client Reference Contact Name & Title	Reference Contact Telephone #
1	- -					( )
2	- -					( )
3	- -					( )
4	- -					( )
5	- -					( )

Provide a response to all questions. Attach additional sheet(s) of paper to this application as needed to respond fully to all questions.

Business Applicant Name _____ TIN_____

13. Current Backlog: List projects your firms has been awarded that have not yet started.

	Client	Project Name	Prime contractor or Subcontractor?	Your Contract value $ (round to closest $100K)	Anticipated Start Date	Scheduled Duration, Years
1						
2						
3						
4						
5						
6						
7						

Provide a response to all questions. Attach additional sheet(s) of paper to this application as needed to respond fully to all questions.

Business Applicant Name _____ TIN _____

14. Schedule Performance: List projects with aggressive/ expedited schedules which were completed on or ahead of time within the last 5 years.

	Client & Project Name	Prime contractor or Subcontractor?	Your Contract value $	Client Reference Contact Name & Title	Reference Contact Telephone #
1	- -				( )
2	- -				( )
3	- -				( )
4	- -				( )
5	- -				( )

Provide a response to all questions. Attach additional sheet(s) of paper to this application as needed to respond fully to all questions.

Business Applicant Name _____ TIN_____

15. Similar Completed Projects: Use this sheet to list at least 5 similar projects completed in the New York City area in the last 5 years that are similar in scope, specifically high rise scaffolding.

Name of the bid package for which this application is made: _____

	Client Company/Agency/Authority and Project Name	Prime contractor or Subcontractor?	Your Contract value $	Size / Square Footage	Client Reference Contact Name & Title	Reference Contact Telephone #
1	- -					( )
2	- -					( )
3	- -					( )
4	- -					( )
5	- -					( )

Provide a response to all questions. Attach additional sheet(s) of paper to this application as needed to respond fully to all questions.

Business Applicant Name _____ TIN _____

The following certification must be completed by an officer of the applicant firm.
A material false statement or omission made in connection with this application is sufficient cause for denial of the application or revocation of a prior approval thereby precluding the business applicant from performing work for URS either as prime contractor or subcontractor for a period of three years. In addition, such false submission may subject the person and/or entity making the false statement to criminal charges, including New York State Penal Law section 175.35 (offering a false statement for filing) and 210.40 (sworn false statement) and/or Title 18 U.S.C sections 1001 (false or fraudulent statement) and 1341 (mail fraud).

I, _____, being duly sworn, state that I am _____ of _____,
(Name, print) (Title) (Business Applicant name)
and that I have read and understood the questions contained in this application. I certify that to the best of my knowledge the information given in response to each question and the appendices is full, complete, and truthful. I acknowledge that URS may, by means it deems appropriate, determine the accuracy and truth of the statements made in the application. I recognize that all the information submitted is for the express purpose of inducing URS to pre-qualify a contractor and does not assure that it will be deemed qualified. I authorize URS to contact any entity named in the application for purposes of verifying the information supplied by the applicant.

_____ _____
(Signature) (Date)

Sworn to before me this _____ day of _____, 2005

_____
Notary Public

END OF BIDDER PRE-QUALIFICATION APPLICATION

Provide a response to all questions. Attach additional sheet(s) of paper to this application as needed to respond fully to all questions.

Team Structure Schedule

Project: LMDC - Deconstruction of Deutsche Bank Building, 130 Liberty Street, NY NY

Reference Bidder Pre-Qualification Application, page 4, item 10, "Staffing Qualifications"

Position	Name	Resume Attached-*for LMDC use*		
		yes	no	notes
Project Executive				
Project Manager				
Field Engineer				
Assistant Project Manager				
Project Superintendent				
Site Superintendent				
Office Engineer				
Office Administrator				
Community Liaison				
Site Safety Health Officer				
Regulatory Compliance Officer				
Waste Compliance Officer				
Project Monitor/Industrial Hygiene Technician				
Project Accountant				
Logistics Coordinator				
Projects Controls/Scheduling				
Purchasing Manager/Contracts Administrator				

>See attached "Staffing Qualifications" for job description and qualification requirements
>Provide the name of the individuals filling each position listed as they apply to this project.
>List additional positions as required
>Attach resume for each individual listed
>Add sheets if necessary

Deconstruction 130 Liberty Street
Staffing Qualifications

I. Staffing Needs – Job Descriptions/ Qualifications

A. **Project Executive** – responsible for overall management of the project.

1) Individual would perform the following tasks:
   a) Coordination and scheduling of all contractor activities;
   b) Resolution of work conflicts and contract change orders;
   c) Chairing weekly meetings with contractors and subcontractors;
   d) Approval of contractor invoices for payment;
   e) Report directly with client, attorneys, other key stakeholders on project status, issues, etc;
   f) Coordination and preparation of all required written reports;
   g) Coordination/interaction with local community groups, politicians, and regulatory agencies.

2) Qualifications:
   a) New York State licensed professional engineer (negotiable in lieu of extent of experience);
   b) Detailed knowledge of New York City construction regulations including New York City Building Code, New York City Department of Environmental Protection, and New York City Fire Department codes and permitting;
   c) Familiarity with NYS DEC, NYS DOH, NYS DOL, and US EPA regulatory programs and permitting;
   d) Minimum 20 years experience working on large scale New York City construction projects (>$20M) at various and increasing levels of responsibility;
   e) Minimum 10 years experience directly managing (technical and financial) large-scale New York City construction projects (>$40)
   f) Excellent verbal and written communication skills. Able to give presentations to major project stakeholders and the public.

B. **Field Engineers** (2) – responsible for field management of project.

1) Individual(s) would perform the following tasks:
   a) Oversee and manage all day to day contractor field activities;
   b) Coordinate directly with contractor's superintendents and foremen to ensure compliance with specifications, plans, and applicable regulations;
   c) Identify and correct deficiencies in contractor's work as they relate to specifications, plans, and regulations;
   d) Prepare daily reports describing contractor's activities; including manpower, equipment, and waste disposal;
   e) Coordinate with Site Safety Health Officer, Regulatory Compliance Officer and Project Executive to discuss and resolve job-related issues; and
   f) Attend job safety and progress meetings, as required

2) Qualifications:
   a) Undergraduate degree in engineering or construction management;
   b) Minimum of 5 years experience working as a construction manager in New York City with emphasis on environmental remediation;
   c) OSHA 40 hr HAZWOPER training.

C. **Site Superintendent** – responsible for all field supervision and control of the facility.

1) Individual would perform the following tasks:
   a) Responsible for management of site including site safety and security;
   b) Oversee and manage all day to day contractor field activities;
   c) Coordinate directly with contractor's superintendents and foremen to ensure compliance with specifications, plans, and applicable regulations;
   d) Prepare daily reports describing contractor's activities; including manpower, equipment, and waste disposal;
   e) Coordinate with Site Safety Health Officer, Regulatory Compliance Officer and Project Executive to discuss and resolve job-related issues;
   f) Hold regular job safety and progress meetings; and
   g) Coordination/interaction with local community.

2) Qualifications:
   a) Detailed knowledge of New York City construction regulations including New York City Building Code, New York City Department of Environmental Protection, and New York City Fire Department codes and permitting;
   b) Familiarity with NYS DEC, NYS DOH, NYS DOL, and US EPA regulatory programs and permitting;
   c) Minimum 20 years experience working on large scale New York City construction projects (>$20M) at various and increasing levels of responsibility;
   d) Minimum 10 years experience as Superintendent for large-scale New York City construction projects (>$20M).
   e) Licensed New York City Site Safety Manager;
   f) 40 Hr HAZWOPER trained, with current 8 hr refresher;
   g) Familiarity with New York City and New York State asbestos abatement regulations.

D. Community Liaison

1) Individual would perform the following tasks:
   a) Responsible for day to day communication with local community;
   b) Responsible for day to day coordination with adjacent projects;
   c) Establish Points of Contact/Responsibilities for Project
   d) Community Outreach/Newsletter

e) Coordinate Agency involvement with Community
f) Public Notification of work disruptions to residents, commuters, & business
g) Responsible for coordinating public relations issues and interaction with Lower Manhattan Construction Command Center

2) Qualifications:
   a) Detailed knowledge of New York City construction regulations including New York City Building Code, New York City Department of Environmental Protection, and New York City Fire Department codes and permitting;

E. **Site Safety Health Officer** – responsible for providing overall technical and administrative oversight of the health and safety program.

1) Individual would perform the following tasks:
   a) Review and approve contractor and subcontractor Health and Safety Plan (HASP) and any changes to the Plan;
   b) Direct and implement requirements of the HASP;
   c) Review and approve the NYCDOB Site Safety Plan, as required by Article 19 of the New York City Building Code;
   d) Coordinate with contractor supervisory and safety personnel, as needed, on matters regarding safety program compliance;
   e) Receive and maintain documentation from contractor field supervisors for all safety related matters, including accident record keeping, accident investigations, safety training and certifications;
   f) Attendance at weekly safety and planning meetings;
   g) Weekly formal and daily site inspections.

2) Qualifications:
   a) Licensed Certified Safety Professional (CSP) or Certified Industrial Hygienist (CIH);
   b) Licensed New York City Site Safety Manager;
   c) Minimum of 15 years experience as a safety officer on construction projects in New York City;
   d) 40 Hr HAZWOPER trained, with current 8 hr refresher;
   e) Familiarity with New York City and New York State asbestos abatement regulations.

F. **Regulatory Compliance Officer** – responsible for compliance with and preventing violations of federal, state, and local laws and regulations.

1) Individual will perform the following tasks:
   a) Review and approve site work plans, which will provide a listing of the specific regulations and permits (if applicable) for each work task;

b) Define and communicate upcoming regulatory compliance issues related to the planning of each project task;
c) Evaluate general regulatory compliance; assist in permit applications; manage waste shipping manifests and all related record-keeping;
d) Prepare and coordinate spill or release notifications to regulatory agencies, if required;
e) Evaluate regulatory non-compliance events to prevent these events in the future;
f) Chair periodic regulatory compliance meetings with the project team;
g) Arrange for periodic executive review meetings with the client and others to report the overall status of the compliance program.

2) Qualifications:
a) Undergraduate degree in engineering or sciences;
b) Knowledge of New York City, New York State, and federal regulations as they relate to the New York City construction environment including hazardous materials, asbestos, and DOT;
c) Minimum 20 years experience working in New York City managing construction, demolition, and/or remediation projects;
d) Extensive experience interacting with federal, state, and local regulators, including permit preparation.

G. Waste Compliance Officer

1) Individual(s) would perform the following tasks:
a) Oversee and monitor all waste removal from site;
b) Maintain all documentation related to waste removal and disposal such as waste manifests;
c) Ensure all trucks are properly labeled and maintained;
d) Work with Project Controls and Scheduling personnel to utilize GPS

2) Qualifications:
a) OSHA 40 hr HAZWOPER training;

H. **Project Monitors/Industrial Hygiene Technicians** – responsible for asbestos abatement oversight and air sampling. (1 – 10 required)

1) Individual(s) would perform the following tasks:
a) Oversee and monitor asbestos abatement work for compliance with applicable regulations;
b) Collect air samples as required by regulations and ambient air monitoring plans;
c) Document worker training, fit testing, medical clearances, and licenses indicating fitness to perform the work;
d) Coordinate with project team for planning and phasing of work.

2) Qualifications:
   a) Certified by NYSDOL as an air sampling technician or asbestos project monitor;
   b) OSHA 40 hr HAZWOPER training;
   c) Knowledge of and experience in sampling for airborne toxins such as metals, polychlorinated biphenyls, silicates, and respirable dust.

I. Project Accountant

1) Individual(s) would perform the following tasks:
   a) Responsible for all invoicing;
   b) Responsible for certified payrolls;
   c) Responsible for compliance with HUD Requirements;
   d) Establish budgets; maintain commitments; coordinate cost vs. schedule impacts; change order costs
   e) Certification of consultants and sub contractor's invoice and requisitions for payment

2) Qualifications:
   a) Undergraduate degree in business, accounting, engineering or construction management;
   b) Minimum of 5 years experience working as a project accountant.

J. Logistics Coordinator

1) Individual (s) would perform the following tasks
   a) Coordination of material delivery and waste removal
   b) Lead interaction with NYC DOT, NYS DOT and PANYNJ to implement Truck Traffic Plan
   c) Coordinate Utility work including, but not limited to, Utility cut-off service, temporary and emergency power
   d) Logistics layout and staging
   e) Communications lead on site movement and flow
   f) Establish phasing of work
   g) Implement Maintenance & Protection of Traffic Plan (MPT)
   h) Responsible for coordination meetings amongst neighboring projects

2) Qualifications
   a) Undergraduate degree in engineering or sciences;
   b) Knowledge of New York City, New York State, and federal regulations as they relate to the New York City construction environment including hazardous materials, asbestos, and DOT;
   c) Minimum 5 years experience working in New York City managing construction logistics;
   d) Extensive experience interacting with federal, state, and local regulators, including permit preparation.

K. Project Controls/Scheduling

1) Individual (s) would perform the following tasks
   a) Responsible for projects technical support including IT and data management
   b) Establish and Monitor/track Project Schedule
   c) Document and project control and reporting requirement
   d) Coordinate permitting process and track insurance documents amongst other requirements
   e) Assist with payment procedures
   f) Utilization of GPS for waste removal on trucks
   g) Reporting on control and scheduling issues and resolutions
   h) Sub contractor coordination
   i) Monitor performance of Sub contractors, cost control, scheduling and schedule control tasks for compliance with contract requirements, project procedures, and work instructions;
   j) Identify and analyze deficiencies, and recommend solutions and corrective actions

2) Qualifications
   a) Undergraduate degree in engineering, construction management or sciences;
   b) Knowledge of New York City, New York State, and federal regulations as they relate to the New York City construction environment including hazardous materials, asbestos, and DOT;
   c) Minimum 10 years experience working in New York City managing Project Controls and Scheduling;
   d) Extensive experience project software, scheduling tools, CPM, and database management

L. Purchasing Manager/Contracts Administrator

1) Individual will perform the following tasks:
   a) Responsible for purchasing materials, goods, services;
   b) Managing and oversight of contractor's and sub contractor's contract requirements
   c) Establish Supplier Diversity requirements
   d) Coordinate Workforce Development and Diversity training and administration
   e) Responsible for Minority and Women-Business Enterprise compliance and reporting

2) Qualifications
   a) Undergraduate degree in business or related field;
   b) Experience managing large scale construction contracts;

c) Minimum 5 years experience working in workforce development such as minority and women-business participation (similar experiences may be considered)
d) Experience in construction purchasing and managing supplier relations

M. Senior Project Manager/Project Director

1) Individual will perform the following tasks
   a) Responsible for entire staff and subcontractors
   b) Daily management of all operations
   c) Interface with LMDC, and all agencies
   d) Coordination of all correspondence, submissions, pay requisitions and documents
   e) Determine delegation of work tasks to the entire staff
   f) Main contact for all tasks and services
   g) Reports status of project to LMDC
   h) Attends all meetings
   i) Reports to the Project Executive

2) Qualifications
   a) Management of projects in excess $50 million, for a minimum of 5 years
   b) Minimum one large NYC facility project, or high profile NYC type project in excess of $50 million
   c) Familiar with NYC construction, trade labor agreements, and agency coordination
   d) Experience on Demolition projects in NYC
   e) Experience on asbestos/environmental related projects in NYC
   f) Excellent verbal and written communication skills
   g) Past experience managing multiple contractors

N. Project Manager/Assistant Project Manager

1) Individual will perform the following tasks
   a) Management of daily activities for each trade
   b) Responsible for all contract management tasks of the subcontractors
   c) Requisition review and approval
   d) Insure compliance with all contract requirements for each subcontractor
   e) Management of labor and staffing
   f) Mange scheduling and coordination between subcontractors
   g) Administer all sub contract requirements
   h) Report to Senior Project Manager/Project Director
   i) Coordinate all activities with agencies and LMDC as required for their work

2) Qualifications:
   a) Management of projects in excess $20 million for a minimum of 5 years
   b) Detailed knowledge of New York City construction regulations including New York City Building Code, New York City Department of

Environmental Protection, and New York City Fire Department codes and permitting;

c) Experience on Demolition projects in NYC
d) Experience on asbestos/environmental related projects in NYC
e) Familiarity with NYS DEC, NYS DOH, NYS DOL, and US EPA regulatory programs and permitting;
f) Excellent verbal and written communication skills.

TRADE AGREEMENT

by and between

LOWER MANHATTAN DEVELOPMENT CORPORATION

and

[_____]

for the
EXTERIOR SCAFFOLDING
in connection with the deconstruction of
130 Liberty Street
New York, NY

dated as of

_____ ___, 2005

and

GENERAL CONDITIONS

TRADE: EXTERIOR SCAFFOLDING

TRADE AGREEMENT (the "Trade Agreement") dated as of _____ ___, 2005 by and between LOWER MANHATTAN DEVELOPMENT CORPORATION a subsidiary of Empire State Development Corporation, with offices at One Liberty Plaza (165 Broadway), New York, NY 10006 ("LMDC") and [_____], a _____ [insert type of entity/state of organization], with offices at _____ ("Contractor").

Introductory Statement

This Trade Agreement and the accompanying General Conditions (together with the Annexes, Schedules and Exhibits, the "Contract") covers the planning and erection of exterior scaffolding ("Scaffolding" or "scaffolding") in connection with the deconstruction of the building and structures (the "Project") located at 130 Liberty Street, New York, New York (defined below as the "Building" or "130 Liberty Street").

The Building was substantially damaged on September 11, 2001 and LMDC acquired the Building from its former owner, Deutsche Bank AG ("DB") on August 31, 2004.

After LMDC acquired the Building, LMDC caused an environmental characterization and follow-up testing of the Building to be performed. These investigations disclosed significant quantities of Hazardous Materials, including ACM. In consequence, the Hazardous Materials need to be removed from the Building in accordance with all applicable Legal Requirements—including all requirements of The City of New York (sometimes the "City"), the State of New York, and the Federal government including the U.S. Environmental Protection Agency for the abatement and removal of all interior materials and deconstruction of a building with internal and exterior ACM. After the Hazardous Materials in the Building have been removed (which may occur in phases by blocks of floors), LMDC desires to deconstruct the Building to prepare for future redevelopment of the site.

LMDC expects to enter into one or more agreements with other contractors for the abatement and removal of all interior materials and deconstruction of the Building (although LMDC has not yet selected any contractor for these tasks). Preparatory to, and as an essential part of, such activities, LMDC needs to have scaffolding erected on the exterior of the Building. Contractor will plan, engineer, and erect such scaffolding pursuant to this Trade Agreement. LMDC may (but will not be required to) assign this Trade Agreement to the contractor responsible for deconstruction of the Building as permitted under the Contract Documents (including Schedule A to the General Conditions).

Contractor has advised LMDC that Contractor is experienced and properly qualified and desires to perform and finish certain services in connection with the Project.

This Contract is for exterior scaffolding planning, engineering, furnishing, and installation, and all other Work as referenced in the Scope of Work and as otherwise described in the Specifications, and any other matters required of Contractor under the Contract Documents.

Contractor has agreed to complete the design, engineering, constructing, and erection of the scaffolding under this Contract on or before the Erection Completion Date, subject to extensions of time for Excusable Delays.

Contractor shall bear the risk without extra compensation of all conditions on the Project Site and on the exterior and interior of the Building, whether foreseeable or Unforeseeable Conditions. Contractor shall also be responsible for all tie-ins of the scaffolding structure to the Building and shall bear the risk of any Unforeseeable Conditions related to same. Contractor shall also bear the risk of any and all environmental conditions encountered while performing the Work, whether in connection with tie-ins or

otherwise. Consequently, Contractor must have all necessary certifications for the performance of any environmental remediation work or other Work associated with all phases of the Contractor's Work, including the erection of the scaffolding.

Contractor will bear the risk without extra compensation of all delays in the Work, foreseeable or unforeseeable, but will be granted extensions of time, in accordance with and subject to the procedures set forth in this Contract, for Excusable Delays. Once the scaffolding has been constructed and erected pursuant to the Contract Documents, Contractor will receive a rental fee as specified in the Contract Documents.

This Introductory Statement forms part of the Contract.

NOW, THEREFORE, in consideration of the mutual promises in this Contract, and subject to the terms of this Contract and intending to be legally bound hereby, Contractor and LMDC agree to keep and perform their respective obligations in and under this Contract, which incorporates and consists of all the terms, covenants, conditions, and provisions listed in the following Table of Contents, the General Conditions and all of the Annexes, Schedules and Exhibits attached thereto.

[SIGNATURE PAGE FOLLOWS THIS PAGE]

IN WITNESS WHEREOF, Contractor and LMDC have executed this Trade Agreement as of the date first above written.

LOWER MANHATTAN DEVELOPMENT CORPORATION

By: _____
Name:
Title:

[Contractor]

By: _____
Name:
Title:

TRADE AGREEMENT

TABLE OF CONTENTS

1. GENERAL CONDITIONS; CONTRACT DOCUMENTS

The following words and phrases have the following meanings in this Contract:

"Contract" or "Contract Documents" means all of the following:

(a) this Trade Agreement, together with the Annexes hereto;

(b) the General Conditions, together with the Schedules and Exhibits attached thereto; and

(c) the Scope of Work (attached hereto as Annex "6");

(c) the Specifications.

"General Conditions" means the General Conditions for all Trade Contracts attached hereto.

"Owner's Representative" means URS Corporation (or a successor firm designated by LMDC from time to time to provide owner's representation/project representation services).

"Specifications" means the Specifications for this Contract, which form part of, and are incorporated in this Agreement, including Volumes I (General Requirements) and II (Technical Specifications), and all schedules, exhibits, annexes, attachments and other documents specified in any of the foregoing as being part of, or incorporated in, the Specifications.

Words and phrases defined elsewhere in this Trade Agreement, in the General Conditions, or in other documents forming part of the Contract have the same meaning herein.

Annexes "1" through "6" attached hereto are part of this Trade Agreement as though fully set forth herein.

2. PRIORITY OF DOCUMENTS

Notwithstanding anything to the contrary in any of the Contract Documents, express or implied, in case of any conflict or inconsistency between or among any provisions or requirements of any of the Contract Documents, the provisions of this Trade Agreement, then the General Conditions, then the Specifications will control, in that order; and, subject to the foregoing, within the Specifications the documents forming part thereof shall have the priority (if any) set forth in the Specifications. If any of the Contract Documents conflict with or contradict any Legal Requirement (including any variances issued by Governmental Authorities), the Deconstruction Plan, or any other plan approved by an applicable Governmental Authority, in each case as same may be modified, the most stringent requirements shall prevail.

3. THE WORK

Upon and subject to the terms and conditions of the Contract Documents, Contractor agrees to do and perform, and furnish the Work set forth in and/or required under, and all in strict accordance with, the Contract Documents and any future changes therein; and Contractor further agrees to assume and perform all other duties and obligations imposed upon Contractor by this Contract. All Work must be in full compliance with all Legal Requirements (which includes any variances and permits issued by Governmental Authorities).

4. LUMP SUM

Upon and subject to the terms and conditions of this Contract, LMDC agrees to pay to Contractor, and Contractor agrees to accept from LMDC, in full consideration for the performance by Contractor of all Work and of all Contractor's duties and obligations of every kind whatsoever under this Contract and the whole thereof, a compensation of _____ dollars ($_____) (throughout this Contract called the "Lump Sum"), and such compensation only, subject only to the express provisions of this Contract specifically setting forth actual, defined additions to or deductions from such compensation.

The enumeration in the Contract Documents of particular things to be furnished or done at Contractor's expense, or without cost or expense to LMDC, or without additional compensation to Contractor shall not be deemed to imply that only things of a nature similar to those enumerated shall be so furnished and done; but, notwithstanding whatever obstacles or Unforeseeable Conditions may arise or be encountered, Contractor shall perform all Work as required under this Contract for the Lump Sum without other compensation other than payments for Extra Work as specifically provided in this Contract.

5. PERFORMANCE AND PAYMENT BONDS

Simultaneously with the signing of this Contract, Contractor has delivered to LMDC bonds issued by _____ for the faithful performance of all obligations imposed upon Contractor by the Contract (the "Performance Bond") and also for the payment of all lawful claims of subcontractors, materialmen and workers arising out of the performance of the Contract (the "Payment Bond"). Such bonds are in the form attached to the General Conditions as Exhibit "1" (both such bonds sometimes referred to together as the "Bonds"), and are each in a penal sum equal to the Lump Sum. The Bonds shall form a part of this Contract as though herein set forth in full.

If at any time and for any reason the Bonds shall cease to be adequate security to LMDC by reason of a reduction in the surety's Moody's or Standard & Poor's rating or by reason of the surety's insolvency, Contractor shall, within five days after notice from LMDC so to do, substitute new Bonds in such form and sum and signed by such other sureties as may be necessary in the opinion of LMDC to constitute adequate security.

6. TIME FOR COMPLETION

Contractor shall complete the performance of all Work under this Contract on or before the applicable milestone dates, and shall cause the scaffolding to be fully installed and erected prior to the Erection Completion Date, time being of the essence in each case. Contractor's obligations for the performance and completion of the Work within the time or times provided for in this Contract are of the essence of this Contract. Contractor guarantees that Contractor can and will complete the performance of the Work within the time hereinbefore stipulated or within such time or times, as extended in accordance with the Article 12 of the General Conditions.

7. SCHEDULE OF VALUES; LABOR RATES

The Schedule of Values for Contractor's work is attached hereto as Annex "2". Contractor's labor rates applicable for any and all Extra Work if, as, and when required under this Contract are attached hereto as Annex "3".

8. SERVICE OF NOTICES

All notices, requests, demands, elections, consents, and other communications of any kind which may or must be given under this Contract must be in writing (each, a "Notice"), delivered to the parties as follows:

A. If to LMDC, to its designated representative at the Site or at the following address:

Lower Manhattan Development Corporation
One Liberty Plaza (165 Broadway) – 20th Floor
New York, New York 10006
Fax: (212) 962-2431
Attention: Luis Mendes
Director of Construction

With a copy to Owner's Representative as follows:

URS Corporation – Care of LMDC
One Liberty Plaza (165 Broadway) – 20th Floor
New York, New York 10006
Fax: (212) 962-2431
Attention: Jamie Daniels
Project Manager

B. If to Contractor, at the following address:

[Contractor to Provide]

Any notice required by this Contract to be given or made within a specified period of time, or on or before a date certain, shall be deemed given or made only if sent (a) by hand delivery evidenced by written receipt, or (b) by registered mail, return receipt requested, and postage and registry fees prepaid. Delivery "by hand" includes commercial express or courier service or overnight delivery service. All notices shall be deemed given when received (or the date of attempted delivery if refused).

9. AUTHORIZED REPRESENTATIVES; KEY PERSONNEL

The Contractor, the authorized representatives and the key personnel of the Contractor are identified in Annex "4" attached hereto.

LMDC's authorized representative is Stefan Pryor. LMDC's project manager is Luis Mendes.

Each party shall be protected fully in relying upon, or dealing with, the authorized representatives of the other party. Additional or replacement authorized representatives may be added or replaced by Notice to the other party.

ANNEX "1"

LIST OF PRE-APPROVED SUBCONTRACTORS

The following subcontractors of Contractor have been approved for Work under this Contract as of the date of signing of this Contract:

[To be proposed by Contractor and, subject to LMDC's approval, inserted at signing]

ANNEX "2"

SCHEDULE OF VALUES

[To be proposed by Contractor and, subject to LMDC's approval, inserted at signing]

ANNEX "3"

LABOR RATES

[To be proposed by Contractor and, subject to LMDC's approval, inserted at signing]

ANNEX "4"

AUTHORIZED REPRESENTATIVES; KEY PERSONNEL

[To be proposed by Contractor in Bid Form, and, subject to LMDC's approval, inserted at signing]

ANNEX "5"

CONTRACT: EXTERNAL SCAFFOLDING

CONTRACT ASSUMPTIONS

The matters set forth below are the "Contract Assumptions" for purposes of the foregoing Contract. These Contract Assumptions are intended to supplement, and not to limit, other provisions of the Contract dealing with the same or similar topics, so that all provisions of the Contract are intended to be complementary and cumulative (and none exclusive):

1. Contractor assumes the risk of any and all potential ACM, Hazardous Materials, or COPC excursions or exceedances occurring during this Project, and their impacts during the Project, whether by delay or otherwise.

2. Contractor specifically assumes the risk of all regulatory and other Governmental Authority (if any) delays.

3. Contractor is responsible for any delay related to failure to sufficiently coordinate with LMDC's other contractors or consultants regarding the Project.

4. No increase in the Lump Sum shall be requested by Contractor or provided by LMDC by reason of any ACM and/or other Hazardous Materials or the types, locations, or amounts thereof, or any matter pertaining thereto.

5. Contractor accepts the conditions in the Building and otherwise at the construction site whether foreseeable conditions or Unforeseeable Conditions, as they exist or may eventually be found to exist and warrants and represents that Contractor can and will perform the Contract under such conditions and that all materials, equipment, labor and other facilities required because of any conditions (physical or otherwise) shall be wholly at Contractor's own cost and expense, anything in this Contract to the contrary notwithstanding.

6. In coordination with other contractors, at Contractor's expense, Contractor shall be permitted non-exclusive use of the existing equipment (elevators, etc.) and utilities (electrical power, water, etc.) in the Building, as set forth in the Specifications, provided, however, that LMDC does not make any representation as to the condition or adequacy of the foregoing for the Contractor's purposes.

7. Contractor understands and acknowledges that the Building currently contains and/or may contain:

   A. Hazardous Materials requiring remediation under applicable Legal Requirements; and/or

   B. Hazardous levels of various contaminants, including, but not limited to, ACM, silica, polycyclic aromatic hydrocarbons, polynuclear aromatic hydrocarbons, dioxin, polychlorinated biphenyls, barium, beryllium, cadmium, chromium, copper, lead, manganese, nickel, zinc, and mercury.

LMDC makes no representations as to potential health or exposure hazards present at the Site, the Building and/or the subsurface conditions at the Site; and Contractor assumes responsibility for the same.

8. Contractor assumes the risk of all time delays and cost impacts due to acquiring or drafting of any plans, drawings, or other materials required of Contractor under this Contract and also any delays incurred by Contractor in connection with obtaining, or failing to obtain, any and all governmental permits, approvals and/or sign-offs for which Contractor is responsible under this Contract.

9. No requests for any variance in Legal Requirements necessary or desirable to implement the Work or otherwise may be requested by the Contractor without the prior written approval of the LMDC. LMDC has the sole and exclusive authority to determine whether to request any variance and to determine the scope and nature of any such variance requests. LMDC is under no obligation to request any variance and there shall be no increase in the Lump Sum as a result of any variance or as a result of LMDC's decision not to request any variance.

ANNEX "6"

SCOPE OF WORK FOR SCAFFOLDING CONTRACTOR

[URS to insert]

ANNEX "6"

SCOPE OF WORK FOR SCAFFOLDING CONTRACTOR

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
- 1.1 Summary
- 1.2 Work Covered by Contract Documents
  - A. Project Identification
  - B. Owner
  - C. Scope of Work – Scaffolding Contractor
    1. General Overview
    2. Contract Assumptions
    3. Health and Safety Requirements
    4. Site Security
    5. Abatement and Removal of Asbestos and Chemicals of Possible Concern
    6. Labor Requirements
- 1.3 Type of Contract
- 1.4 Work Programs
- 1.5 Work Under Other Contracts
- 1.6 Use of Premises
- 1.7 Work Restrictions
- 1.8 Specifications Conventions
- 2 [Not Used]
- 3.1 Protection
- 3.2 Existing Exterior Netting Removal
- 3.3 Exterior Building Washdown

B. BACKGROUND

On September 11, 2001, the "Building" was severely damaged when debris from the World Trade Center ("WTC") broke hundreds of windows and cut a fifteen story gash in the north façade of the Building. Since September 11, 2001, the Building has been unoccupied. The current owner of the Building, Lower Manhattan Development Corporation ("LMDC"), plans to clean and deconstruct the Building as part of the redevelopment and rebuilding of the larger WTC Site. Currently, plans for the Site include underground truck security and bus parking away from the locations of the former WTC Towers 1 and 2 and a proposed fifth office tower which will reduce the building density on the WTC Site and create approximately 30,000 square feet of open space for public use.

The events of September 11, 2001, which caused the destruction of the WTC Towers, physically destroyed portions of the interior and exterior of the Building. The massive debris generated from the collapse of the WTC South Tower broke approximately 1,500 windows and opened a gash ("Gash Area") in the Building's exterior, thereby exposing portions of the interior of the north side of the Building. The debris demolished the plaza in front of the Building, thus exposing the basement and sub-basement (Basement A and Basement B) areas and rupturing a diesel

fuel tank located in the basement, the contents of which burned. The ruptured fuel tank caused the concrete in the basement levels to become saturated with Diesel Range Organics ("DROs"), as was discovered during studies conducted by then-owner Deutsche Bank. In addition, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. The Gash Area and broken windows exposed the interior of the Building to the elements, which may have caused some further impacts after the initial exposures and events of September 11, 2001.

Subsequent to September 11, 2001, operations were undertaken to clear debris from the plaza, lobby, and interior spaces in the Gash Area. A porous geosynthetic mesh or "netting" was hung on the outside of the Building for further protection and safety. The immediate Gash Area was cleaned in accordance with New York City Department of Environmental Protection ("NYCDEP") and New York City Department of Health ("NYCDOH") protocols to permit the construction of columns, beams, and floor decks to stabilize the Gash Area. Once the initial cleaning and stabilization measures were in place, office furniture, equipment, and other non-attached items in the Building were removed and disposed of by Deutsche Bank.

LMDC identified contaminants in the Building in the September 14, 2004 Initial Building Characterization Study Report[1] and the Supplemental Characterizations[2] published in January 2005 (collectively, "LMDC Characterization Studies"). These LMDC Characterization Studies analyzed for five Contaminants of Potential Concern ("COPCs") designated by the United States Environmental Protection Agency ("EPA") as being associated with WTC dust (asbestos, dioxins, lead, polycyclic aromatic hydrocarbons ("PAHs"), and crystalline silica), as well as other contaminants suspected of being present in the Building, including polychlorinated biphenyls ("PCBs") and heavy metals (barium, beryllium, cadmium, chromium, copper, manganese, mercury, nickel, and zinc).

The Building is an office building comprised of 42 stories. The Building measures approximately 180' x 180' and 535' in height. It comprises approximately 1.5 million square feet. The exterior skin of the Building is a glass and aluminum curtain-wall framework. The curtain wall mullions are mechanically attached to the Building's columns and floors at each floor level. The typical building floor slabs are constructed with corrugated metal decking with firespray and a poured concrete slab on top. Typical floors are rated 100psf for live load. The Building has two (2) mechanical floors, located on the 5th floor and 38th/39th floors. Mechanical floors load ratings are usually higher than on typical floors. The building's vertical transportation was comprised of twenty-nine (29) elevators:

- Eight (8) low-rise cares, traveling from the 3rd floor lobby to the 16th floor (stopping at all floors).
- Eight (8) mid-rise cars, traveling from the 3rd floor lobby to the 28th floor (stopping at 3 and 17-28),
- Seven (7) high-rise cars, traveling from the 3rd floor lobby to the 38th floor (stopping at 3 and 28-38).
- One (1) car traveling from basement level B to 39th floor.
- Two (2) cars traveling from basement level B to 38th floor.
- Three (3) special service elevators serving the lower 3-5 floors.

[1] 130 Liberty Street Initial Building Characterization Study Report, The Louis Berger Group, Inc., September 14, 2004.

[2] 130 Liberty Street Supplemental Characterizations, TRC Environmental Corporation., issued as multiple reports in 2005

The Building has two (2) below grade basement areas, Cellar Level "B", and Cellar Level "A". The below-grade construction is build as a "bathtub" to resist a hydrostatic head; the foundation is a concrete mat on caissons. The basement Level "B" slab is to remain intact throughout and after the Deconstruction. There is a tunnel for the 1-9 subway, which runs under Greenwich Street and adjoins the Building with passive vents located in the sidewalk. A fan plant for forced ventilation of the subway tunnel is under Albany Street alongside the South Plaza. This runs approximately the length of Albany Street on the South Side sidewalk.

As part of the WTC Rebuilding Plan, the Building will be deconstructed down to the top of the foundation walls, leaving the basement Cellar "B" slab intact. The Building will be deconstructed **by the Deconstruction Contractor**, in pieces as a safety precaution and will not include the use of explosion/implosion devices. **A complete scaffolding of the Building on all elevations from top to bottom, will be required for this Project, and will be provided by the Scaffolding Contractor**.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: 130 Liberty Street Deconstruction

1. Project Location: 130 Liberty Street, New York, NY

B. Owner: Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor
New York, NY 10006

1. Owner's Authorized Representative: URS Corporation – New York
One Penn Plaza, Suite 610
New York, NY 10119

C. SCOPE OF WORK – SCAFFOLDING CONTRACTOR

1. GENERAL OVERVIEW

The Scope of Work ("SOW") sets forth a summary of the Work required to be completed by the Scaffolding Contractor in connection with the deconstruction of the Building, which was damaged on September 11, 2001.

The Contractor shall at all times comply with, and cause all persons working or otherwise present at or about the Project to comply with, all Legal Requirements applicable to the Project and all relevant portions of the Deconstruction Plan for 130 Liberty Street as it may be amended from time to time. On May 12, 2005, LMDC submitted four sections of the revised draft Phase I Deconstruction Plan ("Draft Deconstruction Plan") to various Governmental Agencies for review, direction, and approval. LMDC submitted Section 1- Waste Management Plan, Section 2- Ambient Air Monitoring Program, Section 3- Emergency Action Plan, and Section 5- Health and Safety Plan. LMDC will be submitting Section 4, the Asbestos and COPC Abatement and Removal Plan, shortly. Currently submitted portions of the Draft Deconstruction Plan are available on LMDC's website:
http://www.renewnyc.com/plan_des_dev/130liberty/deconstruction_plan.asp

Once all or any portion of the Draft Deconstruction Plan is approved by the applicable Governmental Authorities, the approved portion of the Draft Deconstruction Plan becomes one of the Legal Requirements applicable to this Project. The Contractor, all subcontractors, and any others at or about the Project Site must comply at all times with all approved portions of the Deconstruction Plan.

Any and all changes to the Draft Deconstruction Plan, or any approved portions thereof, require LMDC's advance written permission and the approval of the applicable Governmental Authorities. No such changes may be requested without LMDC's advance consent and written approval.

a. In addition to providing Exterior Pipe Scaffolding, the Scaffolding Contractor will also be responsible for providing One (1) two-car hoist located on the Albany Street Elevation, the removal of the existing mesh netting, and the exterior washdown of the building (See Specification Section 01100S for designation of Scope of Work Tasks).

b. Installation and erection of the Scaffold and Hoist(s) will require an Asbestos Licensed Contractor with Certified Asbestos Handlers to execute any netting removal, building exterior washdown, drilling, connections, anchoring, or penetrations into the building, either exterior or interior (i.e. Curtain Wall, Glass, Spandrel Beams, Columns, Floor Slabs, Metal Decking, etc., and all other components of the building).

c. Scaffolding Contractor will be required to provide access points into the building, from the scaffold and or the hoist at all floors, and associated Asbestos Decontamination Vestibules for entry into the building.

d. All Scaffold and Hoist connection points shall be identified in the "Project Approach and Methodology" submitted with the Contractor's bid. Scaffolding Contractor is advised to carefully develop the connection plan, as all costs for relocation of connection points, to facilitate the deconstruction of the building, will be the responsibility of the scaffolding contractor.

e. **Alterations**
    i. Alterations to the Scaffold will be the responsibility of the Deconstruction Contractor, including PE Sign-off for same.
    ii. Dismantling (and final cleaning) of the Scaffold will be the responsibility of the Deconstruction Contractor.
    iii. Dismantling and removal of the hoist will be the responsibility of the Scaffolding Contractor.
    iv. Alterations to the hoist will be the responsibility of the Scaffolding Contractor, including PE Sign-off for same.

f. The existing exterior netting has been **impacted by WTC dust and must be treated** as ACM and therefore shall be removed and disposed of as ACM by the Scaffolding Contractor.

g. The Existing exterior and interior of the building has been **impacted by WTC dust and must be treated** as an Asbestos Containing Material and therefore building related waste generated by the Scaffold work shall be handled, managed and disposed of as ACM by the Scaffolding Contractor.

h. All scaffolding components including construction netting, planking, supports, outriggers, protective platforms, etc., shall be thoroughly cleaned and dismantled by the Deconstruction Contractor. **Scaffold Contractor to provide all labor and trucking to remove Scaffold Components from the job site**. Scaffolding Contractor to coordinate with Deconstruction Contractor.

i. The Lump Sum includes One (1) Hoist located on the Albany Street Elevation. Should additional hoists be required at alternate locations, pricing will be as identified on the Contractor's bid form for Additional Hoists. Hoist is to have 2-cars, one for material, and one for personnel.

j. Contractor shall furnish and install new Sidewalk Bridging along the entire façade at Greenwich Street, Albany Street and Washington Street so as to comply with the requirements of Subchapter 19 of the NYC Building Code for Safety of Public and Property During Construction Operations.

k. LMDC shall cause the removal of currently existing Sidewalk Bridging (at Washington Street and Greenwich Street) to be performed under separate contract and this will be coordinated with the Scaffolding Contractor prior to erection of new bridging.

l. All Sidewalk Bridges will be provided and maintained by the Scaffolding Contractor, including Sidewalk Bridging Lighting.

m. Scaffolding Contractor will be required to maintain safety of all building façade components during Scaffold, Hoist, and Sidewalk Bridging erection, including securing broken glass and aluminum curtain wall, and repairs to the existing netting as required, **until completion/ acceptance of the Scaffold, Hoist, and Sidewalk Bridging erection, at which time these responsibilities will be then transferred to the Deconstruction Contractor.**

n. It is anticipated that needle beams will be required to support the scaffold system on the North Elevation starting at the 2nd Floor.

o. LMDC is engaging the Scaffolding Contractor to perform the Work summarized in this SOW and more particularly set forth in the Specifications Volumes I & II, in order to create a site ready for Deconstruction and subsequent redevelopment. The Scaffolding Contractor shall be responsible for all necessary and/or desirable means and methods to accomplish the intended purpose, whether or not specific procedures or responsibilities are set forth in the SOW or in the Specifications.

2. CONTRACT ASSUMPTIONS

This SOW is based on the following Contract assumptions.

1. In coordination with other contractors, at Contractor's expense, Contractor shall be permitted non-exclusive use of the existing equipment (elevators, etc.) and utilities (electrical power, water, etc.) in the Building, as set forth in the Specifications, provided, however, that LMDC does not make any representation as to the condition or adequacy of the foregoing for the Contractor's purposes.

2. Work under this SOW will be performed during Normal Working Hours. Should work be required after Normal Working Hours, an after hours work permit will be obtained. Any and all associated costs for after hours work, including Owner's and Owner's Authorized Representative expenses, Operating Engineers, Teamsters, Electricians, Shop Stewards, Inspectors, etc., will be borne by the Scaffolding Contractor.

3. These Contract assumptions are intended to supplement, and not to limit, other provisions of the contract dealing with same or similar topics, so that all of the provisions of the contract are intended to be complimentary and cumulative (and none exclusive). See Trade Agreement Annex – 5.

4. HEALTH AND SAFETY REQUIREMENTS

The Scaffolding Contractor shall be responsible for compliance with all applicable codes, statutes and regulations of the City and State of New York, and the United States, including, without limitation, the U.S. Department of Labor-Occupational Safety and Health Administration (OSHA), the New York State Department of Labor (NYDOL), and any environmental agencies having jurisdiction. Scaffolding Contractor shall ensure that the methods of performing the work do not involve undue danger to the personnel employed thereon, the public, and public or private property. Should charges of violation of any of the above be issued to the Contractor during the performance of the Work, a copy of each charge and resolution thereof shall immediately be forwarded to the Owner. Scaffolding Contractor shall be responsible for all fines, penalties and delays resulting from failure to meet this requirement.

The Scaffolding Contractor shall at all times comply with, and cause all persons working or otherwise present at or about the Project to comply with, all health and safety requirements related to the Project, including but not limited to all procedures to ensure compliance with applicable Legal Requirements, including requirements and protocols established by the Occupational Safety and Health Administration (OSHA); the National Institute of Occupational Safety and Health (NIOSH); the United States Environmental Protection Agency (USEPA); the New York State Department of Conservation (NYSDEC); the State of New York, New York State Department of Labor (NYSDOL); the New York City Department of Environmental Protection (NYCDEP); and the City of New York.

Compliance with a formal health a safety plan is required due to structural and environmental damage suffered by the Building on September 11, 2001, hazards associated with the Building's current condition and anticipated deconstruction activities. The current health and safety plan for the Project, entitled the "Site Specific Health and Safety Plan For 130 Liberty Street" was prepared for LMDC by TRC Environmental Corporation in August 2004 ("Current HASP"). The Contractor shall develop and implement his own Health and Safety Plan that at all times complies with, and cause all persons working or otherwise present at or about the Project to comply with, the Current HASP.

LMDC has proposed to modify the Current HASP. In May 2005 LMDC released a document entitled "Health and Safety Plan for the 130 Liberty Street Building Phase I Deconstruction Project" ("Proposed HASP") (copy available on LMDC's website). Once the Proposed HASP is approved by the applicable Governmental Authorities as part of the Phase I Deconstruction Plan, the requirements outlined in the Proposed HASP, as and if approved, will supersede and replace the Current HASP.

Any and all changes to the Current or Proposed HASP require LMDC's advance written permission and the approval of the applicable Governmental Authorities. Moreover, no changes to the Current or Proposed HASP may be proposed or made if they render the protections less stringent than the Current HASP. Nevertheless, the Scaffold Contractor shall be solely responsible for identifying health and safety requirements for his/her employees, and for ensuring the health and safety of his/her employees and the public, which could potentially be impacted by the work of the Scaffolding Contractor.

The Contactor shall create, issue, and implement a Site Plan, and MTA Influence Line Plan, and any other plans as requested by any and all regulatory agencies for this Contract, signed by a Professional Engineer and subject to LMDC's review.

5. SITE SECURITY

Site security precautions shall include, but not be limited to the provision and maintenance of fencing and/or barriers, gates to protect the Contractor's work, and securing access to all Sidewalk Bridging, Scaffolding, and Hoist components.

6. Abatement and Removal of Asbestos and Contaminants of Potential Concern

The **Deconstruction Contractor** shall perform the abatement and removal of ACM and contaminants of potential concern (COPC) from the building with the exception of Exterior Netting Removal, Exterior Building Washdown, and Abatement associated with penetrations/ tie-in locations for scaffold and hoist(s), which will be performed by the **Scaffolding Contractor.**

7. LABOR REQUIREMENTS

1. This Contractor shall be responsible for all costs associated with labor required by collective bargaining agreement within the NYC area as stipulated through the trade associations or unions that have jurisdiction rights to this project. This shall include all overtime, shift time, and differential costs associated with each trade.

2. Labor requirements for this project will include, but not be limited to the following:

    a. Teamsters
    b. Operating Engineers
    c. Master Mechanics
    d. Shop Stewards
    e. Electricians
    f. Elevator Operators
    g. Hoist Operators

3. All costs associated with temporary facilities, communications, cell phones, offices, trailers, etc. shall be the responsibility of this Contractor.

4. This Contractor shall be responsible for all labor harmony and associated costs to maintain proper labor jurisdiction on the trades performing the work. Contractor is advised that they must maintain labor harmony throughout the duration of the

project. All labor disputes, slowdowns, strikes and/or sympathy actions will be the sole responsibility of the contractor to resolve in order to maintain labor harmony.

All costs, delays and scheduling impacts associates with any labor dispute that arises from such action or inaction will be borne by the contractor causing such disharmony in labor.

The contractor causing disharmony in labor will also be responsible for all costs, damages and scheduling impacts which affect and disrupt the other contractors as well as LMDC, and its agents.

It will be the contractor's responsibility to resolve all labor disputes immediately. Failure to resolve such incidents action and inactions which obstruct the work and impact the project schedule shall be considered a breach of contract which may result in termination as per the conditions set forth in this Contract.

1.3 TYPE OF CONTRACT

A. The overall Deconstruction Project will be performed under a single prime contract for Environmental/Deconstruction (Separate Contract), and a single prime contract for Scaffolding/ Hoisting (This Contract). (See Scope of Work Schedule "B" Section 01100S for Detailed Tasks).

1. General Contractor for the Deconstruction of 130 Liberty Street (Deconstruction Contractor).

2. Scaffolding Contractor.

1.4 WORK PROGRAMS

A. The Work shall be conducted in Two Phases which may occur simultaneously in different sections of the Building:

1. Pre-Phase I: Exterior Scaffolding, Hoist(s), Sidewalk Bridging, Existing Exterior Netting Removal, and Exterior Building Washdown.

2. Phase I: Abatement and Removal of Asbestos and Contaminants of Potential Concern (COPC) within a negative pressure enclosure.

3. Phase II: Structural Deconstruction, Backfilling & Finish Sitework.

B. Before commencing Work of each phase, submit a schedule showing the sequence, commencement and completion dates for all phases of the Work.

1.5 WORK UNDER OTHER CONTRACTS

A. The Deconstruction Contractor shall perform abatement and removal of Asbestos and Contaminants of Potential Concern (except as otherwise provided under the Contract Documents) and deconstruction of the Building. Contractor agrees that Contractor's Work under this Contract will be subordinate to the Work of the Deconstruction Contractor when engaged by LMDC; and Contractor agrees to coordinate with, and take direction from, the Deconstruction Contractor.

B. General requirements: Contractor shall cooperate fully with Deconstruction Contractor so that all work at the site may be carried out smoothly, without interfering with or delaying Work under this Contract. Contractor shall coordinate the Work of this Contract with work performed under Deconstruction Contract, subordinated to and taking direction from Deconstruction Contractor when engaged.

C. Preceding Work: LMDC **may award** under a separate contract(s) for the following construction operations at Project site. Those operations may have commenced before Work under this Contract begins.

1. Site Security.

2. Decontamination Unit Maintenance.

3. Close-In Work at Lower Levels.

4. General Building Maintenance (Elevators, Utilities) to be the responsibility of the Owner until the execution of the Deconstruction Contract, at which time these responsibilities will then be transferred to the Deconstruction Contractor.

D. Future Work: LMDC may or may not award separate contract(s) for the following additional work to be performed at site after Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.

1. TBD.

1.6 USE OF PREMISES

A. General: Contractor shall have non-exclusive use of the Site during the construction period. Contractor's use of the Site is limited only by LMDC's right to have work performed or to retain other contractors on portions of Project.

1. Driveways and Entrances: Keep driveways (Loading Dock located at Washington Street) and entrances serving premises clear and available to LMDC, LMDC's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Do not block emergency access to "Viewing Area" at end of Washington Street or Gate 8 to Port Authority Property. Access to these areas is to be maintained at all times.

a. Schedule deliveries to minimize use of driveways and entrances.

b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
c. Sidewalk Bridging and Scaffolding must not encroach the street beyond the curb. Full street widths are required.

1.7 WORK RESTRICTIONS

A. All Work shall be done during Normal Working Hours unless the Contractor requests authorization to Work in other than Normal Working Hours and such authorization is granted by LMDC. If other than Normal Working Hours is authorized by LMDC, the Work shall be done at no additional cost to LMDC. Any and all associated costs for after hours work, including LMDC's and Owner's Representative's expenses, operating engineers, teamsters, electricians, shop stewards, inspectors, etc., will be borne by the Contractor. For purposes of this Contract, "Normal Working Hours" means 7:00 a.m. to 4:00 p.m., Monday through Friday, at times for which the Contractor has received the applicable work permits, but not on any New York State or Federal legal holiday or September 11.

B. Holidays are as follows:
1. New Years Day
2. Memorial Day
3. Independence Day
4. Labor Day
5. Thanksgiving Day
6. Day after Thanksgiving Day
7. Christmas Eve
8. Christmas Day
9. New Years Eve

C. Consult with New York City for construction embargos or street closings.

D. LMDC will impose a moratorium on Work creating excessive noise/vibrations during school testing days each year. Contractor will factor this into the Project schedule and any such moratorium will not constitute an Excusable Delay.

1.8 SPECIFICATION CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 **PROTECTION – To be performed by Scaffolding Contractor**

A. **Scaffolding & Hoists:**

1. Contractor is to recognize that the Project is to be treated as an ACM Project which will require the following:

   a. Installation and erection of Scaffold and Hoist(s) will require an Asbestos Licensed Contractor with Certified Asbestos Handlers to execute all interior work and any drilling, connections, anchoring, or penetrations into the building as well as to perform exterior netting removal and building washdown.
   b. Hoist Construction – See 3.1.A.1.a above.
   c. All material Hoists will be subject to the same regulations/ requirements (filing, permitting, inspection, testing, etc.) as required of personnel hoist(s) under relevant rules and regulations and reference standards.
   d. **See NYSDOL Variance Decision File No. 05-0427 dated 5/11/05 (Attachment 3).**

2. Contractor is required to submit design calculations for all scaffolds, Hoist(s), and Sidewalk Bridging signed and sealed from a Professional Engineer ("P.E." or "PE") registered in the State of New York, engaged by Contractor at Contractor's expense. Design calculations shall include but not be limited to all allowable loading requirements including wind pressure on the tents and anchoring systems and independent platform protection of 150 lbs/SF at the 27th and 14th floors. All submittals will be reviewed by LMDC for comment.

   After scaffolding, hoist(s), and Sidewalk Bridging is erected, the Professional Engineer shall make a site visit to verify that the scaffold and all other work was erected in compliance with the original plan. A written report shall be submitted signed and sealed by the P.E. indicating acceptance of installation in compliance with the original design. Any deviations from the original design shall be duly noted and signed off by the P.E. on as-built drawings with a P.E. stamp. This applies to both frame scaffold with tent and temporary suspended "swing" scaffold, or any other as the contractor sees fit.

3. Contractor is required to submit a scaffolding, hoist(s), and Sidewalk Bridging layout plan including but not limited to the following:

   a. Erection/ dismantling plans including modifications to the Building structure.
   b. Stair tower locations meeting all OSHA and NYC Building requirements. A minimum of one stair tower per elevation shall be required. **Lighting for stair towers will be provided and maintained by the owner until execution of Deconstruction Contract at which time responsibility for lighting maintenance for stair towers will be transferred to the Deconstruction Contractor.**
   c. Ancillary equipment – Indicate locations with all pertinent loads from the operation of such equipment (hoists, cranes, derricks, etc.).

d. All scaffolding shall be netted. 63% knitted debris fabric is to be installed at full surface areas. Netting is to be fire-retardant.
e. All scaffolding and components thereof shall be OSHA compliant.
f. Shoring, Bracing, Etc.
g. Continual Daily Scaffolding inspection by competent person as per Local Law requirements.

4. **Stair Towers:**
Where possible install both stair towers and material hoist towers on exterior of scaffolding. Stair towers shall be exits from the scaffold and not dead-ends.

5. All stair towers shall be lit continuously at every level with 100 watt lights and equipped with appropriate signage at all access points including emergency exits.

6. **Scaffolding Contractor shall provide nine (9) fully planked levels as follows:**

   a. 3 Levels at the top of the Scaffold, 3 Levels below the independent Protection Platform at Floor 27, and 3 Levels below the independent Protection Platform at Floor 14. **Deconstruction Contractor will be responsible for relocation of plank as required thereafter.**

   b. Provide 2 "Protection Platforms" segregating Phase I (Environmental Remediation) and Phase II (Structural Deconstruction) Activities to achieve a 150 LB/SF load capacity. Protection Platforms are to be supported independently from the Scaffold (i.e. needle beams). For the basis of the Bid, Protection Platforms will be constructed at Floors 27 and 14.

7. Contractor is to meet all requirements of the NYC Building Code Subchapter 19 requirements.

8. **Suspended Scaffold:**
Contractor is required to complete form CD-5 and file with NYC Building Department if suspended scaffold is used on an interim basis for construction.

9. All work areas are to be lit including staging areas.

10. **Utility Availability:**
    a. 2" Water Riser with hose-bib is available at all floors.
    b. Each floor has available for contractor's use 400-amp service (Contractor to field verify).

11. **Maintenance:**
General housekeeping on a daily basis is required during erection of Scaffold, Hoist(s), Sidewalk Bridging, Washdown, and netting removal until transfer for use to the Deconstruction Contractor. Scaffolding Contractor shall maintain a safe scaffold (i.e. tie loose planks, debris removal, sweeping, tie-up netting, change stair tower light bulbs, maintain guard rail system) at all times until transfer for use to the Deconstruction Contractor, at which time all maintenance responsibilities will be transferred to the Deconstruction Contractor.

12. When erecting scaffolding from the ground the first 9' shall have either chain link fence (9 ga. 1" mesh fabric) or 5/8" painted plywood as determined by the LMDC to prevent unauthorized entry.

13. **Security:**
All locks on stair tower gates, fence gates are to be keyed alike. Owner to be given Six (6) sets of keys. Local fire house (corner of Greenwich Street and Liberty Street) shall be given 1 set of keys.

14. Top rail, mid-rail and toe board is mandatory on all scaffolding meeting NYC Article – 19 requirements. Scaffolding cross bracing may not be used as top rail or mid-rail.

15. **Scaffold Inspection:**

a. Provide inspection, detailed audit report, and signoff by a New York State Licensed Professional Engineer, immediately should any alteration to any sidewalk bridge, hoist, or scaffolding components occurs to facilitate work.

b. At a minimum, provide monthly inspection and audit report of the condition of the sidewalk bridge, hoist, and scaffold by a Licensed New York State Professional Engineer.

c. Scaffold installer shall be a competent person. Contractor shall have the scaffolding inspected on a daily basis by their competent person. Any scaffolding needing corrective work shall be addressed immediately. A site log shall be maintained by the contractor's competent person indicating daily scaffolding inspections. All necessary repairs and/ or rework of the scaffold, including moving, adjusting or altering ties and/ or supports to accommodate the ongoing work shall be the responsibility of the Scaffolding Contractor during the assigned work tasks, and the Deconstruction Contractor upon transfer for subsequent operations.

16. **Fire Protection:**
a. **Maps and Signs.** Weatherproof maps indicating emergency egress routes must be posted at all scaffold access/ egress points. Consider the work force to determine whether signs must be posted in languages other than English.

b. **Fire Extinguishers.** Provide 100 lb. size extinguishers. The smaller, more portable ones (i.e. 10-20 lb.) will not be permitted. Placement locations and quantities to meet all applicable code requirements.

17. **Night work:**
Contractor shall be responsible for illuminating his work area including access / egress to and from stair towers.

18. **Staging Area:**
Contractor will be required to fence off and illuminate his staging/ storage area subject to review and approval by LMDC.

19. **Non-WTC Dust and Noise Control:**
Scaffolding Contractor must use best efforts to minimize noise and dust. Scaffolding Contractor will be required to implement dust and noise control measures for the work

tasks to comply with all applicable Legal Requirements including, but not limited to the following:

a. Installation of dust barriers at work areas.
b. The use of 2-stage vacuums will be mandatory for all operations.
c. Contractor shall poly all entry points (i.e. doors, windows, etc.) to mitigate the amount of dust infiltrating or exfiltrating the work areas.
d. Dust control shall be maintained on each level where work is occurring including misting and plasticizing.
e. Dust control methods shall include laborers, with water hoses, equipped with fogging nozzles, to insure that airborne particulates are kept to an absolute minimum.
f. Noise level standards shall apply seven days a week during periods of work activities and shall comply to the Building Code of the City of New York, Title 24, Chapter 2, Subchapter 6.
    1. 7:00AM to 5:00PM: 65 dBA. or an increase of 3dBA above ambient (baseline), whichever is higher.
    2. 5PM to 7AM: 55 dBA. or an increase of 3 dBA. above ambient (baseline), whichever is higher.
g. Provide sound attenuation measures to insure compliance with all noise level standards.

20. **Fire Protection:**

a. Fire extinguishers, fire watch personnel and task appropriate fire protection equipment (welding blankets, welding shields, etc.) shall be mandatory subject to LMDC review prior to workers being allowed on scaffold.
b. An individual, assigned as a Firewatch, shall be present during burning operations. This individual equipped with a fire extinguisher, or water hose, shall insure that all potential slag and sparks released from those operations is immediately controlled.
c. Water can be provided from New York City fire hydrants, and through a series of pumps, to be distributed throughout the work areas of the building via the existing dry standpipe for fire protection during Scaffold/Hoist erection, or by other means the contractor sees fit upon approval from LMDC.
d. A dry standpipe shall be maintained within the building, throughout the duration of the Scaffold/Hoist erection and/or Deconstruction process.
e. Torch cutting and welding shall be performed in accordance with the Contractor's standard cutting and welding safety procedures and in accordance with applicable federal, state, and local laws including but not limited to the following requirements:
    1. All cutting and welding shall be performed under a Hot Work (Welding/Cutting) Permit Program;
    2. All Work will be performed by personnel who possess the appropriate New York City Fire Department Flammable gas Torching/ Welding Certificate of Fitness.
    3. All Work shall be performed under firewatch supervision by personnel who possess the New York City Fire Department Flammable Gas Torching/Welding Fire Guard Certificate of Fitness;
    4. Protection from fire hazards with guarding shall be required to confine heat, sparks and slag generated by operation;
    5. Prior to cutting/ welding, inspections shall be conducted by experienced and certified personnel authorized to issue Hot Work Permit; and
    6. Additional special precautions shall be taken when combustible materials are located within 35 feet of the point of operation or wall or floor openings that are within a 35 foot radius of operation.

21. **Submittals:**

1. Scaffold shop drawings (9) plus PE inspection report of installation.
2. Scaffold layout plan (2).
3. Designation of competent person.
4. Daily scaffold inspection reports.
5. If required DOB work permit and application and all related documents (plans, etc.) and all accepted CD5 paperwork.
6. Hoist design including runways, loading docks, frames, members, and supports shall be integral with the scaffolding system and requires the same design calculations, signing and sealing by a Licensed NYS Professional Engineer as the scaffold component.
7. Signed, sealed PE Inspection Report for Hoist(s).
8. Sidewalk Bridging Shop Drawings (9) plus PE inspection report of installation.

B. **The Lump Sum includes all costs for scaffolding, hoist(s), and Sidewalk Bridging on this project so that all work areas are accessible for effective/ efficient performance of contract work. Provide scaffolding around entire building from ground to roof. Scaffold to be heavy duty, designed to take all wind loads from a full netting enclosure and tents/tarps as described herein. Enclose entire scaffold with netting as specified above.**

C. The engineered fixed scaffold system shall be designed and installed to support loads, including but not limited to wind loads, required to complete Phase I and II work, in accordance with NYC Building Code. In addition, scaffold system shall be designed and installed to support the installation and maintenance of exterior air monitoring stations and construction and maintenance of exterior Negative Pressure Tent Enclosures, including supplemental exterior Monoflex, or equivalent barrier on the scaffold system.

Exterior air monitoring shall include up to seven (7) exterior negative exhaust air monitoring locations per floor, during work on the floor. Negative exhaust air monitoring equipment shall be installed on the scaffold system exterior to the building. At each monitoring location access shall be provided to install and maintain equipment of nominal weight (less than 25 pounds). In addition up to four (4) additional exterior ambient air sampling locations may be installed and maintained per each four-floor work area. These multiple (7) unit ambient air monitoring stations are more substantial, with a maximum individual unit weight of 75 pounds.

Monoflex or equivalent non-permeable tarping may be installed exterior to the scaffold to provide additional protection to facilitate the construction and maintenance of exterior tent or other enclosures. For the bid specification scaffold design and installation requirements it shall be assumed that the installation of non-permeable tarp/tent enclosures shall extend up to eight entire floors at one time. Installation of non-permeable enclosures may or may not be on contiguous floors on the building. It is anticipated that tents shall be required for the exterior removal of exterior spray applied fireproofing, and exterior aluminum column cover and fascia panels (ACM caulking), at a minimum (Deconstruction Contract work).

Exterior Negative Pressure Tent Enclosures shall be utilized to clean and release contaminated areas exterior to the Building. Procedures for establishing, cleaning, clearing and maintaining Exterior Negative Pressure Tent Enclosures are described below.

1. As the Negative Pressure Tent Enclosure will be installed exterior to the building on the scaffold system, a Remote Personal Decontamination Enclosure System, but otherwise consistent with the requirements of ICR 56-9, shall be utilized.

2. If at any time a worker has to pass through an uncontaminated area to access the remote decontamination unit or the next work area, the worker wearing two suits of PPE shall remove one suit while in the work area, wet wipe the inner suit, don a clean outer suit and proceed either to the next work area or the decontamination unit.

3. Negative Pressure Tent Enclosures shall be constructed and used per the 05-0427 Variance Decision dated May 11, 2005 (Attachment #3) including but not limited to two layers of six mil fire-retardant polyethylene sheeting and shall include walls, ceiling and a floor (except for portions of floors walls and ceilings that are removal surfaces) with double-folded seams. Exterior tents will be constructed with an attached 3'x 3' airlock. Make-up air shall be provided to the airlock through HEPA-filtered interior air sources.

4. Personnel exiting the Negative Pressure Tent Enclosure shall proceed to the Remote Personal Decontamination Enclosure System.

5. Once tent enclosure work area preparation has been completed and abatement activities commence, on a daily basis and per work-shift, one air sample shall be collected within the tent enclosure entrance/exit and exterior to the tent as required.

6. Clearance air sampling will be conducted inside the tent, prior to removal.

D. **Scaffold, Hoist, and Sidewalk Bridging system to be designed by a New York State Licensed Professional Engineer, meeting all local, State, and Federal Guidelines. Contractor is to be ready for mobilization and preparation of all pre-construction activities including erection of pipe scaffolding, hoist(s), and Sidewalk Bridging upon the issuance of the Notice of Award.**

E. Conduct **Scaffolding, Hoist, and Sidewalk Bridging** operations to prevent injury to people and damage to adjacent facilities to remain. Ensure safe passage of people around deconstruction area.

F. As the building interior is contaminated with asbestos and other contaminants of potential concern (COPC), the building exterior and netting have been impacted by WTC dust and asbestos-containing caulking exists on the finger joints on the exterior aluminum panel column covers and fascia, tie-ins for the erection of the scaffold and hoist shall be performed by New York City Department of Environmental Protection (NYCDEP) and New York State Department of Labor (NYSDOL) asbestos certified handlers in a controlled manner as described in Subsections 3.2 to 3.4 below.

3.2 EXISTING EXTERIOR NETTING REMOVAL

A. The existing exterior netting has been impacted by WTC Dust and shall be treated as an **Asbestos Containing Material** and therefore shall be removed and disposed of as ACM by the Scaffolding Contractor. The cleaned cable can then be removed at a later time. Access to the active work area on the scaffold will be restricted. The work area on the scaffold shall be cordoned off with barrier tape. Only NYSDOL and NYCDEP certified asbestos workers shall

be permitted within the work area. The vacating of each work area and warning signs shall comply with ICR 56-8.1(b). One layer of six-mil polyethylene sheeting or rubber mat shall be installed on the scaffold work area floor. Once the scaffold is prepared, the netting will be misted with an amended water solution prior to cutting and/or HEPA vacuumed (depending upon dust concentrations), then cut under wet conditions into manageable sections. Removed netting will be bagged or wrapped in two (2) layers of polyethylene in preparation for transportation and disposal. Netting shall be removed from the site by the Scaffolding Contractor to an approved disposal facility in compliance with applicable regulations. Scaffold Contractor shall be responsible for removal and proper off-site disposal of all wastes generated during the work. Once the netting is removed from the cable, the exposed cables and tiebacks will be wet wiped, and removed as clean material. If at any time a worker has to pass through an uncontaminated area to access a remote decontamination unit or the next work area, the worker shall don two suits of PPE, remove one suit while in the work area, wet wipe the inner suit, don a clean suit and proceed either to the next work area or the decontamination unit.

3.3 EXTERIOR BUILDING WASHDOWN

A. The dust and debris located on the exterior of the Building shall be cleaned via Building Washdown and shall be performed under Environmental (ACM) Protocols, as all exterior dust must be treated as ACM. The roof, building façade and North Face ground level scaffold area shall be cleaned in accordance with NYCDEP WTC Dust/Residue Roof & Façade Cleaning procedures provided in the NYSDOL Variance Decision File No. 05-0427, dated May 11, 2005 (Attachment #3). Scaffold Contractor shall be responsible for removal and proper off-site disposal of all wastes generated during the work.

3.4 HOIST/SCAFFOLD TIE-INS

Tie-ins for the erection of any scaffold and hoist shall be performed by New York City Department of Environmental Protection ("NYCDEP") and New York State Department of Labor ("NYSDOL") asbestos certified handlers in a controlled manner as described below. Scaffold Contractor shall be responsible for removal and proper off-site disposal of all wastes generated during the work.

A. *Tie-ins requiring Glass Panel Removal*

For tie-ins requiring the removal of sections of the curtain wall glass, the following procedures shall be required:

1. Existing exterior netting shall be removed as required following the procedures described herein.

2. The exterior of the glass to be removed to facilitate installation of tie-ins shall be cleaned per NYCDEP protocols as defined in the NYSDOL Variance Decision File No. 05-0427 (Attachment #3).

3. Prior to removal of glass, the interior tie-in attachment points shall be enclosed within an Interior Negative Pressure Tent Enclosure attached to the glass to be removed as described above. Negative Pressure Tent Enclosure shall be large enough to accommodate workers, equipment,

glass and material removal and cleaning operations. All items within the tent shall be properly removed and surfaces cleaned. Each Negative Pressure Tent Enclosure shall be cleaned and cleared, including passing a visual inspection and clearance air sampling prior to creating the opening to the exterior.

4. Once the necessary tie-in connections are prepared, the opening to the exterior can be established and final connections made for the erection of the hoist or scaffold.

5. The abatement contractor shall then immediately seal the exterior opening with a rigid barrier covered by two layers of six-mil polyethylene sheeting with appropriate supports to ensure the barrier will remain in place until the completion of Phase I Deconstruction activities on the floor.

B. ***Tie-ins requiring Aluminum Panel Removal***

For tie-ins requiring the removal of sections of the curtain wall aluminum panels, the following procedures shall be required:

1. Existing exterior netting shall be removed as required following the procedures described herein.

2. The exterior of the aluminum panels to be removed to facilitate installation of tie-ins shall be cleaned per NYCDEP protocols as defined in the NYSDOL Variance Decision File No. 05-0427 (Attachment #3).

3. Prior to removal of aluminum panels, the interior tie-in attachment points shall be enclosed within an Interior Negative Pressure Tent Enclosure attached to the aluminum panels to be removed as described above. In addition, a Negative Pressure Tent Enclosure shall be constructed on a scaffold exterior to the building to enclose the aluminum panels to be removed. (Note a pilot study is to be proposed to attempt to obtain regulatory relief from the requirement for exterior enclosures for this work.) The Negative Pressure Tent Enclosure shall be large enough to accommodate workers, equipment, aluminum panels and material removal and cleaning operations. All items within the tent shall be properly removed and surfaces cleaned. Each Negative Pressure Tent Enclosure shall be cleaned and cleared, including passing a visual inspection and clearance air sampling prior to creating the opening to the exterior.

4. Once the necessary tie-in connections are prepared, the opening to the exterior can be established and final connections made for the erection of the hoist or scaffold.

5. The abatement contractor shall then immediately seal the exterior opening with a rigid barrier covered by two layers of six-mil polyethylene sheeting with appropriate supports to ensure the barrier will remain in place until the completion of Phase I Deconstruction activities on the floor.

C. ***Tie-ins Requiring Small Penetrations through Curtain Wall***

For tie-ins requiring small (less than six inch diameter) penetrations of the curtain wall utilizing manufacturer equipped HEPA-shrouded drilling/cutting equipment, the following procedures shall be required:

1. Access to the active work area on the scaffold will be restricted. The work area on the scaffold shall be cordoned off with barrier tape.

2. Only NYSDOL and NYCDEP certified asbestos workers shall be permitted within the work area.

3. The exterior of the impacted section of curtain wall to facilitate installation of tie-ins shall be cleaned per NYCDEP protocols as defined in the NYSDOL Variance Decision File No. 05-0427 (Attachment #3).

4. Drilling or cutting through asbestos-containing caulk on sections of aluminum column covers and fascia is not permitted unless work is performed within an exterior Negative Pressure Tent

Enclosure. (Note a pilot study is to be proposed to attempt to obtain regulatory relief from the requirement for exterior enclosures for this work.)

5. Drilling or cutting through curtain wall to create a small penetration for installation of tie-in shall be accomplished with manufacturer equipped HEPA filtered and shrouded drilling/cutting equipment.

6. Polyethylene sheet or rubber mat shall be installed under the work area prior to start of work. Upon completion of creating small access point in curtain wall, connecting rod shall be inserted within penetration and penetration sealed and area HEPA vacuumed and/or wet-wiped.

7. Interior installation of tie-in shall occur within the building by properly certified NYSDOL and NYSDEP asbestos workers.

D. ***Establishing and Releasing a Cleaned Area within the Contaminated Building Areas utilizing Interior Negative Pressure Tent Enclosures***

Interior Negative Pressure Tent Enclosures will be utilized to clean and release contaminated areas within the Building to provide for Hoist/Scaffold tie-ins and attachment points. Procedures for establishing, cleaning, clearing and maintaining Negative Pressure Tent Enclosures are described below.

1. As the Negative Pressure Tent Enclosure will be installed within a contaminated area of the building, a Remote Personnel Decon Enclosure System, otherwise consistent with the requirements of ICR 56-9, shall be utilized.

2. If at any time a worker has to pass through an uncontaminated area to access the remote decon unit or the next work area, the worker wearing two suits of PPE shall remove one suit while in the work area, wet wipe the inner suit, don a clean outer suit and proceed either to the next work area or the decon unit.

3. Negative Pressure Tent Enclosures shall be constructed and used per the 05-0427 Variance Decision dated May 11, 2005 including but not limited to two layers of six mil fire-retardant poly sheeting and shall include walls, ceiling and a floor (except for portions of floors, walls and ceilings that are removal surfaces) with double-folded seams. Interior tent areas will be constructed with an attached 3'x 3' airlock. Make-up air shall be provided to the airlock through HEPA-filtered interior air sources.

4. Personnel exiting the Negative Pressure Tent Enclosure shall proceed through the contaminated portion of the building to the Remote Personnel Decon Enclosure System.

5. Once tent enclosure work area preparation has been completed and abatement activities commence, on a daily basis and per work-shift, one air sample shall be collected within the tent enclosure entrance/exit. No other air samples associated with this work will be collected during the work exterior to the tent in the contaminated portions of the building.

6. Clearance air sampling inside the tent, per 05-0427 Variance Decision, will be conducted under static pressure conditions. No other clearance air samples associated with this work will be collected during the work exterior to the tent in the contaminated portions of the building. Upon completion of clearance air sampling, the tent shall be sealed airtight.

7. Upon receipt of successful clearance air sampling results, the tent enclosure will be maintained under a slight positive pressure utilizing HEPA-filtered supplied air to maintain its clean condition. Personnel entering the interior tent enclosures from a contaminated area shall proceed as follows:
    a. Prior to entering the attached airlock, personnel shall remove the outer layer of protective clothing.
    b. The exterior surface of the respirator shall be wet-wiped or HEPA vacuumed.

8. The opening to the exterior (if required) can then be established within the tent. Once work is complete in the tent, isolation of the opening to the exterior shall be maintained by installation of isolation barriers or decon chamber.

End of Annex 6: Summary/ Scope of Work for Scaffolding Contractor

DRAFT
5/31/05

GENERAL CONDITIONS

FOR ALL

TRADE CONTRACTS

with

LOWER MANHATTAN DEVELOPMENT CORPORATION

for the
deconstruction of
130 Liberty Street
New York, NY

dated as of

_____ ___, 2005

TRADE: EXTERIOR SCAFFOLDING

GENERAL CONDITIONS

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CHAPTER I

GENERAL PROVISIONS

1. DEFINITIONS

The following words and phrases whenever they occur in this Contract or any of the other documents forming a part of the Contract shall be construed as follows:

"ACM" means asbestos (friable or non-friable), asbestos material (friable or non-friable), asbestos-containing material (friable or non-friable), and/or asbestos waste (friable or non-friable), including but not limited to (i) building materials containing asbestos which were present in the Building prior to September 11, 2001, and (ii) any and all materials impacted by asbestos (solely excluding non-porous items impacted by asbestos if and only if said non-porous items have previously been properly cleaned and released in accordance with all Legal Requirements to the satisfaction of all of the applicable federal, state, and local Governmental Authorities). The Government Authorities have stated that (a) WTC dust and debris and (b) all materials impacted by WTC dust and debris must be treated as asbestos material and disposed of as asbestos waste.

"Building" or "130 Liberty Street" means all buildings and structures located on the real property commonly known as 130 Liberty Street, New York, New York 10006, also being known as New York City Block 54, Lot 1.

"Building Contents" means all contents of the Building, including any and all fixtures, personal property, debris, wreckage, and/or other materials or things of any nature whatsoever in, on, or about the Building which are not permanently affixed to the Building.

"Certificate of Final Completion" is defined in Article 28.

"Change Order" or "change order" means a written change order issued by LMDC authorizing Extra Work pursuant to Article 22 upon and subject to the terms and conditions of this Contract.

"Characterization" means that certain Initial Building Characterization Study Report prepared for LMDC by The Louis Berger Group, Inc. and dated September 2004, that certain Supplemental Investigation Summary Report prepared for LMDC by TRC Environmental Corp. dated February 2005, and any other characterization or environmental assessments obtained by LMDC with respect to the Site.

The terms "construction site," "Site," "Site of the Work," "Project Site," "project site," or words of similar import shall mean 130 Liberty Street.

"Contract" is defined in the Trade Agreement. The Contract as so defined shall constitute the complete and exclusive statement of the terms of the agreement between the parties.

"Contract Assumptions" means the assumptions regarding the Building, the Building Contents, and other matters set forth in Annex "5" to the Trade Agreement.

"Contract Documents" means all documents forming the Contract and also all plans, drawings, and other materials forming part of the "Scaffolding Plans" when and as accepted by LMDC.

The term "days" or "calendar days" in reference to a period of time shall mean consecutive calendar days, Saturdays, Sundays and holidays, included.

"Deconstruction Contract" shall mean the agreement for the deconstruction of the Building between LMDC and the Contractor or Construction Manager undertaking such deconstruction and identified as the "Deconstruction Contract" in a Notice given by LMDC to Contractor.

"Deconstruction Plan" shall mean the final approved Deconstruction Plan(s) as and when issued by LMDC and approved by the applicable Governmental Authorities, and any drafts or earlier versions of same issued by LMDC pending final approval by applicable Governmental Authorities.

The term "delay" means any and every delay, obstruction, hindrance, interference, loss of productivity or inefficiency of any kind.

"Demolition" or ("demolition") or "to Demolish" (or "to demolish") or "Deconstruction" or "to Deconstruct" (or to "deconstruct") or words of similar impact mean the abatement and removal of all interior materials (including Hazardous Materials), deconstruction and demolition of the Building in accordance with the Contract Documents, including (a) cleaning and preparing the Building for demolition, (b) deconstructing and demolishing the Building, (c) undertaking environmental monitoring inside and outside the Building during the demolition of the Building, (d) transporting all waste and debris from the site and disposing of the same at approved disposal site in accordance with Legal Requirements, and (e) obtaining all permits or permissions in order to complete the foregoing—all in accordance with, and subject to, Legal Requirements and all other requirements of this Contract.

"Demolition Consultant" means JS Held, Incorporated, who has been appointed by the Prior Insurers and who has certain access and other rights as set forth herein (or such other person as the Prior Insurers shall designate by Notice to LMDC from time to time).

"Documents" or "documents" are defined as documents, records, books, papers, contracts, memoranda, invoices, correspondence, notes, photographs, drawings, charts, graphs, other writings, recording tapes, recording discs, mechanical or electronic information storage or recording elements (including any information stored in or on a computer hard drive, computer memory or website).

"Erection Completion Date" means October 31, 2005, subject to extensions of time for Excusable Delay pursuant to this Contract.

"Interim Arbitrator" means the present Director of the Lower Manhattan Construction Command Center and any successor in that office. If the Director of the Lower Manhattan Construction Command Center is unable to act as Interim Arbitrator, the Interim Arbitrator shall be a person approved by LMDC.

"Environmental Laws" means any federal, state or local law, statute, regulation, ordinance, rule or common law, decrees, orders, judgments or other Legal Requirements relating to pollution or protection of the environment, natural resources or public health, safety and welfare including those pertaining to land use, the release or threatened release of Hazardous Materials, exposure to Hazardous Materials, or generation, use, storage, treatment, disposal, transportation or remediation of Hazardous Materials, including *inter alia*, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, the Resource Conservation and Recovery Act ("RCRA"), the Clean Water Act, the Clean Air Act, the Toxic Substances Control Act, Occupational Safety and Health Act, regulations of the New York City Department of Environmental Protection, regulations of the New York State Department of Labor, the National Emission Standards for Hazardous Pollutants Asbestos Regulations, the New York State

Navigation Law, National Historic Preservation Act and the New York State Historic Preservation Act, each as amended and applicable to the Site as if owned by a private party.

"Excusable Delay" means any delay in the Work resulting from any cause if such cause is beyond Contractor's reasonable control and was not caused by Contractor's error, mismanagement, fault or neglect. Subject to the foregoing, an Excusable Delay shall include any delay caused by: (a) fire, earthquake, explosion, landslide, lightning or flood; or other acts of God; (b) adverse weather not reasonably anticipated; (c) Extra Work; (d) riots or civil disturbance; (e) epidemic; (f) strikes (other than a strike caused by, or within the control of, Contractor or any subcontractor); (g) lockouts by persons other than Contractor or any subcontractor; (h) acts of terrorism; enemy action, or war; (i) blockades; (j) Unforeseeable Conditions including Hazardous Materials known or unforeseen, (in whatever quantities and circumstances as may exist from time to time); (k) acts or omissions of LMDC; (l) the delay of any Governmental Authority in issuing any permits necessary to perform any Work; provided that Contractor uses commercially reasonable efforts to secure all such permits and does not contribute to the failure of the Governmental Authority to timely issue any such permits; (m) changes in Legal Requirements after the signing of this Contract; (n) any other causes beyond Contractor's reasonable control. For the avoidance of doubt, "Excusable Delay" shall not include any delay resulting from (i) uncovering, removal, replacement or repair of defective or incorrect Work previously performed by or under the direction of Contractor; (ii) Work required by reason of Contractor's fault; (iii) any delay occurring during any period when any policy of required insurance or Bonds to be secured and maintained by Contractor are not in effect; (iv) Contractor's failure to place timely orders for delivery of materials, equipment or services; (v) **Contractor's failure to perform or to take any action with reference to the Work which by industry practice is an obligation of the Contractor or its subcontractors** (vi) any other loss of time resulting from Contractor's error, mismanagement, fault, or neglect; and (vii) Contractor's failure to employ an adequate construction force (number and quality). References to "Contractor" in this definition specifically also mean and include all "subcontractors" and "Materialmen."

"Extra Work" means Work required by LMDC pursuant to Article 22 hereof which adds scope or program to the Scope of Work. For the avoidance of doubt, "Extra Work" does not include (a) development of details reasonably inferable from or implied by, but not explicit in, the Contract Documents (and taking into account Contractor's prior review of the same); (b) the inclusion or exclusion of any item which should be included or excluded in accordance with good construction practice, whether or not shown or set forth in a drawing or specification; (c) any matters resulting from, or attributable to, mistake, error, omission, delay, or negligence of Contractor or any of its subcontractors; and (d) without limitation, any Work required by reason of conditions on the interior or exterior of the Building, whether or not Unforeseeable Conditions.

"General Conditions" means these General Conditions for the Contract. Schedules "A" through "J" and Exhibits "1" through "5" attached hereto are part of these General Conditions as though fully set forth herein.

"Governmental Authority" means the United States, the State of New York, the Port Authority of New York and New Jersey, the City of New York, and any and every other agency, authority, department, board, bureau, court, commission, or instrumentality or political subdivision of any of the foregoing.

"HASP" means the Health and Safety Plan in effect for the Building as it may be modified from time to time (if and only if any such modification is approved by LMDC and all relevant Governmental Authorities) and all requirements referenced in, or incorporated by reference in, said Health and Safety Plan.

"Hazardous Materials" means any substance, pollutant, contaminant, waste or other material defined as hazardous or toxic and regulated as such under any Environmental Law, including ACM.

"Integrity Monitor" means Stier Anderson LLC (or a successor firm designated by LMDC from time to time to provide integrity monitoring services).

"Legal Requirement" or "Law" or "law" means (a) any statute, ordinance, code, law, rule, regulation, permit, agency notice or order, approval, consent decree, order or other written requirement, standard or procedure enacted, adopted or applied by any Governmental Authority, or any administrative or judicial interpretation thereof, together with all related amendments, implementing regulations, and reauthorizations including any judgment, writ, order, injunction, award or decree of any court, judge, justice or magistrate, including any arbitrator in any binding arbitration; (b) for the avoidance of doubt, all Environmental Laws; (c) any binding judgment, writ, order, injunction, award or decree of any court, judge, justice, magistrate, administrative agency or other governmental authority (or of any arbitrator in any binding arbitration), implementing, applying or otherwise relating to any item included in clause (a) above; (d) any variances issued by Governmental Authorities (including both variances issued to date as well as those issued in the future); and (e) the final approved Deconstruction Plan. As used in this Agreement, actions taken "in order to comply with any Legal Requirement," or actions "necessary to comply with any Legal Requirement" shall include actions taken in order to meet a Legal Requirement in the absence of a written order or other such directive mandating such actions. For the avoidance of doubt, as set forth elsewhere in this Contract, the Project requires Contractor to comply with all Legal Requirements in undertaking and completing the Work and all means and methods relating thereto. However, additional work required by changes in Legal Requirements after the execution of this Contract by Contractor shall be deemed Extra Work for purposes of Articles 7 and 22 below and other applicable provisions of the Contract.

"Lump Sum" is defined in Article 4 of the Trade Agreement.

"Materialman" means anyone who furnishes materials, plant or equipment (including temporary or consumable materials) to Contractor or any subcontractor for use at or about the construction site in the performance of Work. "Materialman" or "subcontractor," however, shall exclude Contractor or any subsidiary or parent of Contractor or any person, firm or corporation which has a substantial interest in Contractor or in which Contractor or the parent or the subsidiary of Contractor, or an officer or principal of Contractor or of the parent or the subsidiary of Contractor has a substantial interest, provided, however, that for the purpose of Article 25 hereof the exclusion in this paragraph shall not apply to anyone but Contractor itself.

"Notice" means a written notice.

"Owner's Representative" means URS Corporation-New York (or a successor firm designated by LMDC from time to time to provide owner's representation/project representation services).

"Prior Insurers" means, collectively, the two insurers who had previously issued policies of insurance covering the Building - Allianz Global Risks US Insurance Company ("Allianz") and AXA Corporate Solutions Insurance Company as successor to AXA Global Risks US Insurance Company ("AXA").

The phrase "reasonably inferable" means that an experienced contractor in the applicable industry or trade would reasonably believe that an item of Work (whether or not specifically delineated) was required by the particular Project Document in accordance with good practice, standard procedures, or customary expectations of or in such industry or trade.

"RFI" means a request for information issued by Contractor to LMDC or vice-versa.

"Scope of Work" or "SOW" means the Scope of Work attached as Annex "6" to the Trade Agreement.

"Shop Drawings" means all drawings, diagrams, illustrations, schedules, including supporting data, which are specifically prepared for this Contract and submitted by Contractor pursuant to the requirements of the Specifications or LMDC to illustrate some portion of the Work. The terms "shop drawings"," placing drawings" and "working drawings" are used interchangeably in this Contract.

"Specifications" means the Specifications to the Scope of Work and shall be deemed a part of the Scope of Work. Division 1 of the Specifications are attached hereto.

"Subcontractor" or "subcontractor" means anyone who performs Work (other than or in addition to the furnishing of materials, plant or equipment) at or about the construction site, directly or indirectly (i.e., of whatever tier) for or in behalf of Contractor (and whether or not in privity of contract with Contractor), but shall not include any person who furnished merely their own personal labor or their own personal services or who performs Work which consists only of the operation of construction equipment of which they are the lessor. References to "Contractor" in this Contract (whether or not so stated or implied) shall be deemed to include all subcontractors and Materialmen and their employees unless specifically provided otherwise.

"Unforeseeable Conditions" or "unforeseen conditions" means any and all covered or otherwise latent or hidden and materially adverse conditions existing in or around the Building which: (i) are not actually known to Contractor; (ii) would not be reasonably foreseeable by any Person experienced in Contractor's trade or industry undertaking work of the type involved in the particular location, circumstances, and conditions by visual observation or by review of the Contract Documents, Specifications, or other documents previously furnished to Contractor; or (iii) were not disclosed in any Contract Documents, Specifications, or other documents previously furnished to Contractor by LMDC, Owner's Representative, or any other Person.

"Work" means all structures, equipment, plant, labor, materials and other facilities and all other things necessary or proper for, or incidental to, performing the services required under the Contract Documents and otherwise in compliance with the requirements of this Contract. "Work" shall include the furnishing of all labor, services, cranes, hoists, scaffolding, transportation, insurance, temporary facilities, and other things and services of every kind for the full performance and completion of all of Contractor's obligations under this Contract, including documentation and record-keeping requirements; and "performance of Work" and words of similar import shall mean the furnishing of such facilities and the doing of all such things.

"Work required by the Contract Documents in their present form" or words of similar import shall include all Work required by the Contract Documents in their present form (whether or not mentioned in the Contract Documents), and all Work involved in or incidental to the accomplishment of the results required by the Contract Documents in its present form and/or reasonably inferable therefrom (whether or not mentioned therein or shown thereon).

"Work Day" or "Work day" means a day other than a Saturday, a Sunday, a New York State or Federal legal holiday, or September 11th.

"Worker" or "worker" means any employee of Contractor or of a subcontractor who performs personal labor or personal services at the construction site.

Whenever they refer to the Work or its performance, "directed," "required," "permitted," "ordered," "designated," "prescribed" and words of similar import shall mean directed, required, permitted, ordered, designated or prescribed by LMDC (as applicable); and "approved," "acceptable," "satisfactory" and words of similar import shall mean approved by or acceptable or satisfactory to LMDC (as applicable); and "necessary," "reasonable," "proper," "correct" and words of similar import shall mean necessary, reasonable, proper or correct in the judgment of LMDC (as applicable), upon and subject to other terms and conditions of this Contract (including Articles 7 and 22 hereof).

Whenever "including," "include," "such as" or words of similar import are used, the specific things thereafter enumerated shall not limit the generality of the things preceding such words and shall be construed to mean, also, "without limitation".

Certain other words and phrases are defined elsewhere in the Contract Documents and other parts of the Contract and these General Conditions and (unless otherwise specified) have the same meanings throughout the Contract.

2. GENERAL PROVISIONS REGARDING THE WORK

The enumeration in this Contract and in the Contract Documents of particular things to be furnished or done at Contractor's expense, or without cost or expense to LMDC, or without additional compensation to Contractor shall not be deemed to imply that only things of a nature similar to those enumerated shall be so furnished and done; but, notwithstanding whatever obstacles or unforeseen conditions may arise or be encountered, Contractor shall perform all Work as required under this Contract for the Lump Sum without other compensation other than payments for Extra Work as specifically provided in this Contract.

Contractor understands and acknowledges that the Building currently contains and/or may contain: Hazardous Materials requiring remediation under applicable Legal Requirements; hazardous levels of various contaminants, including, but not limited to, ACM, silica, polycyclic aromatic hydrocarbons, polynuclear aromatic hydrocarbons, dioxin, polychlorinated biphenyls, barium, beryllium, cadmium, chromium, copper, lead, manganese, nickel, zinc, and mercury; and/or microbial growth resulting from water damage. Contractor understands that environmental monitoring for the Project may require periodic delays and has provided for the same in the Lump Sum and in Contractor's schedule, upon and subject to the terms and conditions of this Contract. Contractor accepts and assumes the risk of all the Contract Assumptions. Moreover, Contractor will at all times comply with the HASP and cause all persons entering on or working in or around the Project site to comply with the HASP (including all employees of Contractor and all subcontractors, and visitors).

Because of the complexity of the scope of the demolition covered by this Contract, and because of the public attention which is expected to be focused on such demolition, Contractor understands and accepts that such complexity and attention may impact Contractor's schedule; and Contractor has provided for such impact in the Lump Sum and in Contractor's schedule, upon and subject to the terms and conditions of this Contract.

Governmental Authorities have determined that the WTC dust is ACM, subject to all Legal Requirements applicable to ACM (in addition to other Legal Requirements). Contractor shall not seek any variances from such Legal Requirements without LMDC's prior written approval. LMDC has the sole and exclusive authority to determine whether to request any variance and to determine the scope and nature of any such variance requests. LMDC is under no obligation to request any variance and there shall be no increase in the Lump Sum as a result of any variance or as a result of LMDC's decision not to request any variance.

No increase in the Lump Sum shall be requested by Contractor or provided by LMDC by reason of any ACM and/or other Hazardous Materials or the types, locations, or amounts thereof, or any matter pertaining thereto, regardless of how any circumstances may change after the date of the Contract, except as specifically permitted under the Contract.

For the avoidance of doubt, Contractor assumes the risk of any and all conditions in the Building, known or unknown, hidden or visible, and patent or latent, including Unforeseeable Conditions, and will not request additional compensation for any such conditions, except as specifically permitted under the Contract.

LMDC has no obligation (i) to obtain, conduct, and/or pay for any further or supplemental characterization of the Building or of ACM or other Hazardous Materials in, on, or about the Building, or any other monitoring, testing, or inspections of any kind which may be required for the Work or otherwise or (ii) to perform any Work.

LMDC makes no representations as to potential health or exposure hazards present at the Site, the Building and/or the subsurface conditions at the Site; and Contractor assumes responsibility for the same.

Contractor acknowledges that Contractor has had ample time to review to its satisfaction the Contract Documents; and LMDC makes no warranty or representation whatsoever, express or implied, as to the feasibility, constructability or suitability of the Contract Documents.

Contractor warrants and agrees that the Work shall satisfy the requirements of the Contract Documents and shall (without limitation): (a) conform to the Contract Documents; (b) be of the quality required under the Contract Documents and, if not specified, then of a quality appropriate to a first class governmental or major New York City office building; (c) be free of liens or other encumbrances caused or created by Contractor or any subcontractor of or consultant of Contractor (except to the extent in any particular case that LMDC has failed to make a specific payment as and when properly due under this Contract which is the basis for a particular lien); and (d) comply with Laws and applicable requirements of the insurance policies to be obtained pursuant to Article 34 hereof.

Contractor agrees that amounts received by Contractor from LMDC shall be held in trust in accordance with the New York Lien Law and shall be used first (i.e., before application for any other purpose) to pay for labor, materials, services, or equipment furnished in connection with the Work, or any portion thereof, and for premiums on the Bonds and insurance policies required to be maintained by Contractor.

For each proposed waste site and for each proposed transporter of waste, Contractor shall provide the information set forth in Schedule "J" attached hereto.

Unless specified to the contrary in other provisions of the Contract, Contractor shall perform the Work in a good and workerlike manner in accordance with current good standards of industry practice and shall supervise, direct and coordinate all portions of the Work competently and efficiently. Contractor shall have exclusive responsibility for all applications, means, methods, techniques, sequences, and procedures necessary or desirable for the correct, prompt, and orderly prosecution and completion of the Work as required by the Contract, subject, however, to Owner's right to reject means and methods proposed by Contractor which: (a) will constitute or create a hazard to the Work or to persons or property; (b) do not comply with Legal Requirements and/or (c) will not result in Demolition in accordance with the requirements of the Contract Documents. Approval of (or failure to reject) any of Contractor's means and methods of construction and/or demolition for the reasons specified in (a), (b), or (c) above shall not relieve Contractor of any obligations under the Contract or entitle Contractor to any adjustment of the Lump Sum.

3. ACCESS TO RECORDS; OWNERSHIP OF DOCUMENTS

Contractor shall keep and maintain at Contractor's office at the Site the following (the "Books and Records"):

A. complete accounts and cost records of all payments by LMDC to Contractor and/or by Contractor to any subcontractor or other person in connection with the Work, including records of all Extra Work performed;

B. copies of all documents of any kind prepared, issued, or received by Contractor in connection with the Work or the Project including all contract documents, bulletins, requests for information, bonds, subcontracts, purchase orders, correspondence (including correspondence with government entities or relating to funding), claims, anticipated cost reports, shop drawings, change orders, change order logs, handbooks, warranties, guarantees, operating manuals, rate manuals, technical standards and specifications, instructions, permits, licenses, certificates, inspection/investigation reports, notices of lien, certifications of "Prevailing Rate of Wage," documents served in legal proceedings, and insurance documentation;

C. all books of account, bills, vouchers, invoices, payroll records, receiving documents, time books, job diaries and reports, cost analyses, cancelled checks, sales or excise tax filings and returns (or exemptions therefrom), other government filings, and other documents showing acts or transactions in connection with (or relating to or arising by reason of) the Work, this Contract, or each subcontract;

D. samples received;

E. Project schedules (and all revisions thereof);

F. photographs and/or a video record of the Work (as required under the Specifications);

G. environmental samples, test results, laboratory data, air monitoring results, and any and all other similar information; and

H. written policies and procedures; subcontract files (including proposals of successful and unsuccessful bidders, bid recaps, etc., for the Project); original estimates; estimating work sheets; change order files (including documentation covering negotiated settlements); backcharge logs and supporting documentation; general ledger entries detailing cash and trade discounts earned; credits, rebates and refunds of any kind and type whatsoever including without limitation equipment rental rebates, insurance rebates and dividends; and any other Contractor records which may have a bearing on matters of interest to LMDC in connection with the Work.

The Book and Records shall be open to inspection and subject to audit and/or reproduction at any time upon reasonable notice, except in an emergency, during normal business hours by LMDC and its authorized representatives to the extent necessary to adequately permit evaluation and verification of Contractor's compliance with all terms, conditions, obligations and requirements of the Contract or claims submitted by the Contractor or any of it's payees. In those situations where Contractor's records have been generated from computerized data (whether mainframe, mini-computer, or personal computer based computer systems), Contractor agrees to provide LMDC's representatives with extracts of data files in computer readable format on data disks or suitable alternative computer data exchange formats.

Contractor shall require all Subcontractors and other payees (including material suppliers and subconsultants) when working under any type of contract (including lump sum agreements, unit price agreements, time and material agreements, cost plus agreements or lump sum major material purchase orders) to comply with the provisions of this Article by insertion of the requirements hereof in the written agreement between Contractor and such payee. Such requirements shall include flow-down audit provisions in substantially the same form as these provisions.

Contractor shall cooperate fully and shall cause all of Contractor's payees to cooperate fully in furnishing or in making available to LMDC from time to time whenever requested in an expeditious manner any and all such information, materials and data required by this Article.

LMDC or its authorized representatives shall have access to Contractor's facilities near 130 Liberty Street and at the project trailer, shall be allowed to interview all current or former employees to discuss matters pertinent to the performance of this Contract, shall have access to all necessary Documents, and shall be provided adequate and appropriate work space, in order to conduct audits in compliance with this Article.

All plans, drawings, specifications, reports, tests, and other documents of any kind, and all samples, shop drawings, and other submittals, prepared by Contractor or any subcontractor (including any licensed engineer or other licensed professional engaged by Contractor for any aspect of this Project) in connection with the Work, together with all other Books and Records, and all rights in the foregoing (including rights of use, copyright, and trademark), shall be and remain the sole and confidential property of LMDC (whether or not LMDC undertakes, terminates, or completes the Work, or this Contract is terminated for any reason whatsoever, with or without cause, and regardless of any disputes between the parties); and, for the avoidance of doubt, Contractor hereby irrevocably and unconditionally assigns all the foregoing to LMDC. Submission or description of any document (whether or not authorized) described in the foregoing sentence to any person or Governmental Authority for purposes of, or in connection with, the Work shall not be construed as publication in derogation of LMDC's rights under this Contract (but this sentence shall not be construed to authorize any submission or description of a document other than as permitted by this Contract).

As a part of and a condition to final completion (or upon any earlier termination of this Contract by either LMDC, or Contractor for any reason whatsoever or at any other time at LMDC's request for any reason), Contractor shall deliver to LMDC a complete set of the Books and Records. Upon prior notice to LMDC from time to time, Contractor shall have access for six (6) years to the Books and Records which are stored by LMDC after completion of the Work under this Contract.

No provision in this Contract giving LMDC a right of access to records and documents is intended to impair or affect any right of access to records and documents which LMDC would have in the absence of such provision.

For purposes of this Article, references to "LMDC" shall be deemed to include the Prior Insurers, the Owner's Representative, the Integrity Monitor and other auditors, the United States Department of Housing and Urban Development ("HUD"), and their authorized representatives.

For the avoidance of doubt, each subcontractor shall also be subject to and bound by the provisions of this Article.

4. EXEMPTION FROM NEW YORK SALES TAXES

LMDC, a subsidiary of Empire State Development Corporation, an urban development corporation, is exempt from the payment of New York State and City sales and use taxes, as provided in Sections 1116(a) and 1230(a) of the New York Tax Law.

LMDC may delegate agency authority to Contractor for the purchase of any materials, equipment or supplies, or the rental of any equipment, required for the performance of the Work, and Contractor hereby expressly consents and accepts such appointment if made.

LMDC will provide Contractor with an exempt organization certificate to comply with the provisions of the New York Tax Law. Contractor shall furnish all subcontractors and other vendors with LMDC's exempt organization certification.

All purchase orders to be issued for the purchase of materials, equipment, and supplies or to be issued for the rental of equipment required to perform the Work shall clearly state that Contractor is acting as the agent of the LMDC and shall specifically identify LMDC as the exempt organization purchaser. Further, the purchases shall be billed or invoiced by the vendor to LMDC or to the Contractor as agent for LMDC.

All property purchased for the Work by Contractor or its subcontractor as agent for the LMDC shall become property of LMDC upon such purchase, and title to such property shall at no time vest on the Contractor or any subcontractor.

The delivery of all materials, equipment and supplies shall be made to the Site; or under certain circumstances (such as where the materials require additional fabrication before installation on the Site or for storage to protect the materials from theft or vandalism prior to use at the Site) deliveries of such materials, equipment and supplies may be made to a place other than the Site, providing the ultimate delivery of such materials, equipment and supplies is made to the Site. Where delivery is made to a place other than the job site, the purchases must be billed or invoiced by the vendor to LMDC or to Contractor as agent, identify the place of delivery, LMDC's full name and address and the Site location where the materials will ultimately be delivered for installation.

The agency created in this Article shall continue until terminated by either LMDC or the Contractor. Such termination shall be effective after three days written notice, in which event neither the Contractor nor any subcontractor shall represent itself as agent for the LMDC, and all subsequent purchase orders shall be modified accordingly. The agency created in this Article is limited to its terms and shall not be construed as having any broader meaning. Any materials, equipment and supplies purchased, rented or leased pursuant to this agency shall be deemed part of the "Work" for purposes of this Contract. This agency shall not be deemed an authorization by LMDC to Contractor to purchase, rent or lease or provide any materials, equipment, tools, or services, except those required for the Work pursuant to this Contract.

5. COORDINATION WITH OTHER CONTRACTORS

LMDC shall not be liable for any damages suffered by Contractor by reason of the failure or refusal of any other contractor or subcontractor promptly to comply with the directives issued by Owner or any construction manager related to coordination or scheduling of the work, including acceleration. Should Contractor sustain any damage resulting from any such failure or refusal of another contractor, Contractor agrees to have no claim against LMDC for such damage but shall have a right to recover such damage from the contractor at fault. Contractor further agrees to accept liability and responsibility to pay for any costs or damages sustained by any other contractor on the Project arising out of Contractor's failure or refusal to comply with directives issued by LMDC related to coordination or scheduling, including

acceleration. Similar provisions establishing the right to recover damages for failure or refusal to comply with the directives of LMDC as set forth above shall be contained in each of LMDC's subcontracts for the Project.

CHAPTER II

ADJUSTMENTS AND PAYMENTS

6. DELETED WORK

If any Work required by the Contract Documents in their present form shall be deleted or reduced, such deletion or reduction shall be reflected in a Change Order issued by LMDC; and, if Contractor and LMDC do not agree on the amount of the reduction in the Lump Sum by reason of such deletion or reduction, Contractor's compensation shall be reduced by an amount equal to the actual cost in money of the labor and materials that would have been required for the deleted or reduced Work (without mark-up), netted against any compensation for Extra Work required by the same change order (for clarification, Extra Work shall be priced in accordance with Article 7; and the adjustment for deleted or reduced Work shall then be subtracted from such computation of Extra Work).

LMDC shall have authority to agree in writing with Contractor for adjustments by way of reduction in the Lump Sum in lieu of those for which provision is heretofore made in this Article.

7. COMPENSATION FOR EXTRA WORK

LMDC and Contractor may agree upon lump sum or other compensation for Extra Work in lieu of the compensation for which provision is hereinafter made in this Article.

If Contractor and LMDC do not agree on a lump sum or other compensation for particular Extra Work, and the Extra Work is performed, the compensation of Contractor and the applicable subcontractor(s) shall be increased solely by an amount equal to the actual net cost in money of the labor and materials required for such Extra Work plus fifteen percent (15%) of such net cost for all overhead, profit and general conditions[1] costs (including all bond and insurance costs) of such Contractor for such Extra Work.

In proposing a lump sum or other compensation for Extra Work for consideration by LMDC, Contractor shall in any event prepare and present to LMDC an estimate of the costs for such Extra Work computed pursuant to the foregoing paragraph to demonstrate the reasonableness of Contractor's proposal.

As used in this Article (and in this Article only):

"Labor" means foremen, surveyors, laborers, mechanics and other employees below the rank of superintendent, exclusive of timekeepers, directly employed at the construction site, whether employed by Contractor or by its subcontractors, subject to LMDC's approval (not to be unreasonably withheld) as to what employees of any category are "required for Extra Work" and as to the portion of their time allotted to Extra Work; and "cost of labor" means the wages actually paid to and received by such employees plus a proper proportion of (a) premiums, if any, actually paid by the employer for workers' compensation insurance upon the basis of such wages, (b) vacation allowances and union dues and assessments which the employer actually pays pursuant to contractual obligation upon the basis of such wages, and (c) taxes

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[1] As used herein, "general conditions" means all labor, materials, expenses and costs incurred by the Contractor (or the subcontractors, as applicable), to execute the Work which is not covered (or intended to be covered) by a subcontract and which has been approved by LMDC in a Change Order.

actually paid by the employer pursuant to law upon the basis of such wages. "Employees" as used above means only the employees of one employer.

"Materials" means temporary and consumable materials as well as permanent materials; and "cost of materials" means the price (including taxes actually paid by Contractor pursuant to law upon the basis of such materials) for which such materials are sold for cash by the manufacturers or producers thereof, or by regular dealers therein, whether or not such materials are purchased directly from the manufacturer, producer or dealer (or if Contractor is the manufacturer or producer thereof, the reasonable cost to Contractor of the manufacture and production), plus the reasonable cost of delivering such materials to the construction site in the event that the price paid to the manufacturer, producer or dealer does not include delivery and in case of temporary materials, less their salvage value, if any.

The hourly rates for Contractor's own labor are given in Annex "3" to the Trade Agreement.

In reference to an item of equipment, if the particular item of equipment is actually utilized at the construction site by Contractor or subcontractors under this Contract on a Saturday, Sunday or legal holiday said day shall be deemed a Work day.

The rental for equipment, whether owned by Contractor or subcontractors or rented from others and notwithstanding the actual price of any rental or actual costs associated with such equipment, shall be computed by LMDC on the basis of the following:

A.

1.) Hourly rental for those items of equipment listed in the "Rental Rate Blue Book" (published by Machinery Information Division, K-III Directory Corporation, 1735 Technology Drive, Suite 410, San Jose, California 95131-2398), (hereinafter called "the Blue Book") shall be 100% of the applicable rates as listed in said book, reduced to an hourly basis (see formula below) except that such applicable rates shall be reduced by 50% for all hours of rental payable hereunder in excess of 8 hours each day. The edition of this publication to be used shall be the one in effect on the date of the actual rental of the equipment. The "Estimated Operating Cost per Hour" as set forth for such item of equipment in the Blue Book shall be added to the hourly rental for each hour that such equipment is actually engaged in performing Extra Work. No amount for operating cost will be allowed during periods when such equipment is not actually engaged in performing Extra Work (i.e., standby rental time). None of the provisions of the Blue Book shall be deemed referred to or included in this Contract except as specifically set forth in this Article.

2.) If no listing of rental rate and/or hourly operating cost for the item of equipment is in the Blue Book, LMDC shall determine the reasonable rate of rental and/or hourly operating cost of the particular item of equipment by such other means as LMDC finds appropriate.

B. When utilizing the rental rates appearing in the Blue Book, LMDC shall determine the applicable rate and the hourly rental determined therefrom by applying the following criteria:

1.) The rate to be applied for an item of equipment used on a particular Extra Work order shall be the daily, weekly or monthly rates from the foregoing publication

based on the total number of Work days or portions thereof that a particular item of equipment or substitute item of equipment is at the construction site for use by Contractor or subcontractors whether under this Contract or any other contract with LMDC. Included within this period will be (i) Work days of idleness of the equipment at the construction site whether such idleness results from acts or omissions of Contractor, LMDC or third persons, breakdowns in the equipment or any other cause, (ii) Work days on which the equipment is removed from the construction site solely to enable the performance of repairs thereon, and (iii) Work days intervening between the removal of equipment from the construction site for repairs and the delivery to the construction site of the same or substitute equipment. The number of Work days in the period for each rate shall be as indicated below:

Three Work days or less.	Daily Rate
More than three Work days but not more than fifteen Work days.	Weekly Rate
More than fifteen Work days.	Monthly Rate

The pro rata portion which one hour bears to the applicable rate shall be determined in accordance with the following formula:

Hourly rate based on daily rental.	1/8 of daily rental from Blue Book
Hourly rate based on weekly rental.	1/40 of weekly rental from Blue Book
Hourly rate based on monthly rental.	1/176 of monthly rental from Blue Book

2.) The rental rate shall be multiplied by the applicable regional adjustment factor shown for such item of equipment in the Blue Book. The adjustment factor shall not apply to the hourly operating cost.

3.) If LMDC should determine that the nature or size of the equipment used by Contractor in connection with Extra Work is larger or more elaborate, as the case may be, than the size or nature of the minimum equipment determined by LMDC to be suitable for the Extra Work, the reasonable rental will not be based upon the equipment used by Contractor but will be based on the smallest or least elaborate equipment determined by LMDC to have been suitable for the performance of the Extra Work, unless Contractor can demonstrate improved economy or scheduling by utilizing such larger or more elaborate equipment.

(a) In the case of equipment utilized only for Extra Work: (a) in addition to amounts determined as provided in subparagraphs A and B above, there will be added to the rental as computed above the taxes on the rental actually paid by Contractor or subcontractor and the reasonable cost of transporting such equipment to and from the construction site, and (b) notwithstanding the number of hours during which such equipment is utilized, the minimum rental therefor will be for a period of eight hours. The rates to be used are the Blue Book rates applicable to work performed in New York City. The Blue Book additions applicable to equipment subject to extraordinarily hard usage are expressly applicable.

In computing Contractor's compensation insofar as it is based upon Extra Work, and notwithstanding any provision to the contrary appearing in the Blue Book, no consideration shall be given to any items of cost or expense not expressly set forth above, it being expressly agreed that the costs and percentage additions hereinbefore provided cover items of cost and expense to Contractor of any type whatsoever, including administration, overhead, taxes (other than those enumerated above), clean-up, consumables including gas and oil, drafting (including printing or other reproduction), coordination, field measurements, maintenance, repairs, insurance, profit to Contractor and small tools.

Whenever any Extra Work is performed, Contractor shall, at the end of each day, submit to LMDC (a) daily time slips showing the name and number of each workman employed on such Work, the number of hours which he is employed thereon, the character of his duties, and the wages to be paid to him, (b) a memorandum showing the rates and amounts of workers' compensation insurance premiums, if any, and state and federal taxes based on such wages, and vacation allowances and union dues and assessments which the employer actually pays pursuant to contractual obligation upon the basis of such wages (c) a memorandum showing the amount and character of the materials furnished for such Work, from whom they were purchased and the amount to be paid therefor, and (d) a memorandum of equipment used in the performance of such Work, together with the rental claimed therefor. Such memoranda and time slips are for the purpose of enabling LMDC to determine the amounts to be paid by LMDC under this Article; and accordingly, they shall constitute a condition precedent to such payment and the failure of Contractor to furnish them with respect to any Work shall constitute a conclusive and binding determination on Contractor's part that such Work is not Extra Work and shall constitute a waiver by Contractor of claims for payment for such Work. In the event that LMDC and Contractor shall agree in writing upon a lump sum or other compensation for Extra Work in lieu of compensation as provided in the second paragraph of this Article, the daily time slips and memoranda required by this paragraph shall not be required subsequent to the date on which such agreement has been reached.

8. MONTHLY PAYMENTS; MONTHLY REPORTS

On or about the first day of each month, Contractor shall furnish to LMDC:

A. a requisition for payment showing the percentage of Work completed during the prior month and for the entire Project to date, itemized separately by line-item according to the Schedule of Values set forth in Annex "2" to the Trade Agreement; **a separate section of the requisition shall show the amount of Extra Work performed during the period covered by the requisition and the compensation due the Contractor under the terms of the applicable Change Order;**

B. a certification by Contractor that the payments so requested are properly due and payable under the Contract;

C. a certification in writing in such form as may be required pursuant to Article 21 hereof that Contractor has paid and caused Contractor's subcontractors to pay at least the prevailing rate of wage and supplements required by such Article;

D. Waivers of lien from Contractor and every subcontractor (in the forms set forth in Exhibit "2") covering all payments to Contractor pursuant to previous requisitions; and

E. any other documents specifically required to be delivered with Contractor's monthly requisition pursuant to this Contract.

LMDC shall pay Contractor the sums determined to be due by LMDC, minus, however, retainage in the amount of five percent (5%) of such sum and minus all prior advances and payments to Contractor or for Contractor's account. LMDC shall pay Contractor the undisputed amount of such retainage after substantial completion has been achieved.

Within seven days of receipt of any sum attributable to Work performed by a subcontractor or materialman or within such later period as is provided in the subcontract or purchase agreement, Contractor shall pay to such subcontractor or materialman (and each of them shall pay their respective subcontractors and Materialmen, as applicable) said sum, less such amount, if any, as Contractor is authorized to retain under the subcontract or purchase agreement. If (i) LMDC receives notice that Contractor has, without LMDC's approval, failed to pay any subcontractor or Materialman an amount properly due to such subcontractor or Materialman from funds previously paid by LMDC to Contractor within such seven day period and (ii) Contractor fails to persuade LMDC (in LMDC's reasonable judgment) that the funds are withheld for good cause, then, within seven days after Notice from LMDC, Contractor shall immediately pay the amount properly due to such subcontractor or Materialman, or (if LMDC so specifies) shall return such funds to LMDC with interest at an annual rate equal to the Prime Rate published by the Wall Street Journal plus one percentage point from the date when due. Subject to the proviso set forth below, LMDC shall thereafter have the right, in its sole discretion, to directly pay any and all subcontractors and Materialmen who perform Work for or furnish material to Contractor in connection with the Work of this Contract; and if LMDC makes any such payments to the applicable Contractor or Materialman, LMDC shall have the right to deduct any and all such payments from any amounts due from LMDC to Contractor pursuant to this Contract. For the avoidance of doubt, any payment made directly by LMDC to a subcontractor or Materialman shall not be construed to place LMDC in privity of contract with such subcontractor or Materialman or release Contractor from any responsibility or other authority under this Contract.

Prior to approving any amount for payment hereunder, LMDC may require that Contractor submit a certification accurately and fully setting forth the total amount due and payable to each subcontractor and supplier for Work performed or materials provided by such subcontractor or supplier in connection with the Work of this Contract. Any payment made by LMDC to a subcontractor or supplier pursuant to the provisions of this Article shall be made in reliance upon such certification and all such payments shall be considered as advances to Contractor of the compensation payable hereunder. No such payment shall relieve Contractor of any of its obligations hereunder.

LMDC is entitled to, and Contractor shall pay to LMDC, any credits, rebates, refunds, discounts, rewards or allowances obtained from any consultant, Subcontractor, vendor, or equipment or material supplier on account of the Work, whether received by Contractor during the performance, or after the completion, of the Work.

Within ten (10) days after signing this Contract, Contractor shall submit to LMDC a listing of all subcontract and material supply agreements entered into by Contractor for the performance of Work required by this Contract. Such listing shall include the names and addresses of each such subcontractor and supplier and the amounts payable under each such agreement. As and when any modifications are made to such agreements or any additional subcontracts or supply agreements are entered into, Contractor shall inform LMDC of such and shall indicate the amounts payable thereunder.

Nothing contained herein shall be deemed to create any additional rights in such subcontractors or suppliers or to alter the rights of LMDC as such are set forth in Article 10 hereof.

On or before the 10th day of each month, Contractor shall deliver to LMDC, with respect to the prior month, the following ("Contractor's Monthly Report"):

1.) a detailed summary of all Change Orders approved by LMDC, and any Change Orders requested by Contractor to date;

2.) any other documents or information which LMDC reasonably requests (including evidence of amounts previously paid or owing to any subcontractor or employee of Contractor);

3.) any other reports or information required under this Contract or by Legal Requirements as of the applicable date or otherwise reasonably requested by LMDC;

4.) a cumulative list of delays to the Work (whether Excusable Delays or otherwise);

5.) a list of all RFIs previously submitted to or by Contractor;

6.) a report of all sales-tax exempt purchases;

7.) the reports required under Schedule C hereto; and

8.) the Section 3 Workforce Report, substantially in the form attached hereto as Exhibit A-1.

It shall be a condition to payment of Contractor's payment requisition for the current month that Contractor has submitted Contractor's Monthly Report for the prior month.

9. FINAL PAYMENT

After the delivery of the Certificate of Final Completion and upon receipt from LMDC of such information as may be required, the Owner's Representative shall certify in writing to LMDC the total compensation earned by Contractor.

Contractor shall thereupon, as a condition to receiving Final Payment: (i) certify to LMDC in writing, in such form as may be required pursuant to Article 21 hereunder, that Contractor has paid and caused Contractor's subcontractors to pay at least the prevailing rate of wage and supplements required by such Article; (ii) furnish to LMDC a sworn statement detailing all outstanding claims of Contractor against LMDC relating to the Work, including the specified liquidated amount sought in satisfaction of each such claim; and (iii) furnish to LMDC a detailed, true, correct, and complete sworn statement of all claims, just and unjust, of subcontractors, Materialmen and other third persons then outstanding and which Contractor has reason to believe may thereafter be made on account of the Work.

Within sixty days after issuance of such certificate of total compensation earned (or within 60 days after receipt of the documents provided for in the immediately preceding paragraph, if required), and after Contractor has delivered to LMDC general releases and final waivers of lien (in form approved by LMDC) from every subcontractor engaged by Contractor for Work under this Contract (and in any event from all parties listed in Contractor's sworn statement as having outstanding claims), LMDC shall pay to Contractor the amount stated in said certificate, less all other payments and advances whatsoever to or for the account of Contractor, except that LMDC shall not subtract amounts for claims against which Contractor is obligated to indemnify LMDC pursuant to this Contract and for which adequate insurance coverage is available, in LMDC's determination, provided that the applicable insurers have agreed in writing with LMDC that such claim(s) is (are) covered by the respective insurance policy and have accepted in writing the obligation to defend the same.

The acceptance by Contractor, or by anyone claiming by or through Contractor, of Final Payment shall be and shall operate as a release to LMDC of all claims and of all liability to Contractor for all things done or furnished in connection with the Contract and for every act and neglect of LMDC and others relating to or arising out of the Contract, including claims arising out of breach of contract, *quantum meruit* and claims based on claims of third persons. No payment, however, final or otherwise, shall operate to release Contractor or Contractor's sureties from any obligations in connection with this Contract or the Performance and Payment Bond.

Contractor's agreement as provided in the immediately preceding paragraph above shall be deemed to be based upon the consideration forming part of this Contract as a whole and not to be gratuitous; but in any event even if deemed gratuitous and without consideration, such agreement as provided in the immediately preceding paragraph above shall nevertheless be effective. Such release shall include all claims, whether or not in litigation and even though still under consideration by LMDC or the Owner's Representative. Such release shall be effective notwithstanding any purported reservation of right by Contractor to preserve such claim. The acceptance of any check designated as "Final Payment" or bearing any similar designation shall be conclusively presumed to demonstrate the intent of Contractor that such payment was intended to be accepted as final, with the consequences provided in this Article, notwithstanding any purported reservation of rights.

Contractor agrees that Contractor shall not be entitled to, and hereby waives any right Contractor might otherwise have to, and shall not seek any judgment whether under this Contract or otherwise for any such Final Payment or for an amount equivalent thereto or based thereon, or for any part thereof, if such judgment would have the effect of varying, setting aside, disregarding or making inapplicable the terms of this Article 9 or have the effect in any way of entitling Contractor to accept such Final Payment or an amount equivalent thereto or based thereon or any part thereof other than in the same fashion as a voluntary acceptance of a Final Payment subject to all the terms of this Contract including this Article 9.

10. WITHHOLDING OF PAYMENTS

If (1) Contractor fails to perform any of Contractor's obligations under this Contract (including Contractor's obligation to LMDC to pay any claim lawfully made against Contractor by any Materialman, subcontractor or Worker or other person which arises out of or in connection with the performance of this Contract or any other agreement with LMDC) or (2) any claim (just or unjust) which arises out of or in connection with this Contract is made against LMDC by any person or entity or (3) any subcontractor of Contractor under this Contract fails to pay any claims lawfully made against such subcontractor by any Materialman, subcontractor, worker or other person which arises out of or in connection with this Contract, or (4) if in the opinion of LMDC any of the aforesaid contingencies is likely to arise; then, in any such event, LMDC shall have the right, in its discretion, to withhold out of any payment (final or otherwise and even though such payment has already been certified as due) such sums as LMDC may deem ample to protect LMDC against delay or loss or to assure the payment of just claims of third persons, and to apply such sums in such manner as LMDC may deem proper to secure such protection or satisfy such claims. All sums so applied shall be deducted from Contractor's compensation due under this Contract. Omission by LMDC to withhold out of any payment, final or otherwise, a sum for any of the above contingencies, even though such contingency has occurred at the time of such payment, shall not be deemed to indicate that LMDC does not intend to exercise its right with respect to such contingency. Neither the above provisions for rights of LMDC to withhold and apply monies nor any exercise or attempted exercise of, or omission to exercise, such rights by LMDC shall create any obligation of any kind to such Materialmen, subcontractors, workmen or other third persons. At such time as (and to the extent that) the cause of a withholding of payment under this Article is removed, LMDC shall pay Contractor the relevant amount so withheld.

Until actual payment to Contractor, Contractor's right to any amount to be paid under this Contract (even though such amount has already been certified as due) shall be subordinate to the rights of LMDC under this Article 10.

CHAPTER III

PROVISIONS RELATING TO TIME

11. [OMITTED]

12. EXTENSIONS OF TIME FOR EXCUSABLE DELAYS

The time provided for completion of any part of the Contract shall be extended (subject, however, to the provisions of this Article 12) only if Contractor is necessarily delayed in completing such part solely and directly by an Excusable Delay (or Excusable Delays) and upon Contractor's compliance with the requirements of this Article.

In any event, even though an Excusable Delay meets all the above conditions, an extension of time for Contractor's performance shall be granted only to the extent that (i) the performance of the Work is actually and necessarily delayed and (ii) the effect of such cause cannot be anticipated and avoided or mitigated by the exercise of reasonable precautions, efforts and measures (including planning, scheduling and rescheduling), whether before or after the occurrence of the cause of such delay, and an extension shall not be granted for a cause of delay which would not have affected the performance of the Contract were it not for Contractor's error, mismanagement, fault, or neglect or for other delay for which Contractor is not entitled to an extension of time.

The period of any extension of time shall be that necessary to make up the time actually lost, subject to the provisions of this Article, and shall be only for the portion of the Work actually delayed. LMDC may defer all or part of its decision on an extension pending LMDC's receipt from Contractor of all information reasonably necessary for LMDC's decision. Contractor shall not be entitled to a separate extension of time for each of several causes of delay operating concurrently but only for the overall delay regardless of the number of causes.

No Work shall be performed outside of Normal Working Hours without LMDC's approval; and, subject to other Excusable Delays, Contractor shall not be entitled to an extension of time if Contractor is unable to complete the Work before the Erection Completion Date performing the Work during Normal Working Hours.

As a condition precedent to any extension of time, Contractor shall give written notice to LMDC within 15 days after the time when Contractor knows or should know of any cause which might under any circumstances result in an Excusable Delay for which Contractor claims or may claim an extension of time (including those causes which LMDC is responsible for or has knowledge of), specifically stating that an extension is or may be claimed, identifying such cause and describing, as fully as practicable at the time, the nature and expected duration of the delay and its effect on the various portions of the Contract. Since the possible necessity for an extension of time may materially alter the scheduling, plans and other actions of LMDC, and since, with sufficient opportunity, LMDC might, if it so elects, attempt to mitigate the effect of a delay for which an extension of time might be claimed, and since merely oral notice may cause disputes as to the existence or substance thereof, the giving of written notice as above required shall be of the essence of Contractor's obligations and failure of Contractor to give written notice within the time, and containing the information, specified above shall be a conclusive waiver of an extension of time in the particular case.

It shall in all cases be presumed that no extension, or further extension, of time is due unless Contractor shall affirmatively demonstrate to the reasonable satisfaction of LMDC that it is so due. To this end Contractor shall maintain adequate records supporting any claim for an extension of time, and in the absence of such records, the foregoing presumption shall be deemed conclusive.

13. [OMITTED]

14. DELAYS TO CONTRACTOR

Except for extensions of time for Excusable Delays due Contractor in accordance with Article 12 and except and unless otherwise specifically provided elsewhere in the Contract, Contractor assumes the risk of all suspensions of or delays in performance of the Contract of every kind whatsoever, regardless of the length thereof, arising from all causes whatsoever, whether or not relating to this Contract, including acts or omissions of LMDC, and its officers, agents, employees and contractors. Subject to Article 12 hereof and other relevant provisions of this Contract, Contractor shall bear the burden of all costs, loss, damage, expenses and liabilities which Contractor may incur in connection with all delays of any nature whatsoever, whether or not provided for in this Contract; and all such delays, costs, expenses and liabilities shall conclusively be deemed to have been within the contemplation of the parties.

Except and unless otherwise specifically provided elsewhere in the Contract, Contractor agrees to make no claim for damages for delay in the Work (or the performance thereof) of any kind whatsoever, whether foreseeable or unforeseeable, and agrees that any such claim shall be compensated for solely by an extension of time to complete performance of the Work when the provisions of Article 12 hereof allow same.

Notwithstanding any provisions of this Contract, whether relating to time of performance or otherwise, LMDC makes no representation or guaranty as to when the Site or any part thereof will be available for the performance of the Contract or as to whether conditions at the Site will be such as to permit the Contract to be performed thereon without interruption or by any particular sequence or method or as to whether the performance of the Contract can be completed by the time required under this Contract or by any other time.

Wherever in connection with this Contract it is required, expressly or otherwise, that LMDC shall perform any act relating to the Contract, including making available or furnishing any real property, materials, or other things, no guaranty is made by LMDC as to the time of such performance and the delay of LMDC in fulfilling such requirement shall not result in liability of any kind on the part of LMDC except only to the extent, if any, that an extension of time may be due as expressly provided for in Articles 12. Moreover, Contractor shall have no right to rescind or terminate this Contract, and Contractor shall have no cause of action under any theory of quasi-contract or *quantum meruit*, by reason of any delay of any kind or duration whatsoever, subject to Contractor's right to terminate under Article 36.

15. CANCELLATION FOR DELAY

If the performance of the Contract or any portion of it shall, in the opinion of LMDC, be materially delayed, whether or not through the fault of Contractor, by any cause which affects Contractor's ability to perform the Contract without affecting to the same degree LMDC's own ability to perform it, either directly or through others, LMDC shall have the right at any time during the existence of such delay to cancel this Contract as to any portion not yet performed, without prejudice to the rights, liabilities and obligations of the parties under this Contract arising out of portions already performed. In the event of

such cancellation, no allowance shall be made for anticipated profits. This provision supplements (and does not restrict) Article 16 hereof.

CHAPTER IV

CONDUCT OF CONTRACT

16. TERMINATION BY LMDC

If at any time it shall be, from the viewpoint of LMDC, impracticable or undesirable in LMDC's sole judgment to proceed with or continue the performance of the Contract or any part thereof, whether or not for reasons beyond the control of LMDC and for any reason or for no reason (i.e., with or without cause), LMDC shall have authority to suspend performance of any part or all of the Contract until such time as LMDC may deem it practicable or desirable to proceed. Moreover, if at any time it shall be, from the viewpoint of LMDC, impracticable or undesirable in LMDC 's judgment to proceed with or continue the performance of the Contract or any part thereof for any reason or for no reason (i.e., with or without cause), LMDC shall have authority to cancel this Contract as to any or all portions not yet performed and as to any materials not yet installed even though delivered. Such cancellation shall be without prejudice to the rights and obligations of the parties arising out of portions already performed. For such cancellation, Contractor shall receive as its entire remaining compensation a cancellation payment consisting of the following: (a) all amounts due but not yet paid Contractor under the Contract for Contractor's Work completed prior to the cancellation date; (b) direct costs of any supplies, materials, machinery, equipment, or other property specially purchased by Contractor or any subcontractor for the Work and not capable of installation or use elsewhere except as a part of the Work under this Contract; (c) other reasonable costs for which Contractor is obligated under non-cancelable agreements, even though Contractor has not yet received delivery or performance of the applicable Work (but limited as though all subcontractors of Contractor have received a cancellation notice effective as of the same date and are bound by similar provisions in the Subcontracts); (d) any reasonable loss sustained by Contractor on other materials or equipment previously purchased for the Work and resold in a commercially reasonable manner for less than the purchase price; and (e) any reasonable documented out-of-pocket direct costs associated with demobilization incurred by Contractor resulting from the cancellation; but (f) no allowance shall be made for mark-up on the foregoing or other profit except that Contractor shall receive 2.5% on the sum of the costs specified in (a) through (e) above to cover administrative costs of cancellation.

17. INTERPRETATIONS AND DISPUTE RESOLUTION

Inasmuch as the public interest requires that the Project to which this Contract relates shall be performed in the manner which LMDC deems best, LMDC shall have authority, in the first instance, subject to this Article 17, to determine what is or is not necessary or proper for or incidental for the Project. In the exercise of this authority, LMDC shall have power to alter the Scope of Work; to require the performance of Work not required by the Contract Documents in their present form, even though of a totally different character from that now required; and to vary, increase and diminish the character, quantity and quality of, or to countermand, any Work now or hereafter required, subject, however, to Articles 7 and 22. Such variation, increase, diminution or countermanding need not be based on necessity but may be based on convenience.

Subject to this Article 17, to resolve all disputes and to prevent litigation prior to completion of the Work, LMDC and Contractor authorize the Interim Arbitrator to decide all questions of any nature whatsoever arising out of, under, or in connection with, or in any way related to or on account of, this Contract (including claims in the nature of breach of Contract or fraud or misrepresentation before or subsequent to

signing of this Contract and claims of a type which are barred by the provisions of this Contract) upon and subject to the terms and conditions in this Article. The Interim Arbitrator's decision may be based on such assistance as the Interim Arbitrator may find desirable. The effect of the Interim Arbitrator's decision shall not be impaired or waived by any negotiations or settlement offers in connection with the question decided, whether or not he participated therein himself, or by any prior decision of others, which prior decisions shall be deemed subject to review, or by any termination or cancellation of this Contract.

All such questions shall be submitted in writing by Contractor to the Interim Arbitrator for his decision, together with all evidence and other pertinent information in regard to such questions, in order that a fair and impartial decision may be made. In any action against LMDC relating to any such question, Contractor must allege in Contractor's complaint and prove such submission, which shall be a condition precedent to any such action. No evidence or information shall be introduced or relied upon in such an action that has not been so presented to the Interim Arbitrator, except to the extent that the party proposing to introduce or rely upon the same establishes that such evidence or information was not reasonably available or reasonably understood to be significant at the time of the proceeding before the Interim Arbitrator. For the avoidance of doubt, Contractor may only invoke the provisions of this Article 17 with respect to disputes with LMDC.

If Contractor or LMDC gives written notice of dispute to the other (or if Contractor or LMDC otherwise dispute any action of the other or of the Interim Arbitrator and they fail to resolve their dispute within 21 days after written notice from one party to the other advising of the dispute and specifying this Article 17), either party may submit a notice of dispute to the Interim Arbitrator. Each such submission to the Interim Arbitrator shall specify in reasonable detail:

(a) the nature of the dispute, or any information or interpretation requested by the party (the "petitioner") giving notice to the Interim Arbitrator:

(b) the date when the petitioner reasonably requires a decision; and

(c) the petitioner's proposed determination to resolve the dispute.

The petitioner shall include with such request all documents and other materials which the petitioner deems relevant. The petitioner shall promptly furnish any other information which the Interim Arbitrator requests in connection with any such matter. The petitioner shall give copies to the other party (the "respondent") of all documents or other materials submitted by the petitioner to the Interim Arbitrator.

The Interim Arbitrator shall review each matter submitted and shall allow the respondent an opportunity to submit a written statement of the respondent's position, together with any documents or materials which the respondent deems relevant (which shall be given to the petitioner). The Interim Arbitrator may also confer with both parties to discuss the dispute and may allow either party to submit a further written statement (or statements) of its position or oral presentation or testimony. In considering or rendering any decision, the Interim Arbitrator shall construe, interpret, and apply the Contract strictly in accordance with its terms. The Interim Arbitrator shall deliver a decision to Contractor and LMDC within 30 days after the parties have submitted their final presentations as above. The decision of the Interim Arbitrator may follow the "baseball" format—that is, the Interim Arbitrator may select either the determination proposed by LMDC or the determination proposed by Contractor without modification; or the Interim Arbitrator may issue a decision based on the Interim Arbitrator's own determination of the relevant issue. Contractor and LMDC shall comply promptly with decisions of the Interim Arbitrator.

Contractor shall not stop Work during the pendency of any dispute nor shall LMDC withhold any undisputed amount which is properly due and payable under the provisions of this Contract.

A surety issuing any Bond with respect to the Contract shall be bound by decisions of the Interim Arbitrator to the same extent as Contractor. Moreover, by issuing its Bond such surety shall be deemed to have agreed that submission of any matter to the Interim Arbitrator, and/or any decision or other action of the Interim Arbitrator, shall not discharge, release, amend, or waive such Bond or any rights of LMDC thereunder.

18. LMDC'S REVIEWS AND INSPECTIONS

Subject to Article 17: (a) in the performance of the Contract, Contractor shall conform to all orders, directions and requirements of LMDC and shall perform the Contract to the satisfaction of LMDC at such times and places, by such methods and in such manner and sequence as required by the Specifications, and the Contract shall at all stages be subject to LMDC's inspection; (b) LMDC shall determine the amount, quality, acceptability and fitness of all parts of the Work and shall interpret the Contract Documents, Specifications and any orders for Extra Work and (c) Contractor shall employ no equipment, materials, methods or men to which LMDC objects, and shall remove no materials, equipment or other facilities from the construction site without permission. Upon request, LMDC shall confirm in writing any oral order, direction, requirements or determination.

Contractor is requested to advise LMDC promptly in writing of questions pertaining to the Work as they arise.

The enumeration herein or in the Contract Documents of particular instances in which the opinion, judgment, discretion or determination of LMDC shall control or in which the Contract shall be performed to LMDC's satisfaction or subject to LMDC's inspection, shall not imply that only the matters of a nature similar to those enumerated shall be so governed and performed, but without exception the entire Contract shall be so governed and so performed.

LMDC has engaged the Owner's Representative to provide project management and owner's representative services with respect to the Contract (all as set forth in separate agreement(s) between LMDC and the Owner's Representative). For the avoidance of doubt, references to "LMDC" in this Agreement shall also be deemed to be references to the Owner's Representative unless specifically stated otherwise. Also, Owner's Representative shall be deemed included in all indemnifications for the benefit of LMDC under the Contract.

19. NOTICE REQUIREMENTS

No claim against LMDC shall be made or asserted in any action or proceeding at law or in equity, and Contractor shall not be entitled to allowance of such claim, unless Contractor shall have complied with all requirements relating to the giving of Notice of the information with respect to such claim as provided in this Article. The failure of Contractor to give such Notice and information as to any claim shall be conclusively deemed to be a waiver by Contractor of such claim, such Notice and information being conditions precedent to such claim. As used herein "claim" shall include any claim arising out of, under, or in connection with, or in any way related to or on account of, this Contract (including claims in the nature of breach of Contract or fraud or misrepresentation before or subsequent to the signing of this Contract and claims of a type which are barred by the provisions of this Contract) for damages, payment or compensation of any nature or for extension of any time for performance of any part of this Contract.

The requirements as to the giving of Notice and information with respect to claims shall be as follows:

A. In the case of any claims for Extra Work, extension of time for completion, idle salaried men and equipment, or any other matter for which requirements are set forth elsewhere in

this Contract as to notice and information, the respective requirements set forth in the applicable provision of this Contract shall apply.

B. In the case of all other types of claim, Notice shall have been given to LMDC, personally, as soon as practicable, and in any case, within five days, after occurrence of the act, omission, or other circumstance upon which the claim is or will be based, stating as fully as practicable at the time all information relating thereto. Such information shall be supplemented with any further information as soon as practicable after it becomes or should become known to Contractor, including daily records showing all costs which Contractor may be incurring or all other circumstances which will affect any claim to be made, which records shall be submitted to LMDC, personally.

The above requirements for Notices and information are for the purpose of enabling LMDC cancel or revise any order, change its plans, mitigate or remedy the effects of circumstances giving rise to a claim or take such other action as may seem desirable and to verify any claimed expense or circumstances as they occur, and the requirements herein for such Notice and information are essential to this Contract and are in addition to any notice required by statute with respect to suits against LMDC.

The Notices and information referred to above are required whether or not LMDC is aware of the existence of any circumstances which might constitute a basis for a claim and whether or not LMDC has indicated it will consider a claim.

No act, omission, or statement of any kind shall be regarded as a waiver of any of the provisions of this Article or may be relied upon as such waiver except only either a written statement signed by LMDC expressly stating that a waiver is intended as to any particular provision of this Article, and more particularly no discussion, negotiations, consideration, correspondence, or requests for information with respect to a claim by any director, officer, employee or agent of LMDC shall be construed as a waiver of any provision of this Article or as authority or apparent authority to effect such a waiver.

Since merely oral notice or information may cause disputes as to the existence or substance thereof, and since notice, even if written, to other persons than LMDC may not be sufficient to come to the attention of the representative of LMDC with the knowledge and responsibility of dealing with the situation, only Notice and information complying with the express provisions of this Article 19 shall be deemed to fulfill Contractor's obligation under this Contract.

20. NON-DISCRIMINATION AND AFFIRMATIVE ACTION; OPPORTUNITY DOWNTOWN PLAN; OTHER LMDC REQUIREMENTS

Contractor shall comply with all terms, covenants, conditions and provisions of Schedule "C" hereto which set forth requirements regarding Non-Discrimination and Affirmative Action as if fully set forth herein; and the same are incorporated herein by reference.

Contractor shall also comply with all requirements set forth in Schedule "A" hereto.

Schedule "F" hereto sets forth the "Opportunity Downtown Plan" which Contractor and LMDC have jointly adopted to reflect the goal and procedures of Contractor to encourage and promote participation in this Project by women-owned, minority-owned, and downtown Manhattan-owned business enterprises and by the categories of individuals described in such plan. The Opportunity Downtown Plan is incorporated herein and compliance therewith will be deemed Contractor's compliance with the requirements of clauses I.5 and II of Schedule "C."

Contractor shall (and Contractor shall cause its subcontractors to) follow LMDC's procedures to confirm that all persons employed on the site are either citizens of the United States or legal aliens with valid work visas.

21. PREVAILING RATE OF WAGE

Contractor shall pay or provide (and shall cause all subcontractors to pay or provide) to Contractor's or subcontractors' Workers, laborers and mechanics (who are employed by Contractor or them to work on an hourly or daily basis at any trade or occupation at or about the construction site or elsewhere in connection with the Work) at least the prevailing rate of wage and supplements for others engaged in the same trade or occupation in the locality in which the Work is being performed as determined by LMDC.

For purposes of this Contract, the prevailing rates of wage and supplements are those established by the Secretary of Labor of the United States pursuant to the Davis-Bacon Act (40 U.S.C.A. 276a) for the locality in which the Work is to be performed. The applicable rates shall be those which are in effect on the date of the signing of this Contract.

The provisions of this Article 21 are inserted in this Contract for the benefit of such Workers, laborers and mechanics as well as for the benefit of LMDC; and if Contractor or any subcontractor shall pay or provide any such Worker, laborer or mechanic less than the rates of wages and supplements above described, such Worker, laborer or mechanic shall have a direct right of action against Contractor or such subcontractor for the difference between the wages and supplements actually paid or provided and those to which she is entitled under this Article. If such Worker, laborer or mechanic is employed by any subcontractor whose subcontract does not contain a provision substantially similar to the provisions of this Article (requiring the payment or provision of at least the above minimum, and providing for a cause of action in the event of the subcontractor's failure to pay or provide such wages and supplements) such Worker, laborer or mechanic shall have a direct right of action against Contractor. LMDC shall not be a necessary party to any action brought by any Worker, laborer or mechanic to obtain a money judgment against Contractor or any subcontractor pursuant to this Article.

Nothing herein contained shall be construed to prevent Contractor or any subcontractor from paying higher rates of wages or providing higher supplements than the minimum hereinbefore prescribed; and nothing herein contained shall be construed to constitute a representation or guarantee that Contractor or any subcontractor can obtain Workers, laborers and mechanics for the minimum herein before prescribed.

In an area of Contractor's office at the Site of the Work which is accessible to Contractor's employees, Contractor shall display printed material setting forth information for the employees of Contractor and Contractor's subcontractors concerning the wage and supplemental benefit requirements set forth in this Article. Contractor shall also cause each of Contractor's subcontractors to display such material in a similarly accessible place in any office which the subcontractor maintains at the Site of the Work.

LMDC may at any time (including with each monthly requisition) request that Contractor and each subcontractor certify in writing that Contractor (and the applicable subcontractor) has paid or provided (and has caused all subcontractors to pay or provide) at least the prevailing rates of wage and supplements required by this Article 21 and Contractor shall comply (and cause its subcontractors to comply) with any such request within ten (10) calendar days of Contractor's receipt thereof. Contractor shall include in Contractor's certification such detail as LMDC may require with respect to hourly wages and supplements actually paid or provided by Contractor or any subcontractor to each of Contractor's or their laborers, Workers and mechanics employed as described in this Article, records of which shall be prepared by Contractor and maintained as required by Article 3 hereof (and Contractor shall cause such records to be prepared and maintained in the same manner by subcontractors). Contractor's certification shall be

executed by a corporate officer, if Contractor is a corporation; a partner, if Contractor is a partnership; a manager, if Contractor is a limited liability company; or the owner, if Contractor is a sole proprietorship.

Contractor's failure to comply with any provision of this Article 21 shall be deemed a substantial breach of this Contract.

22. EXTRA WORK ORDERS

No Extra Work shall be performed except pursuant to a Change Order of LMDC expressly and unmistakably indicating LMDC's intention to treat the Work described therein as Extra Work, subject to the next paragraph.

If Contractor is of the opinion that any Work ordered to be done as Work pursuant to the Contract Documents is instead Extra Work ("Disputed Work"), Contractor shall nevertheless comply with such order, but shall within 72 hours give written notice thereof to LMDC, stating why Contractor deems it to be Extra Work, and shall moreover furnish to LMDC time slips and memoranda as required by Article 7 hereof. Said notice, time slips and memoranda are for the purpose of affording to LMDC an opportunity to verify Contractor's claim at the time and (if Contractor desires so to do) to cancel promptly such order, direction or requirement, of affording to LMDC an opportunity of keeping an accurate record of the materials, labor and other items involved, and generally of affording to LMDC an opportunity to take such action as it may deem desirable in light of Contractor's claims. Accordingly, the failure of Contractor to serve such notice or to furnish such time slips and memoranda shall be deemed to be a conclusive and binding determination on Contractor's part that the direction, order or requirement does not involve the performance of Extra Work, and shall be deemed to be a waiver by Contractor of all claims for additional compensation or damages by reason thereof, such written notice, time slips and memoranda being a condition precedent to such claims. For any Extra Work that is not Disputed Work, Contractor shall not be obligated to perform such Extra Work prior to Contractor's receipt of a written order from LMDC in accordance with the provisions of this Article 22. Contractor shall not stop Work by reason of any dispute as to whether or not a particular task is Extra Work.

23. PERFORMANCE OF EXTRA WORK

The provisions of this Contract relating generally to Work and its performance shall apply without exception to any Extra Work required and to the performance thereof. Moreover, the provisions of the Contract Documents relating generally to the Work and its performance shall also apply to any Extra Work required and to the performance thereof, except to the extent that a written order in connection with any particular item of Extra Work may expressly provide otherwise.

24. ACCESS TO WORK; INSPECTIONS; TESTING

During the progress of the Work through final completion, Contractor shall at all times afford LMDC, the Owner's Representative, ESDC, the Interim Arbitrator, the Prior Insurers, the Demolition Consultant and any other persons designated by LMDC, access to the Work and every reasonable, safe, and proper facility for inspecting or examining all Work at the Site.

Contractor shall conduct all tests or inspections specifically required of Contractor or any of its subcontractors under this Contract (or which are otherwise required by any Laws which place the responsibility for conducting such test or inspection on Contractor). Contractor shall give three days' advance notice of a test or inspection to LMDC or other persons who will be affected by (or who should necessarily or properly be present for) such test or inspection. Contractor shall engage a licensed engineer to conduct or witness any test or inspection which is the responsibility of Contractor under this

Section. Contractor shall give LMDC copies of all field inspection certificates within seven days after Contractor receives the same.

LMDC may at any time conduct (or cause to be conducted) such on-site inspections and such structural, environmental, mechanical, electrical, chemical, or other tests as LMDC deems necessary or desirable to ascertain whether the Work complies with the Contract or for any other reason. LMDC will pay for a test or inspection requested by LMDC as Extra Work, unless such test or inspection reveals a failure of the Work to comply with this Contract or Laws, in which event Contractor shall bear all expenses of such inspection or test.

Contractor shall secure and deliver to LMDC promptly all certificates of inspection, test reports, work logs, or approvals with respect to the Work as and when required by this Contract (or by Laws which place responsibility for the same on Contractor).

25. ASSIGNMENTS AND SUBCONTRACTS; PRE-APPROVED SUBCONTRACTORS

Any assignment or other transfer by Contractor of this Contract or any part hereof or of any of Contractor's rights hereunder or of any monies due or to become due hereunder and any delegation of any of Contractor's duties hereunder without the express consent in writing of LMDC shall be void and of no effect as to LMDC, provided, however, that Contractor may subcontract portions of the Work to such persons as LMDC may, from time to time, expressly approve in writing as set forth below. For each individual or entity proposed by Contractor as a Contractor in addition to those already approved and listed on Annex "1" to the Trade Agreement, Contractor shall submit to LMDC such information as LMDC may reasonably require to ascertain the qualification and experience of the prospective Contractor, including the submission of a completed LMDC Standard Business Background Questionnaire in the form attached hereto as Exhibit "3".

Annex "1" to the Trade Agreement lists all subcontractors of Contractor approved by LMDC as of the signing of this Contract. The forms of agreements between Contractor and any such subcontractor and the hourly rates of such subcontractors shall be subject to LMDC's review and approval, and Contractor shall ensure that such agreements are substantially in the form of this Contract. Further subcontracting by Contractor and/or any subcontractor shall be subject to (a) approval of LMDC in its sole discretion; and (b) qualification by the subcontractor with all documentation, approval and filing requirements which would apply if such subcontractor were seeking to be approved as a direct contractor of the City of New York. Approval of a subcontractor may be rescinded for, among other things, failure of Contractor to furnish the subcontractor's certificate of insurance within the time set forth in Schedule "I" attached hereto.

No consent to any assignment or other transfer, and no approval of any subcontractor, shall under any circumstances operate to relieve Contractor of any of Contractor's obligations; no subcontract, no approval of any subcontractor and no act or omission of LMDC or the Owner's Representative shall create any rights in favor of such subcontractor and against LMDC; and as between LMDC and Contractor, all assignees, subcontractors, and other transferees shall for all purposes be deemed to be agents of Contractor.

If LMDC objects to the performance of any subcontractor, LMDC may give Contractor a written notice of objection that states LMDC's reasons for objection; and Contractor shall take such action as necessary or appropriate to correct and cure the problems in performance by such subcontractor which are the subject of LMDC's Notice. All acts, omissions, and failure or inability to perform by any subcontractor shall be deemed those of Contractor under this Contract.

Each Subcontract shall include a provision under which the subcontractor agrees that the Subcontract shall be assigned to LMDC, at LMDC's written election, upon a termination of Contractor's rights to perform the Contract (such assignment to become effective upon LMDC's giving written notice to the subcontractor) and shall likewise provide that if Contractor's contract is terminated that such Subcontract shall be assigned LMDC (or any replacement construction manager) at LMDC's written election.

26. CLAIMS OF THIRD PERSONS; DISCHARGE OF LIENS

Contractor undertakes to pay all claims lawfully made against Contractor by subcontractors, Materialmen and workmen, and all claims lawfully made against Contractor by other third persons arising out of or in connection with or because of the performance of this Contract and to cause all subcontractors to pay all such claims lawfully made against them.

If any subcontractor, Materialman or any other person claiming to have been employed (directly or indirectly) by or through Contractor or any subcontractor files a lien (unless as a result of LMDC's failure to pay an amount properly due under this Contract), Contractor shall satisfy, remove or discharge such lien at Contractor's expense by bonding, payment or otherwise within thirty (30) days after notice to LMDC of the filing thereof. If Contractor fails to do so, LMDC may satisfy, remove or discharge such lien; and, at LMDC's election:

A. LMDC may deduct the cost thereof (including all applicable fees and costs, including attorney's fees) from Contractor's next succeeding requisition(s) (or may invalidate all or a portion of any previously-approved but unpaid requisitions) until LMDC recoups the total cost thereof; or

B. Contractor shall pay the same to LMDC upon demand.

27. CERTIFICATES OF PARTIAL COMPLETION

If at any time prior to the giving of the Certificate of Final Completion, any portion of the Work has been satisfactorily completed, and if in the judgment of LMDC such portion of the Work is not necessary for the operations of Contractor but will be immediately useful to and is needed by LMDC for other purposes, LMDC may give to Contractor a certificate in writing to that effect (herein called a "Certificate of Partial Completion"), and thereupon or at any time thereafter LMDC may take over and use the portion of the Work described in such Certificate and exclude Contractor therefrom.

The giving of a Certificate of Partial Completion shall not be construed to constitute an extension of Contractor's time to complete the portion of the Work to which it relates in the event that Contractor has failed to complete the same in accordance with the terms of this Contract. Moreover, the issuance of a Certificate of Partial Completion shall not operate to release Contractor or Contractor's sureties from any obligations under or upon this Contract or the Performance and Payment Bond.

28. FINAL COMPLETION

After the satisfactory completion of all Work whatsoever required and the making of such tests and inspections as may be necessary or desirable, LMDC shall give to Contractor a certificate in writing (herein called the "Certificate of Final Completion") certifying that in LMDC's opinion all Work under this Contract, including Extra Work, has been completed in accordance with the Contract Documents, and certifying the date as of which it was so completed.

The giving of the Certificate of Final Completion shall not be construed to constitute an extension of Contractor's time for performance in the event that Contractor has failed to complete the Work in accordance with the terms of this Contract. Moreover, the issuance of the Certificate of Final Completion shall not operate to release Contractor or Contractor's sureties from any obligations under or upon this Contract or the Performance and Payment Bond.

Upon Final Completion, or upon a termination of Contractor's right to perform the Contract, Contractor shall:

A. unless LMDC directly or otherwise takes possession of and uses the same under Article 35, promptly remove from the Project Site all equipment, implements, machinery, tools, temporary facilities of any kind and other property owned, leased, or rented by Contractor or subcontractors (including sheds, trailers, workshops, and toilets), and repair any damage caused by such removal;

B. [omitted];

C. [omitted];

D. complete and comply with all other close-out requirements in the Contract Documents; and

E. promptly cause all employees of Contractor and any subcontractors to vacate the Project Site.

If Contractor fails to comply with any obligation under this Article, LMDC may perform the action contemplated after two (2) Work Days' written notice to Contractor; and, at LMDC's election, LMDC may deduct the entire cost (or any portion thereof) from the unpaid amount due to Contractor; or Contractor shall pay the entire cost (or any portion thereof) upon demand, notwithstanding that any other person or entity may have defaulted in taking similar action or occupied the same areas or otherwise had any responsibility for the condition involved. Contractor shall have no right to further payments under any payment application until Contractor has complied with all obligations under this Article.

29. NO GIFTS, GRATUITIES, OFFERS OF EMPLOYMENT, ETC.; NO MEMORABILIA

During the term of this Contract, Contractor shall not offer, give or agree to give anything of value either to a LMDC employee, agent, job shopper, consultant, construction manager or other person or firm representing LMDC, or to a member of the immediate family (i.e., a spouse, child, parent, brother or sister) of any of the foregoing, in connection with the performance by such employee, agent, job shopper, consultant, construction manager or other person or firm representing LMDC of duties involving transactions with Contractor on behalf of LMDC, whether or not such duties are related to this Contract or any other LMDC contract or matter. Any such conduct shall be deemed a material breach of this Contract.

As used herein, "anything of value" shall include but not be limited to any (a) favors, such as meals, entertainment, transportation (other than that contemplated by the Contract or any other LMDC contract), etc., which might tend to obligate a LMDC employee to Contractor, and (b) gift, gratuity, money, goods, equipment, services, lodging, discounts not available to the general public, offers or promises of employment, loans or the cancellation thereof, preferential treatment or business opportunity. Such term shall not include compensation contemplated by this Contract or any other LMDC contract.

Contractor shall report to LMDC's Investigation Division (212-587-9325) directly and without undue delay any information concerning conduct which Contractor learns may involve: (x) corruption, criminal activity, conflict of interest, gross mismanagement or abuse of authority; or (y) any solicitation of money, goods, requests for future employment or benefit of thing of value, by or on behalf of any government employee, officer or public official, any Contractor employee, officer, agent, subcontractor, Materialman, or labor official, or other person for any purpose which may be related to the procurement of this Contract by Contractor, or which may affect performance of this Contract in any way.

Neither Contractor nor any subcontractor or Materialman, nor any employee of any of them, shall retain any material or items of any kind salvaged from the Building as memorabilia or souvenirs relating to September 11, 2001 or otherwise. (This paragraph shall not be construed, however, to prevent commercial salvage and reuse in accordance with the Contract Documents provided that no aspect of such salvage and reuse makes reference to September 11, 2001).

Contractor shall not communicate (nor permit any subcontractor or Materialman to communicate) with the media, any governmental officials, or any community organization with respect to any aspect of the Work, without the prior written approval of LMDC.

Contractor shall require that all contracts with all subcontractors and Materialmen shall include the provisions set forth in this Article; and Contractor shall be responsible for informing its own principals and employees to the same effect.

CHAPTER V

WARRANTIES MADE AND LIABILITY ASSUMED BY THE CONTRACTOR

30. CONTRACTOR'S WARRANTIES

Contractor represents and warrants to LMDC:

A. That Contractor is financially solvent, that Contractor is experienced in and competent to perform the type of services contemplated by this Contract, that the facts stated or shown in any papers submitted or referred to LMDC by Contractor prior to the signing of this Contract are true, and that Contractor is authorized to perform this Contract;

B. That Contractor has carefully examined and analyzed the provisions and requirements of this Contract and inspected the Building, the Site, and the Building Contents; that from Contractor's own investigations Contractor has satisfied itself as to the nature of all things needed for the performance of this Contract, the general and local conditions and all other matters which in any way affect this Contract or its performance, and that the time available to Contractor for such examination, analysis, inspection and investigations was adequate, including any related to or required by ACM or other Hazardous Materials disclosed by the Characterization or otherwise present in the Building, any other studies of the Building by LMDC or anyone else (including DB or the Prior Insurers), or otherwise; and that Contractor accepts and agrees to bear the risk of the Contract Assumptions;

C. That the Contract is feasible of performance in accordance with all its provisions and requirements and that Contractor can and will perform it in strict accordance with such provisions and requirements;

D. That Contractor has reviewed and is familiar with all Legal Requirements applicable to the Work required of Contractor under this Contract as of the date of the signing of this Contract;

E. That Contractor has substantial experience in performing the type of Work required of Contractor pursuant to this Contract (including all planning, design, and engineering required thereby);

F. That Contractor has planned and adequately provided for the logistics, mobilization, staffing, testing, management, coordination, and other planning and administration as necessary to timely complete the Work as required of Contractor under this Contract;

G. That, as and to the extent that such representation affects Contractor or the performance of Contractor's Work under this Contract, Contractor has made or will make all inspections and investigations of the physical structure, condition and components of the Building; of the Building Contents; of any easements previously disclosed to Contractor in writing; and of plans and other documents delivered to Contractor by LMDC or Owner's Representative which Contractor, in Contractor's judgment, deems necessary or desirable for Contractor's performance of the Work under this Contract;

H. That, as and to the extent that such representation affects Contractor or the performance of Contractor's Work under this Contract, Contractor has made or will make appropriate inquiry of the Metropolitan Transit Authority, any applicable utility companies, and the City of New York as to subsurface or transportation installations, water lines, utility installations or other facilities that may have an impact on the Work;

I. That Contractor has made all reviews and analyses of the Project Documents which Contractor deems necessary or desirable for Contractor's timely performance of the Work as required under this Contract;

J. That no officer, director, agent or employee of LMDC is personally interested directly or indirectly in this Contract or the compensation to be paid hereunder;

K. That, except only for those representations, statements or promises expressly contained in this Contract (including the Contract Documents), no representation, statement or promise, oral or in writing, of any kind whatsoever by LMDC, their respective officers, directors, agents, employees or consultants has induced Contractor to enter into this Contract or has been relied upon by Contractor, including any with reference to: (1) the meaning, correctness, suitability, or completeness of any provisions or requirements of this Contract; (2) the nature, existence or location of materials, structures, obstructions, utilities or conditions, surface or subsurface, which may be encountered at the Building and/or the construction site including ACM and/or other Hazardous Materials; (3) the nature, quantity, quality or size of the materials, equipment, labor and other facilities needed for the performance of this Contract; (4) the general or local conditions which may in any way affect this Contract or its performance; (5) the price of the Contract; or (6) any other matters, whether similar to or different from those referred to in (1) through (5) immediately above, affecting or having any connection with this Contract, the bidding thereon, any discussions thereof, the performance thereof or those employed therein or connected or concerned therewith;

L. That LMDC makes no warranty or representation whatsoever, express or implied, as to the feasibility, constructability or suitability of the Contract Documents. Contractor agrees that the Lump Sum fully and completely compensates Contractor for all Work required to implement the Contract Documents; and

M. That the information provided in the Standard Business Background Questionnaire submitted by Contractor and related documents remain true and accurate as of the date hereof and that Contractor will immediately notify LMDC if there is any material change in the information contained therein.

Each of the foregoing representations is intended to supplement, and not to limit, the other representations and the other provisions of this Contract.

Moreover, Contractor accepts the conditions in, on, and/or about the Building (including all Building Contents) and otherwise at the construction site as they exist or may eventually be found to exist (including the Contract Assumptions) and warrants and represents that Contractor can and will perform the Contract under such conditions and that all materials, equipment, labor and other facilities required because of any unforeseen conditions (physical or otherwise) shall be wholly at Contractor's own cost and expense, anything in this Contract to the contrary notwithstanding.

Nothing in the Contract Documents or any other part of the Contract is intended as or shall constitute a representation by LMDC as to the feasibility of performance of this Contract or any part thereof. Moreover, LMDC does not warrant or represent by any provision of this Contract or the Contract Documents as to time for performance or completion or otherwise that the Contract may be performed or completed by the times required herein or by any other times.

Contractor further represents and warrants that Contractor was given ample opportunity and time and by means of this paragraph was requested by LMDC to review thoroughly all documents forming this Contract (including the Contract Documents) prior to signing this Contract in order that Contractor might request inclusion in this Contract of any statement, representation, promise or provision which Contractor desired or on which Contractor wished to place reliance; that Contractor did so review said documents, that either every such statement, representation, promise or provision has been included in this Contract or else, if omitted, that Contractor expressly relinquishes the benefit of any such omitted statement, representation, promise or provision and is willing to perform this Contract without claiming reliance thereon or making any other claim on account of such omission.

Contractor further recognizes that the provisions of this Article 30 (though not only such provisions) are essential to LMDC's consent to enter into this Contract and that without such provisions, LMDC would not have entered into this Contract.

31. RISKS ASSUMED BY CONTRACTOR

Contractor assumes the following distinct and several risks, whether they arise from acts or omissions of Contractor, of LMDC, or of third persons, or from any other cause, and whether such risks are within or beyond the control of Contractor and/or are known or unknown, and foreseeable or unforeseeable, as and to the extent that such risk affects the Contractor and/or the Contractor's performance of Work pursuant to this Contract:

A. The risk of loss or damage to the Work prior to the rendition of the Certificate of Final Completion (other than Work which must be removed in any event as part of the

Demolition of the Building), provided Contractor shall forthwith secure and make safe such damaged Work for future intended removal;

B. The risk of loss or damage to the structures to be demolished occurring prior to completion of demolition by Contractor if and to the extent that any such structures would not be removed as part of the Demolition (such structures being still included, however, in the term "Work"). In the event of such loss, damage or alterations, Contractor shall nevertheless complete the performance of the Work, including the demolition, without additional cost to LMDC and without compensation for lost salvage value;

C. The risk of claims, loss, liability, damage, expense, fines or penalties, just or unjust, made or asserted by third persons or assessed by courts or Governmental Authorities or entities against Contractor, LMDC or any other Indemnitee on account of injuries (including wrongful death), loss, damage or liability of any kind whatsoever arising or alleged to arise out of or in connection with the performance of the Work (whether or not actually caused by or resulting from the performance of the Work) or out of or in connection with Contractor's operations or presence at or in the vicinity of the construction site and/or the Building, (including claims against Contractor or LMDC for the payment of workers' compensation), whether such claims, loss, liability, damage, expense, fines or penalties are made or assessed and whether such injuries, damage, loss, liability, damage and/or expense are sustained at any time both before and/or after the rendition of the Certificate of Final Completion;

D. The risk of loss or damage to any property of Contractor, and of claims made or asserted against Contractor, LMDC or any other Indemnitee for loss or damage to any property of subcontractors, Materialmen, workmen and others performing the Work, occurring at any time prior to final completion and the removal of such property from the construction site and/or the Building or the vicinity thereof;

E. The risk of locating, dealing with, and removing any and all Building Contents, fixtures, equipment, materials, and/or other conditions of the Building;

F. The risk of price fluctuation;

G. The risk that subsurface soil conditions are inadequate for the proposed scope of cleaning, deconstruction and site Work;

H. Any and all risks associated with the presence of ACM, Hazardous Materials, or COPCs in, on, or about the Building and/or the Building Contents, including any and all potential ACM, Hazardous Materials, or COPC excursions or exceedances (whether in air monitoring or otherwise) existing in the Building and/or the Building Contents and occurring during this Project, and their impacts during the Project;

I. The risk that the exterior of the Building, including any netting, is and/or may become contaminated with any and all Hazardous Materials;

J. The risk of all regulatory and other Governmental Authority delays;

K. The risk of all time delays and cost impacts due to acquiring of drafting of any and all variances, permits, and/ or additional work plans, and final work plan approval required in order to proceed and perform removal of ACM and WTC dust related work;

L. The risk of all delays or extended schedules caused by waste characterization sampling including direct costs, Contractor supervision and labor, general conditions, and overhead and profit. Contractor assumes the risk of delays due to testing of waste materials prior to shipment of said materials from site and that waste materials will have to be stored on site for waste stream testing purposes;

M. Without limiting any matters or subjects covered by A through L above, the risk of claims, loss, liability, damage, expense, tax, fines or penalties, just or unjust, made or asserted by third persons or assessed by courts or governmental agencies or entities against Contractor, LMDC or any other Indemnitee by reason of, or resulting in whole or in part from, Contractor's failure to comply with Legal Requirements; and

N. Loss, liability, damage, expense, tax, fines, or penalties, just or unjust, paid or incurred by LMDC by reason of Contractor's failure to keep, observe, and perform Contractor's obligations under this Contract.

Contractor shall indemnify all Indemnitees (as defined below) against all claims described in subparagraphs A through N above paid or incurred by any of the Indemnitees, or asserted against any of the Indemnitees, and for all expense incurred by any of them in the defense, settlement or satisfaction thereof, including reasonable expenses of attorneys, by reason of the acts, omissions, negligence and/or willful misconduct of Contractor, except to the extent that such indemnity would be precluded by applicable law. If so directed, Contractor shall defend against any claim (including an allegation that an Indemnitee was negligent or engaged in willful misconduct) described above by counsel approved by the Indemnitee, unless and except to the extent that it is established by an initial court order or judgment that the applicable Indemnitee was negligent or engaged in willful misconduct. Nor shall Contractor settle any such claims without the prior written consent of all Indemnitees against whom such claims have been asserted unless the effect of such settlement is to release unconditionally from complete liability every Indemnitee against whom the applicable claim was asserted.

The provisions of this Article 31 shall also be for the benefit of all Indemnitees, so that they shall have all the rights which they would have under this Article 31 if they were named at each place above at which LMDC is named, including a direct right of action against Contractor to enforce the foregoing indemnity.

Neither the issuance of a Certificate of Final Completion nor the making of Final Payment shall release Contractor from Contractor's obligations under this Article 31. Moreover, neither the enumeration in this Article 31 nor the enumeration elsewhere in this Contract of particular risks assumed by Contractor or of particular claims for which Contractor is responsible, nor the securing by Contractor, LMDC, or any Indemnitee of any insurance coverage contemplated under Article 34, shall be deemed (a) to limit the effect of the provisions of this Article 31 or of any other provision of this Contract relating to such risks or claims, (b) to imply that Contractor assumes or is responsible for risks or claims only of the type enumerated in this Article 31 or in any other provision of this Contract, or (c) to limit the risks which Contractor would assume or the claims for which Contractor would be responsible in the absence of such enumerations.

In this Contract "Indemnitees" means LMDC; Empire State Development Corporation ("ESDC"); the Owner's Representative; and each employee, officer, director and consultant of each of them.

32. CERTAIN RIGHTS OF PRIOR INSURERS; NO OTHER THIRD PARTY RIGHTS

LMDC and Contractor hereby agree that the Demolition Consultant shall have the following rights under and with respect to this Contract—that is, the right to:

A. have reasonable access to the Site prior to and during the Demolition;

B. have reasonable access to the Books and Records of the Contractor pertaining to the Contract or the Demolition; and

C. have reasonable access to any test results generated by Contractor or its consultants during the Demolition.

With respect to each of the foregoing, such right shall be subject to (a) any Legal Requirement applicable to LMDC and/or Contractor; and (b) the provision by the Demolition Consultant of reasonable notice prior to seeking the access provided above.

Except as set forth in the foregoing paragraph, nothing contained in this Contract is intended for the benefit of third persons other than LMDC, ESDC and the Port Authority, except to the extent that the Contract specifically provides otherwise by use of the words "benefit" or "direct right of action." LMDC, ESDC and the Port Authority shall be third-party beneficiaries of this Contract.

33. OBLIGATIONS UPON TERMINATION

Upon any termination of Contractor's right to perform this Contract, Contractor shall:

A. stop Work on the date and to the extent specified by LMDC;

B. take all action as necessary (or as LMDC may direct) to protect and preserve all materials, equipment, tools, facilities and other property and Persons;

C. deliver to LMDC correct and complete copies of all Subcontracts, together with a complete and accurate statement of:

1.) the items ordered and not yet delivered pursuant to each agreement;

2.) the expected delivery dates of all such items;

3.) the total cost of each agreement and the terms of payment;

4.) the estimated costs of canceling each agreement; and

5.) sums paid under contracts and all other sums due and outstanding;

D. and, if LMDC so requests (at their respective option), Contractor shall assign to LMDC Contractor's rights under any Subcontracts designated in writing;

E. deliver to LMDC promptly a correct and complete list of all supplies, materials, machinery, equipment and other property previously delivered or fabricated by Contractor or any subcontractor or other person or entity but not yet incorporated into the Work;

F. advise LMDC promptly of any special circumstances which might limit or prohibit cancellation of any Subcontract;

G. give written notice promptly to every surety which has issued a Bond with respect to this Contract (with a copy of each such notice to LMDC);

H. unless LMDC requests an assignment thereof under clause C. above, terminate each Subcontract and make no additional agreements with subcontractors with respect to the Work or this Contract;

I. as directed by LMDC, transfer free and clear title to LMDC by appropriate instruments of title, and deliver to the Project Site (or such other place as LMDC may specify), all property paid for by LMDC;

J. notify LMDC promptly in writing of any legal proceedings against Contractor by any subcontractor relating to the termination of the Work (or any Subcontracts);

K. deliver to LMDC promptly all plans, drawings, manuals, books, records, and other documents which the Contract would otherwise have required Contractor to deliver to LMDC prior to (or upon) Final Completion;

L. give written notice promptly (if required) under each policy of insurance (with a copy of each such notice to LMDC), but continue to maintain all policies of insurance required under this Contract unless and until LMDC directs otherwise; and

M. take such other actions, and execute such other documents, as LMDC may reasonably request to effectuate and confirm the foregoing matters, or as may be necessary or desirable to minimize LMDC's costs, and take no action which will increase any amount payable by LMDC under the Contract.

34. INSURANCE PROCURED BY CONTRACTOR

As part of the Lump Sum, Contractor shall provide and maintain the insurance coverages specified in Schedule "I" hereto upon and subject to the terms and conditions set forth in Schedule "I".

CHAPTER VI

RIGHTS AND REMEDIES

35. RIGHTS AND REMEDIES OF LMDC

LMDC shall have the following rights in the event LMDC shall deem Contractor guilty of a breach of any term whatsoever of this Contract:

A. The right to take over and complete the Work or any part thereof at the expense of Contractor, either directly or through other contractors.

B. The right to cancel this Contract as to any or all of the Work yet to be performed.

C. The right to specific performance, an injunction or any other appropriate equitable remedy.

D. The right to money damages.

The enumeration in this Article or elsewhere in this Contract of specific rights and remedies of LMDC shall not be deemed to limit any other rights or remedies which LMDC would have in the absence of such enumeration; and no exercise by LMDC of any right or remedy shall operate as a waiver of any other of LMDC's rights or remedies not inconsistent therewith or to estop LMDC from exercising such other rights or remedies.

For the avoidance of doubt, the following will be deemed breaches of this Contract:

E. Whether or not the time has yet arrived for performance of an obligation under this Contract:

1.) Contractor gives a written statement to any representative of LMDC indicating that Contractor cannot or will not perform any one or more of Contractor's obligations under this Contract;

2.) any material act or omission of Contractor occurs which makes it improbable at the time that Contractor will be able to perform any one or more of Contractor's obligations under this Contract; and

3.) any suspension of or failure to proceed with any part of the Work by Contractor occurs which makes it improbable at the time that Contractor will be able to perform any one or more of Contractor's obligations under this Contract;

F. Contractor fails to commence the performance of the Work within 15 days of the date hereof, unless the time is extended pursuant to Article 12;

G. Contractor abandons the Work in violation of Contractor's obligations under this Contract;

H. Contractor fails to comply with any Legal Requirements; provided that, (except where such failure to cure will result in an imminent threat to safety or health, in which event Contractor shall comply immediately): (i) LMDC has given Contractor a Notice of such noncompliance; and (ii) Contractor has failed to give Notice to LMDC within five days of the receipt of such Notice of noncompliance describing in reasonable detail Contractor's proposed cure and the time period in which Contractor shall effect such cure, which proposal and time period shall be subject to LMDC's approval; and/or that Contractor thereafter fails to effect such cure in accordance with Contractor's proposal and time period if and as so approved by LMDC;

I. Contractor reduces Contractor's work force to a number which would be insufficient to complete the Work in accordance with the project schedule and Contractor fails, after seven (7) days' written notice from LMDC, to increase the work force to a number sufficient so as to complete the Work;

J. Contractor subcontracts Contractor's rights or obligations hereunder, except as permitted under this Contract; or Contractor assigns this Contract (or any part of Contractor's rights or obligations hereunder) in contravention of this Contract;

K. Contractor fails to secure and maintain all insurance required of Contractor by this Contract;

L. Contractor does not complete the installation and erection of the scaffolding within thirty (30) days of the Erection Completion Date and/or Contractor does not complete the Work within thirty (30) days of the substantial completion date (as extended under Article 12);

M. the unpaid balance of the Lump Sum is clearly insufficient to complete the Work and to pay all liens which are Contractor's responsibility under this Contract (and not yet bonded or discharged), and Contractor fails to confirm in writing, after seven (7) days written notice from LMDC, that Contractor shall complete the Work in accordance with this Contract;

N. Contractor:

1.) seeks, consents to, acquiesces in, or suffers the appointment of, a receiver of all or a material part of Contractor's property or income;

2.) admits in writing Contractor's inability to pay Contractor's debts as they mature;

3.) makes a general assignment for the benefit of creditors;

4.) files a voluntary petition in bankruptcy, or a petition or an answer seeking reorganization or an arrangement with creditors or an advantage under any present or future federal, state or other law relating to bankruptcy, reorganization, insolvency, readjustment of debt, dissolution or liquidation or similar relief; or files an answer admitting the material allegations of a petition filed against Contractor in any proceeding under any such law; and/or

5.) is adjudicated an insolvent or is subject to an involuntary petition in bankruptcy, and such adjudication or filing is not set aside or terminated within thirty (30) days;

O. An attachment is levied or a judgment is executed against all or any material part of Contractor's property or income and the same is not discharged within thirty (30) days;

P. Any statement, certification, or representation of Contractor in this Contract, or any other document submitted by Contractor with respect to the Work or the Contract (or for purposes of securing the Contract) is false, fraudulent, or materially untrue or incorrect when made;

Q. Contractor fails to satisfy, remove, bond, or discharge any lien if, as and when required under this Contract;

R. There occurs a change in Contractor's financial condition which has (or clearly will have) a material adverse effect on Contractor's ability to perform its obligations under this Contract;

S. Contractor (or the chairman or president, or any vice president, treasurer, or any shareholder owning more than twenty percent (20%) of Contractor's issued and outstanding capital stock, or the sole proprietor of Contractor or any general partner or

joint venturer of Contractor) is finally determined to be guilty of a felony related or pertaining to the business activities of Contractor; and/or

T. Except as covered by (E) through (R) above, Contractor materially fails to perform or observe any other term, covenant, condition and provision of the Contract for thirty (30) days after written notice from LMDC specifying the nature of Contractor's failure; provided, however, that if curing or correcting such failure requires Work to be performed, acts to be done, or conditions to be removed which cannot be performed, done, or removed within such thirty (30) days, no breach of this Contract shall be deemed to have occurred if Contractor:

1.) gives written notice to LMDC within such thirty (30) days acknowledging that Contractor intends to take all actions necessary to remedy the matter involved with due diligence;

2.) promptly commences to cure and correct the matter involved; and

3.) cures and corrects the matter involved within a reasonable time, taking into account the relevant circumstances.

If LMDC cancels this Contract as to any or all of the Work for Contractor's breach and if it is determined subsequently for any reason that a breach of the Contract did not occur or that Contractor had cured such breach in a timely manner in accordance with the Contract provisions, then LMDC's cancellation of this Contract shall be deemed to have been an elective termination of the Contract pursuant to Article 16 hereof.

36. RIGHTS AND REMEDIES OF CONTRACTOR

Inasmuch as Contractor can be adequately compensated by money damages for any breach of this Contract which may be committed by LMDC, Contractor expressly agrees that no default, act or omission of LMDC shall constitute a material breach of this Contract entitling Contractor to cancel or rescind it or (unless LMDC shall so direct) to suspend or abandon performance, except as set forth in the third paragraph of this Article.

Contractor shall not bring any legal proceeding against LMDC or any other Indemnitee under the Contract, or with respect to any aspect of the Work, unless Contractor commences same no later than three hundred sixty five (365) days after the earlier of: (a) the issuance of the Certificate of Final Completion; (b) the date on which Contractor's forces leave the Site after completion of Work thereon; (c) any termination of Contractor's right to perform the Work under Articles 15, 16 or 35 hereof; and/or (d) any earlier abandonment of the Project or purported termination by Contractor based upon any alleged default by LMDC. This Article 36 shall not be construed to (a) revive any claim of Contractor previously waived under other provisions of the Contract; (b) release any third-party claim against an Indemnitee and to the extent such claim is based on negligent acts or willful misconduct of an Indemnitee; or (c) to deprive Contractor of any defense in any legal proceeding commenced against Contractor by LMDC or any other person or entity, or of any counterclaim against LMDC or any other person or entity relating to any subject other than LMDC's payments (or non-payment) to Contractor for Work after the expiration of any period (or periods) specified in this Article 36. With respect to any legal proceeding against the Port Authority, Contractor shall not bring any legal proceeding unless Contractor complies with the requirements of Sections 7101 through 7109 of the Unconsolidated Laws of the State of New York.

37. PERFORMANCE OF REMEDIAL WORK

In the exercise of its right to take over and complete Work, or if LMDC terminates this Contract by reason of a breach by Contractor, in either case for which provision is made in Article 35 hereof, LMDC shall have the right to take possession of and use or permit the use of any and all plant, materials, equipment and other facilities provided by Contractor for the purpose of the Work and Contractor shall not remove any of the same from the site of the Work without express permission. Unless expressly directed to discontinue the performance of all Work, or unless LMDC terminates this Contract, Contractor shall continue to perform the remainder thereof in such manner as in no way will hinder or interfere with the portions taken over by LMDC.

In the certificate of total compensation earned, for which provision is made in Article 9 hereof, the certificate shall separately state the amount of Work so performed by LMDC, or incurred by LMDC to engage another contractor or contractors to complete the portion of the Work left unfinished by Contractor upon a termination by LMDC for Contractor's breach of this Contract; shall credit to LMDC the cost thereof; and shall credit to Contractor (as if Contractor had received the same) the compensation earned with respect thereto; and the difference between them shall be payable by Contractor to LMDC, or vice versa as the case may be. If such difference is in its favor, LMDC may deduct it from any moneys due Contractor, and if such moneys be insufficient, the balance thereof shall be payable to LMDC within thirty (30) days of demand therefor (with interest on any balance not paid by such thirtieth day at the annual interest rate specified in Article 10); if in Contractor's favor, it shall constitute part of the Final Payment.

The exercise by LMDC of its right to take over the Work, or to complete unfinished Work after a termination of this Contract for a breach of it by Contractor, shall not release Contractor or Contractor's sureties from any of Contractor's or such sureties' obligations or liabilities under this Contract or the Performance and Payment Bond.

38. NO ESTOPPEL OR WAIVER

LMDC shall not be precluded or estopped by any acceptance, certificate or payment, final or otherwise, issued or made under this Contract or otherwise issued or made by it, the Owner's Representative, or any officer, agent or employee of LMDC, from showing at any time the true amount and character of Work performed, or from showing that any such acceptance, certificate or payment is incorrect or was improperly issued or made; and LMDC shall not be precluded or estopped, notwithstanding any such acceptance, certificate or payment, from recovering from Contractor any damages which it may sustain by reason of any failure on Contractor's part to comply strictly with this Contract, and any moneys which may be paid to Contractor or for Contractor's account in excess of those to which Contractor is lawfully entitled.

Neither the acceptance of the Work or any part thereof, nor any payment therefor, nor any order or certificate issued under this Contract or otherwise issued by LMDC, the Owner's Representative, or any officer, agent or employee of LMDC, nor any permission or direction to continue with the performance of Work, nor any performance by LMDC of any of Contractor's duties or obligations, nor any aid lent to Contractor by LMDC in Contractor's performance of such duties or obligations, nor any other thing done or omitted to be done by LMDC, its directors, officers, agents or employees shall be deemed to be a waiver of any provision of this Contract or of any rights or remedies to which LMDC may be entitled because of any breach thereof, excepting only a resolution of its directors, providing expressly for such waiver. No cancellation, rescission or annulment hereof, in whole or as to any part of the Work, because of any breach hereof, shall be deemed a waiver of any money damages to which LMDC may be entitled

because of such breach. Moreover, no waiver by LMDC of any breach of this Contract shall be deemed to be a waiver of any other or any subsequent breach.

CHAPTER VII

MISCELLANEOUS

39. SUBMISSION TO JURISDICTION

Contractor hereby irrevocably submits to the exclusive jurisdiction of the Supreme Court of the State of New York, New York County and the United States District Court for the Southern District of New York in regard to any controversy (whether arising by reason of commencement of legal proceedings, defense, counter-claims, or otherwise) arising out of, connected with, or in any way concerning this Contract. Contractor agrees that service of process on Contractor in relation to such jurisdiction may be made, at the option of LMDC, either by registered or certified mail addressed to the applicable office as provided for in Article 8 of the Trade Agreement, by registered or certified mail addressed to any office actually maintained by Contractor or by actual personal delivery to Contractor if Contractor be an individual, to any partner if Contractor be a partnership or to an officer, director or managing or general agent if Contractor be a corporation.

Such service shall be deemed to be sufficient when jurisdiction would not lie because of the lack of basis to serve process in the manner otherwise provided by law. In any case, however, process may be served as stated above whether or not it might otherwise have been served in a different manner.

40. PROVISIONS OF LAW DEEMED INSERTED

Each and every provision of law and Article required by law to be inserted in this Contract shall be deemed to be inserted herein and the Contract shall be read and enforced as though it were included therein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion.

41. INVALID CLAUSES

If any provision of this Contract shall be such as to destroy its mutuality or to render it invalid or illegal, then, if it shall not appear to have been so material that without it the Contract would not have been made by the parties, it shall not be deemed to form part thereof but the balance of the Contract shall remain in full force and effect.

42. NON-LIABILITY OF PERSONNEL

No officer, director, agent, or employee of LMDC, ESDC, the Port Authority or the Owner's Representative shall be charged personally by Contractor with any liability or held liable to Contractor under any term or provision of this Contract, or because of its execution or attempted execution, or because of any breach hereof.

43. [OMITTED]

44. MODIFICATION OF CONTRACT

No change in or modification, termination or discharge of this Contract, in any form whatsoever, shall be valid or enforceable unless it is in writing and signed by the party to be charged therewith or such party's duly authorized representative, provided, however, that any change in or modification, termination or discharge of this Contract expressly provided for in this Contract shall be effective as so provided.

SCHEDULE A

CERTAIN LMDC REQUIREMENTS

ARTICLE I

A1.1 [omitted]

A1.2 CONTRACTOR AS INDEPENDENT CONTRACTOR. Except as set forth in Article 4 and notwithstanding any other provision of this Contract, Contractor's status (and that of any subcontractor) shall be that of an independent contractor and not that of an agent or employee of LMDC. Accordingly, neither Contractor nor any subcontractor shall hold itself out as, or claim to be acting in the capacity of, an employee or agent of LMDC.

A1.3 [omitted]

A1.4 APPROVALS OR ACCEPTANCE BY LMDC. Whenever action is to be taken, or approval or acceptance given, by LMDC, such action, approval or acceptance shall be deemed to have been taken or given only if so taken or given by an authorized representative of LMDC, by the official of LMDC who signed this Contract on behalf of LMDC, or by another officer or employee of LMDC duly designated by such signing officer to represent LMDC in connection therewith. LMDC shall notify Contractor in writing of the giving or withholding of each such approval or acceptance within a reasonable period of time. LMDC's acceptance or approval of any specifications, drawings, plans, reports or other materials prepared by Contractor hereunder shall in no way relieve Contractor of responsibility and/or liability for such material.

A1.5 CONFLICT-OF-INTEREST. Contractor represents and warrants that:

(a) Contractor has not now, and will not acquire, any interest, direct or indirect, present or prospective, in the project to which Contractor's work relates or the real estate which is the subject of the project, or in the immediate vicinity thereof and has not employed and will not knowingly employ in connection with work to be performed hereunder any person or entity having any such interest during the term of this Contract.

(b) No officer, employee, agent or director of LMDC shall be permitted by Contractor to share in any benefit to Contractor that arises from Contractor's work hereunder.

(c) Contractor shall not permit any officer, employee, agent or director of LMDC, or any of its subsidiaries to participate in any decision relating to this Contract which affects the personal interest of the aforementioned individuals, or the interests of any corporation, partnership, or association in which those individuals are directly or indirectly interested; nor shall any officer, agent, director or employee of LMDC be permitted by Contractor to have any interest, direct or indirect, in this Contract or the proceeds thereof.

(d) Contractor shall cause, for the benefit of LMDC, every contract or agreement with any Contractor to include the representations contained in subsections (a), (b), (c) of this Section A1.5. Contractor will take such action in enforcing such provisions as LMDC may direct, or, at its option, assign such rights as it may have to LMDC for enforcement by same.

A1.2 NO BROKER. Contractor represents that it has not employed any person, corporation or partnership, to solicit or procure this Contract, and has not made, and will not make, any payment or

agreement for the payment of any commission, percentage, brokerage or contingent fee, or other compensation in connection with the procurement of this Contract.

ARTICLE II

DOCUMENTS AND RECORDS

A.2.1 SUBMISSION AND PRODUCTION OF RECORDS. Please refer to Article 3 of the Contract.

ARTICLE III

PROVISIONS REQUIRED BY LAW

A3.1 CONTRACTOR TO COMPLY WITH LEGAL REQUIREMENTS. Contractor in performing its obligations and in preparing all documents required under this Contract shall comply with Legal Requirements. All provisions required by such Legal Requirements to be included in this Contract shall be deemed to be included in this Contract with the same effect as if set forth in full. Such laws shall include, but are not limited to, the following laws referenced in this Section A3.1.

Contractor shall comply with all applicable HUD guidelines relating to Community Development Block Grant ("CDBG") funding, as modified or waived with respect to LMDC and published by HUD at 67 F.R. 12707 and 67 F.R. 36017. Contractor shall comply with applicable provisions of the Housing and Community Development Act of 1974, as amended, section 434 of the Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 2002 (Public Law 107-73), the 2001 Emergency Supplemental Appropriations Act for Recovery from and Response to Terrorist Attacks on the United States (Public Law 107-38), and other applicable laws, including but not limited to:

(a) Anti-discrimination and Labor Laws, including but not limited to:

(1) The Housing and Urban Development Act of 1968 (12 U.S.C. § 1701u) as supplemented by HUD regulations (24 CFR part 135) with respect to efforts to provide to the greatest extent feasible employment and other economic opportunities to low- and very low-income individuals;

(2) Section 109 of Title I of the Housing and Community Development Act of 1974, as amended;

(3) Nondiscrimination in program administration and activities (29 U.S.C. § 794, 42 U.S.C. § 5309(a) and § 6101 *et seq.*);

(4) Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.*);

(5) Title VIII of the Civil Rights Act of 1968, as amended;

(6) Section 504 of the Rehabilitation Act of 1973;

(7) The Age Discrimination Act of 1975;

(8) Executive Order 11063;

(9) Executive Order 11246 (as amended by Executive Orders 11375, 11478, 12106 and 12086)

(10) The Fair Housing Act (42 U.S.C. §§ 3601-20);

(11) The Copeland "Anti-Kickback" Act (18 U.S.C. § 874) as supplemented in the U.S. Department of Labor ("DOL") regulations (29 CFR parts 1, 3, 5 and 7) with respect to all contracts for construction or repair;

(12) The Davis-Bacon Act (42 U.S.C. § 5310, 40 U.S.C. §§ 276a to 276a-7), as supplemented by DOL regulations (29 CFR part 5), with respect to construction contracts in excess of $2000; and

(13) Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. §§ 327-330) as supplemented by DOL regulations (29 CFR part 5) with respect to construction contracts in excess of $2000, and in excess of $2500 for other contracts which involve the employment of mechanics or laborers.

(b) Safe and Accessible Facilities and Services. Contractor must provide safe and accessible facilities and services in accordance with applicable law, including but not limited to:

(1) Americans with Disabilities Act (42 U.S.C. §§ 4151-4157);

(2) The Lead-Based Paint Poisoning and Prevention Act (42 U.S.C. §§ 4821-4846);

(3) All applicable standards, orders, or requirements issued under section 306 of the Clean Air Act (42 U.S.C. § 1857(h)), section 508 of the Clean Water Act (33 U.S.C. § 1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR part 15); and

(4) Mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Pub. L. 94-163, 89 Stat. 871) (53 FR 8068, 8087, Mar. 11, 1988, as amended at 60 FR 19639, 19642, Apr. 19, 1995).

(c) Privacy Act. Contractor must comply with the Privacy Act (5 U.S.C. § 552a) and ensure that all personal information obtained from the public is handled in compliance with the Privacy Act. Contractor must ensure the minimum required access to any such personal information collected or received from the public and will hire a bonded clerk to ensure compliance with the Privacy Act as to any such information in its possession.

(d) Drug Free Workplace. Contractor shall or shall continue to provide and maintain a drug-free workplace by implementing a workplace drug policy that includes:

(1) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;

(2) Establishing an ongoing drug-free awareness program to inform employees about () the dangers of drug abuse in the workplace, () the grantee's policy of

maintaining a drug-free workplace, () any available drug counseling, rehabilitation, and employee assistance programs; and () the penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

(3) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by subparagraph (1) herein;

(4) Notifying the employee in the statement required by subparagraph (1) herein that, as a condition of employment under the grant, the employee will: () abide by the terms of the statement; and () notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;

(5) Notifying LMDC, in writing, within five (5) calendar days after receiving notice under subparagraph 4(ii) from an employee or otherwise receiving actual notice of such conviction; and

(6) Taking one of the following actions, within 30 calendar days of receiving notice under subparagraph 4(ii), with respect to any employee who is so convicted: (i) taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or (ii) requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency.

(e) Anti-Lobbying. To the best of Contractor's knowledge and belief:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of it, to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement;

If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, it will complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions; and

It will require that the certification language of this paragraph (e) be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

(f) Section 3. The Work to be performed under this Contract is a project assisted under a program providing direct Federal financial assistance from HUD and is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended (12 U.S.C. § 1701u). Contractor shall comply with the following provisions of Section 3:

(1) The Work to be performed under this Contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. § 1701u (Section 3). The purpose of Section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by Section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

(2) Contractor agrees to comply with HUD's regulations in 24 CFR part 135, which implement Section 3. As evidenced by Contractor's execution of this contract, Contractor certifies that Contractor is under no contractual or other impediment that would prevent Contractor from complying with the part 135 regulations.

(3) Contractor agrees to send to each labor organization or representative of workers with which Contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of Contractor's commitments under this Section 3 clause, and will post copies of the notice in conspicuous places at the Project Site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the Section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the Work shall begin.

(4) Contractor agrees to include this Section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. Contractor will not subcontract with any Contractor where Contractor has notice or knowledge that the Contractor has been found in violation of the regulations in 24 CFR part 135.

(5) Contractor will certify that any vacant employment positions, including training positions, that are filled (1) after Contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent Contractor's obligations under 24 CFR part 135.

(6) Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this Contract for default, and debarment or suspension from future HUD assisted contracts.

(7) With respect to Work performed in connection with Section 3 covered Indian housing assistance, section 7(b) of the Indian Self-Determination and Education Assistance Act also applies to the work to be performed under this Contract.

Section 7(b) requires that to the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Contractor is subject to the provisions of Section 3 and Section 7(b) and agrees to comply with Section 3 to the maximum extent feasible, but not in derogation of compliance with Section 7(b).

(8) Contractor will be required to report on its efforts and the results of its efforts to comply with Section 3 on a quarterly basis, utilizing the Section 3 Workforce Report attached hereto as Exhibit A-1.

(g) September 11, 2001 Recovery. Contractor will make efforts to employ for the Work individuals affected by September 11, 2001, specifically, but not limited to, individuals who (a) lost wages from their work below Houston Street due to September 11, 2001, or (b) lived below Houston Street on September 11, 2001 or currently reside there. Contractor shall submit quarterly reports to LMDC substantially in the form attached hereto as Exhibit A-3, regarding its efforts to satisfy its obligations under this clause (g).

A3.2 CONTRACTOR TO OBTAIN PERMITS, ETC. Except as otherwise instructed in writing by LMDC, Contractor shall obtain and comply with all legally required licenses, consents, approvals, orders, authorizations, permits, restrictions, declarations and filings required to be obtained by LMDC in connection with the Work.

ARTICLE IV

OTHER STANDARD PROVISIONS

A4.1 ASSIGNMENT BY LMDC. LMDC may transfer and assign any and all of its rights and obligations under this Contract, including transferring and assigning its rights to Contractor's performance of any or all Work or Services under the Contract Documents, to any partnership, firm, limited liability company, corporation, Governmental Authority, or department or other entity. LMDC shall give Contractor written notice of any such transfer and assignment. Such transfer shall relieve LMDC of any liability or obligation under this Contract from and after the date of such assignment and transfer. (For the avoidance of doubt, this Article specifically permits such an assignment and transfer to any contractor engaged in the abatement and removal of interior materials and/or deconstruction of the Building.)

A4.2 GOVERNING LAW. This Contract shall be construed and enforced in accordance with the laws of the State of New York (without giving effect to principles of conflicts of laws).

A4.3 ENTIRE AGREEMENT/AMENDMENT. This Contract constitutes the entire Contract between the parties hereto and no statement, promise, condition, understanding, inducement, or representation, oral or written, expressed or implied, which is not contained herein shall be binding or valid and this Contract shall not be changed, modified or altered in any manner except by an instrument in writing executed by the parties hereto.

A4.4 CONFIDENTIALITY. Contractor hereby agrees that all data, recommendations, reports and other materials developed in the course of any study or work performed in connection with this Contract are strictly confidential between Contractor and LMDC and Contractor may not at any time reveal or disclose such data, recommendations or reports in whole or in part to any third party without

first obtaining permission from LMDC. Notwithstanding the preceding sentence, Contractor shall cooperate fully with such third parties as LMDC may designate by written request. Such cooperation shall include making available to such parties, data, information and reports used or developed by Contractor in connection with this Contract.

A4.5 ASSISTANCE. Contractor hereby agrees to assist LMDC in its efforts to include the public in the development of the Work, which may include presentations to the local community board(s) and other local civic and community groups and incorporating comments from these groups in the implementation of the Work.

A4.6 LMDC RECOGNITION. Contractor hereby agrees to insure recognition of the role of HUD and of LMDC in the manner provided in Exhibit A-2 attached hereto.

A4.7 SUBCONTRACT PROVISIONS. Contractor shall include the provisions of Articles II and III and this Section A4.7 of this Schedule "A" in every Subcontract or purchase order it awards, specifically or by reference, so that such provisions will be binding upon each of the subcontractors and their subcontractors and vendors.

A4.8 ENVIRONMENTAL CONDITIONS.

(a) Contractor agrees to comply with all Environmental Laws.

(b) Additional Deconstruction Measures. Contractor agrees to meet all commitments included in or as mandated by (1) the World Trade Center Memorial and Redevelopment Plan Record of Decision and Findings Statement (the "ROD"), dated June 2004, (attached hereto as Exhibit A-4) or (2) the Coordinated Construction Act for Lower Manhattan (the "Act") (attached hereto as Exhibit A-5) as relevant to deconstruction activities, including, without limitation, the following:

1. Prior to deconstruction activities, prepare and implement a site-specific Health and Safety Plan (HASP), dust control measures, and contaminated soil and groundwater management plans pursuant to section 3.2.9 of the ROD;

2. All off-road construction equipment of 50 horsepower or greater must be retrofitted to include oxidation catalysts, particulate filters or other best available control technology to reduce air emissions (including, without limitation, particulate emissions) to the lowest extent practicable and must utilize ultra-low sulfur fuel as mandated by the Act and as discussed in section 3.2.20 of the ROD;

3. In order to avoid or minimize adverse effects to historic resources within and adjacent to the Project Site (as defined by the ROD), all deconstruction activities must adhere to any Construction Protection Plans prepared pursuant to section 3.2.20 of the ROD.

(c) Environmental Performance Commitments. To the degree not otherwise provided elsewhere in this Agreement, Contractor agrees to implement the Lower Manhattan environmental performance commitments set forth in Exhibit A-6, attached hereto. Contractor will identify the specific measures implemented and may include additional commitments and specific measures as part of the Project's governmental entities coordination plan, construction environmental plan, design documents, and contracts.

A4.9 **MISCELLANEOUS.** This Schedule A supplements (and is not intended to limit or restrict) the other provisions of the Contract. The parties agree that this Schedule A shall be controlling in the event of any inconsistencies or conflicts between the terms of this Schedule A and any other part of this Contract, subject to Article 20 and Schedule "F" hereof.

EXHIBIT A-1

Section 3 Workforce Report

Type of Report (Check One) / / Total Workforce / / Contract Specific Workforce	
Type of Service (Check One) / / Professional, Construction, Consultant / / Service/ Consultant / / Commodities	
Contractor Name:	Contractor Start Date:
Address:	Reporting Period:
	/ / Quarterly Report / / Semi-Annual Report
Telephone Number	Project Name:
Federal ID NO:	Project Location:
Check One: / / Prime Contractor / / Contractor	County: Zip:
Contract Number:	Product/Services Provided:
Contract Amount:	

Number of Employees

Federal Occupational Category	Total Number of Employees Working on this Project	Low Income Employees Residing in Metropolitan Area	Very Low Income Employees Residing in Metropolitan Area	Low Income Employees Residing in Service Area or Neighborhood in which Project is Located	Very Low Income Employees Residing in Service Area or Neighborhood in which Project is Located	Low Income Employees Participating in Other HUD Programs	Very Low Income Employees Participating Other HUD Programs
Official/Administrator							
Professionals							
Technicians							
Sales Workers							
Office & Clerical							
Craft Workers							
Operatives							
Laborers							
Service Workers							
TOTALS							

Certification:

I, _____ (Print Name) the, _____ (Title) of _____ (Print Company Name) do certify that (i) I have read this Workforce Utilization Report on Section 3 and (ii) to the best of my knowledge, information, and belief the information herein is complete and accurate.

Signature: _____

EXHIBIT A-2

LMDC and HUD Recognition

Please find below guidelines for recognition of HUD and LMDC with respect to the Work. Note, any public information and all of the items below must be approved by LMDC in advance of publication or posting.

Written documents

All written documents for public release must include the following language, unless otherwise specified in writing by LMDC:

1. "This [project] is made possible by funding from the Lower Manhattan Development Corporation, which is funded through Community Development Block Grants from the U.S. Department of Housing and Urban Development."

2. Written documents should also include the LMDC logo and the names of the Governor, Mayor, Chairman of LMDC, and President of LMDC.

Internet information and e-mail information

1. Internet information must include all of the items required for written documentation and a link to LMDC's website.

Offices open to the public providing services funded by LMDC

1. All offices must include a sign including all of the items required for written documentation.

Construction Signs

1. All construction signs must include a sign including all of the items required for written documentation.

2. All construction signs must also include the name of the project, an expected end date for the Work, the name of LMDC and Contractor, and a phone number for the public to call to obtain information about the Work. This must be a phone number maintained by LMDC, Contractor or one of the subcontractors.

EXHIBIT A-3

Workforce Utilization Report on Employees Impacted by September 11, 2001

Type of Report (Check One) / / Total Workforce / / Contract Specific Workforce	
Type of Service (Check One) / / Professional, Construction, Consultant / / Service/ Consultant / / Commodities	
Contractor Name:	Contractor Start Date:
Address:	Reporting Period:
	/ / Quarterly Report / / Semi-Annual Report
Telephone Number	Project Name:
Federal ID NO:	Project Location:
Check One: / / Prime Contractor / / Contractor	County: Zip:
Contract Number:	Product/Services Provided:
Contract Amount:	

Number of Employees

Federal Occupational Category	Total Number of Existing Employees Working on this Project	Total Number of New Employees Hired for this Project	Existing Employees that Lost Job or Wages as a Result of September 11, 2001	New Employees that Lost Job or Wages as a Result of September 11th, 2001	Low-Income Existing and New Employees that Lost Job or Wages as a Result of September 11th, 2001	Moderate-Income Existing and New Employees that Lost Job or Wages as Result of September 11th, 2001	Low-Income Existing and New employees that live below Houston Street	Moderate-Income Existing and New Employees that Live Below Houston Street
Official/Administrator								
Professionals								
Technicians								
Sales Workers								
Office & Clerical								
Craft Workers								
Operatives								
Laborers								
Service Workers								
TOTALS								

Certification:

I, _____ (Print Name) the, _____ (Title) of _____ (Print Company Name) do certify that (i) I have read this Workforce Utilization Report on Employees Impacted by September 11, 2001 and (ii) to the best of my knowledge, information, and belief the information herein is complete and accurate.

Signature: _____

EXHIBIT A-4

RECORD OF DECISION AND FINDINGS STATEMENT

See files on LMDC's website at http://www.renewnyc.com/plan_des_dev/rod_contents.asp.

EXHIBIT A-5

COORDINATED CONSTRUCTION ACT FOR LOWER MANHATTAN

[attached]

EXHIBIT A-6

ENVIRONMENTAL PERFORMANCE COMMITMENTS
SCAFFOLDING CONTRACT

Air Quality:
Use ultra low sulfur diesel fuel in off-road construction equipment with engine horsepower (HP) rating of 50 HP and above.
Use diesel engine retrofit technology in off-road equipment to further reduce emissions. Such technology may include Diesel Oxidation Catalyst / Diesel Particulate Filters, engine upgrades, engine replacements, or combinations of these strategies.
Limit unnecessary idling times on diesel powered engines to 3 minutes.
Locate diesel powered exhausts away from fresh air intakes.
Control dust related to construction site through a Soil Erosion Sediment Control Plan that includes, among other things: a. spraying of a suppressing agent on dust pile (non-hazardous, biodegradable); b. containment of fugitive dust; and c. adjustment for meteorological conditions as appropriate.

Noise and Vibration:
Implement a Construction Environment Plan which reduces noise and vibration
Where practicable, schedule individual project construction activities to avoid or minimize adverse impacts.
Coordinate construction activities with projects under construction in adjacent and nearby locations to avoid or minimize impacts.
Consider condition of surrounding buildings, structures, infrastructure, and utilities where appropriate.
Prepare contingency measures in the event established limits are exceeded.
Develop a materials staging and construction access plan prior to start of construction. Truck staging zones are to be placed for minimum disruption and impact.

Cultural and Historic Resources:
Coordinate with other projects to avoid or minimize interruption in access to cultural and historic sites.
Participate in public information and outreach regarding the project.
Monitor noise and vibration during construction at such sites as appropriate.

Access and Circulation:
Establish a project-specific pedestrian and vehicular maintenance and protection plan.
Promote public awareness through mechanisms such as: a. signage; b. telephone hotline (as may be available); and c. LMDC web site updates.
Ensure sufficient alternate street, building, and station access during construction period.
Communicate regularly with New York City Department of Transportation and Lower Manhattan Construction Command Center regarding construction coordination efforts.

Economic Effects:

Minimize residential and retail impacts by adding appropriate signage for affected businesses and amenities.

Design for the Environment:
Conserving Materials and Resources
Environmentally-friendly Operations & Maintenance
Waste Management and Recycling

SCHEDULE B

[omitted]

SCHEDULE C

LMDC NON-DISCRIMINATION AND AFFIRMATIVE ACTION PROVISIONS

In this Schedule, "Contracting Party" means Contractor and any other parties included below in the definition of "Contracting Party".

I. Policy

It is the policy of the State of New York, Empire State Development Corporation ("ESDC"), and LMDC to comply with all federal, State and local law, policy, orders, rules and regulations which prohibit unlawful discrimination because of race, ethnicity, creed, color, national origin, sex, sexual orientation, age, disability, marital status or status with regard to public assistance, and to take affirmative action to ensure that Minority and Women-owned Business Enterprises (M/WBEs), Minority Group Members and women share in the economic opportunities generated by LMDC's participation in projects or initiatives, and/or the use of LMDC funds.

(1) The Contracting Party represents that its equal employment opportunity policy statement incorporates, at a minimum, the policies and practices set forth below:

(a) Contracting Party shall (i) not discriminate against employees or applicants for employment because of race, ethnicity, creed, color, national origin, sex, sexual orientation, age, disability, marital status, or status with regard to public assistance, (ii) undertake or continue existing programs of affirmative action to insure that all employment practices are free from such discrimination and to insure that Minority Group Members and women are afforded equal employment opportunities without discrimination, and (iii) make and document its conscientious and active efforts to employ and utilize Minority Group Members and women in its workforce on Contracts. Such action shall be taken with reference to, but not limited to, recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff or termination, rates of pay or other forms of compensation, and selection for training or retraining, including apprenticeship and on-the-job training.

(b) At the request of LMDC, the Contracting Party shall request each employment agency, labor union, or authorized representative of workers with whom it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union, or representative does not unlawfully discriminate, and that such union or representative will affirmatively cooperate in the implementation of the Contracting Party's obligations herein.

(2) Upon commencement of the contract services and quarterly thereafter during the term of the Contract, the Contracting Party shall submit to LMDC, a Workforce Employment Utilization Report (Attachment C-1) of the workforce actually utilized on the Contract, itemized by ethnic background, gender, and Federal Occupational Categories or other appropriate categories specified by LMDC. In the case where the Contracting Party's and/or subcontractor's workforce does not change within the quarterly period, the Contracting Party shall so notify LMDC in writing.

(3) The Contracting Party will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice advising the labor union or worker's representative of the Contracting Party's commitments hereunder, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(4) The Contracting Party will, in all solicitations or advertisements for employees placed by or on behalf of the Contracting Party, state that it is an Equal Opportunity or Affirmative Action employer.

(5) The Contracting Party shall provide written or electronic notification to LMDC no later than five days prior to posting notification of procurement for goods, services, and or construction related activities contemplated by this Contract. This notification shall include type of procurement and information on how to obtain bid documents. The Contracting Party shall provide LMDC written or electronic notification no later than five days after award of contract for goods, services, or construction related activities contemplated by this Contract. This notification shall include name of the Contracting Party, contact name and phone number for the Contracting Party, type of services, and contract size. LMDC may publish notification of procurement and award of contract on LMDC's website and in regular mailings to small businesses, minority and women owned organizations, government agencies, and interested individuals. LMDC may facilitate meetings between contractors and the above groups for contracts awarded over $1 million using HUD CDBG funds granted to LMDC. The Contracting Party shall be required to attend these meetings.

The Contracting Party shall include, or cause to be included, the provisions of Articles (1) through (5) above in every Contract or purchase order that it enters into in order to fulfill its obligations under this Contract, in such a manner that such provisions will be binding upon each and every Contracting Party with respect to any Contract or Subcontract.

II. Goals for Minority and Women-Owned Business Enterprise Participation

(a) The Contracting Party is required to use its best efforts to achieve an overall M/WBE participation goal of 20% of the total dollar value of this Contract.

(b) The goal for M/WBE participation in the performance of the work is expressed as a percentage of the contract price.

(c) The total dollar value of the work performed by M/WBEs will be determined as: (i) the dollar value of the work subcontracted to M/WBEs; (ii) where the Contracting Party is a joint venture, association, partnership or other similar entity including one or more M/WBEs -- the contract price multiplied by the percentage of the entity's profits/losses which are to accrue to the M/WBE(s) under the Contracting Party's agreement; or (iii) where the M/WBE is the Contracting Party -- the contract price.

(d) The Contracting Party shall include, or cause to be included, the provisions of Articles (a) through (c) in every Contract or purchase order that it enters into in order to fulfill its obligations under this Contract, in such a manner that such provisions will be binding upon each and every Contracting Party with respect to any Contract or Subcontract.

III. Reporting Requirements

The Contracting Party will permit access to its books, records and accounts, with respect to the Contract, by LMDC for purposes of investigation to ascertain compliance with the provisions herein. Upon request, the Contracting Party shall periodically file, or cause to be filed, reports, substantially in the format attached hereto as Attachments C-1 and C-2 (M/WBE Compliance Report to be filed monthly), with LMDC, detailing compliance with the provisions of these non-discrimination and affirmative action Articles. An owner or officer of the Contracting Party shall certify to the accuracy of the information contained in the reporting documentation.

IV. Non-Compliance and Sanctions

In the event that any Contracting Party fails to use its best efforts to comply with the provisions herein, LMDC may impose such sanctions on the Contracting Party by reason of the failure of the Contracting Party to use best efforts.

Such sanctions that may be imposed and remedies invoked hereunder, shall be considered independent of, or in addition to, sanctions and remedies otherwise provided by law.

ESDC AND LMDC NON-DISCRIMINATION AND AFFIRMATIVE ACTION DEFINITIONS

Affirmative Action

Shall mean the actions to be undertaken by any Contracting Party in connection with any project or initiative to ensure non-discrimination and Minority/Women-owned Business Enterprise and minority/female workforce participation, as set forth in Section II herein, and developed by ESDC or LMDC.

Affirmative Action Officer ("AAO")

Shall mean LMDC's Project Manager-M/WBE Monitoring, or his/her designee, managing the affirmative action program for LMDC in coordination with LMDC's Legal Affairs Department.

Best Efforts - Minority and Women-owned Business Enterprise Participation

Best efforts are not limited to the efforts specified herein, and the role of M/WBE firms are not restricted to that of a subcontractor/subconsultant. Where applicable, M/WBE firms should be considered for roles as prime contractors. Such best efforts shall include at least the following:

(a) Dividing the Work into smaller portions in such a manner as to permit subcontracting to the extent that it is economically and technically feasible to do so;

(b) Actively and affirmatively soliciting bids from qualified M/WBEs, including circulation of solicitations to minority and women's trade associations. Each Contracting Party shall maintain records detailing the efforts made to provide for meaningful M/WBE participation in the work. Such record keeping must include the names and addresses of all M/WBEs contacted and, if a M/WBE is the low bidder and is not selected for such work or portion thereof, the reasons for such decision;

(c) Making plans and specifications for prospective work available to M/WBEs in sufficient time for review;

(d) Utilizing the services and cooperating with those organizations providing technical assistance to the Contracting Party in connection with potential M/WBE participation on the Contract;

(e) Utilizing the resources of LMDC and ESDC's Affirmative Action Unit (AAU) to identify New York State certified M/WBE firms for the purpose of soliciting bids and subcontracts; and

(f) Encouraging the formation of joint ventures, associations, partnerships, or other similar entities, where appropriate, to ensure that the Contracting Party will meet its obligations herein.

(g) The Contracting Party shall remit payment in a timely fashion.

Contract

Shall mean (i) a written agreement or purchase order instrument, or amendment thereto, executed by or on behalf of a Contracting Party, providing for a total expenditure in excess of $5,000 for labor, services,

supplies, equipment, materials or any combination of the foregoing funded in whole or in part with LMDC funds and (ii) any loan or grant agreement funded in whole or in part with LMDC funds.

Contracting Party

Shall mean (i) Contractor and any contractor, subcontractor, consultant, subconsultant or vendor supplying goods or services, pursuant to a contract or purchase order in excess of $1,500, in connection with any projects or initiatives funded in whole or in part by ESDC and/or LMDC and (ii) any borrower or grantee receiving funds from ESDC or LMDC pursuant to a loan or grant document.

Minority Business Enterprise ("MBE")

Shall mean a business enterprise, including a sole proprietorship, partnership or corporation that is: (i) at least fifty-one percent (51%) owned by one or more Minority Group Members; (ii) an enterprise in which such minority ownership is real, substantial and continuing; (iii) an enterprise in which such minority ownership has and exercises the authority to control and operate, independently, the day-to-day business decisions of the enterprise; (iv) an enterprise authorized to do business in the State of New York and is independently owned and operated; and (v) an enterprise certified by New York State as a minority business.

Minority Group Member

Shall mean a United States citizen or permanent resident alien who is and can demonstrate membership in (A) one of the following racial groups: (i) American Indian or Alaska native, (ii) Asian, (iii) Black or African American, (iv) Native Hawaiian or Other Pacific Islander, OR (B) a Hispanic or Latino ethnic group.

Subcontract

Shall mean an agreement providing for a total expenditure in excess of $1,500 between a Contracting Party and any individual or business enterprise, for goods or services rendered in connection with any project or initiative funded in whole or in part with ESDC funds or LMDC with funds from the U.S. Department of Housing and Urban Development.

Women-owned Business Enterprise ("WBE")

Shall mean a business enterprise, including a sole proprietorship, partnership or corporation that is: (i) at least fifty-one percent (51%) owned by one or more citizens or permanent resident aliens who are women; (ii) an enterprise in which the ownership interest of such women is real, substantial and continuing; (iii) an enterprise in which such women ownership has and exercises the authority to control and operate, independently, the day-to-day business decisions of the enterprise; (iv) an enterprise authorized to do business in the State of New York and is independently owned and operated; and (v) an enterprise certified by New York State as woman-owned.

Minority and Women Business Enterprise Listings

The ESDC Affirmative Action Unit (AAU) is available to assist you in identifying M/WBEs certified by the State of New York that can provide goods and services in connection with existing and proposed contracts. If you require M/WBE listings, please call the AAU at (212) 803-3224 or use ESDC's M/WBE database at http://205.232.252.35/

For additional assistance, contact LMDC's Project Manager-M/WBE Monitoring at (212) 962-2300.

MONTHLY EMPLOYMENT UTILIZATION REPORT

(See next page for instructions)

PROJECT NAME:

PROJECT LOCATION:

COUNTY: _____ ZIP:

REPORTING PERIOD: Month

Year

CONTRACTOR START DATE: _____

ESTIMATED COMPLETION DATE:

PERCENT OF JOB COMPLETED *(for reporting period)*:

CONTRACT NO.:

CONTRACT AMOUNT: $

COMPANY EMPLOYMENT DATA

A. TOTAL COMPANY EMPLOYEES *(at the Beginning of project)*		B. TOTAL COMPANY EMPLOYEES *(at the end of project)*		C. NET INCREASE *(applies only to changes, if any, in Company's Employee makeup at the end of project)*			
				TOTAL MALE		TOTAL FEMALE	
Male	Female	Male	Female	C1. EMPLOY-EES	C2. OCCUPA-TIONAL CODES/# OF EMPLOYEES	C3. EMPLOY-EES	C4. OCCUPA-TIONAL CODES/# OF EMPLOYEES
				TOTAL WHITE		TOTAL WHITE	
				TOTAL BLACK		TOTAL BLACK	
				TOTAL HISPANIC		TOTAL HISPANIC	
				TOTAL ASIAN		TOTAL ASIAN	
				TOTAL NATIVE AMERICAN		TOTAL NATIVE AMERICAN	

1. WORKER HOURS OF EMPLOYMENT

BLACK (Not of Hispanic Origin)		1c. HISPANIC		1d. ASIAN or PACIFIC ISLANDER		1e. NATIVE AMERICAN/ ALASKAN NATIVE	
MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE

2. NUMBER OF WORKERS

2a. ALL		2b. MINORITY	
MALE	FEMALE	MALE	FEMALE

3. CONSTRUCTION TRADES

_____ (Print Name), the _____ (Title), do certify that (i) I have read this Monthly Employment Utilization Report and (ii) to the best of my knowledge, information and belief the information contained herein is complete and accurate.

_____ DATE

MONTHLY EMPLOYMENT UTILIZATION REPORT

Instructions for Completion

The Monthly Employment Utilization Report ("MEUR") is to be completed by each subject contractor (both Prime and Sub) and signed by a responsible official of the company. The reports are to be filed by the 5th day of each month during the term of the project, and they shall include the total work-hours for each employee classification in each trade in the covered area for the monthly reporting period. The prime contractor is responsible for submitting its subcontractors report, along with its own. Additional copies of this form may be obtained from Lower Manhattan Development Corp. ("LMDC").

Minority: Includes Blacks, Hispanics, Native Americans, Alaskan Natives, and Asian and Pacific Islanders, both men and women.

1. *Worker Hours of Employment (a-e)*:
   - *a) All Worker Hours*: The total number of male hours, the total number of female hours, and the total of both male and female hours worked under each classification.
   - *b) through e) Minority Worker Hours* The total number of male hours and the total number of female hours worked by each specified group of minority worker in each classification.

2. *Number of Workers (a-b)*:
   - *a) All Workers* Total number of males and total number of females working in each classification of each trade in the contractor's aggregate workforce during reporting period.
   - *b) Minority Workers* Total number of male minorities and total number of female minorities working in each classification, in each trade in the contractor's aggregate workforce during reporting period.

3. *Construction Trade*: Only those construction crafts which contractor employs in the covered area. *Construction Trades include:* Field Office Staff (Professionals and Office/Clerical), Laborers, Equipment Operators, Surveyors, Truck Drivers, Iron Workers, Carpenters, Cement Masons, Painters, Electricians, Plumbers and Other.

Note: LMDC may demand payroll records to substantiate work hours listed on the Monthly Employment Utilization Report, if discrepancies should arise.

OCCUPATIONAL CODES

Officials/Administrators	100
Professionals	110
Technicians	120
Sales Workers	130
Office & Clerical	140
Craft Workers	150
Operatives	160
Laborers	170
Service Workers	180

FORWARD TO:

[insert LMDC's contact person]

SCHEDULE C, Attachment C-2

MBE/WBE COMPLIANCE REPORT
CONSTRUCTION
(to be filed monthly)

PROJECT SPONSOR/DEVELOPER: _____ **LMDC AA REPRESENTATIVE:** David Ridley

ADDRESS: _____

PROJECT NAME: _____

_____

PROJECT START DATE: _____ **PERCENT COMPLETE:**

ACTUAL COMPLETION: _____

TELEPHONE: _____

CONTACT PERSON: _____

Attach M/WBE contract documentation, i.e. executed contracts, signed purchase orders or canceled checks. This report should be completed by an officer of the reporting company, and forwarded to the LMDC with the appropriate documentation.

PRIME CONTRACTOR (Name, Address, Contact Person and Phone)	TYPE OF CONTRACT (Trade/Service)	CONTRACT AMOUNT	SUB CONTRACTOR NO. & AMT.	MBE/WBE SUBCONTRACTOR (Name, Address, Contact Person and Phone)	SCOPE OF SERVICES	AMOUNT CONTRACTED TO MBE/WBE

CERTIFICATION:

I, _____ (Print Name), the _____ (Title), do certify that (i) I have read this Compliance Report and (ii) to the best of my knowledge, information and belief the information contained herein is complete and accurate.

SIGNATURE _____ **DATE**

Forward to:

[insert LMDC's contact person]

SCHEDULE D

[omitted]

SCHEDULE E

[omitted]

SCHEDULE F
OPPORTUNITY DOWNTOWN PLAN

The Lower Manhattan Development Corporation is committed to ensuring that minorities and women participate in the rebuilding of Lower Manhattan.

It is the policy of the Lower Manhattan Development Corporation (LMDC) to comply with all federal, State and local law, policy, orders, rules and regulations which prohibit unlawful discrimination because of race, ethnicity, creed, color, national origin, sex, sexual orientation, age, disability or marital status, and to take affirmative action to ensure that Minority and Women-owned Business Enterprises (M/WBEs), Minority Group Members and women share in the economic opportunities generated by LMDC's participation in projects or initiatives, and/or the use of LMDC funds. LMDC is a subsidiary of the Empire State Development Corporation (ESDC) and applies ESDC's non-discrimination and affirmative action policy to LMDC activities and contracts. The ESDC Affirmative Action Unit (AAU) is available to assist you in identifying M/WBEs certified by the State of New York that can provide goods and services in connection with existing and proposed contracts.

OPPORTUNITY DOWNTOWN PROGRAM HISTORY

In cooperation with Silverstein Properties, Tishman Construction, the Port Authority of New York and New Jersey, the Metropolitan Transportation Authority, the Manhattan Borough President's Office and the City and State of New York, the *Opportunity Downtown –Rebuilding Conference for Minority and Women Business Owners* was held on January 13, 2004 at Pace University to launch this initiative and provide information on contracting opportunities for minority- and women-owned businesses.

Building on the success of the first event, LMDC partnered with the Downtown Alliance, Manhattan Chamber of Commerce, the New York City Department of Small Business Services and the City and State of New York for the March 16, 2004 *Opportunity Downtown: Business to Business Exchange Event* – in an effort to identify and facilitate mutually beneficial procurement opportunities between Lower Manhattan's small businesses and corporations.

On March 31, 2004, LMDC, Non-Traditional Employment for Women, NOW Legal Defense and Education Fund, the Building Trade Employer's Association, and the General Contractor's Association sponsored *Opportunity Downtown: Women Working*. This free informational conference highlighted jobs in construction and the construction trades for women looking to change careers. The event included several hands-on demonstrations and a panel discussion with women who are in the industry. Additionally, an information session provided attendees information and access to pre- apprenticeship and training programs in the trades.

130 LIBERTY STREET

LMDC intends to deconstruct the existing structure at 130 Liberty Street (Project). Contractor will be providing certain services for the Project, as elaborated in this Contract.

LMDC and Contractor agree to coordinate their efforts to achieve the goals of LMDC in incorporating MBE & WBE concerns and to include minority and women employees into the project workforce. This Plan outlines the partnering efforts of LMDC and Contractor to achieve the goals of this Plan.

In accordance with this Plan, Contractor shall use best efforts to meet or exceed the following goals in satisfaction of the applicable opportunity-related provisions included within the Agreement:

- 20% participation of M/WBEs as certified by the State of New York.
- 25% participation of minorities in construction trades on the Project.
- 14% participation of women in construction trades on the Project.

This Plan outlines the terms and conditions of Contractor's obligation to use best efforts to achieve these goals, as well as LMDC's commitment to use best efforts to assist Contractor in achieving these goals.

PART I: Minority and Women Owned Business Enterprises

LMDC and Contractor agree to cooperate in the identification of qualified M/WBEs to be engaged in connection with the Project. The list of qualified M/WBEs will then be a resource to the first tier subcontractors of Contractor. Throughout the process of identifying and establishing a list of enterprises, LMDC and Contractor shall coordinate their efforts. All communication with community groups and other outside organizations shall be through LMDC, unless specifically noted otherwise in this Plan.

1. M/WBE Programs.

LMDC shall arrange and host public M/WBE Programs, solely intended to inform the M/WBE community of the Project and the work and services to be performed in connection with the Project.

In connection with all such M/WBE Programs, Contractor shall:

a.) Participate. Provide an overview of the Project identifying anticipated Project needs (such as contracting and purchasing needs). Such presentation shall include a description of the procurement methods and bidding requirements imposed by each subcontractor involved in the Project. (It is mutually acknowledged that such programs may occur after-hours or on non-work days.)

b.) Provide an M/WBE questionnaire to be completed by each M/WBE seeking to be engaged in connection with the Project.

c.) Be available for one-on-one discussions with individual M/WBEs seeking to be engaged in connection with the Project.

d.) Provide literature to all conference attendees, which shall include the name, contact and other relevant information for Contractor and all other subcontractors engaged in the Project.

e.) At LMDC's request, consent to the inclusion on LMDC website (or in LMDC-prepared literature relating to the Project) of contact information and other relevant information for Contractor and its subcontractors.

2. General Outreach Program

LMDC shall provide to Contractor (and Contractor shall provide to its first tier subcontractors), LMDC's current list of M/WBEs. Contractor shall require all first tier subcontractors to incorporate this information into their individual subcontractor/vendor lists and shall include these entities in their process of securing services.

During the course of the Project, it is expected that additional firms shall express an interest in performing services with respect to the Project. LMDC and Contractor shall promptly notify the other of any such indications of interest received during the Project. Contractor shall require all subcontractors to notify

them of any such indications of interest received during the Project. Contractor shall review such indications of interest and forward Information Questionnaires to each such M/WBE for completion. At LMDC's request, Consultant shall consult with LMDC in such review.

Any M/WBEs added to the list through this subsequent qualification process shall be shared with the first tier subcontractors. The actual inclusion of any such M/WBEs into the Project shall be subject to the terms and conditions of this Plan.

In connection with these general outreach programs, Contractor shall:

a.) Require the first tier subcontractors to provide an outline of the services required for their individual scopes of work and those services to be subcontracted.

b.) Obtain from the first tier subcontractors the names of those M/WBEs which the subcontractors have previously used and those the subcontractors intend to use for the services listed.

c.) Distribute an M/WBE questionnaire to those firms received from the subcontractors and create a consolidated list of firms for the subcontractors to contact for services and to invite to M/WBE programs described hereunder.

d.) With the assistance of LMDC, consolidate any newly identified M/WBEs onto a master list of M/WBEs, which list shall be provided to all first tier subcontractors for use on the Project.

PART II: Minorities And Women in the Workforce

LMDC is committed to ensuring that women and minorities are afforded the opportunity to participate in the workforce. LMDC shall host conferences for recruiting minorities and women who currently serve in the trades or are eligible for apprenticeship programs to participate in the Project.

In consultation with, and with the reasonable assistance of LMDC, Contractor shall:

1) Interact with the local labor unions and organizations in meetings to identify and recruit minority and women to be well represented in the Project workforce.

2) Participate in any conferences held by LMDC to identify minorities and women in the unions or those who are eligible for apprenticeship programs who are interested in participating in the Project. Provide an overview of the Project and the membership procedures for the various unions to be engaged in the Project. (It is mutually acknowledged that such conferences may occur after-hours or on non-work days.)

3) Require at least one responsible party from each first tier subcontractor to participate in all such conferences and meetings.

4) Facilitate introductions between minority and women workers and key personnel from the subcontractors and unions involved in the Project.

5) As requested by LMDC, meet separately with minority and/or women's groups or labor forces to identify potential employment opportunities as they may occur.

6) As requested by LMDC, cooperate with LMDC in advertising and other public information activities aimed at informing minority and women workers as to the time and location of any conferences to be held and any other actions such workers may take to participate in the Project.

SCHEDULE G

[omitted]

SCHEDULE H

[omitted]

SCHEDULE I

CONTRACTOR INSURANCE REQUIREMENTS

1. The required insurance under this Contract means and includes, for Contractor, all coverages described in, and required under, paragraphs 2 through 8 below (the "Required Contractor Insurance").

2. Contractor shall secure and maintain the following coverages, with the following minimum limits of coverage:

(a) workers' compensation insurance as required by Laws for New York or any other states in which Contractor conducts operations for all persons employed in connection with the Work, with additional coverage under the Federal Employers' Liability Act for one million dollars ($1,000,000) each accident;

(b) commercial general liability insurance[2], such insurance to insure against liability for bodily and/or personal injury and death and for property damage in an amount of forty million dollars ($40,000,000), combined single limit (including primary and umbrella coverages), covering and responding to Articles 26 and 31 of this Contract and covering the Project Site and all streets, alleys and sidewalks adjoining or appurtenant to the Project Site, and which shall include:

(i) operations-premises liability;

(ii) completed operations coverage (to be kept in force for not less than two (2) years after completion of the Work);

(iii) broad form contractual liability, including coverage within 50 feet of any railroad property;

(iv) broad form property damage coverage; and

(v) a broad form commercial general liability endorsement (including explosion, collapse, and underground property damage).

(c) comprehensive automobile liability insurance for all owned, non-owned, leased, rented and/or hired vehicles insuring against liability for bodily and/or personal injury and death and for property damage in an amount of two million dollars ($2,000,000), except that with respect to trucks involved in the Work, coverage shall be in an amount of five million dollars ($5,000,000), which may be satisfied out of primary or umbrella coverage.

3. Except as specified for completed operations coverage under paragraph 2(b)(iii) above, Contractor shall maintain all coverages of Required Contractor Insurance from the date of this Contract through Final Completion and thereafter during any period while Contractor and/or any Contractor is

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[2] For all purposes of this Contract, Contractor's liability insurance, as required pursuant to this Schedule "I," shall be effective as of the date of this Contract as if Contractor had commenced full operations under this Contract.

performing any Work (including any warranty or corrective work) or furnishing any services pursuant to the Contract.

4. Contractor shall require that all subcontractors carry workers' compensation insurance, general liability insurance, commercial automobile liability insurance, and property damage insurance on tools and equipment of the same categories as specified in paragraphs 2 and 3 and subject to the coverage amounts specified below; and Contractor shall require each subcontractor to furnish the same documentation of such coverage as required of Contractor hereunder, unless and except as LMDC agrees otherwise in writing. The amount of insurance coverage to be maintained by each subcontractor shall be at least five million dollars ($5,000,000) or such amounts that the Contractor believes are reasonable for the type of Work being performed by each Contractor, subject to LMDC's reasonable approval.

5. Contractor is advised that LMDC does not maintain, nor intend to maintain, any insurance which would cover Contractor's or any Contractor's temporary plant and equipment used in connection with the Work. Accordingly, Contractor assumes all risk of damage or loss to such plant and equipment and releases LMDC from any and all liability in connection with any damage or loss to any such plant and equipment.

6. Each insurance policy of Required Contractor Insurance (including policies for subcontractors) shall contain the following (whether or not requiring additional premium):

(a) an agreement by the insurer that such policy shall not be cancelled, denied renewal (including cancellation or non-renewal for non-payment of premium), amended, or any coverages reduced, without at least thirty (30) days prior written notice by mail to LMDC (with copies to ESDC and Owner's Representative) at the address specified in this Contract;

(b) policy language or an endorsement providing for cross liability/severability of interests of all insured parties;

(c) an endorsement designating LMDC and all other Indemnitees as additional insureds (except for the coverage required pursuant to paragraph 2(a));

(d) ISO endorsement CG 24 14 11 85 relating to the insurer's waiver of the right to assert governmental immunity; and

(e) a provision that a notice of accident or claim to the insurer by LMDC shall be deemed notice by all insureds under the policy.

All insurance policies required to be maintained by Contractor shall be primary protection for losses due to the Contractor's operations, and no Indemnitee shall be called upon to contribute to any loss.

7. Contractor and each subcontractor shall deliver to LMDC certificates of insurance evidencing the Required Contractor Insurance with evidence of payment of premiums provided by the insurers, before bringing any personnel, materials, or equipment to the Project Site, or otherwise commencing the Work, whether on the Project Site, or elsewhere. Not later than five (5) days before any renewal premiums become due, Contractor shall deliver endorsements or other evidence of the renewal of all insurance.

8. All the foregoing coverages shall be evidenced by valid and enforceable policies issued by a company or companies which are licensed to do business in the State of New York and having Best's Ratings of "A-" and "14" or better (or which are otherwise reasonably acceptable to LMDC, such

acceptance to be in writing). All liability insurance required to be provided and kept in force under this Schedule shall be written on the "occurrence" basis.

9. At the request of any insured, certified copies of original policies shall be submitted by the Contractor and each Contractor.

NOTE: Subject to the requirement below, Contractor is responsible at Contractor's expense, for securing any contractor pollution liability insurance policy (or similar coverage) which Contractor may deem necessary or desirable to cover Contractor, its subcontractors, and all their employees for all Work under this Contract and all activities, acts, or omissions relating to the building or the Project. Contractor agrees that LMDC will not include Contractor or its subcontractors on any contractor pollution liability insurance, pollution legal liability insurance, or similar coverage; and Contractor and its subcontractors agree not to seek any such coverage or protection from LMDC. It is a requirement of this Contract, however, that Contractor obtain for itself and its subcontractors construction pollution liability coverage of at least $5,000,000, naming LMDC as an additional insured.

SCHEDULE J

REQUIREMENTS FOR PROPOSED WASTE SITES AND WASTE TRANSPORTERS

Contractor shall provide the following information to LMDC for each proposed waste site:

(1) Standard Business Background Questionnaires ("SBBQs"), including FEIN number;

(2) The identity of the type of waste going to each facility as well as an estimate of the waste volume;

(3) All necessary permit information (under Part 360 of the New York State solid waste regulations (6 NYCRR 360) or its functional equivalent for facilities outside of New York State or otherwise) establishing that the facility is properly licensed to accept the proposed waste;

(4) A copy of the facility's requirements for waste acceptance;

(5) A copy of the facility's standard form of contract;

(6) Insurance coverage information (including name of insurers, policy numbers, policy summaries, and limits of liability) for the facility; and

(7) A suitable representation from the facility certifying that the facility assumes control and liability for the proper management and disposal of the waste received and a release and indemnity of LMDC from all related liabilities.

Contractor shall provide the following information to LMDC for each proposed transporter:

(1) SBBQs, including FEIN number;

(2) The identity of the type of waste the transporter will be shipping and the facility to which it will travel as well as an estimate of the waste volume;

(3) All waste transporter permits (under Part 364 or otherwise) establishing that the transporter is licensed to transport the proposed waste;

(4) Department of Transportation registration for each state through which the waste will be transported;

(5) A copy of the transporter's standard form of contract and bill of lading;

(6) Insurance coverage information (including name of insurers, policy numbers, policy summaries, and limits of liability) for the transporter;

(7) A suitable representation from the transporter certifying that the transporter assumes control and liability for the proper shipment of the waste received and a release and indemnity of LMDC from all related liabilities; and

(8) All of the following: (a) tractor and trailer titles, registrations, proof of inspection, and over weight permits (where applicable) and (b) copies of the drivers licenses of the proposed drivers to insure they have an appropriate license with any required HAZMAT or other necessary certification.

EXHIBIT 1

PERFORMANCE AND PAYMENT BONDS

EXHIBIT 1-A

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS that we, the undersigned Contractor, a corporation organized under the laws of the State of _____, and surety company, as principal and surety, respectively,

Contractor _____ Surety _____

are hereby held and firmly bound unto _____ (hereinafter called "LMDC") and its heirs, executors, administrators and successors in the penal sum of _____ Dollars and zero Cents ($_____), for the payment of which sum of money, well and truly to be made, we and each of us hereby jointly and severally bind ourselves, our heirs, representatives, executors, administrators, successors and assigns.

Signed this _____ day of _____ 2005

The condition of the above obligation is that:

WHEREAS, the above named principal (referred to herein as "principal" and/or "Contractor") has entered into a contract with LMDC dated as of _____ ___, 2005, a copy of which contract is by reference made a part hereof and is hereinafter referred to as the "Trade Contract," and

WHEREAS, LMDC has required this bond for the faithful performance of the Work (as defined in the Trade Contract) to be performed under the Trade Contract;

NOW THEREFORE, if the said principal shall promptly, well and faithfully do and perform the Work agreed by such principal to be done and performed according to the terms and true intent and meaning of the Trade Contract, then this obligation shall be void, otherwise to remain in full force and effect. It is expressly understood and agreed that the aggregate liability of the surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as hereinbefore stated.

In the event that LMDC terminates the Trade Contract as a result of Contractor's breach of the Trade Contract, the surety shall:

(a) complete all Work in accordance with the terms, covenants, conditions and provisions of the Trade Contract, or

(b) obtain a bid or bids for completing the Work from bidders satisfactory to LMDC and, upon a determination by LMDC and the sureties of the lowest responsible bid, arrange a contract between LMDC and such bidder upon terms and conditions satisfactory to LMDC (hereinafter referred to as a "Completion Contract"); and the surety shall make available as work progresses under a Completion Contract sufficient funds to pay the cost of completion of the Work thereunder, less the Balance of the Contract Price; but not exceeding, including all other loss and expense for which the sureties may be liable under this bond, the penal sum. The term "Balance of the Contract Price" shall mean the Lump Sum under the Trade Contract less all amounts previously paid to Contractor.

The term "Work" as used herein shall have the same meaning as in the Trade Contract.

Surety shall be bound by decisions of the Interim Arbitrator to the same extent as Contractor. Surety agrees that submission of any matter to the Interim Arbitrator, and/or any decision or other action of the Interim Arbitrator, shall not discharge, release, amend, or waive this Performance Bond or any rights of LMDC thereunder.

Any suit by LMDC under this bond must be instituted before the earlier of: (a) the expiration of two (2) years from the date of substantial completion of the Work, or (b) two (2) years after the principal ceased performing the Work under the Trade Contract. If the limitation set forth in this bond is void or prohibited by law, the minimum period of limitation available to the surety as a defense in the jurisdiction of the suit shall be applicable, and said period of limitation shall be deemed to have accrued and shall commence to run no later than (y) the date of substantial completion of the Work or (z) the date the principal ceased performing Work, whichever occurs first.

The surety, for value received, hereby stipulates and agrees that its obligations under this bond shall be in no way impaired or affected by any extensions of time, modification, omission, addition or change in or to the Trade Contract, or by any supervision or inspection or omission to supervise or inspect the Demolition; and said surety does hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, or waivers.

The amount of this bond shall be reduced by and to the extent of any payment or payments made by surety in good faith hereunder whether made directly to LMDC or otherwise in discharge of principal's obligations. **No demand made under this bond shall constitute a waiver of the right of LMDC to make a subsequent demand under this bond, provided, however that** the surety's liability hereunder to LMDC is limited, singly, or in the aggregate, to the penal sum of the bond set forth herein. This bond shall not afford coverage for any liability of the principal for tortious acts, whether or not said liability is direct or is imposed by the Trade Contract, and shall not serve as or be a substitute for or supplemental to any liability or other insurance required by the Trade Contract.

This bond shall be governed by, and construed in accordance with, the laws of the State of New York, without giving effect to conflict of law principles.

[SIGNATURE PAGE FOLLOWS THIS PAGE]

IN WITNESS WHEREOF, the principal and the sureties have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Principal: _____

By: _____
Name:
Title:

(Seal)

Surety: _____

By: _____
Name:
Title:

APPROVED AS TO ACCEPTABILITY OF SURETY:

[LMDC]

By: _____
Name:
Title:

ACKNOWLEDGMENT OF PRINCIPAL

State of _____
_____ SS:
County of _____

On this _____ day of _____, 20 , before me personally came and appeared _____ to me known, who being by me duly sworn, did depose and say that he resides at _____; that he is the _____ of _____ _____ the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation, and that he signed his name thereto by like order.

(Seal) _____

AFFIX ACKNOWLEDGMENT AND JUSTIFICATION OF SURETY

EXHIBIT 1-B

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS that we, the undersigned Contractor, a corporation organized under the laws of the State of _____, and surety company, as principal and surety, respectively,

Contractor _____ Surety _____

are hereby held and firmly bound unto _____ (herein called "LMDC") and its heirs, executors, administrators and successors in the penal sum of _____ Dollars and zero Cents ($_____), for the payment of which sum of money, well and truly to be made, we and each of us hereby jointly and severally bind ourselves, our heirs, representatives, executors, administrators, successors and assigns.

Signed this _____ day of _____ 2005

The condition of the above obligation is that:

WHEREAS, the above named principal (referred to herein as "principal" and/or "Contractor") has entered into a contract with LMDC dated as of _____ ___, 2005, a copy of which contract is by reference made a part hereof and is hereinafter referred to as the "Trade Contract," and

WHEREAS, LMDC has required this bond for the prompt payment of all lawful claims of Claimants arising out of the performance of the Trade Contract;

NOW THEREFORE, if the said principal shall promptly, well and faithfully pay all amounts due from principal according to the terms and true intent and meaning of the Trade Contract, and if all lawful claims of Claimants arising out of the performance of the Work under the Trade Contract are paid, then this obligation shall be void, otherwise to remain in full force and effect. It is expressly understood and agreed that the aggregate liability of the surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as hereinbefore stated.

Every Claimant who has not been paid all monies due to such Claimant for Labor or Materials furnished by such Claimant may sue on this bond for the use of such Claimant, prosecute the suit to final judgment for such sum or sums as may be justly due Claimant, and have execution thereon. LMDC shall not be liable for the payment of any costs or expenses of any such suit. A "Claimant" is any person who has furnished Labor or Material to the Contractor or to a subcontractor of the Contractor in the prosecution of the Work. "Labor" shall include all wages and compensation for labor performed. "Materials" shall include all materials and supplies (whether or not incorporated in the Work), as well as machinery and equipment rented or purchased for the Work. Labor and Materials shall include, also, water, gas, power, light, heat, oil, gasoline, telephone, and other utilities. "Work" shall have the same meaning as in the Trade Contract.

The above-named principal and surety hereby jointly and severally agree with LMDC that every Claimant as herein defined who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such Claimant's work or labor was done or performed or materials were furnished by such Claimant, may bring suit on this bond, prosecute the suit to final judgment for the

amount due under Claimant's contract for the labor and/or materials supplied by the Claimant which were used, consumed or incorporated in the performance of the Work, and have execution thereon; provided, however, that a Claimant having a direct contractual relationship with a subcontractor of the principal shall have a right of action on this bond only if said Claimant notifies the surety in writing of its claim within ninety (90) days from the date on which said Claimant did or performed the last labor and/or materials for which the claim is made. LMDC shall not be liable for the payment of any costs or expenses of any such suit.

Surety shall be bound by decisions of the Interim Arbitrator to the same extent as Contractor. Surety agrees that submission of any matter to the Interim Arbitrator, and/or any decision or other action of the Interim Arbitrator, shall not discharge, release, amend, or waive this Payment Bond or any rights of LMDC thereunder.

No suit or action shall be commenced hereunder by any Claimant (a) after the expiration of the earlier of: (1) one year after the day on which the Claimant last supplied the labor and/or materials for which the claim is made; or (b) the limitation period set forth in the public works bond statutes, if any, in the location where the Work is being performed. Any limitation contained in this bond which is prohibited by any law controlling in the state where the suit is filed shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by the law of that state; and other than in a state court of competent jurisdiction in the county or other political subdivision of the state in which the project, or any part thereof, is situated, or in the United States District Court for the district in which the project, or any part thereof, is situated, and not elsewhere.

This undertaking is for the benefit of all Claimants having lawful claims arising out of the performance of said Contract, and all such Claimants shall have a direct right of action upon this bond.

The surety shall give the General Counsel of LMDC written notice of surety's payment of any claim of a Claimant hereunder, within ten (10) days of the date of such payment, at the following address: General Counsel, Lower Manhattan Development Corporation, One Liberty Plaza, New York, NY 10006.

The surety, for value received, hereby stipulates and agrees that its obligations under this bond shall be in no way impaired or affected by any extensions of time, modification, omission, addition or change in or to the Trade Contract, or by any supervision or inspection or omission to supervise or inspect the Demolition, or by any payment thereunder before the time required therein; and said surety does hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, payments, or waivers.

The amount of this bond shall be reduced by and to the extent of any payment or payments made by surety in good faith hereunder to any Claimant(s). The surety's liability hereunder to all Claimants is limited, singly, or in the aggregate, to the penal sum of the bond set forth herein. This bond shall not afford coverage for any liability of the principal for tortious acts, whether or not said liability is direct or is imposed by the Trade Contract, and shall not serve as or be a substitute for or supplemental to any liability or other insurance required by the Trade Contract.

This bond shall be governed by, and construed in accordance with, the laws of the State of New York, without giving effect to conflict of law principles.

[SIGNATURE PAGE FOLLOWS THIS PAGE]

IN WITNESS WHEREOF, the principal and the sureties have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Principal: _____

By: _____
Name:
Title:

(Seal)

Surety: _____

By: _____
Name:
Title:

APPROVED AS TO ACCEPTABILITY OF SURETY:

[LMDC]

By: _____
Name:
Title:

ACKNOWLEDGMENT OF PRINCIPAL

State of _____
_____ SS:
County of _____

On this _____. day of _____, 20 , before me personally came and appeared _____, to me known, who being by me duly sworn, did depose and say that he resides at _____; that he is the _____. of _____ the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation, and that he signed his name thereto by like order.

(Seal) _____.

AFFIX ACKNOWLEDGMENT AND JUSTIFICATION OF SURETY

EXHIBIT 2

[to be discussed]

WAIVERS OF LIEN

CONTRACTOR'S PARTIAL RELEASE AND WAIVER OF LIEN

_____ ("Contractor"), in connection with the demolition of a building owned by THE LOWER MANHATTAN DEVELOPMENT CORPORATION, a subsidiary of NEW YORK STATE URBAN DEVELOPMENT CORPORATION, d/b/a EMPIRE STATE DEVELOPMENT CORPORATION with offices at One Liberty Plaza (165 Broadway), New York, New York 10006 ("LMDC"), commonly known as 130 Liberty Street, New York, New York ("Project"), and the payment to Contractor of certain sums requisitioned by pursuant to its Application for Payment No. _____ dated _____, _____ (the "Requisition") for Work supplied, furnished or performed for the Project to the date of the Requisition, for LMDC's benefit, DOES HEREBY CERTIFY AND ACKNOWLEDGE that Contractor has received payment in the amount of $_____, which constitutes all sums due and owing to Contractor in accordance with Contractor's agreement with LMDC with respect thereto (the "Contract"), other than sums (if any) withheld by LMDC in accordance with such agreement, for Work supplied, furnished or performed for the Project to the date of the Requisition next preceding the Requisition[3] (the "Prior Requisition Date") and DOES HEREBY FOREVER RELEASE AND WAIVE for Contractor, its successors and assigns any and all rights, claims and demands Contractor has or may have against LMDC or the Port Authority of New York and New Jersey (the "Port Authority") (including any rights which Contractor has or may have pursuant to the New York Lien Law to file any lien or notice of lien against the Project or any property of LMDC or the Port Authority on account of or deriving from Work performed or furnished for the Project to the Prior Requisition Date). As used herein, "Work" means labor, materials, supplies, furnished, or performed by Contractor with respect to the Project.

IN WITNESS WHEREOF, Contractor has caused this Waiver of Lien to be duly executed and the seal of Contractor to be affixed as of the date of the Requisition by the undersigned officer who is duly authorized to do so.

(Contractor)

By: _____
Name:
Title:

Subscribed and sworn to before me
this ____ day of _____, _____

_____
Notary Public

[3] For purposes of this lien waiver, the "Requisition next preceding the Requisition" means the last Requisition with respect to which LMDC has made payment.

EXHIBIT 3

[omitted]

EXHIBIT 4

[omitted]

EXHIBIT 5

VARIANCE

See the files on LMDC's website at http://www.renewnyc.com/plan_des_dev/130liberty/variances.asp.

Schedule "B"
SCOPE OF WORK – SCAFFOLDING/ HOISTING

A. All of the provisions of this Schedule "B" are to be deemed in addition to and/or in modification of the provisions of the Annexed Contract, General Conditions, General Requirements, Scope of Work and the Technical Specifications. In all instances where a provision of the Schedule "B" is inconsistent with any provision of this contract, such provision of the Schedule "B" shall be controlling. It is understood and agreed, however, that except as herein specifically provided, all of the provisions of the Annexed Contract, General Conditions, General Requirements, Scope of Work and the Technical Specifications shall be binding and controlling on the parties.

B. Contract price includes all labor, material, equipment and services required to complete the work as called for in specifications, work scopes and includes but is not limited to the following items:

- Permitting.
- Submittals/ Shop Drawings.
- Scaffold/ Hoist / Sidewalk Bridging Plan by a Licensed New York State Professional Engineer inclusive of all shoring, bracing, and support systems.
- Provide inspection, detailed audit report, and signoff by a New York State Licensed Professional Engineer immediately should any alteration to any sidewalk bridge, hoist, or scaffolding component occur to facilitate the work during erection.
- At a minimum, provide monthly inspection and audit report of the condition of the sidewalk bridge, hoist, and scaffold by a Licensed New York State Professional Engineer.
- General Conditions and Supervision.
- Prepare and level North Plaza at Cellar Level "B".
- Penetrations to existing building for scaffold and hoist supports to be performed by composite crews consisting of Licensed Asbestos Handlers for environmental issues including HEPA vacuuming.
- Furnish and install needle beams, supports, frames, cribbing, dunnage, outriggers, planks, stair towers, protection platforms, fencing/plywood barriers, lighting, fire protection and all other appurtenances for a fully functional scaffold on all sides/ elevations of the building.
- Furnish and Install One (1) Hoist on Albany Street including cribbing, dunnage, concrete support pads. Provide platforms and Decontamination Vestibules at all Floors/ Levels.
- Provide for operation of Hoist until Scaffold is 100% complete and Hoist is tested and ready for use. Transfer of Hoist operation to Deconstruction Contractor upon acceptance of Scaffold/ Hoist installation.
- Building wash under Environmental (ACM) Protocols.
- Existing Netting Removal under Environmental (ACM) Protocols.
- Complete new netting wrap on Scaffold.

- Scaffold maintenance/ housekeeping and inspection by competent person during erection and until transfer for use by the Deconstruction Contractor.
- All work to be compliant with all applicable codes and standards.
- Remove Scaffold components from project site as dismantled by the Deconstruction Contractor.
- Dismantle and remove Hoist(s) components from Project Site.
- Dismantle and remove Sidewalk Bridging from Project Site.
- Noise and dust control.
- Regulatory Agency Sign-Offs.
- Site cleanup related to Scaffold/ Hoist/ Sidewalk Bridging including sweeping of sidewalk bridging.
- Temporary Heat as required.
- Daily cleanup including dumpsters for general waste and debris.
- Overtime, shiftwork, etc. as required to meet project milestones with no additional costs to LMDC.
- Any Temporary Construction or Shoring necessary to facilitate the work, and dismantling and disposal of same.
- Snow removal at work locations and access to same.
- Demobilization.

Specification No.	Specification Section	Scaffolding Contractor
01100	Schedule "B" Scope of Work	Primary
01310	Project Management and Coordination	Primary
01311	Critical Path Method Scheduling	Coordination
01320	Deconstruction Progress Documents	Primary
01322	Photographic Documentation	Primary
01330	Submittal Procedures	Primary
01400	Quality Control	Primary
01420	References	Primary
01500	Temporary Facilities and Controls	Primary
01524	Construction Waste Management	Primary
01541	Site Security	Coordination
01595	Safety and Health	Primary
01700	Execution Requirements	Primary
01770	Closeout Procedures	Primary
02010	Storm Water Management	Primary
02020	Sedimentation and Erosion Control Compliance	Primary
02222	Excavation and Backfill	Primary
03100	Concrete Formwork	Primary
03200	Concrete Reinforcement	Primary
03302	Concrete	Primary
15335	Fire Protection	Primary
15400	Plumbing	Coordination
16001	Electrical Demolition	Coordination

Note 1: Contractor is responsible for conforming to each technical specification section in its entirety as outlined on the Table Of Contents of the Technical Specifications. Due to the possible occurrences of errors in printing, *i.e. missing pages*, each bidder is alerted henceforth to the potential omission of pages and his/her undeniable responsibility to provide work that abides by the complete set of stipulations made on all relevant technical specification sections. Upon verifying completeness of the documents, the bidder is to obtain all missing information from the Owner, if such should be the case. Failure to confirm completeness of documents does not relieve the low bidder of the responsibility to provide work in compliance to all intended specifications.

Note 2: Specification Sections designated as "Coordination" and "Reference" are provided so that all Contractors have a thorough understanding of the overall Project Requirements, and their contractual responsibility for coordination with same.

SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Administrative and supervisory personnel.
2. Project meetings.
3. Requests for Information (RFIs).

1.2 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.3 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

B. Coordination with other Contractors: Contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly parts of the Work.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Pre-demolition conferences.
7. Project closeout activities.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1.4 SUBMITTALS

A. Key Personnel Names: Prior to starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1. Include special personnel required for coordination of operations with other contractors.

1.6 PROJECT MEETINGS

A. General: Attend meetings at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.

B. Preconstruction Conference: Attend a preconstruction conference before starting construction, but no later than fifteen (15) days after execution of the Agreement.

1. Attendees: Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

a. Tentative construction schedule.
b. Phasing.
c. Critical work sequencing and long-lead items.
d. Designation of key personnel and their duties.
e. Procedures for processing field decisions and Change Orders.
f. Procedures for RFIs.
g. Testing and inspecting.
h. Procedures for processing Applications for Payment.
i. Distribution of the Contract Documents.
j. Submittal procedures.
k. Preparation of Record Documents.
l. Use of the premises.
m. Work restrictions.
n. Construction waste management and recycling.
o. Office, work, and storage areas.

p. Deliveries.
q. First aid.
r. Security.
s. Progress cleaning.
t. Working hours.
u. The Contract Documents.
v. Temporary facilities and controls.
w. Space and access limitations.
x. Regulations of authorities having jurisdiction.
y. Coordination with other work.
z. Protection of adjacent property.
aa. Protection of construction and personnel.

3. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

C. Progress Meetings: Conduct progress meetings at **weekly** intervals.

1. Attendees: In addition to representatives of Owner, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and comment on minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Sequence of operations.
2) Status of submittals.
3) Deliveries.
4) Access.
5) Site utilization.
6) Temporary facilities and controls.
7) Work hours.
8) Hazards and risks.
9) Progress cleaning.
10) Quality and work standards.
11) Status of correction of deficient items.
12) Field observations.

13) RFIs.
14) Pending changes.
15) Status of Change Orders.
16) Pending claims and disputes.
17) Documentation of information for payment requests.

1.7 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI.

1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

1. Project name.
2. Date.
3. Name of Contractor.
4. RFI number, numbered sequentially.
5. Specification Section number and title and related paragraphs, as appropriate.
6. Drawing number and detail references, as appropriate.
7. Field dimensions and conditions, as appropriate.
8. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall quantify impact in the RFI.
9. Contractor's signature.
10. Attachments: Include drawings, descriptions, measurements, photos, and other information necessary to fully describe items needing interpretation.

a. Supplementary drawings prepared by Contractor shall include dimensions, structural grid references, and details of affected materials, assemblies, and attachments.

C. Owner's Action: Owner will review each RFI, determine action required, and return it. Allow ten (10) working days for Owner's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for information already indicated in the Contract Documents.
d. Incomplete RFIs or RFIs with numerous errors.

2. Owner's action may include a request for additional information, in which case Owner's time for response will start again.

D. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log at each progress meeting. Include the following:

1. Project name.
2. RFI number including RFIs that were dropped and not submitted.
3. Brief RFI description.
4. Date the RFI was submitted.
5. Date Owner's response was received.
6. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310

SECTION 01320 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Preliminary Construction Schedule.
2. Contractor's Construction Schedule.
3. Submittals Schedule.
4. Daily construction reports.
5. Field condition reports.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the Schedule of Values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by Architect.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

H. Major Area: A story of construction, a separate building, or a similar significant construction element.

I. Milestone: A key or critical point in time for reference or measurement.

J. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

K. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.3 SUBMITTALS

A. Qualification Data: For scheduling consultant.

B. Submittals Schedule: Submit eight (8) copies of schedule. Arrange the following information in a tabular format:

1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.

C. Preliminary Deconstruction Schedule: Submit eight (8) copies.
1. Preliminary Deconstruction Schedule: Prepare a preliminary horizontal bar-chart-type demolition schedule for the project. Submit the Preliminary Demolition Schedule to the Owner within 7 calendar days after the date established for commencement of the Contract, unless otherwise required by the Contract Clauses. Revise the Preliminary as required until it is approved by the Contracting Officer.
   a. Provide a separate time bar for each significant demolition activity. Coordinate each element on the schedule with other demolition activities. Schedule each demolition activity in proper sequence.
   b. Schedule shall be time-scaled in not more than weekly increments, with the dates of the first day of each week indicated.
   c. Completion of the Work shall be indicated in advance of the date established for completion of the Contract.
   d. With the submission of the Preliminary Demolition Schedule, include a tabulation by date of submittals required during the first 90 calendar days of demolition, or show the submittals on the schedule. Include the submittals required to maintain orderly progress of the Work and those required early because of long lead-time for manufacture or fabrication.

2. Approval of cost-loaded preliminary construction schedule will not constitute approval of Schedule of Values for cost-loaded activities.

D. Preliminary Network Diagram: Submit eight (8) copies, large enough to show entire network for entire construction period. Show logic ties for activities.

E. Contractor's Deconstruction Schedule: Submit eight (8) copies of schedule, large enough to show entire schedule for entire construction period.
   1. Contractor's Deconstruction Schedule: Prepare and periodically update a comprehensive, fully developed, horizontal bar-chart-type deconstruction schedule. Base the Contractor's Deconstruction Schedule on the approved preliminary deconstruction schedule and whatever updating and feedback has been received since the start of deconstruction.
      a. Submit the initial Contractor's Deconstruction Schedule within 60 calendar days after the date established for commencement of the Contact.
      b. Within each deconstruction activity's time bar, indicate estimated completion percentages in not more than 10 percent increments and, as work progresses, place marks in the bars to indicate actual completion percentages.
      c. Cost Correlation: If requested by the Owner, provide a cost correlation line at the head of the schedule to indicate planned and actual cost. As work progresses, show dollar volume of Work performed as of the dates used for applications for payment.
      d. Individual Work Stages: Show significant stages for each category or unit of work.
      e. Area Separations: Arrange the schedule to separately show each major category or unit of work for each major area of demolition. Indicate where each major category or unit of work must be sequenced or integrated with other work as necessary for overall work in that area. A major area is defined as a story of demolition, a separate building or similar separation. Copies of the original drawings of the existing building are attached to the Contract for reference. These may be used to prevent and track, phase abatement and demolition operations.
      f. Updating: Provide an updated schedule in conjunction with each project meeting. In addition, revise the schedule after each event or activity that causes a significant change in the planned progress of the Work. Highlight or otherwise emphasis revisions for ease of identification.
      g. Distribution: Print and distribute copies of the initial Contractor's Demolition Schedule, and each updated or revised schedule, to the Owner, as well as to subcontractors and other parties required to comply with upcoming scheduled dates. Post copies in the project meeting room and temporary field office.

   2. Submit an electronic copy of schedule, using Primavera (P3- PRX) software, via E-Mail and on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.

F. CPM Reports: Concurrent with CPM schedule, submit eight (8) copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

   1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
   2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
   3. Total Float Report: List of all activities sorted in ascending order of total float.

G. Daily Construction Reports: Submit eight (8) copies at progress meetings.

1. Daily Deconstruction Reports: Prepare a daily deconstruction report recording the following information concerning events at the site. Submit duplicate copies to the Owner or Owner's Authorized Representative at **weekly** intervals.
   a. List of subcontractors at the site.
   b. List of separate contractors at the site.
   c. Count of personnel at the site.
   d. High and low temperatures, general weather conditions.
   e. Accidents.
   f. Meetings and significant decisions.
   g. Unusual events.
   h. Stoppages, delays, shortages, and losses.
   i. Emergency procedures.
   j. Orders and requests of governing authorities.
   k. Change Orders received or implemented.
   l. Services connected or disconnected.
   m. Summary of all work performed, detailed by trade.

H. Field Correction Reports: When the need to take corrective action requires a departure from the Contract Documents, prepare a detailed report. Include a statement describing the problem and recommended changes. Indicate reasons the Contract Documents cannot be followed. Submit a copy to the Owner or Owner's Authorized Representative for approval.

I. Unusual Event Reports: When an event of an unusual and significant nature occurs at the site, prepare a detailed report. List the chain of events, persons participating, response(s) by the Contractor's personnel, evaluation of the results or effects, and similar pertinent information. Submit a copy to the Owner or Owner's Authorized Representative immediately. Advise the Owner or Owner's Authorized Representative in advance when such events are known or predictable.

1.4 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to the Preliminary Construction Schedule and Contractor's Construction Schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including **[phasing]** **[work stages]** **[area separations]** and **[interim milestones]**.
4. Review schedule for work of Owner's other separate contracts.
5. Review time required for review of submittals and resubmittals.
6. Review requirements for tests and inspections by independent testing and inspecting agencies.
7. Review and finalize list of construction activities to be included in schedule.
8. Review submittal requirements and procedures.

9. Review procedures for updating schedule.

1.5 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review and resubmittal when establishing dates.

1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
2. Initial Submittal: Submit concurrently with preliminary schedule. Include submittals required during the first 60 days of construction.

a. At Contractor's option, show submittals on the Preliminary Construction Schedule, instead of tabulating them separately.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."

B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial and Final Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Activities: Treat each floor or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Owner.

2. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
3. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Owner's administrative procedures necessary for certification of Substantial Completion.

D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Others: Include a separate activity for each portion of the Work performed by others.
4. Work Restrictions: Show the effect of the following items on the schedule:

   a. Coordination with other contractors.
   b. Uninterruptible services.
   c. Use of premises restrictions.
   d. Provisions for future construction.
   e. Seasonal variations.
   f. Environmental control.

5. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

   a. Subcontract awards.
   b. Submittals.
   c. Purchases.
   d. Sample testing.
   e. Deliveries.
   f. Tests and inspections.
   g. Final clean-up.

E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

F. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.

G. Computer Software: Prepare schedules using Microsoft Project or Primavera.

2.3 PRELIMINARY CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit preliminary horizontal bar-chart-type construction schedule within seven (7) days of the Notice to Proceed.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first sixty (60) days of construction. Include skeleton diagram for the remainder of the Work.

2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Preliminary Network Diagram: Submit diagram within seven (7) days of the Notice to Proceed. Outline significant construction activities for the first sixty (60) days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's Construction Schedule using a computerized, time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than fifteen (15) days after the Notice to Proceed.

    a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Owner's approval of the schedule.

2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting.
3. Use "one workday" as the unit of time. Include list of nonworking days and holidays incorporated into the schedule.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

    a. Preparation and processing of submittals.
    b. Mobilization and demobilization.
    c. Utility interruptions.
    d. Acquiring permits.
    e. Demolition work.
    f. Work by others that may affect or be affected by Contractor's activities.
    g. Testing.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.

4. Format: Mark the critical path.

    a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

E. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Principal events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.

F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

2.5 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (refer to special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Change Directives received and implemented.
16. Services connected and disconnected.
17. Substantial Completions authorized.

B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.

1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.

B. Contractor's Construction Schedule Updating: At monthly intervals, update and submit schedule to reflect actual construction progress and activities.
1. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
2. As the Work progresses, indicate Actual Completion percentage for each activity.

END OF SECTION 01320

SECTION 01322 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

A. Engage a qualified photographer to take photographs during demolition.

B. Photographer's Qualifications: Photographer shall have an established reputation as a photographer and shall be regularly engaged as a professional photographer.

1.2 SUBMITTALS

A. Qualification Data: Submit photographer's list of completed projects with project names and addresses, and names and addresses of owners and architects.

B. Demolition Photograph Prints: Photographer shall submit 3 prints of each view to the Contracting Officer, and one print of each view to the Contractor, within 7 calendar days after taking photographs.

C. Demolition Photograph Negatives: Along with the prints, the photographer shall submit one set of photographic negatives, in protective envelopes and identified by the date the photographs were taken, to the Contracting Officer. The negatives shall be available for the Government's unrestricted use.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Photographic Film Format: Medium format film, 60 by 70 mm.

B. Prints: Smooth surface matte color prints on commercial-grade stock.
   1. Size: 200 by 250 mm.
   2. Margins: White margins shall be provided on all borders.
   3. 25 mm wide margin shall be provided and punched for standard 3-ring binder on left side for vertical shots and on top for horizontal shots.
   4. Identification: Each photograph shall be labeled on the front in the bottom margin with project name and date the photograph was taken. On the back, an applied label or rubber-stamped impression shall be provided with the following information:
      a. Project name.
      b. Name, address and telephone number of photographer.
      c. Name of Contractor.
      d. Date the photograph was taken.
      e. Description of vantage point, including location, direction and any other information necessary for accuracy.

PART 3 - EXECUTION

3.1 COOPERATION WITH PHOTOGRAPHER

A. Contractor shall cooperate with the photographer's work, including providing auxiliary services as requested, access to the project site, and use of temporary lighting and other facilities.

3.2 DEMOLITION PHOTOGRAPHS

A. Predemolition Photographs: Before demolition is started, photographer shall take photographs of the site and surrounding properties from different points of view selected by the Contracting Officer's Representative.
   1. Take not less than 12 photographs to show existing buildings and conditions adjacent to the project property, in sufficient detail to record accurately the physical conditions at the start of demolition. Provide and submit additional documentation described in Section 02060, Building Demolition.

B. Demolition Period Photographs: At intervals during demolition, photographer shall take photographs of the project's progress from different points of view. Vantage points shall be selected by the photographer unless otherwise directed by the Contracting Officer's Representative.
   1. Frequency: Take photographs weekly, with timing each month adjusted to coincide with the cutoff date associated with each application for payment.
   2. Number: Take not less than 4 photographs each time, to best show the status of demolition and progress since taking previous photographs.

C. Special Photographs: In addition to periodic photographs, photographer shall take special photographs of subject matter and from vantage points selected by the Contracting Officer's Representative.
   1. Frequency: Take special photographs at 6 times during demolition or at the completion of the project, when requested by the Contracting Officer's Representative.
   2. Number: Take an average of 8 photographs each time, for a cumulative total of not less than 48 special photographs.

END OF SECTION 01322

SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submittals.

1.2 DEFINITIONS (Not Used)

1.3 SUBMITTAL PROCEDURES

A. General: Electronic copies of Drawings will **not** be provided.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Owner reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Owner's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow ten (10) work days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Owner will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow ten (10) days for review of each resubmittal.

E. Identification: Place a title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on title block.
2. Provide a space approximately half a page beside title block to record Contractor's review and approval markings and action taken by Owner.
3. Include the following information on title block for processing and recording action taken:

a. Project name.
b. Date.
c. Name and address of Contractor.
d. Name and address of subcontractor.
e. Name and address of supplier.
f. Name of manufacturer.
g. Submittal number or other unique identifier, including revision identifier.

1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).

h. Number and title of appropriate Specification Section.
i. Drawing number and detail references, as appropriate.
j. Other necessary identification.

F. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

G. Copies: Submit eight (8) copies.

H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Owner will return submittals without review received from sources other than Contractor.

I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in title block and clearly indicate extent of revision.

J. Distribution: Furnish copies of final submittals to subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

PART 2 - PRODUCTS

2.1 SUBMITTALS

A. General: Prepare and submit Submittals required by individual Specification Sections.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale.

1. Preparation: Include the following information, as applicable:

a. Dimensions.
b. Identification of products.
c. Wiring diagrams showing field-installed wiring.
d. Design calculations.
e. Compliance with specified standards.

f. Notation of coordination requirements.
g. Notation of dimensions established by field measurement.
h. Seal and signature of professional engineer if specified.

2. Sheet Size: Submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.

C. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation".

D. Submittals Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."

E. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Number of Copies: Submit eight (8) copies of subcontractor list.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Owner.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 OWNER'S ACTION

A. General: Owner will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Owner's Review: Owner will review each submittal, make marks to indicate corrections or modifications required, and return it. Owner will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.

C. Partial submittals are not acceptable, will be considered non-responsive, and will be returned without review.

END OF SECTION 01330

SECTION 01400 - QUALITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes administrative and procedural requirements for quality control services to verify quality assurance requirements specified in the Demolition Contract Clauses, individual specification sections and elsewhere in the Contract Documents.

B. Specific quality control requirements for individual demolition activities including abatement are included in the sections that specify those activities.

C. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements, and do not limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.

1.2 GOVERNING REGULATIONS AND AUTHORITIES

A. Obtain copies of applicable regulations cited in the Contract Documents and make these available at the Project site for reference.

1.3 RESPONSIBILITIES

A. Contractor Responsibilities: Unless specifically indicated otherwise, the Contractor shall hire an independent Testing Agency acceptable to the Owner to provide for tests, inspections and other quality control services specified or required by authorities having jurisdiction. Costs for these services are included in the Contract price.

B. Where individual sections specifically indicate that certain tests, inspections or other quality control services are to be provided by a testing agency, the Contractor shall employ and pay for a qualified independent testing agency to perform the quality control services.

C. Contractor shall submit each testing agency's firm name, and credentials to perform the specified services, to the Owner's approval at least 15 calendar days before scheduled inspections or tests.

D. Owner Responsibilities: Where individual sections specifically indicate that certain tests, inspections or other quality control services are the Owner's responsibility, the Owner will employ and pay for a qualified independent testing agency to perform those services.

E. Retesting: The Contractor is responsible for retesting, including repeated inspections and other services, where results of the initial tests, inspections or other quality control services indicate noncompliance with the requirements of the Contract Document, regardless of whether or not the original test, inspection or service was the Contractor's responsibility. Costs for retesting, and for revising or replacing noncomplying demolition, shall be the Contractor's responsibility.

F. Associated Services: The Contractor shall cooperate with agencies and others performing required tests, inspections and other quality control services, and shall provide reasonable auxiliary services as requested. Contractor shall notify the testing and inspection entities

sufficiently in advance of operations to permit their timely assignment of personnel. Auxiliary services include but are not limited to the following:

1. Providing access to the work.
2. Furnishing incidental labor and facilities necessary to facilitate inspections and tests.
3. Taking adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
    a. Provide facilities for storage and curing of test samples.
    b. Deliver samples to testing laboratories.
    c. Provide security and protection of samples and test equipment at the Project site.

G. Duties of the Testing Agency: The independent testing agency engaged to perform tests, inspections and other quality control services shall cooperate with the Owner's representative and the Contractor in performance of the agency's duties.

1. The agency shall provide qualified personnel to perform required inspections and tests.
2. The agency shall notify the Owner's representative and the Contractor of irregularities or deficiencies observed in the Work during performance of their services.
3. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.
4. The agency shall not perform any duties of the Contractor.

H. Coordination: The Contractor shall coordinate the sequence of activities to accommodate required services with a minimum of delay.

1. Activities shall be coordinated to avoid the necessity of delaying demolition to accommodate inspections and tests.

I. The Contractor shall be responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.4 QUALIFICATIONS OF INDEPENDENT TESTING AGENCIES

A. A qualified independent testing agency shall be an accredited entity engaged to perform tests or inspections, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those tests or inspections.

B. Testing agencies shall be acceptable to the Owner.

C. Testing agencies shall be authorized by authorities having jurisdiction to operate in the jurisdiction where the project is located.

1.5 SUBMITTALS

A. Reports: The Contractor, or the testing agency where they perform the services, shall submit a certified written report, in duplicate, of each test, inspection or other quality control service to the Owner.

B. Submit additional copies of each written report directly to the governing authority, when directed by the authority.

C. Written reports shall include but not be limited to the following:

1. Date of issue.
2. Project title and number.

3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making the test or inspection.
6. Designation of the work and test method.
7. Identifications of product and specification section.
8. Complete test or inspection data.
9. Test results and an interpretation of test results.
10. Ambient conditions at the time of sample taking and testing.
11. Comments or professional opinion on whether tested or inspected Work complies with Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting.

D. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for testing, inspection or other quality control services.

END OF SECTION 01400

SECTION 01420 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General Explanation: Specification language often includes terms that are defined elsewhere in the Contract Documents, including the Demolition Contract Clauses. Certain terms are defined in this section. These definitions or explanations are not necessarily complete or exclusive, but are general for the Work and may be explained more explicitly in other Sections.

B. "General Conditions" refer collectively to the Demolition Contract Clauses, Labor Standards and the U.S. Department of Labor Wage Decision bound into the specifications.

C. "Special Conditions" refer collectively to "Supplementary Conditions" and any other sections with numbers starting with 00 bound into the specifications.

D. "Indicated" refers to graphic representations, notes or schedules on the Drawings, or to requirements elsewhere in the Specifications or other Contract Documents. Terms such as "shown", "noted", "scheduled" and "specified" have the same meaning as "indicated" and are used to further help locate the reference, but no limitation on location is intended except as specifically stated.

E. Where "directed", "authorized", "selected", "approved", or a similar term is used in conjunction with the Contractor's submittals, applications, requests and other activities, and the specifications state that an individual other than the Owner, such as the Architect or Construction Engineer, shall provide this action, it is understood that only the Owner has this authority unless the individual stated is so authorized in writing by the Owner.
   1. When the individual is so authorized by the Owner, the Contractor may still appeal the action to the Owner.
   2. The Owner's decision will be final.
   3. In no case shall the Owner's action be interpreted as releasing the Contractor from responsibility to fulfill the requirements of the Contract Documents.

F. "Regulations" include laws, ordinances, statutes and lawful orders issued by authorities having jurisdiction, as well as rules, conventions and agreements within the construction industry that control performance of the Work.

G. "Project site" refers to the space available to the Contractor for performance of the Work, either exclusively or in conjunction with others performing other work.

H. "Furnish" means to supply and deliver to the Project site, ready for unloading, unpacking, assembling, installation and similar operations.

I. "Install" describes operations at the Project site, including unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations.

J. "Provide" means to furnish and install, complete in place and ready for full use.

C. Minimum Quantity and Quality: The quantity or quality indicated shall be the minimum provided. The actual installation may comply exactly with the minimum quantity or quality indicated, or it may exceed the minimum levels within reasonable limits.
   1. Indicated numeric values are minimum or maximum as appropriate for the context of the requirements.
   2. Refer uncertainties to the Owner for a decision before proceeding.

D. Abbreviations: Names and titles of standards are frequently abbreviated. Abbreviations and acronyms used in the Specifications and other Contract Documents mean the associated names. The following names are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the Contract Documents. This list is general in nature and not all standards listed may apply to this Contract.
   1. AA - Aluminum Association
   2. AABC - Associated Air Balance Council
   3. AAMA - American Architectural Manufacturers Association
   4. AAN - American Association of Nurserymen (See ANLA)
   5. AASHTO - American Association of State Highway and Transportation
   6. AATCC - American Association of Textile Chemists and Colorists
   7. ABMA - American Bearing Manufacturers Association
   8. ABMA - American Boiler Manufacturers Association
   9. ACI - American Concrete Institute
   10. ACIL - American Council of Independent Laboratories -
   11. The Association of Independent Scientific, Engineering, and Testing Firms
   12. ACPA - American Concrete Pipe Association
   13. ADC - Air Diffusion Council
   14. AEIC - Association of Edison Illuminating Companies
   15. AFBMA - Anti-Friction Bearing Manufacturers Association (See ABMA)
   16. AFPA - American Forest and Paper Association
   17. AGA - American Gas Association
   18. AHA - American Hardboard Association
   19. AHAM - Association of Home Appliance Manufacturers
   20. AI - Asphalt Institute
   21. AIA - The American Institute of Architects
   22. AIA - American Insurance Association
   23. AIHA - American Industrial Hygiene Association
   24. AISC - American Institute of Steel Construction
   25. AISI - American Iron and Steel Institute
   26. AITC - American Institute of Timber Construction
   27. ALA - American Laminators Association (See LMA)
   28. ALCA - Associated Landscape Contractors of America
   29. ALI - Associated Laboratories, Inc.
   30. ALSC - American Lumber Standards Committee
   31. AMCA - Air Movement and Control Association International, Inc.
   32. ANLA - American Nursery and Landscape Association
   33. ANSI - American National Standards Institute
   34. AOAC - Association of Official Analytical Chemists International
   35. AOSA - Association of Official Seed Analysts
   36. APA - American Plywood Association (see EWA)
   37. APA - Architectural Precast Association
   38. API - American Petroleum Institute
   39. ARI - Air-Conditioning and Refrigeration Institute

40. ARMA - Asphalt Roofing Manufacturers Association
41. ASA - Acoustical Society of America
42. ASC - Adhesive and Sealant Council
43. ASCA - Architectural Spray Coaters Association
44. ASCE - American Society of Civil Engineers
45. ASHES - American Society for Healthcare Environmental Services - Division of the American Hospital Association
46. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.
47. ASLA - American Society of Landscape Architects
48. ASME - American Society of Mechanical Engineers
49. ASPA - American Sod Producers Association (See TPI)
50. ASPE - American Society of Plumbing Engineers
51. ASQ - American Society for Quality
52. ASSE - American Society of Sanitary Engineering
53. ASTM - American Society for Testing and Materials
54. ATIS - Alliance for Telecommunications Industry Solutions
55. AWCI - Association of the Wall and Ceiling Industries International
56. AWCMA - American Window Covering Manufacturers Association (See WCMA)
57. AWI - Architectural Woodwork Institute
58. AWPA - American Wood-Preservers' Association
59. AWS - American Welding Society
60. AWWA - American Water Works Association
61. BAC - Brick Association of the Carolinas
62. BHMA - Builders Hardware Manufacturers Association
63. BIA - Brick Industry Association
64. BIFMA - The Business and Institutional Furniture Manufacturer's Association International
65. CABO - Council of American Building Officials
66. CAGI - Compressed Air and Gas Institute
67. CAUS - Color Association of the United States
68. CBHF - State of California, Department of Consumer Affairs, Bureau of Home Furnishings and Thermal Insulation Technical Information
69. CBMA - Certified Ballast Manufacturers Association
70. CCC - Carpet Cushion Council
71. CDA - Copper Development Association Inc.
72. CE - Corps of Engineers (U.S. Department of the Army)
73. CFFA - Chemical Fabrics & Film Association, Inc.
74. CFR - Code of Federal Regulations (Publications available from the Government Printing Office)
75. CGA - Compressed Gas Association
76. CGSB - Canadian General Standards Board
77. CISCA - Ceilings and Interior Systems Construction Association
78. CISPI - Cast Iron Soil Pipe Institute
79. CLFMI - Chain Link Fence Manufacturers Institute
80. CPA - Composite Panel Association
81. CPPA - Corrugated Polyethylene Pipe Association
82. CPSC - Consumer Product Safety Commission
83. CRI - Carpet and Rug Institute
84. CRSI - Concrete Reinforcing Steel Institute
85. CS - Commercial Standard (U.S. Department of Commerce)

86. CSI - Construction Specifications Institute
87. CSSB - Cedar Shake and Shingle Bureau
88. CTI - Ceramic Tile Institute of America
89. CTI - Cooling Tower Institute
90. DASMA - Door and Access Systems Manufacturers Association, International
91. DHI - Door and Hardware Institute
92. DIPRA - Ductile Iron Pipe Research Association
93. DOC - Department of Commerce (Publications available from the Government Printing Office)
94. DOT - Department of Transportation
95. ECSA - Exchange Carriers Standards Association (See ATIS)
96. EIA - Electronic Industries Association
97. EIMA - EIFS Industry Members Association
98. EJMA - Expansion Joint Manufacturers Association
99. EPA - Environmental Protection Agency
100. ETL - ETL Testing Laboratories Inc. (see ITS)
101. EWA - Engineered Wood Association
102. FAA - Federal Aviation Administration
103. FCC - Federal Communications Commission
104. FCI - Fluid Controls Institute
105. FCICA - Floor Covering Installation Contractors Association
106. FDA - Federal Drug Administration
107. FGMA - Flat Glass Marketing Association (See GANA)
108. FHA - Federal Housing Administration (U.S. Department of Housing and Urban Development)
109. FM - Factory Mutual System
110. FS - Federal Specification (Publications available from GSA)
111. GA - Gypsum Association
112. GANA - Glass Association of North America
113. GRI - Geosynthetic Research Institute
114. GSA - General Services Administration
115. HEI - Heat Exchange Institute
116. HFES - Human Factors and Ergonomics Society
117. HI - Hydraulic Institute
118. HI - Hydronics Institute - Division of Gas Appliance Manufacturers Association
119. HMA - Hardwood Manufacturers Association
120. HPVA - Hardwood Plywood and Veneer Association
121. IAS - International Approval Services - Division of Canadian Standards Association
122. IBD - Institute of Business Designers (See IIDA)
123. ICEA - Insulated Cable Engineers Association
124. IEC - International Electrotechnical Commission (Publications available from ANSI)
125. IEEE - Institute of Electrical and Electronics Engineers
126. IESNA - Illuminating Engineering Society of North America
127. IGCC - Insulating Glass Certification Council
128. IIDA - International Interior Design Association
129. ILI - Indiana Limestone Institute of America
130. IMSA - International Municipal Signal Association
131. INCE - Institute of Noise Control Engineering
132. IRI - HSB Industrial Risk Insurers
133. ISA - International Society for Measurement and Control

134. ISEA - Industrial Safety Equipment Association
135. ISS - Iron and Steel Society
136. ITS - Intertek Testing Services
137. KCMA - Kitchen Cabinet Manufacturers Association
138. LGSI - Light Gage Structural Institute
139. LIA - Lead Industries Association, Inc.
140. LMA - Laminating Materials Association
141. LPI - Lightning Protection Institute
142. MBMA - Metal Building Manufacturers Association
143. MCAA - Mechanical Contractors Association of America
144. MFMA - Maple Flooring Manufacturers Association
145. MFMA - Metal Framing Manufacturers Association
146. MHIA - Material Handling Industry Association
147. MIA - Marble Institute of America
148. MIA - Masonry Institute of America
149. MIL - Military Standardization Documents (U.S. Department of Defense)
150. ML/SFA - Metal Lath/Steel Framing Association
151. MRCA - Midwest Roofing Contractors Association
152. MSS - Manufacturers Standardization Society of the Valve and Fittings Industry
153. NAA - National Arborist Association
154. NAAMM - National Association of Architectural Metal Manufacturers
155. NAAMM - North American Association of Mirror Manufacturers (See GANA)
156. NACE - National Association of Corrosion Engineers International
157. NAGDM - National Association of Garage Door Manufacturers (See DASMA)
158. NAIMA - North American Insulation Manufacturers Association
159. NAMI - National Accreditation & Management Institute, Inc.
160. NAPA - National Asphalt Pavement Association
161. NBHA - National Builders Hardware Association (See DHI)
162. NBGQA - National Building Granite Quarries Association, Inc.
163. NCAC - National Council of Acoustical Consultants
164. NCCA - National Coil Coaters Association
165. NCMA - National Concrete Masonry Association
166. NCPI - National Clay Pipe Institute
167. NCRPM - National Council on Radiation Protection and Measurements
168. NCSPA - National Corrugated Steel Pipe Association
169. NEBB - Natural Environmental Balancing Bureau
170. NECA - National Electrical Contractors Association
171. NEI - National Elevator Industry
172. NELMA - Northeastern Lumber Manufacturers Association
173. NEMA - National Electrical Manufacturers Association
174. NETA - InterNational Electrical Testing Association
175. NFPA - National Fire Protection Association
176. NFPA - National Forest Products Association (See AFPA)
177. NFRC - National Fenestration Rating Council Incorporated
178. NGA - National Glass Association
179. NHLA - National Hardwood Lumber Association
180. NIA - National Insulation Association
181. NIAC - National Insulation and Abatement Contractors Association (See NIA)
182. NIST - National Institute of Standards and Technology (U.S. Department of Commerce)
183. NKCA - National Kitchen Cabinet Association (See KCMA)

184. NLGA - National Lumber Grades Authority
185. NOFMA - National Oak Flooring Manufacturers Association
186. NPA - National Parking Association
187. NPCA - National Paint and Coatings Association
188. NRCA - National Roofing Contractors Association
189. NRMCA - National Ready Mixed Concrete Association
190. NSA - National Stone Association
191. NSF - National Sanitation Foundation International
192. NSSEA - National School Supply and Equipment Association
193. NTMA - National Terrazzo and Mosaic Association
194. NUSIG - National Uniform Seismic Installation Guidelines
195. NWMA - National Woodwork Manufacturers Association (See NWWDA)
196. NWWDA - National Wood Window and Door Association
197. OSHA - Occupational Safety and Health Administration (U.S. Department of Labor)
198. PATMI - Powder Actuated Tool Manufacturers' Institute
199. PCA - Portland Cement Association
200. PCI - Precast/Prestressed Concrete Institute
201. PDCA - Painting and Decorating Contractors of America
202. PDI - Plumbing and Drainage Institute
203. PEI - Porcelain Enamel Institute
204. PGI - Polyvinylchioride Geomembrane Institute - Technology Program, University of Illinois-Urbana Champaign
205. PIMA - Photographic and Imaging Manufacturers Association
206. PPFA - Plastic Pipe and Fittings Association
207. PPI - Plastics Pipe Institute (The Society of the Plastics Industry, Inc.)
208. PS - Product Standards of the National Bureau of Standards (U.S. Department of Commerce)
209. RCMA - Roof Coatings Manufacturers Association Center Park
210. RCSC - Research Council on Structural Connections
211. Sargent & Lundy
212. RFCI - Resilient Floor Covering Institute
213. RMA - Rubber Manufacturers Association
214. RUS - Rural Utilities Service
215. SAE - Society of Automotive Engineers International
216. SDI - Steel Deck Institute
217. SDI - Steel Door Institute
218. SEFA - Scientific Equipment and Furniture Association
219. SEGD - Society for Environmental Graphic Design
220. SGCC - Safety Glazing Certification Council
221. SHLMA - Southern Hardwood Lumber Manufacturers Association (See HMA)
222. SIGMA - Sealed Insulating Glass Manufacturers Association
223. SJI - Steel Joist Institute
224. SMA - Screen Manufacturers Association
225. SMACNA - Sheet Metal and Air Conditioning Contractors'National Association
226. SPI - The Society of the Plastics Industry, Inc.
227. SPIB - Southern Pine Inspection Bureau
228. SPRI - Single Ply Roofing Institute
229. SSINA - Specialty Steel Industry of North America
230. SSPC - Steel Structures Painting Council - The Society for Protective Coatings
231. SSPMA - Sump and Sewage Pump Manufacturers Association

232. STI - Steel Tank Institute
233. SWI - Steel Window Institute
234. SWPA - Submersible Wastewater Pump Association
235. SWRI - Sealant, Waterproofing and Restoration Institute
236. TCA - Tile Council of America
237. TFS - Texas Forest Service
238. TIMA - Thermal Insulation Manufacturers Association (See NAIvIA)
239. TPI - Truss Plate Institute
240. TPI - Turfgrass Producers International
241. TRB - Transportation Research Board - National Research Council
242. UFAC - Upholstered Furniture Action Council
243. UL - Underwriters Laboratories Inc.
244. UNI - Uni-Bell PVC Pipe Association
245. USDA - U.S. Department of Agriculture
246. USITT - U.S. Institute of Theater Technology - The American Association of Design and Production Professionals in the Performing Arts
247. USP - U.S. Pharmacopeia
248. USPS - U.S. Postal Service
249. WA - Wallcoverings Association
250. WASTEC - Waste Equipment Technology Association
251. WCLIB - West Coast Lumber Inspection Bureau
252. WCMA - Window Covering Manufacturers Association
253. WEF - Water Environment Federation
254. WIC - Woodwork Institute of California
255. WMMPA - Wood Moulding & Millwork Producers Association
256. WPCF - Water Pollution Control Federation (See WEF)
257. WRI - Wire Reinforcement Institute
258. WSC - Water Systems Council
259. WSFI - Wood and Synthetic Flooring Institute (See MFMA)
260. WWPA - Western Wood Products Association

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION (Not applicable)

END OF SECTION 01420

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for temporary utilities, support facilities, security and protection facilities.

1.2 DEFINITIONS (not used)

1.3 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, other contractors, testing agencies, and authorities having jurisdiction.

B. Water Service: Pay water service use charges for water used by all entities for construction operations.

C. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations, including owner representative's office trailer.

D. Water Service: Water from Owner's existing water system is available for use. Provide connections and extensions of services as required for construction operations. Available in a centrally located water closet w/ spigot on each floor. Spec. Section 15400 and 15335.

E. Electric Power Service: In conjunction with Specification Section 16001. Electric power from Owner's existing system is available for use. Provide connections and extensions of services as required for construction operations. 400 Amp service panel partially energized on each floor with temp. light existing at various floors in conjunction with existing 2' x 4' grid lighting.

1.4 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups and staging areas.

B. Health & Safety Plan (HASP).

C. Emergency Action Plan (EAP).

D. MTA Influence Line Plan.

E. Truck Traffic Plan.

F. Deconstruction Plan.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Maintain and repair all building systems including exterior netting, exterior fascia and windows, and exterior openings in proper condition throughout duration of Work.

B. See Scope of Work for more details.

PART 2 - PRODUCTS

2.1 MATERIALS

A. As per requirements of the Building Code of the City of New York, Title 27, Chapter 1 Construction and Maintenance, Subchapter 19 Safety of Public and Property During Construction Operations.

2.2 TEMPORARY FACILITIES

A. Field Offices, Owner Representative's Office Trailer:
1. Clean daily, including removal and proper disposal of waste.
2. Wash, when required, and at least once every week.

B. Contractor to furnish and install adequate field Trailers, Offices, etc. for their personnel and operations.

C. Cranes and Hoists: Properly sized, built and maintained per all applicable regulations.
1. Factory approved Tier II crane to be supplied if contractor requires crane for the project. No retrofits. Minimum lifting capacity of 20,000 lbs. And 200 Ft. Radius.

D. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated, with class and extinguishing agent as required by locations and classes of fire exposures.

B. Temporary Heat: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, or open-flame heaters are prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work and other Contractors. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
1. Connect temporary service to Owner's existing power source. Each floor has available for contractor's use 400-amp service (contractor to field verify).

F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install lighting for Project identification sign.
3. At all times, the top floor of the building to be illuminated at night.

G. The Deconstruction Contractor shall provide temporary power to activate at least 3 Elevators in each (low, mid, high-rise) bank, through the initial period of this contract to serve in assisting

access to the upper floors for their own selective demolition, the miscellaneous Environmental Cleaning Operation and Asbestos Removal. If the other contractors are complete, they may be deactivated sooner.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.

2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion.

3. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Project Identification and Temporary Signs: Provide Project identification and other signs. Install signs to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.

1. Provide temporary, directional signs for construction personnel and visitors.
2. Maintain and touchup signs so they are legible at all times.

D. Waste Disposal Facilities: Comply with requirements specified in Division 1 Section "Construction Waste Management."

E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.

F. Existing Elevator Use: Use of Owner's existing elevators will be permitted, as long as elevators are cleaned and maintained in a condition acceptable to Owner. Elevator maintenance is the responsibility of the deconstruction contractor.

1. Do not load elevators beyond their rated weight capacity.

G. Temporary Stairs: Provide temporary stairs where ladders are not adequate.

H. Existing Stair Usage: Use of Owner's existing stairs will be permitted, as long as stairs are cleaned and maintained in a condition acceptable to Owner.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If, despite such protection, stairs become damaged, restore damaged areas.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

1. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation or other protection has been established.

C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains. Potential areas where oil can be encountered on the site include, but are not limited to pits, floor trenches; hydraulic lines abandoned-in-place, elevator shafts, and catch basins or traps. All oil areas are to be cleaned prior to demolition. However, in the event that oil unexpectedly enters the storm sewer, preventive measures will be provided by the Contractor to minimize oil reaching the NYC system.

D. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues. Perform control operations lawfully, using environmentally safe materials.

E. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates. Existing bridges are at Greenwich, Liberty, and Washington Streets. Contractor to assume all rentals and deconstruction of same.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.

F. Security Service: Provide a minimum of four security personnel 24 hours per day, 7 days per week. The three shall be a Security Supervisor, 2 Guards at building entry, and a Guard at Washington and Albany Street.

G. Security at All Entry Points: Provide security guards at unlocked perimeter entry points to only allow authorized personnel and delivery vehicles into site.

H. Provide and use for all employees and visitors a photo ID System, EPI Suite Pro by ImageWare Systems (www.fargo.com) or approved equal.

I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

J. Covered Walkway: Erect structurally adequate, protective, covered walkway for passage of individuals along adjacent public street(s). Coordinate with entrance gates, other facilities, and obstructions. (see scope of work).

1. Construct covered walkways and fences as required by New York City Building Code.
2. Provide barricades, warning signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
3. Paint and maintain in a manner approved by Owner.

K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.

L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241 and New York City Building Code.

1. Prohibit smoking in all building areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. A welding and burning permit must be obtained before any burning job is started on the premises. Contractors are responsible to provide fire watch and fire extinguishers on all burning and welding jobs.
5. Fire System – It is the responsibility of the contractor to notify the owner before turning off any fire systems.
6. All personnel designated as fire watch are required to wear orange hard hats.
7. Fire Protection:
   a. Maps and Signs. Weatherproof maps indicating emergency egress routes must be posted at all scaffold access/ egress points. Consider the work force to determine whether signs must be posted in languages other than English.
   b. Fire Extinguishers. Utilize at least 100 lb. Size extinguishers to avoid ease of disappearance from site.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Repair or replace fences, gates, street paving, curbs, and sidewalks, as required by Owner and authorities having jurisdiction.

END OF SECTION 01500

SECTION 01524 - CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Salvaging non-hazardous demolition waste.
2. Recycling non-hazardous demolition waste.
3. Disposing of non-hazardous demolition waste.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 SUBMITTALS

A. Waste Management Plan: Submit eight (8) copies of plan within ten (10) days of date established for the Notice to Proceed.

B. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

C. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

D. Qualification Data: For refrigerant recovery technician.

E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.4 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan.
2. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
3. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
4. Review waste management requirements for each trade.

1.5 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification, and waste reduction work plan. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.

5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by Owner. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with Division 1 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within five (5) days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Division 1 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING DEMOLITION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 01524

SECTION 01595 – SAFETY AND HEALTH

PART 1 - GENERAL

1.1 SUMMARY

A. References: In addition to publications referenced in the Demolition Contract Clauses, the following Code of Federal Regulations (CFR) publications designate and define hazardous materials and conditions, and establish procedures for handling these materials and conditions.
   1. 29 CFR, Part 1910: Occupational Safety and Health Administration (OSHA) General Industry and Health Standards.
   2. 29 CFR, Part 1926: OSHA Construction Industry Standards.
   3. 40 CFR, Part 61: National Emission Standards for Hazardous Air Pollutants.
   4. 40 CFR, Part 261: Environmental Protection Agency (EPA) Characteristics of Hazardous Waste.
   5. 40 CFR, Part 761, EPA Polychlorinated Biphenyls (PCBs), Manufacturing, Processing, Distribution in Commerce and Use Prohibitions.
   6. 40 CFR, Part 763: EPA Asbestos.

B. Hazardous Materials: Some hazardous and toxic materials and substances are included in 29 CFR Part 1910, subparts H and Z, and in 29 CFR Part 1926. Commonly encountered hazardous materials include but are not limited to asbestos, PCBs, explosives and radioactive material.
   1. Asbestos may be found in vinyl floor tile, insulation, boiler lagging, pipe coverings and other materials.
   2. PCBs may be contained in transformers, capacitors, voltage regulators, oil switches, mechanical insulation and other materials.
   3. Other materials such as lead, mercury, etc.

C. Acquisition of Publications: Referenced CFR publications may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

1.2 SAFETY MEETING

A. Prior to commencing demolition, and during the progress of the project as requested by the Contracting Officer, representatives of the Contractor, including the principal on-site project representative and one or more safety representatives, shall meet with designated representatives of the Owner for the purpose of reviewing the Contract's safety and health requirements.

B. The Contractor's safety and health program shall be reviewed, and implementation of safety and health provisions pertinent to the Work shall be discussed.

1.3 COMPLIANCE WITH REGULATIONS

A. The Work, including contact with or handling of hazardous materials, disturbance or dismantling of structures containing hazardous materials, and disposal of hazardous materials,

shall comply with the applicable requirements of 29 CFR Parts 1910 and 1926, and 40 CFR Parts 61, 261, 761 and 763.

1. Work involving disturbance or dismantling of asbestos or asbestos containing materials, demolition of structures containing asbestos and removal of asbestos, shall comply with 40 CFR Part 61, Subparts A and M, and 40 CFR Part 763, as applicable
2. Work shall additionally comply with applicable state and local safety and health regulations.
3. In case of a conflict between applicable regulations, the more stringent requirements shall apply.

B. Contractor Responsibility: The Contractor shall assume full responsibility and liability for compliance with all applicable codes, standards and regulations pertaining to the health and safety of personnel during execution of the Work, and shall hold the Owner harmless for any action on the Contractor's part, or that of the Contractor's employees or subcontractors, that results in illness, injury or death.

1. The Contractor shall have written safety and health programs in compliance with 29 CFR Parts 1910 and 1926.
2. Refer also to Section 01310, Project Management and Coordination for Site Safety Manager requirements,

1.4 SUBMITTALS

A. Safety and Health Programs: The Contractor shall submit, for approval, copies of the project safety and health programs, as applicable to the work scope, or required as a result of the safety meeting, including but not necessarily limited to the following:

1. Occupational Noise Exposure.
2. Fall Protection.
3. Personnel Protective Equipment.
4. Control of Hazardous Energy.
5. Electrical Safety Related Work Practices.
6. Lead.
7. Asbestos.
8. Respirator Protection.
9. Confined spaces.

B. Contractor's Safety Plan: In addition to specific safety and health programs applicable to the project, Contractor shall submit firm's general safety plan listing emergency procedures and contact persons with home addresses and telephone numbers.

C. Submit copies of shipping manifests and permits from applicable Federal, State or Local authorities and disposal facilities, and submit certificates that hazardous material has been disposed of in accordance with regulations. Refer to Division 2 sections for Haz-Mat materials documentation requirements.

D. Accident Reporting: Submit a copy of each accident report that the Contractor or Subcontractors submits to their insurance carriers, within seven calendar days after the date of the accident.

PART 2 - PRODUCTS

2.1 PERSONNEL PROTECTIVE EQUIPMENT

A. Special facilities, devices, equipment and similar items used by the Contractor in execution of the Work shall comply with 29 CFR Part 1910, Subpart I and other applicable regulations.

2.2 HAZARDOUS MATERIALS

A. The Contractor shall bring to the attention of the Owner, or the Owner's authorized representative, any material encountered during execution of the Work that the Contractor suspects is hazardous.

B. The Owner shall determine whether the Contractor shall perform tests to determine if the material is hazardous.

C. If the Owner directs the Contractor to perform tests and the material is found to be hazardous, or if the material is found to be hazardous without Contractor testing, a change to the Contract price may be provided, subject to the applicable provisions of the Contract.

PART 3 - EXECUTION

3.1 EMERGENCY SUSPENSION OF WORK

A. When the Contractor is notified by the Owner, or the Owner's authorized representative, of non-compliance with the safety or health provisions of the Contract, the Contractor shall immediately, unless otherwise instructed, correct the unsafe or unhealthy condition.
   1. If the Contractor fails to comply promptly, all or part of the Work will be stopped by notice from the Owner or the Owner's authorized representative.
   2. When, in the opinion of and by notice given by the Owner or the Owner's authorized representative, satisfactory corrective action has been taken by the Contractor, work shall resume.
   3. The Contractor shall not be allowed any extension of time or compensation for damages in connection with a work stoppage for an unsafe or unhealthy condition.

3.2 PROTECTION OF PERSONNEL

A. The Contractor shall take all necessary precautions to prevent injury to the public and personnel employed in the work, or damage to property of others. The public includes all persons not employed by the Contractor or a subcontractor. Refer to Section 01500, Temporary Facilities and Controls for specific details of required protection.

B. Wherever practical, the work area shall be fenced, barricaded or otherwise blocked off from the public or occupants to prevent unauthorized entry into the work area.
   1. Provide traffic barricades and traffic control signage where construction activities occur in vehicular areas.

2. Corridors, aisles, stairways, doors and exitways shall not be obstructed or used in a manner to encroach upon routes of ingress or egress, or to present an unsafe or unhealthy condition.
3. Store, position and use equipment, tools, materials, scraps and trash in a manner that does not present a hazard by accidental shiftings, ignition or other hazardous activity.
4. Store and transport refuse and debris in a manner to prevent unsafe and unhealthy conditions. Cover refuse containers, and remove refuse on a frequent regular basis acceptable to the Owner. Use tarpaulins or other means to prevent loose transported materials from dropping from trucks.

C. All contractors are to issue or discuss and obtain sign offs for the following standards including but not limited to:
1. Fall Hazard Procedures.
2. Confined Space Procedures.
3. Burning & Welding Procedures.
4. Hazard Communication Procedure.
5. Personal Protective Equipment.
6. Evacuation Procedures.
7. HASP Plan, Site Safety Plan, and Emergency Action Plan. (Current plans can be viewed on the LMDC Website at www.renewnyc.com).

D. Roof Safety: Only authorized personnel are allowed on any roofing structures. All authorized contractors working on the roof must follow roof access policy.

3.3 ENVIRONMENTAL PROTECTION

A. Dispose of solid, liquid and gaseous contaminants in accordance with local codes, laws, ordinances and regulations.

B. Comply with applicable federal, state and local noise control laws, ordinances and regulations, including but not limited to 29 CFR 1910.95 and 29 CFR 1926.52.

3.4 HOUSEKEEPING

A. Contractor is to provide the means and methods to insure a clean site. Upon notification to contractor (24 Hrs.), if site is not kept clean to the satisfaction of the Owner, the services of a professional cleaning service may be utilized, and costs for same will be back-charged accordingly to the contractor.

B. All scrap, trash and refuse to be removed from the site, is to be placed in truck or suitable containers furnished by contractor, so that the area will be clean at all times. Contractors are to be responsible for cleanliness of area in which they work.

C. Deposit scrap, oil rags, matches, etc., in proper containers.

D. Pipes, conduits or structural steel must not be left hanging unguarded where they will constitute a hazard.

E. Boards with protruding nails or other loose material must not be left on floor where they may be stepped on or become stumbling hazards. Holes, inserts bolts or other stumbling hazards in floor must not be left unguarded.

F. Contractor must see that all loose materials are removed from overhead before leaving work. Contractor to make provisions while working to prevent tools, materials, etc., from falling.

G. All lunch bags, coffee cups, sandwich wrapping, soda bottles are to be placed in proper disposal containers and not left lying around.

3.5 RULES FOR PERSONAL CONDUCT

A. No drinking or, possession of alcoholic beverages are allowed on the property at any time.

B. No gambling of any kind is allowed on the premises.

C. All contractor employees are restricted to areas in which their respective jobs are operating. They are not to wander around.

D. Theft or misappropriation of employee or owners property shall be subject to immediate legal action. All packages are subject to inspection by security.

E. Horseplay will not be tolerated.

F. Rules for personal hygiene in regards to toilet facilities being used must be adhered to.

G. Prior to starting a job location, advise all employees where the nearest safety exit and means of communications are located.

H. Failure to cooperate with any member of management, in the performance of their duties will be grounds for denial of entry onto property.

I. Failure to abide by the safety, housekeeping and personal conduct rules set forth, will result in contractor employee being barred from the premises.

J. Personnel will not be permitted to work in sandals, sneakers, or any other articles of clothing that may be deemed hazardous by the Owner.

3.6 EMERGENCY CONTACT

A. Contractor is to provide a contact person(s) for emergency notification 24-Hours per day, 7-Days per week should a problem arise at the project site.

END OF SECTION 01595

SECTION 01700 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Existing conditions.
2. Preparation
3. Installation
4. Progress cleaning

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of all utilities.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to utility owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Owner. Include a

detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 INSTALLATION

A. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

B. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

C. Hazardous Materials: Use products, cleaners, and other materials that are not considered hazardous.

3.4 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

E. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

END OF SECTION 01700

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for Contract closeout including, but not limited to, the following:
   1. Inspection procedures.
   2. Project record document submittal.
   3. Final cleaning.

B. Other closeout requirements for all contract activities are included in the individual sections.

C. Substantial Completion is defined as that state when the Contractor has complied with the Contract requirements, except for minor deviations, and the project is sufficiently complete and capable of being used by the Owner for the intended purpose.

1.2 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for Substantial Completion, complete the following.
   1. Provide supporting documentation for completion as indicated elsewhere in the Contract Documents and a statement showing an accounting of changes to the Contract Sum if any.
   2. Submit a list to the Owner, of incomplete items, the value of incomplete work, and reasons the Work is not complete.
   3. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities.
   4. Submit final project photographs, damage or settlement survey, and utility lines survey.

B. Inspection Procedures: On receipt of a request for inspection, the Owner's Representative will either proceed with inspection or advise the Contractor of unfilled requirements. The Owner will notify the Contractor of Substantial Completion following the inspection or advise the Contractor of construction that must be completed or corrected before Substantial Completion.
   1. The Owner's Representative will repeat the inspection when requested and when assured that the Work is substantially complete.
   2. Results of the completed inspection will form the basis of the requirements for Final Acceptance.

1.3 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting reinspection for Final Acceptance, complete the following:
   1. Submit final payment request with releases and supporting documentation not previously submitted and accepted.

2. Submit an updated final statement, accounting for final additional changes to the Contract price, if any.
3. Submit a certified copy of the previous Substantial Completion inspection list of items to be completed or corrected. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance, and shall be endorsed and dated by the Contractor.
4. Submit record documents and similar final record information.

B. Reinspection Procedure: The Owner's Representative will reinspect the Work upon receipt of notice from the Contractor that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Owner.
1. Upon completion of reinspection, the Owner will notify the Contractor of Final Acceptance or will advice the Contractor of Work that is incomplete or of obligations that have not been fulfilled and are required for Final Acceptance.
2. If necessary, reinspection will be repeated.

1.4 RECORD DOCUMENT SUBMITTALS

A. Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for the Owner's Representative's reference during normal working hours.

B. Record Drawings: Maintain and submit a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual demolition where the demolition varies substantially from the Work as originally shown. Mark the drawing that is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
1. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
2. Mark new information not shown on Contract Drawings or Shop Drawings.
3. Note related Change Order numbers where applicable.
4. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets. Print suitable titles, dates, and other identification on the cover of each set.

C. Record Specifications: Maintain and submit one complete copy of the Specifications with addenda. Include one copy of other written construction documents, such as Change Orders and modifications issued in printed form during construction.
1. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.
2. Give particular attention to substitutions and selection of options, and information about concealed construction that cannot otherwise be readily determined later by direct observation.
3. Note related record drawing information and Product Data.

D. Other Documentation: Maintain and submit complete Hazardous Materials Waste Manifests and a complete and comprehensive summary of waste management and energy consideration goals and accomplishments.

1.5 UTILITY LINES SURVEY

A. Provide an accurately dimensioned survey showing location and elevation and condition of all utility lines subsequent to demolition including caps, valves, connections and changes in direction, within property lines and outside of building walls for a distance 5' beyond the point of disconnection.
   1. Points where utility lines leave buildings shall be dimensioned from building corners.
   2. Points where utility lines cross property lines shall be dimensioned from lot monuments.
   3. Final survey shall be performed by a New York State licensed surveyor stamped and submitted on a mylar transparency.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. Remove all demolished materials, equipment and debris from the site at the completion of the work. Final cleaning shall also include cleaning of adjacent properties of debris, dust, etc. originating from the site.

B. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests.

C. Removal of Protection: Remove temporary protection and facilities installed for the protection of the Work during demolition unless otherwise directed by the Owner.

D. Compliance: Comply with the regulations of authorities having jurisdiction and with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Government property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of it lawfully.

E. Remaining Materials: Dispose of these materials as directed by the Owner's Representative.

END OF SECTION 01770

SECTION 02010 - STORMWATER MANAGEMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

1.1.1 This contract needs to conform with all the requirements of the Owners Stormwater discharge requirements of the Owners Stormwater discharge permit with N.Y.S. D.E.C., and shall comply with any terms of the Stormwater Management plan which are included at the end of this section.

1.1.1 All applicable requirements of other portions of the Contract Documents apply to this section including but not limited to Construction General Conditions and Special Conditions.

1.2 SITE SURVEY AND BID

Before submitting bid, bidder shall carefully examine existing field conditions. Design and/or as-built drawings are not available covering all of the stormwater systems. Submission of bid will be construed as evidence that required examination has been made. Claims for extra labor, equipment and materials required due to existing conditions, which could have been foreseen, will not be recognized.

1.3 QUALIFICATIONS OF CONTRACTOR

As part of the Contractor Bid, submit information approval showing that the Contractor has successfully completed a demolition project with stormwater management of similar complexity and having such required experience.

1.4 DESCRIPTION OF WORK

The demolition contract contains the following stormwater control measures:

A. Demolition Areas

1. All equipment or materials that could contaminate stormwater,like grease on conveyer chains, gear boxes, etc., must be removed from the structure prior to the demolition of the building structure. All cleaning work being performed by the Misc. Environmental Contractor must be completed. All contaminated concrete will have been cleaned prior to building demolition.

2. Stormwater must be contained within the footprint of the property and treated on-site. Following the completion of concrete floor cleaning operations, restriction of stormwater run-off by sandbags or other methods approved by the Construction Manager. The stormwater restriction control shall remain in place at the completion of the demolition contract, or until approval by the owner is granted.

3. Pits and ramps may be used for retention during demolition operations provided that they have been cleaned in accordance with the requirements of the LMDC and their Consultants.

4. Preventive measures shall be provided to minimize stormwater run-off into basements and crawl spaces. Openings at ground floor grade shall be covered following the completion of basement cleaning operations.

5. All floor drains connected to the industrial waste collection system must be plugged after the concrete floors have been cleaned. Refer to the Plumbing Specifications, Section 15400 for additional information.

6. All roof drain pipes and associated clean-outs are to be cut off at the first floor grade and provided with temporary plugs prior to the commencement of demolition operations, and must be protected against damage during demolition.

7. The site stormwater system, including all roof drains converted to floor drains, connecting storm sewers discharging to the city system, and storm manholes and catch basins shall be cleaned at the completion of the Deconstruction Contract. Cleaning shall include locating manholes and catch basins and vacuuming these structures in an upstream to downstream path to the last structure prior to the outfall discharge to the City system.

B. Contractor Staging Areas

Contractor shall provide plan(s) and details for protection of areas adjacent to Contractor's staging areas from run-off containing sediment, grease, oils, and any construction debris.

C. General

Inlet filters, approved by the LMDC, shall be provided and maintained for the duration of demolition operations on all site drainage inlets within the limits of construction activities.

The Contractor shall provide filtration devices to prevent any solid, grit, sand etc. from being washed into the City System. These filtration devices shall be regularly cleaned after every storm event, or as often as necessary to prevent any unsatisfactory discharge.

1.5 SUBMITTALS

A. Before demolition work is commenced, the Contractor shall submit for review and approval his program for stormwater management during the Demolition Contract, signed and sealed by a New York State licensed Professional Civil Engineer. The engineer shall submit monthly status reports certifying that the requirements of the approved stormwater management program are met.

B. The Contractor shall include with its bid the name, address and N.Y.S. Professional Engineers License number of the person responsible for the Stormwater Program.

MATERIALS AND EQUIPMENT

All materials and equipment required to maintain the stormwater management system in service shall be approved by the LMDC and their Consultants.

SECTION 02020 - SEDIMENTATION AND EROSION CONTROL COMPLIANCE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. This Section is provided to identify those construction activities or other activities which may introduce sediment to the environment, including the State and City systems, native waters and natural resources, and to prevent or minimize any damage to the environment which might result from such activities, both during and following completion of the Project.

This Section reinforces those sedimentation and erosion control requirements which the Contractor is bound to meet under the terms of the Contract, or under Federal, State, and City laws and regulations. If a Contractor fails to comply with sedimentation and erosion control provisions of the Contract or law, the Contractor shall be penalized as provided in this Section and as provided elsewhere in this Contract.

B. The extent and location of sedimentation and erosion control compliance work is shown on the contract drawings. Work under this section also includes, but is not limited to, the following:

1. Hay bales
2. Filter fabric fence
3. Anti-tracking mats
4. Temporary sediment basins and channels

C. Related Work Specified Elsewhere:

Storm Water Management: Section 02010

1.2 QUALITY ASSURANCE:

A. Codes and Standards: Comply with provisions of the following, except as otherwise indicated.

1. "State Or Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges and Incidental Construction.

PART 2 - PRODUCTS

2.1 HAY BALES:

A. Hay bales shall conform to the requirements of Section 2.18, Form 814.

2.2 FILTER FABRIC FENCE:

A. Filter fabric fence shall conform to the requirements of Section 2.19, Form 814.

2.3 ANTI-TRACKING MATS:

A. Crushed stone shall conform to the gradation requirements for 2" size of Article M.01.01, Form 814, or as required by the Port Authority.

B. Filter fabric shall conform to the requirements of Subarticle M.08.01-26, Form 814.

PART 3 - EXECUTION

3.1 GENERAL:

A. The Contractor shall comply with the applicable requirements of Section 1.10, Form 814, amended as follows:

1. Article 1.10.02 - Compliance With Laws and Regulations:

a. In the second sentence of the second paragraph, change "State" to "Owner".

b. In the only sentence of the third paragraph, change "Department" to "Owner".

c. In the fourth paragraph, change "Department" to "Owner".

2. Article 1.10.03 - Water Pollution Control:

a. In Subarticle 1.10.03(a), second sentence of the first paragraph, change "Department" to "Owner"

b. In Subarticle 1.10.03(b), second sentence of the first paragraph, change "DOT" to "Owner".

c. In Subarticle 1.10.03(b), Best Management Practices, delete Item #1 in its entirety and substitute the following:

"1. Construction shall proceed in accordance with the requirements of the General Sequence of Grading and Construction Activities, Application of Soil Erosion and Sedimentation Control Measures, and Final Stabilization of Site as indicated on the plans."

d. In Subarticle 1.10.03(b), Best Management Practices, delete Item #6 in its entirety.

e. In Subarticle 1.10.03(b), third sentence of the third paragraph, change "Department" to "Owner".

3. Article 1.10.06 - Protection of Archaeological and Paleontological Remains and Materials:

a. In the first sentence of the first paragraph, change "likelihood" to "possibility".

b. Delete the third paragraph in its entirety.

4. Article 1.10.07 - Contaminated and/or Hazardous Material:

a. In the only sentence of the first paragraph, change "Department" to "Owner".

b. In the only sentence of the second paragraph, change "Department" to "Owner".

c. Delete the fifth paragraph in its entirety and substitute the following:

"When the Contractor performs support work incidental to the removal, treatment, or disposal of hazardous or contaminated material, payment shall be made in accordance with the provisions of the General Conditions of these specifications."

d. In the second sentence of the seventh paragraph, change "Department" to "Owner".

e. Delete the eighth paragraph in its entirety.

3.2 INSTALLATION:

A. Prior to any construction, a pre-construction conference shall be held among the Engineer, the Owner, and the Contractor to review the erosion and sedimentation control measures to be taken.

B. Hay Bales shall be installed in accordance with the requirements of Section 2.18.03, Form 814.

C. Filter fabric fence barriers shall be installed in accordance with the requirements of Section 2.19.03, Form 814.

D. The area of the anti-tracking mat should be cleared of all vegetation, roots, and other objectionable material. Fabric shall be placed on the subgrade prior to the placement. Crushed stone shall be placed to the specified dimensions.

The anti-tracking mats shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights-of-way. This will require periodic top dressing with additional stone or additional length as condition demand and

repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public right-of-way must be removed immediately. The anti-tracking mats shall be removed when they are no longer necessary or as ordered by the Owner or Engineer.

- END OF SECTION 02020 -

SECTION 02222

EXCAVATION, BACKFILLING AND FILLING (NARROWSCOPE)

PART 1 - GENERAL

1.01 SUMMARY

A. This Section specifies requirements for excavation, backfilling and filling.

B. Definitions

1. As used herein, excavation shall mean the removal of existing pavement, concrete foundations and all materials other than bedrock (ledge rock) encountered within the limits of excavation.

2. As used herein, backfilling shall mean the filling of excavations made for construction purposes and shall extend only to existing grades, or design grades, whichever are lower.

1.02 REFERENCES

American Society for Testing and Materials (ASTM)

ASTM D 422	Test method for Particle - Size Analysis of Soils
ASTM D 1557	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-Kg) Rammer and 18-in. (457-mm) Drop
ASTM D 4318	Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils

1.03 JOB CONDITIONS

A. Protect excavations as follows:

1. Prevent water from entering excavated areas.

2. Dispose of water in a manner not to cause injury to the public health or damage to public or private property.

3. If underlying soil is weakened or disturbed, remove the disturbed soil and replace it in conformance with 3.01 A.5.

1.04 SUBMITTALS

A. Submit sample in clean, sturdy container or bag which shall not permit loss of any of the material.

B. Clearly label sample with: Contract location; title and number; designation of fill; and source of the material being supplied.

C. Submit sample at least three weeks prior to delivery of material to the site.

D. Do not deliver any material until the Engineer has checked and approved material from that source.

E. Contractor to supply plans "MTA Influence Line Drawings". Apply for approval with any and all agencies having jurisdiction prior to any excavation, backfilling or ground disturbance. Contractor to be liable for any services required by the MTA or City Agency during the progress of this contract.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fill and Backfill

1. Clean sand and gravel containing no organic matter, and conforming to the following Gradations or as approved by the Port Authority:

Sieve Sizes	Total Percent Passing by Weight NJIEC Designation: I-12	I-10
4 inch	100	100
3/4 inch	70-100	60-100
No. 50	0-75	5-40
No. 200	0-5	0-20

2. Material shall conform to the requirements for I-12 designation, subject to 2.01 A.3 below.

3. Where the entire fill or backfill is above the water table, material conforming to the requirements for I-10 designation may be used in lieu of I-12 designation except under foundations, aircraft pavement and utilities.

4. Use recycled material from the demolition process or material excavated at the construction site if it satisfies above requirements, and meets with Port Authority approval.

PART 3 - EXECUTION

3.01 EXCAVATION

A. General

1. Excavation shall consist of the removal of materials as defined in 1.01 B.1.

2. Excavate to elevations required to perform the work.

3. Should bottom of excavation be weakened, disturbed or carried below required depth:

a. Under footings - compact bottom as specified in 3.02 below and replace over-excavation with

concrete of the same Class as that specified for the footing or foundation.

b. Elsewhere - Compact bottom as approved by the Engineer and refill with material conforming to I-12 designation defined in 2.01 A.

4. Perform excavation around and adjacent to existing structures, pipes and conduits which are to remain in place, without damage to or movement of existing construction. When excavation is to be performed under such structures, pipes and conduits, support them in a manner as approved by the Engineer to ensure uninterrupted operation of the supported items.

5. All debris and all material unsuitable for or in excess of that required for backfill or fill, shall be disposed of away from the construction site, except that the Engineer may direct that excess suitable fill be disposed of at a facility approved by such agencies having jurisdiction.

3.02 PLACEMENT AND COMPACTION

A. Compaction Requirements

Subgrade, excavated surfaces, existing surfaces, backfill and fill shall be compacted to achieve a density of at least 90 percent of the maximum density as determined by Method D of ASTM D 1557, except where alternate density requirements are approved by the Engineer and/or Port Authority.

B. Backfill and Fill

1. Moisture content of backfill and fill material shall be within a range of plus or minus two percent of optimum.

2. Backfill and fill shall be placed in 14-inch, loose layers and compacted with approved mechanical tampers to specified density.

3.03 FIELD TESTS

A. Inspection and Testing

1. The Engineer will determine the extent of testing required based on observations of the work being performed in the field.

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

PART 1 - GENERAL

1.01 SUMMARY

This Section specifies requirements for concrete formwork.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

American Concrete Institute (ACI)

ACI 347 Recommended Practice for Concrete Formwork

American Society for Testing and Materials (ASTM)

ASTM D 1751 Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. For wood products furnished for the Work of this Section, the Contractor shall comply with the applicable provisions of the "National Design Specifications for Wood Construction" of the National Forest Products Association (NFPA).

B. Shop Drawings

1. All formwork and shoring shop drawings shall be signed and sealed by a Professional Engineer licensed in the State where the Work is to be performed.

2. Shop drawings shall indicate:

   a. Pertinent dimensions, openings, methods of construction, materials, joint arrangement and details, ties and shores, and location of bracing and temporary supports;

   b. Means of leakage prevention for architectural concrete;

   c. Sequence and timing of erection and stripping;

   d. Vertical, horizontal and special loads in accordance with "Loads" of ACI 347.

C. Design calculations shall be prepared by a Professional Engineer licensed in the State where the Work is to be performed.

1.04 SUBMITTALS

A. Submit samples of the following in accordance with the requirements of "Shop drawings, Catalog Cuts, and Samples" of Division 1 - GENERAL PROVISIONS:

   1. Form ties and spreaders with manufacturer's specifications;

   2. Tapes for plywood joints with manufacturer's literature;
   3. Waterstops and premolded expansion joint filler.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Earth Forms

Use only for footings where shown on the Contract Drawings.

B. Lumber Forms

Use for edge forms and unexposed finish concrete. Boards shall be 6 inches or 8 inches, shiplapped or tongue and groove, "Standard" Grade Douglas Fir, conforming to the "Standard Grading and Dressing Rules No. 15", of the West Coast Lumber Inspection Bureau. Boards shall be four sides surfaced.

C. Plywood Forms

Use for exposed finish concrete. Forms shall conform to U.S. Product Standard PA 1-66. Each panel shall carry the grade trademark of the American Plywood Association along with the Douglas Fir Plywood Association (DFPA) Quality stamp and shall be full size (4-foot x 8-foot) panels.

1. Plywood for surfaces to receive membrane waterproofing shall be a minimum of 5/8 inch thick and shall be "B-B Plyform Class 1 Exterior" grade.

2. Plywood where "Smooth Finish" is required, as shown on the Contract Drawings, shall be "HD Overlay Plyform Class 2 Exterior" grade, a minimum of 3/4 inch thick.

D. Prefabricated Forms

Prefabricated forms shall be as listed below and where shown on the Contract Drawings:

1. Pan Type void Forms

Removable steel or reinforced plastic of sizes and profiles required to produce completed Work shown.

2. Tubular Column Type

Metal, fiberglass-reinforced plastic, or spirally wound laminated fiber materials; inside surface treated with release agent; of sizes required to produce completed Work shown.

E. Steel Forms

Sheet steel, suitably reinforced and designed for the particular use shown on the Contract Drawings.

F. Form Liners

Smooth, durable, grainless and non-staining hardboard.

G. Framing, Studding, and Bracing

Stud or No. 3 Structural Light Framing grade.

H. Form Ties and Spreaders

Standard, non-corrosive metal form clamp assembly, of type acting as spreaders and leaving no metal within 1 inch of concrete face. No wire ties, wood spreaders or through bolts will be permitted.

I. Form Anchors and Hangers

Anchors and hangers used for exposed concrete shall not leave exposed metal at surface. Hangers supporting forms from structural steel shall be symmetrically arranged on supporting members to minimize twisting or rotation of member. Penetration of structural steel members will not be permitted.

J. Form Coating Agent

Provide on of the following:

1. "Arcal-80"; Arcal Chemical Corporation
2. "Synthex"; Industrial Synthetics Company
3. "Nox-Crete Form Coating"; Nox-Crete Company

K. Vapor Retarder

Where shown on the Contract Drawings, 8 mil thick polyethylene sheet.

L. Bituminous Joint Filer: ASTM D 1751

PART 3 - EXECUTION

3.01 PREPARATION

A. Earth Forms

Trench earth forms neatly and accurately and at least 2 inches wider than footing widths shown on the Contract Drawings, unless otherwise indicated. Construct wood edge strips at top of each side of trench to secure reinforcing and prevent trench from sloughs. Form sides of footings where earth sloughs. Earth forms shall be tamped firm and cleaned of all debris and loose material before depositing concrete.

B. Formwork - General

Construct forms in the correct shape and dimensions, mortar tight, of sufficient strength, and so braced and tied together that the movement of men, equipment, materials or the placing and vibrating of the concrete shall not throw them out of line or position. Forms shall be strong enough to maintain their shape under all imposed loads. Camber where necessary to assure level finished soffits. Carefully verify the horizontal and vertical positions of forms and correct all inaccuracies to the satisfaction of the Engineer before placing concrete in any form. Complete all wedging and bracing before placing concrete.

C. Forms for "Smooth Finish" Concrete

Use steel, plywood or lined board forms. Plywood and form liners shall be clean, smooth, uniform in size and free from damaged edges and holes. Form lining shall have close-fitting square joints between separate sheets and shall not be sprung into place. Sheets of form liners and plywood shall be full size wherever possible and joints shall be taped to prevent protrusions in concrete. Use special care in forming and stripping wood forms to protect corners and in forming and stripping wood forms to protect corners and edges. All horizontal joints shall be level and continuous. Wood forms shall be kept wet at all times until stripping.

D. Forms for Surfaces to Receive Membrane Waterproofing

Use plywood or steel forms. After erection of forms, tape joints of plywood to prevent protrusions in concrete.

E. Framing, Studding and Bracing

Space studs at 16 inches on center maximum for boards and 12 inches on center maximum for plywood. Framing, bracing, centering and supporting members shall be of amply size and strength to carry safely, without deflection all dead and live loads to which forms may be subjected, and shall be spaced sufficiently close to prevent any building or sagging or forms. Soffits of all beam forms shall be constructed of material a minimum of two inches thick. Concrete out of line, level or plumb will be cause for rejection by the Engineer of the whole Work affected. Distribute bracing loads over base area on which bracing is erected. When placed on ground, protect against undermining, settlement or accidental impact.

3.02 INSTALLATION

A. Tolerances

Formwork shall be constructed so that concrete surfaces shall be within construction tolerances specified in "Tolerances for Reinformed Concrete Buildings" of ACI 347.

B. Chamfered Corners

As shown on the Contract Drawings, provide moldings in forms for all chamfering required. Moldings shall be 45-degree right triangles in profile, or size required, milled from wood free from visible defects.

C. Form Ties

Form ties shall be of sufficient strength and used in sufficient quantities to prevent spreading of the forms.

Place ties at least one inch away from the finished surface of the concrete. Leave inner rods in concrete when forms are stripped. Space all form ties to be equidistant, and symmetrical and lined up both vertically and horizontally.

D. Cleanouts and Access Panels

Provide removable cleanout sections or access panels at the bottoms of all forms to permit inspection and effective cleaning of loose dirt, debris, and waste material. Clean all forms and surfaces against which concrete is to be placed of all chips, sawdust, and other debris and thoroughly blow out with compressed air just before concrete is placed.

E. Arrangement

Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.

F. Construction Joints

Provide a surfaced pouring strip where construction joints intersect exposed surfaces to provide a straight line at joints. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage. Construction joints shall show no overlapping of concrete and shall, as closely as possible, present the same appearance as butted plywood joints. Joints in a continuous line shall be straight, true, and sharp.

G. Embedded Items

Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, waterstops and other features. No wood or aluminum shall be embedded in concrete. Obtain any required information pertaining to embedded items to be furnished for the Work specified in other Sections. Securely anchor all embedded items in correct location and alignment prior to placing concrete. No electrical or telephone conduit larger than 3/4 inch in diameter and no plumbing pipes of any size will be permitted in concrete walls or slabs.

H. Openings for Items Passing Through Concrete

Frame openings in concrete where shown on the Contract Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of Work specified under other Sections. Coordinate all Work of this nature in order that there shall be no unnecessary cutting and patching of concrete. Perform any cutting and repairing of concrete required as a result of failure to provide for such openings at no cost to the Authority.

I. Screeds

Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs. Slope slabs to drain where required or as shown on the Contract Drawings. Before depositing concrete, remove all debris from the space to be occupied by the concrete and thoroughly wet all forms. Remove free-standing water.

J. Screed Supports

For concrete over waterproof membranes and vapor-barrier membranes, use screed supports of a cradle, pad or base type which shall not puncture the membrane. Staking through the membrane will not be permitted.

K. Shores and Falsework

Provide shores and falsework of adequate strength to protect persons and adjacent structures. Falsework and supports shall be adequate in size and strength to resist the loads imposed upon them without deformation, deflection, or settlement. Use wedges in parts or jacks where required to bring forms, shoring, or falsework for beams, girders, slabs, and other parts of the structure to the necessary elevations and uniform bearing before placing concrete. Do not use single wedges. Vertical and lateral loads shall be carried to ground by the formwork system or by bracing. Where shores rest on ground, provide adequate mud sills or other bases. Construct forms to permit their removal without disturbing the original shoring. Ensure that there is no

movement of shores, braces or other supports during placement of concrete.

L. Reuse and Coating of Forms

Thoroughly clean forms and reapply form coating before each reuse. For exposed Work, do not reuse any form which cannot be reconditioned to "like new" condition. Discard forms considered unsatisfactory by the Engineer. Apply form coating to all forms in accordance with the manufacturer's specifications, except where "Scored Finish" is required as shown on the Contract Drawings. Do not coat forms for concrete that is to receive a "Scored Finish". Apply form coatings before placing reinforcing steel.

M. Inspection

Notify the Engineer after placement of reinforcing steel in the forms, but prior to placing any concrete, so that his inspection may be made.

3.03 REMOVAL OF FORMS AND SHORES

A. The forms and supporting shoring shall not be removed until the members have acquired sufficient strength to support their weight and the loads superimposed thereon safely and until the time and sequence of removal have been approved by the Engineer. Formwork shall be removed without damage to the concrete.

B. Except when otherwise approved by the Engineer, forms shall be left in place for not less that the total number of days as specified in ACI 347.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 SUMMARY

This Section specifies requirements for furnishing and installing concrete reinforcement.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

American Concrete Institute (ACI)

ACI 315 Details and Detailing of Concrete Reinforcement

ACI 318 Building Code Requirements for Reinforced Concrete

American Society for Testing and Materials (ASTM)

ASTM A 82 Steel Wire, Plain, for Concrete Reinforcement

ASTM A 184 Fabricated Deformed Steel Bar Mats for Concrete Reinforcement

ASTM A 185 Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement

ASTM A 497 Welded Deformed Steel Wire Fabric for Concrete Reinforcement

ASTM A 615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

ASTM A 767 Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement

ASTM A 775 Epoxy-Coated Reinforcing Steel Bars

American Welding Society (AWS)

AWS D 1.4 Structural Welding Code - Reinforcing Steel

Concrete Reinforcing Steel Institute (CRSI)

Manual of Standard Practice
Placing Reinforcing Bars

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

For Work of this Section involving bridges, the Contractor shall comply with the applicable provisions of "Standard Specifications for Highway Bridges" of the American Association of State Highway and Transportation Officials (AASHTO).

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver concrete reinforcement in bundles marked with metal tags indicating size, length and mark number.

B. Store and handle materials to prevent contamination that could impair bond.

1.05 SUBMITTALS

A. Shop Drawings

1. Submit detailed shop drawings including chairs, splices, bending schedules and bending diagrams for all concrete reinforcement in accordance with requirements of "Shop Drawings, Catalog cuts, and Samples" of Division 1 - GENERAL PROVISIONS.

2. Any proposed change in the size, spacing or arrangement of the reinforcing steel shall be clearly indicated on the shop drawings.

3. Reinforcing steel shall not interfere with placement of embedded items.

B. Mill Reports

Furnish certified mill test reports for all concrete reinforcement.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Reinforcing Bars

Types shall be as listed below and where shown on the Contract Drawings:

1. Reinforcing Bars: ASTM A 615, deformed

   a. Grade 60, unless otherwise shown on the Contract Drawings;
   b. Grade 40, for bar sizes #3 through #6 at manholes and catchbasins, if any.

2. Galvanized Reinforcing Bars

   ASTM A 767, Class-I (3.0 oz. zinc psf) hot-dip galvanized, after fabrication and bending.

   a. Coat sheared ends with an approved zinc-rich formulation.
   b. Repair damaged coating, after bending, with an approved zinc-rich formulation.

3. Welded Wire Fabric

   Types shall be as listed below, where shown on the Contract Drawings:

   1. Plain Type

      ASTM A 185, plain finish, unless otherwise shown on the Contract Drawings

      a. Flat sheets for size W5 and larger;
      b. Coiled rolls for sizes below W5.

2. Deformed Wire

ASTM A 497, plain finish, unless otherwise shown on the Contract Drawings

a. Flat sheets for size W5 and larger;
b. Coiled rolls for sizes below D5.

C. Fabricated Steel Bar Mats

Fabricated steel bar mats shall be in accordance with ASTM A 184, where shown on the Contract Drawings, and as follows:

1. Bar grade, size and spacing as shown;

2. Welded connections, unless otherwise shown on the Contract Drawings.

D. Steel Wire

Steel wire shall comply with ASTM A 82, plain finish, unless otherwise shown on the Contract Drawings.

2.02 ACCESSORIES

A. Tie Wire

Provide minimum 16-gage, annealed type. Provide nylon-coated wire for use with epoxy-coated reinforcing bars, if any.

B. Supports for Reinforcement

Provide bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use galvanized steel wire bar type supports complying with CRSI standards and as follows:

1. For supporting epoxy-coated reinforcing bars, use plastic coated supports, or supports fabricated of dielectric material.
2. For slabs-on-grade, use supports with horizontal plate runners.
3. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, use supports with plastic capped legs (CRSI, Class 1).
4. Where architectural concrete is shown on the Contract Drawings, use plastic side form spacers.

2.03 FABRICATION

A. Fabricate concrete reinforcement as shown on the Contract Drawings and on approved shop drawings, in accordance with ACI 315 "Tolerances".

B. Bend all concrete reinforcement cold. Heating of bars of wire fabric is prohibited.

C. Where welding of concrete reinforcement is required, weld in accordance with AWS D1.4.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Place concrete reinforcement as shown on the Contract Drawings and on approved shop drawings. Where not shown on the Contract Drawings, comply with CRSI "Placing Reinforcing Bars".

B. Clean concrete reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

C. Accurately position, support and secure concrete reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support concrete reinforcement by chairs, runners, bolsters, spacers, and hangers in accordance with CRSI "Manual of Standard Practice". Do not interfere with placement of embedded items.

D. Avoid cutting or puncturing vapor retarder, if any, during concrete reinforcement placement.

E. Place concrete reinforcement to obtain at least the minimum covers shown on the Contract Drawings for concrete protection, or in accordance with ACI 318 "Concrete Protection for Reinforcement," if not shown on the Contract Drawings. Arrange, space and securely tie bars and bar supports to hold concrete reinforcement in position during concrete placement operations. Set ties so ends are directed into concrete, not toward exposed concrete surfaces.

F. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire, but in no case shall lap be less than requirements of ACI 318 "Splices of Welded Deformed Wire Fabric in Tension" or "Splices of Welded Smooth Wire Fabric in Tension". Offset end laps in adjacent widths to prevent continuous laps in either direction.

G. After concrete placement, do not field bend partially embedded concrete reinforcement except as shown on the Contract Drawings or as permitted by the Engineer.

END OF SECTION

SECTION 03302

CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

This Section specifies requirements for furnishing and casting concrete.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

American Concrete Institute (ACI)

ACI 301	Specifications for Structural Concrete for Buildings
ACI 304	Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
ACI 318	Building Code Requirements for Reinforced Concrete
ACI 347	Recommended Practice for Concrete Formwork

American Society for Testing and Materials (ASTM)

ASTM C 33	Concrete Aggregates
ASTM C 94	Ready-Mixed Concrete
ASTM C 138	Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
ASTM C 143	Test Method for Slump of Portland Cement Concrete
ASTM C 150	Portland Cement

ASTM C 173 Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

ASTM C 231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

ASTM C 260 Air-Entraining Admixtures for Concrete

ASTM C 494 Chemical Admixtures for Concrete

ASTM C 618 Fly Ash or Calcinated Natural Pozzolan for Use as Admixtures in Portland Cement Concrete

ASTM C 989 Ground Iron Blast Furnace Slag for Use in Concrete and Mortars

ASTM C 1751 Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-Extruding and Resilient Bituminous Types)

1.03 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements

1. Do not mix or place concrete when the ambient temperature is below 40 degrees F or when conditions indicate that the temperature will fall below 40 degrees F within 72 hours, unless approved by the Engineer or unless the areas to be concreted are enclosed and heated in an approved manner.

2. Take all necessary precautions to ensure that the temperature of the concrete when placed is a minimum of 50 degrees F. These precautions shall include but are not limited to the following:

a. Heated mix water;
b. Application of steam to aggregates;
c. Scheduling of placement for warmest part of the day;
d. Heating within enclosures.

3. Reinforcement, forms and ground with which concrete will be in contact shall be completely frost free.

4. Do not use calcium chloride.

5. Comply with all provisions of this Section for placing and curing.

B. Hot Weather Requirements

1. Do not mix or place concrete when the ambient temperature exceeds 90 degrees F.

2. If the ambient temperature exceeds 75 degrees F, the following precautions, as approved by the Engineer, shall be followed:

   a. Schedule Work so that concrete can be placed with the least possible delay and, if so approved by the Engineer, place concrete during late afternoon or at night.

   b. Sprinkle coarse aggregate to cool by evaporation.

   c. Use chilled mixing water or shaved ice to replace part of the mixing water.

   d. In the case of truck mixers, do not rotate the drum during and after the addition of cement to the mix until the mixing water is added at the construction site.

   e. Prevent absorption by sprinkling subgrade and wood forms just before placement so that they will not absorb water from the mix.

   f. Erect windbreaks to prevent strong hot winds from drying exposed concrete surfaces while they are being finished.

   g. Use a water reducing retarding admixture in the mix.

h. Screed and float concrete as it is placed and start curing immediately.

1.04 QUALITY ASSURANCE

A. The Contractor shall be responsible for the quality of the concrete and concrete construction. Quality of concrete will be determined by the Engineer, based on conformance with the requirements of this Section and on the results of strength tests performed, as specified on samples of concrete taken at its point of discharge from delivery trucks.

B. The Engineer may perform tests and inspections of:

1. Concrete aggregates, whenever they are being loaded at their source of supply;

2. Concrete ingredients at the concrete batching plant.

C. Only certified cement shall be used. Certified cement will be received only from the following mills:

1. Allentown Portland Cement Company
2. Keystone Portland Cement Company
3. Lone Star Industries, Inc.
4. Coplay Cement Company
5. Whitehall Cement Manufacturing Company
6. Hercules Cement Company
7. Atlantic Cement Company
8. Independent Cement Company

D. The mill shall agree to furnish certified cement in accordance with requirements and controls contained in an agreement between the Authority and the mill. A copy of the agreement, which is the same for each of the mills listed in 1.04 C, is available for inspection at the Engineering Materials Laboratory, Port Authority Technical Center, 241 Erie Street, Jersey City, NJ 07310-1397.

E. For all cement certified for use for this Contract, the Engineer may at any time spot-check operations at the

manufacturer's plant and take samples to check the mill certification. Sampling will be done either at the mill or at the point of destination. Samples of cement shall be tested from time to time, as directed by the Engineer, at both the manufacturer's and the Authority's laboratories.

F. The Engineer shall be notified at least forty-eight hours in advance of the loading of aggregates to permit sampling and inspection of material by the Engineer while it is being loaded at the source of supply.

G. To verify the potential compressive strength and durability of the concrete mixture, the Engineer may make trial batches of concrete containing the ingredients proposed for use, subject to the following:

1. Notify the Engineer of the proposed sources of materials at least 8 days prior to placing concrete.

2. Furnish the Engineer with whatever quantities of these materials he may require for the trial batches at least 8 days prior to placing concrete.

H. Quality control tests during mixing and placing of concrete will be performed by the Engineer as follows:

1. Air content will be determined in accordance with ASTM C 138, C 173 or C 231.

2. Slump will be determined frequently in accordance with ASTM C 143.

I. Provide labor and means for obtaining all samples of concrete required for tests and for curing and protecting concrete cylinders at the construction site.

1.05 SUBMITTALS

A. Submit the following to the Engineer for approval:

1. Certification and source of cement;

2. Certification and source of fine and coarse aggregate;

3. Source, type and chloride content of admixtures;

4. Certification and source of fly ash and slag;

5. Source and type of air entraining agent, water reducing admixture and water reducing retarding admixture.

6. Samples of concrete ingredients for trail batches;
7. Concrete batcher and supplier location and type of plant;

8. Request for use of pumping as a method of placement.

B. Do not deliver any concrete to the construction site until all approvals have been obtained.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement

1. ASTM C 150, type I or Type II,

2. Deliver cement:

a. In strong paper bags containing 94 lbs. net of cement per bag marked with the brand, type and name of manufacturer and sealed in an approved manner;

b. In clean weathertight containers constructed especially for transporting cement, sealed with a numbered seal referenced to the silo from which the cement is drawn and the certified test report for that silo. If any seals on containers, bins, barges or hoppers are broken, except in the presence of or with

the consent of the Engineer, do not use the cement.

B. Fly Ash

ASTM C 618, Type F, with a maximum loss of ignition of 3.0 percent

C. Slag: ASTM C 989, Grade 120

D. Fine Aggregate: ASTM C 33

E. Coarse Aggregate

ASTM C 33, Size Number 57, Class Designation 4S (regardless of type)

F. Water

Use clean water suitable for drinking purposes for both mixing and curing concrete.

G. Air Entraining Agent: ASTM C 260

1. "Darex", manufactured by W.R. Grace, Cambridge, MA;

2. "MBVR", manufactured by Master Builders, Cleveland, OH;

3. "Sika AER", manufactured by Sika Chemical Co., Lyndhurst, NJ;

4. "Air-Mix", manufactured by Euclid Chemical Co., Cleveland, OH.

H. Water Reducing Retarding Admixture

ASTM C 494, Type D containing no lignosulfonic acids.

1. "Daratard-17", manufactured by W.R. Grace, Cambridge, MA;

2. "Pozz 122R", manufactured by Master Builders, Cleveland, OH;

3. "Plastiment", manufactured by Sika Chemical Co., Lyndhurst, NJ;

4. "Eucon Retarder-75", manufactured by Euclid Chemical Co., Cleveland, OH.

I. Forms

1. For exposed concrete, use:

   a. dressed, tongue and groove boards;

   b. closely fitting steel forms especially designed for the purpose; or

   c. exterior grade plywood.

2. Form Ties and Spreaders

   Standard, non-corrosive metal form clamp assembly, of type acting as spreaders and leaving no metal within 1 inch of concrete face. No wire ties, wood spreaders or through bolts will be permitted.

3. Form Coating

   Provide one of the following:

   a. "Nox-Crete Form Coating", manufactured by Nox-Crete Company;

   b. "Arcal-80", manufactured by Arcal Chemical Corporation;

   c. "Synthex", manufactured by Industrial Synthetics Company.

J. Bituminous Joint Filler: ASTM D 1751.

2.02 MIXES

A. Mixing of concrete shall be as per ASTM C 94 except as otherwise specified in this Section. Mix concrete in the proportions specified in the Concrete Proportions table in 2.02 C. The Contractor shall be responsible for attaining required compressive strengths designated below whether or not attainable from the mixes specified. If the Contractor is not able to obtain the required strength using the mix specified, he shall submit a substitute mix design to the Engineer for approval. Such substitute mix shall be developed according to ACI 318 "Building Code Requirements for Reinforced Concrete" and ACI 301 "Specifications for Structural Concrete for Buildings". The Contractor shall not be entitled to any additional compensation for use of a substitute mix. Submittals shall be subject to the time period specified in 1.04G.

Class Designations	Required Strength f'c
B	4000 psi
C	3000 psi*
D	3000 psi

* Designed for easy troweling for use in slabs.

f'c is the specified 28-day compressive strength of the concrete in pounds per square inch. To satisfy the strength performance requirement, the average strength of concrete mixes shall be in excess of f'c. The degree of excess shall be determined as specified in ACI 318, Chapter 4.

B. If the Contractor proposes to use pumping as a method of placement, submit a written request to the Engineer for his approval, including the proposed mix and the pumping

scheme. The submitted mix must be designed according to ACI 318 "Building code Requirements for Reinforced Concrete" and ACI 301 "Specifications for Structural Concrete for Buildings". Method of pumping shall be in accordance with ACI 304 "Placing Concrete by Pumping Methods".

C. Concrete Proportions

		Class Designation		
Ingredient	Units	"B"	"C"	"D"
Cement*	lbs.	94	94	94
Fine Aggregate	lbs.	176	196	226
Coarse Aggregate	lbs.	284	294	354
Water - maximum	gals.	5.25	5.75	6.25
Slump Range	inches	2-4	2-4	2-4
Air Entrain. Agent	As required to obtain an air content of 6% plus or minus 1.5%			
Water Reducer Retarder		**	**	**

* Substitute either fly ash or slag for a portion of the cement content specified for each class at the minimum rate of 15% of the cement content by weight. The maximum rates of substitution shall be 20% for fly ash, and 40% for slag. Fly ash and slag substitution in the same mix is not permitted. Depending on the final use of the concrete, upon written request of the Contractor, the Engineer may waive the requirement for addition of fly ash or slag.

For cement-slag mixes, the water-cement ratio shall be computed using the same formula as for pure cement, with the "weight of cement" equal to the total weight of cement plus slag. For cement-fly ash mixes, the water-cement ratio shall be computed using the formula:

$$\text{water-cement ratio (per unit volume of concrete)} = \frac{\text{weight of water}}{\text{weight of cement} + (0.8 \times \text{weight of fly ash})}$$

The substitution of either fly ash or slag cement may tend to decrease the entrained air in the mix, and also to retard setting and early strength gain (particularly at lower temperatures). Make adjustments as required to proportions of air-entraining agents and retarders, and to anticipated times for setting and initial curing.

** Where required in accordance with 1.03 B. Quantity as recommended by the manufacturer. Air entraining agent and water reducing retarding admixture shall be products of the same manufacturer.

D. Adjustment of Proportions

1. Design Mixture

a. The above mixes were designed using fine aggregates with a specific gravity of 2.65 in a saturated surface-dry condition and a coarse aggregate with a specific gravity of 2.83.

b. If the materials proposed for use differ from the above, adjustments to the listed proportions shall be made to ensure proper yield.

2. Daily Adjustments (to obtain the optimum mixture)

a. Change the weight of fine aggregate by an amount not exceeding plus or minus ten percent. The total weight of fine and coarse aggregate per bay of cement shall remain as shown in the table in 2.02 C.

b. Make adjustments to the weight of fine aggregate to compensate for the volume of surface water carried on the aggregate. This volume of water shall be deducted from the volume of water specified in the table in 2.02 C.

E. Where concrete or mortar is separately required in small batches of less than a cubic yard and the Engineer has specifically approved, concrete may be mixed by hand, provided the methods of mixing, transferring and placing the concrete are first approved by the Engineer.

F. Concrete or mortar which has partially hardened or has attained its initial set shall not be remixed or retempered and shall be discarded.

PART 3 - EXECUTION

3.01 PREPARATION

A. Forms

1. Forms shall be substantial in design and of adequate strength to support safely the concrete load and construction live loads.

2. Forms shall be tight enough to prevent leakage of water and grout and shall be braced and tied so as to maintain true position and line without bulging, sagging or other deformation.

3. Bolts and ties shall be of approved design and shall be left in the concrete and so connected that, after the forms have been removed, no metal will be closer than one inch from the surface of the concrete.

4. Thoroughly clean forms before concrete is placed and apply form coating.

5. Earth forms may be used only for footings, where the soil is firm and stable and the concrete will not be exposed. Trench earth forms neatly and accurately and at least 2 inches wider than the footing widths shown on the Contract Drawings. Form sides of footings where earth sloughs. Earth forms shall be tamped firm and cleaned of all

debris and loose material before depositing concrete.

6. Do not reuse forms that may produce concrete surfaces unequal to those obtained with new forms.

7. Strip forms carefully so as not to damage concrete surfaces.

8. Except when otherwise approved by the Engineer, forms shall be left in place for not less than the total number of days (not necessarily consecutive) specified in ACI 347 for the particular ACI 347 table member in which the temperature of the air in contact with the concrete is above 50 degrees F.

3.02 INSTALLATION

A. Deposit concrete only in the presence of the Engineer and by methods approved by him.

B. Consolidate concrete by spading coarse aggregate away from the forms, using approved equipment so that the concrete is worked into all corners and around all embedded material and does not result in excessive voids or honeycomb in the surfaces.

C. For concrete surfaces exposed to drying action, keep wet at least seven days or until concrete reaches at least 70 percent of f'c after the forms are removed, whichever period is less, except that when the temperature is below 50 degrees F wetting will not be required. Provide suitable means for maintaining a temperature in the concrete of at least 50 degrees for not less than three days for concrete not subject to live or dead loads and for not less than six days for concrete subject to partial loads. Do not add salts, chemicals or admixtures of any kind to the concrete, except as specified in this Section.

D. Finish concrete in accordance with the following requirements:

1. For surfaces of concrete which are exposed to view in the finished construction, remove fins, fill honeycomb and holes resulting from bolts and ties with a mortar containing cement and sand in the same proportions as in the concrete, and utilizing cement which shall produce mortar of the same color as the concrete. Finish with a steel trowel to match adjacent surfaces, and rub the roughened surfaces with a carborundum brick and clean, fresh water.

2. Apply a "Trowel Finish" to unformed surfaces, except sidewalks, exposed to view in the finished construction. "Trowel Finish" shall be a surface of concrete obtained by the use of a steel trowel, after screeding and floating the surface of the concrete immediately after pouring, to produce a dense, smooth, even surface suitable for painting or the application of floor covering. The troweling shall not take place until the surfaces have set sufficiently to sustain knee boards without damage.

3. Sidewalks shall receive a "Float Finish". "Float Finish" shall be a surface of concrete obtained by the use of a wood float. A float finish shall be applied to horizontal surfaces immediately after screeding and before initial setting has begun.

E. Concrete Curbs and Sidewalks

1. Use "Class B" concrete.

2. Give sidewalks a "Float Finish" and tool edges and joints for a width of two inches and round corners to a radius of 1/4 inch with an approved edging tool.

3. Install expansion joints at not more than 20-foot intervals in sidewalks with matching joints in curbs. Use 1/4-inch bituminous joint filler.

4. Score sidewalks in squares as approved by the Engineer.

3.03 PROTECTIONS

Protect concrete surfaces carefully, by means approved by the Engineer, to prevent damage or marring.

END OF SECTION

SECTION 15335 - FIRE PROTECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

1.1.1 General provisions of the contract and division 1 specification sections apply to this section.

1.2 REFERENCES

1.2.1 The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the test by the basic designation only.

National Fire Protection Association (NFPA)

NFPA 13 1991 Sprinkler Systems
NFPA 14 1990 Standpipe and Hose Systems
NFPA 20 1990 Centrifugal Fire Pumps
NFPA 22 1987 Water Tanks for Private Fire Protection
NFPA 24 1992 Private Fire Service Mains and Their Appurtenances
NFPA 241 1989 Safeguarding Construction, Alterations and Demolition Operations

1.3 SITE SURVEY

1.3.1 Before submitting bid, bidder shall carefully examine existing field conditions. Design and/or as-built drawings are not available covering the fire protection systems. Submission of bid will be construed as evidence that required examination has been made. Claims for extra labor, equipment and materials required due to existing conditions, which could have been foreseen, will not be recognized.

1.4 QUALIFICATIONS OF CONTRACTOR

1.4.1 Included in the Contractors bid, he shall submit data indicating that the Contractor has successfully completed a demolition project with fire protection program and system of similar complexity and having such required experience.

1.5 DESCRIPTION OF WORK

1.5.1 The dry fire standpipe systems shall be retained in service and maintained in conformity with the progress of the demolition activity in such a manner that the systems are always operational in conformance with the requirements of NFPA Standards 13 and 14.

1.5.2 The site fire distribution grid and the electric 3-Phase 440 Amp. fire pump system shall be maintained in service for as long as practical, and all efforts should be made to keep it in service for the extent the demolition work, in conformance with the requirements of NFPA Standards 20, 22, and 24. No parts of this system shall be taken out of service or shut down without prior approval of the Construction Manager and Owner. The contractor will be responsible to maintain and approved fire prevention system at all times and to keep it in service for the extent of the Demolition.

1.5.3 Contractor shall coordinate his proposed scope of work with the New York City Fire Department, and all other agencies having jurisdiction. NFPA Standard 241 shall be used by the Contractor in the development of his work scope.

1.5.4 No materials, demolition work, or equipment shall interfere with access to site fire hydrants, siamese connections or spare fire extinguishing systems.

1.5.5 Prior to start of demolition work, properly authorized personnel shall seal all control valves in the fire protection system in the open or closed position to correspond to the normal operating mode.

1.5.6 When the fire standpipe systems are being regularly turned off and on to facilitate removal and capping of segments, the control valves shall be checked at the end of each shift to ascertain that the fire protection is in service. Control valves shall be sealed in the open or closed position by properly authorized personnel.

1.5.7 Fire standpipe piping systems shall be removed, extended, and/or revised to maintain the fire protection systems in service at all times during the demolition process.

1.5.8 Fire standpipe risers that come out of service shall be completely removed. Segments underground shall be cut at ground level, slurried full of sand and plugged with concrete. Any pipng which is in a basement or crawl space area shall be removed. The holes in slabs and foundation walls shall be plugged.

1.5.9 Provide Type "A" fire extinguisher (or insure their availability) for temporary offices and similar spaces where there is minimal danger of electrical or grease-oil-flammable liquid fires. In other locations provide Type "ABC" dry chemical extinguishers, or a combination of several extinguishers of NFPA recommended types for the exposure in each case.

1.5.10 Contractor shall provide 55 gallon drums of water, and buckets of sand in work areas with no active fire protection systems. The number of drums of water and buckets of sand shall be determined by the size of the unprotected area(s).

1.5.11 Contractor shall assign an employee to each work area in each work shift as fire watch where welding, cutting and other operations involving portable equipment using arc or open flame. The Fire Watch period shall extend to a half hour after the normal work shift, wetting down debris around the burning area. All employees performing fire watch service shall wear a red helmet and shall sign off with Security before leaving the site.

1.6 SUBMITTALS

1.6.1 Prior to start of demolition work, the Contractor shall prepare and submit for approval a fire safety program which shall cover all the work under the demolition contract. The right of the owner to administer and enforce this program shall be established, even though the demolition of the buildings in this contract may be entirely under the jurisdiction of the Contractor.

1.6.2 The New York City Fire Department shall be consulted for guidance in the preparation of the fire safety program.

1.6.3 The fire safety program shall include a detailed technical approach that will be used to maintain the systems in

operation, during the demolition process, with a discussion of the equipment, methods and procedures to use. The fire safety program shall conform to existing federal, state and local rules and regulations.

1.6.4 The Contractor shall not proceed with any demolition operations or fire safety program until the fire safety program has been reviewed and approved by LMDC and its agents.

1.7 MATERIALS AND EQUIPMENT

1.7.1 All materials and equipment required to maintain all the fire protection systems in service shall conform to NFPA standard requirements and shall be UL/FM listed.

1.7.2 Provide new or used materials and equipment that are undamaged and in serviceable condition. Provide only materials and equipment that are recognized/listed by UL/FM as suitable for the intended use, by compliance with appropriate standards.

1.7.3 Employ UL listed fire hoses with a pressure rating greater than the maximum pressure of the water distribution system to extend temporary service to remote work areas.

-- END OF SECTION 15335 --

SECTION 01311 – CRITICAL PATH METHOD SCHEDULING

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

A. Description.

B. Computer Scheduling System.

C. Qualifications of Personnel.

D. Preparation Guidelines for CPM Schedules.

E. Submittal and Review Process.

F. Maintenance and Update of the CPM Schedule.

G. Project Schedule Revisions.

H. CPM Schedule Recovery.

I. Time Impact Analysis for Changes, Delays and Contractor Requests.

J. General.

K. Payment.

1.2 DESCRIPTION

A. The Contractor shall at its own expense, prepare, maintain and update detailed Critical Path Method (CPM) Resource-Loaded Progress Schedules (hereinafter "CPM Schedule") as described in this Section. CPM Schedules shall be prepared in such a manner as to permit the orderly planning, organization, execution of the work, and be sufficiently detailed to accurately depict all the Work required by the Contract. The CPM Schedules shall be updated and/or revised as required, after review by the Contracting Officer, no less than once a month during the course of the Work, and shall accurately reflect and report the actual performance and progress of the Work in accordance with the requirements set forth in "Maintenance and Update of the CPM Schedule".

B. Contractor's attention is directed to the schedule demands of this project. URS Corp. anticipates accelerated work schedule to meet same and contractor should include all costs associated with meeting or exceeding the delivery and completion date requirements (i.e. extended shifts, 2nd shifts, weekends, holidays) to avoid damages. The intent is that time extensions will not be granted for change order work. Extra work must be implemented within the time frame of the base contract. Contractor is to meet or exceed required completion dates regardless of the restrictions (weekends, after-hours are permitted). All costs associated are to be inclusive in the amount stipulated on the contractor's bid.

C. Contractor must be fully prepared to mobilize and staged to actively work as detailed on the Milestone dates, therefore all submittals, schedules, permits, notifications, protocols, etc. must be expedited and approved prior to commencement of work.

1.3 COMPUTER SCHEDULING SYSTEM

A. The Contractor shall utilize a computer scheduling system that is capable of complying with the resource requirements of these specifications and designed specifically for the production of CPM schedule computer reports, which will validate the detailed logic networks and pro-vide the required schedule analysis and supporting documentation for progress payments. The computer scheduling system shall be Primavera Project Planner, latest issue or equivalent.

1.4 QUALIFICATIONS OF PERSONNEL

A. The Contractor will engage, at the Contractor's own expense, a qualified CPM Scheduling Consultant (hereinafter "Scheduling Consultant), approved by the Contracting Officer, to assist in the preparation and production of the CPM Schedule. The Contractor may perform these services with the Contractor's own organization if the qualifications of assigned staff are approved by the Contracting Officer.

B. The Scheduling Consultant, or the Contractor's assigned staff, shall meet the following criteria:
1. The name and address of the proposed Scheduling Consultant, if used.
2. Information sufficient to show that the proposed Scheduling Consultant, or the Contractor's own organization, has staff and computer facilities meeting the criteria specified in this Section.
3. A list of at least three (3) projects completed within the past ten (10) years of similar scope and cost to this Project for which the proposed consultant, or its own organization, or staff thereof has performed services similar to those required under this Con-tract. The Contractor shall also submit any other pertinent information required by the Contracting Officer. The Government shall have the right to approve or disapprove employment of the consultant proposed, or the performance of the requirements herein by the Contractor's own organization.

1.5 PREPARATION GUIDELINES FOR CPM SCHEDULES

A. The CPM Schedule shall represent a practical plan to complete the Work within the required time(s) for completion, as defined in the Contract Documents.
1. A CPM Schedule showing completions later than those specified in the Contract Documents will not be accepted.
2. Schedules found to be impractical by the Contracting Officer, at his sole discretion, shall be revised and resubmitted by the Contractor.
3. Float is defined as the amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any activity in the project schedule. Total float is defined as the amount of time any given activity or path of activities may be delayed before it will affect the project completion time. Float is not time for the exclusive use or benefit of either the Government or the Contractor, but must be used in the best interest of completing the project on time. Extensions of time for performance required under the General Conditions pertaining to equitable time adjustment will be

granted only to the extent that the equitable time adjustment exceeds total float in the activity or path of activities affected at the time notice to proceed was issued for the change.

B. The CPM Schedule shall show the sequence and interdependence of submittals, material procurement, construction activities and phasing as described in Section 01010, and shall specifically include as a minimum.
   1. The start and completion of all items of the Work, their major components and mile-stone completion dates, if any.
   2. Submittals and material procurement activities including, but not limited to:
      a. Shop Drawings, Catalog Cuts & Samples
      b. Steps required to obtain necessary permits
      c. Inspections/Surveys
      d. Safety Plans
      e. Temporary Facilities & Utilities
      f. Project Record Documents
      g. Operations & Maintenance Manuals

   3. These activities in the CPM Schedule shall indicate the following:
      a. Time of submittals, review and acceptance by the Government.
      b. Time of fabrication and delivery of manufactured products.
      c. The relationship between procurement and construction activities.
   4. Activities for the preparation and submission of as-built documentation.
   5. Activities relating to the start-up and testing of equipment and/or systems for completion of punch list items and training of personnel.
   6. All the relationships to Work of other Contractors, which affect the Work to be performed under this Contract.

C. The CPM Schedule shall:
   1. Be sufficiently detailed to assure adequate planning, execution and progress evaluation of the Work within Contract time(s) for completion. Activities shall generally range in duration from fourteen (14) calendar days or as deemed reasonable by the Contracting Officer, based on complexity and criticality of the tasks involved. An exception may be made for procurement items that may have a duration which starts with the approval of shop drawings and ends with delivery of the item to the construction site. The selection and number of activities will be subject to the approval of the Contracting Officer. The diagram shall show not only the activities of actual construction work for each trade category of the project, but also all other activities that affect progress, such as including submittal of shop drawings, equipment schedules, samples, coordination drawings, templates, fabrication, delivery and the like, the Government's review and approval of shop drawings, equipment schedules, samples and templates, and the delivery of Government-furnished equipment or partition drawings, or both. Show activity duration (i.e., the single best estimate, considering the scope of the activity and the resources planned for the activity) for each activity on the diagram. Failure to include any element of work required for the performance of this Contract shall not excuse the Con-tractor from completing all work required within any applicable completion date, notwithstanding the Contracting Officer's approval of the schedule.
   2. Allow for monitoring and evaluation of progress in performance of the Work.
   3. The CPM submittal shall be in the form of Precedence Diagramming Method (PDM).
      a. The activities shall include:
         1) Activity identifier - Maximum length of 8 characters.

2) Concise description of the work.
3) Duration in calendar days.
4) The dollar value of each activity in the schedule for cash flow purposes.
5) Resources for each activity to include:
   a) Average labor crew size estimated to install material.
   b) Major equipment needed to support installation.
6) Responsibility Code; identifying who performs the Work by trade.
7) Other codes as designated by the Government.
8) Include milestone activities as designated by the Government.

b. The network diagram shall show continuous flow from left to right.

4. Identify Workdays per week and shifts per day that the Contractor intends to perform Work.
5. Include time for the Government to review submittals in accordance with Section 01300 - Submittals herein, inspect the Work and respond to tenant deliverables.
6. Identify activities constituting the controlling operations or Critical Path.

D. The CPM Schedule shall constitute the representation that:
1. The Contractor and Subcontractors plan to execute the Work in the sequence indicated on such schedule per paragraph 1.6.D herein.
2. The Contractor has distributed the CPM Schedule to his subcontractors for their review and comment. It shall be the Contractor's responsibility to obtain each Subcontractor's written approval and/or concurrence with the CPM Schedule. If a Subcontract has not been awarded for a certain portion of the Work when the Contract progress schedule is submitted, the Contractor will modify the CPM data to reflect any changes resulting from the new subcontractual arrangement through the procedure outlined in Section 1.8 herein, "PROJECT SCHEDULE REVISIONS."
3. All elements of Work required for the performance of the Contract shall be included. Failure by the Contractor to include any element of Work required for performance of the Contract shall not excuse the Contractor from completing all Work in accordance with specified milestones.
4. Seasonal weather conditions shall be considered and included in the planning and scheduling of all Work influenced by high and low ambient temperatures and/or precipitation to ensure completion of all Work in accordance with specified milestones. Seasonal weather conditions shall be determined by an assessment of average historic climatic conditions based upon records furnished by the National Oceanic and Atmospheric Administration (NOAA).
5. The Contractor has inspected the Project site and has considered the Work of other Contractors.
6. The Contractor has incorporated any other special conditions in planning the Work such as specified non-work periods or work to be performed during other than normal business hours.

E. The Contractor will be required to identify and separately code all schedule activities that may be affected by work in areas of shared access. The Contractor shall provide a separate submission of a CPM schedule for all coded activities on a monthly basis. The schedule shall be organized in the order of early start and shall reflect the Contractor's planned start dates and total float for each tagged activity. Meetings will be held as necessary to coordinate activities in common work areas. The Contractor shall provide an individual fully versed in the details and schedule requirements of the work to attend these meetings. Activities that are determined to be in conflict with interfacing Contract activities will be identified and coordinated at these meetings.

1.6 SUBMITTAL AND REVIEW PROCESS

A. The CPM Schedule for the entire duration of the Project, with full resource loading, is due 30 calendar days after AWARD of the Contract for Construction. The Contracting Officer may withhold all or a portion of the progress payments until the Contractor submits a complete CPM Schedule acceptable to the Contracting Officer.

B. For the CPM Schedule submittals and each of the Schedule Update submittals, the Contractor shall provide the following:
   1. Schedule Reports (copies as required) - includes detailed activity information relating to early start, early finish, late start, late finish, total float, original duration, remaining duration, actual start, actual finish, percent completion, and resource usage.
      a. Activity Report - all activities sorted by activity identifier.
      b. Critical Path Report - activities with percent complete less than 100%, sorted by Total Float, then by Early Start.
      c. Early Start Report - all activities sorted by Actual/Early Start.
      d. Activity sort by Trade - early start date - total float.
   2. Cash Flow - all activities, using the Early Start schedule, by month.
   3. Graphic Displays each of the Complete Project Schedule - including time display from the beginning to the completion of the Work.
      a. Network Diagram - all activities on a time scaled diagram displaying each activity number, description and Total Float.
      b. Summary Bar Chart.
   4. Computer Files - two copies of all CPM schedules in an electronic readable format capable of being read by Primavera Project Planner on diskette. Each Schedule Update, Schedule Revision or Time Impact Analysis must be an individual data file to allow Target data comparisons with other CPM submittals.
   5. A detailed narrative explaining the Contractor's Means and Methods, progress to date, productivity rates, equipment to be used, factors affecting the Work and details of all changes to the approved schedule.

C. The Contracting Officer will review the Contractor's proposed baseline CPM Schedule and Schedule Update submittals and return them to the Contractor with comments or acceptance within 14 calendar days. If not accepted by the Contracting Officer, the Contractor shall re-vise Schedules in accordance with the Contracting Officer's comments, and resubmit for the Contracting Officer's acceptance, within 7 calendar days of the receipt by the Contractor of the Contracting Officer's comments. Until such time as the Contracting Officer grants acceptance, the Contractor shall resubmit these Schedules by the same time frames and in the same format as required in this paragraph for the initial resubmission.

D. The Contractor shall certify that both the CPM Schedule and subsequent schedule update submittals correctly represent the sequence, means, methods, techniques and procedures in which he plans to execute the Work, and the actual execution of the Work.

E. At the discretion of the Contracting Officer, the Contractor's applications for payment may either be withheld or modified due to the Contractor's failure to submit an acceptable CPM Schedule within the stated number of calendar days from AWARD of the Contract for Construction, or to the lack of acceptance by the Contracting Officer of such schedule or subsequent Schedule Update submittals, in accordance with this Section.

1.7 MAINTENANCE AND UPDATE OF THE CPM SCHEDULE

A. The Contracting Officer shall conduct a monthly progress meeting attended by representatives of the Contractor, Scheduling Consultant or Contractor's assigned staff, the Contracting Officer, and others as deemed necessary by the Contracting Officer. The focus of the meeting is to assess Project status and develop solutions to items hindering progress. The attendees shall review:

1. Progress during the period.
2. Progress scheduled during the next period, as forecasted and as originally planned.
3. Anticipated problems and proposed solutions.
4. Discussion of each of the logic revisions to the schedule.
5. Analysis and discussion of alternative methods to mitigate accumulated delays.

B. At the monthly progress meetings the Contractor shall submit to the Contracting Officer for review a detailed 6 week look ahead Bar Chart Progress Schedule from the current CPM Schedule.

C. The Contracting Officer will prepare meeting notes summarizing schedule status, problems hindering progress and actions to be taken to maintain planned progress (action item list designating action, person responsible, and date action to be taken).

D. Within 5 days of the conclusion of the monthly progress meeting, the Contractor shall submit, based on the schedule status information discussed and accepted at the monthly progress meeting, an updated CPM schedule. Reported progress for each affected activity will include:
Actual Start Date
Actual Finish Date (for completed activities) Remaining Duration (for Activities in progress) Percent Complete
Calculations for the updated schedule must be based on retained logic.
Each Schedule Update submission will include all materials as described in Section 1.5.0 herein.

E. As frequently as deemed necessary, the Contracting Officer may require, at no additional cost to the Government, the Contractor to expand in further detail any part of the Schedule Update CPM Schedule in order to explain and demonstrate the construction sequence forecasted therein. This expanded Schedule shall be in sufficient detail and shall comply with the following requirements:

1. Be in CPM format
2. Identify the Work being performed
3. Be submitted within 15 calendar days from receipt of the Contracting Officer's request

In order to complement the information provided in these expanded/detail schedules the Contractor may also be requested to prepare and submit marked-up drawings such as cross sections, profiles and Plan views of the area under analysis.

1.8 PROJECT SCHEDULE REVISIONS

A. Updating the CPM Schedule to reflect actual progress made to the date of a Schedule Update shall not be considered revisions to the CPM Schedule. All other changes, including but not limited to the following, shall be considered CPM Schedule Revisions:

1. Adding and/or deleting activity relationships.

2. Adding and/or deleting activities.
3. Changes to original durations.
4. Changes to Contract Milestone dates.
5. Performance of Work out of sequence.

B. If, as a result of the monthly CPM Schedule Update, it appears the CPM Schedule no longer represents the actual prosecution and progress of the Work, the Contracting Officer will re-quest, and the Contractor shall submit, a revision to the CPM Schedule in accordance with Article 1.7 herein.

C. All revisions shall be subject to review and approval by the Contracting Officer prior to incorporation into the CPM schedule.

1.9 CPM SCHEDULE RECOVERY

A. Whenever the Contractor fails to achieve a Milestone established in the Contract Schedule, or the Contractor's progress is not commensurate with that required to adhere to the Contract Time or Milestone(s), the Contractor shall promptly undertake appropriate action at no additional cost to the Government to recover the CPM Schedule.

B. The Contractor shall submit with the next Application for Payment (following recognition of the problem) a written recovery statement to the Contracting Officer describing the cause for the slippage and the actions planned by the Contractor to recover the CPM Schedule within the shortest reasonable time.

C. Appropriate recovery actions may include, but not be limited to, assignment of additional labor, subcontractors or equipment shift or overtime work, expediting of submittal or deliveries, or any combinations of them. Overlapping of activities or sequencing changes to increase Activity concurrence shall be deemed appropriate only if properly substantiated in the submittal.

D. The Contractor's refusal, failure or neglect to take appropriate recovery action or to submit a written recovery statement shall constitute reasonable evidence that the Contractor is not prosecuting the Work, or separable part, with the diligence that will insure its completion within the applicable Contract Time, and shall constitute sufficient basis for the Contracting Officer to withhold any payment otherwise due, or identify and order alternate recovery actions on the basis of the information in the Contract CPM Schedule.

1.10 TIME IMPACT ANALYSIS FOR CHANGES, DELAYS AND CONTRACTOR REQUESTS

A. When changes are initiated or delays are experienced, or the Contractor, in accordance with Article 1.8 herein, desires to revise the CPM Schedule, the Contractor shall submit to the Contracting Officer, a written Time Impact Analysis illustrating the influence of each change, de-lay, or Contractor request on any Milestone. Each Time Impact Analysis shall include a Fragmentary Network (Network Analysis) demonstrating how the Contractor proposes to in-corporate the change, delay or Contractor request into the CPM Schedule. The Time Impact Analysis shall demonstrate the time impact to each and every affected Activity in the CPM Schedule utilizing the most recent CPM Schedule Update as the basis for the Analysis. The date of the most recent CPM Schedule Update shall be a date prior to the date the change is given to the Contractor, the date the delay occurred or the date the Contractor submits a re-quest for a

change. The event time used in the Time Impact Analysis shall be included in the most recent CPM Schedule Update or as adjusted by mutual agreement. The Time Impact Analysis shall include a computer diskette which shall contain the details of the change including, but not limited to, added, changed or deleted data for Activities, logic restraints, re-sources or costs.

B. Activity delays shall not necessarily mean that an extension of any Milestone is warranted or due the Contractor. A change or delay may not affect existing critical Activities or cause non critical Activities to become critical. A change or delay may result in only absorbing a part of the available total float that may exist within an Activity chain of the Network, thereby not causing any effect on any Milestone.

C. Total float is defined as the amount of time between the early start date and the late start date, or the early finish date and the late finish date, for each and every activity in the CPM Schedule. Float is not for the exclusive use or benefit of either the Contracting Officer or the Con-tractor.

D. Four copies of each Time Impact Analysis shall be submitted within 10 calendar days after the commencement of a delay or the notice of direction for a change is given to the Contractor.

E. In cases where the Contractor does not submit a Time Impact Analysis within 10 calendar days, the Contractor agrees that the particular change, delay or Contractor request does not re-quire an extension of time to a Milestone, and the Contractor hereby waives its right to subsequently request a time extension.

F. Acceptance or rejection of each Time Impact Analysis by the Contracting Officer shall be made within 10 calendar days after receipt unless subsequent meetings and negotiations are necessary. Upon acceptance, a copy of the Time Impact Analysis approved by the Contracting Officer shall be returned to the Contractor, and incorporated into the CPM Schedule at the next monthly CPM Schedule Update. The Time Impact Analysis shall be incorporated into and attached to any relevant Change Order(s).

1.11 GENERAL

A. The Contractor's attention is specifically directed to the fact that submission and acceptance of the CPM Schedule as well as CPM Schedule progress updates are required for the Contracting Officer to certify the approximate amount of Work performed by the Contractor.

B. Neither the review nor acceptance of the Contractor's CPM Schedule or other data submitted by the Contractor pursuant to this Section, nor any other action on the part of the Contracting Officer under this Section shall in any way be deemed as a representation by the Contracting Officer that the Contractor can or will be permitted to follow a particular schedule or sequence of operations or that, by following any such schedule or sequence, he can or will complete the Work by the time(s) required by the Contract or by any other time(s). Nor shall the acceptance of any CPM Schedule or other such data relieve the Contractor of his obligation to complete the Work by the time(s) required in the Contract, even though such CPM Schedule approved may be inconsistent with such completion.

C. Any acceptance under this Section shall be construed merely to mean that the Contracting Officer knew of no good reason at that time to object thereto. No review or acceptance or any other action under this Section shall limit, affect or impair the Contractor's obligation to per-

form all the Work by time(s) required by the Contract and in accordance with all other provisions of the Contract.

D. The Performance of the Work by the time(s) required in the Contract after taking into account extensions to which the Contractor may be entitled under Article 1.10 - TIME IMPACT ANALYSIS FOR CHANGES, DELAYS AND CONTRACTOR REQUESTS herein, may require the use by the Contractor of overtime labor, additional shifts or additional plant and equipment and/or other measures. In any event, the Contractor shall anticipate, avoid and mitigate the effects of all delays, whether or not such delays involve Activities with positive float. When in the judgment of the Contracting Officer, the Work is not proceeding in accordance with the CPM Schedule, or it is likely that the Work might not be completed by the time(s) required in the Contract, the Contracting Officer may order the Contractor, without additional compensation, to employ additional shifts, to increase the number of men employed, to use additional plant or equipment, or to take such steps as may be necessary or required to assure the completion of the various operations within the time(s) allotted therefor in the approved CPM Schedule, or by the aforesaid completion time(s).
No action on the part of the Contractor pursuant to this Section shall be construed as a request for an extension of the time(s) for completion required by the Contract. A request for an extension of time shall be deemed made only if it complies with the requirements of Division 0 - Form 3506 Article 44 FAR 52.249-14 "Excusable Delays" (Apr. 1984). No extension of the time(s) for completion shall be inferred because of any action, failure to act, or statement on behalf of the Contracting Officer pursuant to this Section.

E. Failure of the Contractor to comply with the requirements of the Contracting Officer under this paragraph shall be grounds for determination by the Contracting Officer that the Contractor is not prosecuting the work with such diligence as will insure completion within the time specified. Upon such determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part thereof, in accordance with Division 0, Form 3506, Article 98 FAR 52.249-10 "Default (Fixed Price Construction" (4-84).

1.12 PAYMENT

A. No separate payment will be made for Work under this Section. The cost of Work described in this Section shall be included in the Contract price.

1.13 SUBMITTAL SCHEDULE

A. General: Immediately after the development and acceptance of the fully developed progress schedule, prepare a complete schedule of work-related submittals. Submit this schedule within ten (10) days of the date required for establishment of progress schedule.

B. Form: Prepare the schedule in chronological order of submittals. Show category of the submittal, name of subcontractor, a generic description of work covered, related section numbers, the activity or event number on the progress schedule, the scheduled date for first submittal, resubmittal, and the final release or approval by the Contracting Officer.

C. Schedule submissions to insure that submissions will be without concentrations, in time to enable the Contracting Officer to retain same for review in the scheduled period of time. The

Contracting Officer shall review the submittal for possible excessive submittal concentrations. Periods of excessive submittal concentrations identified by the Contracting Officer shall be rescheduled in accordance with the Contracting Officer's requirements.

1. Submit the Schedule of Submissions, keyed to the Construction Progress Schedule "CPM."
2. Provide time in the Schedule for resubmission of all submittals.
3. Create and manage a priority system to establish the proper priority of submittals based upon the original and updated construction progress schedule. Update the priority system every two weeks.
4. Identify the submission time required for each individual submittal, giving greater time to more complicated submittals and/or submittals or greater magnitude and review time. Subdivide large submittals into smaller packages for review.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01311

SECTION 01541 - SITE SECURITY

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all work and material associated with following security site improvements, equipment, and processes. This work is the responsibility of the Deconstruction Contractor.

1.2 RELATED DOCUMENTS

A. DRAWING C-003 SITE SECURITY

B. Temporary Facilities and Controls — Section 01500.

C. Scope of Work – Section 01100.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

A. Site Security Requirements
   1. Provide and install fencing as specified in 01500, which shall be part of the base bid.
   2. The fence line needs to have four (4) flood lights at a minimum on Albany Street, Washington Street, Liberty Street, and Washington Street to illuminate the perimeter and should be mounted on all four corners of the property on twenty (20) foot poles, (which will not affect the operation of the neighborhood).
   3. At the double gate, provide one (1) 6' X 10' Model 106 guard booth, as manufactured by PAR-KUT International, 1-800-394-6599. The booth should be totally self-contained, with air conditioner/heating unit (roof mounted), telephone outlets, electrical outlets, and dimmer switch to control lighting. The PAR-KUT is required to be located on a cement pad.
   4. The main security entrance point will be at the loading dock ramp which must contain a heater and air conditioner unit, electric power, telephone, and a rest room located inside. All utilities shall be protected and insulated as required. A pedestrian gate is located near the loading dock and will be used to enter and exit the building. Location of space shall be as approved by Owner and located to minimize subsequent moves. All costs of moving will be responsibility of contractor. Provide all necessary support structures for the space. Provide janitorial, maintenance and other features of trailer as detailed in 01500 Temporary Facilities and Controls, Temporary Owner's Representative's Offices.

B. Access Control Procedures
   1. Admittance to and departure from the construction site will be controlled by the Contractor as determined by the Owner. All contractor personnel will use Washington Street entrance to access and exit the facility unless otherwise authorized by the Owner.

No other entry or exit points will be authorized. The UPO (Uniformed Protective Officer) will verify all personnel attempting access to the construction site are properly cleared and on the access roster.

2. A Visitor Access Log will be maintained at the Access Control Point. All visitors will sign in and out, each time they enter or depart the construction site.
3. Contractors will insist that their employees use the most direct route between the entrance and their work area. If an individual is found in an unauthorized area, a security incident review shall be initiated. The Owner will work with the contractor on these issues and define reasonable limits.
4. For after hours and holiday access to the construction site the contractor will provide an access list of all employees who are scheduled to work during these periods. This list will contain the employee's name and badge number. The list will be submitted at least three (3) business days in advance of the planned date of commencement of work.
5. All personnel entering the job site will be required to pass through a check-point, and be screened, and or submit to a physical search prior to entry. All hand carried tools, equipment, materials, personal possessions, packages, etc. both incoming and outgoing will, be physically inspected using metal detectors or other devices to insure the safety and integrity of the item.
6. Entrance to the premises by the contractor's personnel, representatives of subcontractors, and suppliers of materials shall be controlled by the Contractor. Special badges will be used to identify contractors and subcontractors personnel employed on the job site. Security shall maintain a daily record of all individuals entering and leaving the job site.
7. It will be necessary for contractors to wear proper identification at all times. The badges are to contain an identification number and will be displayed on the outermost garment. All contractor's employees will be signed in and out at the entrance assigned to contractors as directed. No cameras will be allowed on the property unless authorized in writing by the Owner.

END OF SECTION 01541

SECTION 15400 - PLUMBING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

1.1.1 General provisions of the Contract and Division 1 specification sections apply to this section.

1.2 REFERENCE

1.2.1 All work covered in this section shall conform to the requirements, rules and regulations, of the following state and local authorities, and of the gas utility company:

New York City Building Code
New York State Building Code
Consolidated Edison Company

1.3 SITE SURVEY

1.3.1 Before submitting proposal, bidder shall carefully examine existing field conditions. Design and/or as-built drawings are not available covering the plumbing systems. Submission of proposal will be construed as evidence that required examination has been made. Claims for extra labor, equipment and material required due to existing conditions, which could have been foreseen, will not be recognized.

1.4 QUALIFICATIONS OF CONTRACTOR

1.4.1 Prior to commence of demolition work, submit data for approval showing that the Contractor has successfully completed a demolition project with plumbing systems of similar complexity and having such required experience.

1.5 SCOPE OF WORK

1.5.1 The work covered by this section consists of furnishing all equipment, labor, materials, and supplies to perform all operations necessary to demolish and remove off-site all the plumbing systems at the Building at 130 Liberty Street. Tradesmen accomplishing the work in this section shall be licensed as required by local authority for the work performed.

1.6 DESCRIPTION OF WORK

1.6.1 The plumbing systems covered in this section include but are not limited to:

Sanitary, Waste and Vent Systems
Cold, Hot and Hot Water Return Systems
Roof Storm Water Drainage Systems
Industrial Waste Water Systems
Gas Systems
Compressed Air Systems
Process Systems
Domestic and Fire Water Systems

1.6.2 Sanitary, Waste and Vent Systems - These Systems shall be cleaned and flushed out with water.

1.6.2.1 Sanitary, Waste, Vent Lines and all accessories shall be demolished and removed to a point level with the ground and/or basement/crawl space floor level. Sanitary lines shall be plugged with concrete where they connect to the City sanitary manhole, outside of the building footprint. Concrete plug surface shall be shaped to conform to adjacent surfaces of the manhole.

1.6.2.2 All underground lines and manholes shall be completely slurry filled with sand. Provide concrete plug on all lines at required level.

1.6.3 Cold, Hot and Hot Water Systems - These systems will be cleaned of all asbestos materials under a separate contract. The CM/Engineer will advise this contractor when areas are available for demolition work.

1.6.3.1 Use qualified and licensed tradesmen for installation and maintenance of temporary services and facilities. Locate

temporary services and facilities where they will serve the entire project adequately and result in minimum interference with the performance of the demolition work.

1.6.3.2 Cold, hot and hot water return lines, and all accessories shall be demolished and removed.

1.6.4 Roof Storm Water Drainage Systems - These systems shall be demolished and removed to a point level with the ground and/or basement floor level. For continuation, refer to Section - Stormwater Management Plan.

1.6.5 Waste Water Systems - Under this section, Contractor shall maintain these systems in full operation until advised by the CM/Engineer that the systems shall be demolished and removed. Systems will be cleaned under this contract prior to demolition work. For continuation, refer to Section - Stormwater Management Plan.

1.6.5.1 Relocate, modify, and extend piping services as required during the course of the demolition work so as to maintain deconstruction systems in operation.

1.6.5.2 Contractor shall provide electric power to maintain any and all systems in full operation.

1.6.6 Gas System - The Gas System has been purged in compliance with appropriate standards and regulations, and the system will be cut-off from the Con-Edison Service at the property line. One (1) gas line remains holding air at the Mezzanine Level. This line has not been identified as of this writing, however it is the responsibility of this contractor to check that all lines have been purged. Contractor shall remove and deliver all equipment and materials in the gas meter rig to Con-Edison warehouse if required.

1.6.6.1 The Contractor shall prepare and submit for review and approval the procedure(s) that will be used to void the gas piping system(s) of fuel gas and replace the fuel gas with air. Due to the complex gas piping system(s), large pipe sizes and 10 PSI gas pressure, the Contractor should consider a combination of the different purging methods available. Approved combustible gas detectors shall be used to confirm that the gas piping system(s) has been completely purged of fuel gas. Contractor shall submit to

the CM/Engineer certification that tests have been performed and that system(s) has been purged of fuel gas and filled with air. Certification form(s) must be received by the CM/Engineer before demolition work will be authorized to start/proceed (also refer to 1.6.6).

1.6.6.2 On notice to proceed from the CM/Engineer, the Contractor under this section will demolish and remove the existing gas systems to include all accessories.

1.6.7 Compressed Air Systems - Upon notice to proceed, the Contractor shall drop the pressure in the equipment and piping system down to atmosphere pressure. Demolition and removal of the compressed air system should be phased in with normal building demolition work. This work has been completed in earlier phases. Contractor is responsible to remediate any remaining systems.

1.6.8 Process Systems - All equipment and piping systems will be environmentally cleaned under another contract. After this has been performed, CM/Engineer will advise that demolition and removal can proceed.

1.6.9 Domestic and Fire Water Systems - Water meter room, site water distribution grid and electric fire pump shall remain active as long as possible for this Contractor use and others during the demolition.

1.6.9.1 Upon notice to proceed from the CM/Engineer, Contractor shall demolish and remove system components as follows

a) Arrange with NYC Water Department to cut water service to the site at 130 Liberty Street.

b) Cut and cap/plug City water service, provide bands/rods with anchor blocks.

c) All piping to the water meter room shall be removed. Contractor shall remove and deliver to the New York City Water Department warehouse all equipment and materials in the water meter room if required.

d) Demolish and remove fire pump, fire water storage tank and all interconnecting piping. Cut and cap/plug water lines at the underground water mains.

e) Existing Underground Water Distribution Grid (Domestic and Fire) is to remain and all piping location crawl space shall be removed after it has been taken out of service. All underground lines remaining shall be capped and plugged.

-- END OF SECTION 15400 --

SECTION 16001 - ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.1 Related Documents

Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 Summary

This section includes the electrical demolition requirements.

1.3 Quality Assurance

Comply with NFPA, NEC, OSHA, and Consolidated Edison Company requirements.

1.4 Sequencing and Scheduling

Coordinate electrical system demolition with other systems being demolished.

1.5 SITE SURVEY

1.5.1 Before submitting bid, bidder shall carefully examine existing field conditions. Design and/or as-built drawings are not available covering the fire protection systems. Submission of bid will be construed as evidence that required examination has been made. Claims for extra labor, equipment and materials required due to existing conditions, which could have been foreseen, will not be recognized.

PART 2 - PRODUCTS

Various components of the project must remain operating while demolition is progressing as follows:

1. Temporary lighting and power.

PART 3 - EXECUTION

1. Contractor will be required to energize and maintain power to the building.

2. Coordinate all phases of power and lighting demolition with all trades.

3. Coordinate final disconnection of electric services with Consolidated Edison Company.

4. Remove and abandon all site manholes and raceway systems. Systems to be abandoned shall be filled with sand to avoid collapse.

5. Coordinate all system removals with the construction manager.

6. Temporary electrical services required to perform contract work as follows:

   A. Comply with NEC and OSHA.

   B. Provide and maintain temporary electric power system for contract needs throughout contract period.

   C. Provide secondary power centers for miscellaneous tools and equipment used in work areas.

      1) Provide weatherproof distribution boxes with minimum of four (4) grounded outlets each.

      2) Provide circuit protection for each circuit.

      3) Provide ground fault protection for each circuit in accordance with applicable federal and state requirements.

      4) Each contractor using the secondary power centers shall provide their own grounded, UL listed extension cords and other accessories

from secondary power centers to point of operation.

7. Temporary lighting required to perform work and provide for safety and security.

   A. Provide temporary lighting as required for safe and adequate working conditions throughout for public safety, security lighting, and workers needs.

   B. Required minimum lighting levels: (Use incandescent lighting, unless otherwise specified.)

      1) 150 watts spaced 20 feet on centers each way throughout the building(s).

      2) 150 watts at each landing and story in each stairway.

      3) 200 watts spaced 30 feet on centers in all corridors.

      4) Additional lighting required for safety purposes.

   C. Unless otherwise indicated, mount temporary lighting at a maximum height of 10 feet above each floor level.

   D. Security Lighting

      1) Within the building, illuminate all stairways, corridors and entrances involved in contract. Work on a 24 hour per day basis. Contractor may use construction lighting for this purpose.

      2) Perimeter/exterior lighting shall be provided at all security entrance and exit areas (Washington Street)and along all fire lanes. This lighting shall be provide throughout the length of this contract every evening from dusk till dawn. The contractor has the option

to utilize the existing lighting system, but must provide a power source after point is reached where existing power source can no longer be used.

3) Top floor of building at any time of Phase I or II is to be lit from dusk to sunrise so as to achieve a visible effect for aircraft.

4) All scaffold systems, throughout duration of erection and during deconstruction shall have adequate light to meet existing codes.

5) Complete site is to be adequately lit at Liberty Street, Washington Street, Albany Street, and Greenwich Street so as to prevent unauthorized entry, vandalism, etc.

-- END OF SECTION 16001 --

ATTACHMENT 1

INITIAL BUILDING CHARACTERIZATION STUDY REPORT

Prepared by The Louis Berger Group, Inc.
September 14, 2004

VOLUME I: STUDY REPORT TEXT, TABLES, AND FIGURES

VOLUME II: APPENDICES located at:
http://renewnyc.com/plan_des_dev/130liberty/characterization_study_report.asp

130 Liberty Street
New York, New York

Initial Building Characterization Study Report

VOLUME I: Study Report Text, Tables, and Figures

Prepared for:
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan
Development Corporation

Prepared By:
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199 Water Street, 23rd Floor, New York, NY 10038

September 14, 2004

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VOLUME II – APPENDICES

EXECUTIVE SUMMARY

In its role as an Environmental Consultant, the Louis Berger Group, Inc. (Berger) was retained and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct an *Initial Building Characterization Study* (the Study) at the building located at 130 Liberty Street (the Building), which is scheduled for cleaning and deconstruction. The Building is a 40-story, approximately 1.4 million square foot (SF) office building, with two basement levels, located in Lower Manhattan, one block south of the World Trade Center (WTC) site. Until 1999, the Building, which was built between 1973 and 1974, was owned by the Banker's Trust Corporation. In 1999, Deutsche Bank acquired the Building and owned it until August 31, 2004, when it was sold to LMDC.

The events of September 11, 2001, which caused the destruction of the WTC Towers, physically destroyed portions of the interior and exterior of the Building and exposed it to a combination of soot, dust, dirt, debris, and contaminants. Deutsche Bank, the owner of the Building on September 11, 2001, disputed with its property insurance carriers about the extent of the damage to the Building, and whether or not it could be reoccupied. Deutsche Bank took the position that the damage to the Building was so severe and the contamination so extensive that the Building could not be reoccupied and thus must be demolished and replaced. The insurance carriers took a contrary stance that the Building's damage and contamination were similar to other buildings in the area and as such could safely and effectively be cleaned and reoccupied. The differences in opinion between Deutsche Bank and its insurers led to litigation. In preparation for litigation, both Deutsche Bank and its insurers performed environmental investigations of the Building to determine the nature and extent of the contamination.

In late 2003, Governor George Pataki appointed Senator George Mitchell to mediate the dispute between Deutsche Bank and its insurance carriers in order to progress with the planned WTC Memorial and Redevelopment Plan. With the support and assistance of LMDC, Senator Mitchell resolved the dispute, which allowed LMDC to acquire the Building in anticipation of its cleaning and deconstruction, with a commitment by Deutsche Bank's insurers to cover any required costs in excess of an agreed upon amount. The Building, as part of the WTC Memorial and Redevelopment Plan, is scheduled for cleaning and methodical deconstruction.

To ensure a safe and timely cleaning and deconstruction effort, LMDC retained Berger to perform an independent environmental investigation of the Building. The investigation included the inspection, sampling, and analysis of suspect asbestos-containing materials (ACM) and potentially contaminated dust, as well as visual observations of the presence of mold on exposed

surfaces. Because LMDC was not the owner of the Building prior to August 31, 2004, the initial investigation was limited to the accessible portions of the Building.

The results of the sampling and testing performed for this Initial Building Characterization Study revealed levels of contaminants that must be addressed in the deconstruction of the Building.

Approximately 2,000 bulk samples of suspect building materials were collected and analyzed for asbestos using the Polarized Light Microscopy (PLM) and/or Transmission Electron Microscopy (TEM). The majority of samples tested negative for asbestos, including spray-on fire-proofing, wall-board, roofing materials, and most thermal insulation for piping and ducts. Other building materials tested contained greater than one percent asbestos and are considered ACM. Altogether, an approximate total of 155,000 SF of flooring and wall materials and 95,000 linear feet (LF) of caulk, insulation, and sealant materials were identified as ACM.

The dust was sampled throughout the Building and analyzed for five Contaminants of Potential Concern (COPCs) designated by the United States Environmental Protection Agency (EPA) as being associated with WTC dust (i.e., asbestos, dioxins, lead, polycyclic aromatic hydrocarbons (PAHs), and crystalline silica), as well as other contaminants suspected of being present in the Building, including polychlorinated biphenyls (PCBs) and heavy metals (barium, beryllium, cadmium, chromium, copper, manganese, mercury, nickel, and zinc).

A total of 815 bulk samples of the settled dust were collected and analyzed at a laboratory via PLM analysis. The PLM analysis is specified by the EPA, the New York City Department of Environmental Protection (NYCDEP), and the New York State Department of Labor (NYSDOL) for quantifying asbestos in bulk dust samples. Although trace amounts of asbestos were identified in some of the samples, there were no samples that contained greater than one percent asbestos via PLM analysis.

In addition to PLM testing, the Study also included TEM analysis of the dust for asbestos. The EPA (AHERA) and New York State Department of Health (NYSDOH) recognize TEM to be a more precise methodology; PLM is not the best analytical technique available to determine concentrations of asbestos fibers in WTC dust. Friable WTC dust in concentrations less than or equal to 1% asbestos still have a significant potential to generate elevated airborne concentrations when disturbed. Forty supplemental screening samples of the settled dust were collected from porous and non-porous surfaces and analyzed for asbestos using TEM. The results revealed detectable levels of asbestos that must be addressed in the deconstruction of the Building. The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and $40^{th}/41^{st}$ floor mechanical room.

In addition to the asbestos samples, 844 bulk samples of the settled dust were also analyzed for four other COPCs designated by the EPA as being associated with WTC dust (i.e., dioxins, lead, PAHs, and crystalline silica), as well as other contaminants suspected of being present in the Building, including PCBs and heavy metals (barium, beryllium, cadmium, chromium, copper, manganese, nickel, zinc, and mercury). The results revealed detectable levels of these contaminants that must be addressed in the deconstruction of the Building.

Detectable levels of silica, PAHs, dioxins, PCBs, and heavy metals, including mercury were identified in dust above and below the suspended ceilings (with the area above the suspended ceilings also being referred to as the "plenum"). The levels of the contaminants in the dust samples vary throughout the Building. These findings are consistent with studies conducted previously by others revealing the highly variable nature of contaminant levels in WTC dust. The variations in contaminant levels found are consistent with the level of disturbance that has occurred within the Building since September 11, 2001, including the cleaning of the "Gash Area."

The EPA has published residential background levels (estimated pre-existing levels) and residential benchmark levels (potential health-based cleanup target levels) for many of these contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The specific analytes consistently found at levels above the available criteria were asbestos (levels in dust exceed in 24 of the 31 floors tested [77%]), dioxin (exceeds in 123 of 125 samples [99%]), lead (exceeds in 121 of 125 samples [97%]), quartz (exceeds in 111 of 118 samples [94%]), PAHs (exceeds in 100 of 125 samples [80%]), chromium (exceeds in 38 of 125 samples [30%]), and manganese (exceeds in 26 of 125 samples [21%]). Nickel, beryllium, and PCBs did not exceed available criteria in any of the samples tested. PCB levels were compared to the EPA spill cleanup criteria. All other analytes (cristobalite, barium, cadmium, copper, zinc, and mercury) exceeded available criteria in less than 5% of the samples tested.

In addition to the sampling of dust, a preliminary screening for mercury vapor was performed subsequent to LMDC's acquisition of the Building. The screening was performed to evaluate potential worker health and safety issues associated with mercury vapor because of its unique characteristic as a heavy metal that vaporizes at room temperature. Based on the measurements obtained from a direct-read screening device, there were no detectable mercury vapor levels in the open spaces within the Building.

Further testing is necessary to completely develop the cleaning and deconstruction plan. To this end, LMDC and Berger are currently working to develop and implement a supplemental

investigation program that, at a minimum, will involve obtaining access to previously inaccessible surfaces and interstitial spaces—including the curtain wall, interior walls, the exterior of the Building, and cell systems and raceways within the concrete slabs–for testing of all of the constituents addressed in the Initial Building Characterization Study (asbestos and other analytes as well as visual inspection for mold). Berger also recommends additional testing to characterize waste materials to be removed from the Building for handling, transportation, storage, and disposal or recycling. The additional information provided from this supplemental testing and inspection program will be shared with the deconstruction contractor, regulatory authorities, and the public, as part of the finalization and implementation of the cleaning and deconstruction plan.

Based on the results of this Study, Berger offers the following recommendations:

- LMDC should continue to maintain a health and safety plan and external air monitoring program. LMDC should review and modify its health and safety plan and external air monitoring program as appropriate to address all of the conditions identified in this Study;
- LMDC should continue to review and address the potential for release of contaminants from the Building;
- LMDC should further develop and implement an emergency action plan for the Building;
- LMDC should conduct further testing as recommended in this Study;
- LMDC should further develop its plan for cleaning and deconstruction and address the contaminants identified in this Study and in the further testing;
- LMDC should continue to consult with all appropriate regulatory agencies (e.g., NYCDEP, NYSDOL, EPA, New York State Department of Environmental Conservation (NYSDEC), and Occupational Safety and Health Association (OSHA)) in order to prepare specific cleaning, deconstruction, and environmental monitoring protocols;
- In connection with the deconstruction plan, LMDC should further develop appropriate site-specific health and safety plan documents (including establishing the organizational and procedural safeguards to be implemented to ensure the protection of site workers and the surrounding community);

- In connection with the deconstruction plan, LMDC should further develop appropriate work and site operations plan documents to cover such items as work area controls/limitations, decontamination facilities, engineered containment and control systems, monitoring programs, emergency/contingency plans, waste management, and assurances that the work will comply with all applicable federal, state, and local regulations;

- LMDC should file appropriate notifications and obtain necessary permits, including the Asbestos Control Program 7 (ACP-7), from the appropriate regulatory agencies;

- As currently contemplated, LMDC should engage a contractor with a NYSDOL asbestos handling license, as necessary, to perform the work; and

- LMDC should conduct appropriate monitoring and quality assurance/quality control inspections throughout the cleaning and deconstruction process.

1.0 INTRODUCTION

In its role as an Environmental Consultant, the Louis Berger Group, Inc. (Berger) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct an *Initial Building Characterization Study* (the Study) at the building located at 130 Liberty Street (the Building), which is scheduled for cleaning and deconstruction. The Building is a 40-story, approximately 1.4 million square foot (SF) office building, with two basement levels. The Building is located in Lower Manhattan, one block south of the World Trade Center (WTC) site. Until 1999, the Building, which was built between 1973 and 1974, was owned by the Banker's Trust Corporation. In 1999, Deutsche Bank acquired the Building and owned it until August 31, 2004, when it was sold to LMDC.

As a part of the proposed reconstruction of the WTC site, the Building is scheduled to be cleaned and methodically deconstructed, including, but not limited to, removal and disposal of all interior walls, stairs, ceilings, floor coverings, Mechanical, Electrical, and Plumbing (MEP) items, exterior skin, superstructure concrete, and structural steel. The Building will be deconstructed. As a safety precaution, the deconstruction will not utilize explosion/implosion devices as is often the case with conventional building demolition. Conducting this initial Study was the initial step in the development of the cleaning and deconstruction plan.

The overall intent and objective of the Study was to provide an initial characterization of any hazardous substances of concern that are present in the Building that should be taken into account during the cleaning and deconstruction process. The characterization determined the presence of asbestos-containing materials (ACM) in the building materials, various analytes of concern in dust, and mold on exposed surfaces. The analytes to which this Study refer include: (1) five Contaminants of Potential Concern (COPCs) designated by the United States Environmental Protection Agency (EPA) as associated with WTC dust (i.e., asbestos, dioxins, lead, polycyclic aromatic hydrocarbons (PAHs), and crystalline silica); and (2) other contaminants suspected of being present in the Building and of potential concern (i.e., polychlorinated biphenyls (PCBs) and heavy metals (barium, beryllium, cadmium, chromium, copper, manganese, mercury, nickel, and zinc)). Fibrous glass, otherwise known as Man-Made Vitreous Fibers (MMVF), is also included in the list of six COPCs designated by the EPA. MMVF is known to be prevalent throughout the Building in the fiberglass insulation materials and its presence in the dust is assumed. Moreover, any procedures designed to address asbestos will also adequately address MMVF in the Building. Therefore, Berger did not analyze dust samples for MMVF.

The Study was used to facilitate and refine any further contaminant delineation studies that might be appropriate. Moreover, the Study will serve as a reference document in support of the overall building cleaning and deconstruction project.

Based on this Study, and in anticipation of further testing that is currently contemplated, decisions will be made regarding preparing an appropriate cleaning, deconstruction, and project monitoring program; a health and safety plan; the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction); handling methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities; and a waste characterization, handling, and management plan. Testing will be an ongoing process, which will occur throughout the cleaning and deconstruction process, as necessary.

1.1 Background

The events of September 11, 2001, which caused the destruction of the WTC Towers, physically destroyed portions of the interior and exterior of the Building. The massive debris generated from the collapse of the WTC South Tower broke approximately 1,500 windows and opened a gash ("Gash Area") in the Building's exterior, thereby exposing portions of the interior of the north side of the Building. The debris demolished the plaza in front of the Building, thus exposing the basement and sub-basement (Basement A and Basement B) areas and rupturing a diesel fuel tank located in the basement, the contents of which burned. The ruptured fuel tank caused the concrete in the basement levels to become saturated with Diesel Range Organics (DROs), as was discovered during studies conducted by Deutsche Bank. In addition, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. The Gash Area and broken windows exposed the interior of the Building to the elements, which may have caused some further impacts after the initial exposures and events of September 11, 2001.

Subsequent to September 11, 2001, operations were undertaken to clear debris from the plaza, lobby, and interior spaces in the Gash Area. A porous geosynthetic mesh or "netting" was hung on the outside of the Building for further protection and safety. The immediate Gash Area was cleaned in accordance with New York City Department of Environmental Protection (NYCDEP) and New York City Department of Health (NYCDOH) protocols to permit the construction of columns, beams, and floor decks to stabilize the Gash Area. Once the initial cleaning and stabilization measures were in place, office furniture, equipment, and other non-attached items in the Building were removed and disposed of by Deutsche Bank. Since September 11, 2001, several study activities were also undertaken to assist Deutsche Bank and its property insurance carriers to understand the extent and impacts of the WTC-related contamination.

Deutsche Bank, the owner of the Building on September 11, 2001, disputed with its property insurance carriers about the extent of the damage to the Building, and whether or not it could be reoccupied. According to Deutsche Bank, the Building could not be reoccupied and had to be demolished and replaced. Deutsche Bank's property insurance carriers took a contrary position. They asserted that, like other buildings in the area, this Building could be safely and effectively cleaned and reoccupied. As a result of these conflicting positions, Deutsche Bank became engaged in a dispute with two of its insurers concerning the cost to repair or, if necessary, replace the Building. This dispute became protracted and eventually resulted in litigation, indefinitely threatening to prevent the repair or replacement of the Building.

LMDC first became involved with the Building as a result of the Deutsche Bank dispute with its insurers in order to expedite its timely and safe deconstruction. The delay caused by Deutsche Bank's litigation with its insurers was neither in New York City's interest nor the interest of the residents and workers of Lower Manhattan. The delay also prevented the cleanup of the dust in the Building. Accordingly, in late 2003, Governor Pataki appointed Senator George Mitchell to mediate the dispute between the insurers and Deutsche Bank. With the active support and involvement of LMDC, Senator Mitchell resolved the dispute, permitting LMDC to acquire the Building in its present condition.

As a result of divergent opinions from Deutsche Bank and its insurers concerning the source, nature, and extent of the contamination in the Building, LMDC retained Berger to conduct its own independent environmental investigation of the Building. An impartial environmental investigation was particularly important because the competing studies prepared by Deutsche Bank and its insurers were conducted to support their respective legal positions. Accordingly, LMDC retained Berger to collect its own samples for analysis by an independent laboratory.

1.2 Previous Environmental Studies

Several studies concerning WTC-related contaminants have been performed by, or with the review of, the federal, state, and local regulatory authorities in the aftermath of the events of September 11, 2001. In particular, the EPA has been responsible for many studies, and most importantly those associated with the development of the EPA's list of COPCs, as discussed above. These studies were used in large part by Berger, albeit not exclusively, to develop the list of constituents to be included in the initial sampling and analysis program.

Berger also reviewed the studies performed by others with regard to the Building during the execution of this Study. Because the data gathered by Deutsche Bank and its insurers was obtained in the litigation context, LMDC retained Berger to conduct independent third party

testing, rather than adopt the results of either Deutsche Bank or its insurers. Berger believes that such independent testing is likely to be the most unbiased presentation of the results.

The data that Deutsche Bank and its insurers collected was germane to reoccupying the Building, as opposed to deconstructing it. LMDC will deconstruct the Building; it will not be reoccupied. The purpose of the study performed by Berger was to create a safe building deconstruction program, unlike the assessments by Deutsche Bank and its insurers that were for other purposes. Berger did refer to both Deutsche Bank and its insurers' data to aid in developing the list of analytes used for this Study and to determine suitable locations for testing. Berger also performed a qualitative comparison of the results from this Study with those of Deutsche Bank and its insurers. Additional testing was performed as a result of this comparison.

1.3 Purpose and Objectives

The purpose and objectives of the Study was to provide information to LMDC and its contractors and consultants for the development of its cleaning and deconstruction plan by providing quantitative information about hazards in the Building. The Study included tests necessary to make determinations regarding: (1) appropriate safety precautions for worker and public health and safety; (2) appropriate cleaning and disposal procedures; and (3) compliance with applicable federal, state, and local regulations.

The Study was conducted as the first step in the cleaning and deconstruction process. While important, the initial characterization study is not the only step in the testing process, and additional environmental testing will be undertaken in the future, as recommended in this report.

Following the Building characterization, the cleaning and deconstruction plan will be created in compliance with applicable statutes, rules, and regulations. The cleaning and deconstruction plan will be submitted to applicable regulators for review, comment, and approval.

This initial characterization of ACM, WTC Dust (including asbestos, silica, PAHs, dioxin, PCBs, and heavy metals, including mercury), and mold is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the Study are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction

contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the residents of the surrounding community. Section 5.0 sets forth conclusions and recommendations, outlining the series of tasks that are expected to follow this Study. Such tasks include preparing an appropriate project cleaning and deconstruction plan; monitoring program; a health and safety plan; and a waste characterization, handling, and management plan.

1.4 Scope of Work

To facilitate the development of the 130 Liberty Street Cleaning and Deconstruction Plan, LMDC authorized Berger to undertake this Study .

To meet these objectives, the following specific tasks were performed to complete the Study:

Task 1: Preparation of a Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP), and Site-Specific Health and Safety Plan (HASP);

Task 2: Asbestos Building Inspection and Material Survey;

Task 3: Dust Characterization for Asbestos;

Task 4: Dust Characterization for Other Analytes, Including Silica, PAHs, Dioxins, PCBs, and Heavy Metals, including Mercury; and

Task 5: Visual Inspection for the Presence of Mold on Exposed Surfaces.

Task 1 consisted of the preparation of plans outlining the inspection, sampling, testing, and health and safety procedures that were used to implement the Study. These planning documents included a SAP, QAPP, and HASP. Additionally, an initial site survey was performed to verify the physical condition of the Building, to evaluate available access, and to assess whether assumptions made in the plans were appropriate.

For Task 2, the asbestos inspection and bulk sampling were conducted using the guidelines established by the EPA in the *Guidance for Controlling Asbestos-Containing Materials in Buildings,* Office of Pesticides and Toxic Substances, DOC #560/5-85-024 and 40 C.F.R. Part 763, Asbestos Hazard Emergency Response Act (AHERA). Bulk samples of suspected ACMs were analyzed by Polarized Light Microscopy (PLM) and/or Transmission Electron Microscopy (TEM), as prescribed in the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) Methods 198.1 and 198.4. The results were compared to

the criteria set by the EPA's National Emissions Standard for Hazardous Air Pollutants (NESHAP) 40 C.F.R. Part 61, Subpart M.

For Task 3, samples were analyzed by PLM with dispersion staining according to the method specified in the EPA *Interim Method of the Determination of Asbestos in Bulk Insulation Samples*, Appendix A, Subpart F, 40 C.F.R. Part 763; and NYSDOH ELAP Method 198.1. Supplemental screening samples of the settled dust were collected from porous and non-porous surfaces and analyzed for asbestos using TEM in accordance with ASTM Standard D 5755-95, "*Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Fiber Concentration.*" Porous surfaces include suspended ceiling tiles and carpet. Non-Porous surfaces included concrete, floor tiles, and wall boards. This method describes the procedures for collecting non-airborne dust samples.

For Task 4, an initial site survey was conducted and six general sampling zones were identified. The zones were based on the amount of visible dust present and the means by which dust was forced into the Building and settled on many of its surfaces on September 11, 2001. Dust may have entered the Building through the Heating, Ventilation, and Air Conditioning (HVAC) systems or through penetrations in the Building's exterior (e.g., the Gash Area and any other broken windows). Once inside the Building, dust may have been circulated by the HVAC system, vertical shafts, or broken windows. This dust was sampled from representative locations and tested using EPA-approved testing methods.

To determine a sample location plan that would be representative of the Building as a whole, six (6) zones were identified as follows:

- Zone 1 - Mechanical Rooms on the 5th, 6th, 40th, and 41st Floors to include the air intakes, fan rooms, and air handling units of the HVAC system (Figure 1).

- Zone 2 - Office Space located at or below the 24th Floor that may have been subjected to dust entering the Building through the Gash, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows (Figure 2).

- Zone 3 - Office Space located above the 24th Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows (Figure 3).

- Zone 4 - Gash Area that was cleaned by Deutsche Bank subsequent to September 11, 2001 to permit structural work to be performed (Figure 4).

- Zone 5 - Roof Area that may have been impacted by the settling or adhesion of dust to the exterior surfaces (Figure 5).

- Zone 6 - Exterior façade building materials[1] (Figure 6).

With regard to dust in particular, the sampling strategy was based on the premise that WTC dust infiltrated parts of the Building in varying degrees resulting in distinct zones of contamination, as described above. As a result, the number of samples that would be representative of each zone was determined and based in part upon some of the information identified in previous studies of the Building. Once these preliminary determinations were made, the specific floor locations were selected. This sampling-by-zone approach resulted in selecting a specific number of samples for a specific number of floors as described in Section 2.0, Methodology. This sampling approach was deemed to be representative of the dust concentrations in the Building, and therefore, samples were not collected from every floor. Furthermore, more detailed floor-by-floor sampling was also unnecessary assuming the likely deconstruction approach will include engineering controls and monitoring that will be applied to each floor regardless of the exact level of contamination on that floor.

Task 5 was a limited task consisting of the visual inspection of only the interior exposed surfaces of the Building for the presence of mold impacted-surfaces. Because mold growth can only occur in the presence of moisture, any water-damaged materials were also to be identified as part of this task.

The remainder of this document is divided into four sections. Section 2.0 describes the general methodology, which is followed by a presentation of results and findings in Sections 3.0 and 4.0, respectively. The conclusions and recommendations from this Study are presented in Section 5.0. Attached as appendices (in separate volumes) are the Task 1 Planning Documents (including the SAP, QAPP, and HASP) in Appendix A; Data Summary Tables (including asbestos and other analytes) in Appendices B and C; Asbestos Bulk Sample Location Plans (for Tasks 2 and 3) in Appendices D and E; and Final Laboratory Analytical Reports (for Tasks 2 through 4) in Appendices F through H.

1 The sampling for Zone 6 was limited to readily accessible exterior areas on the ground floor of the Building, with limited samples taken adjacent to locations of suspected ACM building material samples. Further sampling of upper levels of the Building's exterior is planned, but was not part of this initial Study.

2.0 METHODOLOGY

The following subsections present the methodologies for implementation of the Asbestos Building Inspection and Material Survey, the Dust Characterization for Asbestos, the Dust Characterization for Other Analytes, and the Visual Mold Inspection. These tasks were implemented in accordance with the SAP, QAPP, and HASP prepared for the Study (included in Appendix A, a separate volume) and the initial site survey that was performed to verify the assumptions made in these plans. Berger holds a valid NYSDOL Asbestos Handling License (License # 03-0940).

2.1 Asbestos Building Inspection and Material Survey

For this task, guidelines used were established by the EPA in the publication *Guidance for Controlling Asbestos-Containing Materials in Buildings,* Office of Pesticides and Toxic Substances, DOC #560/5-85-024 and 40 C.F.R. Part 763, AHERA. The AHERA guidelines represent the most up-to-date inspection and sampling protocol available, and as such were utilized during the inspection and bulk sampling. For the purposes of this inspection, suspect ACM were placed in three material categories: thermal systems insulation, surfacing materials, and miscellaneous materials. The locations within the Building were inspected physically, functional space-by-functional space and Homogeneous Area-by-Homogeneous Area, to determine the presence of ACM. AHERA defines a Homogeneous Area as suspect material of similar age, appearance, function, and texture.

The inspection included the following tasks:

1. Visual determination of the extent of visible and accessible suspect materials and conditions of the material;

2. Collection of samples of suspect building materials and analysis for asbestos content;

3. Determination of friability and condition of suspect materials through a physical "Hand Pressure" test;

4. Assessments of suspect friable and non-friable materials and locations;

5. Quantification of the amount of suspect friable and non-friable materials in their respective locations;

6. Identification of all suspect materials sampled on the appropriate building floor plan diagram with the sample number; and

7. Preparation of an Asbestos Field Survey Data Sheet/Chain of Custody record, which accompanied the samples to the laboratory.

Protocols associated with the Asbestos Building Inspection and Material Survey are discussed in further detail in the following subsections. These include inspection procedures, bulk sampling procedures, physical condition assessment, bulk sample submission and retention, and laboratory analytical procedures and methodologies.

2.1.1 *Physical Inspection Procedures*

All accessible locations within the Building, including the Roof, were inspected physically, functional space-by-functional space (room-by-room) and Homogeneous Area-by-Homogeneous Area, to determine the presence of ACM. A limited inspection was also conducted on the exterior façade of the Building. All suspect material in each functional space, including above the suspended ceiling (the plenum), was categorized by Homogeneous Area prior to bulk sampling. This task included, but was not necessarily limited to, the following:

1. Conducting a thorough on-site visual inspection of the Building, including areas above the suspended ceiling (the "plenum"). Inspections were scheduled and coordinated with the Building Representative and conform to the approved work schedule. During the inspection, Berger identified and documented the condition of the suspected material based on functional area usage, and other factors deemed appropriate;

2. Indicating all areas of homogeneous material, without regard to the results of subsequent laboratory bulk analysis, either on a set of building floor plans, on schematic drawings, or in tabular form;

3. Identifying the functional spaces on the drawings; and

4. Completing the Asbestos Field Survey Data Sheet/Chain of Custody Form for each homogeneous material, and listing all functional spaces where ACM is suspected to be present.

Based on the results of the physical inspection, final sample locations were identified and suspect ACM samples were collected according to the procedures described in the next section.

2.1.2 *Bulk Sampling Procedures*

Berger conducted bulk sampling of all friable and non-friable suspected ACMs in compliance with the requirements of AHERA for bulk sampling (40 C.F.R. 763.86) and consistent with the SAP and the QAPP. Over 2,000 samples of suspect ACM were collected for analysis as part of the Study. All sample locations were clearly identified on Building floor plans (Appendix D) and marked with an identification number corresponding to the respective sample number written on the Asbestos Field Survey Data Sheet/Chain of Custody Form (Appendix F), which accompanied the samples to the laboratory. A minimum of one side-by-side quality control sample was collected for each grouping of 20 samples or part thereof.

Bulk sampling was conducted in the following manner:

1. Berger collected representative bulk samples of all materials suspected to contain asbestos. Sample locations were determined using the EPA's simplified random sampling method (EPA 560/5-85-030a). All sample locations were indicated on drawings or floor plans. Each sample location was identified by a unique number that permits the cross-referencing of sample information.

2. Bulk samples were collected from materials in each Homogeneous Area to determine the asbestos content and to identify the complete content matrix of the material. Homogeneity was based on, but not necessarily limited to, the following criteria:

    - Visual appearance;
    - Texture; and
    - Use (including but not limited to: ceilings, floors, walls, mechanical equipment, ceiling tiles, floor tiles, pipe wrapping, elbow materials, valve material on structural members, decks, beams, and duct work).

3. With two exceptions, at least three samples of each suspect material were collected and analyzed before concluding that there was no asbestos in the material. The exception was a single sample of thermal system insulation, including patching, or miscellaneous material that meets the following size restrictions: the thermal system insulation is of less than six LF or six SF and the miscellaneous material is less than 160 SF or 260 LF in total quantity. Otherwise, the numbers of samples to be collected for each Homogeneous Area were as follows:

    - Surfacing material on ceilings, walls, and structural members:

a. Less than 1,000 SF = at least three samples;

b. Between 1,000 SF and 5,000 SF = at least five samples;

c. Greater than 5,000 SF = at least seven samples;

d. At least one additional sample for each additional 10,000 SF up to a total of nine samples; and,

e. At least one sample for each patched area.

- Thermal system insulation such as pipe work, valves, elbows, and ductwork:

  a. At least one bulk sample from each Homogeneous Area of patched thermal system insulation if the patched section is less than six LF or six SF;

  b. At least three bulk samples from each Homogeneous Area of thermal system insulation equal to or greater than six LF or six SF; and

  c. At least one sample of valve material, hanger, and elbow mud for each insulated line of varying diameter and visible appearance.

- Miscellaneous materials:

  a. Miscellaneous materials include ceiling and floor tiles, linoleum or vinyl floor coverings, baseboards and similar material, and their adhesives and were collected as follows: at least one sample for an area containing up to 160 SF or 260 LF of suspect material; at least three samples for an area of 260 - 5,000 SF or between 160 – 1,000 LF of suspect material; and at least one additional sample for each 5,000 SF or 1,000 LF or part thereof of material, to a total of nine samples.

  b. Roofing, built-up roof (BUR) systems as well as other types of suspected roof ACM were also sampled as follows: three samples of each layer for a homogeneous roof area up to 10,000 SF and one additional sample for each additional 10,000 SF, or part thereof, to a total of nine samples.

4. Quality Assurance/Quality Control (QA/QC) samples: one random split sample for every 20 samples, or part thereof, was collected and submitted for analysis.

2.1.3 *Physical Condition Assessment*

The EPA AHERA specifies that a physical assessment of all friable suspect material must be performed during the inspection. The suspect materials were assessed to determine the potential hazards and the hazards ranked according to severity. The physical condition assessment consisted of determining:

- The condition of the suspect ACM; and
- The cause of damage and potential for future disturbance.

AHERA lists seven categories by which to assess the current condition and potential for damage as follows:

1. Damaged or Significantly Damaged Friable Thermal System Insulation;
2. Damaged Friable Surfacing Material;
3. Significantly Damaged Friable Surfacing Material;
4. Damaged or Significantly Damaged Friable Miscellaneous Material;
5. ACM with potential for damage;
6. ACM with the potential for significant damage; and
7. Any remaining Friable ACM or Friable Suspected (assumed) ACM.

A rank of "1," means the material is in "poor" condition and requires top priority for abatement response action. A result of "5" would indicate material in "fair" condition with "moderate" potential for future damage. It would have a high priority for abatement response action. A rank of "7" indicates material in "good" condition with "low" potential for future damage. These areas would have a low abatement response priority.

The second step in the assessment process was to determine the potential for future damage or deterioration for material classified as good or fair. The potential for future damage was classified as High, Moderate, or Low. Factors considered included the potential for physical

contact and the influence of environmental factors such as vibration, air erosion, the likelihood of water damage, etc.

The third step was to determine the friability rating and to classify the material as Friable ACM or Non-Friable ACM. "Friable ACM," as defined by NYSDOL and EPA, is any material that contains more than one percent asbestos and can be crumbled, pulverized, or reduced to powder by hand pressure. In New York City, the definition of "Friable ACM" is any material that contains more than one percent asbestos and can be crumbled, pulverized, or reduced to powder by hand pressure and/or mechanical means (NYCDEP Title 15 Regulations). For this study, the EPA/NYSDOL definition of friability was used. It refers to a material's likeliness to release airborne fibers. There is a greater possibility that a friable material will release fibers into the air when disturbed than will a non-friable material (e.g., floor tiles, roofing materials, etc.) thereby causing a potential hazard.

The assessment process defines the extent of the damaged condition as follows:

- If the extent of the damage is roughly ten percent of the material and is evenly distributed throughout the material, then the material is considered significantly damaged; and/or
- If the extent of the damage is roughly 25 percent of the material and is localized, then the material is considered significantly damaged.

2.1.4 *Bulk Sample Submission and Retention*

Berger was responsible for transmittal of the samples to the laboratory and for assuring that the laboratory analyzed each sample identifying the type and amount of asbestos and other components present in accordance with the QAPP.

Field personnel completed Asbestos Field Survey Data Sheet/Chain of Custody Form for all samples submitted to the laboratory. Following completion, the sampling personnel signed and dated the form and submitted the samples to the laboratory. Each person, in succession, that took possession of the samples then signed and dated the form, providing documentation that the samples were under the control of a designated person at all times. The Asbestos Field Survey Data Sheet/Chain of Custody Forms with all signatures are provided with the final reports from the laboratory (Appendix F). The bulk sample submission protocols are summarized as follows:

1. Berger submitted the bulk samples to a Laboratory that is accredited by National Voluntary Laboratory Accreditation Program (NVLAP) under the National Institute of Standards & Technology and the NYSDOH ELAP.

2. The samples were submitted to the laboratory for analysis promptly upon completion of the survey. Berger prepared and retained documentation that accurately reflected all changes in the chain of custody and location of each sample. Documentation indicated all persons who took custody of samples and the period of time in each person's custody, as well as to whom the samples were relinquished. There were no unaccounted periods of time with regard to each sample.

3. Berger had the laboratory analyze each sample and identify the type and amount of asbestos present as well as other components, in accordance with the QAPP.

4. Bulk samples were retained by the laboratory with the chain of custody documentation.

5. QA/QC was used to monitor the performance of the analytical laboratory. A duplicate sample was collected immediately adjacent to the related bulk sample for every 20th bulk sample collected. It was labeled and numbered independently in a manner such that the laboratory personnel, if the same laboratory was used for the analysis, could not have discerned the QC sample(s).

6. Samples were hand delivered to the analytical laboratory in an appropriate and suitable manner. All packaging and labels complied with Federal Department of Transportation (DOT) regulations as provided in 49 C.F.R. 171-178.

2.1.5 *Laboratory Analytical Procedures and Methodologies*

Laboratory analytical services using Polarized Light Microscopy (PLM) and Transmission Electron Microscopy (TEM) methods were performed by Amerisci Laboratories, Inc. located at 117 East 30th Street, New York, New York. Amerisci Laboratories is accredited by NVLAP (Accreditation Number 200546-0) under the National Institute of Standards & Technology (NIST); the NYSDOH ELAP (Accreditation Number 11480), and the American Industrial Hygienist Association (AIHA) (Accreditation Number 1028).

Bulk samples of suspect ACM were analyzed by PLM Method 198.1 and/or TEM Method 198.4 as described in NYSDOH ELAP for the criteria set by the NESHAP, 40 C.F.R. Part 61. They

were also analyzed on a "Positive-Stop" basis using both the PLM and TEM methods. A summary description of the analyses conducted is as follows:

Polarized Light Microscopy (PLM) Methods

Samples were analyzed by PLM with dispersion staining according to the method specified in the EPA *Interim Method of the Determination of Asbestos in Bulk Insulation Samples*, Appendix A, Subpart F, 40 C.F.R. Part 763; and NYSDOH ELAP Method 198.1. This is a standard of analysis in optical mineralogy and the currently accepted method for the determination of asbestos in friable bulk samples. Friable ACM is any material that contains more than one percent asbestos and can be crumbled, pulverized, or reduced to powder by hand pressure. A suspect material is immersed in a solution of known refractive index and subjected to illumination by polarized light. The resulting characteristic color display enables mineral identification.

The NYSDOH has revised the PLM Stratified Point Counting Method. The new method, *Polarized Light Microscopy Methods for Identifying and Quantitating Asbestos in Bulk Samples* can be found as Item 198.1 in the ELAP Certification manual. The State of New York ELAP has determined that analysis of non-friable, organically bound material (NOB) is not reliably performed by PLM. Therefore, if PLM analysis of an NOB yields a negative result, TEM must be performed to further confirm the result. All samples were initially analyzed by PLM. Samples that produced a negative PLM result and were classified as an NOB were then re-analyzed utilizing the TEM methodology.

Transmission Electron Microscopy (TEM) Methods

Detection of asbestos fibers in NOBs such as floor tile, mastics, roofing materials, and window caulking/glazing, is often extremely difficult because of the small fibers used during manufacture, their subsequent mixing and coating with an organic matrix (vinyl, asphalt, etc.) and potential combination during sample preparation. To address this problem, specialized sample preparation (gravimetric reduction per Chatfield, 1991) and analysis by TEM is required.

The use of TEM addresses the principle that the limit of an optical microscope's ability to detect objects is affected by the wavelength of light, which is the source for PLM analysis. The electron microscope used in TEM analysis is inherently superior to the optical microscope for detecting very small fibers. TEM's extremely short wavelength, coupled with simple image presentation, yields resolvable images of even the smallest asbestos fibers. Furthermore, identification of chrysotile or amphibole crystalline structure can be consistently produced via the electron-diffraction capabilities of modern TEMs. Accordingly, the TEM's resolution of up

to 20,000x magnification provides the most reliable method for detecting and quantifying asbestos fibers in NOBs and is considered the only method that can be used to report true negative results from PLM analysis of NOB samples as per the New York State Department of Health Environmental Laboratory Approval Program Guidelines (NYSDOH-ELAP).

Positive Stop Procedures for PLM and TEM Analysis

In accordance with EPA guidelines, samples are categorized into "homogeneous groups" by material type. The number of samples to be taken for each group is dictated by the type and quantity of the material. All samples within the homogeneous group must be less than one percent asbestos in order to classify the material as "non-asbestos." Conversely, the positive result of any one sample dictates that the homogeneous group be classified as ACM. Thus, when the individual samples of each homogeneous group are analyzed, the laboratory discontinues analysis when asbestos has been identified in one of the samples. These subsequent samples, which have not yet been analyzed, are reported as Not Analyzed/Positive Stop (NA/PS) and the homogeneous material is classified as an ACM. NA/PS procedures are economically beneficial by reducing analytical cost for repetitive analysis.

2.2 Dust Characterization for Asbestos

The guidelines used for the dust characterization for asbestos were established by the EPA in the *Guidance for Controlling Asbestos-Containing Materials in Buildings,* Office of Pesticides and Toxic Substances, DOC #560/5-85-024 and 40 C.F.R. Part 763, AHERA. Berger collected representative bulk samples of the settled dust. To determine the asbestos content from the following locations, each floor was divided into separate functional areas as follows:

- Random locations under the suspended ceiling (plenum);
- Random locations above the suspended ceiling (plenum); and
- The exterior netting on the Building.

Sample locations were determined using the EPA's simplified random sampling method (EPA 560/5-85-030a). All sample locations were documented on floor plans (Appendix E) and well as Asbestos Air Sample Logs/Chain of Custody Forms. Each sample location was identified by a unique number, which permitted the cross-referencing of sample information throughout the report. The documentation (consisting of Floor Plans and Air Sample Logs/Chain of Custody Forms) was deemed to be sufficient to locate and ascertain the extent of settled dust throughout the Building. Each floor was divided into two separate functional spaces: above the suspended ceiling (or plenum) and under the suspended ceiling. Each floor was divided into a grid with

nine sections, the sections were numbered starting from Section 1 in the south west corner, Section 2 in the next section east, Section 3 in the south east corner, and Section 4 in the west central area, counting east from the west wall in each section. The 9th Section was in the northeast corner. The areas were numbered using the floor number followed by the section number. Area 1 was the southeast section of the floor. For example, the area in the southeast corner of the 1st Floor was called Area 01-01. The Areas 01-01 through 42-09 included every section of the Building; samples collected above and under the suspended ceiling were be labeled separately to identify where the samples were collected.

The dust samples were analyzed by PLM with dispersion staining according to the method specified in the EPA *Interim Method of the Determination of Asbestos in Bulk Insulation Samples*, Appendix A, Subpart F, 40 C.F.R. Part 763; and NYSDOH ELAP Method 198.1. This is a standard of analysis in optical mineralogy and the currently accepted method for the determination of asbestos in friable bulk samples. Supplemental screening samples of the settled dust were collected from porous and non-porous surfaces and analyzed for asbestos using TEM in accordance with ASTM Standard D 5755-95, "*Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Fiber Concentration.*" Porous surfaces include suspended ceiling tiles and carpet. Non-Porous surfaces included concrete, floor tiles, and wall boards. This method describes the procedures for collecting non-airborne dust samples.

2.2.1 *Physical Inspection Procedures*

All accessible locations within the Building were inspected physically, functional space-by-functional space (room-by-room) and Homogeneous Area-by-Homogeneous Area to determine the presence of settled dust above and below the suspended ceiling (the plenum). The settled dust in each functional area listed above was categorized as a separate Homogeneous Area prior to sampling. Random sampling was conducted according to the protocol described in the SAP. All sampling information was documented on the Asbestos Air Sample Logs/Chain of Custody Form. This task included, but was not necessarily limited to, the following:

1. Conducting a thorough on-site visual inspection of the Building, including areas above the suspended ceiling.

2. Each floor was subdivided into two Homogeneous Areas, one above the plenum and one below the plenum. Each Homogeneous Area was then subdivided into nine sections and one sample was collected from each of the nine sections on each floor, resulting in approximately 18 samples per floor. Samples were taken from over 800 locations,

including porous and non-porous surfaces, and on mechanical equipment, based on the amount of dust found on each for each sample area. In areas where there was no discernable difference in accumulation, samples were collected from the lowest level where dust could be sampled.

3. Berger conducted sampling of all dust suspected to be asbestos-containing in compliance with the requirements of EPA's AHERA for bulk sampling (40 C.F.R. 763.86). A minimum of one side-by-side quality control sample was collected for each grouping of 20 samples. All sample locations were clearly identified on copies of the Building schematic diagrams (drawings or floor plans) and marked with an identification number corresponding to the respective sample number.

2.2.2 *Bulk Sampling Procedure*

Berger conducted bulk sampling of the settled dust in compliance with the requirements of AHERA for bulk sampling (40 C.F.R. 763.86) and consistent with the SAP and the QAPP. A minimum of one side-by-side quality control sample was collected for each grouping of 20 samples or part thereof. All sample locations were clearly identified on building floor plans and marked with an identification number corresponding to the respective sample number written on the Asbestos Air Sample Logs/Chain of Custody Form, which accompanied the samples to the laboratory.

For areas with significant dust accumulation, the dust was wetted, scraped and placed into a sample container. For areas with minimal dust accumulation the same procedure was followed except that the sample area was larger. Sample locations in each section of the Building were determined by the inspector in the field. Samples were collected from horizontal surfaces in the section from areas that contained visible dust.

The following procedures were used in collection of forty (40) additional samples of the settled dust using the ASTM Standard D 5755-95 Microvacuum technique:

1. A sampling template of 100 square centimeters (cm^2) was used at sample locations;

2. The flow rate of the pump with the cassette attached was set above 2 liters per minute;

3. Vacuuming began inside the template and passes were made for the entire sampling time and intersected at right angles, sampling continued until there was no visible dust or for a

minimum of 2 minutes, and debris or particles greater than 1 mm in diameter were avoided; and

4. Upon completion of sampling at a location, the cassette was sealed by turning the cassette upright, turning off the pump, and sealing the top of the cassette.

The TEM samples were collected at random locations throughout the building to include porous and non-porous surfaces from above the plenum and below the plenum (for a total of 40 samples).

2.2.3 *Laboratory Analytical Procedures and Methodologies*

Laboratory analytical services using PLM and TEM methods were performed by Amerisci Laboratories, Inc. located at 117 East 30th Street, New York, New York. Amerisci Laboratories is accredited by NVLAP (Accreditation Number 200546-0) under the National Institute of Standards & Technology (NIST); the NYSDOH ELAP (Accreditation Number 11480), and the American Industrial Hygienist Association (AIHA) (Accreditation Number 1028). Descriptions of the analyses conducted are as follows:

Polarized Light Microscopy (PLM) Method

Samples were analyzed by PLM with dispersion staining according to the method specified in the EPA *Interim Method of the Determination of Asbestos in Bulk Insulation Samples*, Appendix A, Subpart F, 40 C.F.R. Part 763; and NYSDOH ELAP Method 198.1. This is a standard of analysis in optical mineralogy and the currently accepted method for the determination of asbestos in friable bulk samples. Friable ACM is that material which may be crumbled, pulverized, powdered, crushed or exposed asbestos which is capable of being released into the air by hand pressure. A suspect material is immersed in a solution of known refractive index and subjected to illumination by polarized light. The resulting characteristic color display enables mineral identification.

Transmission Electron Microscopy (TEM) Method

The dust samples were analyzed using the NYSDOH ELAP Method 198.4. The use of TEM addresses the principle that the limit of an optical microscope's ability to detect objects is affected by the wavelength of light, which is the source for PLM analysis. The electron microscope used in TEM analysis is inherently superior to the optical microscope for detecting very small fibers. TEM's extremely short wavelength, coupled with simple image presentation,

yields resolvable images of even the smallest asbestos fibers. Furthermore, identification of chrysotile or amphibole crystalline structure can be consistently produced via the electron-diffraction capabilities of modern TEMs. Accordingly, the TEM's resolution of up to 20,000x magnification provides the most reliable method for detecting and quantifying asbestos fibers as per the NYSDOH ELAP.

2.3 Dust Characterization for Other Analytes

This task involved the characterization of contaminants other than asbestos in dust samples. Specific analytes included: (1) COPCs designated by the EPA as associated with WTC dust (i.e., asbestos, dioxins, lead, PAHs, and crystalline silica); and (2) other contaminants suspected of being present in the Building and of potential concern (i.e., PCBs, heavy metals, and mercury). In addition, this section discusses the methods used for an evaluation of the presence of mercury vapor, which was later added to the scope of work. It should be noted that for carpets, settled dust was evaluated by sampling and analyzing the carpet itself; as such, any chemicals present in the manufacturing or installation of the carpet will be represented in the results.

Sampling efforts were accomplished in accordance with applicable standards and a systematic, targeted sampling design to collect representative surficial samples from building components and other areas with the highest likelihood of being contaminated. The methods utilized are presented in the SAP and QAPP and are summarized in this section. The following subsections describe in further detail the initial site survey, sample location identification, and methods of sample collection and analysis.

2.3.1 *Initial Site Survey*

An initial site visit was made to the Building prior to performing the sampling. The Project Team, consisting of the Task Manager and each of the Task Coordinators, performed the initial site survey. The Project Team visited representative floors in each of the zones to gain familiarity with the entry/security procedures and Building lay-out, as well as to determine representative areas to sample. A general knowledge of the key features of the Building and the varying degree of dust accumulation were noted during the survey. During the site survey, it was noted that the Gash Area (Zone 4) was previously cleaned. It was also noted that Mechanical areas on the 5th, 40th, and 41st Floors (Zone 1) had appreciably greater dust accumulation on various surfaces compared to surfaces on office floors. This information was utilized during the development of the final sampling strategy to aid in selection of the floors that would be most appropriate for sample collection.

2.3.2 *Sample Location Identification*

A sampling strategy representative of the Building was developed following the initial site walkthrough, which identified six general sampling zones based on the amount of visible dust present and methods by which dust was thrust into the Building on September 11, 2001. Dust may have entered the Building in the following ways: (1) through the HVAC System and broken windows, which allowed falling debris, dust, and fumes to infiltrate the Building; and (2) contaminants produced as a result of combustion of building materials, building contents, fuel oil, and jet fuel that may have blown into the Building by prevailing winds. For this study, the six zones identified are illustrated on Figures 1 through 6 and consist of the following:

- Zone 1: Mechanical Rooms on the 5th and 40th floors that include the air intakes, fan rooms, and air handling units of the HVAC system (Figure 1).
- Zone 2: Office Space located at or below the 24th Floor that may have been subjected to dust entering the Building through the Gash Area, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows (Figure 2).
- Zone 3: Office Space located above the 24th Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows (Figure 3).
- Zone 4: Gash Area that was cleaned subsequent to September 11, 2001 to permit structural work to be performed (Figure 4).
- Zone 5: Roof Area that may have been impacted by the settling or adhesion of dust to the exterior surfaces (Figure 5).
- Zone 6: Exterior Façade that may have been impacted by the settling or adhesion of dust to the exterior surfaces of the Building (Figure 6).

The sampling strategy was based on the areas susceptible to WTC dust that infiltrated parts of the Building in varying degrees resulting in distinct zones of contamination, as described above. Specific floor locations were selected following a determination of the number of samples that would be representative of each zone, which was based on information identified in previous studies of the Building. This approach resulted in selecting a specific number of samples for a specific number of floors as outlined in Table 1. As a result of this approach, samples were not collected from each floor.

In Zones 1, 2, and 3, a total of thirty-two, thirty-nine, and thirty-eight sample locations were identified, respectively. In Zone 4, nine (9) sample locations were identified including two samples that were collected from the exterior netting used to contain the damage and debris caused by the collapse of the WTC. In Zone 5, four (4) sample locations were identified and each location chosen was based upon the extent of visible dust and/or the representativeness of the sample location. In Zone 6, three (3) sample locations were identified on the Exterior Façade. Within each zone, sample locations were selected so that approximately one quarter of the samples were collected from floor surfaces (both carpeted and uncarpeted), one quarter of the samples were collected from horizontal surfaces (ledges), one quarter of the samples were collected from HVAC interior ductwork, and one quarter of the samples were collected from above the suspended ceiling (plenum). Table 1 presents a summary of the number of samples collected by zone.

TABLE 1
TASK 4 – NUMBER OF SAMPLE LOCATIONS BY ZONE

Zone 1	Number of Sample Locations
5th Floor	**18**
40th Floor	**14**
Zone 1 Total	32
Zone 2	Number of Sample Locations
2nd Floor	**6**
4th Floor	**8**
10th Floor	**4**
12th Floor	**4**
14th Floor	**6**
18th Floor	**8**
Basement (Level A/B)	**2**
Basement (Vault)	**1**
Zone 2 Total	39
Zone 3	Number of Sample Locations
25th Floor	**4**
27th Floor	**2**
31st Floor	**4**
35th Floor	**2**
39th Floor	**7**
40th Floor	**12**
41st Floor	**7**
Zone 3 Total	38
Zone 4	Number of Sample Locations
7th Floor	**1**
10th Floor	**1**
12th Floor	**1**
15th Floor	**1**

TABLE 1 (continued) TASK 4 – NUMBER OF SAMPLE LOCATIONS BY ZONE	
17th Floor	**1**
22nd Floor	**1**
24th Floor	**1**
Netting (Floors 17 & 24)	**2**
Zone 4 Total	9
Zone 5	Number of Sample Locations
Roof	**4**
Zone 5 Total	4
Zone 6	Number of Sample Locations
Exterior Façade	**3**
Zone 6 Total	3

2.3.3 *Sample Collection and Analysis*

Samples were collected using wipe, vacuum, and/or bulk sampling techniques and analyzed for silica, PAHs, dioxins, PCBs, heavy metals (barium, beryllium, cadmium, chromium, copper, lead, manganese, nickel, and zinc), and mercury. Silica analysis was performed by Analytics Corporation, located in Richmond, Virginia, under NYSDOH ELAP (Accreditation Number 11386), and AIHA (Accreditation Number 100531). Severn Trent Laboratories, Inc. located in Shelton, Connecticut, performed dioxin analysis, under NYSDOH ELAP (Accreditation Number 15681). Laboratory analysis of the remaining analytes was performed by Severn Trent Laboratories, located in Sacramento, California, under NYSDOH ELAP (Accreditation Number 10602). Table 2 presents a summary of the sample collection methods by analyte and the number of samples collected.

TABLE 2
SAMPLE COLLECTION AND ANALYSIS PARAMETERS

Analytical Parameter	Analytical Method	Sampling Media	Number of Samples	Number of QC Samples	Total Number of Samples
Silica in Dust	XRD	Wipe/Vacuum	117	17	134
PAHs	8270C	Wipe/Bulk	125	17	142
Dioxin	8290	Wipe/Bulk	126	17	143
PCBs	8082	Wipe/Bulk	125	17	142
Heavy Metals	6010B	Wipe/Bulk	125	17	142
Mercury	7471A	Wipe/Bulk	125	17	142
Notes: XRD per Modified NIOSH Method 7500					

Additional sample collection information is provided in Table 3, which shows the sample matrix, analytical method, sample preservation, holding time and sample container requirements by analyte.

TABLE 3
SAMPLE COLLECTION REQUIREMENTS

Analytical Parameter	Sample Matrix	Analytical Method	Sample Preservation	Holding Time (days)[1]	Sample Container
Silica in Dust	Wipe or vacuum (PW PVC)	NIOSH 7500 Modified	None	N/A	Glass Jar
PAHs	Gauze w/hexane; bulk	8270	Refrigerate / keep dark	14/40	Glass Jar
Dioxin	Gauze w/ hexane;	8290	Refrigerate / keep dark	14/40	Glass Jar
PCBs	Gauze w/hexane; bulk	8082	Refrigerate	14/40	Glass Jar
Heavy Metals	Gauze w/deionized water; bulk	6010B	None	180*	Glass Jar
Mercury	Gauze w/deionized water; bulk	7471A	Refrigerate	28*	Glass Jar

Notes:
N/A = Not applicable
[1] 14/40 = 14 days to sample extraction/40 days to extract analysis
* Metals and Mercury samples must be digested and analyzed within the stated holding times

All wipe, vacuum, and bulk samples were immediately placed in dedicated glass sample jars prior to being placed in chilled coolers and recorded on a Chain of Custody Form. Samples were preserved according to the specific method requirements and delivered to the laboratory within 24 hours of collection.

Micro-Vacuum Sampling Methods

A micro-vacuuming method was employed to collect silica and the other COPCs from within the zones described above for certain sampling substrates (e.g., carpeting). A pre-weighed polyvinyl chloride (PVC) cassette (for silica) was connected to a three-foot length run of Tygon tubing (with a 45° angle cut into the sample intake portion) on the sampling side and a pump set at a flow rate of 10.0 liters per minute on the intake side. Using a template, samples were collected within a ten-centimeter-by-ten-centimeter area for a period of approximately two minutes. Appropriate personal protective equipment (PPE), including coveralls, gloves, boots, and a High Efficiency Particulate Arrestance (HEPA) filtered respirator were worn by sampling technicians

at all times. Samples were placed in a sealed bag and kept cold during collection, holding, and submittal periods to the approved analytical laboratory.

Bulk Dust Sampling Methods

Bulk sampling methods were used to collect dust for a determination of percentages of various silica species, i.e., crystalline versus amorphous. A clean laboratory scoop was utilized to collect representative samples from non-porous surfaces where extensive dust was present. Appropriate PPE, including coveralls, gloves, boots, and HEPA filtered respirators were worn by sampling technicians at all times. At least two such samples were collected from each zone. Samples were placed in a sealed bag and kept cold during collection, holding, and submittal periods to the approved analytical laboratory.

Bulk Carpeting Sampling Methods

A bulk sampling method was employed to collect dioxin and PAH samples from carpet. A clean cutting tool was utilized to remove a ten-centimeter-by-ten-centimeter area using a pre-cut template. Sample locations were determined utilizing the above-described protocol. Appropriate PPE, including coveralls, gloves, boots, and a HEPA filtered respirator were worn by sampling technicians at all times. Samples were placed in a sealed bag and kept cold during collection, holding, and submittal periods to the approved analytical laboratory.

Wipe Sampling Methods

A wipe sampling method was employed to collect PCBs, PAHs, and metals (including mercury) within the zones described above. This was the default sampling method when there was an absence of carpeting. Individual samples (per suitable wipe/matrix/container) for each of these analytes were collected from within a ten-centimeter-by-ten-centimeter area template. PCBs and PAHs were collected on sterile gauze pad treated with a 4:1 acetone/hexane mixture, while metals were collected on a sterile gauze pad treated with deionized water. Appropriate PPE, including coveralls, gloves, boots, and HEPA filtered respirators were worn by sampling technicians at all times. Samples were placed in a sealed bag and kept cold during collection, holding, and submittal periods to the approved analytical laboratory.

Sample Identification and Labeling

Each sample was assigned a unique identification number:

WXYYSZZV	=	Example identification number
W	=	Analyte group (C for Chemical)
X	=	Sampler #
YY	=	Floor #
S	=	Sample (constant)
ZZ	=	Sample number
V	=	Sampling event (e.g., A = 1st time, B = 2nd time, if required)

The sample container was labeled with the sample identification number, date of collection, and the sampler's initials.

Sampling Documentation

The information necessary to relate sample locations for reporting purposes were documented in bound field log books. The following information was completed for each sample collected:

- Client and Facility information;
- Sample identification number;
- Date/time sampled;
- Sampler;
- Room/area from where the sample was taken;
- Equipment/area number, if applicable;
- Description of areas/items sampled; and
- Sketch of sample locations.

A copy of the sample log sheet was forwarded to the Task Manager and QA/QC Manager for review and inclusion in the project file.

Chain of Custody Form

Field personnel completed Chain of Custody Forms for all samples submitted to the laboratory. Following completion, the sampling personnel signed and dated the form and submitted the samples to the laboratory. Each person that successively took possession of the samples then signed and dated the form, providing documentation that the samples were under the control of a designated person at all times. The Chain of Custody Forms, with all signatures, were provided with the final reports from the laboratory.

Samples were treated in an appropriate and suitable manner for delivery to the analytical laboratory. All packaging and labels complied with Federal DOT regulations as provided in 49 C.F.R. 171-178. Specific requirements for sample shipment were outlined in the QAPP.

QA/QC

Data quality was assessed on all field samples and corresponding laboratory QA/QC samples following the recommended procedures outlined in the following documents:

- EPA Region II Standard Operating Procedure (SOP) HW-22: *Validating Semivolatile Organic Compounds by SW-846 Method 8270* (Rev 2, June 2001);
- EPA Region II SOP HW-23B: *Validating PCB Compounds by SW-846 Method 8082* (Rev 1.0, May 2002);
- EPA Region II SOP HW-19: *Validating PCDDs and PCDFs by HRGC/HRMS* (Rev 1.0, October 1994); and
- EPA Contract Laboratory Program (CLP) *National Functional Guidelines for Inorganic Data Review* (February 1994).

The EPA Guidelines were employed for the validation, as the guidelines were written for CLP methodologies and SW-846 methods, which were used for this investigation. Rationale is provided for cases where professional judgment is used to determine data quality. For silica analyses, the data quality was assessed in accordance with the requirements of the National Institute for Occupational Safety and Health (NIOSH) Method 7500. The following information, along with the requirements of the specific methods, was used to assess the quality of the analytical results:

- Holding Times;
- Instrument Tunes (Dioxins, PAHs);
- Initial and Continuing Calibration Data;
- Method Blanks;
- Surrogate Recovery Data;
- Laboratory Control Samples;
- Matrix Spike/Matrix Spike Duplicates;
- Retention Time Data (Dioxins, PCBs);
- Internal Standard Data (PAHs, Dioxins); and
- Duplicate Sample Results.

The number/type of QA/QC samples is presented in Table 2.

Method Detection Limits

Method Detection Limits (MDLs) represent the lowest concentration a laboratory analysis can quantify with confidence. The presence of a detectable analyte in a sample indicates that the concentration of the analyte exceeds the MDL. Non-detectable concentrations indicate that the selected analyte was not present in a concentration that exceeded the MDL, but it does not indicate that the selected contaminant is absent from the sample in concentrations lower than the MDL.

In general, MDLs are established through the analytical method, the measuring instrument's sensitivity, the amount of interference from the sample matrix, the concentration of the analytes, and the Data Quality Objectives of the project. The laboratories contracted for this project established MDLs for each analysis that are consistent with standard industry practice and are sufficiently low (in the absence of matrix interference or elevated concentrations requiring sample dilution) to permit evaluation.

Reporting Units

Upon completion of the analyses, the contract laboratories reported the results by analyte. For wipe, bulk carpeting, and micro-vacuum samples, the analytical results were presented in the ratio of mass of the analyte over the sample collection area. For bulk dust samples, the analytical results were presented in the ratio of the mass of the analyte over the mass of the

sample. Table 4 presents the units the laboratory reported by analyte and sample type. To complete the evaluation, the wipe, bulk carpeting, and micro-vacuum sample results were scaled to the industry standard ratio of ug/meter^2 (ug/m^2) or ng/m^2 (nanograms per square meter for dioxins).

TABLE 4
ANALYTE REPORTING UNITS

Analyte	Sample Method			
	Wipe	**Bulk Carpeting**	**Micro-Vacuum**	**Bulk Dust**
Silica	mg/100 cm^2	mg/100 cm^2	mg/100 cm^2	mg/kg
Dioxin	pg/100 cm^2	pg/100 cm^2	pg/100 cm^2	pg/g
PAHs	ug/100 cm^2	ug/100 cm^2	ug/100 cm^2	ug/kg
PCBs	ug/100 cm^2	ug/100 cm^2	ug/100 cm^2	ug/kg
Metals	ug/100 cm^2	ug/100 cm^2	ug/100 cm^2	ug/kg
Mercury	ug/100 cm^2	ug/100 cm^2	ug/100 cm^2	mg/kg

Notes:
mg/100 cm^2 – milligrams per 100 square centimeter sampling area
ug/100 cm^2 – micrograms per 100 square centimeter sampling area
ug/kg – micrograms per kilogram
pg/100 cm^2 – picograms per 100 square centimeter sampling area
pg/g – picograms per gram
mg/kg – milligrams per kilogram

Equipment Decontamination

As primarily disposable tools/media were utilized during the sampling process, limited equipment decontamination procedures were necessary. Berger ensured that dedicated (as opposed to re-usable) sample collection media were utilized for each wipe/dust sample. Examples of measures used to avoid contamination included:

- The outer case holding the sampling pump was wiped with sterile towelettes; and
- The extension cord(s) being utilized were wiped utilizing sterile towelettes.

Mercury Vapor

As an addition to the original scope of work, one hundred fifty-three (153) direct reading samples for mercury vapor were collected using the Jerome Meter 431-X. The Jerome 431-X mercury vapor analyzer uses a patented gold film sensor for accurate detection and measurement of toxic mercury vapor in the air. This portable handheld unit can easily be carried to locations with mercury concerns for applications such as industrial hygiene monitoring, mercury spill clean up and mercury exclusion testing. Simple, push button operation allows users to measure mercury levels from 0.003 to 0.999 mg/m^3 in just seconds. The sampling was performed on ten floors of the building on September 3, 2004 during an approximately 8-hour time period, with

approximately four (4) hours of actual sampling time. Each of the ten floors where sampling was performed was divided into approximately 15 areas.

2.4 Visual Mold Inspection

Berger performed an initial visual inspection of readily accessible areas within the Building to assess the presence and, if any, the quantity of mold or mold precursors (e.g., water-damaged building materials or water infiltration). The inspection was performed systematically from the top of the Building to the Basement levels. Accessible surfaces on all floors of the Building were visually inspected for evidence of mold and its precursors. The space above the suspended ceiling (plenum) was only investigated in instances where stained ceiling tiles were noted or where ceiling tiles were missing. All materials suspected of being impacted by mold were quantified in SF in field notebooks and the locations depicted on building floor plans.

3.0 RESULTS

The following subsections present the results of the Asbestos Building Inspection and Material Survey, the Dust Characterization for Asbestos, the Dust Characterization for Other Analytes, and the Visual Mold Inspection. Full data summary tables and final analytical laboratory reports are presented in the Appendices attached to this Report (in separate volumes).

3.1 Asbestos Building Inspection and Material Survey

A summary of the asbestos inspection findings and laboratory results of all building materials sampled and analyzed are presented in two tables located in Appendix B. Table 5 below presents the total quantities of materials being confirmed via laboratory analysis as having an amount greater than one percent asbestos:

- Floor tiles on various floors;
- Associated mastic on floor tiles on various floors;
- Associated mastic on linoleum sheeting on 18th Floor;
- Duct joint caulking on 23rd and 40th Floors;
- Sealant at cable entrances in Basement;
- Pipe insulation on different floors;
- Transite walls on 5th and 40th Floors;
- Wall/floor joint tar material in Gash Area;
- Fan room walls insulation on 40th Floor;
- Caulking material at roof fans;
- Window caulking on roof;
- Exterior sealant and caulking material on curtain wall; and
- Baseboard mastic.

An approximate total of 154,940 SF and 95,150 LF of ACM were identified throughout the Building. A summary of the findings are displayed in the following tables:

TABLE 5
SUMMARY OF INSPECTION RESULTS
FOR CONFIRMED ASBESTOS-CONTAINING BUILDING MATERIALS

CONFIRMED ACM	APPROXIMATE QUANTITY		FRIABILITY†	NOTES / LOCATION
	SF	LF		
12" x 12" Floor Tiles & Associated Mastic	123,780		Non-friable	Approximately 123,780 SF of asbestos-containing "Floor Tiles & Associated Mastic" were identified in the following locations: 30 SF in Basement B; 28,000 SF (2 Layers) in Basement A; 10,500 SF on 1st Floor; 800 SF on 2nd Floor; 4,500 SF on 3rd Floor; 2,000 SF on 5th & 6th Floors; 400 SF on 7th Floor; 10,500 SF on 9th Floor; 900 SF on 10th Floor; 7,000 SF on 11th Floor; 6,150 SF on 14th Floor; 150 SF on 15th Floor; 300 SF on 17th Floor; 350 SF on 18th Floor; 950 SF on 19th Floor; 300 SF on 20th Floor; 600 SF on 22nd Floor; 2,250 SF on 23rd Floor; 260 SF on 24th Floor; 6,000 SF on 25th Floor; 1,000 SF on 26th Floor; 1,620 SF on 28th Floor; 400 SF on 29th Floor; 2,100 SF on 30th Floor; 3,800 SF on 31st Floor; 500 SF on 32nd Floor; 5,700 SF on 33rd Floor; 5,200 SF on 34th Floor; 800 SF on 35th Floor; 50 SF on 36th Floor; 2,550 SF on 37th Floor; 3,120 SF on 38th Floor; 5,500 SF on 39th Floor; and 9,500 SF on 40th and 41st Floors.
Sealant at Cable Entrances	50		Non-friable	Located in Basement A.
24" Pipe Insulation		300	Friable	Located in Basement A.
30" Pipe Insulation		500	Friable	Located in Basement A.
Transite Board Wall	4,500		Non-friable	Located on the 5th and 6th Floor MER.
Pipe Insulation, Greater Than 12"		1,200	Friable	Located on the 5th and 6th Floor MER.
Gash: Wall/Floor Joint Tar Paper	1,710		Non-friable	Located in the North Side Gash area: 250 SF on 7th Floor; 250 SF on 8th Floor; 60 SF on 9th Floor; 200 SF on 10th Floor; 250 SF on 11th Floor; 250 SF on 12th Floor; 100 SF on 15th Floor; 100 SF on 16th Floor; 250 SF on 17th Floor.
Linoleum Sheeting and Mastic	500		Non-friable	Located on the 18th Floor the Linoleum Sheeting material is Non-ACM. However it cannot be separated from the underlying ACM Mastic material without a contaminated residue. Remove as ACM.
Pipe & Fittings Insulation at 6"-12" Pipe		550	Friable	Pipe Fittings are non-ACM but remove and dispose of as ACM since it cannot be separated from the ACM Piping without contamination.
HVAC Duct Caulking (Joint)		1,510	Friable	1,500 LF on the 23rd Floor and 10 LF on the 40th & 41st Floor MER.
Transite Wall	20,000		Non-friable	Located on the 40th & 41st Floors.
Fan Room Walls Insulation (Black)	3,000		Non-friable	
Caulking at Fans		50	Non-friable	Located on the Roof.
Window Caulking		40	Non-friable	

TABLE 5 (continued)
SUMMARY OF INSPECTION RESULTS
FOR CONFIRMED ASBESTOS-CONTAINING BUILDING MATERIALS

CONFIRMED ACM	APPROXIMATE QUANTITY		FRIABILITY†	NOTES / LOCATION
	SF	LF		
Sealant over Weather Stripping at Metal Column Parts		45,500	Non-friable	Located on the Exterior Façade. (Estimated quantity for 38 Floors. Excludes approx. 5,000 LF from Gash area).
Caulking between Column Metal Covers		45,500	Non-friable	
Baseboard Mastic	1,400		Non-friable	500 SF on 7th Floor; 100 SF on 12th Floor; 500 SF on 16th Floor; 300 SF on 23rd Floor.

Notes:
* All amounts are approximations, not exact measurements.
** Estimated quantity for 38 floors. Excludes approximately 5,000 LF from the Gash Area.
† Friable ACM is the term given to any material that contains more than one percent asbestos and can be crumbled, pulverized, or reduced to powder by hand pressure as per NYSDOL and the EPA. In New York City, the definition of 'Friable ACM' is the term given to any material that contains more than one percent asbestos and can be crumbled, pulverized, or reduced to powder by hand pressure and/or mechanical means (NYCDEP Title 15 Regulations). It refers to a material's likeliness to release airborne fibers. There is a greater possibility that a friable material will release fibers into the air when disturbed than will a non-friable material (e.g., floor tiles, roofing materials, etc.) thereby causing a potential hazard. For this Table, the EPA/NYSDOL definition of friability was used.

TABLE 6
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	CONFIRMED ACM	APPROXIMATE QUANTITY	
		SF	LF
BASEMENT B			
	12" x 12" Black Floor Tiles	30	
	Associated Mastic on Floor Tiles		
BASEMENT A			
	12" x 12" Floor Tile/3rd Layer (Black)	14,000	
	12" x 12" Floor Tile/3rd Layer (Light Brown)		
	Associated Mastic on Floor Tiles		
	12" x 12" Floor Tile/2nd Layer (Dark Grey)	12,000	
	Associated Mastic on Floor Tiles		
	12" x 12" Floor Tile (Black)	2,000	
	Sealant at Cable Entrances	50	
	24" Pipe Insulation		300
	30" Pipe Insulation		500

TABLE 6 (continued)
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	CONFIRMED ACM	APPROXIMATE QUANTITY	
		SF	LF
1ST FLOOR			
	12" x 12" Floor Tiles [2 layers]	10,500	
MEZZANINE			
	12"x12" Beige Floor Tiles	800	
2ND FLOOR			
	NONE		
3RD FLOOR			
	12" x 12" Floor Tile	4,500	
	Associated Mastic on Floor Tiles		
4TH FLOOR			
	NONE		
5TH AND 6TH FLOORS MECHANICAL ROOM			
	Transite Board Wall	4,500	
	Pipe Insulation, Greater Than 12"		1,200
	12" x 12" Floor Tiles	2,000	
	Associated Mastic on Floor Tiles		
7TH FLOOR			
	12" x 12" Floor Tiles	400	
	Gash: Wall/Floor Joint Tar Paper	250	
	Associated Mastic on Baseboard (Brown)	500	
8TH FLOOR			
	Gash: Wall/Floor Joint Tar Paper	250	
9TH FLOOR			
	12" x 12" Floor Tiles (Beige)	9,000	
	Associated Mastic on Floor Tiles		
	12" x 12" Floor Tiles 2 Layers (Grey/Composite)	1,500	
	Associated Mastic on Floor Tiles		
	Gash: Wall/Floor Joint Tar Paper	60	
10TH FLOOR			
	12" x 12" Floor Tiles (Beige)	600	
	12" x 12" Floor Tiles (Black)	300	
	Gash: Wall/Floor Joint Tar Paper	200	
11TH FLOOR			
	12" x 12" Floor Tiles 2nd Layer (Black)	7,000	
	Associated Mastic on Floor Tiles		
	Gash: Wall/Floor Joint Tar Paper	250	
12TH FLOOR			

TABLE 6 (continued)
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	CONFIRMED ACM	APPROXIMATE QUANTITY	
		SF	LF
	Gash: Wall/Floor Joint Tar Paper	250	
	Associated Mastic on Baseboard (Brown)	100	
14TH FLOOR			
	12" x 12" Floor Tiles 2 Layers (Beige)	6,000	
	12" x 12" Floor Tiles (Black)	150	
15TH FLOOR			
	12" x 12" Floor Tiles 2nd Layer (Black)	150	
	Gash: Wall/Floor Joint Tar Paper	100	
16TH FLOOR			
	Gash: Wall/Floor Joint Tar Paper	100	
	Associated Mastic on Baseboard (Brown)	500	
17TH FLOOR			
	12" x 12" Floor Tiles (Black)	300	
	Mastic associated with 12" x 12" Floor Tiles		
	Gash: Wall/Floor Joint Tar	250	
18TH FLOOR			
	12" x 12" Floor Tiles 2nd Layer (Black)	350	
	Linoleum Sheeting	500	
	Associated Mastic on Linoleum Sheeting		
19TH FLOOR			
	12" x 12" Floor Tiles 1st Layer (Beige)	350	
	12" x 12" Floor Tiles 2nd Layer (Black)	600	
20TH FLOOR			
	Pipe Insulation at 6"-12" Pipe		500
	Pipe Joint Insulation at 1" Pipe		50
	12" x 12" Floor Tiles (Black)	300	
21ST FLOOR			
	NONE		
22ND FLOOR			
	12" x 12" Floor Tiles 2 Layers (Grey)	600	
	Associated Mastic on Floor Tiles		
23RD FLOOR			
	12" x 12" Floor Tiles 2nd Layer (Black)	250	
	Associated Mastic on Floor Tiles		
	12" x 12" Floor Tiles (Grey)	2,000	
	HVAC Duct Caulking (Joint)		1,500
	Associated Mastic on Baseboard (Brown)	300	

TABLE 6 (continued)
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	CONFIRMED ACM	APPROXIMATE QUANTITY	
		SF	LF
24TH FLOOR			
	12" x 12" Floor Tiles (Grey)	260	
	Associated Mastic on Floor Tiles		
25TH FLOOR			
	12" x 12" Floor Tiles (Black)	6,000	
26TH FLOOR			
	12" x 12" Floor Tiles (Beige)	1,000	
	Associated Mastic on Floor Tiles		
27TH FLOOR			
	NONE		
28TH FLOOR			
	12" x 12" Floor Tiles (Grey)	1,500	
	12" x 12" Floor Tiles (Light Brown)	120	
29TH FLOOR			
	12" x 12" Floor Tiles (Grey)	400	
	Associated Mastic on Floor Tiles		
30TH FLOOR			
	12"x12" Pink Floor Tiles	800	
	Mastic associated with 12"x12" Pink Floor Tiles		
	12"x12" Black Floor Tiles	1,300	
	Mastic Associated with 12"x12" Black Floor Tiles		
31ST FLOOR			
	12"x12" Black Floor Tiles	3,000	
	12'x12" Beige Floor Tiles	800	
	Mastic associated with 12'x12" Beige Floor Tiles		
32ND FLOOR			
	12"x12" Black Floor Tiles	500	
	Mastic Associated with 12"x12" Black Floor Tiles		
33RD FLOOR			
	12"x12" Black Floor Tiles	3,000	
	Mastic associated with 12"x12" Black Floor Tiles		
	12"x12" Floor Tiles [2-layer composite]	2,500	
	Associated Mastic with 12"x12" composite Floor Tiles		
	12"x12" Grey Floor Tiles	200	
34TH FLOOR			
	12"x12" Grey Floor Tiles [2-layer composite]	1,700	

TABLE 6 (continued)
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	CONFIRMED ACM	APPROXIMATE QUANTITY	
		SF	LF
	Mastic associated with 12"12" Grey Floor Tiles		
	12"x12" Black Floor Tiles [1 layer]	3,500	
	Mastic Associated with 12"x12" Black Floor Tiles		
35TH FLOOR			
	12" x 12" Floor Tiles 2 Layers (Beige)	800	
36TH FLOOR			
	12" x 12" Floor Tiles (Black)	50	
	Associated Mastic on Floor Tiles		
37TH FLOOR			
	12" x 12" Floor Tiles (Brown)	2,500	
	Associated Mastic on Floor Tiles		
	12" x 12" Floor Tiles (Beige)	50	
38TH FLOOR			
	12" x 12" Floor Tiles (Grey)	3,000	
	Associated Mastic on Floor Tiles		
	12" x 12" Floor Tiles Composite 3 Layers (Blue)	120	
39TH FLOOR			
	12" x 12" Floor Tiles 2 Layers (Pink and Tan)	1,500	
	Associated Mastic on Floor Tiles		
	12" x 12" Floor Tiles (Grey)	4,000	
	Associated Mastic on Floor Tiles		
40TH AND 41ST FLOORS MECHANICAL ROOM			
	12" x 12" Floor Tiles (Black)	5,000	
	Associated Mastic on Floor Tiles		
	12" x 12" Floor Tiles (Grey)	4,500	
	Associated Mastic on Floor Tiles		
	Transite Wall	20,000	
	Fan Room Walls Insulation (Black)	3,000	
	HVAC Duct Joint Caulking		10
ROOF			
	Caulking at Fans		50
	Window Caulking		40
EXTERIOR FAÇADE			
	Sealant over Weather Stripping at Metal Column Parts		1,500
	Caulking between Column Metal Covers (Grey)		1,500

TABLE 6 (continued)
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	CONFIRMED ACM	APPROXIMATE QUANTITY	
		SF	LF
	Sealant over Weather Stripping at Metal Column Parts		44,000
	Caulking between Column Metal Covers (Grey)	TBD	44,000
		95,150	154,940

Notes:
* All amounts are approximations, not exact measurements.
** Estimated quantity for 38 floors. Excludes approximately 5,000 LF from the Gash Area.

Based upon visual observations and experience with similar buildings, Berger also suspects (and until proven not to be present assumes) that there is "Filling Material" and/or "Caulking Material" in the interstitial spaces of curtain walls within the Building. While it was not authorized as part of the initial investigation, exploratory demolition will be conducted prior to deconstruction and a New York City Certified Asbestos Investigator will inspect and collect bulk samples for confirmatory testing if suspect materials are identified.

3.2 Dust Characterization for Asbestos

Settled dust with visible accumulations of less than one quarter of an inch high was identified throughout the Building in locations such as the top of radiator covers, carpets, concrete floors, horizontal surfaces on door frames, reception desks, and HVAC units. Above the suspended ceiling, visible dust was identified on top of ceiling tiles, ceiling grids, HVAC ductwork, electrical lighting fixtures, and sheetrock ceilings. Approximately 815 dust samples were collected from the interior of the Building and the exterior netting and analyzed using the Polarized Light Microscopy (PLM) method. Additionally, 40 random bulk samples of the dust from the interior were collected and analyzed for asbestos using the Transmission Electron Microscopy (TEM) method. Data summary tables are presented in Appendix B and Table 7 presents a summary of the results of the TEM sampling, by floor.

TABLE 7
SUMMARY OF ASBESTOS DUST TEM RESULTS BY FLOOR

Location	Sample Type	No. of Samples	# Detects	% Detects	# Non-Detects	% Non-Detects	Min. Con. (structures /cm^2)	Max. Con. (structures /cm^2)
Floor 1	Vac	2	2	100.00%	0	0.00%	269,640	3,852,000
Floor M	Vac	1	1	100.00%	0	0.00%	607,760	607,760
Floor 2	Vac	1	1	100.00%	0	0.00%	4,879,200	4,879,200
Floor 3	Vac	2	2	100.00%	0	0.00%	269,640	663,400
Floor 4	Vac	1	1	100.00%	0	0.00%	102,720	102,720
Floor 5	Vac	5	4	80.00%	1	20.00%	<891	1,305,400
Floor 7	Vac	1	1	100.00%	0	0.00%	5,350	5,350
Floor 8	Vac	1	1	100.00%	0	0.00%	178,333	178,333
Floor 9	Vac	1	1	100.00%	0	0.00%	94,160	94,160
Floor 10	Vac	1	1	100.00%	0	0.00%	196,880	196,880
Floor 11	Vac	1	1	100.00%	0	0.00%	64,200	64,200
Floor 14	Vac	1	1	100.00%	0	0.00%	25,680	25,680
Floor 15	Vac	1	1	100.00%	0	0.00%	727,600	727,600
Floor 17	Vac	1	1	100.00%	0	0.00%	299,600	299,600
Floor 18	Vac	1	1	100.00%	0	0.00%	17,833	17,833
Floor 20	Vac	1	1	100.00%	0	0.00%	64,200	64,200
Floor 21	Vac	1	1	100.00%	0	0.00%	205,440	205,440
Floor 22	Vac	1	1	100.00%	0	0.00%	34,240	34,240
Floor 24	Vac	1	0	0.00%	1	100.00%	<891	<891
Floor 25	Vac	1	0	0.00%	1	100.00%	<891	<891
Floor 27	Vac	1	1	100.00%	0	0.00%	11,591	11,591
Floor 28	Vac	1	0	0.00%	1	100.00%	<891	<891
Floor 30	Vac	1	1	100.00%	0	0.00%	203,300	203,300

TABLE 7 (continued)
SUMMARY OF ASBESTOS DUST TEM RESULTS BY FLOOR

Location	Sample Type	No. of Samples	# Detects	% Detects	# Non-Detects	% Non-Detects	Min. Con. (structures /cm^2)	Max. Con. (structures /cm^2)
Floor 31	Vac	1	1	100.00%	0	0.00%	42,800	42,800
Floor 32	Vac	1	1	100.00%	0	0.00%	1,070	1,070
Floor 34	Vac	1	1	100.00%	0	0.00%	<891	<891
Floor 35	Vac	1	1	100.00%	0	0.00%	41,730	41,730
Floor 36	Vac	1	1	100.00%	0	0.00%	67,766	67,766
Floor 39	Vac	1	1	100.00%	0	0.00%	4,280	4,280
Floor 40	Vac	2	2	100.00%	0	0.00%	214,000	273,920
Floor 41	Vac	3	2	66.70%	1	33.30%	<891	3,332,285

3.3 Dust Characterization for Other Analytes

The following subsections present the results for each of the analytes (other than asbestos) in dust sampled during the Study, including silica (quartz and cristobalite), PAHs, dioxins, PCBs, heavy metals, and mercury. Final laboratory analytical reports and a summary of results are included as appendices, which are provided as a separate volume to this report.

3.3.1 *Silica (Quartz and Cristobalite)*

A total of one hundred seventeen (117) wipe and vacuum samples were collected for laboratory analysis for quartz and cristobalite. The results of these analyses are presented in Tables 8 and 9, which are differentiated by zone and above/below plenum. The laboratory reported all results in units of either mg/filter (for vacuum samples) or mg/wipe. These results directly correlate to mg/100 cm^2, as the vacuum samples and the wipe samples collected represent an area of 100 cm^2. In order to convert these results to the standard units of ug/m^2, the laboratory-provided results are multiplied by 100,000 (conversions: 1,000 ug/mg; 10,000 cm^2/m^2). Note that Zones 5 and 6 contain samples that were collected from exterior surfaces, and those results are not included in the above/below the plenum table.

TABLE 8
SUMMARY OF QUARTZ AND CRISTOBALITE
SAMPLE ANALYSIS RESULTS BY ZONE

QUARTZ

Zone	Sample Type	No. Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m²	Max Conc. ug/m²
1	Vac	30	0	0.0%	30	100.0%	71,000	10,000,000
Totals		*30*	*0*	*0.0%*	*30*	*100.0%*		
2	Wipe	1	0	0.0%	1	100.0%	530,000	530,000
	Vac	39	1	2.6%	38	97.4%	500	2,400,000
Totals		*40*	*1*	*2.5%*	*39*	*97.5%*		
3	Vac	34	0	0.0%	34	100.0%	1,000	3,500,000
Totals		*34*	*0*	*0.0%*	*34*	*100.0%*		
4	Vac	7	2	28.6%	5	71.4%	23,000	6,700,000
Totals		*7*	*2*	*28.6%*	*5*	*71.4%*		
5	Vac	4	0	0.0%	4	100.0%	1,500	12,000
Totals		*4*	*0*	*0.0%*	*4*	*100.0%*		
6	Wipe	3	0	0.0%	3	100.0%	320,000	1,800,000
Totals		*3*	*0*	*0.0%*	*3*	*100.0%*		
TOTALS		**118**	**3**	**2.6%**	**115**	**97.4%**	**500**	**10,000,000**

CRISTOBALITE

Zone	Sample Type	No. Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m²	Max Conc. ug/m²
1	Vac	30	30	100.0%	0	0.0%		
Totals		*30*	*30*	*100.0%*	*0*	*0.0%*		
2	Wipe	1	1	100.0%	0	0.0%		
	Vac	39	39	100.0%	0	0.0%		
Totals		*40*	*40*	*100.0%*	*0*	*0.0%*		
3	Vac	34	34	100.0%	0	0.0%		
Totals		*34*	*34*	*100.0%*	*0*	*0.0%*		
4	Vac	7	6	87.5%	1	12.5%	2,800	2,800
Totals		*7*	*6*	*87.5%*	*1*	*12.5%*		
5	Vac	4	4	100.0%	0	0.0%		
Totals		*4*	*4*	*100.0%*	*0*	*0.0%*		
6	Wipe	3	2	66.7%	1	0.0%	340,000	340,000
Totals		*3*	*2*	*66.7%*	*1*	*0.0%*		
TOTALS		**118**	**116**	**98.3%**	**2**	**1.7%**	**2,800**	**340,000**

TABLE 9
SUMMARY OF QUARTZ AND CRISTOBALITE
SAMPLE ANALYSIS RESULTS ABOVE AND BELOW PLENUM

QUARTZ

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Vac	26	1	3.8%	25	96.2%	1,000	1,200,000
Below Plenum	Wipe	1	0	0.0%	1	100.0%	530,000	530,000
	Vac	84	2	2.4%	82	97.6%	500	10,000,000
TOTALS		**111**	**3**	**2.7%**	**108**	**97.3%**	**500**	**10,000,000**

CRISTOBALITE

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Vac	26	26	100.0%	0	0.0%		
Below Plenum	Wipe	1	1	100.0%	0	0.0%		
	Vac	84	83	98.8%	1	1.2%	2,800	2,800
TOTALS		**111**	**110**	**99.1%**	**1**	**0.9%**	**2,800**	**2,800**

3.3.2 *PAHs*

One hundred twenty-five (125) samples were analyzed for PAHs. A summary of the laboratory analytical results are presented below on Tables 10 and 11, which are differentiated by zone and above/below plenum. The laboratory reported all results in units of either ug/wipe or ug/sample (for bulk samples). These results directly correlate to ug/100 cm^2, as the wipe and the bulk samples collected represent an area of 100 cm^2. In order to convert these results to the standard units of ug/m^2, the laboratory-provided results are multiplied by 100 (conversion: 10,000 cm^2/m^2). The World Health Organization (WHO) has established a convention whereby the results for seven PAH compounds (i.e., benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene) are expressed as a toxicity equivalency concentration (TEQ). The TEQ is based upon toxicity equivalency factors (TEF) referenced to benzo(a)pyrene, which is the most toxic of the PAHs. The TEQ is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the TEFs are then added to obtain the TEQ for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. Note that Zones 5 and 6 contain samples that were collected from exterior surfaces and those results are not included in the above/below plenum table.

TABLE 10
SUMMARY OF PAH
SAMPLE ANALYSIS RESULTS BY ZONE

Zone	Sample Type	No. Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2 (TEQ)	Max Conc. ug/m^2 (TEQ)
1	Wipe	30	0	0.0%	30	100.0%	3	5,028
	Bulk	2	0	0.0%	2	100.0%	58	58
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	0	0.0%	29	100.0%	58	1,857
	Bulk	10	0	0.0%	10	100.0%	58	11,555
Totals		*39*	*0*	*0.0%*	*39*	*100.0%*		
3	Wipe	28	0	0.0%	28	100.0%	578	1,156
	Bulk	9	0	0.0%	9	100.0%	578	578
	Vac	1	0	0.0%	1	100.0%	578	578
Totals		*38*	*0*	*0.0%*	*38*	*100.0%*		
4	Wipe	7	0	0.0%	7	100.0%	1,156	1,156
	Bulk	2	0	0.0%	2	100.0%	5,778	5,778
Totals		*9*	*0*	*0.0%*	*9*	*100.0%*		
5	Wipe	4	0	0.0%	4	100.0%	578	788
Totals		*4*	*0*	*0.0%*	*4*	*100.0%*		
6	Wipe	3	0	0%	3	100.0%	578	1,156
Totals		*3*	*0*	*0%*	*3*	*100.0%*		
TOTALS		**125**	**0**	**0%**	**125**	**100.0%**	**3**	**11,555**

TABLE 11
SUMMARY OF PAH
SAMPLE ANALYSIS RESULTS ABOVE AND BELOW PLENUM

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2 (TEQ)	Max Conc. ug/m^2 (TEQ)
Above Plenum	Wipe	26	0	0.0%	26	100.0%	58	578
Below Plenum	Wipe	68	0	0.0%	68	100.0%	3	5,028
	Bulk	24	0	0.0%	24	100.0%	58	11,555
TOTALS		**118**	**0**	**0.0%**	**118**	**100.0%**	**3**	**11,555**

3.3.3 *Dioxin*

One hundred twenty-four (124) samples were analyzed for dioxin concentrations. A summary of the laboratory analytical results is presented below on Tables 12 and 13, which are differentiated by zone and above/below plenum. The laboratory reported all results in units of picograms (pg) per sample. These results directly correlate to pg/100 cm^2, as the wipe and the bulk samples collected represent an area of 100 cm^2. In order to convert these results to the typical units used for dioxin, which is nanograms (standard units of ng/m^2), the laboratory-provided results are

multiplied by 0.1 (conversions: 1,000 pg/ng; 10,000 cm^2/m^2). The WHO has established a convention whereby the results for all dioxin compounds are expressed as a toxicity equivalency concentration (TEQ). The TEQ is based upon TEF referenced to 2,3,7,8 TCDD, which is the most toxic of the dioxin compounds. The TEQ is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the TEFs are then added to obtain the TEQ for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. Note that Zones 5 and 6 contain samples that were collected from exterior surfaces and those results are not included in the above/below plenum table.

TABLE 12
SUMMARY OF DIOXIN
SAMPLE ANALYSIS RESULTS BY ZONE

Zone	Sample Type	No. Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ng/m² (TEQ)	Max Conc. ng/m² (TEQ)
1	Wipe	32	0	0.0%	32	100.0%	5.5	33.5
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	0	0.0%	29	100.0%	1.22	32.8
	Bulk	9	0	0.0%	9	100.0%	0.67	46.1
Totals		*38*	*0*	*0.0%*	*38*	*100.0%*		
3	Wipe	26	0	0.0%	26	100.0%	2.53	34.8
	Bulk	10	0	0.0%	10	100.0%	1.24	84.8
Totals		*36*	*0*	*0.0%*	*36*	*100.0%*		
4	Wipe	8	0	0.0%	8	100.0%	12.9	22.9
Totals		*8*	*0*	*0.0%*	*8*	*100.0%*		
5	Wipe	4	0	0.0%	4	100.0%	3.92	214
	Bulk	3	0	0.0%	3	100.0%	4.2	26.6
Totals		*7*	*0*	*0.0%*	*7*	*100.0%*		
6	Wipe	3	0	0.0%	3	100.0%	3.11	13.2
Totals		*3*	*0*	*0.0%*	*3*	*100.0%*		
TOTALS		**124**	*0*	**0.0%**	**124**	**100.0%**	**0.67**	**214**

TABLE 13
SUMMARY OF DIOXIN
SAMPLE ANALYSIS RESULTS ABOVE AND BELOW PLENUM

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ng/m^2 (TEQ)	Max Conc. ng/m^2 (TEQ)
Above Plenum	Wipe	29	0	0.0%	29	100.0%	3.22	30.3
Below Plenum	Wipe	58	0	0.0%	57	100.0%	1.2	34.8
	Bulk	18	0	0.0%	18	100.0%	0.67	214
TOTALS		**105**	**0**	**0.0%**	**105**	**100.0%**	**0.67**	**214**

3.3.4 *PCBs*

One hundred and twenty-five (125) samples were collected and analyzed for PCBs. A summary of the laboratory results are presented below on Tables 14 and 15, which are differentiated by zone and above/below plenum. The laboratory reported all results in units of either ug/filter or ug/sample (for bulk samples). These results directly correlate to ug/100 cm^2, as both the wipe area and bulk sample areas correspond to 100 cm^2. In order to convert these results to the standard units of ug/m^2, the laboratory-provided results are multiplied by 100 (conversion: 10,000 cm^2/m^2). Note that Zones 5 and 6 contain samples that were collected from exterior surfaces and those results are not included in the above/below plenum table.

TABLE 14
SUMMARY OF PCB
SAMPLE ANALYSIS RESULTS BY ZONE

Zone	Sample Type	No. Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
1	Wipe	30	25	83.3%	5	16.7%	58	120
	Bulk	2	1	50.0%	1	50.0%	97	110
Totals		*32*	*26*	*81.3%*	*6*	*18.8%*		
2	Wipe	29	28	96.6%	1	3.4%	63	63
	Bulk	10	10	100.0%	0	0.0%		
Totals		*39*	*38*	*97.4%*	*1*	*2.6%*		
3	Wipe	28	28	100.0%	0	0.0%		
	Bulk	10	8	80.0%	2	20.0%	360	360
Totals		*38*	*36*	*94.7%*	*2*	*5.3%*		
4	Wipe	7	6	85.7%	1	14.3%	120	120
	Bulk	2	2	100.0%	0	0.0%		
Totals		*9*	*8*	*88.9%*	*1*	*11.1%*		
5	Wipe	4	4	100.0%	0	0.0%		

TABLE 14 (continued)
SUMMARY OF PCB
SAMPLE ANALYSIS RESULTS BY ZONE

Zone	Sample Type	No. Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Totals		*4*	*4*	*100.0%*	*0*	*0.0%*		
6	Wipe	3	3	100.0%	0	0.0%		
Totals		*3*	*3*	*100.0%*	*0*	*0.0%*		
TOTALS		**125**	**115**	**92.0%**	**10**	**8.0%**	**58**	**360**

TABLE 15
SUMMARY OF PCB
SAMPLE ANALYSIS RESULTS ABOVE AND BELOW PLENUM

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Wipe	26	25	96.2%	1	3.8%	63	63
Below Plenum	Wipe	68	62	91.2%	6	8.8%	58	120
	Bulk	23	21	87.0%	3	13.0%	97	360
TOTALS		**117**	**107**	**91.5%**	**10**	**8.5%**	**58**	**360**

3.3.5 *Heavy Metals*

One hundred twenty-five (125) samples were collected and analyzed for heavy metals, specifically, barium, beryllium, cadmium, chromium, copper, lead, manganese, nickel, and zinc. A summary of the analytical results are presented below in Tables 16 and 17, which are differentiated by zone and above/below plenum. The laboratory reported all results in units of either ug/filter or ug/sample (for bulk samples). These results directly correlate to ug/100 cm^2, as both the wipe area and bulk sample areas correspond to 100 cm^2. In order to convert these results to the standard units of ug/m^2, the laboratory-provided results are multiplied by 100 (conversion: 10,000 cm^2/m^2). Note that Zones 5 and 6 contain samples that were collected from exterior surfaces and those results are not included in the above/below plenum table.

TABLE 16
SUMMARY OF HEAVY METALS
SAMPLE ANALYSIS RESULTS BY ZONE

BARIUM

Sampling Zone	Sample Type	No. of Samples*	No. of Non-Detects	% of Non-Detects	Detects	% of Detects	Min. Conc. ug/m^2	Max Conc. ug/m^2
1	Wipe	30	0	0.0%	30	100.0%	1,340	42,800
	Bulk	2	0	0.0%	2	100.0%	32,800	44,700
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	0	0.0%	29	100.0%	290	5,790
	Bulk	10	0	0.0%	10	100.0%	2,380	149,000
Totals		*39*	*0*	*0.0%*	*39*	*100.0%*		
3	Wipe	28	0	0.0%	28	100.0%	130	44,000
	Bulk	10	0	0.0%	10	100.0%	1,290	64,700
Totals		*38*	*0*	*0.0%*	*38*	*100.0%*		
4	Wipe	7	0	0.0%	7	100.0%	1,050	28,400
	Bulk	2	0	0.0%	2	100.0%	2,620	5,440
Totals		*9*	*0*	*0.0%*	*9*	*100.0%*		
5	Wipe	4	0	0.0%	4	100.0%	390	650
Totals		*4*	0	*0.0%*	*4*	*100.0%*		
6	Wipe	3	0	0.0%	3	100.0%	2,180	14,200
Totals		*3*	*0*	*0.0%*	3	*100.0%*		
TOTALS		**125**	**0**	**0.0%**	**125**	**100.0%**	**130**	**149,000**

BERYLLIUM

Sampling Zone	Sample Type	No. of Samples*	No. of Non-Detects	% of Non-Detects	Detects	% of Detects	Min. Conc. ug/m^2	Max Conc. ug/m^2
1	Wipe	30	22	73.3%	8	26.7%	32	390
	Bulk	2	2	100.0%	0	0.0%		
Totals		*32*	*24*	*75.0%*	*8*	*25.0%*		
2	Wipe	29	29	100.0%	0	0.0%		
	Bulk	10	10	100.0%	0	0.0%		
Totals		*39*	*39*	*100.0%*	*0*	0.0%		
3	Wipe	28	28	100.0%	0	0.0%		
	Bulk	10	9	90.0%	1	10.0%	35	35
Totals		*38*	*37*	*97.4%*	*1*	2.6%		
4	Wipe	7	7	100.0%	0	0.0%		
	Bulk	2	2	100.0%	0	0.0%		
Totals		*9*	*9*	*100.0%*	*0*	0.0%		
5	Wipe	4	4	100.0%	0	0.0%		
Totals		*4*	*4*	*100.0%*	*0*	0.0%		
6	Wipe	3	3	100.0%	0	0.0%		
Totals		*3*	*3*	*100.0%*	*0*	*0.0%*		

TABLE 16 (continued)
SUMMARY OF HEAVY METALS
SAMPLE ANALYSIS RESULTS BY ZONE

BERYLLIUM (continued)

Sampling Zone	Sample Type	No. of Samples*	No. of Non-Detects	% of Non-Detects	Detects	% of Detects	Min. Conc. ug/m²	Max Conc. ug/m²
TOTALS		**125**	**116**	**92.8%**	**9**	**7.2%**	**32**	**390**

CADMIUM

Sampling Zone	Sample Type	No. of Samples*	No. of Non-Detects	% of Non-Detects	Detects	% of Detects	Min. Conc. ug/m²	Max Conc. ug/m²
1	Wipe	30	3	10.0%	27	90.0%	140	7,830
	Bulk	2	2	100.0%	0	0.0%		
Totals		*32*	*5*	*15.6%*	*27*	*84.4%*		
2	Wipe	29	25	86.2%	4	13.8%	51	400
	Bulk	10	10	100.0%	0	0.0%		
Totals		*39*	*35*	*89.4%*	*4*	*10.6%*		
3	Wipe	28	10	35.7%	18	64.3%	61	970
	Bulk	10	6	60.0%	4	40.0%	110	3,490
Totals		*38*	*16*	*42.1%*	*22*	*57.9%*		
4	Wipe	7	4	57.1%	3	42.9%	310	370
	Bulk	2	2	100.0%	0	0.0%		
Totals		*9*	*6*	*66.7%*	*3*	*33.3%*		
5	Wipe	4	4	100.0%	0	0.0%		
Totals		*4*	*4*	*100.0%*	*0*	*0.0%*		
6	Wipe	3	1	33.3%	2	66.7%	290	1,110
Totals		*3*	*1*	33.3%	2	66.7%		
TOTALS		**125**	**67**	**53.6%**	**58**	**46.4%**	**51**	**7,830**

CHROMIUM

Sampling Zone	Sample Type	No. of Samples*	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m²	Max Conc. ug/m²
1	Wipe	30	0	0.0%	30	100.0%	570	35,100
	Bulk	2	0	0.0%	2	100.0%	5,600	7,000
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	1	3.4%	28	96.6%	95	2,920
	Bulk	10	0	0.0%	10	100.0%	910	77,500
Totals		*39*	*1*	*2.6%*	*38*	*97.4%*		
3	Wipe	28	0	0.0%	28	100.0%	49	16,800
	Bulk	10	0	0.0%	10	100.0%	530	118,000
Totals		*38*	*0*	*0.0%*	*38*	*100.0%*		
4	Wipe	7	0	0.0%	7	100.0%	1,850	11,800
	Bulk	2	2	100.0%	0	0.0%		
Totals		*9*	*2*	*22.2%*	*7*	*77.8%*		
5	Wipe	4	1	25.0%	3	75.0%	110	9,300
Totals		*4*	*1*	*25.0%*	*3*	*75.0%*		

TABLE 16 (continued)
SUMMARY OF HEAVY METALS
SAMPLE ANALYSIS RESULTS BY ZONE

CHROMIUM (continued)

Sampling Zone	Sample Type	No. of Samples*	No. of Non-Detects	% of Non-Detects	Detects	% of Detects	Min. Conc. ug/m²	Max Conc. ug/m²
6	Wipe	3	0	0.0%	3	100.0%	4,690	8,200
Totals		*3*	*0*	*0.0%*	*3*	*100.0%*		
TOTALS		**125**	**4**	**3.2%**	**121**	**96.8%**	**49**	**118,000**

COPPER

Sampling Zone	Sample Type	No. of Samples*	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m²	Max Conc. ug/m²
1	Wipe	30	0	0.0%	30	100.0%	5,780	114,000
	Bulk	2	0	0.0%	2	100.0%	5,570	23,600
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	1	3.4%	28	96.6%	340	94,900
	Bulk	10	1	11.1%	9	88.9%	2,680	103,000
Totals		*39*	*2*	*5.3%*	*37*	*94.7%*		
3	Wipe	28	0	0.0%	28	100.0%	120	145,000
	Bulk	10	0	0.0%	10	100.0%	1,890	45,200
Totals		*38*	*0*	*0.0%*	*38*	*100.0%*		
4	Wipe	7	0	0.0%	7	100.0%	1,760	21,900
	Bulk	2	1	50.0%	1	50.0%	3,360	3,360
Totals		*9*	*1*	*11.1%*	*8*	*88.9%*		
5	Wipe	4	2	50.0%	2	50.0%	450	560
Totals		*4*	*2*	*50.0%*	*2*	*50.0%*		
6	Wipe	3	0	0.0%	3	100%	3,680	18,600
Totals		*3*	*0*	*0.0%*	*3*	*100%*		
TOTALS		**125**	**5**	**4.0%**	**120**	**96.0%**	**120**	**145,000**

LEAD

Sampling Zone	Sample Type	No. of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m²	Max Conc. ug/m²
1	Wipe	30	0	0.0%	30	100.0%	2,470	101,000
	Bulk	2	0	0.0%	2	100.0%	7,630	27,800
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	0	0.0%	29	100.0%	270	10,600
	Bulk	10	2	22.2%	7	77.8%	2430	71,200
Totals		*39*	*2*	*5.3%*	*36*	*94.7%*		
3	Wipe	28	0	0.0%	28	100.0%	150	57,000
	Bulk	10	1	12.5%	7	87.5%	1,600	72,400
Totals		*38*	*1*	*2.7%*	*36*	*97.3%*		
4	Wipe	7	0	0.0%	7	100.0%	1,200	29,600
	Bulk	2	0	0.0%	2	100.0%	2,300	3,360
Totals		*9*	*0*	*0.0%*	*9*	*100.0%*		

TABLE 16 (continued)
SUMMARY OF HEAVY METALS
SAMPLE ANALYSIS RESULTS BY ZONE

LEAD (continued)

Sampling Zone	Sample Type	No. of Samples*	No. of Non-Detects	% of Non-Detects	Detects	% of Detects	Min. Conc. ug/m^2	Max Conc. ug/m^2
5	Wipe	4	0	0.0%	4	100.0%	500	2,070
Totals		*4*	*0*	*0.0%*	*4*	*100.0%*		
6	Wipe	3	0	0.0%	3	100.0%	6,940	29,800
Totals		*3*	*0*	*0.0%*	*3*	*100.0%*		
TOTALS		**125**	**3**	**2.4%**	**122**	**97.6%**	**150**	**101,000**

MANGANESE

Sampling Zone	Sample Type	No. of Samples*	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
1	Wipe	30	0	0.0%	30	100.0%	3,080	187,000
	Bulk	2	0	0.0%	2	100.0%	4,090	17,400
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	0	0.0%	29	100.0%	280	15,300
	Bulk	10	0	0.0%	10	100.0%	19,800	320,000
Totals		*39*	*0*	*0.0%*	*39*	*100.0%*		
3	Wipe	28	0	0.0%	28	100.0%	180	17,700
	Bulk	10	0	0.0%	10	100.0%	3,910	228,000
Totals		*38*	*0*	*0.0%*	*38*	*100.0%*		
4	Wipe	7	0	0.0%	7	100.0%	7,660	176,000
	Bulk	2	1	50.0%	1	50.0%	3,010	3,010
Totals		*9*	*1*	*11.1%*	*8*	*88.9%*		
5	Wipe	4	2	50.0%	2	50.0%	230	370
Totals		*4*	*2*	*50.0%*	*2*	*50.0%*		
6	Wipe	3	0	0.0%	3	100.0%	4,390	30,600
Totals		*3*	*0*	*0.0%*	*3*	*80.0%*		
TOTALS		**125**	**3**	**2.4%**	**122**	**97.6%**	**180**	**320,000**

NICKEL

Sampling Zone	Sample Type	No. of Samples*	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
1	Wipe	30	0	0.0%	30	100.0%	460	10,500
	Bulk	2	0	0.0%	2	100.0%	2,840	4,250
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	3	10.3%	26	89.7%	61	1,340
	Bulk	10	1	10.0%	9	90.0%	1,310	9,740
Totals		*39*	*4*	*9.8%*	*35*	*91.2%*		
3	Wipe	28	0	0.0%	28	100.0%	46	4,290
	Bulk	10	2	12.5%	8	87.5%	300	25,800
Totals		*38*	*2*	*2.7%*	*36*	*97.3%*		
4	Wipe	7	0	0.0%	7	100.0%	1,630	13,400

TABLE 16 (continued)
SUMMARY OF HEAVY METALS
SAMPLE ANALYSIS RESULTS BY ZONE

NICKEL (continued)

Sampling Zone	Sample Type	No. of Samples*	No. of Non-Detects	% of Non-Detects	Detects	% of Detects	Min. Conc. ug/m^2	Max Conc. ug/m^2
	Bulk	2	1	50.0%	1	50.0%	1,820	1,820
Totals		*9*	*1*	*11.1%*	*8*	*88.9%*		
5	Wipe	4	0	0.0%	4	100.0%	120	410
Totals		*4*	*0*	*0.0%*	*4*	*100.0%*		
6	Wipe	3	0	0.0%	3	100.0%	580	2,920
Totals		*3*	*0*	*0.0%*	*3*	*100.0%*		
TOTALS		**125**	**7**	**5.6%**	**118**	**94.4%**	**46**	**25,800**

ZINC

Sampling Zone	Sample Type	No. of Samples*	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
1	Wipe	30	0	0.0%	30	100.0%	22,000	1,040,000
	Bulk	2	0	0.0%	2	100.0%	36,800	114,000
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	0	0.0%	29	100.0%	5,260	421,000
	Bulk	10	1	10.0%	9	90.0%	9,810	38,600
Totals		*39*	*1*	*3.9%*	*38*	*96.1%*		
3	Wipe	28	0	0.0%	28	100.0%	2,550	644,000
	Bulk	10	0	0.0%	10	100.0%	11,500	1,140,000
Totals		*38*	*0*	*0.0%*	*38*	*100.0%*		
4	Wipe	7	0	0.0%	7	100.0%	10,500	186,000
	Bulk	2	1	50.0%	1	50.0%	12,800	12,800
Totals		*9*	*1*	*11.1%*	*8*	*88.9%*		
5	Wipe	4	0	0.0%	4	100.0%	4,440	6,280
Totals		*4*	*0*	*0.0%*	*4*	*100.0%*		
6	Wipe	3	0	0.0%	3	100.0%	16,700	101,000
Totals		*3*	*0*	*20.0%*	*3*	*100.0%*		
TOTALS		**125**	**2**	**1.6%**	**123**	**98.4%**	**2,550**	**1,140,000**

TABLE 17
SUMMARY OF HEAVY METALS SAMPLE ANALYSIS RESULTS
ABOVE AND BELOW PLENUM

BARIUM

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Wipe	26	0	0.0%	26	100.0%	150	10,300
Below Plenum	Wipe	68	0	0.0%	68	100.0%	130	44,000
	Bulk	24	0	0.0%	24	100.0%	1,290	149,000
TOTALS		**118**	**0**	**0.0%**	**118**	**100.0%**	**130**	**149,000**

BERYLLIUM

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Wipe	26	26	100.0%	0	0.0%		
Below Plenum	Wipe	68	60	88.2%	8	11.8%	32	390
	Bulk	24	1	4.2%	23	95.8%	35	35
TOTALS		**118**	**87**	**73.7**	**31**	**26.3%**	**32**	**390**

CADMIUM

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Wipe	26	18	69.2%	8	30.8%	84	620
Below Plenum	Wipe	68	24	35.3%	44	64.7%	51	7,830
	Bulk	24	20	83.3%	4	16.7%	110	3,490
TOTALS		**118**	**62**	**52.5%**	**56**	**47.5%**	**51**	**7,830**

CHROMIUM

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Wipe	26	1	3.8%	25	96.2%	78	5,840
Below Plenum	Wipe	68	0	0.0%	68	100.0%	49	35,100
	Bulk	24	3	12.5%	21	87.5%	530	118,000
TOTALS		**118**	**4**	**2.6%**	**114**	**97.4%**	**49**	**118,000**

COPPER

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Wipe	26	1	3.8%	25	96.2%	290	94,900
Below Plenum	Wipe	68	0	0.0%	68	100.0%	120	145,000
	Bulk	24	2	8.3%	22	91.7%	1890	103,000
TOTALS		**118**	**3**	**2.5%**	**115**	**97.5%**	**120**	**145,000**

LEAD

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Wipe	26	0	0.0%	26	100.0%	350	10,900
Below	Wipe	68	0	0.0%	68	100.0%	150	101,000

Plenum	Bulk	24	3	12.5%	21	87.5%	1600	72,400

TABLE 17 (continued)
SUMMARY OF HEAVY METALS SAMPLE ANALYSIS RESULTS
ABOVE AND BELOW PLENUM

LEAD (continued)

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
TOTALS		**118**	**3**	**2.5%**	**115**	**97.5%**	**150**	**101,000**

MANGANESE

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Wipe	26	0	0.0%	26	100.0%	180	15,300
Below Plenum	Wipe	68	0	0.0%	68	100.0%	300	187,000
	Bulk	24	1	4.2%	23	95.8%	3010	320,000
TOTALS		**118**	**1**	**0.8%**	**117**	**99.2%**	**180**	**320,000**

NICKEL

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Wipe	26	2	7.7%	24	92.3%	46	1,850
Below Plenum	Wipe	68	1	1.5%	67	98.5%	56	13,400
	Bulk	24	4	16.7%	20	83.3%	300	25,800
TOTALS		**118**	7	**6.3%**	**111**	**93.7%**	**46**	**25,800**

ZINC

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Wipe	26	0	0.0%	26	100.0%	2,550	421,000
Below Plenum	Wipe	68	0	0.0%	68	100.0%	2,700	1,040,000
	Bulk	24	2	8.3%	22	91.7%	9,810	1,140,000
TOTALS		**118**	**2**	**1.7%**	**116**	**98.3%**	**2,550**	**1,140,000**

3.3.6 *Mercury*

One hundred twenty-five (125) dust samples were collected and analyzed for mercury. A summary of the analytical results are presented below in Tables 18 and 19, which are differentiated by zone and above/below plenum. The laboratory reported all results in units of either ug/filter or ug/sample (for bulk samples). These results directly correlate to ug/100 cm^2, as both the wipe area and bulk sample areas correspond to 100 cm^2. In order to convert these results to the standard units of ug/m^2, the laboratory-provided results are multiplied by 100 (conversion: 10,000 cm^2/m^2). Note that Zones 4, 5 and 6 contain samples that were collected from exterior surfaces and those results are not included in the above/below plenum table.

TABLE 18
SUMMARY OF MERCURY
SAMPLE ANALYSIS RESULTS BY ZONE

MERCURY								
Zone	**Sample Type**	**No. Samples**	**# Non Detects**	**%Non Detects**	**# Detects**	**% Detects**	**Min Conc. ug/m²**	**Max Conc. ug/m²**
1	Wipe	30	12	40.0%	18	60.0%	1.8	28
	Bulk	2	1	50.0%	1	50.0%	54	54
Totals		*32*	*13*	*40.6%*	*19*	*59.4%*		
2	Wipe	29	15	51.7%	14	48.3%	0.84	38
	Bulk	10	10	100.0%	0	0.0%		
Totals		*39*	*25*	*64.1%*	*14*	*35.9%*		
3	Wipe	28	5	17.9%	23	82.1%	0.84	160
	Bulk	10	6	66.7%	4	33.3%	7.4	98
Totals		*38*	*11*	*28.9%*	*27*	*71.1%*		
4	Wipe	7	5	71.4%	2	28.6%	1.3	2.2
	Bulk	2	2	100.0%	0	0.0%		
Totals		*9*	*7*	*77.8%*	*2*	*22.2%*		
5	Wipe	4	1	25.0%	3	75.0%	0.84	1.3
Totals		*4*	*1*	*25.0%*	*3*	*75.0%*		
6	Wipe	3	1	33.3%	2	66.7%	5.4	5.8
Totals		*3*	*1*	*33.3%*	*2*	*66.7%*		
TOTALS		**125**	**58**	**46.4%**	**67**	**53.6%**	**0.84**	**160**

TABLE 19
SUMMARY OF MERCURY
SAMPLE ANALYSIS RESULTS ABOVE AND BELOW PLENUM

MERCURY								
A/B Plenum	**Sample Type**	**Total # of Samples**	**# Non Detects**	**%Non Detects**	**# Detects**	**% Detects**	**Min Conc. ug/m²**	**Max Conc. ug/m²**
Above Plenum	Wipe	26	9	34.6%	17	65.4%	1.1	160
Below Plenum	Wipe	68	28	41.2%	40	58.8%	0.84	160
	Bulk	24	19	79.2%	5	20.8%	7.4	98
TOTALS		**118**	**56**	**47.5%**	**62**	**52.5%**	**0.84**	**160**

In addition to the dust wipe samples, one hundred fifty three direct reading samples for Mercury Vapor were collected using the Jerome Meter 431-X. As described in Section 2.0, the Jerome 431-X mercury vapor analyzer uses a patented gold film sensor for accurate detection and measurement of toxic mercury vapor in the air. This portable handheld unit can easily be carried to locations with mercury concerns for applications such as industrial hygiene monitoring, mercury spill clean up, and mercury exclusion testing. Simple, push button operation allows

users to measure mercury levels from 0.003 to 0.999 mg/m3 in just seconds. A summary of the results are presented below in Table 20, which is differentiated by floors.

TABLE 20
SUMMARY OF MERCURY VAPOR RESULTS

MERCURY								
Floor	**Sample Type**	**Total # of Readings**	**# Non Detects**	**%Non Detects**	**# Detects**	**% Detects**	**Min Conc. mg/m^3**	**Max Conc. mg/m^3**
5 & 6th Floor MER	Direct Reading	17	17	100 %	0	0	<0.003	<0.003
14	Direct Reading	17	17	100 %	0	0	<0.003	<0.003
17	Direct Reading	14	14	100 %	0	0	<0.003	<0.003
20	Direct Reading	16	16	100 %	0	0	<0.003	<0.003
32	Direct Reading	22	22	100 %	0	0	<0.003	<0.003
35	Direct Reading	17	17	100 %	0	0	<0.003	<0.003
38	Direct Reading	17	17	100 %	0	0	<0.003	<0.003
40th & 41st Floor MER	Direct Reading	33	33	100 %	0	0	<0.003	<0.003
TOTALS		**153**	**153**	**100 %**	**0**	**0 %**	**<0.003**	**<0.003**

Note: MER = Mechanical Equipment Room

3.4 Visual Mold Inspection

The non-intrusive visual inspection was performed during May 2004 and building components and materials inspected included:

- Sprayed-on fireproofing ceiling material;
- Suspended ceiling tiles;
- Sheetrock wall material;
- Wall stucco;
- Carpet;
- Pipe and fittings insulation material;
- Water tank insulation wrap material;
- HVAC duct insulation; and

- Other miscellaneous materials.

No evidence of significant water-damaged building materials or active water infiltration was noted in the Building, with two exceptions: the Gash Area located on the 7th through 24th Floors and Basement B. The Gash Area is open to the elements and some water infiltration was noted; however, the Gash Area has been stripped of finish materials and the presence of water on the exposed concrete and steel surfaces has not resulted in mold growth. In the Basement B, standing water was observed in low lying areas of the floor. Based on conversations with Building contractor personnel, the water enters this Building level through the slab and walls, and the rate of entry increases after precipitation events. Berger observed distinct layers of mineral deposits on the first row of cinder blocks; however, no mold was observed on the concrete floors and low walls in or around the standing water in the Basement B, except where noted. Interstitial spaces and normally concealed areas were not inspected during this initial investigation. For deconstruction, previously concealed areas will be made accessible for a detailed inspection.

4.0 FINDINGS

The following subsections present the findings of the Asbestos Building Inspection and Material Survey, the Dust Characterization for Asbestos, the Dust Characterization for Other Analytes, and the Visual Mold Inspection.

4.1 Asbestos Building Inspection and Material Survey

The Asbestos Building Inspection and Material Survey was conducted to facilitate the proposed cleaning and deconstruction of the Building and to enable compliance with required environmental, health, and safety practices, including, but not limited to, the applicable OSHA requirements; TSCA Title II AHERA/ASHARA; New York City Department of Buildings (NYCDOB); NYCDEP Title 15; NYSDOL Industrial Code Rule 56; and the EPA's NESHAP. The EPA has set the criteria by which all materials confirmed or assumed to have greater than one percent (1%) asbestos are considered to be ACM.

Approximately 2,000 bulk samples of suspect building materials were collected and analyzed for asbestos using the Polarized Light Microscopy (PLM) and/or Transmission Electron Microscopy (TEM). The majority of samples tested negative for asbestos, including spray-on fire-proofing, wall-board, roofing materials, and most thermal insulation for piping and ducts. Other building materials tested contained greater than one percent asbestos and are considered asbestos-containing materials.

An approximate total of 155,000 SF and 95,000 LF of ACM were identified throughout the Building, as follows:

- Approximately 123,780 SF of asbestos-containing "Floor Tiles & Associated Mastic" were identified.

  The Floor Tiles and associated Mastic are considered non-friable materials as per the definition by the EPA and NYSDOL. These materials, however, can be rendered friable if impacted using mechanical means as per the NYCDEP definition of friability. Up to a total quantity of 160 SF may be removed using NYCDEP Title 15 non-friable methods. Amounts greater than 160 SF, have to be removed utilizing full containment methods. The NYCDEP have implemented an approved work procedure for removing such materials called Attachment FT, which requires the filing of an NYCDEP Asbestos Control Program (ACP) Form ACP-7.

- Approximately 50 SF of asbestos-containing "Sealant at Cable Entrances" was identified in Basement A.
- Approximately 300 LF of asbestos-containing "24-inch O.D. Pipe Insulation" was identified in Basement A.
- Approximately 500 LF of asbestos-containing "30-inch O.D. Pipe Insulation" was identified in Basement A.
- Approximately 4,500 SF of asbestos-containing "Transite Wall Board" was identified in the 5th and 6th Floor Mechanical Room.
- Approximately 1,200 LF of asbestos-containing "Pipe Insulation (12-20 inch) O.D." was identified in the 5th and 6th Floor Mechanical Room.
- Approximately 1,700 SF of asbestos-containing "Wall & Floor Joint Tar Paper" was identified in the North Side Gash area.
- Approximately 500 SF of asbestos-containing "Linoleum Flooring and Mastic" was identified on the 18th Floor.
- Approximately 500 LF of asbestos-containing "Pipe Insulation (6-12 inch) O.D." was identified on the 20th Floor.
- Approximately 1,510 LF of asbestos-containing "HVAC Duct Joint Caulking" was identified on the 23rd Floor and in the Mechanical Rooms.
- Approximately 20,000 SF of asbestos-containing "Transite Wall Material" was identified on the 40th and 41st Floors.
- Approximately 3,000 SF of asbestos-containing "Wall Insulation Material" was identified in the Fan Room in the 40th and 41st Floor Mechanical Rooms.
- Approximately 50 LF of asbestos-containing "Caulking Material" was identified on the fan units on the roof.
- Approximately 40 LF of asbestos-containing "Window Caulking Material" was identified in the masonry openings on the roof.
- Approximately 1,400 SF of asbestos-containing "Baseboard Mastic" was identified.

- Approximately 45,500 LF of asbestos-containing "Sealant Material" was identified over the weather stripping at metal column parts located on the exterior façade. This is an estimated quantity for 38 Floors, excluding approximately 5,000 LF from the Gash Area.

  Exterior "Sealant Material" is considered non-friable material as per the definition of the EPA and NYSDOL. This material, however, may be rendered friable if impacted using mechanical means as per the NYCDEP definition of friability. As such the NYCDEP has established specific work procedures using friable removal methods for the handing and disposal of this material. This work procedure is called Attachment EC and includes the filing of an NYCDEP ACP Form ACP-7.

- Approximately 45,500 LF of asbestos-containing "Exterior Caulking Material" was identified between the column metal covers located on the exterior façade. This is an estimated quantity for 38 floors, excluding approximately 5,000 LF from the Gash Area.

  Exterior "Caulking Materials" are considered non-friable materials as per the definition of the EPA and NYSDOL. These materials, however, may be rendered friable if impacted using mechanical means as per the NYCDEP definition of friability. As such the NYCDEP has established specific work procedures using friable removal methods for the handing and disposal of such materials. This work procedure is called Attachment EC and includes the filing of an NYCDEP ACP Form ACP-7.

Based upon visual observations and experience with similar buildings, Berger also suspects (and until proven not to be present assumes) that there is "Filling Material" and/ or "Caulking Material" in the interstitial spaces of curtain walls within the Building. The confirmation of the presence of these materials via exploratory demolition will be conducted prior to disturbing them through deconstruction activities and a New York City Certified Asbestos Investigator, who is also a NYSDOL certified asbestos inspector, will inspect and collect bulk samples for confirmatory testing if suspect materials are identified.

4.2 Dust Characterization for Asbestos

The Dust Characterization for Asbestos was also conducted to facilitate the proposed deconstruction of the Building and to enable compliance with required environmental, health, and safety practices including, but not limited to, the applicable OSHA requirements; TSCA Title II AHERA/ASHARA; NYCDOB; NYCDEP Title 15; NYSDOL Industrial Code Rule 56; and the EPA's NESHAP. The EPA has set the criteria by which all materials confirmed or assumed to have greater than one percent (1%) asbestos are considered to be ACM.

A total of 815 bulk samples of the settled dust were collected and analyzed at a laboratory via PLM analysis. The PLM analysis is specified by the EPA and NYCDEP for quantifying asbestos in bulk dust samples. Although trace amounts of asbestos were identified in some of the samples, there were no samples that contained greater than one percent asbestos by PLM.

In addition to PLM testing, the Study also included TEM testing. The EPA (AHERA) and NYSDOH recognize TEM as being a more precise methodology; PLM is not the best analytical technique available to determine concentrations of asbestos fibers in WTC dust. Friable WTC dust in concentrations less than or equal to 1% asbestos still have a significant potential to generate elevated airborne concentrations when disturbed. Forty (40) supplemental screening samples of the settled dust were collected from porous and non-porous surfaces and analyzed for asbestos using TEM. The results revealed detectable levels of asbestos above the residential background level of 6,192 structures/cm^2 identified in the EPA *World Trade Center Background Study Report Interim Final* (April 2003). The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and the 40th/41st floor mechanical room. Asbestos was detected in dust at concentrations in excess of 6,192 structures/cm^2 on 24 of the 31 floors sampled by TEM analysis (77%). The samples containing asbestos ranged from a minimum concentration of less than 891 structures/cm^2 (from Floors 5, 24, 25, 28, 34, and 41) to a maximum concentration of 4,879,200 structures/cm^2 (from Floor 2).

4.3 Dust Characterization for Other Analytes

A multi-agency task force was formed following the collapse of the WTC on September 11, 2001 to develop interim guidance in support of re-occupancy decisions for nearby buildings. This task force evaluated impacted indoor environments for the presence and implications of contaminants that might pose long-term health risks to local residents. As part of this evaluation, a task force committee was established to identify contaminants of health concern and establish health-based benchmarks for those contaminants in support of ongoing cleanup efforts in Lower Manhattan prior to reoccupancy by residents. One outcome of these efforts was the final report entitled *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks* (May 2003), prepared by the COPC Committee of the World Trade Center Indoor Air Task Force Working Group, which the COPC Committee used in selecting the compounds of concern for Lower Manhattan clean-up efforts. In part, this report stated:

> A systematic risk-based approach was used to select COPC. The process began with the review of an extremely large environmental data set, including indoor and outdoor air and dust data. This was followed by a two-level screening which

considered individual contaminant toxicity, the prevalence of a contaminant within and across media, and the likelihood that a detected contaminant was related to the WTC disaster. The goal of the process was to identify those contaminants most likely to be present within indoor environments at levels of health concern.

The Committee identified asbestos, dioxins, lead, PAHs, fibrous glass, and crystalline silica as the principal COPCs. These potential contaminants were found to be most consistent in WTC dust at levels of health concern in the Lower Manhattan area from previous sampling and testing programs conducted by the EPA. The COPC Committee has also established health-based criteria for reoccupancy of residential buildings contaminated with these COPCs.

Results of the Study regarding the WTC dust COPCs (with the exception of asbestos, which is presented in Section 4.2), as well as other analytes that were suspected to be present in the Building (namely PCBs, heavy metals, and mercury), are described below:

Silica (Quartz and Cristobalite) - Silica is the second most common mineral in the earth's crust and is a major component of natural sand, rock, and mineral ores. It is a common component of building materials as it is present in sand, concrete, and other materials. The natural crystalline forms of silica include quartz and cristobalite.

Quartz--There was significant variation in the quartz testing results collected from the Building dust samples. Quartz was detected in 115 of the 118 samples tested. The samples containing quartz ranged from a low concentration of 500 ug/m^2 (from Zone 2) to a maximum concentration of 10,000,000 ug/m^2 (in Zone 1). This variation in quartz concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential background levels (estimated pre-existing levels) and residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The *Interim Final World Trade Center Background Study Report,* dated April 2003, identified a representative mean background concentration for Manhattan residential buildings for quartz of 79.6 ug/ft^2 (approximately 857 ug/m^2). The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks*, dated May 2003, did not specifically identify a residential health-based benchmark for quartz. This Study has identified quartz concentrations within the Building that exceed the background residential level in 111 of the 118 samples analyzed (94%).

Cristobalite--There was significant variation in the cristobalite testing results collected from the Building dust samples. Cristobalite was detected in only two of the 118 samples tested. The samples containing cristobalite ranged from a low concentration of 2,800 ug/m^2 (from Zone 4) to a maximum concentration of 340,000 ug/m^2 (in Zone 6). The EPA has published residential background levels (estimated pre-existing levels) and residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The *Interim Final World Trade Center Background Study Report,* dated April 2003, identified a representative mean background concentration for Manhattan residential buildings for cristobalite of 103.7 ug/ft^2 (approximately 1,116 ug/m^2). The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks*, dated May 2003, did not specifically identify a residential health-based benchmark for cristobalite. This Study has identified cristobalite concentrations within the Building that exceed the background residential level, although only in two of 118 samples (2%).

Polycyclic Aromatic Hydrocarbons (PAHs) - PAHs are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are very commonly identified constituents in materials such as plastic building materials and furnishings, as well as asphalt pavement and roofing/sealing materials. In accordance with conventions established by the World Health Organization (WHO), Toxicity Equivalency Factors (TEFs) are applied to seven PAH compounds and a Toxicity Equivalency Concentration (TEQ) for PAHs is derived. This convention was applied to the data obtained for this investigation; thus, the PAH concentrations reported are the TEQs.

There was significant variation in the PAH testing results collected from the Building dust samples. The samples containing PAH ranged from a low concentration of 3 ug/m^2 (from Zone 1) to a maximum concentration of 11,555 ug/m^2 (in Zone 2). This variation in PAH concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential background levels (estimated pre-existing levels) and residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The *Interim Final World Trade Center Background Study Report*, dated April 2003, did not specifically identify a representative mean background concentration for Manhattan residential buildings for PAH. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air*

Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks, dated May 2003, identifies a residential health-based benchmark for PAHs of 150 ug/m^2. This Study has identified PAH concentrations within the Building that exceed the health based benchmark identified in the EPA study in 100 of the 125 samples tested (80%).

Dioxin - Dioxin is a general term that describes a group of hundreds of chemicals that are highly persistent in the environment. Dioxin is formed as an unintentional by-product of many industrial processes involving chlorine such as waste incineration, chemical and pesticide manufacturing, and pulp and paper bleaching, and by burning chlorine-based chemical compounds with hydrocarbons. In accordance with conventions established by WHO, TEFs are applied to all dioxin compounds and a TEQ for dioxins is derived. This convention was applied to the data obtained for this investigation; thus, the dioxin concentrations reported are the TEQs.

There was significant variation in the dioxin testing results collected from the Building dust samples. Dioxin was detected in all 124 samples tested. The samples containing dioxin ranged from a low concentration of 1 ng/m^2 (from Zone 2) to a maximum concentration of 214 ng/m^2 (in Zone 5). These results are consistent with the highly variable nature of WTC dust. This variation in dioxin concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential background levels (estimated pre-existing levels) and residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The *Interim Final World Trade Center Background Study Report*, dated April 2003, identified a representative mean background concentration for Manhattan residential buildings for dioxin of 0.693 ng/m^2. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks,* dated May 2003, identifies a residential health-based benchmark for dioxin of 2 ng/m^2. This study has identified dioxin concentrations within the Building. One hundred twenty-three of the 124 samples analyzed for dioxin (99%) exceed both the background residential level and the health-based benchmark identified in the EPA studies.

Polychlorinated Biphenyls (PCBs) - PCBs are a group of synthetic organic chemicals that are either oily liquids or solids and are colorless to light yellow. PCBs were detected in 10 of 125 samples tested (8%). The samples containing PCBs ranged from a low concentration of 58 ug/m^2 (from Zone 1) to a maximum concentration of 360 ug/m^2 (in Zone 3). These results are consistent with the highly variable nature of WTC dust. This variation in PCB concentrations is consistent with the level of disturbance that has occurred within the Building, including the

cleaning of the "Gash Area," since September 11, 2001. The EPA has published PCB spill clean-up criteria for industrial properties of 1,000 ug/m^2. While this level is not directly applicable to a commercial deconstruction project, it can be used to put the results of this Study into relative context. This Study did not identify PCB concentrations within the Building that exceed this criterion.

Heavy Metals (Barium, Beryllium, Cadmium, Chromium, Copper, Lead, Manganese, Nickel, and Zinc) - Metals are a common component of building materials as well as many natural materials. Metals concentrations were detected in all zones for the following metals: barium, copper, chromium, lead, manganese, nickel, and zinc. Beryllium concentrations were detected in Zones 1 and 3, and cadmium concentrations were detected in Zones 1 through 4, and 6. Metals concentrations detected above and below the plenum varied, depending on the metal, and are summarized as shown in Table 21 that follows.

TABLE 21
HEAVY METAL CONCENTRATIONS DETECTED
ABOVE AND BELOW PLENUM

Metal	Above Plenum	Below Plenum
Barium	150 – 10,300 ug/m^2	130 – 149,000 ug/m^2
Beryllium	Not Detected	32 – 390 ug/m^2
Cadmium	84 – 620 ug/m^2	51 – 7,830 ug/m^2
Chromium	78 – 5,840 ug/m^2	49 – 118,000 ug/m^2
Copper	290 – 94,900 ug/m^2	120 – 145,000 ug/m^2
Lead	350 – 10,900 ug/m^2	150 – 101,000 ug/m^2
Manganese	180 – 15,300 ug/m^2	300 – 320,000 ug/m^2
Nickel	46 – 1,850 ug/m^2	56 – 25,800 ug/m^2
Zinc	2,550 – 421,000 ug/m^2	2,700 – 1,114,000 ug/m^2

Barium--There was significant variation in the barium testing results collected from the Building dust samples. Barium was detected in all 125 samples tested. The samples containing barium ranged from a low concentration of 130 ug/m^2 (from Zone 3) to a maximum concentration of 149,000 ug/m^2 (in Zone 2). This variation in barium concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks,* dated May 2003, identifies a residential health-based benchmark for barium of 110,000 ug/m^2. This Study has identified

barium concentrations within the Building that exceed the health-based benchmark identified in the EPA study in only three of the 125 samples tested (2.4%).

Beryllium-- There was significant variation in the beryllium testing results collected from the Building dust samples. Beryllium was detected in nine of the 125 samples tested. The samples containing beryllium ranged from a low concentration of 32 ug/m^2 (from Zone 1) to a maximum concentration of 390 ug/m^2 (in Zone 1). This variation in beryllium concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks,* dated May 2003, identifies a residential health-based benchmark for beryllium of 3,140 ug/m^2. This Study has not identified beryllium concentrations within the Building that exceed the health-based benchmark identified in the EPA study.

Cadmium--There was significant variation in the cadmium testing results collected from the Building dust samples. Cadmium was detected in 58 of the 125 samples tested. The samples containing cadmium ranged from a low concentration of 51 ug/m^2 (from Zone 2) to a maximum concentration of 7,830 ug/m^2 (in Zone 1). This variation in cadmium concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks,* dated May 2003, identifies a residential health-based benchmark for cadmium of 1,560 ug/m^2. This Study has identified cadmium concentrations within the Building that exceed the health-based benchmark identified in the EPA study in six of the 125 samples tested (4.8%).

Chromium--There was significant variation in the chromium testing results collected from the Building dust samples. Chromium was detected in 121 of the 125 samples tested. The samples containing chromium ranged from a low concentration of 49 ug/m^2 (from Zone 3) to a maximum concentration of 118,000 ug/m^2 (in Zone 3). This variation in chromium concentrations is consistent with the level of disturbance that has occurred within the Building, including the

cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks*, dated May 2003, identifies a residential health-based benchmark for chromium of 4,700 ug/m^2. This Study has identified chromium concentrations within the Building that exceed the health based benchmark identified in the EPA study in 38 of the 125 samples tested (30%).

Copper--There was significant variation in the copper testing results collected from the Building dust samples. Copper was detected in 120 of the 125 samples tested. The samples containing copper ranged from a low concentration of 120 ug/m^2 (from Zone 3) to a maximum concentration of 145,000 ug/m^2 (in Zone 3). This variation in copper concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks*, dated May 2003, identifies a residential health-based benchmark for copper of 62,700 ug/m^2. This Study has identified copper concentrations within the Building that exceed the health-based benchmark identified in the EPA study in six of the 125 samples tested (4.8%).

Lead--There was significant variation in the lead testing results collected from the Building dust samples. Lead was detected in 122 of 125 samples tested. The samples containing lead ranged from a low concentration of 150 ug/m^2 (from Zone 3) to a maximum concentration of 101,000 ug/m^2 (in Zone 1). This variation in lead concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential background levels (estimated pre-existing levels) and residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The *Interim Final World Trade Center Background Study Report*, dated April 2003, identified a representative mean background concentration for Manhattan residential buildings for lead of 1.78 ug/ft^2 (approximately 19 ug/m^2). The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of*

Potential Concern and Setting Health-Based Benchmarks, dated May 2003, identifies a residential health-based benchmark for lead of 25 ug/ft^2 (approximately 270 ug/m^2). This Study has identified lead concentrations within the Building that exceed both the background residential level and the health-based benchmark identified in the EPA studies in 121 of the 125 samples tested (97%).

Manganese--There was significant variation in the manganese testing results collected from the Building dust samples. Manganese was detected in 122 of the 125 samples tested. The samples containing manganese ranged from a low concentration of 180 ug/m^2 (from Zone 3) to a maximum concentration of 320,000 ug/m^2 (in Zone 2). This variation in manganese concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks,* dated May 2003, identifies a residential health-based benchmark for manganese of 31,400 ug/m^2. This Study has identified manganese concentrations within the Building that exceed the health-based benchmark identified in the EPA study in 26 of the 125 samples tested (21%).

Nickel--There was significant variation in the nickel testing results collected from the Building dust samples. Nickel was detected in 118 of the 125 samples tested. The samples containing nickel ranged from a low concentration of 46 ug/m^2 (from Zone 3) to a maximum concentration of 25,800 ug/m^2 (in Zone 3). This variation in nickel concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks*, dated May 2003, identifies a residential health-based benchmark for nickel of 31,400 ug/m^2. This Study has not identified nickel concentrations within the Building that exceed the health-based benchmark identified in the EPA study.

Zinc--There was significant variation in the zinc testing results collected from the Building dust samples. Zinc was detected in 123 of the 125 samples tested. The samples containing zinc ranged from a low concentration of 2,550 ug/m^2 (from Zone 3) to a maximum concentration of 1,140,000 ug/m^2 (in Zone 3). This variation in zinc concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential background levels (estimated pre-existing levels) and residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks,* dated May 2003, identifies a residential health-based benchmark for zinc of 470,000 ug/m^2. This Study has identified zinc concentrations within the Building that exceed the health-based benchmark identified in the EPA study in six of the 125 samples tested (4.8%).

Mercury - Mercury is a naturally occurring metal that has several forms. It is used in electrical and temperature controls as well as computer display monitors. Elemental mercury is a shiny, silver-white, odorless liquid. If heated, it is a colorless, odorless gas. There was significant variation in the mercury testing results collected from the Building dust samples. Mercury was detected in 67 of the 125 samples tested. The samples containing mercury ranged from a low concentration of 1 ug/m^2 (from Zone 2) to a maximum concentration of 160 ug/m^2 (in Zone 3). This variation in mercury concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks,* dated May 2003, identifies a residential health-based benchmark for mercury of 157 ug/m^2. This Study has identified mercury concentrations within the Building that exceed the health-based benchmark identified in the EPA study in two of the 125 samples tested (1.6%).

As described in Section 3.3.6, mercury vapor was not detected in any samples above the instrument detection limit. Results of sampling are shown in Table 22. All results were non-detectable, i.e. less than 0.003 mg/m^3 and therefore below all relevant occupational exposure limits. Relevant exposure limits for elemental mercury vapor are as follows:

TABLE 22
MERCURY VAPOR OCCUPATIONAL EXPOSURE LIMITS

Organization	Type of Exposure Limit	Exposure Limit
OSHA(1)	Ceiling	0.1 mg/m^3
ACGIH(2)	8 Hour Time Weighted Average	0.025 mg/m^3
NIOSH(3)	8 Hour Time Weighted Average	0.05 mg/m^3

(1) OSHA = Occupational Safety and Health Administration
(2) ACGIH = American Conference of Governmental Industrial Hygienists
(3) NIOSH = National Institute for Occupational Safety and Health

Results indicate that mercury vapor cartridges for respiratory protection are not required during routine activities in the building, i.e., walking around the building to conduct visual surveys. The results do not apply to non-routine activities, i.e., construction, where dust and other materials that may contain significant levels of elemental mercury could be disturbed. The results identified above, along with subsequent studies, will be utilized in the development of cleaning and deconstruction plans that will be protective of workers as well as the general public.

4.4 Visual Mold Inspection (Exposed Surfaces Only)

The EPA and NYCDOH have both published guidance documents on assessing and remediating mold in indoor environments. The EPA Office of Air and Radiation, Indoor Environments Division published *Mold Remediation in Schools and Commercial Buildings* in March 2001 to present recommendations on mold remediation. The NYCDOH published *Guidelines on Assessment and Remediation of Fungi in Indoor Environments* in January 2002. Neither the EPA nor the NYCDOH regulates mold or mold spores in indoor air. Both agencies have established recommended work practices in assessing and remediating mold in indoor environments for the purpose of building reoccupancy. Additionally, although handling measures for mold-impacted or water-damaged building materials are recommended by the EPA and NYCDOH, these materials may be safely and legally disposed of as construction and demolition debris.

The visual mold inspection done as part of this initial Study revealed the presence of mold-impacted building materials on exposed surfaces in seven locations distributed over five different floors (11th, 7th, 3rd, Basement A, and Basement B). The extent of mold at each location ranged from six to 24 SF, and in total, 105 SF of mold-impacted building materials were identified. No evidence of significant water-damaged building materials was noted in the Building, although active water infiltration was noted in Basement B. Inspection was not performed for non-exposed surfaces (i.e., concealed interstitial spaces) and will be performed as part of the

supplemental investigations that are being executed in conjunction with the cleaning and deconstruction plan development.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the sampling and testing performed for this initial characterization Study revealed levels of contaminants that should be cleaned in connection with the deconstruction of the Building. Throughout the Building, ACM was positively identified in various materials. Detectable levels of asbestos, silica, PAHs, dioxins, PCBs, and heavy metals (including mercury) were also identified in dust above and below the suspended ceilings. The results indicating varying contaminant levels are consistent with the highly variable nature of WTC dust. This variation is also consistent with the level of activity that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001.

As described herein, there are specific regulations that address ACM for demolition activities and ACM have been positively identified in various materials throughout the Building. Additionally, detectable levels of asbestos, silica, PAHs, dioxin, PCBs, and heavy metals (including mercury) were also identified above and below the suspended ceilings. To varying degrees, exposure to, and/or the potential release of, these materials and chemical constituents give rise to the need for appropriate planning, engineering controls, monitoring, and other health and safety measures to protect workers and to avoid exposure to the surrounding community.

The findings of this report can therefore serve as a reference document that will be used by LMDC and the deconstruction contractor to determine appropriate methods for the cleaning and deconstruction program, such as: planning; permitting; engineering controls; cleaning; monitoring; and waste handling/disposal. In addition, this Study will serve as a baseline for the development and execution of any further sampling and testing and/or exposure assessments that might be deemed appropriate.

Further testing is necessary to completely develop the cleaning and deconstruction plan. To this end, LMDC and Berger are currently working to develop and implement a supplemental investigation program that, at a minimum, will involve obtaining access to previously inaccessible surfaces and interstitial spaces—including the curtain wall, interior walls, the exterior of the Building, and cell systems and raceways within the concrete slabs–for testing of all of the constituents addressed in the initial characterization study (asbestos and other analytes as well as visual inspection for mold). Berger also recommends additional testing to characterize waste materials to be removed for purposes of handling, transportation, storage, and disposal or recycling. The additional information provided from this supplemental testing and inspection program will be shared with the deconstruction contractor, regulatory authorities, and the public, as part of the finalization and implementation of the cleaning and deconstruction plan.

Based on the results of this Study, Berger offers the following recommendations:

- LMDC should continue to maintain a health and safety plan and external air monitoring program. LMDC should review and modify its health and safety plan and external air monitoring program as appropriate to address all of the conditions identified in this Study;

- LMDC should continue to review and address the potential for release of contaminants from the Building;

- LMDC should further develop and implement an emergency action plan for the Building;

- LMDC should conduct further testing as recommended in this Study;

- LMDC should further develop its plan for cleaning and deconstruction and address the contaminants identified in this Study and in the further testing;

- LMDC should continue to consult with all appropriate regulatory agencies (e.g., New York City Department of Environmental Protection (NYCDEP), NYSDOL, EPA, New York State Department of Environmental Conservation (NYSDEC), and Occupational Safety and Health Association (OSHA)) in order to prepare specific cleaning, deconstruction, and environmental monitoring protocols;

- In connection with the deconstruction plan, LMDC should further develop appropriate site-specific health and safety plan documents (including establishing the organizational and procedural safeguards to be implemented to ensure the protection of site workers and the surrounding community);

- In connection with the deconstruction plan, LMDC should further develop appropriate work and site operations plan documents to cover such items as work area controls/limitations, decontamination facilities, engineered containment and control systems, monitoring programs, emergency/contingency plans, waste management, and assurances that the work will comply with all applicable federal, state, and local regulations;

- LMDC should file appropriate notifications and obtain necessary permits, including the Asbestos Control Program 7 (ACP-7), from the appropriate regulatory agencies;

- As currently contemplated, LMDC should engage a contractor with a NYSDOL asbestos handling license, as necessary, to perform the work; and

- LMDC should conduct appropriate monitoring and quality assurance/quality control inspections throughout the cleaning and deconstruction process.

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September 14, 2004

GLOSSARY OF TERMS/ACRONYMS

ug	Micrograms A unit of measure; associated, for the purposes of this report, with quantities of COPCs. Specifically, a microgram is equivalent to $1x10^{-6}$ grams.
ACM	Asbestos-containing Materials
AHERA	The Federal Asbestos Hazard Emergency Response Act
Asbestos	For the purposes of this report, any material analyzed and found to contain one percent or more asbestos content is considered to be asbestos and can be classified as ACM.
ASHARA	The Federal Asbestos School Hazard Abatement Reauthorization Act
Berger	The Louis Berger Group, Inc. Environmental Consulting firm under contract with LMDC
the Building	For the purposes of this report, this term refers to the specific structure physically located at 130 Liberty Street, New York, New York, and within which this *Initial Building Characterization Study* was conducted.
BUR	Built-Up Roof system
CLP	Contract Laboratory Program Run by EPA
COPC	Contaminants of Potential Concern as defined by the EPA's Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Task Force Working Group in their report *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks* (May 2003), including asbestos, dioxins, lead, PAHs, fibrous glass, and silica. COPCs also refers to other analytes suspected of being present in the Building including PCBs, heavy metals (barium, beryllium, cadmium, chromium, copper, manganese, nickel, and zinc), and mercury.
Damage Condition	1- If the extent of the damage is roughly ten percent of the material and is evenly distributed throughout the material, then the material is considered significantly damaged. 2- If the extent of the damage is roughly 25 percent of the material and is localized, then the material is considered significantly damaged.
Demolition	The total razing of a building or an entire portion thereof. Section 56-1.4(ac) of NYSDOL

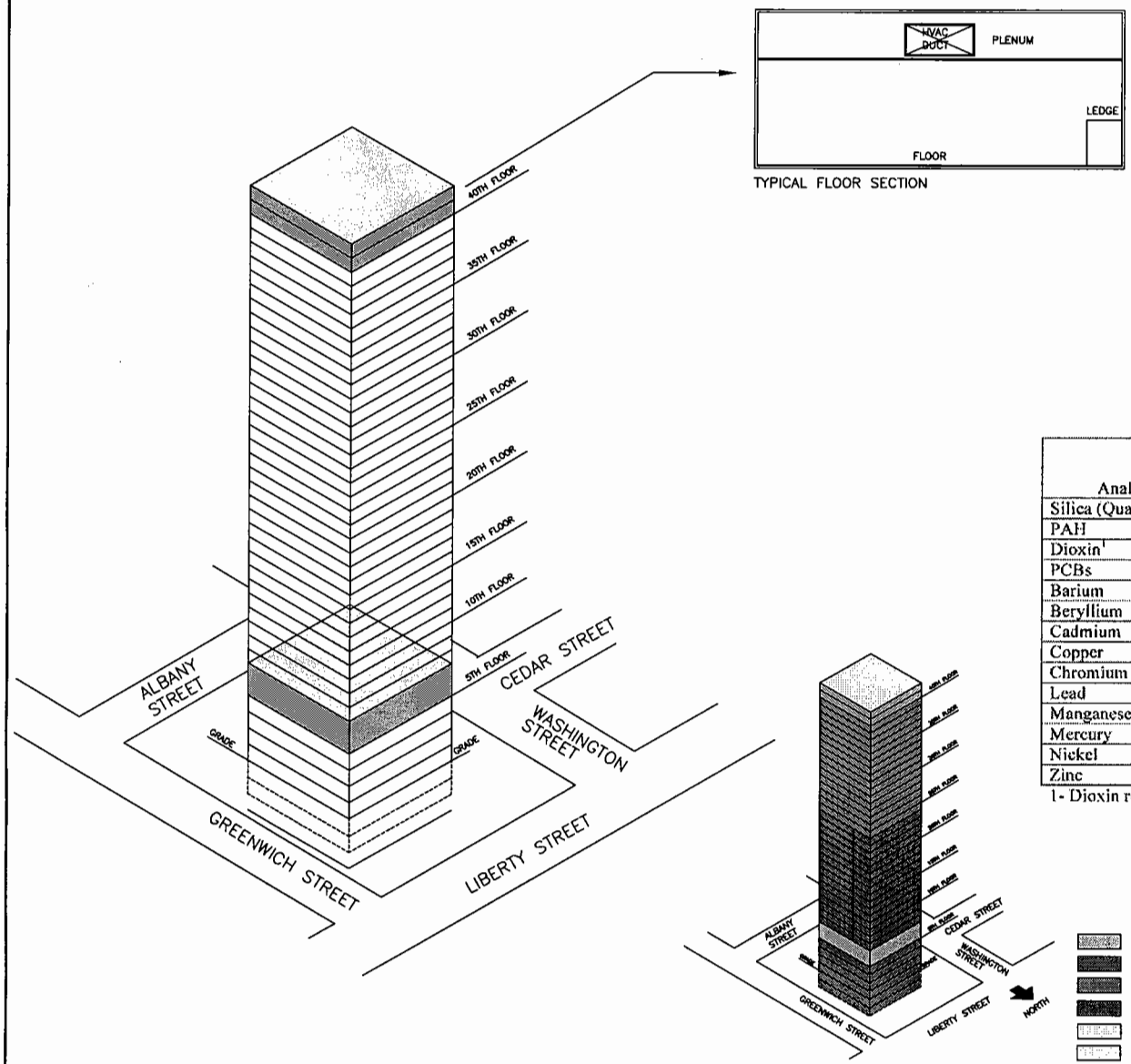
Dioxin	A type of COPC for the purposes of this report
DOT	Federal Department of Transportation
ELAP	Environmental Laboratory Approval Program Run by NYSDOH
EPA	The United States Environmental Protection Agency
SF	Square foot/feet A unit of measure defining a two-dimensional area encompassing a one foot length by a one foot width
Friable ACM	For purposes of this report, friable is a term given to a material that contains more than one percent asbestos and can be crumbled, pulverized or reduced to powder when dry by hand pressure as per the definition by the Environmental Protection Agency and the New York State Department of Labor. In New York City, the definition of friable ACM refers to any material that contains more than one percent asbestos and can be crumbled, pulverized or reduced to powder by hand or other mechanical pressure.
HASP	Health and Safety Plan
Heavy metals	For the purposes of this report, heavy metals are a type of COPC. In particular, the following elements are included under this category: barium, beryllium, cadmium, chromium, copper, lead, manganese, nickel, and zinc.
HEPA	High Efficiency Particulate Arrestance Also known as High Efficiency Particulate Air, this device is a filter designed to very efficiently remove minute particles from the air.
Homogenous group	For the purposes of this report, a homogenous group is a number of samples assumed to be of the same material that have been obtained from a homogenous area, which are considered for analytical purposes to be nearly identical. This type of group classification makes it possible to take advantage of NA/PS analysis methods.
HVAC	Heating, Ventilation, and Air-Conditioning
LF	Linear Foot/Feet A unit of measure defining a one dimensional length of area
LMDC	Lower Manhattan Development Corporation

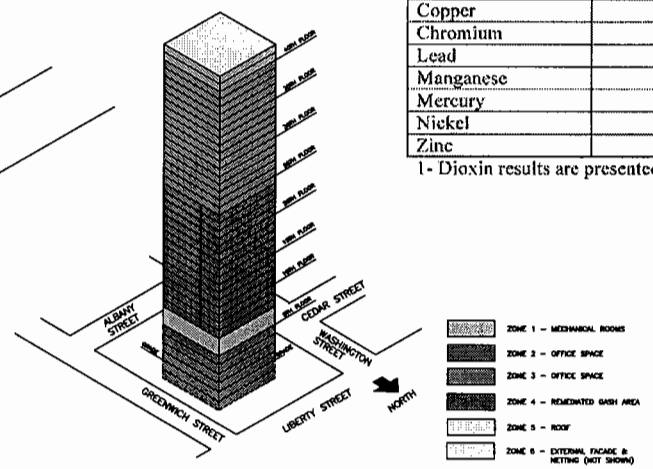
m^2	Meter(s) squared
	A unit of measure defining a two-dimensional area encompassing a one meter length by a one meter width
MEP	Mechanical, Electrical, and Plumbing
Mercury	A type of COPC for the purposes of this report
NA/PS	Not Analyzed/Positive Stop
	Efficient and economically beneficial analytical method that reduces the need for repetitive analysis of homogenous samples by testing only a limited number of samples in the group, as opposed to testing them all
ND	Not detected above the Method Detection Limit (MDL)
	For the purposes of this report, when a COPC is not detected using methods established in this report to test for specific COPCs within a sample
NESHAP	National Emissions Standards for Hazardous Air Pollutants
	Set forth by the EPA
Ng	Nanograms
	A unit of measure; associated, for the purposes of this report, with quantities of COPCs. Specifically, a nanogram is equivalent to $1x10^{-9}$ grams.
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NOB	Non-friable, Organically Bound material
Non-asbestos-containing material	For the purposes of this report, this is any material that has less than one percent asbestos content as per the EPA-NESHAP.
NVLAP	National Voluntary Laboratory Accreditation Program
	Run by NIST cooperatively with the NYSDOH ELAP
NYCDEP	New York City Department of Environmental Protection
NYCDOB	New York City Department of Buildings
NYCDOH	New York City Department of Health
NYSDOH	New York State Department of Health

NYSDOL	New York State Department of Labor
OSHA	Occupational Safety and Health Administration
PAHs	Polycyclic Aromatic Hydrocarbons A type of COPC for the purposes of this report
PCBs	Polychlorinated Biphenyls A type of COPC for the purposes of this report
PEL	Permissible Exposure Limit Set forth by OSHA for workers engaged in activities, such as demolitions, which would bring them into contact with COPCs. For the purposes of this report, PEL refers to airborne COPCs.
Plenum	A type of suspended ceiling commonly found throughout the Building and used as a sampling site on various floors. Samples were collected from either above the plenum, or below it.
PLM	Polarized Light Microscopy An optical microscope utilizing wavelengths of light to obtain information on the studied suspected material. A suspect material immersed in a solution of known refraction index and subjected to illumination by polarized light. The resulting characteristic color display enables mineral identification.
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
SAP	Sampling and Analysis Plan
Silica	A type of COPC for the purposes of this report
SOP	Standard Operating Procedure
TEM	Transmission Electron Microscopy The use of TEM addresses the principle that the limit of an optical microscope's ability to detect objects is affected by the wavelengths of light. TEM's extremely short wavelength, coupled with simple image presentation, yields resolvable images of even the smallest fibers with a resolution of up to 20,000 X.

	With much greater optical magnification than PLM, TEM is considered the only reliable method that can be used to report true negative results from PLM analysis of NOB samples as per the NYSDOH ELAP 198.4 Methods.
TSCA	The Federal Toxic Substances Control Act
WTC	World Trade Center

FIGURES





Zone 1 – Summary of Detected Concentrations

Analyte	Percent of Samples with Detections	Minimum Detected Concentration ($\mu g/m^2$)	Maximum Detected Concentration ($\mu g/m^2$)
Silica (Quartz)	100%	71,000	10,000,000
PAH	100%	3	5,028
Dioxin[1]	100%	5.5	33.5
PCBs	18.8%	60	120
Barium	100%	1,340	44,700
Beryllium	25%	32	390
Cadmium	84.4%	50	7,830
Copper	100%	5,570	114,000
Chromium	100%	570	35,100
Lead	100%	2,470	101,000
Manganese	100%	3,080	187,000
Mercury	59.4%	25	54
Nickel	100%	460	10,500
Zinc	100%	22,000	1,040,000

1- Dioxin results are presented in ng/m^2

THE LOUIS BERGER GROUP, INC.

WTC DUST SAMPLING LOCATIONS (TASK 4) ZONE 1

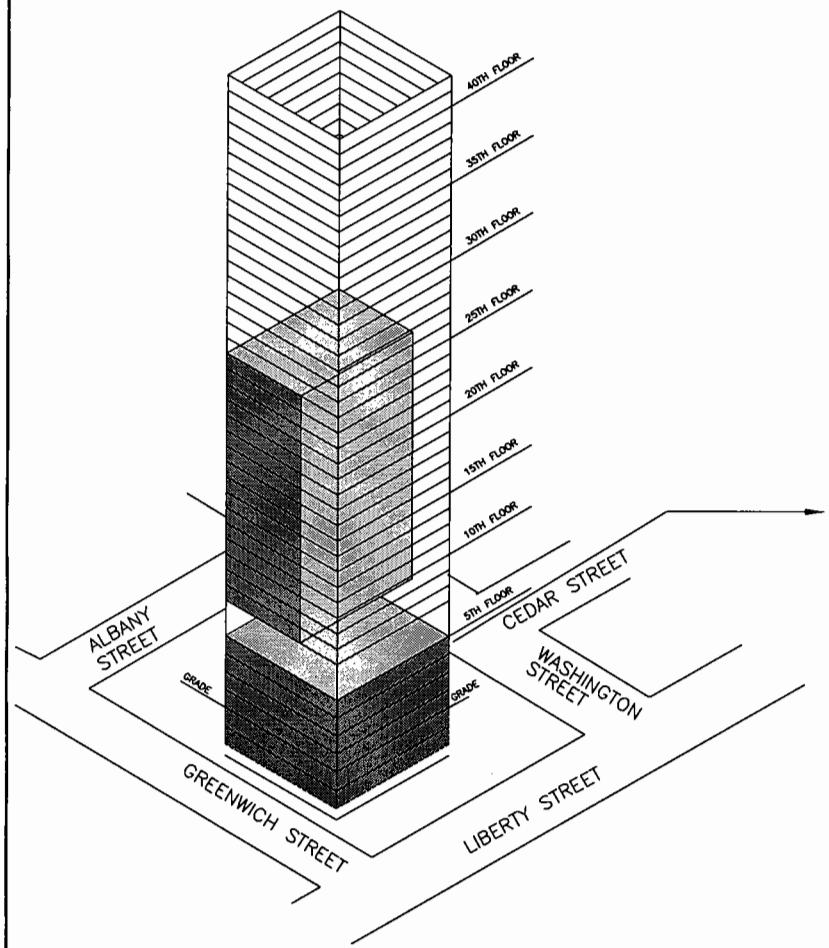
130 LIBERTY STREET
NEW YORK, NEW YORK

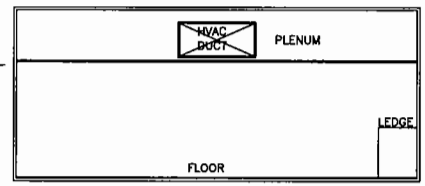
Scale: N.T.S.	08/04/04	FIG. 1

Zone 2 – Summary of Detected Concentrations

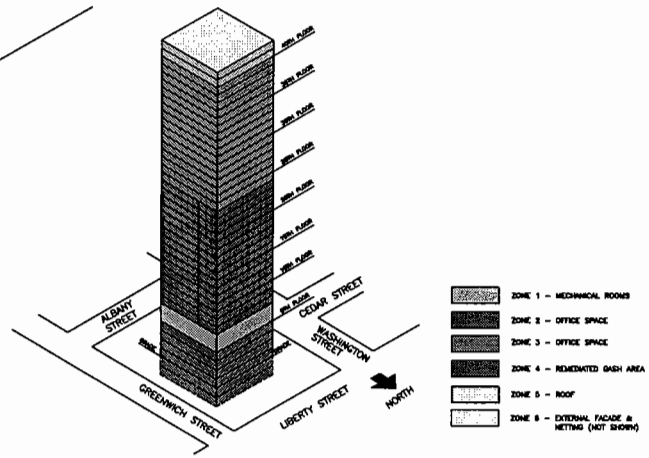
Analyte	Percent of Samples with Detections	Minimum Detected Concentration ($\mu g/m^2$)	Maximum Detected Concentration ($\mu g/m^2$)
Silica (Quartz)	97.5%	500	2,400,000
PAH	100%	58	11,555
Dioxin[1]	100%	0.67	46.1
PCBs	2.6%	63	63
Barium	100%	290	149,000
Beryllium	0%	--	--
Cadmium	10.6%	25	400
Copper	94.7%	340	103,000
Chromium	97.4%	375	76,900
Lead	94.7%	270	71,200
Manganese	100%	280	320,000
Mercury	35.9%	0.84	38
Nickel	91.2%	61	9,740
Zinc	96.1%	5,260	421,000

1- Dioxin results are presented in ng/m^2





TYPICAL FLOOR SECTION

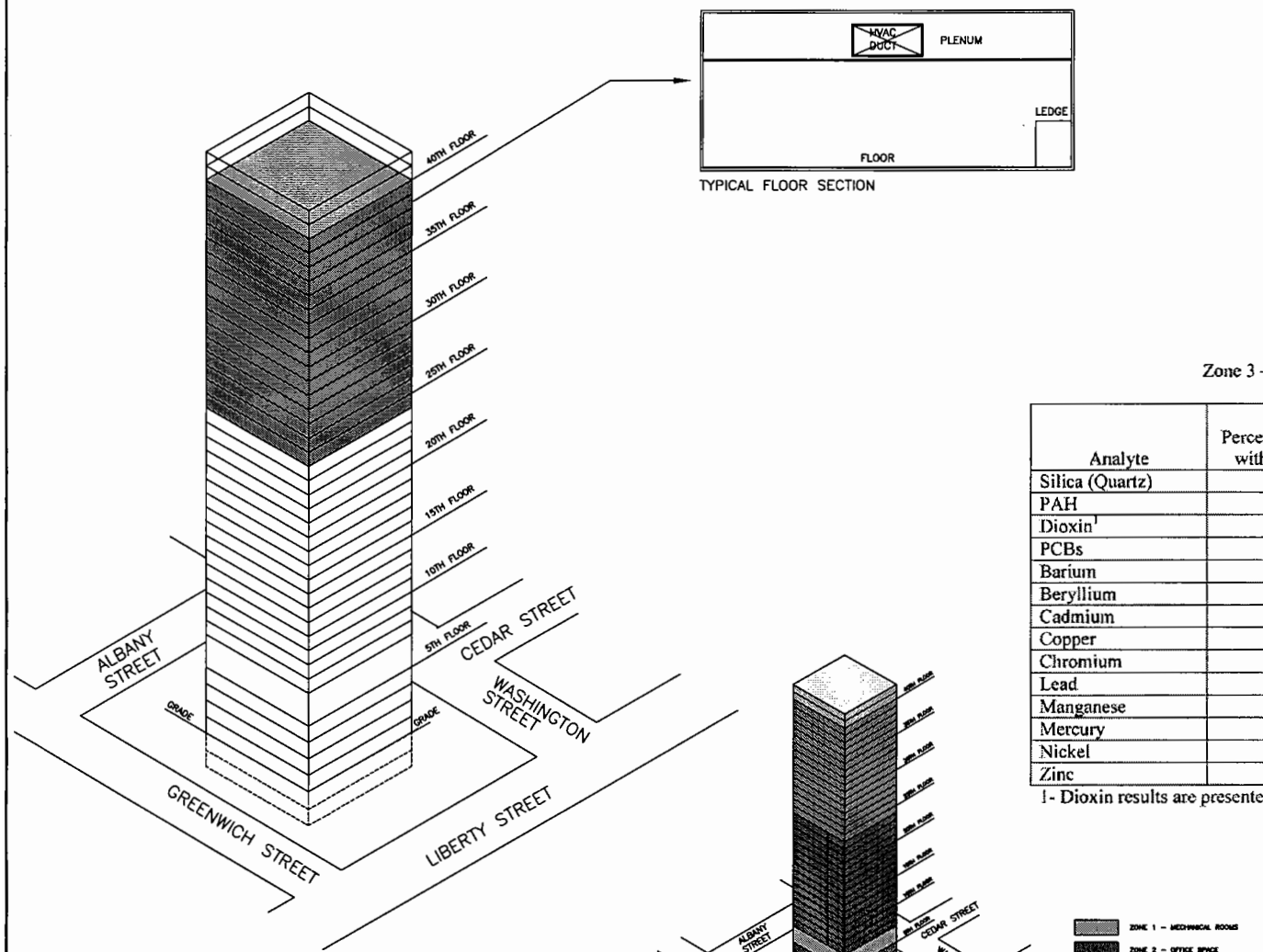


THE LOUIS BERGER GROUP, INC.

WTC DUST SAMPLING LOCATIONS (TASK 4) ZONE 2

130 LIBERTY STREET
NEW YORK, NEW YORK

Scale: N.T.S.	08/04/04	FIG. 2



Zone 3 – Summary of Detected Concentrations

Analyte	Percent of Samples with Detections	Minimum Detected Concentration ($\mu g/m^2$)	Maximum Detected Concentration ($\mu g/m^2$)
Silica (Quartz)	100%	1,000	3,500,000
PAH	100%	578	1,156
Dioxin[1]	100%	1.24	84.8
PCBs	5.3%	360	360
Barium	100%	130	60,900
Beryllium	2.6%	35	35
Cadmium	57.9%	110	3,490
Copper	100%	120	145,000
Chromium	100%	49	118,000
Lead	97.3%	150	72,400
Manganese	100%	180	228,000
Mercury	71.1%	1.1	160
Nickel	97.3%	46	25,800
Zinc	100%	2,550	1,140,000

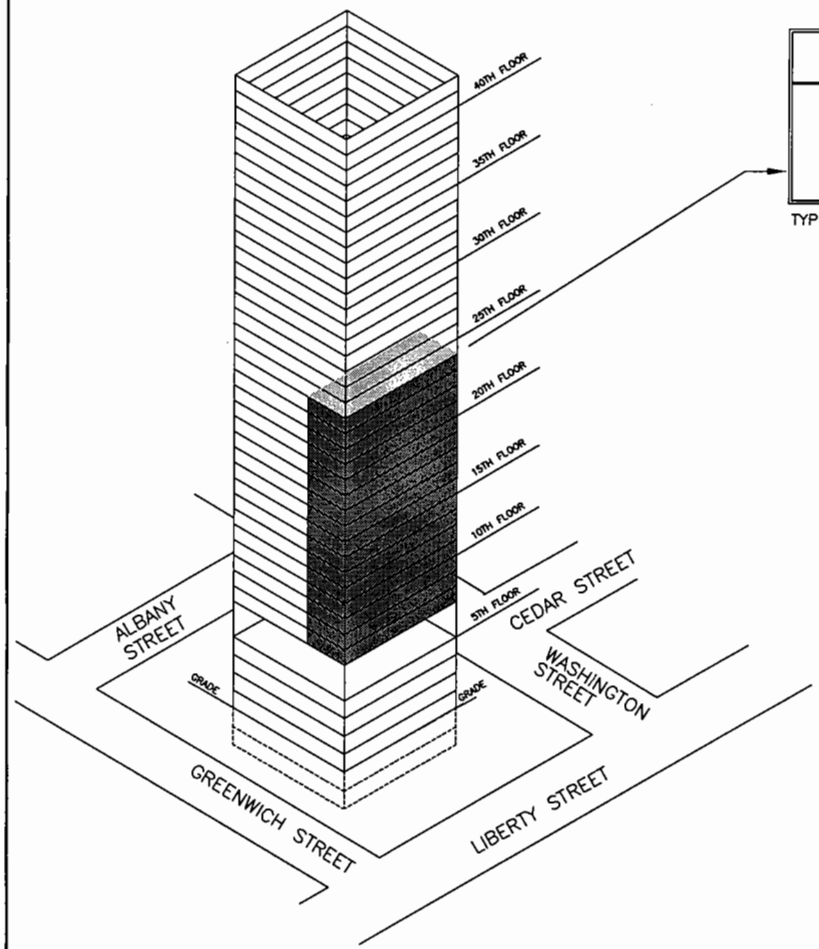
1- Dioxin results are presented in ng/m^2

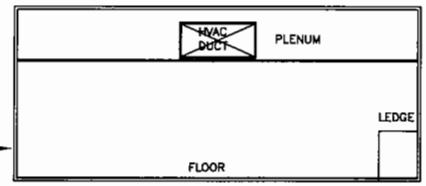
THE LOUIS BERGER GROUP, INC.

WTC DUST SAMPLING LOCATIONS (TASK 4) ZONE 3

130 LIBERTY STREET
NEW YORK, NEW YORK

Scale: N.T.S.	08/04/04	FIG. 3



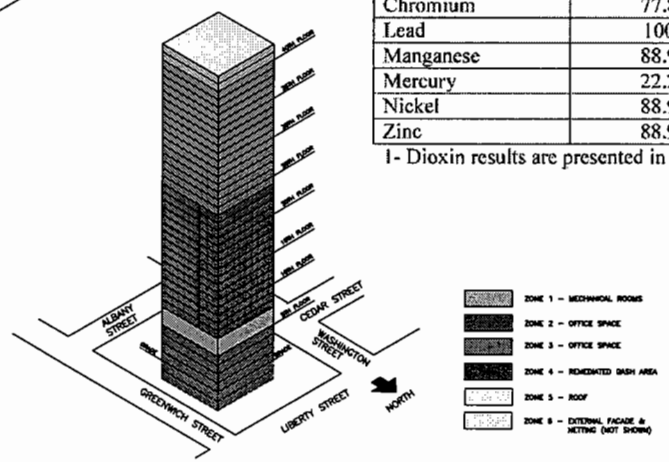


TYPICAL FLOOR SECTION

Zone 4 – Summary of Detected Concentrations

Analyte	Percent of Samples with Detections	Minimum Detected Concentration ($\mu g/m^2$)	Maximum Detected Concentration ($\mu g/m^2$)
Silica (Quartz)	71.4%	250	6,700,000
PAH	100%	1,156	5,778
Dioxin[1]	100%	12.9	22.9
PCBs	11.1%	120	120
Barium	100%	1,050	28,400
Beryllium	0%	--	--
Cadmium	33.3%	310	370
Copper	88.9%	1,760	21,900
Chromium	77.8%	500	11,800
Lead	100%	1,200	29,600
Manganese	88.9%	3,010	176,000
Mercury	22.2%	1.3	2.2
Nickel	88.9%	1,630	13,400
Zinc	88.9%	10,500	186,000

1- Dioxin results are presented in ng/m^2

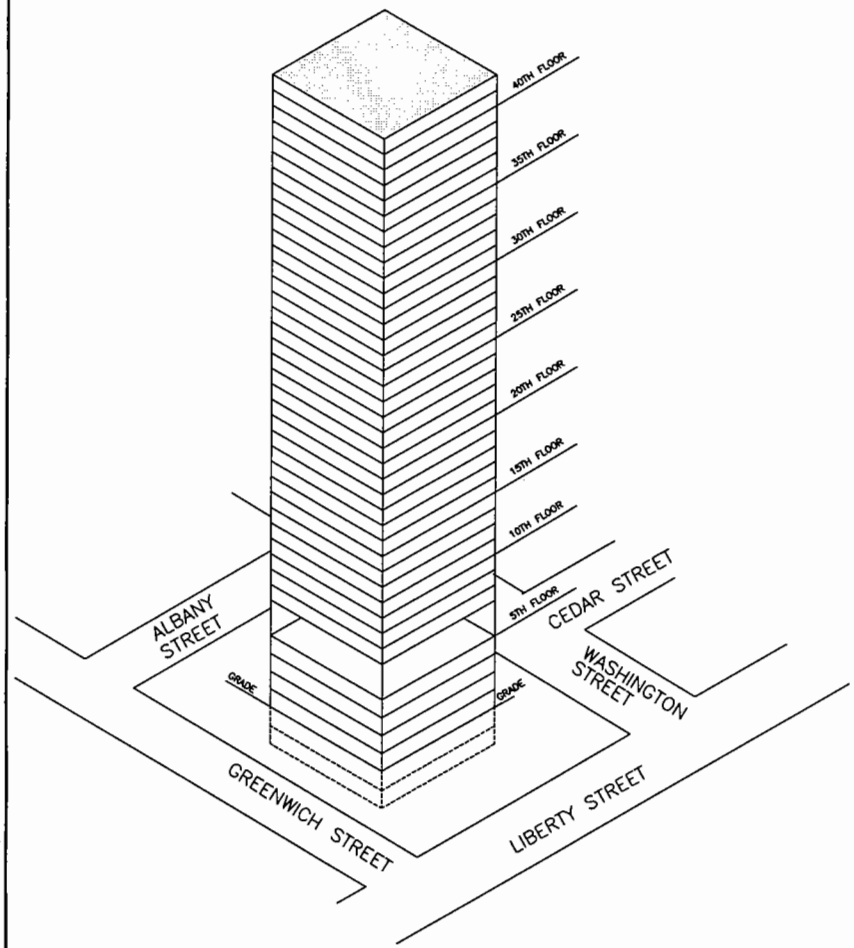


THE LOUIS BERGER GROUP, INC.

WTC DUST SAMPLING LOCATIONS (TASK 4) ZONE 4

130 LIBERTY STREET
NEW YORK, NEW YORK

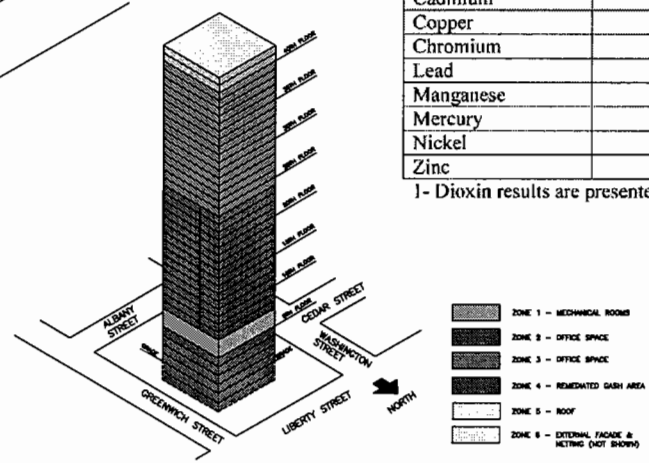
Scale: N.T.S.	08/04/04	FIG. 4



Zone 5 – Summary of Detected Concentrations

Analyte	Percent of Samples with Detections	Minimum Detected Concentration ($\mu g/m^2$)	Maximum Detected Concentration ($\mu g/m^2$)
Silica (Quartz)	100%	1,500	12,000
PAH	100%	578	788
Dioxin[1]	100%	3.92	214
PCBs	0%	--	--
Barium	75%	390	650
Beryllium	0%	--	--
Cadmium	0%	--	--
Copper	50%	450	560
Chromium	75%	110	9,300
Lead	100%	500	2,070
Manganese	50%	230	370
Mercury	75%	0.84	1.3
Nickel	75%	120	410
Zinc	100%	4,440	6,280

1- Dioxin results are presented in ng/m^2

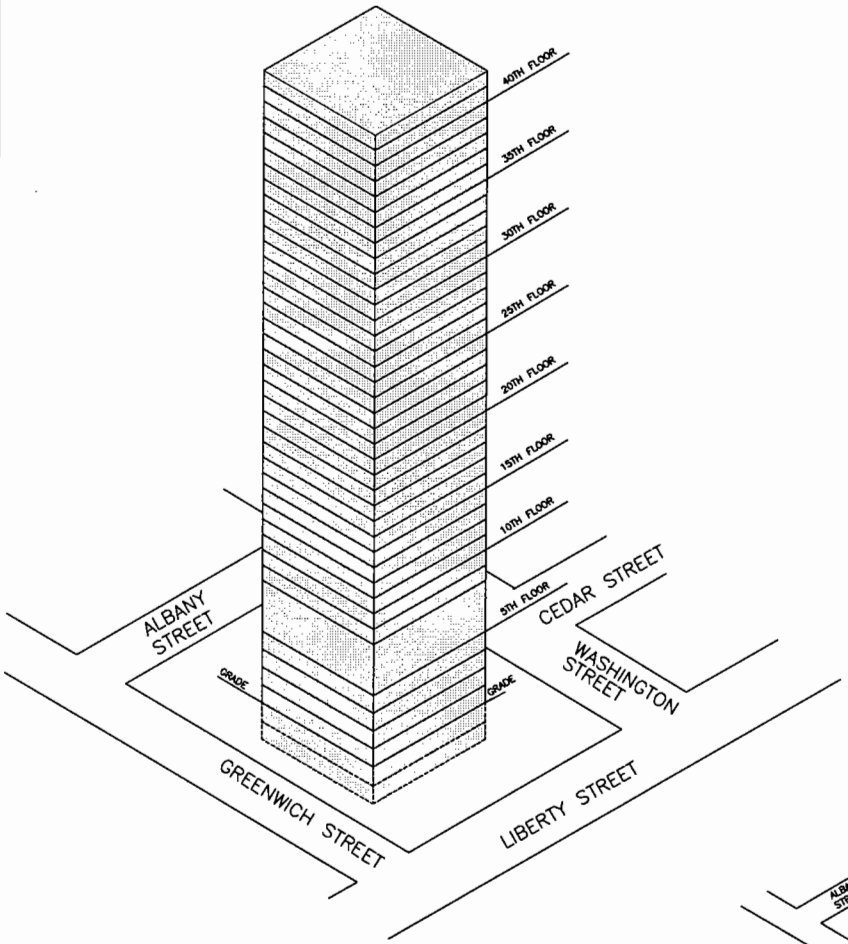


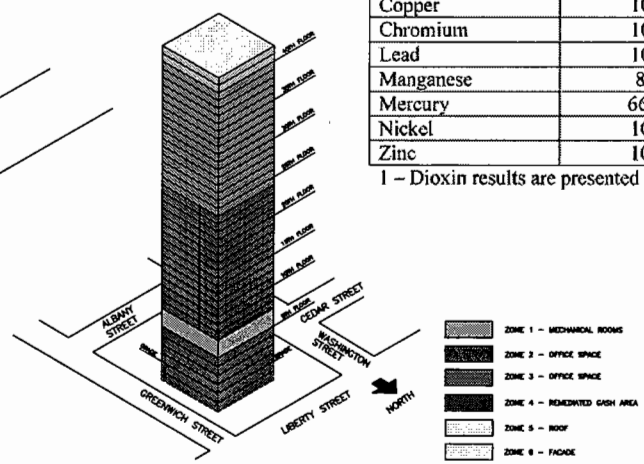
THE LOUIS BERGER GROUP, INC.

WTC DUST SAMPLING LOCATIONS (TASK 4) ZONE 5

130 LIBERTY STREET
NEW YORK, NEW YORK

Scale: N.T.S.	08/04/04	FIG. 5





Zone 6 – Summary of Detected Concentrations

Analyte	Percent of Samples with Detections	Minimum Detected Concentration ($\mu g/m^2$)	Maximum Detected Concentration ($\mu g/m^2$)
Silica (Quartz)	100%	320,000	1,800,000
PAH	0%	--	--
Dioxin[1]	100%	3.11	13.2
PCBs	0%	--	--
Barium	100%	2,180	14,200
Beryllium	0%	--	--
Cadmium	66.7%	290	1,100
Copper	100%	3,680	18,600
Chromium	100%	4,690	8,200
Lead	100%	6,940	29,800
Manganese	80%	4,390	30,600
Mercury	66.7%	5.4	5.8
Nickel	100%	580	2,920
Zinc	100%	16,700	101,000

1 – Dioxin results are presented in ng/m^2

THE LOUIS BERGER GROUP, INC.

WTC DUST SAMPLING LOCATIONS (TASK 4) ZONE 6

130 LIBERTY STREET
NEW YORK, NEW YORK

Scale: N.T.S.	08/04/04	FIG. 6

The Louis Berger Group, Inc.
199 Water Street, 23rd Floor
New York, NY 10038

Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor
New York, NY 10006

September 2004

ATTACHMENT 2

SUPPLEMENTAL INVESTIGATION SUMMARY REPORTS

Prepared by TRC Environmental Corp.

Part 1: Fireproofing Sampling Summary Results (2/10/05)

Part 2: Vertical Shafts Sampling Summary Results (2/10/05)

Part 3: Interior Wall Interstitial Space Sampling Summary Results (2/10/05)

Part 4: Heating, Ventilation, and Air Conditioning Distribution Duct Sampling Summary Results (2/10/05)

Part 5: Cell System Sampling Summary Results (2/10/05)

Part 6: Curtain Wall Cavity Sampling Summary Results (2/10/05)

Part 7: Building Exterior Sampling Summary Results (2/10/05)

Part 8: Preliminary Waste Characterization Sampling Summary Results (2/10/05)

Part 9: Visual Mold Inspection Summary (2/22/05)

130 Liberty Street

New York, New York

Supplemental Investigation Summary Report

Fireproofing Sampling Summary Results

Prepared for:
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan
Development Corporation

Prepared By:

TRC
Customer-Focused Solutions

TRC Environmental Corp.
1430 Broadway, 10th Floor
New York, New York 10018

February 10, 2005

1. INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents the results of the supplemental investigation and testing of fireproofing located within the Building.

1.1 Background

The Building is located across the street and south of the WTC site and is a former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

In addition, Berger recommended performing preliminary waste characterization.

This supplemental investigation summary presents the results of additional inspection and

sampling performed by TRC of fireproofing within the Building. Supplemental investigations regarding curtain wall cavity, heating, ventilation, and air conditioning (HVAC) ductwork, cell systems within floors, interstitial spaces within interior walls and column cavities, exterior building surfaces, waste characterization, and visual inspection of the Building for mold and asbestos containing building materials (ACBM) are addressed in separate summaries.

As part of the supplemental investigation, TRC collected the following samples:

COPC	Asbestos	Lead	Silica	Dioxin	PAH	MMVF
Total Samples	126	106	35	55	55	27

For the fireproofing located within inaccessible areas at 130 Liberty Street, TRC collected thirteen representative surface bulk samples for lead, silica, polycyclic aromatic hydrocarbons (PAHs), and dioxins analysis and three bulk samples for man-made vitreous fibers (MMVF). Bulk sampling and analysis for asbestos was conducted as part of the *Initial Building Characterization Report.* In addition, TRC collected fifteen microvacuum samples of fireproofing for asbestos and ten microvacuum samples of fireproofing for lead. Asbestos, lead, silica, PAHs, dioxins, and MMVF make up the United States Environmental Protection Agency (USEPA) contaminants of potential concern (COPCs) list.

TRC did not utilize a tiered approach to sample analysis as was done for other SI components tested. All COPCs were analyzed and the results reviewed. Results of this study were compared to the findings in the *Initial Building Characterization Report,* benchmark, and background concentrations presented in previous environmental studies as detailed in the following sections.

1.3 Previous Environmental Studies

Several studies concerning WTC-related contaminants have been performed by, or with the review of, the federal, state, and local regulatory authorities in the aftermath of the events of September 11, 2001. In particular, the USEPA has been responsible for studies associated with the development of the EPA's list of COPCs, as discussed in this section.

The USEPA COPC Committee developed, in their *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health Based Benchmarks, Peer Review Draft (September 2002),* a tiered approach to evaluate the health risks posed by contaminants that might be present in an indoor environment (air

and settled dust) for residential reoccupancy. For each COPC, three levels were developed:

Tier I - Level above which, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), aggressive clean-up action should be taken expeditiously along with follow-up sampling to confirm attainment of Tier III level.

Tier II - Range where diligent cleaning should continue, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), with follow-up sampling to confirm attainment of Tier III level.

Tier III - Level below which the risk is negligible or consistent with the New York City background level found in the USEPA Background Study as identified below.

These levels were established for residential reoccupancy. The Tier I screening level was intended to be protective of a resident who may have been exposed to WTC-related contaminants in their residence for one year. The Tier III clearance level was intended to be protective of a resident who is exposed to WTC-related contaminants in their residence for 30 years, which was the upper-bound estimate for residency in one dwelling. For COPCs in settled dust, the tiered values are as follows:

	Settled Dust		
COPC	**Tier I**	**Tier II**	**Tier III**
Asbestos (str/cm2)	>30,000	30,000 to background	Background
Lead (ug/ft2)	>40	40 to 25 (or background)	<25 (or background)
Silica	--	Above background	Background
PAH (mg/m2)	>9	9 to 0.3 (or background)	<0.3 (or background)
MMVF (str/cm2)	>100,000	100,000 to background	Background
Dioxin (ng/m2)	>120	120 to 4 (or background)	<4 (or background)

These levels were developed to be risk-based levels for residential settings. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

Subsequent to peer review of the September 2002 report, the USEPA COPC Committee developed, in their *World Trade Center Indoor Environmental Assessment: Selecting Health-Based Benchmarks (May 2003)* report, health based benchmarks that reflected only the Tier III levels.

The USEPA, Region 2, also developed the *World Trade Center Background Study Report (April 2003).* The objective of this study was to determine and/or estimate indoor baseline levels or background concentrations for the presence of specific contaminants in residential buildings unaffected by the WTC disaster. The average background concentrations for COPCs in settled dust on hard surfaces are summarized below.

COPC	Average Background
Asbestos (str/cm2)	6,192
Lead (ug/ft2)	1.78
Silica (ug/ft2)	79.6 (expressed as quartz)
PAH (mg/m2)	<0.29
MMVF (str/cm2)	52
Dioxin (ng/m2)	0.693

Based on the text by Millette and Hays, *Settled Asbestos Dust Sampling and Analysis*, levels of asbestos in settled dust as determined by the microvacuum techniques are considered low if less than 1,000 str/cm^2. Levels above 10,000 str/cm^2 are considered generally above background. Levels above 100,000 str/cm^2 are considered high and in the range of significant accidental release from an abatement site.

1.4 Purpose and Objectives

The objective of the SI is to provide additional information relative to the concentrations of COPCs within previously inaccessible spaces. This SI summary presents the results specifically for the fireproofing investigation.

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

2. METHODOLOGY

This section presents the methodologies implemented for the fireproofing characterization in previously inaccessible areas within the Building. These tasks were implemented in general accordance with the *Sampling Analysis and Quality Assurance Project Plan* (SAQAPP) developed by TRC dated November 15, 2004. Fireproofing was added to the SI component list, subsequent development to the SAQAPP

TRC collected representative bulk and/or microvacuum samples for the COPCs from fireproofing located in the building. Sprayed-on fireproofing sampled included interior vertical column, ceiling deck, and perimeter column materials.

Asbestos surface microvacuum samples were collected and analyzed per methods detailed in the American Society for Testing and Materials (ASTM) standard test method D5755-03. Asbestos bulk samples were collected and analyzed per methods detailed in the New York State Environmental Laboratory Approval Program (NYS ELAP) test method 198.1.

Lead microvacuum and bulk samples were collected following ASTM standard test method E1973-99 and the United States Department of Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing and analyzed as per analytical method NIOSH 7082 and USEPA SW-846 7420, respectively.

Bulk silica, dioxins, MMVF, and PAHs were analyzed per methods NIOSH 7500 Issue 3, SW 846-8290, EMSL MSD 0310, and SW 846-8270C, respectively.

All samples were properly labeled as per the SAQAPP. Asbestos, lead, silica, and MMVF samples were delivered to the EMSL Analytical Inc. laboratory, an independent New York State Department of Health (NYSDOH ELAP # 10872 for asbestos and lead) and an American Industrial Hygiene Association (AIHA # 100194 for silica) certified laboratory. PAH and dioxin samples were delivered to Paradigm Analytical Labs in Wilmington, North Carolina (NYSDOH ELAP # 11685).

3. RESULTS

3.1 Asbestos

Fifteen asbestos microvacuum, two blank, and three bulk samples were collected on various floors of the Building as detailed below. Samples were divided up by Zone, as described in the *Initial Building Characterization Report*. Zones 2 and 3 apply to TRC's study and are defined as follows:

> Zone 2: Office space located at or below the 24th Floor that may have been subjected to dust entering the Building through the Gash, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows.
>
> Zone 3: Office space located above the 24th Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows.

Microvacuum sample results ranged from less than 2,990 structures per square centimeter (str/cm^2) to 2,750,000 str/cm^2. Seven of the fifteen samples exceeded the Tier I value of 30,000 str/cm^2. However, asbestos was detected in a field blank sample associated with five of the fifteen samples. The arithmetic mean concentration for the remaining ten results was 75,073 str/cm^2 using one-half the detection limit for non-detected sample results. No asbestos was detected in the three bulk samples. Sample results are provided in the attached Tables 1 and 2.

Sample ID	Floor	Location	Zone
Microvacuum Samples			
ZD-001	9	SE Area FE-12	2
ZD-002	8	NW Area AB-56	2
ZD-003	7	NE Area GH-56	2
ZD-004	4	Elev. Lobby EF-56	2
ZD-005	2	SE Area EF-12	2
ZD-001	39	ED-78	3
ZD-002	35	AB-56	3
ZD-003	30	DC-67	3
ZD-004	25	EC-23	3
ZD-005	15	AB-35	2
ZD-006	9	AB-45	2
ZD-007	8	DF-56	2
ZD-008	7	FE-46	2
ZD-009	4	FE-46	2
ZD-010	2	FE-13	2
Bulk Samples			
KD-7-BULK-FIREPROOFING-ASBESTOS-001	7	Exterior wall GH-56	2

Sample ID	Floor	Location	Zone
KD-4-BULK-FIREPROOFING-ASBESTOS-002	4	Exterior wall GH-34	2
KD-20-BULK-FIREPROOFING-ASBESTOS-003	20	Exterior wall AB-34	2

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

TRC reviewed the *Initial Building Characterization Report*. This report presents the results of 40 supplemental screening samples of the settled dust from porous and non-porous surfaces and analyzed for asbestos using TEM. The samples were collected from various locations within the Building, including, but not limited to carpeting, counters, vent units, and above the ceiling tiles. The results revealed detectable levels of asbestos above the residential background level of 6,192 structures/cm^2 identified in the EPA *World Trade Center Background Study Report Interim Final* (April 2003). The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and the 40th/41st floor mechanical room. Asbestos was detected in dust at concentrations in excess of 6,192 structures/cm^2 in 24 of the 31 floors sampled by TEM analysis (77%). The samples containing asbestos ranged from a minimum concentration of less than 891 structures/cm^2 (from Floors 5, 24, 25, 28, 34, and 41) to a maximum concentration of 4,879,200 structures/cm^2 (from Floor 2). These results are generally greater than but within an order of magnitude of the SI results.

TRC reviewed the *Deutsche Bank Damage Assessment report: Contamination Report Pursuant to Testing Protocol-04, Spray-On Fireproofing Data Report* by RJ Lee Group, Inc. dated May 2003. The average and maximum asbestos concentrations of samples collected in the non-gash areas of the building were 1,953,000 str/cm^2 and 605,400,000 str/cm^2, respectively. The concentrations reported in the RJ Lee report are significantly higher than the concentrations found in this SI.

3.2 Lead

Ten microvacuum, one blank and 13 lead bulk samples were collected on various floors of the Building as detailed below. Microvacuum sample results ranged from less than 4 ug/ft^2 to 100 ug/ft^2 with an arithmetic average of 24 ug/ft^2. Lead was detected in one of the 13 bulk samples with a result of 0.02% lead. Using the weight and the known surface area of the sample collected, this equates to a result of 148,490 ug/ft^2. This high

concentration result is potentially due to the steal beam mill scale that was scraped off and included with the fireproofing upon sample collection. Therefore, this anomalous result has not been included in the evaluation and comparison to surface dust loading criteria. Sample results are provided in the attached Tables 3 and 4.

Sample ID	Floor	Location	Zone
ZD-001	39	ED-78	3
ZD-002	35	AB-56	3
ZD-003	30	DC-67	3
ZD-004	25	EC-23	3
ZD-005	15	AB-35	2
ZD-006	9	AB-45	2
ZD-007	8	DF-56	2
ZD-008	7	FE-46	2
ZD-009	4	FE-46	2
ZD-010	2	FE-13	2
SR-Pb-29-Vertical Column-001	29	West Column AB-23	3
SR-Pb-20-Vertical Column-002	20	West Column AB-23	2
SR-Pb-18-Vertical Column-003	18	West Column AB-23	2
SR-Pb-15-Vertical Column-004	15	West Column AB-23	2
SR-Pb-12-Vertical Column-005	12	West Column AB-23	2
SR-Pb-11-Vertical Column-006	11	West Column AB-23	2
SR-Pb-10-Vertical Column-007	10	West Column AB-23	2
SR-Pb-9-Vertical Column-008	9	West Column AB-23	2
SR-Pb-8-Vertical Column-009	8	West Column AB-23	2
SR-Pb-7-Vertical Column-010	7	West Column AB-23	2
KD-7-BULK-EXT.FIREPROOFING-001	7	Exterior wall GH-56	2
KD-4-BULK-EXT.FIREPROOFING-002	4	Exterior wall GH-34	2
KD-20-BULK-EXT.FIREPROOFING-003	20	Exterior wall AB-34	2

A limited data validation was performed on the above microvacuum and bulk samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the lead testing results collected from the Building dust samples. Lead was detected in 122 of 125 samples tested. Lead results of samples collected above the plenum ranged from 350 ug/m^2 (32.52 ug/ft^2) to 10,900 ug/m^2 (1,012.6 ug/ft^2). Lead results from samples collected below the plenum ranged from 150 ug/m^2 (13.92 ug/ft^2 - in Zone 3) to 101,000 ug/m^2 (9,383.2 ug/ft^2 - in Zone 1). These results are almost two orders of magnitude higher than the results of this SI.

RJ Lee's *TP-04 Spray–On Fireproofing Summary Report* indicated average and maximum lead concentrations of samples in the non-gash areas of this report were 30.3 ug/ft^2 and 264 ug/ft^2, respectively. These results are generally consistent with the SI results.

3.3 Silica

Thirteen bulk samples were collected at the same locations where lead samples were collected as detailed in section 3.2. The silica sample results ranged from less than 5.10 g/ft^2 to 37.54 g/ft^2 with an arithmetic average of 19.67 g/ft^2. These relatively high silica results are expected since silica is commonly found in fireproofing. In fact, silica comprised 2.2% to 5% of the fireproofing material. Sample results are provided in the attached Table 5.

A limited data validation was performed on the 13 bulk samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the quartz, a natural form of silica, testing results collected from the Building dust samples. Quartz was detected in 115 of the 118 samples tested. The samples containing quartz ranged from a low concentration of 500 ug/m^2 (464.5 ug/ft^2 - from Zone 2) to a maximum concentration of 10,000,000 ug/m^2 (929,030 ug/ft^2 - in Zone 1).

3.4 Dioxin

Thirteen dioxin bulk samples were collected at the same locations where lead samples were collected as detailed in Section 3.2. The dioxin sample results were converted to mass of dioxins per surface area units by using the sample weight and the surface area sampled. The World Health Organization (WHO) has established a convention whereby the results for all dioxin compounds are expressed as a toxicity equivalency concentration (TEQ). The TEQ is based upon TEF referenced to 2,3,7,8 TCDD, which is the most toxic of the dioxin compounds. The TEQ is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the toxicity equivalent factors (TEFs) are then added to obtain the TEQ for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. Results ranged from 13.5 nanograms per square meter (ng/m2) to 436 ng/m2 with an arithmetic average of 64.58 ng/m2. Sample results are provided in the attached Table 6.

A limited data validation was performed on the 13 bulk samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the dioxin testing results collected from the Building dust samples. Dioxin was detected in all 124 samples tested. The samples containing dioxin ranged from a low concentration of 1 ng/m^2 (from Zone 2) to a maximum concentration of 214 ng/m^2 (in Zone 5). These results are consistent with the highly variable nature of WTC dust. Results of this study were generally consistent with the concentrations found in the SI.

RJ Lee collected 1,552 dioxin/furan samples as outlined in the *TP-04 Spray-On Fireproofing Summary Report.* The results indicated average and maximum dioxin/furan results in the non-gash areas were 2,185 pg/g and 198,201 pg/g, respectively. In the SI, the average and maximum dioxin/furan results for the fireproofing were 16.68 pg/g and 158pg/g, respectively. The concentrations reported in the RJ Lee report are at least two orders of magnitude higher than the results reported in this SI.

3.5 Polycyclic Aromatic Hydrocarbons (PAHs)

Thirteen PAH bulk samples were collected at the same locations where lead samples were collected as detailed in section 3.2. The PAH sample results were converted using the sample weight and the surface area sampled. The carcinogenic PAHs results were used to calculate the benzo(a)pyrene (BaP) equivalent to measure the relative potency. The BaP equivalent is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the TEFs are then added to obtain the BaP equivalent for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. The BaP equivalent results ranged from 54.47 micrograms per square meter (ug/m^2) to 122.48 ug/m^2 with an arithmetic average of 90 ug/m^2. Sample results are provided in the attached Table 7.

A limited data validation was performed on the 13 bulk samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the PAH testing results collected from the Building dust samples. The samples containing PAH ranged from a low concentration of 3 ug/m^2 (from Zone 1) to a

maximum concentration of 11,555 ug/m^2 (in Zone 2). These results are greater than one order of magnitude above the results of the SI.

RJ Lee collected 1,502 PAH samples as outline in the *TP-04 Spray-On Fireproofing Summary Report*. The results indicated average and maximum PAH results in the non-gash areas were 189 ug/kg and 10,082 ug/kg, respectively. In this SI, the results indicated average and maximum PAH results in the interstitial spaces were 161.66 ug/kg and 241.52 ug/kg, respectively. The average and maximum BaP equivalent results in the interstitial spaces were 16 ug/kg and 45.53 ug/kg, respectively. In general, the results of the RJ Lee report were higher than the PAH concentrations found in this SI.

3.6 Man Made Vitreous Fibers (MMVF)

Three MMVF bulk samples were collected on various floors of the Building as detailed below. MMVF was expected to be detected because it is inherently part of fireproofing. Of the three samples, MMVFs were detected in two samples at 15% (4.22 grams) and 10% (2.18 grams) concentrations. Sample results summary is provided in the attached Table 8.

Asbestos Sample ID	Floor	Location	Zone
KD-7-Bulk-MMVF-FP-001	7	Exterior wall GH-56	2
KD-7-Bulk-MMVF-FP-002	4	Exterior wall GH-34	2
KD-7-Bulk-MMVF-FP-003	20	Exterior wall AB-34	2

A limited data validation was performed on the three bulk samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

4. FINDINGS

Sample results were compared to criteria provided in Section 1.2 and 1.3 and identified on the bottom of each table as well as the result of previous studies.

This SI has identified average asbestos concentrations on fireproofing surfaces that exceed the benchmark criteria provided in the May 2003 and September 2002 USEPA WTC Indoor Environmental Assessment studies, April 2003 Background Study, and are generally consistent with (although generally lower than) the concentrations identified in the *Initial Building Characterization Report.*

Lead was identified in the fireproofing in concentrations less than the USEPA risk based criteria and the Initial Building Characterization Report. Silica and MMVF were detected in high concentrations as expected, as they are inherent to fireproofing. SI fireproofing dioxin TEQ results were found to be generally consistent with concentrations found in the Initial Building Characterization Report, but below the September 2002 Tier I levels, which represent a one-year risk-based residential value. SI fireproofing PAH BaP equivalent results were found to be less than the *Initial Building Characterization Report* and USEPA risk-based concentrations.

While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

5. CONCLUSIONS AND RECOMMENDATIONS

COPCs were found within the dust on the surfaces of the fireproofing located within the Building. Concentrations were generally lower than the COPC levels found on the exposed surfaces as discussed in the *Initial Building Characterization Report,* however multiple samples and some arithmetic average results exceeded the USEPA residential health-based benchmark and background criteria. The results of the sampling and testing performed for this Supplemental Investigation revealed levels of contaminants that should be considered in connection with the deconstruction of the Building. Therefore, TRC recommends review of the results by federal, state, and local regulators and the fireproofing be handled in a manner that complies with applicable laws.

6. REFERENCES

Damage Assessment, 130 Liberty Street Property, Contamination Report Pursuant to Testing Protocol-04, Spray-On Fireproofing, Summary Report. RJ Lee Group, Inc., May 2003.

Initial Building Characterization Study Report, 130 Liberty Street, New York, New York. The Louis Berger Group, Inc., September 14, 2004.

Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part A). Interim Final. Office of Emergency and Remedial Response, Washington, D.C. United States Environmental Protection Agency, December 1989.

Sampling, Analysis, and Quality Assurance Project Plan, Supplement Investigation of 130 Liberty Street, New York, New York. TRC Environmental Corp., November 15, 2004.

Settled Asbestos Dust Sampling and Analysis. James R. Millette, Steven M. Hays, 1994.

World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

World Trade Center Background Study Report, Interim Final. United States Environmental Protection Agency, Region 2, April 2003.

Fireproofing Samples
LMDC
130 Liberty Street
New York
February 10, 2004

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Table 1
Fireproofing - Asbestos Surface Dust Sampling Results
Asbestos Microvacuum (ASTM D5755-03)

Fireproofing Samples
LMDC
130 Liberty Street
February 10, 2004

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Zone	Location	ASBESTOS (structures/cm^2)
ZD-001	030423955-0001	12/3/2004	Microvacuum	9	2	SE Area FE-12	<6270
ZD-002	030423955-0002	12/3/2004	Microvacuum	8	2	NW Area AB-56	23,300
ZD-003	030423955-0003	12/3/2004	Microvacuum	7	2	NE Area GH-56	126,000
ZD-004	030423955-0004	12/3/2004	Microvacuum	4	2	Elev. Lobby EF-56	2,750,000
ZD-005	030423955-0005	12/3/2004	Microvacuum	2	2	SE Area EF-12	72,200
ZD-006	030423955-000	12/3/2004	Microvacuum			Blank	19 Structures
ZD-001	030425020-0001	12/15/2004	Microvacuum	39	3	ED-78	44,200
ZD-002	030425020-0002	12/15/2004	Microvacuum	35	3	AB-56	22,800
ZD-003	030425020-0003	12/15/2004	Microvacuum	30	3	DC-67	5,920
ZD-004	030425020-0004	12/15/2004	Microvacuum	25	3	EC-23	4,650
ZD-005	030425020-0005	12/15/2004	Microvacuum	15	2	AB-35	<2,990
ZD-006	030425020-0006	12/15/2004	Microvacuum	9	2	AB-45	95,700
ZD-007	030425020-0007	12/15/2004	Microvacuum	8	2	DF-56	7,980
ZD-008	030425020-0008	12/15/2004	Microvacuum	7	2	FE-46	6,980
ZD-009	030425020-0009	12/15/2004	Microvacuum	4	2	FE-46	298,000
ZD-010	030425020-0010	12/15/2004	Microvacuum	2	2	FE-13	263,000
ZD-011	030425020-0011	12/15/2004	Microvacuum			Blank	Blank

	str/cm2
Arithmetic Mean (ND=1/2)*	75,073
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	6,192
September 2002 WTC Indoor Assessment[3]	
Tier I	>30,000
Tier II	>30,000 to background
Tier III	Background

* Averages only done for samples collected on 12/15/04 due to asbestos detected in blank for samples collected on 12/3/04.

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 2
Fireproofing - Asbestos Bulk Sampling Results
Asbestos Bulk (ELAP 198.1)

Fireproofing Samples
LMDC
130 Liberty Street
February 10, 2004

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	% Asbestos
KD-7-BULK-FIREPROOFING-ASBESTOS-001	040423812-0001	12/2/2004	Bulk	7	Exterior wall GH-56	NAD
KD-4-BULK-FIREPROOFING-ASBESTOS-002	040423812-0002	12/2/2004	Bulk	4	Exterior wall GH-34	NAD
KD-20-BULK-FIREPROOFING-ASBESTOS-003	040423812-0003	12/2/2004	Bulk	20	Exterior wall AB-34	NAD

NAD - No asbestos detected.

Table 3
Fireproofing - Lead Surface Dust Sampling Results
Lead Microvacuum (NIOSH 7082)

Fireproofing Samples
LMDC
130 Liberty Street
February 10, 2004

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Zone	Location	Lead (ug/ft^2)	Lead (ug/m^2)
ZD-001	030425032-0001	12/15/2004	Microvacuum	39	3	ED-78	11	118
ZD-002	030425032-0002	12/15/2004	Microvacuum	35	3	AB-56	<4	<43
ZD-003	030425032-0003	12/15/2004	Microvacuum	30	3	DC-67	11	118
ZD-004	030425032-0004	12/15/2004	Microvacuum	25	3	EC-23	18	194
ZD-005	030425032-0005	12/15/2004	Microvacuum	15	2	AB-35	20	215
ZD-006	030425032-0006	12/15/2004	Microvacuum	9	2	AB-45	31	334
ZD-007	030425032-0007	12/15/2004	Microvacuum	8	2	DF-56	13	140
ZD-008	030425032-0008	12/15/2004	Microvacuum	7	2	FE-46	16	172
ZD-009	030425032-0009	12/15/2004	Microvacuum	4	2	FE-46	100	1,076
ZD-010	030425032-0010	12/15/2004	Microvacuum	2	2	FE-13	15	161
ZD-011	030425032-0011	12/15/2004	Microvacuum			Blank	<4	<43

	ug/ft2
Arithmetic Mean (ND=1/2)	24
May 2003 Benchmark[1]	25
April 2003 Background Assessment[2]	1.78
September 2002 WTC Indoor Assessment[3]	
Tier I	>40
Tier II	40 to 25 (or background)
Tier III	<25 (or background)

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 4
Fireproofing - Lead Bulk Sampling Results
Lead (SW 846, 7420)

Fireproofing Samples
LMDC
130 Liberty Street
February 10, 2004

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Lead (ug/ft2)	Sample weight (grams)	Percent Lead by Weight
SR-Pb-29-Vertical Column-001	030422954-0001	11/19/2004	Bulk	29	West Column AB-23	148,490	742.45	0.02
SR-Pb-20-Vertical Column-002	030422954-0002	11/19/2004	Bulk	20	West Column AB-23	<0.075	753.21	<0.01
SR-Pb-18-Vertical Column-003	030422954-0003	11/19/2004	Bulk	18	West Column AB-23	<0.089	898.14	<0.01
SR-Pb-15-Vertical Column-004	030422954-0004	11/19/2004	Bulk	15	West Column AB-23	<0.073	729.83	<0.01
SR-Pb-12-Vertical Column-005	030422954-0005	11/19/2004	Bulk	12	West Column AB-23	<0.057	566.11	<0.01
SR-Pb-11-Vertical Column-006	030422954-0006	11/19/2004	Bulk	11	West Column AB-23	<0.069	689.51	<0.01
SR-Pb-10-Vertical Column-007	030422954-0007	11/19/2004	Bulk	10	West Column AB-23	<0.067	674.21	<0.01
SR-Pb-9-Vertical Column-008	030422954-0008	11/19/2004	Bulk	9	West Column AB-23	<0.067	670.06	<0.01
SR-Pb-8-Vertical Column-009	030422954-0009	11/19/2004	Bulk	8	West Column AB-23	<0.089	893.91	<0.01
SR-Pb-7-Vertical Column-010	030422954-0010	11/19/2004	Bulk	7	West Column AB-23	<0.091	915.36	<0.01
KD-7-BULK-EXT.FIREPROOFING-001	030423847-0001	12/2/2004	Bulk	7	Exterior wall GH-56	<0.014	138.6	<0.01
KD-4-BULK-EXT.FIREPROOFING-002	030423847-0002	12/2/2004	Bulk	4	Exterior wall GH-34	<0.008	77.8	<0.01
KD-20-BULK-EXT.FIREPROOFING-003	030423847-0003	12/2/2004	Bulk	20	Exterior wall AB-34	<0.008	79.1	<0.01

Table 5
Fireproofing- Silica
Bulk Materials (NIOSH 7500, Issue 3)

Fireproofing Samples
LMDC
130 Liberty Street
February 10, 2004

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Silica (grams/ft2)	Sample Weight (grams)
SR-SI-29-Vertical Column-001	040423150-0001	11/19/2004	Bulk	29	West Column AB-23	37.54	756.77
SR-SI-20-Vertical Column-002	040423150-0002	11/19/2004	Bulk	20	West Column AB-23	16.43	606.59
SR-SI-18-Vertical Column-003	040423150-0003	11/19/2004	Bulk	18	West Column AB-23	16.75	753.53
SR-SI-15-Vertical Column-004	040423150-0004	11/19/2004	Bulk	15	West Column AB-23	22.61	730.52
SR-SI-12-Vertical Column-005	040423150-0005	11/19/2004	Bulk	12	West Column AB-23	23.02	701.86
SR-SI-11-Vertical Column-006	040423150-0006	11/19/2004	Bulk	11	West Column AB-23	25.66	785.59
SR-SI-10-Vertical Column-007	040423150-0007	11/19/2004	Bulk	10	West Column AB-23	22.12	714.71
SR-SI-9-Vertical Column-008	040423150-0008	11/19/2004	Bulk	9	West Column AB-23	22.39	668.99
SR-SI-8-Vertical Column-009	040423150-0009	11/19/2004	Bulk	8	West Column AB-23	23.12	809.03
SR-SI-7-Vertical Column-010	040423150-0010	11/19/2004	Bulk	7	West Column AB-23	23.82	1063.34
KD-7-SILICA-BULK-EXT-F.P.-001	040423812-0001	12/2/2004	Bulk	7	Exterior wall GH-56	11.60	179.66
KD-4-SILICA-BULK-EXT-F.P.-002	040423812-0002	12/2/2004	Bulk	4	Exterior wall GH-34	5.10	63.4
KD-20-SILICA-BULK-EXT-F.P.-003	040423812-0003	12/2/2004	Bulk	20	Exterior wall AB-34	5.50	91.97

	g/ft2
Arithmetic Mean	19.67
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	>0.0000796 (expressed as quartz)
September 2002 WTC Indoor Assessment[3]	
Tier I	–
Tier II	above background
Tier III	background

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 6
Fireproofing - Dioxin
Dioxin (SW 846-8290)

Fireproofing Samples
LMDC
130 Liberty Street
February 10, 2004

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	WHO TEQ (ND=1/2; ng/m2)
SR-Dioxin-29-Vertical Column-001	G220-19-1B	11/19/2004	Bulk	29	West Column AB-23	38.6
SR-Dioxin-20-Vertical Column-002	G220-19-2B	11/19/2004	Bulk	20	West Column AB-23	40.0
SR-Dioxin-18-Vertical Column-003	G220-19-3B	11/19/2004	Bulk	18	West Column AB-23	49.8
SR-Dioxin-15-Vertical Column-004	G220-19-4B	11/19/2004	Bulk	15	West Column AB-23	43.7
SR-Dioxin-12-Vertical Column-005	G220-19-5B	11/19/2004	Bulk	12	West Column AB-23	27.7
SR-Dioxin-11-Vertical Column-006	G220-19-6B	11/19/2004	Bulk	11	West Column AB-23	27.0
SR-Dioxin-10-Vertical Column-007	G220-19-7B	11/19/2004	Bulk	10	West Column AB-23	41.1
SR-Dioxin-9-Vertical Column-008	G220-19-8B	11/19/2004	Bulk	9	West Column AB-23	24.7
SR-Dioxin-8-Vertical Column-009	G220-19-9B	11/19/2004	Bulk	8	West Column AB-23	34.3
SR-Dioxin-7-Vertical Column-010	G220-19-10B	11/19/2004	Bulk	7	West Column AB-23	49.6
KD-7-Bulk-Diox-FP-Ext.Wall-001	G220-26-1B	12/2/2004	Bulk	7	Exterior wall GH-56	436
KD-4-Bulk-Diox0FP-Ext.Wall-002	G220-26-2B	12/2/2004	Bulk	4	Exterior wall GH-34	13.5
KD-20-Bulk-Diox-FP-ExtWall-003	G220-26-3B	12/2/2004	Bulk	20	Exterior wall AB-34	13.5

	ng/m2
Arithmetic Mean	64.58
May 2003 Benchmark[1]	2.0
April 2003 Background Assessment[2]	0.693
September 2002 WTC Indoor Assessment[3]	
Tier I	>120
Tier II	120 to 4 (or background)
Tier III	<4 (or background)

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 7
Fireproofing - Polycyclic Aromatic Hydrocarbons (PAH)
PAH Wipe (SW 846, 8270C)

Fireproofing Samples
LMDC
130 Liberty Street
February 10, 2004

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	PAH (ug/m2)	Benzo(a)Pyrene Equivalent (ug/m2)
SR-PAH-29-Vertical Column-001	G220-20-1B	11/19/2004	Bulk	29	West Column AB-23	2,185.00	115.12
SR-PAH-20-Vertical Column-002	G220-20-2B	11/19/2004	Bulk	20	West Column AB-23	2,003.60	90.90
SR-PAH-18-Vertical Column-003	G220-20-3B	11/19/2004	Bulk	18	West Column AB-23	1,757.00	85.68
SR-PAH-15-Vertical Column-004	G220-20-4B	11/19/2004	Bulk	15	West Column AB-23	1,875.00	93.01
SR-PAH-12-Vertical Column-005	G220-20-5B	11/19/2004	Bulk	12	West Column AB-23	1,200.20	54.47
SR-PAH-11-Vertical Column-006	G220-20-6B	11/19/2004	Bulk	11	West Column AB-23	2,071.80	63.84
SR-PAH-10-Vertical Column-007	G220-20-7B	11/19/2004	Bulk	10	West Column AB-23	1,650.70	70.66
SR-PAH-9-Vertical Column-008	G220-20-8B	11/19/2004	Bulk	9	West Column AB-23	2,501.00	80.28
SR-PAH-8-Vertical Column-009	G220-20-9B	11/19/2004	Bulk	8	West Column AB-23	2,012.00	80.26
SR-PAH-7-Vertical Column-010	G220-20-10B	11/19/2004	Bulk	7	West Column AB-23	1,954.00	102.74
KD-7-BULK-EXT.FIREPROOFING-001	G220-25-1B	12/2/2004	Bulk	7	Exterior wall GH-56	226.90	105.03
KD-4-BULK-EXT.FIREPROOFING-002	G220-25-2B	12/2/2004	Bulk	4	Exterior wall GH-34	283.30	108.96
KD-20-BULK-EXT.FIREPROOFING-003	G220-25-3B	12/2/2004	Bulk	20	Exterior wall AB-34	373.00	122.48

Benzo(a)Pyrene Equivalent determined using 1/2 the detection limit.

	ug/m2 - BaP Equivalent
BaP Arithmetic Mean (ND=1/2)	90
May 2003 Benchmark[1]	150
April 2003 Background Assessment[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>9,000
Tier II	9,000 to 300 (or background)
Tier III	<300 (or background)

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 8
Fireproofing - Man Made Vitreous Fibers (MMVF)
MMVF Bulk (EMSL MSD 0310)

Fireproofing Samples
LMDC
130 Liberty Street
February 10, 2004

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Zone	MMVF (Percent)	Sample Weight (grams)	MMVF (grams)
Curtain wall								
KD-7-Bulk-MMVF-FP-001	360401087-0001	12/3/2004	Wipe	7	2	15.00	28.13	4.22
KD-7-Bulk-MMVF-FP-002	360401087-0002	12/3/2004	Wipe	7	2	<0.1	25.21	<0.03
KD-7-Bulk-MMVF-FP-003	360401087-0003	12/3/2004	Wipe	7	2	10.00	21.76	2.18

	str/cm2
Arithmetic Mean (ND=1/2)	2.14
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>100,000
Tier II	100,000 to background
Tier III	background

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

130 Liberty Street

New York, New York

Supplemental Investigation Summary Report

Vertical Shafts Sampling Summary Results

Prepared for:
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan Development Corporation

Prepared By:

TRC
Customer-Focused Solutions

TRC Environmental Corp.
1430 Broadway, 10th Floor
New York, New York 10018

February 10, 2005

1. INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents the results of the supplemental investigation and testing of the previously inaccessible interior vertical shafts (i.e. pipe, duct, and elevator shafts) within the Building.

1.1 Background

The Building is located across the street and south of the WTC site and is a former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

In addition, Berger recommended performing preliminary waste characterization.

This supplemental investigation summary presents the results of additional inspection and sampling performed by TRC of the previously inaccessible vertical shafts within the Building. Supplemental investigations regarding curtain wall cavity, cell systems within floors, heating, ventilation, and air conditioning (HVAC) ductwork, interstitial spaces within interior walls and column cavities, exterior building surfaces, fireproofing, waste characterization, and visual inspection of the Building for mold and asbestos containing building materials (ACBM) are addressed in separate summaries.

As part of the supplemental investigation, TRC collected the following samples:

COPC	Asbestos	Lead	Silica	Dioxin	PAH	MMVF
Total Samples	126	106	35	55	55	27

For the interior vertical shafts within 130 Liberty Street, TRC collected fifteen (15) representative surface wipe samples for the United States Environmental Protection Agency (USEPA) contaminants of potential concern (COPCs) list analysis. The COPC list includes asbestos, lead, man-made vitreous fibers (MMVF), silica, polynuclear aromatic hydrocarbons (PAHs) and dioxins.

TRC utilized a tiered approach to sample analysis. All asbestos and lead wipe samples were analyzed and the results reviewed. Results of this study were compared to the findings in the *Initial Building Characterization Report,* benchmark, and background concentrations presented in previous environmental studies as detailed in the following sections. If surface concentrations of asbestos and lead were found to be similar to the *Initial Building Characterization Report* and elevated when compared to benchmark and background concentrations, further analysis for the remaining COPCs was not conducted. If surface concentrations of asbestos and lead were found to be less than the *Initial Building Characterization Report,* benchmark, and background concentrations, further analysis for the remaining COPCs was conducted.

1.3 Previous Environmental Studies

Several studies concerning WTC-related contaminants have been performed by, or with the review of, the federal, state, and local regulatory authorities in the aftermath of the events of September 11, 2001. In particular, the USEPA has been responsible for studies associated with the development of the EPA's list of COPCs, as discussed in this section.

The USEPA COPC Committee developed, in their *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health Based Benchmarks, Peer Review Draft (September 2002),* a tiered approach to evaluate the health risks posed by contaminants that might be present in an indoor environment (air and settled dust) for residential reoccupancy. For each COPC, three levels were developed:

Tier I - Level above which, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), aggressive clean-up action should be taken expeditiously along with follow-up sampling to confirm attainment of Tier III level.

Tier II - Range where diligent cleaning should continue, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), with follow-up sampling to confirm attainment of Tier III level.

Tier III - Level below which the risk is negligible or consistent with the New York City background level found in the USEPA Background Study as identified below.

These levels were established for residential reoccupancy. The Tier I screening level was intended to be protective of a resident who may have been exposed to WTC-related contaminants in their residence for one year. The Tier III clearance level was intended to be protective of a resident who is exposed to WTC-related contaminants in their residence for 30 years, which was the upper-bound estimate for residency in one dwelling. For asbestos and lead in settled dust, the tiered values are as follows:

ASBESTOS

Tier	Settled Dust
I	>30,000 str/cm2
II	30,000 str/cm2 to background
III	Background

LEAD

Tier	Settled Dust
I	>40 ug/ft2
II	40 ug/ft2 to 25 ug/ft2 (or background)
III	<25 ug/ft2 (or background)

These levels were developed to be risk-based levels for residential settings. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

Subsequent to peer review of the September 2002 report, the USEPA COPC Committee developed, in their *World Trade Center Indoor Environmental Assessment: Selecting Health-Based Benchmarks (May 2003)* report, health based benchmarks that reflected only the Tier III levels.

The USEPA, Region 2, also developed the *World Trade Center Background Study Report (April 2003).* The objective of this study was to determine and/or estimate indoor baseline levels or background concentrations for the presence of specific contaminants in residential buildings unaffected by the WTC disaster. The average background concentrations for asbestos and lead in settled dust on hard surfaces are 6,192 structures per square centimeter (str/cm^2) and 1.78 micrograms per square foot (ug/ft^2), respectively.

Based on the text by Millette and Hays, *Settled Asbestos Dust Sampling and Analysis*, levels of asbestos in settled dust as determined by the microvacuum techniques are considered low if less than 1,000 str/cm^2. Levels above 10,000 str/cm^2 are considered generally above background. Levels above 100,000 str/cm^2 are considered high and in the range of significant accidental release from an abatement site.

1.4 Purpose and Objectives

The objective of the SI is to provide additional information relative to the concentrations of COPCs within previously inaccessible spaces. This SI summary presents the results specifically for the vertical shafts (i.e. duct, pipe, and elevator shafts) investigation.

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference

information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

2. METHODOLOGY

This section presents the methodologies implemented for the dust characterization for asbestos and lead in the vertical shafts. These tasks were implemented in accordance with the *Sampling Analysis and Quality Assurance Project Plan* (SAQAPP) developed by TRC dated November 15, 2004.

TRC collected representative surface wipe samples for asbestos and lead from the vertical shafts, elevator shafts, and elevator pits. The vertical shafts were accessed by cutting a hole into the shaft wall. Each elevator shaft was accessed via the roof hatch of each elevator.

Asbestos surface wipe samples were collected and analyzed per methods detailed in the American Society for Testing Materials (ASTM) standard test method D6480-99. Asbestos bulk samples were collected and analyzed per methods detailed in the New York State Environmental Laboratory Approval Program (NYS ELAP) test method 198.1. Lead wipe samples were collected following the United States Department of Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing Appendix 13.1 and analyzed as per analytical method USEPA SW-846 7420.

Samples were properly labeled as per the SAQAPP and delivered to the EMSL Analytical Inc. laboratory, an independent New York State Department of Health certified laboratory.

3. RESULTS

3.1 Asbestos

Fifteen asbestos wipe, one duplicate, two blanks, and ten bulk dust samples were collected on various floors of the Building as detailed below. Samples were divided up by Zone, as described in the *Initial Building Characterization Report*. Zones 2 and 3 apply to TRC's study and are defined as follows:

> Zone 2: Office space located at or below the 24th Floor that may have been subjected to dust entering the Building through the Gash, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows.
>
> Zone 3: Office space located above the 24th Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows.

Wipe sample results ranged from less than 6,820 structures per square centimeter (str/cm^2) to 134,000 str/cm^2. Six (6) of the fifteen (15) samples exceeded the Tier I value of 30,000 str/cm^2. The arithmetic mean concentration for these eleven results was 37,374 str/cm^2 using one-half the detection limit for non-detected sample results. No asbestos was detected in the ten bulk samples. Sample results are provided in the attached Tables 1 and 3.

Asbestos Sample ID	Floor	Location	Zone
KD-ASB-W-29-VERTICAL SHAFT-001	29	Vertical Shaft	3
KD-ASB-W-20-VERTICAL SHAFT-002	20	Vertical Shaft	2
KD-ASB-W-18-VERTICAL SHAFT-003	18	Vertical Shaft	2
KD-ASB-W-15-VERTICAL SHAFT-004	15	Vertical Shaft	2
KD-ASB-W-12-VERTICAL SHAFT-005	12	Vertical Shaft	2
KD-ASB-W-10-VERTICAL SHAFT-006	10	Vertical Shaft	2
KD-ASB-W-8-VERTICAL SHAFT-007	8	Vertical Shaft	2
KD-ASB-W-7-VERTICAL SHAFT-008	7	Vertical Shaft	2
KD-ASB-W-9-VERTICAL SHAFT-009	9	Vertical Shaft	2
KD-ASB-W-11-VERTICAL SHAFT-010	11	Vertical Shaft	2
KD-001-ASB-ELEVATOR SHAFT-18FL WALL-CAR26	4	Elevator Shaft	2
KD-002-ASB-ELEVATOR SHAFT-22FL WALL-CAR26	22	Elevator Shaft	2
KD-003-ASB-ELEVATOR SHAFT-31FL WALL-CAR26	31	Elevator Pit	3
KD-004-ASB-ELEVATOR PIT-1ST FL-1TO4	1	Elevator Pit	2
KD-005-ASB-ELEVATOR PIT-1DTFL-	1	Metal plate wall	2

Asbestos Sample ID	Floor	Location	Zone
20TO22			
KD-002	35	Pipe Shaft, ED-34	3
KD-003	2	Pipe Shaft, DC-56	2
KD-004	4	Pipe Shaft, DB-34	2
KD-002	1	Elevator Pits 1-4	2
KD-003	1	Elevator Pits 20-22	2
KD-004	1	Elevator Pits 17-19	2
KD-005	39	Elevator top, car 26, wall & hatch	3
KD-006	31	Elevator shaft wall, car 26	3
KD-007	22	Elevator shaft wall, car 26	2
KD-008	19	Elevator shaft wall, car 26	2

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes. For the wipe samples, potential uncertainty exists in the concentrations of the positive results for asbestos in select samples due to variability in the field duplicate results. This issue may have a minor impact on the data usability.

TRC reviewed the *Initial Building Characterization Report.* Berger collected 40 supplemental screening samples of the settled dust from porous and non-porous surfaces and analyzed for asbestos using TEM. The samples were collected from various places within the Building, including, but not limited to carpeting, counters, vent units, and above the ceiling tiles. The results revealed detectable levels of asbestos above the residential background level of 6,192 structures/cm^2 identified in the EPA *World Trade Center Background Study Report Interim Final* (April 2003). The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and the 40th/41st floor mechanical room. Asbestos was detected in dust at concentrations in excess of 6,192 structures/cm^2 in 24 of the 31 floors sampled by TEM analysis (77%). The samples containing asbestos ranged from a minimum concentration of less than 891 structures/cm^2 (from Floors 5, 24, 25, 28, 34, and 41) to a maximum concentration of 4,879,200 structures/cm^2 (from Floor 2). These results are relatively greater than the vertical shafts SI results.

TRC reviewed the *Deutsche Bank Damage Assessment report: Contamination Report Pursuant to Testing Protocol-12, Elevator and Elevator Shafts Summary Report* by RJ Lee Group, Inc. dated December 2003. The average and maximum asbestos

concentrations of this report were 4,198,000 str/cm^2 and 71,390,000 str/cm^2, respectively. Although the concentrations reported in the RJ Lee report are significantly higher than the concentrations found in this SI, both reports identify the presence of asbestos in surface dust in the elevator shafts.

3.2 Lead

Fifteen lead wipe samples, one duplicate, and two blank samples were collected on various floors of the Building as detailed below. Sample results ranged from less than 10 ug/ft^2 to 340 ug/ft^2 with an arithmetic average of 116 ug/ft^2. Sample results are provided in the attached Table 2.

Sample ID	Floor	Location	Zone
KD-Pb-W-29-VERTICAL SHAFT-001	29	Vertical Shaft	3
KD-Pb-W-20-VERTICAL SHAFT-002	20	Vertical Shaft	2
KD-Pb-W-18-VERTICAL SHAFT-003	18	Vertical Shaft	2
KD-Pb-W-15-VERTICAL SHAFT-004	15	Vertical Shaft	2
KD-Pb-W-12-VERTICAL SHAFT-005	12	Vertical Shaft	2
KD-Pb-W-10-VERTICAL SHAFT-006	10	Vertical Shaft	2
KD-Pb-W-8-VERTICAL SHAFT-007	8	Vertical Shaft	2
KD-Pb-W-7-VERTICAL SHAFT-008	7	Vertical Shaft	2
KD-Pb-W-9-VERTICAL SHAFT-009	9	Vertical Shaft	2
KD-Pb-W-11-VERTICAL SHAFT-010	11	Vertical Shaft	2
KD-001-LEAD-ELEVATOR SHAFT 18 FL WALL-CAR 26	18	Elevator Shaft	2
KD-002-LEAD-ELEVATOR SHAFT 22 FL-WALL-CAR 26	22	Elevator Shaft	2
KD-003-LEAD-ELEVATOR SHAFT-31 FL-WALL-CAR 26	31	Elevator Shaft	3
KD-004-LEAD-ELEVATOR SHAFT-1 FL -1 TO 4 PIT	1	Pit room-elevator counter weights 1-4	2
KD-005-LEAD-ELEVATOR SHAFT-1 FL-20 TO 22 PIT	1	Pit room-elevator counter weights 20-22	2

A limited data validation was performed on the above samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the lead testing results collected from the Building dust samples. Lead was detected in 122 of 125 samples tested. Lead results of samples collected above the plenum ranged

from 350 ug/m^2 (32.52 ug/ft^2) to 10,900 ug/m^2 (1,012.6 ug/ft^2). Lead results from samples collected below the plenum ranged from 150 ug/m^2 (13.92 ug/ft^2 - in Zone 3) to 101,000 ug/m^2 (9,383.2 ug/ft^2 - in Zone 1). This variation in lead concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The report has identified lead concentrations within the Building that exceed both the background residential level and the health-based benchmark identified in the EPA studies in 121 of the 125 samples tested (97%). These results are relatively greater than the vertical shafts SI results.

The *Elevator and Elevator Shaft Summary Report* indicated average and maximum lead results were 970 ug/ft^2 and 27,000 ug/ft^2, respectively. Although the concentrations listed in this RJ Lee report are higher than the concentrations found in this SI, both reports identify the presence of lead in surface dust in the elevator shafts.

4. FINDINGS

Sample results were compared to criteria provided in Section 1.2 and 1.3 and identified on the bottom of Tables 1 through 3. This Supplemental Investigation has identified average asbestos and lead concentrations in the interior of the vertical and elevator shafts that exceed the benchmark criteria provided in the May 2003 and September 2002 WTC Indoor Air Assessment studies, April 2003 background study, and are generally consistent with the concentrations identified in the *Initial Building Characterization Report.* Therefore, the remaining COPC wipe samples were not analyzed. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

5. CONCLUSIONS AND RECOMMENDATIONS

Asbestos and lead were found within the dust on the surfaces of the interior of the vertical shafts. Concentrations were generally lower than the asbestos and lead levels discussed in the *Initial Building Characterization Report* and the RJ Lee *Elevator and Elevator Shaft Summary Report* for the dust in the exposed areas, however multiple samples and arithmetic average results exceeded the USEPA residential health-based benchmark and background criteria. The results of the sampling and testing performed for this Supplemental Investigation revealed levels of contaminants that should be considered in connection with the deconstruction of the Building. Therefore, TRC recommends review of the results by federal, state, and local regulators and that the vertical shafts be handled in a manner that complies with applicable laws.

6. REFERENCES

Damage Assessment, 130 Liberty Street Property, Contamination Report Pursuant to Testing Protocol-12, Elevator and Elevator Shafts, Summary Report. RJ Lee Group, Inc., December 2003.

Initial Building Characterization Study Report, 130 Liberty Street, New York, New York. The Louis Berger Group, Inc., September 14, 2004.

Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part A). Interim Final. Office of Emergency and Remedial Response, Washington, D.C. United States Environmental Protection Agency, December 1989.

Sampling, Analysis, and Quality Assurance Project Plan, Supplement Investigation of 130 Liberty Street, New York, New York. TRC Environmental Corp., November 15, 2004.

Settled Asbestos Dust Sampling and Analysis. James R. Millette, Steven M. Hays, 1994.

World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

World Trade Center Background Study Report, Interim Final. United States Environmental Protection Agency, Region 2, April 2003.

Supplemental Investigation
Vertical Shafts Surface Sample Results
LMDC
130 Liberty Street
New York, New York
February 10, 2005

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Table 1
Vertical Shafts - Asbestos
Asbestos Wipe (SW 6480-99)

Vertical Shafts Surface Sample Results
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	ASBESTOS (structures/cm^2)
KD-ASB-W-29-VERTICAL SHAFT-001	030422803-0001	11/18/2004	Wipe	29	Sheetrock	**59,800**
KD-ASB-W-29-VERTICAL SHAFT-001 QA/QC	030422803-0002	11/18/2004	Wipe	29	Sheetrock	29,900
KD-ASB-W-20-VERTICAL SHAFT-002	030422803-0003	11/18/2004	Wipe	20	Sheetrock	29,900
KD-ASB-W-18-VERTICAL SHAFT-003	030422803-0004	11/18/2004	Wipe	18	Sheetrock	<14,200
KD-ASB-W-15-VERTICAL SHAFT-004	030422803-0005	11/18/2004	Wipe	15	Sheetrock	<14,900
KD-ASB-W-12-VERTICAL SHAFT-005	030422803-0006	11/18/2004	Wipe	12	Sheetrock	14,300
KD-ASB-W-10-VERTICAL SHAFT-006	030422803-0007	11/18/2004	Wipe	10	Sheetrock	<14,900
KD-ASB-W-8-VERTICAL SHAFT-007	030422803-0008	11/18/2004	Wipe	8	Sheetrock	<14,900
KD-ASB-W-7-VERTICAL SHAFT-008	030422803-0009	11/18/2004	Wipe	7	Sheetrock	**134,000**
KD-ASB-W-9-VERTICAL SHAFT-009	030422803-0010	11/18/2004	Wipe	9	Sheetrock	**39,800**
KD-ASB-W-11-VERTICAL SHAFT-010	030422803-0011	11/18/2004	Wipe	11	Sheetrock	<14,900
KD-ASB-W-000-VERTICAL SHAFT-FB1	030422803-0012	11/18/2004	Wipe	FB	Blank	Blank
KD-001-ASB-ELEVATOR SHAFT-18FL WALL-CAR2(	030424469-0001	12/9/2004	Wipe	18	Metal plate wall	**37,600**
KD-002-ASB-ELEVATOR SHAFT-22FL WALL-CAR2(	030424469-0002	12/9/2004	Wipe	22	Metal plate wall	13,700
KD-003-ASB-ELEVATOR SHAFT-31FL WALL-CAR2(	030424469-0003	12/9/2004	Wipe	31	Metal plate wall	<6,820
KD-004-ASB-ELEVATOR PIT-1ST FL-1TO4	030424469-0004	12/9/2004	Wipe	1	Metal plate wall	**72,200**
KD-005-ASB-ELEVATOR PIT-1DTFL-20TO22	030424469-0005	12/9/2004	Wipe	1	Metal plate wall	**119,000**
KD-0002-BL-BLANK-000-FL	030424469-0006	12/9/2004	Wipe	FB	Blank	Blank

	str/cm2
Arithmetic Mean (ND=1/2)	37,374
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	6,192
September 2002 WTC Indoor Assessment[3]	
Tier I	>30,000
Tier II	>30,000 to background
Tier III	Background

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 2
Vertical Shafts - Lead
Lead Wipe (SW-846 7420)

Vertical Shafts Surface Sample Results
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Lead (ug/ft^2)	Lead (ug/m^2)
KD-Pb-W-29-VERTICAL SHAFT-001	030422874-0001	11/18/2004	Wipe	29	Sheetrock	**140**	**1,507**
KD-Pb-W-29-VERTICAL SHAFT-001 QA/QC	030422874-0002	11/18/2004	Wipe	29	Sheetrock	**140**	**1,507**
KD-Pb-W-20-VERTICAL SHAFT-002	030422874-0003	11/18/2004	Wipe	20	Sheetrock	21	**226**
KD-Pb-W-18-VERTICAL SHAFT-003	030422874-0004	11/18/2004	Wipe	18	Sheetrock	13	**140**
KD-Pb-W-15-VERTICAL SHAFT-004	030422874-0005	11/18/2004	Wipe	15	Sheetrock	24	**258**
KD-Pb-W-12-VERTICAL SHAFT-005	030422874-0006	11/18/2004	Wipe	12	Sheetrock	32	**344**
KD-Pb-W-10-VERTICAL SHAFT-006	030422874-0007	11/18/2004	Wipe	10	Sheetrock	38	**409**
KD-Pb-W-8-VERTICAL SHAFT-007	030422874-0008	11/18/2004	Wipe	8	Sheetrock	**67**	**721**
KD-Pb-W-7-VERTICAL SHAFT-008	030422874-0009	11/18/2004	Wipe	7	Sheetrock	**<10**	**<108**
KD-Pb-W-9-VERTICAL SHAFT-009	030422874-0010	11/18/2004	Wipe	9	Sheetrock	**41**	**441**
KD-Pb-W-11-VERTICAL SHAFT-010	030422874-0011	11/18/2004	Wipe	11	Sheetrock	**160**	**1,722**
KD-Pb-W-000-VERTICAL SHAFT-FB1	030422874-0012	11/18/2004	Wipe	FB	Blank	<10	**<108**
KD-001-LEAD-ELEVATOR SHAFT 18 FL WALL-CAR 26	030424472-0001	12/9/2004	Wipe	18	Metal plate wall	**88**	**947**
KD-002-LEAD-ELEVATOR SHAFT 22 FL-WALL-CAR 26	030424472-0002	12/9/2004	Wipe	22	Metal plate wall	**110**	**1,184**
KD-003-LEAD-ELEVATOR SHAFT-31 FL-WALL-CAR 26	030424472-0003	12/9/2004	Wipe	31	Metal plate wall	**310**	**3,337**
KD-004-LEAD-ELEVATOR SHAFT-1 FL -1 TO 4 PIT	030424472-0004	12/9/2004	Wipe	1	Pit room-elevator counter weights 1-4	**340**	**3,660**
KD-005-LEAD-ELEVATOR SHAFT-1 FL-20 TO 22 PIT	030424472-0005	12/9/2004	Wipe	1	Pit room-elevator counter weights 20-22	**240**	**2,583**
KD-000-BL-BLANK-000FL	030424472-0006	12/9/2004	Wipe	FB	Blank	<10	**<108**

	ug/ft2
Arithmetic Mean (ND=1/2)	109
May 2003 Benchmark[1]	25
April 2003 Background Assessment[2]	1.78
September 2002 WTC Indoor Assessment[3]	
Tier I	>40
Tier II	40 to 25 (or background)
Tier III	<25 (or background)

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Contaminants of Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 3
Vertical Shafts - Asbestos Bulk
Asbestos Bulk (NYS ELAP 198.1)

Vertical Shafts Surface Sample Results
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	ASBESTOS (%)
KD-002	030424266-0001	12/7/2004	Bulk	35	Pipe Shaft, ED-34	ND
KD-003	030424266-0002	12/7/2004	Bulk	2	Pipe Shaft, DC-56	ND
KD-004	030424266-0003	12/7/2004	Bulk	4	Pipe Shaft, DB-34	ND
KD-002	030424267-0001	12/7/2004	Bulk	1	Elevator Pits 1-4	ND
KD-003	030424267-0002	12/7/2004	Bulk	1	Elevator Pits 20-22	ND
KD-004	030424267-0003	12/7/2004	Bulk	1	Elevator Pits 17-19	ND
KD-005	030424267-0004	12/7/2004	Bulk	39	Elevator top, car 26, wall & hatch	ND
KD-006	030424267-0005	12/7/2004	Bulk	31	Elevator shaft wall, car 26	ND
KD-007	030424267-0006	12/7/2004	Bulk	22	Elevator shaft wall, car 26	ND
KD-008	030424267-0007	12/7/2004	Bulk	19	Elevator shaft wall, car 26	ND

ND = Not Detected

130 Liberty Street

New York, New York

Supplemental Investigation Summary Report

Interior Wall Interstitial Space Sampling Summary Results

Prepared for:
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan
Development Corporation

Prepared By:

TRC
Customer-Focused Solutions

TRC Environmental Corp.
1430 Broadway, 10th Floor
New York, New York 10018

February 10, 2005

1. INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents the results of the supplemental investigation and testing of the previously inaccessible interior wall interstitial spaces within the Building.

1.1 Background

The Building is located across the street and south of the WTC site and is a former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

In addition, Berger recommended performing preliminary waste characterization.

This SI summary presents the results of additional inspection and sampling performed by TRC of the previously inaccessible interior wall interstitial spaces within the Building. SIs regarding curtain wall cavity, heating, ventilation, and air conditioning (HVAC) ductwork, cell systems within floors, fireproofing, exterior building surfaces, waste characterization, and visual inspection of the Building for mold and asbestos containing building materials (ACBM) are addressed in separate summaries.

As part of the supplemental investigation, TRC collected the following samples:

COPC	Asbestos	Lead	Silica	Dioxin	PAH	MMVF
Total Samples	126	106	35	55	55	27

For the interior wall interstitial spaces within 130 Liberty Street, TRC collected ten representative surface wipe samples for asbestos, lead, silica, polycyclic aromatic hydrocarbons (PAHs), man-made vitreous fibers (MMVF), and dioxins analysis. In addition, three bulk samples were collected for asbestos. Asbestos, lead, silica, PAHs, dioxins, and MMVF make up the United States Environmental Protection Agency (USEPA) contaminants of potential concern (COPCs) list.

TRC utilized a tiered approach to sample analysis. All asbestos and lead wipe samples were analyzed and the results reviewed. Results of this study were compared to the findings in the *Initial Building Characterization Report* and benchmark and background concentrations presented in previous environmental studies as detailed in the following sections. If surface concentrations of asbestos and lead were found to be similar to the *Initial Building Characterization Report* and elevated when compared to benchmark and background concentrations, further analysis for the remaining COPCs was not conducted. If surface concentrations of asbestos and lead were found to be less than the *Initial Building Characterization Report,* benchmark, and background concentrations, further analysis for the remaining COPCs was conducted.

1.3 Previous Environmental Studies

Several studies concerning WTC-related contaminants have been performed by, or with the review of, the federal, state, and local regulatory authorities in the aftermath of the events of September 11, 2001. In particular, the USEPA has been responsible for studies associated with the development of the EPA's list of COPCs, as discussed in this section.

The USEPA COPC Committee developed, in their *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health Based Benchmarks, Peer Review Draft (September 2002),* a tiered approach to evaluate the

health risks posed by contaminants that might be present in an indoor environment (air and settled dust) for residential reoccupancy. For each COPC, three levels were developed:

Tier I - Level above which, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), aggressive clean-up action should be taken expeditiously along with follow-up sampling to confirm attainment of Tier III level.

Tier II - Range where diligent cleaning should continue, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), with follow-up sampling to confirm attainment of Tier III level.

Tier III - Level below which the risk is negligible or consistent with the New York City background level found in the USEPA Background Study as identified below.

These levels were established for residential reoccupancy. The Tier I screening level was intended to be protective of a resident who may have been exposed to WTC-related contaminants in their residence for one year. The Tier III clearance level was intended to be protective of a resident who is exposed to WTC-related contaminants in their residence for 30 years, which was the upper-bound estimate for residency in one dwelling. For COPCs in settled dust, the tiered values are as follows:

	Settled Dust		
COPC	**Tier I**	**Tier II**	**Tier III**
Asbestos (str/cm2)	>30,000	30,000 to background	Background
Lead (ug/ft2)	>40	40 to 25 (or background)	<25 (or background)
Silica	--	Above background	Background
PAH (mg/m2)	>9	9 to 0.3 (or background)	<0.3 (or background)
MMVF (str/cm2)	>100,000	100,000 to background	Background
Dioxin (ng/m2)	>120	120 to 4 (or background)	<4 (or background)

These levels were developed to be risk-based levels for residential settings. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

Subsequent to peer review of the September 2002 report, the USEPA COPC Committee developed, in their *World Trade Center Indoor Environmental Assessment: Selecting Health-Based Benchmarks (May 2003)* report, health based benchmarks that reflected only the Tier III levels.

The USEPA, Region 2, also developed the *World Trade Center Background Study Report (April 2003).* The objective of this study was to determine and/or estimate indoor baseline levels or background concentrations for the presence of specific contaminants in residential buildings unaffected by the WTC disaster. The average background concentrations for COPCs in settled dust on hard surfaces are summarized below.

COPC	Average Background
Asbestos (str/cm2)	6,192
Lead (ug/ft2)	1.78
Silica (ug/ft2)	79.6 (expressed as quartz)
PAH (mg/m2)	<0.29
MMVF (str/cm2)	52
Dioxin (ng/m2)	0.693

Based on the text by Millette and Hays, *Settled Asbestos Dust Sampling and Analysis*, levels of asbestos in settled dust as determined by the microvacuum techniques are considered low if less than 1,000 str/cm^2. Levels above 10,000 str/cm^2 are considered generally above background. Levels above 100,000 str/cm^2 are considered high and in the range of significant accidental release from an abatement site.

1.4 Purpose and Objectives

The objective of the SI is to provide additional information relative to the concentrations of COPCs within previously inaccessible spaces. This SI summary presents the results specifically for the interior wall interstitial space investigation.

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

2. METHODOLOGY

This section presents the methodologies implemented for the interstitial space characterization in previously inaccessible areas within the Building. These tasks were implemented in accordance with the *Sampling Analysis and Quality Assurance Project Plan* (SAQAPP) developed by TRC dated November 15, 2004.

TRC collected representative wipe and bulk samples for the COPCs from the interior wall interstitial spaces subsequent to establishment of a clean contained area. Prior to any sampling, sampling locations were selected that were previously undisturbed representative areas (i.e. not impacted by previous investigations or cleaning protocols). The following procedure was utilized to access the interstitial cavity spaces:

1. The wallboard to be cut was surveyed with a stud finder and anticipated cut lines marked to provide multiple openings at a sample location.

2. A rotary cutting tool was utilized to cut ¾ of the depth of the sheetrock along the cut line to ensure that the wallboard backing paper was not penetrated.

3. The area was cleaned and a tent containment was created around the work area. The contained work area was maintained under positive pressure. This work area was then visually inspected, and air samples collected for asbestos and lead.

4. Upon receipt of successful clearance air samples, the wallboard cut line was sprayed with water, then the remaining depth cut with a utility knife and wallboard removed into the tent containment to access the interstitial cavity space.

Asbestos and MMVF wipe samples were collected following American Society for Testing and Materials (ASTM) 6480-99. Lead and silica wipe samples were collected following the United States Department of Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, Appendix 13.1. Dioxin and PAH samples were collected following ASTM D6661-01. Samples were analyzed as per the following methods:

COPC	Analytical Method
Asbestos	ASTM 6480-99
Lead	USEPA SW 846-7420
Silica	NIOSH 7500 (XRD)
Dioxin	USEPA SW 846-8290
PAH	USEPA SW 846-8270C
MMVF	EMSL MSD 0310

Bulk asbestos samples were analyzed per method New York State Environmental Laboratory Approval Program (NYS ELAP) 198.1.

All samples were properly labeled as per the SAQAPP. Asbestos, lead, silica, and MMVF samples were delivered to the EMSL Analytical Inc. laboratory, an independent New York State Department of Health certified laboratory (NYSDOH ELAP # 11506). PAH and dioxin samples were delivered to Paradigm Analytical Labs in Wilmington, North Carolina (NYSDOH ELAP # 11685).

3. RESULTS

3.1 Asbestos

Ten asbestos wipe, one field blank, and three bulk samples were collected on various floors of the Building as detailed below. Samples were divided up by Zone, as described in the *Initial Building Characterization Report.* Zones 2 and 3 apply to TRC's study and are defined as follows:

> Zone 2: Office space located at or below the 24th Floor that may have been subjected to dust entering the Building through the Gash, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows.
>
> Zone 3: Office space located above the 24th Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows.

In all of the ten wipe samples, no asbestos was detected. However, asbestos was detected, at 1.57% (chrysotile), in one of the three asbestos bulk samples collected from the second floor. This sample was collected from an uncontained area on the second floor that had a pre-existing large penetration of the sheetrock. Therefore this dust and associated result are more representative of general interior conditions, than an un-impacted interior wall interstitial space. Sample results are provided in the attached Tables 1 and 2.

Asbestos Sample ID	Floor	Location	Zone
Wipe Samples			
KD-7-W-INT.WALL-ASB-001I	7	Sheetrock GF-56	2
KD-26-W-INT.WALL-ASB-001I	26	Sheetrock GF-56	3
KD-4-W-INT.WALL-ASB-002I	4	Sheetrock DC-23	2
KD-20-W-INT.WALL-ASB-003I	20	Sheetrock CB-34	2
KD-16-W-ASB-INT.WALL-004I	16	Sheetrock HG-56	2
KD-14-W-ASB-INT.WALL-005I	14	Sheetrock AB-24	2
KD-10-W-ASB-INT-007I	10	Sheetrock GF-56	2

Asbestos Sample ID	Floor	Location	Zone
KD-2-W-INT.WALL-ASB-008I	2	Sheetrock HG-45	2
KD-24-WIPEINT.WALL-ASB-009I	24	Sheetrock, NW Area AB-45	3
KD-29-WIPEINT.WALL-ASB-010I	29	Sheetrock wall, NE area GH-78	3
Bulk Samples			
KD-7-ASB-INT.DUST-001I	7	FG-56	2
KD-02-BULK-INT.WALL-DUST-007I	2	G-3	2
ZD-29-BULK-INTWALL-DUST-001I	29	NE area GH-78	3

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

TRC reviewed Berger's *Initial Building Characterization Report.* Berger collected 40 supplemental screening samples of the settled dust from porous and non-porous surfaces and analyzed for asbestos using TEM. The samples were collected from various places within the Building, including, but not limited to carpeting, counters, vent units, and above the ceiling tiles. The results revealed detectable levels of asbestos above the residential background level of 6,192 structures/cm^2 identified in the EPA *World Trade Center Background Study Report Interim Final* (April 2003). The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and the 40th/41st floor mechanical room. Asbestos was detected in dust at concentrations in excess of 6,192 structures/cm^2 in 24 of the 31 floors sampled by TEM analysis (77%). The samples containing asbestos ranged from a minimum concentration of less than 891 structures/cm^2 (from Floors 5, 24, 25, 28, 34, and 41) to a maximum concentration of 4,879,200 structures/cm^2 (from Floor 2). These results are considerably higher than the non-detect asbestos concentrations found in this SI.

TRC reviewed the *Deutsche Bank Damage Assessment report: Contamination Report Pursuant to Testing Protocol-06, Interior Wall Cavities Data Report* by RJ Lee Group, Inc. dated May 2003. The average and maximum asbestos concentrations of samples collected in the non-gash areas of this report were 827,000 str/cm^2 and 61,410,000 str/cm^2, respectively. These results are all significantly higher than the non-detect asbestos concentrations found in the interstitial walls of this SI.

TRC reviewed the *Test Report on Wall Cavities "Wall Cell Protocol"* by Young Laboratories, Inc. dated September 27, 2004, which is part of the *Insurer's Expert Report Related to the Deutsche Bank's 130 Liberty Street Claims.* In this report, samples were

collected from the interior wall cavity wallboard surfaces from three different wall types: floor to slab, non-insulated floor to ceiling, and insulated floor to ceiling using the TEM microvacuum method. The results are as follows:

Wall Type	n	Minimum str/cm^2	Maximum str/cm^2	Average str/cm^2	Non detects %
Floor to slab	30	<1,596	67,602	8,534	26.7
Non-insulated floor to ceiling	24	<1,596	20,345	3,015	66.7
Insulated floor to ceiling	30	<1,596	215,412	10,505	43.3

Compared to the wipe sample results of this SI, these results on average are higher.

3.2 Lead

Ten lead wipe and one field blank samples were collected at the same locations as asbestos detailed in Section 3.1. Wipe sample results ranged from less than 10 ug/ft^2 to 24 ug/ft^2 with an arithmetic average of 8 ug/ft^2. Sample results are provided in the attached Table 3.

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to Berger's Initial *Building Characterization Report*, there was significant variation in the lead testing results collected from the Building dust samples. Lead was detected in 122 of 125 samples tested. Lead results of samples collected above the plenum ranged from 350 ug/m^2 (32.52 ug/ft^2) to 10,900 ug/m^2 (1,012.6 ug/ft^2). Lead results from samples collected below the plenum ranged from 150 ug/m^2 (13.92 ug/ft^2 - in Zone 3) to 101,000 ug/m^2 (9,383.2 ug/ft^2 - in Zone 1). These results are considerably higher than the lead concentrations found in the interstitial walls of this SI.

TRC reviewed the *TP-06 Interior Wall Cavities Data Report,* which reported the average and maximum lead concentrations of samples collected in the non-gash areas of this report were 171.9 ug/ft^2 and 1,630 ug/ft^2, respectively. These results are considerably higher than the lead concentrations found in the interstitial walls of this SI.

According to the *Test Report on Wall Cavities "Wall Cell Protocol"* lead results of bulk dust samples collected from the stud trays are as follows:

Wall Type	n	Minimum ug/g	Maximum ug/g	Average ug/g	Non detects %
Floor to slab	30	<3.8	420	73	22.2
Non-insulated floor to ceiling	24	13	100	40	0
Insulated floor to ceiling	30	<3.7	<51	9.6	100

Lead bulk dust samples collected from the wallboard surfaces are as follows:

Wall Type	n	Minimum ug/g	Maximum ug/g	Average ug/g	Non detects %
Floor to slab	30	<2.5	83	16	66.7
Non-insulated floor to ceiling	24	<2.8	4.1	2.5	87.5
Insulated floor to ceiling	30	<3.3	11	3.3	70

Lead bulk dust samples were not collected from the interstitial wall cavities in this SI; however, these results confirm the presence of low levels of lead in the interstitial walls.

3.3 Silica

Ten silica wipe and one field blank samples were collected on various floors of the Building as detailed in Section 3.1. The silica sample results ranged from less than 0.055 mg/ft^2 to 2.42 mg/ft^2 with an arithmetic average of 0.55 mg/ft^2. Sample results are provided in the attached Table 4.

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the quartz, a natural form of silica, testing results collected from the Building dust samples. Quartz was detected in 115 of the 118 samples tested. The samples containing quartz ranged from a low concentration of 500 ug/m^2 (0.46 mg/ft^2 - from Zone 2) to a maximum concentration of 10,000,000 ug/m^2 (929 mg/ft^2 - in Zone 1). These results are at least two orders of magnitude greater than the silica concentrations found within the interstitial walls.

TRC reviewed the *TP-06 Interior Wall Cavities Data Report,* which reported the average and maximum lead concentrations of samples collected in the non-gash areas of this report were 171.9 ug/ft^2 and 1,630 ug/ft^2, respectively. These results are generally

consistent (within one order of magnitude) with the silica concentrations found in the interstitial walls of this SI.

According to the *Test Report on Wall Cavities "Wall Cell Protocol"* crystalline silica results of samples collected from the wallboard surface results are as follows:

Wall Type	n	Minimum ug/ft^2	Maximum ug/ft^2	Average ug/ft^2	Non detects %
Floor to slab	30	<92	815	327	16.7
Non-insulated floor to ceiling	26	<92	1,296	244	38.5
Insulated floor to ceiling	34	<92	574	170	23.5

Silica results are generally consistent (within one order of magnitude) with the silica concentrations found in this SI.

3.4 Dioxin

Ten dioxin wipe and one field blank sample were collected at the same locations where asbestos wipe samples were collected as detailed in section 3.1. The World Health Organization (WHO) has established a convention whereby the results for all dioxin compounds are expressed as a toxicity equivalency concentration (TEQ). The TEQ is based upon TEF referenced to 2,3,7,8 TCDD, which is the most toxic of the dioxin compounds. The TEQ is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the toxicity equivalent factors (TEFs) are then added to obtain the TEQ for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. Dioxin TEQ results ranged from 0.84 nanograms per square meter (ng/m^2) to 1.87 ng/m^2 with an arithmetic average of 1.10 ng/m^2. This average concentration is below the USEPA Tier III Benchmark concentration. Sample results are provided in the attached Table 5.

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes. Select results were qualified as non-detects due to blank contamination. There were no adverse affects on the data usability on the basis of these issues as the affected results were still significantly below the USEPA Tier I residential health-risk based benchmark value.

According to the *Initial Building Characterization Report*, there was significant variation in the dioxin testing results collected from the Building dust samples. Dioxin was detected in all 124 samples tested. The samples containing dioxin ranged from a low concentration of 1 ng/m^2 (from Zone 2) to a maximum concentration of 214 ng/m^2 (in Zone 5). The results of this study were at least an order of magnitude greater than the concentrations detected in this SI.

RJ Lee collected 175 dioxin/furan samples as outlined in the *TP-06 Interior Wall Cavities Data Report*. The results indicated average and maximum dioxin/furan results in the non-gash area were 46.1 ng/m^2 and 1,568.9 ng/m^2, respectively. The dioxin/furan concentrations reported in the RJ Lee report are up to three orders of magnitude greater than the concentrations found in this SI.

According to the *Test Report on Wall Cavities "Wall Cell Protocol"* dioxin results of samples collected from the wallboard surface results are as follows:

Wall Type	n	Minimum pg/g	Maximum pg/g	Average pg/g	Non detects %
Floor to slab	30	0.2	153	13	0
Non-insulated floor to ceiling	24	0	1.7	0.37	4.2
Insulated floor to ceiling	29	0	32	3.6	3.4

Dioxin bulk dust samples collected from the stud tray are as follows:

Wall Type	n	Minimum pg/g	Maximum pg/g	Average pg/g	Non detects %
Floor to slab	9	1.2	62	17	0
Non-insulated floor to ceiling	11	0	24	5.1	54.5
Insulated floor to ceiling	14	0	2.3	0.43	50.0

Dioxin bulk dust samples were not collected from the interstitial wall cavities in this SI; however, these results confirm the presence of low levels of dioxins in the interstitial walls.

3.5 Polycyclic Aromatic Hydrocarbons (PAHs)

Ten PAH wipe and one field blank samples were collected at the same locations where asbestos wipe samples were collected as detailed in section 3.1. The carcinogenic PAHs results were used to calculate the benzo(a)pyrene (BaP) equivalent to measure the relative potency. The BaP equivalent is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the TEFs are then added to obtain the BaP equivalent for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. No PAHs were detected in the interior walls and all BaP equivalent wipe results were less than 57.8 micrograms per square meter (ug/m^2). Sample results are provided in the attached Table 6.

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes. Potential low bias exists for anthracene and benzo(a)pyrene in the samples KD-24-W-IntWall-PAH-009I and KD-29-W-IntWall-PAH-010I due to low LCS recoveries. This has minimal effect on the data usability since all results are still approximately two orders of magnitude lower than USEPA Tier I residential health-risk based benchmark value.

According to the *Initial Building Characterization Report*, there was significant variation in the PAH testing results collected from the Building dust samples. The samples containing PAH ranged from a low concentration of 3 ug/m^2 (from Zone 1) to a maximum concentration of 11,555 ug/m^2 (in Zone 2). The PAH concentrations reported in the *Initial Building Characterization Report* were greater than the non-detect concentrations found in this SI.

RJ Lee collected 167 dioxin/furan samples as outlined in the *TP-06 Interior Wall Cavities Data Report*. The results indicated average and maximum PAH results in the non-gash area were 15.0 ug/m^2 and 184.1 ug/m^2, respectively. The PAH concentrations reported in the RJ Lee report are greater than the non-detect concentrations found in this SI.

3.6 Man Made Vitreous Fibers (MMVF)

Ten MMVF wipe and one field blank sample were collected at the same locations where asbestos wipe samples were collected as detailed in section 3.1. The MMVF wipe results ranged from 15.17 str/cm^2 to 641.3 str/cm^2, with an arithmetic mean of 142.19 str/cm^2.

This average is approximately three orders of magnitude less than the USEPA Tier I benchmark 1-year risk based concentration. Sample results summary is provided in the attached Table 7.

A limited data validation was performed on the samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

4. FINDINGS

This Supplemental Investigation has identified that none of the COPCs exceed the Tier I value in the September 2002 WTC Indoor Air Assessment study. Asbestos was not detected in any of the wipe samples; however, it was identified to be present in one out of three bulk dust samples collected. This bulk dust sample was collected from a second floor interior wall interstitial space that had a previous sheetrock penetration. Therefore this result is not representative of an un-impacted interior wall interstitial space; rather it should be considered representative of general interior dust conditions. The average lead, silica, MMVF and dioxin results exceed the April 2003 Background Study criteria but were found to be less than the USEPA Tier I Benchmark concentrations. PAHs were not detected in any of the samples collected.

While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

5. CONCLUSIONS AND RECOMMENDATIONS

COPCs concentrations within the dust on the surfaces of the interior walls interstitial spaces were at least an order of magnitude less than the COPC levels for the dust in the accessible areas discussed in the *Initial Building Characterization Report* and the *Interior Wall Cavities Data Report.* No asbestos or PAHs were detected on the wipe samples collected from the interior wall interstitial spaces. Lead, silica, MMVF and dioxin arithmetic average results were less than Tier I USEPA Benchmark concentrations but exceeded the USEPA residential background criteria. The results of the sampling and testing performed for this Supplemental Investigation revealed low levels of contaminants in connection with the Building deconstruction, which are inconsistent with previous studies. Therefore, TRC recommends review of the results by federal, state, and local regulators and that the interior wall interstitial spaces be handled in a manner that complies with applicable laws.

6. REFERENCES

Damage Assessment, 130 Liberty Street Property, Contamination Report Pursuant to Testing Protocol-06, Interior Wall Cavities Data Report. RJ Lee Group, Inc., May 2003.

Initial Building Characterization Study Report, 130 Liberty Street, New York, New York. The Louis Berger Group, Inc., September 14, 2004.

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World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

World Trade Center Background Study Report, Interim Final. United States Environmental Protection Agency, Region 2, April 2003.

Interstitial Walls
LMDC
130 Liberty Street
New York, New York
February 10, 2005

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Table 1
Interior Wall Interstitial Spaces - Asbestos
Asbestos Wipe (SW 6480-99)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Asbestos (structures/cm^2)
KD-7-W-INT.WALL-ASB-001I	030423849-0001	12/2/2004	Wipe	7	Sheetrock, GF-56	<6,250
KD-26-W-INT.WALL-ASB-001I	030423849-0002	12/2/2004	Wipe	26	Sheetrock, GF-56	<6,250
KD-4-W-INT.WALL-ASB-002I	030423849-0003	12/2/2004	Wipe	4	Sheetrock, DC-23	<6,250
KD-20-W-INT.WALL-ASB-003I	030423849-0004	12/2/2004	Wipe	20	Sheetrock, CB-34	<6,250
KD-16-W-ASB-INT.WALL-004I	030423849-0006	12/2/2004	Wipe	16	Sheetrock,n HG-56	<6,250
KD-14-W-ASB-INT.WALL-005I	030423849-0007	12/2/2004	Wipe	14	Sheetrock, AB-24	<6,250
KD-10-W-ASB-INT-007I	030423849-0009	12/2/2004	Wipe	10	Sheetrock,n GF-56	<6,250
KD-2-W-INT.WALL-ASB-008I	030423849-0011	12/2/2004	Wipe	2	Sheetrock, HG-45	<6,250
KD-24-WIPEINT.WALL-ASB-009I	030423953-0003	12/3/2004	Wipe	24	Sheetrock, NW Area AB-45	<6,250
KD-29-WIPEINT.WALL-ASB-010I	030423953-0004	12/3/2004	Wipe	29	Sheetrock, NE area GH-78	<6,970
KD-000-W-INT.WALL-ASB-000	030423849-0013	12/2/2004	Wipe			Blank

	str/cm2
Arithmetic Mean (ND=1/2)	None detected
May 2003 Benchmark[1]	n/a
April 2003 WTC Background Study[2]	6,192
September 2002 WTC Indoor Assessment[3]	
Tier I	>30,000
Tier II	>30,000 to background
Tier III	Background

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final* . United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 2
Interior Wall Interstitial Spaces - Asbestos
Asbestos Bulk PLM (NYS ELAP 198.1)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Asbestos (percent)
KD-7-ASB-INT.DUST-001I	030423846-0001	12/2/2004	Bulk	7	FG-56	NAD
KD-02-BULK-INT.WALL-DUST-007I	030423846-0009	12/2/2004	Bulk	2	G-3	1.57%
ZD-29-BULK-INTWALL-DUST-001I	030423956-0001	12/3/2004	Bulk	29	NE area GH-78	NAD

Table 3
Interior Wall Interstitial Spaces - Lead
Lead Wipe (SW 846, 7420)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Lead (ug/ft2)	Lead (ug/m2)
KD-26-W-PB-INTWALL-001I	030423947-0001	12/2/2004	Wipe	26	Sheetrock, tent location GF-56	<10	<108
KD-7-W-PB-INTWALL-001I	030423947-0002	12/2/2004	Wipe	7	Sheetrock, tent location GF-56	24	258
KD-20-W-PB-INTWALL-003I	030423947-0003	12/2/2004	Wipe	20	Sheetrock, tent location CB-34	<10	<108
KD-4-W-PB-INTWALL-002I	030423947-0004	12/2/2004	Wipe	4	Sheetrock, tent location DC-23	<10	<108
KD-16-W-PB-INTWALL-004I	030423947-0005	12/2/2004	Wipe	16	Exterior wall tent location HG-56	<10	<108
KD-14-W-PB-INT.WALL-005I	030423947-0006	12/2/2004	Wipe	14	Sheetrock, tent location AB-24	<10	<108
KD-10-W-PB-INTWALL-007I	030423947-0008	12/2/2004	Wipe	10	Sheetrock, tent location GF-56	<10	<108
KD-2-W-PB-INTWALL-008I	030423947-0009	12/2/2004	Wipe	14	Sheetrock, tent location HG-45	<10	<108
KD-000-W-PB-000-FBLANK	030423947-0011	12/2/2004			Blank	<10	<108
KD-24-WIPE-INTWALLLEAD-009I	030423954-0003	12/3/2004	Wipe	24	Sheetrock, NW Area A-4	16	172
KD-29-WIPE-INTWALLLEAD-010I	030423954-0005	12/3/2004	Wipe	29	Sheetrock, NE Area GH-78	<10	<108

	ug/ft2
Arithmetic Mean (ND=1/2)	8
May 2003 Benchmark[1]	25
April 2003 WTC Background Study[2]	1.78
September 2002 WTC Indoor Assessment[3]	
Tier I	>40
Tier II	40 to 25 (or background)
Tier III	<25 (or background)

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final* . United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 4
Interior Wall Interstitial Spaces - Silica
Silica Wipe (NIOSH 7500, XRD)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Silica (mg/ft2)
KD-24-W-INT.WALL-SILICA-009I	040425315-0001	12/3/2004	Wipe	24	CB-45	0.084
KD-29-W-INT.WALL-SILICA-010I	040425315-0002	12/3/2004	Wipe	29	HG-78	2.420
KD-7-W-INT.WALL-SILICA-001I	040425316-0001	12/2/2004	Wipe	7	GF-56	1.340
KD-4-W-INT.WALL-SILICA-002I	040425316-0002	12/2/2004	Wipe	4	DC-23	0.356
KD-20-W-INT.WALL-SILICA-003I	040425316-0003	12/2/2004	Wipe	20	DC-24	0.255
KD-16-W-INT.WALL-SILICA-004I	040425316-0004	12/2/2004	Wipe	16	GH-56	0.055
KD-14-W-INT.WALL-SILICA-005I	040425316-0005	12/2/2004	Wipe	14	AB-34	0.065
ZD-26-W-INT.WALL-SILICA-006I	040425316-0006	12/2/2004	Wipe	26		0.260
KD-000-W-SILICA-BLANK-000	040425316-0007	12/2/2004	Wipe		Blank	0.000
KD-10-W-INT.WALL-SILICA-007I	040425316-0008	12/2/2004	Wipe	10	GF-56	0.515
KD-2-W-INT.WALL-SILICA-008I	040425316-0009	12/2/2004	Wipe	2	GF-56	0.196

	mg/ft2
Arithmetic Mean	0.55
May 2003 Benchmark[1]	n/a
April 2003 WTC Background Study[2]	>0.0796 (expressed as quartz)
September 2002 WTC Indoor Assessment[3]	
Tier I	--
Tier II	above background
Tier III	background

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final* . United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 5
Interior Wall Interstitial Spaces - Dioxin
Dioxin (SW 846-8290)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	TEQ (ND=1/2; ng/m2)
ZD-26-W-DX-Int.Wall-001I	G220-29-1C	12/2/2004	Wipe	26	GF-56	1.07
KD-7-W-DX-Int.Wall-001I	G220-29-2C	12/2/2004	Wipe	7	GF-56	0.84
KD-20-W-DX-Int.Wall-003I	G220-29-3C	12/2/2004	Wipe	20	DC-23	0.89
KD-4-W-DX-Int.Wall-002I	G220-29-4C	12/2/2004	Wipe	4	DC-23	1.24
KD-16-W-DX-Int.Wall-004I	G220-29-6C	12/2/2004	Wipe	16	GH-56	0.87
KD-14-W-DX-Int.Wall-005I	G220-29-7C	12/2/2004	Wipe	14	AB-34	1.02
KD-10-W-DX-Int.Wall-007I	G220-29-10C	12/2/2004	Wipe	10	GF-56	0.84
KD-2-W-DX-Int.Wall-008I	G220-29-11C	12/2/2004	Wipe	2	GF-56	1.03
KD-000-W-Dx-000-Fblank	G220-29-12C	12/2/2004	Wipe		Blank	1.36
KD-24-W-Int.Wall DX-009I	G220-30-3B	12/3/2004	Wipe	24	A-4	1.87
KD-29-W-Int.Wall DX-010I	G220-30-5B	12/3/2004	Wipe	29	GH-78	1.32

	ng/m2
Arithmetic Mean	1.10
May 2003 Benchmark[1]	2.0
April 2003 WTC Background Study[2]	0.693
September 2002 WTC Indoor Assessment[3]	
Tier I	>120
Tier II	120 to 4 (or background)
Tier III	<4 (or background)

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final* . United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 6
Interior Wall Interstitial Spaces - Polycyclic Aromatic Hydrocarbons (PAH)
PAH (SW 846-8290)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	PAH (ug/m2)	Benzo(a)Pyrene Equivalent (ug/m2)
ZD-26-W-PAH-Int.Wall-001I	G220-27-1B	12/2/2004	Wipe	26	Sheetrock, GF-56	<800	<57.8
KD-7-W-PAH-Int.Wall-001I	G220-27-2B	12/2/2004	Wipe	7	Sheetrock, GF-56	<800	<57.9
KD-20-W-PAH-Int.Wall-003I	G220-27-3B	12/2/2004	Wipe	20	Sheetrock, CB-34	<800	<57.10
KD-4-W-PAH-Int.Wall-002I	G220-27-4B	12/2/2004	Wipe	4	Sheetrock, DC-23	<800	<57.11
KD-16-W-PAH-Int.Wall-004I	G220-27-6B	12/2/2004	Wipe	16	Sheetrock, HG-56	<800	<57.12
KD-14-W-PAH-Int.Wall-005I	G220-27-7B	12/2/2004	Wipe	14	Sheetrock, AB-24	<800	<57.13
KD-10-W-PAH-Int.Wall-007I	G220-27-10B	12/2/2004	Wipe	10	Sheetrock, GF-56	<800	<57.14
KD-2-W-PAH-Int.Wall-008I	G220-27-12B	12/2/2004	Wipe	2	Sheetrock, HG-45	<800	<57.15
KD-24-W-PAH-Int.Wall-009I	G220-28-3B	12/2/2004	Wipe	24	Sheetrock, CB-45	<800	<57.16
KD-29-W-PAH-Int.Wall-010I	G220-28-5B	12/2/2004	Wipe	29	Sheetrock, HG-78	<800	<57.17
KD-000-PAH-W-Blank-000	G220-28-6B	12/2/2004	Wipe		Blank	<800	<57.18

	ug/m2 - BaP Equivalent
BaP Arithmetic Mean (ND=1/2)	<57.8
May 2003 Benchmark[1]	150
April 2003 WTC Background Study[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>9,000
Tier II	9,000 to 300 (or background)
Tier III	<300 (or background)

Benzo(a)pyrene Equivalent using 1/2 the detection limit.

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final .* United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 7
Interior Wall Interstitial Spaces - Man Made Vitreous Fibers
MMVF Wipe (EMSL MSD 0310)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	MMVF (str/cm2)
KD-7-Int.Wall-MMVF-001	360401138-0001	12/2/2004	Wipe	7	GF-56	234.40
KD-4-Int.Wall-MMVF-002	360401138-0002	12/2/2004	Wipe	4	DC-23	41.40
KD-20-Int.Wall-MMVF-003	360401138-0003	12/2/2004	Wipe	20	DC-23	27.60
KD-16-Int.Wall-MMVF-004	360401138-0004	12/2/2004	Wipe	16	GH-56	27.60
KD-14-Int.Wall-MMVF-005	360401138-0005	12/2/2004	Wipe	14	AB-34	172.40
KD-26-Int.Wall-MMVF-006	360401138-0006	12/2/2004	Wipe	26	GF-56	641.30
KD-10-Int.Wall-MMVF-007	360401138-0007	12/2/2004	Wipe	10	GF-56	20.70
KD-2-Int.Wall-MMVF-008	360401138-0008	12/2/2004	Wipe	2	GF-56	20.70
KD-000-W-MMVF-Blank-000	360401138-0009	12/2/2004	Wipe		Blank	ND
KD-24-wipe-Int.Wall-MMVF-009I	360401139-0001	12/3/2004	Wipe	24	A-4	15.17
KD-29-wipe-Int.Wall-MMVF-010I	360401139-0002	12/3/2004	Wipe	29	GH-78	220.60

	str/cm2
Arithmetic Mean (ND=1/2)	142.19
May 2003 Benchmark[1]	n/a
April 2003 WTC Background Study[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>100,000
Tier II	100,000 to background
Tier III	background

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final .* United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

130 Liberty Street

New York, New York

Supplemental Investigation Summary Report

Heating, Ventilation, and Air Conditioning Distribution Duct Sampling Summary Results

Prepared for:
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan
Development Corporation

Prepared By:

TRC
Customer-Focused Solutions

TRC Environmental Corp.
1430 Broadway, 10th Floor
New York, New York 10018

February 10, 2005

1.0 INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents the results of the supplemental investigation and testing of the previously inaccessible interior heating, ventilation, and air conditioning (HVAC) distribution ductwork within the Building.

1.1 Background

The Building is located across the street and south of the WTC site and is a former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

In addition, Berger recommended performing preliminary waste characterization.

This supplemental investigation summary presents the additional inspection and sampling performed by TRC of the previously inaccessible interior heating, ventilation, and air conditioning (HVAC) distribution ductwork within the Building. Supplemental investigations regarding curtain wall cavity, cell systems within floors, interstitial spaces within interior walls and column cavities, inside vertical shafts, exterior building surfaces, fireproofing, waste characterization, and visual inspection of the Building for mold and asbestos containing building materials (ACBM) are addressed in separate summaries.

As part of the supplemental investigation, TRC collected the following samples:

COPC	Asbestos	Lead	Silica	Dioxin	PAH	MMVF
Total Samples	126	106	35	55	55	27

For the interior surfaces of the HVAC distribution ductwork at 130 Liberty Street, TRC collected at a minimum ten representative (10) surface wipe/or micro-vacuum samples for the United States Environmental Protection Agency (USEPA) contaminants of potential concern (COPCs) list analysis. The COPC list includes asbestos, lead, man-made vitreous fibers (MMVF), silica, polynuclear aromatic hydrocarbons (PAHs) and dioxins. Sampling locations were accessed through the duct clean-out access ports.

TRC utilized a tiered approach to sample analysis. All asbestos and lead wipe samples were analyzed and the results reviewed. Results of this study were compared to the findings in the *Initial Building Characterization Report* and benchmark and background concentrations presented in previous environmental studies as detailed in the following sections. If surface concentrations of asbestos and lead were found to be similar to the *Initial Building Characterization Report* and elevated when compared to benchmark and background concentrations, further analysis for the remaining COPCs was not conducted. If surface concentrations of asbestos and lead were found to be less than the *Initial Building Characterization Report,* benchmark, and background concentrations, further analysis for the remaining COPCs was conducted.

1.3 Previous Environmental Studies

Several studies concerning WTC-related contaminants have been performed by, or with the review of, the federal, state, and local regulatory authorities in the aftermath of the events of September 11, 2001. In particular, the USEPA has been responsible for studies associated with the development of the EPA's list of COPCs, as discussed in this section.

The USEPA COPC Committee developed, in their *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health Based Benchmarks, Peer Review Draft (September 2002),* a tiered approach to evaluate the health risks posed by contaminants that might be present in an indoor environment (air and settled dust) for residential reoccupancy. For each COPC, three levels were developed:

Tier I - Level above which, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), aggressive clean-up action should be taken expeditiously along with follow-up sampling to confirm attainment of Tier III level.

Tier II - Range where diligent cleaning should continue, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), with follow-up sampling to confirm attainment of Tier III level.

Tier III - Level below which the risk is negligible or consistent with the New York City background level found in the USEPA Background Study as identified below.

These levels were established for residential reoccupancy. The Tier I screening level was intended to be protective of a resident who may have been exposed to WTC-related contaminants in their residence for one year. The Tier III clearance level was intended to be protective of a resident who is exposed to WTC-related contaminants in their residence for 30 years, which was the upper-bound estimate for residency in one dwelling. For asbestos and lead in settled dust, the tiered values are as follows:

ASBESTOS

Tier	Settled Dust
I	>30,000 str/cm2
II	30,000 str/cm2 to background
III	Background

LEAD

Tier	Settled Dust
I	>40 ug/ft2
II	40 ug/ft2 to 25 ug/ft2 (or background)
III	<25 ug/ft2 (or background)

These levels were developed to be risk-based levels for residential settings. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

Subsequent to peer review of the September 2002 report, the USEPA COPC Committee developed, in their *World Trade Center Indoor Environmental Assessment: Selecting Health-Based Benchmarks (May 2003)* report, health based benchmarks that reflected only the Tier III levels.

The USEPA, Region 2, also developed the *World Trade Center Background Study Report (April 2003).* The objective of this study was to determine and/or estimate indoor baseline levels or background concentrations for the presence of specific contaminants in residential buildings unaffected by the WTC disaster. The average background concentrations for asbestos and lead in settled dust on hard surfaces are 6,192 structures per square centimeter (str/cm^2) and 1.78 micrograms per square foot (ug/ft^2), respectively.

Based on the text by Millette and Hays, *Settled Asbestos Dust Sampling and Analysis*, levels of asbestos in settled dust as determined by the microvacuum techniques are considered low if less than 1,000 str/cm^2. Levels above 10,000 str/cm^2 are considered generally above background. Levels above 100,000 str/cm^2 are considered high and in the range of significant accidental release from an abatement site.

1.4 Purpose and Objectives

The objective of the SI is to provide additional information relative to the concentrations of COPCs within previously inaccessible spaces. This SI summary outlines results specifically for the HVAC distribution ductwork investigation.

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and

deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

2.0 METHODOLOGY

This section presents the methodologies implemented for the dust characterization for asbestos and lead in the HVAC distribution ductwork. These tasks were implemented in accordance with the *Sampling Analysis and Quality Assurance Project Plan* (SAQAPP) developed by TRC dated November 15, 2004.

TRC collected representative surface wipe samples for asbestos and lead from the interior HVAC distribution ductwork, excluding the 5th, 6th, 40th, and 41st mechanical floors. Wipe and/or micro-vacuum sampling had been conducted previously within the HVAC units on the mechanical floors, as reported in the *Initial Building Characterization Report,* and these areas are scheduled for cleaning prior to Building deconstruction.

Samples were collected through HVAC cleaning access ports using the following equipment:

Asbestos surface wipe and micro-vacuum samples were collected and analyzed per methods detailed in the American Society for Testing Materials (ASTM) standard test method D6480-99 and ASTM D5755-03, respectively. Asbestos bulk samples were analyzed per method PLM NYS 198.1. Lead wipe samples were collected following the United States Department of Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing Appendix 13.1 and analyzed as per analytical method USEPA SW-846 7420. Lead micro-vacuum samples were sampled via ASTM method E 1973-99 and analyzed per method NIOSH 7082.

Samples were properly labeled as per the SAQAPP and delivered to the EMSL Analytical Inc. laboratory, an independent New York State Department of Health certified laboratory.

3.0 RESULTS

3.1 Asbestos

Ten asbestos wipe, one micro-vacuum, one duplicate, and three bulk dust samples were collected on various floors of the Building as detailed below. Samples were divided up by Zone, as described in the *Initial Building Characterization Report.* Zones 2 and 3 apply to TRC's study and are defined as follows:

> Zone 2: Office space located at or below the 24th Floor that may have been subjected to dust entering the Building through the Gash, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows.
>
> Zone 3: Office space located above the 24th Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows.

Wipe and micro-vacuum sample results ranged from less than 15,600 structures per square centimeter (str/cm^2) to 4,620,000 str/cm^2. The arithmetic mean concentration for these eleven results was 1,188,236 str/cm^2 using one half the detection limit for non-detected sample results. No asbestos was detected in the three bulk samples. Sample results are provided in the attached Table 1A and 1C.

Asbestos Sample ID	Floor	Location	Zone
Wipe			
GM-ASB-W-MEZZ-HVAC-010	Mez-zanine	Building center, southeast quadrant	2
KD-ASB-W02-HVAC-009	2	West central building side	2
KD-ASB-W03-HVAC-008	3	Building center, southeast quadrant	2
KD-ASB-W-04-HVAC-007	4	North central building side	2
KD-ASB-W-05-HVAC-006	5	South central building	2
KD-ASB-W-08-HVAC-005	8	Northeast quadrant, building center	2
KD-ASB-W-12-HVAC-004	12	Northeast quadrant, building center	2
KD-ASB-W-18-HVAC-001	18	Southwestern building quadrant, building center	2
KD-ASB-W-27-HVAC-0003	27	Southeastern building quadrant, building center	3
KD-ASB-W-39-HVAC-0002	39	Building center	3
Microvacuum			
SR-ASB-MV02-HVAC-001	2	Microvacuum, Interior HVAC	2
Bulk			
KD-0002	35	Southern building face	3
KD-0003	2	Southern building face	2
KD-0004	4	Building center	2

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

TRC reviewed the *Initial Building Characterization Report.* Berger collected 40 supplemental screening samples of the settled dust from porous and non-porous surfaces and analyzed for asbestos using TEM. The samples were collected from various places within the Building, including, but not limited to carpeting, counters, vent units, and above the ceiling tiles. The results revealed detectable levels of asbestos above the residential background level of 6,192 structures/cm^2 identified in the EPA *World Trade Center Background Study Report Interim Final* (April 2003). The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and the $40^{th}/41^{st}$ floor mechanical room. Asbestos was detected in dust at concentrations in excess of 6,192 structures/cm^2 in 24 of the 31 floors sampled by TEM analysis (77%). The samples containing asbestos ranged from a minimum concentration of less than 891 structures/cm^2 (from Floors 5, 24, 25, 28, 34, and 41) to a maximum concentration of 4,879,200 structures/cm^2 (from Floor 2). These results are generally consistent with the HVAC SI results.

TRC reviewed the *Deutsche Bank Damage Assessment Report: Contamination Report Pursuant to Testing Protocol-11, Perimeter Induction Units Summary Report* by RJ Lee Group, Inc. dated December 2003. The perimeter induction units are an integral part of the HVAC system that provides conditioned air to the occupied spaces of the Building. The average and maximum asbestos concentrations presented in this report were 2,228,000 str/cm^2 and 199,600,000 str/cm^2, respectively. The average result is comparable to the concentrations identified in this SI of the HVAC system, although the maximum results is at least two orders of magnitude higher than the maximum concentration identified in this SI.

3.2 Lead

Ten lead wipe samples, one microvacuum sample, one duplicate sample, and one field blank sample were collected on various floors of the Building as detailed below. Sample results ranged from 12.5 ug/ft^2 to 1,300 ug/ft^2 with an arithmetic average of 494 ug/ft^2. Sample results are provided in the attached Table 1B.

Sample ID	Floor	Location	Zone
Wipe			
ZD-Pb-W-HVAC-29-010	29	Northeast building corner	3
ZD-Pb-W-HVAC-20-002	20	West central building side	2
ZD-Pb-W-HVAC-18-003	18	Building center	2
ZD-Pb-W-HVAC-15-004	15	Building center	2
ZD-Pb-W-HVAC-12-005	12	Northeast quadrant	2
ZD-Pb-W-HVAC-11-006	11	West central building side	2
ZD-Pb-W-HVAC-10-007	10	Southeast building corner	2
ZD-Pb-W-HVAC-9-008	9	Southern quadrant of building	2
ZD-Pb-W-HVAC-8-009	8	Southeastern quadrant, building center	2
ZD-Pb-W-HVAC-7-010	7	Southwestern building quadrant, towards center	2
ZD-Pb-W-HVAC-7-011	7	Northwest quadrant by Gash	2
Microvacuum			
KD-MV-2-HVAC-01	2	In HVAC	2

A limited data validation was performed on the above samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the lead testing results collected from the Building dust samples. Lead was detected in 122 of 125 samples tested. Lead results of samples collected above the plenum ranged from 350 ug/m^2 (32.52 ug/ft^2) to 10,900 ug/m^2 (1,012.6 ug/ft^2). Lead results from samples collected below the plenum ranged from 150 ug/m^2 (13.92 ug/ft^2 - in Zone 3) to 101,000 ug/m^2 (9,383.2 ug/ft^2 - in Zone 1). This variation in lead concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The report has identified lead concentrations within the Building that exceed both the background residential level and the health-based benchmark identified in the EPA studies in 121 of the 125 samples tested (97%). These results are relatively greater than the HVAC SI results.

RJ Lee's *Perimeter Induction Unit Summary Report* indicated average and maximum lead surface concentrations of 118 ug/ft^2 and 1,210 ug/ft^2, respectively. These average and maximum results are generally consistent (within one order of magnitude) with the average concentrations of lead found in this SI.

4.0 FINDINGS

Sample results were compared to criteria provided in Section 1.2 and 1.3 and identified on the bottom of Tables 1A and 1B. This Supplemental Investigation has identified average asbestos and lead concentrations in the interior of the HVAC ductwork system that exceed the benchmark criteria provided in the May 2003 and September 2002 WTC Indoor Air Assessment studies and are generally consistent with the concentrations identified in the *Initial Building Characterization Report.* Therefore, the other COPC wipe samples were not analyzed. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Supplemental Investigation into relative context.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The levels of asbestos and lead on the surfaces of the interior of the HVAC distribution ductwork were generally consistent with the asbestos and lead levels for the dust in the accessible areas identified in the *Initial Building Characterization Report* and exceeded the USEPA residential health-based benchmark and background criteria. The results of the sampling and testing performed for this Supplemental Investigation revealed levels of contaminants that should be addressed in connection with the deconstruction of the Building. Therefore, TRC recommends review of the results by federal, state, and local regulators and that the HVAC ductwork be handled in a manner that complies with applicable laws.

6.0 REFERENCES

Damage Assessment, 130 Liberty Street Property, Contamination Report Pursuant to Testing Protocol-11, Perimeter Induction Units, Summary Report. RJ Lee Group, Inc., December 2003.

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Settled Asbestos Dust Sampling and Analysis. James R. Millette, Steven M. Hays, 1994.

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World Trade Center Background Study Report, Interim Final. United States Environmental Protection Agency, Region 2, April 2003.

Supplemental Investigation
HVAC Distribution Ducts Interior Surface Sample Results
LMDC
130 Liberty Street
New York, New York
February 10, 2005

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Table 1
HVAC Distribution Ductwork - Asbestos Surface Dust Sampling Results
Asbestos Wipe (ASTM 6480-99) and
Asbestos Microvacuum (ASTM D5755-03)
HVAC Distribution Ducts Interior Surface Sample Results
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Zone	Location	ASBESTOS (structures/cm^2)
GM-ASB-W-MEZZ-HVAC-010	030422631-0001	11/15/04	Wipe	Mezz	2	Interior HVAC, East Grid F4	**735,000**
KD-ASB-W02-HVAC-009	030422631-0002	11/15/04	Wipe	2	2	Interior HVAC, West Grid B4	**4,620,000**
KD-ASB-W03-HVAC-008	030422631-0003	11/15/04	Wipe	3	2	Interior HVAC, Central Grid F3	**1,360,000**
KD-ASB-W-04-HVAC-007	030422631-0004	11/15/04	Wipe	4	2	Interior HVAC, North Grid C7	**2,520,000**
KD-ASB-W-04-HVAC-007-QA/QC	030422631-0005	11/15/04	Wipe	4	2	Interior HVAC, North Grid C7	**4,730,000**
KD-ASB-W-05-HVAC-006	030422631-0006	11/15/04	Wipe	5	2	Interior HVAC, South Central Grid D3	<314,000
KD-ASB-W-08-HVAC-005	030422631-0007	11/15/04	Wipe	8	2	Interior HVAC, North Grid F6	<156,000
KD-ASB-W-12-HVAC-004	030422631-0008	11/15/04	Wipe	12	2	Interior HVAC, North Grid F5	<156,000
KD-ASB-W-18-HVAC-001	030422631-0009	11/15/04	Wipe	18	2	Interior HVAC, South Central Grid C3	<15,600
KD-ASB-W-27-HVAC-0003	030422631-0010	11/15/04	Wipe	27	3	Interior HVAC, South Central Grid E3	<15,600
KD-ASB-W-39-HVAC-0002	030422631-0011	11/15/04	Wipe	39	3	Interior HVAC, North Central Grid E3	<314,000
SR-ASB-MV02-HVAC-001	030422817-0001	11/18/04	MicroVac	2	2	Interior HVAC	**3,350,000**

	str/cm2
Arithmetic Mean (ND=1/2)	1,188,236
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	6,192
September 2002 WTC Indoor Assessment[3]	
Tier I	>30,000
Tier II	>30,000 to background
Tier III	Background

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final* . United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 2
HVAC Distribution Ductwork - Lead Surface Dust Sampling Results
Lead Wipe (SW-846 7420)
Lead Microvacuum (NIOSH 7082)
LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Zone	Location	Lead (ug/ft^2)	Lead (ug/m^2)
ZD-Pb-W-HVAC-29-010	030423328-0001	11/24/04	Wipe	29	3	HG-67 NE Corner Bldg	**480**	5,167
ZD-Pb-W-HVAC-20-002	030423328-0002	11/24/04	Wipe	20	2	AB-56 N Bldg	**730**	7,858
ZD-Pb-W-HVAC-18-003	030423328-0003	11/24/04	Wipe	18	2	ED-34 Center of Bldg	**790**	8,503
ZD-Pb-W-HVAC-15-004	030423328-0004	11/24/04	Wipe	15	2	ED-56 N-Center of Bldg	**350**	3,767
ZD-Pb-W-HVAC-12-005	030423328-0005	11/24/04	Wipe	12	2	GF-56 NE Bldg	**190**	2,045
ZD-Pb-W-HVAC-11-006	030423328-0006	11/24/04	Wipe	11	2	AB-56 NW Bldg	**1,300**	13,993
ZD-Pb-W-HVAC-10-007	030423328-0007	11/24/04	Wipe	10	2	HG-23 SE of Elevators	**230**	2,476
ZD-Pb-W-HVAC-9-008	030423328-0008	11/24/04	Wipe	9	2	FG-23 S of Elevators	**140**	1,507
ZD-Pb-W-HVAC-8-009	030423328-0009	11/24/04	Wipe	8	2	FE-34 SS of Elevators	**430**	4,628
ZD-Pb-W-HVAC-7-010	030423328-0010	11/24/04	Wipe	7	2	BC-34 West of Elevators	**780**	8,396
ZD-Pb-W-HVAC-7-011	030423328-0011	11/24/04	Wipe	7	2	QA/QC Sample NW by Gash	**1,300**	13,993
ZD-Pb-W-HVAC-X-000-BLANK	030423328-0012	11/24/04	Wipe			Blank	<10	<108
KD-MV-2-HVAC-01	030422818-0001	11/18/04	Microvacuum	2	2	In HVAC	12.5	135
BL	030422818-0002	11/18/04	Microvacuum			Blank	<4	<43

	ug/ft2
Arithmetic Mean (ND=1/2)	494
May 2003 Benchmark[1]	25
April 2003 Background Assessment[2]	1.78
September 2002 WTC Indoor Assessment[3]	
Tier I	>40
Tier II	40 to 25 (or background)
Tier III	<25 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final.* United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Contaminants of Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 3
HVAC Distribution Ductwork - Asbestos Bulk Sampling Results
Asbestos Bulk (ELAP 198.1)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Zone	Location	Asbestos (%)
KD-002	030424268-0001	12/7/04	Bulk	35	3	ED-18	NAD
KD-003	030424268-0002	12/7/04	Bulk	2	2	FE-12	NAD
KD-004	030424268-0003	12/7/04	Bulk	4	2	FE-45	NAD

NAD = No asbestos detected

130 Liberty Street

New York, New York

Supplemental Investigation Summary Report

Cell System Sampling Summary Results

Prepared for:
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan
Development Corporation

Prepared By:

TRC
Customer-Focused Solutions

TRC Environmental Corp.
1430 Broadway, 10th Floor
New York, New York 10018

February 10, 2005

1. INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents the results of the supplemental investigation and testing of the previously inaccessible cell systems within the Building.

1.1 Background

The Building is located across the street and south of the WTC site and is the former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

In addition, Berger recommended performing preliminary waste characterization.

This supplemental investigation summary presents the results of additional inspection and sampling performed by TRC of cell systems within the Building. The cell systems are essentially two layers (one in a North-South orientation and the other in a East-West orientation) of electrical and telecommunication cable ducts that traverse the floor within the floor. The cell system facilitated running electrical and telecommunication cables from the associated closets to terminals within the office. The cell system was accessed via circular access ports located throughout the floor to collect samples.

Supplemental investigations regarding curtain wall cavity, vertical shafts, heating, ventilation, and air conditioning (HVAC) ductwork, fireproofing, interstitial spaces within interior walls and column cavities, exterior building surfaces, waste characterization, and visual inspection of the Building for mold and asbestos containing building materials (ACBM) are addressed in separate summaries.

As part of the supplemental investigation, TRC collected the following samples:

COPC	Asbestos	Lead	Silica	Dioxin	PAH	MMVF
Total Samples	126	106	35	55	55	27

For the cell systems located within the floors of 130 Liberty Street, TRC collected ten representative surface wipe samples for asbestos, lead, polycyclic aromatic hydrocarbons (PAHs), dioxins, and man-made vitreous fibers (MMVF). Asbestos, lead, silica, PAHs, dioxins, and MMVF make up the United States Environmental Protection Agency (USEPA) contaminants of potential concern (COPCs) list. Samples were not collected for silica since it is inherent to the concrete in which the cell system structures are encased.

TRC did not utilize a tiered approach to sample analysis as was done for other SI components tested. All COPCs were analyzed and the results reviewed. Results of this study were compared to the findings in the *Initial Building Characterization Report*, benchmark and background concentrations presented in previous environmental studies as detailed in the following sections.

1.3 Previous Environmental Studies

Several studies concerning WTC-related contaminants have been performed by, or with the review of, the federal, state, and local regulatory authorities in the aftermath of the events of September 11, 2001. In particular, the USEPA has been responsible for studies associated with the development of the EPA's list of COPCs, as discussed in this section.

The USEPA COPC Committee developed, in their *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health Based Benchmarks, Peer Review Draft (September 2002),* a tiered approach to evaluate the health risks posed by contaminants that might be present in an indoor environment (air and settled dust) for residential reoccupancy. For each COPC, three levels were developed:

Tier I - Level above which, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), aggressive clean-up action should be taken expeditiously along with follow-up sampling to confirm attainment of Tier III level.

Tier II - Range where diligent cleaning should continue, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), with follow-up sampling to confirm attainment of Tier III level.

Tier III - Level below which the risk is negligible or consistent with the New York City background level found in the USEPA Background Study as identified below.

These levels were established for residential reoccupancy. The Tier I screening level was intended to be protective of a resident who may have been exposed to WTC-related contaminants in their residence for one year. The Tier III clearance level was intended to be protective of a resident who is exposed to WTC-related contaminants in their residence for 30 years, which was the upper-bound estimate for residency in one dwelling. For COPCs in settled dust, the tiered values are as follows:

	Settled Dust		
COPC	**Tier I**	**Tier II**	**Tier III**
Asbestos (str/cm2)	>30,000	30,000 to background	Background
Lead (ug/ft2)	>40	40 to 25 (or background)	<25 (or background)
Silica	--	Above background	Background
PAH (mg/m2)	>9	9 to 0.3 (or background)	<0.3 (or background)
MMVF (str/cm2)	>100,000	100,000 to background	Background
Dioxin (ng/m2)	>120	120 to 4 (or background)	<4 (or background)

These levels were developed to be risk-based levels for residential settings. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

Subsequent to peer review of the September 2002 report, the USEPA COPC Committee developed, in their *World Trade Center Indoor Environmental Assessment: Selecting Health-Based Benchmarks (May 2003)* report, health based benchmarks that reflected only the Tier III levels.

The USEPA, Region 2, also developed the *World Trade Center Background Study Report (April 2003).* The objective of this study was to determine and/or estimate indoor baseline levels or background concentrations for the presence of specific contaminants in residential buildings unaffected by the WTC disaster. The average background concentrations for COPCs in settled dust on hard surfaces are summarized below.

COPC	Average Background
Asbestos (str/cm2)	6,192
Lead (ug/ft2)	1.78
Silica (ug/ft2)	79.6 (expressed as quartz)
PAH (mg/m2)	<0.29
MMVF (str/cm2)	52
Dioxin (ng/m2)	0.693

Based on the text by Millette and Hays, *Settled Asbestos Dust Sampling and Analysis*, levels of asbestos in settled dust as determined by the microvacuum techniques are considered low if less than 1,000 str/cm^2. Levels above 10,000 str/cm^2 are considered generally above background. Levels above 100,000 str/cm^2 are considered high and in the range of significant accidental release from an abatement site.

1.4 Purpose and Objectives

The objective of the SI is to provide additional information relative to the concentrations of COPCs within previously inaccessible spaces. This SI summary presents the results specifically for the cell system investigation.

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning

and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

2. METHODOLOGY

This section presents the methodologies implemented for the cell system characterization in previously inaccessible areas within the Building. These tasks were implemented in general accordance with the *Sampling Analysis and Quality Assurance Project Plan* (SAQAPP) developed by TRC dated November 15, 2004.

TRC collected representative wipe samples for the COPCs from the access ports to the cell systems typically located below the carpeting on each floor of the Building. Prior to opening the access port and sampling, the access port cover, adjacent floor and carpet at each location was thoroughly HEPA-vacuumed to provide a cleaned working area. This cleaned work area was then covered with clean polyethylene sheeting that was sealed with duct tape to the cleaned floor. Immediately prior to sampling, the clean polyethylene sheeting was cut to provide access to the sampling location.

Asbestos and MMVF wipe samples were collected from within the cell system access port following American Society for Testing and Materials (ASTM) 6480-99. Lead and silica wipe samples were collected following the United States Department of Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, Appendix 13.1. Dioxin and PAH samples were collected following ASTM D6661-01. Samples were analyzed as per the following methods:

COPC	Analytical Method
Asbestos	ASTM 6480-99
Lead	USEPA SW 846 7420
Silica	NIOSH 7500 (XRD)
Dioxin	USEPA SW 846-8290
PAH	USEPA SW 846-8270C
MMVF	EMSL MSD 0310

All samples were properly labeled as per the SAQAPP. Asbestos, lead, silica, and MMVF samples were delivered to the EMSL Analytical Inc. laboratory, an independent New York State Department of Health certified laboratory (NYSDOH ELAP # 11506). PAH and dioxin samples were delivered to Paradigm Analytical Labs in Wilmington, North Carolina (NYSDOH ELAP # 11685).

3. RESULTS

3.1 Asbestos

Ten asbestos wipe, one blank, and one duplicate sample were collected on various floors of the Building as detailed below. Samples were divided up by Zone, as described in the *Initial Building Characterization Report.* Zones 2 and 3 apply to TRC's study and are defined as follows:

> Zone 2: Office space located at or below the 24th Floor that may have been subjected to dust entering the Building through the Gash, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows.
>
> Zone 3: Office space located above the 24th Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows.

Wipe sample results ranged from less than 2,390 structures per square centimeter (str/cm^2) to 593,000 str/cm^2. The arithmetic mean concentration for these ten results was 62,986 str/cm^2 using one half the detection limit for non-detected sample results. Only one sample exceeded the Tier I Indoor Air Assessment at a concentration of 593,000 str/cm^2. Sample results are provided in the attached Table 1.

Asbestos Sample ID	Floor	Zone
GM-ASB-W-29-Cell-001	29	3
GM-ASB-W-20-Cell-002	20	2
GM-ASB-W-15-Cell-003	15	2
GM-ASB-W-18-Cell-004	18	2
GM-ASB-W-12-Cell-005	12	2
GM-ASB-W-10-Cell-006	10	3
GM-ASB-W-8-Cell-007	8	3
GM-ASB-W-7-Cell-008	7	3
GM-ASB-W-9-Cell-009	9	2
GM-ASB-W-11-Cell-010	11	2

A limited data validation was performed on the wipe samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

TRC reviewed the *Initial Building Characterization Report.* This report presents the results of 40 supplemental screening samples of the settled dust from porous and non-porous surfaces and analyzed for asbestos using TEM. The samples were collected from

various locations within the Building, including, but not limited to carpeting, counters, vent units, and above the ceiling tiles. The results revealed detectable levels of asbestos above the residential background level of 6,192 structures/cm^2 identified in the EPA *World Trade Center Background Study Report Interim Final* (April 2003). The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and the $40^{th}/41^{st}$ floor mechanical room. Asbestos was detected in dust at concentrations in excess of 6,192 structures/cm^2 in 24 of the 31 floors sampled by TEM analysis (77%). The samples containing asbestos ranged from a minimum concentration of less than 891 structures/cm^2 (from Floors 5, 24, 25, 28, 34, and 41) to a maximum concentration of 4,879,200 structures/cm^2 (from Floor 2). These results are generally greater than the SI results.

TRC reviewed the *Deutsche Bank Damage Assessment report: Contamination Report Pursuant to Testing Protocol-09, Cell System and Risers Data Report* by RJ Lee Group, Inc. dated May 2003. The average and maximum asbestos concentrations of samples collected in the non-gash areas of the building were 10,700,000 str/cm^2 and 1,033,000,000 str/cm^2, respectively. The concentrations reported in the RJ Lee report are significantly higher than the concentrations found in this SI.

3.2 Lead

Ten lead wipe, one blank and one duplicate samples were collected at the same locations as asbestos, listed in Section 3.1. Wipe sample results ranged from less than 16 ug/ft^2 to 18,226 ug/ft^2 with an arithmetic mean of 3,171 ug/ft^2. Sample results are provided in the attached Table 2.

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes. Potential uncertainty exists for all detected lead results due to variability in the field duplicate results.

According to the *Initial Building Characterization Report*, there was significant variation in the lead testing results collected from the Building dust samples. Lead was detected in 122 of 125 samples tested. Lead results of samples collected above the plenum ranged from 350 ug/m^2 (32.52 ug/ft^2) to 10,900 ug/m^2 (1,012.6 ug/ft^2). Lead results from samples collected below the plenum ranged from 150 ug/m^2 (13.92 ug/ft^2 - in Zone 3) to 101,000 ug/m^2 (9,383.2 ug/ft^2 - in Zone 1). These results are generally consistent with (although somewhat lower than) the SI results.

RJ Lee's *TP-09 Cell Systems and Risers Summary Report* indicated average and maximum lead concentrations of samples in the non-gash areas of this report were 14,151 ug/ft^2 and 190,000 ug/ft^2, respectively. These results are almost two orders of magnitude higher than the results of this SI.

3.3 Dioxin

Ten dioxin wipe, one blank, and one duplicate samples were collected at the same locations as asbestos, listed in Section 3.1. The World Health Organization (WHO) has established a convention whereby the results for all dioxin compounds are expressed as a toxicity equivalency concentration (TEQ). The TEQ is based upon TEF referenced to 2,3,7,8 TCDD, which is the most toxic of the dioxin compounds. The TEQ is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the toxicity equivalent factors (TEFs) are then added to obtain the TEQ for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. TEQ results ranged from 0.34 nanograms per square meter (ng/m^2) to 4.84 ng/m^2 with an arithmetic average of 2.17 ng/m^2. All results were below the USEPA Tier I value with the mean slightly above the Tier III value of 2 ng/m^2. Sample results are provided in the attached Table 3.

A limited data validation was performed on the wipe and two of the three bulk samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes. Select results were qualified as non-detects due to blank contamination. Potential low bias exists for all results in sample GM-DIOXIN-W_12-Cell-005QA/WC due to a holding time exceedance. Potential uncertainty exists for the results 1,2,3,4,6,7,8-HpCDD, OCDD,2,3,7,8-TCDF, 2,3,4,7,8-PeCDF, OCDF, total PeCDDs, total HpCDDs, and total HpCDFs in samples GM-DIOXIN-W-12-Cell-005 and GM-DIOXIN-W-12-Cell-005 QA/QC due to variability in the field duplicate results. There were no adverse effects on the data usability on the basis of these issues as the affected results were still significantly below the project action level and did not affect the TEQ results.

According to the *Initial Building Characterization Report*, there was significant variation in the dioxin testing results collected from the Building dust samples. Dioxin was detected in all 124 samples tested. The samples containing dioxin ranged from a low concentration of 1 ng/m^2 (from Zone 2) to a maximum concentration of 214 ng/m^2 (in Zone 5). These results are consistent with the highly variable nature of WTC dust. Results of this study were generally higher than the concentrations found in the SI.

RJ Lee collected 1,552 dioxin/furan samples as outlined in the *TP-09 Cell Systems and Risers Data Report*. The results indicated average and maximum dioxin/furan results in the non-gash areas were 1,590 ng/m^2 and 29,504 ng/m^2, respectively. Results of this study were approximately three orders of magnitude higher than the concentrations found in the SI.

3.4 Polycyclic Aromatic Hydrocarbons (PAHs)

Ten PAH wipe, one field blank, and one duplicate samples were collected at the same locations as asbestos, listed in Section 3.1. The carcinogenic PAHs results were used to calculate the benzo(a)pyrene (BaP) equivalent to measure the relative potency. All BaP equivalent results were 40.44 micrograms per square meter (ug/m^2). Sample results are provided in the attached Table 4.

A limited data validation was performed on the wipe samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008 (October 1999)*. In general, the data appeared to be valid as reported and may be used for decision-making purposes. Select results were qualified as non-detects due to blank contamination. There was no adverse affect on the data usability as these non-detect results were still below the Indoor Air Assessment Tier I level. Total PAH results provided in Table 4 that were affected by the change in result status are designated with a "J" indicating the value is an estimate. This change in designation does not affect the BaP equivalent calculations.

According to the *Initial Building Characterization Report*, there was significant variation in the PAH testing results collected from the Building dust samples. The samples containing PAH ranged from a low concentration of 3 ug/m^2 (from Zone 1) to a maximum concentration of 11,555 ug/m^2 (in Zone 2). These results are greater than three orders of magnitude above the results of the SI.

3.5 Man Made Vitreous Fibers (MMVF)

Ten MMVF wipe, one field blank, and one duplicate samples were collected on various floors of the Building as asbestos, listed in Section 3.1. Results ranged from 944 str/cm^2 to 1,476 str/cm^2 with an arithmetic average of 1,172 str/cm^2. This is approximately two orders of magnitude less than the USEPA Tier I value of 100,000 str/cm^2. Sample results are provided in the attached Table 5.

A limited data validation was performed on the wipe samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data*

Review EPA 540/R-99/008 (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

4. FINDINGS

Sample results were compared to criteria provided in Section 1.2 and 1.3 and identified on the bottom of each table. This Supplemental Investigation has identified average asbestos and lead concentrations on surface dust within the cell systems that exceed the benchmark criteria provided in the May 2003 and September 2002 USEPA WTC Indoor Environmental Assessment studies, April 2003 Background Study, but are generally lower than the concentrations identified in the *Initial Building Characterization Report.* The elevation of the average asbestos concentration above the USEPA Tier I value is attributed to one potential anomaly of 593,000 str/cm^2. Dioxins and PAHs were found to be relatively low compared to the Initial Building Characterization Report, RJ Lee's studies, and the USEPA Tier I levels, which represent a one-year risk-based residential value. SI cell system MMVF results were also found to be below the USEPA Tier I level.

While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

5. CONCLUSIONS AND RECOMMENDATIONS

COPCs were found within the dust on the surfaces of the cell systems located within the Building. Concentrations were generally lower than the COPC levels of the dust in the accessible areas discussed in the *Initial Building Characterization Report,* however multiple samples and some arithmetic average results exceeded the USEPA residential health-based benchmark and background criteria. The results of the sampling and testing performed for this Supplemental Investigation revealed levels of contaminants that should be considered in connection with the deconstruction of the Building. Therefore, TRC recommends review of the results by federal, state, and local regulators and that the cell systems be handled in a manner that complies with applicable laws.

6. REFERENCES

Damage Assessment, 130 Liberty Street Property, Contamination Report Pursuant to Testing Protocol-09, Cell System and Risers, Summary Report. RJ Lee Group, Inc., May 2003.

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Settled Asbestos Dust Sampling and Analysis. James R. Millette, Steven M. Hays, 1994.

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World Trade Center Background Study Report, Interim Final. United States Environmental Protection Agency, Region 2, April 2003.

Cell Systems
LMDC
130 Liberty Street
New York, New York
February 10, 2005

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Table 1
Cell Systems - Asbestos
Asbestos Wipe (SW 6480-99)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	ASBESTOS (structures/cm^2)
GM-ASB-W-29-Cell-001	030422802-0001	11/16/2004	Wipe	29	Cell Structure	<2,390
GM-ASB-W-20-Cell-002	030422802-0002	11/16/2004	Wipe	20	Cell Structure	<2,440
GM-ASB-W-15-Cell-003	030422802-0003	11/16/2004	Wipe	15	Metal	<2,440
GM-ASB-W-18-Cell-004	030422802-0004	11/16/2004	Wipe	18	Metal	<2,440
GM-ASB-W-12-Cell-005	030422802-0005	11/16/2004	Wipe	12	Metal	<2,440
GM-ASB-W-12-Cell-005QA/QC	030422802-0006	11/16/2004	Wipe	12	Metal	<2,440
GM-ASB-W-10-Cell-006	030422802-0007	11/16/2004	Wipe	10	Metal	22,800
GM-ASB-W-8-Cell-007	030422802-0008	11/16/2004	Wipe	8	Metal	593,000
GM-ASB-W-7-Cell-008	030422802-0009	11/16/2004	Wipe	7	Metal	5,590
GM-ASB-W-9-Cell-009	030422802-0010	11/16/2004	Wipe	9	Metal	<2,390
GM-ASB-W-11-Cell-010	030422802-0011	11/16/2004	Wipe	11	Metal	<2,390
GM-ASB-W-000-Cell-FB1	030422802-0012	11/16/2004	Wipe	FB	Blank	Blank

Measured surface area is 285 cm2.

	str/cm2
Arithmetic Mean (ND=1/2)	62,986
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	6,192
September 2002 WTC Indoor Assessment[3]	
Tier I	>30,000
Tier II	>30,000 to background
Tier III	Background

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final.* United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contamin Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 200

Table 2
Cell Systems- Lead
Lead Wipe (ICP 6010B)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Lead (ug/ft^2)	Lead (ug/m^2)
KD-Pb-W-29-Cell-001	010404067-0001	11/18/2004	Wipe	29	8,903	95,834
KD-Pb-W-29-Cell-001QA/QC	010404067-0002	11/18/2004	Wipe	29	18,226	196,181
KD-Pb-W-20-Cell-002	010404067-0003	11/18/2004	Wipe	20	3,097	33,333
KD-Pb-W-18-Cell-004	010404067-0004	11/18/2004	Wipe	15	1,903	20,486
KD-Pb-W-15-Cell-003	010404067-0005	11/18/2004	Wipe	18	3,355	36,111
GM-Pb-W-12-Cell-005	010404067-0006	11/18/2004	Wipe	12	1,229	13,229
GM-Pb-W-10-Cell-006	010404067-0007	11/18/2004	Wipe	10	6,516	70,139
GM-Pb-W-8-Cell-007	010404067-0008	11/18/2004	Wipe	8	4,968	53,472
GM-Pb-W-7-Cell-008	010404067-0009	11/18/2004	Wipe	7	<16	<172
GM-Pb-W-9-Cell-009	010404067-0010	11/18/2004	Wipe	9	1,600	17,222
GM-Pb-W-11-Cell-010	010404067-0011	11/18/2004	Wipe	11	135	1,458
GM-Pb-W-000-Cell-Fblank	010404067-0012	11/18/2004	Wipe	FB	<2	<22

Measured surface area is 0.31 ft2.

	ug/ft2
Arithmetic Mean (ND=1/2)	3,171
May 2003 Benchmark[1]	25
April 2003 Background Assessment[2]	1.78
September 2002 WTC Indoor Assessment[3]	
Tier I	>40
Tier II	40 to 25 (or background)
Tier III	<25 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 3
Cell Systems - Dioxin
Dioxin (SW 846-8290)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	WHO TEQ (ND=1/2; ng/m2)
GM-Dioxin-W-29-Cell-001	G220-23-1B	11/17/2004	Wipe	29	1.06
GM-Dioxin-W-20-Cell-002	G220-23-2B	11/17/2004	Wipe	20	3.05
GM-Dioxin-W-18-Cell-003	G220-23-3B	11/17/2004	Wipe	18	0.81
KD-Dioxin-W-15-Cell-004	G220-23-4B	11/17/2004	Wipe	15	1.75
GM-Dioxin-W-12-Cell-005	G220-23-5B	11/17/2004	Wipe	12	2.64
GM-Dioxin-W-10-Cell-006	G220-23-6B	11/17/2004	Wipe	10	2.95
GM-Dioxin-W-8-Cell-007	G220-23-7B	11/17/2004	Wipe	8	0.75
GM-Dioxin-W-7-Cell-008	G220-23-8B	11/17/2004	Wipe	7	1.78
GM-Dioxin-W-9-Cell-009	G220-23-9B	11/17/2004	Wipe	9	2.11
GM-Dioxin-W-011-Cell-010	G220-23-10B	11/17/2004	Wipe	11	4.84
GM-Dioxin-W-000-Cell-FB1	G220-23-11B	11/17/2004	Wipe		0.34
GM-Dioxin-W-12-Cell-005 QA/QC	G220-31-1B	11/17/2004	Wipe	12	2.31 J

	ng/m2
Arithmetic Mean	2.17
May 2003 Benchmark[1]	2.0
April 2003 Background Assessment[2]	0.693
September 2002 WTC Indoor Assessment[3]	
Tier I	>120
Tier II	120 to 4 (or background)
Tier III	<4 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 4
Cell Systems - Polycyclic Aromatic Hydrocarbons (PAHs)
PAH Wipe (SW 846-8270C)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	PAH (ug/m2)	Benzo(a)Pyrene Equivalent (ug/m2)
GM-PAH-W-29-Cell-001	G220-21-1B	11/18/2004	Wipe	29	17.5 J	<40.44
GM-PAH-W-20-Cell-002	G220-21-2B	11/18/2004	Wipe	20	21 J	<40.44
KD-PAH-W-15-Cell-003	G220-21-3B	11/18/2004	Wipe	15	35 J	40.44
GM-PAH-W-18-Cell-004	G220-21-4C	11/18/2004	Wipe	18	38.5 J	40.44
GM-PAH-W-12-Cell-005	G220-21-5B	11/18/2004	Wipe	12	91 J	40.44
GM-PAH-W-10-Cell-006	G220-21-6B	11/18/2004	Wipe	10	21 J	<40.44
GM-PAH-W-8-Cell-007	G220-21-7B	11/18/2004	Wipe	8	21 J	<40.44
GM-PAH-W-18-Cell-004 QA/QC	G220-21-12B	11/18/2004	Wipe	18	17.5 J	<40.44
GM-PAH-W-7-Cell-008	G220-21-8B	11/18/2004	Wipe	7	24.5 J	<40.44
GM-PAH-W-9-Cell-009	G220-21-9B	11/18/2004	Wipe	9	21 J	<40.44
GM-PAH-W-011-Cell-010	G220-21-10B	11/18/2004	Wipe	11	98 J	<40.44
GM-PAH-W-000-Cell-FB1	G220-21-11B	11/18/2004	Wipe		87.5	56.19

Each area sampled is 285 cm2.
Benzo(a)Pyrene Equivalent determined using 1/2 the detection limit.

	ug/m2 - BaP Equivalent
BaP Arithmetic Mean (ND=1/2)	40
May 2003 Benchmark[1]	150
April 2003 Background Assessment[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>9,000
Tier II	9,000 to 300 (or background)
Tier III	<300 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based* Benchmarks. Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 5
Cell Systems - Man Made Vitreous Fibers (MMVF)
MMVF Bulk (EMSL MSD 0310)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	MMVF (str/cm2)
GM-MMVF-W-29-Cell-001	360401096	11/18/2004	Wipe	29	968
GM-MMVF-W-20-Cell-002	360401096	11/18/2004	Wipe	20	1,210
KD-MMVF-W-18-Cell-004	360401096	11/18/2004	Wipe	18	1,161
KD-MMVF-W-15-Cell-003	360401096	11/18/2004	Wipe	15	944
GM-MMVF-W-12-Cell-005	360401096	11/18/2004	Wipe	12	1,427
GM-MMVF-W-011-Cell-010	360401096	11/18/2004	Wipe	11	1,161
GM-MMVF-W-10-Cell-006	360401096	11/18/2004	Wipe	10	1,476
GM-MMVF-W-10-Cell-006 QA/QC	360401096	11/18/2004	Wipe	10	1,427
GM-MMVF-W-9-Cell-009	360401096	11/18/2004	Wipe	9	1,137
GM-MMVF-W-8-Cell-007	360401096	11/18/2004	Wipe	8	847
GM-MMVF-W-7-Cell-008	360401096	11/18/2004	Wipe	7	1,403
GM-MMVF-W-000-Cell-FB1	360401096	11/18/2004	Wipe		ND

Each area sampled is 285 cm2.

	str/cm2
Arithmetic Mean (ND=1/2)	1,173.40
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>100,000
Tier II	100,000 to background
Tier III	background

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based* Benchmarks. Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

130 Liberty Street

New York, New York

Supplemental Investigation Summary Report

Curtain Wall Cavity Sampling Summary Results

Prepared for:
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan
Development Corporation

Prepared By:

TRC
Customer-Focused Solutions

TRC Environmental Corp.
1430 Broadway, 10th Floor
New York, New York 10018

February 10, 2005

1. INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents the results of the supplemental investigation and testing of the previously inaccessible curtain wall cavities within the Building.

1.1 Background

The Building is located across the street and south of the WTC site and is a former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

In addition, Berger recommended performing preliminary waste characterization.

This supplemental investigation summary presents the results of additional inspection and sampling performed by TRC of the previously inaccessible curtain wall cavities within the Building. Supplemental investigations regarding heating, ventilation, and air conditioning (HVAC) ductwork, cell systems within floors, interstitial spaces within interior walls and column cavities, fireproofing, exterior building surfaces, waste characterization, and visual inspection of the Building for mold and asbestos containing building materials (ACBM) are addressed in other summaries.

As part of the supplemental investigation, TRC collected the following samples:

COPC	Asbestos	Lead	Silica	Dioxin	PAH	MMVF
Total Samples	126	106	35	55	55	27

For the previously inaccessible curtain wall cavities at 130 Liberty Street, TRC collected samples at the following frequency from the aluminum wall, drip pan, and spray-on fireproofing. Samples were collected for the United States Environmental Protection Agency (USEPA) contaminants of potential concern (COPCs), including asbestos, lead, silica, polycyclic aromatic hydrocarbons (PAHs), dioxins, and man-made vitreous fibers (MMVF):

COPC	**Frequency**
Asbestos wipe/microvacuum	10
Asbestos bulk	11
Lead wipe/microvacuum	11
Lead bulk	5
Silica bulk	3
Dioxin wipe	7
Dioxin bulk	3
PAH wipe	6
PAH bulk	3
MMVF bulk	3

TRC utilized a tiered approach to sample analysis. All asbestos and lead wipe samples were analyzed and the results reviewed. Results of this study were compared to the findings in the *Initial Building Characterization Report* and benchmark and background concentrations presented in previous environmental studies as detailed in the following sections. If surface concentrations of asbestos and lead were found to be similar to the *Initial Building Characterization Report* and elevated when compared to benchmark and

background concentrations, further analysis for the remaining COPCs was not conducted. If surface concentrations of asbestos and lead were found to be less than the *Initial Building Characterization Report,* benchmark, and background concentrations, further analysis for the remaining COPCs was conducted.

1.3 Previous Environmental Studies

Several studies concerning WTC-related contaminants have been performed by, or with the review of, the federal, state, and local regulatory authorities in the aftermath of the events of September 11, 2001. In particular, the USEPA has been responsible for studies associated with the development of the EPA's list of COPCs, as discussed in this section.

The USEPA COPC Committee developed, in their *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health Based Benchmarks, Peer Review Draft (September 2002),* a tiered approach to evaluate the health risks posed by contaminants that might be present in an indoor environment (air and settled dust) for residential reoccupancy. For each COPC, three levels were developed:

Tier I - Level above which, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), aggressive clean-up action should be taken expeditiously along with follow-up sampling to confirm attainment of Tier III level.

Tier II - Range where diligent cleaning should continue, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), with follow-up sampling to confirm attainment of Tier III level.

Tier III - Level below which the risk is negligible or consistent with the New York City background level found in the USEPA Background Study as identified below.

These levels were established for residential reoccupancy. The Tier I screening level was intended to be protective of a resident who may have been exposed to WTC-related contaminants in their residence for one year. The Tier III clearance level was intended to be protective of a resident who is exposed to WTC-related contaminants in their residence for 30 years, which was the upper-bound estimate for residency in one dwelling. For COPCs in settled dust, the tiered values are as follows:

	Settled Dust		
COPC	**Tier I**	**Tier II**	**Tier III**
Asbestos (str/cm^2)	>30,000	30,000 to background	Background
Lead (ug/ft^2)	>40	40 to 25 (or background)	<25 (or background)
Silica	--	Above background	Background
PAH (mg/m^2)	>9	9 to 0.3 (or background)	<0.3 (or background)
MMVF (str/cm^2)	>100,000	100,000 to background	Background
Dioxin (ng/m^2)	>120	120 to 4 (or background)	<4 (or background)

These levels were developed to be risk-based levels for residential settings. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

Subsequent to peer review of the September 2002 report, the USEPA COPC Committee developed, in their *World Trade Center Indoor Environmental Assessment: Selecting Health-Based Benchmarks (May 2003)* report, health based benchmarks that reflected only the Tier III levels.

The USEPA, Region 2, also developed the *World Trade Center Background Study Report (April 2003).* The objective of this study was to determine and/or estimate indoor baseline levels or background concentrations for the presence of specific contaminants in residential buildings unaffected by the WTC disaster. The average background concentrations for COPCs in settled dust on hard surfaces are summarized below.

COPC	**Average Background**
Asbestos (str/cm^2)	6,192
Lead (ug/ft^2)	1.78
Silica (ug/ft^2)	79.6 (expressed as quartz)
PAH (mg/m^2)	<0.29
MMVF (str/cm^2)	52
Dioxin (ng/m^2)	0.693

Based on the text by Millette and Hays, *Settled Asbestos Dust Sampling and Analysis*, levels of asbestos in settled dust as determined by the microvacuum techniques are considered low if less than 1,000 str/cm^2. Levels above 10,000 str/cm^2 are considered generally above background. Levels above 100,000 str/cm^2 are considered high and in the range of significant accidental release from an abatement site.

1.4 Purpose and Objectives

The objective of the SI is to provide additional information relative to the concentrations of COPCs within previously inaccessible spaces. This SI summary presents the results specifically for the previously inaccessible curtain wall cavity investigation.

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

2. METHODOLOGY

This section presents the methodologies implemented for the previously inaccessible curtain wall characterization within the Building. These tasks were implemented in general accordance with the *Sampling Analysis and Quality Assurance Project Plan* (SAQAPP) developed by TRC dated November 15, 2004.

TRC collected representative wipe, microvacuum, and/or bulk samples for the COPCs from the drip pan, fireproofing, and aluminum exterior wall within the curtain wall cavities of 130 Liberty Street subsequent to establishment of a clean contained area. Prior to any sampling, sampling locations were selected that were previously undisturbed representative areas (i.e. not impacted by previous investigations or cleaning protocols). The following procedure was utilized to access the interstitial cavity spaces:

1. The wallboard to be cut was surveyed with a stud finder and anticipated cut lines marked to provide multiple openings at a sample location.

2. A rotary cutting tool was utilized to cut ¾ of the depth of the sheetrock along the cut line to ensure that the wallboard backing paper was not penetrated.

3. The area was cleaned and a tent containment was created around the work area. The contained work area was maintained under positive pressure. This work area was then visually inspected, and air samples collected for asbestos and lead.

4. Upon receipt of successful clearance air samples, the wallboard cut line was sprayed with water, then the remaining depth cut with a utility knife and wallboard and greenboard removed into the tent containment to access the interstitial cavity space.

Asbestos and MMVF wipe samples were collected following American Society for Testing and Materials (ASTM) 6480-99. Asbestos microvacuum samples were collected following ASTM D 5755-95. Lead microvacuum samples were collected following ASTM E 1973-99 and lead and silica wipe samples were collected following the United States Department of Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, Appendix 13.1. Dioxin and PAH samples were collected following ASTM D6661-01. Samples were analyzed as per the following methods:

COPC	Analytical Method
Asbestos wipe	ASTM 6480-99
Asbestos microvacuum	ASTM D5755-03
Asbestos bulk	NYS ELAP 198.1
Lead wipe and bulk	USEPA SW 846-7420
Lead microvacuum	NIOSH 7082
Silica	NIOSH 7500 (XRD)
Dioxin	USEPA SW 846-8290
PAH	USEPA SW 846-8270C
MMVF	EMSL MSD 0310

All samples were properly labeled as per the SAQAPP. Asbestos, lead, silica, and MMVF samples were delivered to the EMSL Analytical Inc. laboratory, an independent New York State Department of Health (NYSDOH ELAP # 10872 for asbestos and lead) and an American Industrial Hygiene Association (AIHA # 100194 for silica) certified laboratory. PAH and dioxin samples were delivered to Paradigm Analytical Labs in Wilmington, North Carolina (NYSDOH ELAP # 11685).

3. RESULTS

3.1 Asbestos

Eight asbestos wipe, two microvacuum, three blank, one duplicate, and eleven bulk samples were collected on various floors of the Building as detailed below. Samples were divided up by Zone, as described in the *Initial Building Characterization Report*. Zones 2 and 3 apply to TRC's study and are defined as follows:

> Zone 2: Office space located at or below the 24th Floor that may have been subjected to dust entering the Building through the Gash, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows.
>
> Zone 3: Office space located above the 24th Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows.

Microvacuum and wipe sample results ranged from less than 6,250 structures per square centimeter (str/cm^2) to 55,900 str/cm^2. One of the ten samples exceeded the Tier I value of 30,000 str/cm^2. The arithmetic mean concentration for the remaining ten results was 14,038 str/cm^2 using one-half the detection limit for non-detected sample results. This average is above the USEPA average background concentration but below the USEPA Tier I residential health-risk based benchmark value of 30,000 str/cm^2. No asbestos was detected in the eleven bulk samples. Sample results are provided in the attached Tables 1 and 2.

Asbestos Sample ID	Floor	Location	Zone
Wipe			
KD-16-W-ASB-EXT.WALL-DP-004E	16	Drip pan, HG-56	2
KD-14-W-ASB-DP-EXT-005E	14	Drip pan, AB-24	2
KD-10-W-ASB-EXT.WALL-007E	10	Aluminum wall, HG-56	2
KD-2-W-EXT.WALL-ASB-008E	2	Aluminum wall, ED-12	2
KD-26-WIPEEXT.DRIP PAN-ASB-006E	26	Drip pan, NE area H-6	3
KD-24-WIPEEXT.AL.WALL-ASB-009E	24	Aluminum wall, NE area A-4	3
KD-29-WIPEEXT.AL.WALL-ASB-010E	29	Aluminum wall, NE area H-8	3
KD-001-ASB-EXTWALL7FL-W-ALUMINUMWALL	7	Aluminum Wall	2
Microvacuum			
ZD-01-ASB	14	Fireproofing	2
ZD-02-ASB	10	Fireproofing	2
Bulk			

Asbestos Sample ID	Floor	Location	Zone
KD-7-BULK-FIREPROOFING-ASBESTOS-001	7	Tent location HG-56	2
KD-4-BULK-FIREPROOFING-ASBESTOS-002	4	Tent location HG-34	2
KD-20-BULK-FIREPROOFING-ASBESTOS-003	20	Tent location, AB-34	2
ZD-29-BULK-EXT.WALL-DUST-001E	29	NE area H-8	3
KD-7-ASB-EXT.DUST-001E	7	Concrete/metal, GH-56	2
KD-4-BULK-EXT.WALL-DUST-002E	4	Concrete/metal, GH-34	2
KD-20-DUST-EXT-003E	20	Concrete/metal, AB-4	2
KD-16-DUST-DRIPPAN-004E-BULK-EXT.	16	Concrete/metal, H-5	2
KD-14-DUST-DRIPPAN-005E-BULK-EXT.	14	Concrete/metal, A-3	2
KD-10-BULK-EXT.WALL-DUST-006E	10	Concrete/metal, H-5	2
KD-02-BULK-EXT.WALL-DUST-007E	2	Concrete wall, D-1	2

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes. Potential uncertainty exists for the asbestos results in sample KD-001-ASB-EXTWALL-7FL-W-ALUMINUMWALL due to variability in field duplicate results. The results of the original sample is used in calculating the results average as this result exceeded the September 2002 Tier I level and the field duplicate result fell below the project action level.

TRC reviewed the *Initial Building Characterization Report.* This report presents the results of 40 supplemental screening samples of the settled dust from porous and non-porous surfaces and analyzed for asbestos using TEM. The samples were collected from various locations within the Building, including, but not limited to carpeting, counters, vent units, and above the ceiling tiles. The results revealed detectable levels of asbestos above the residential background level of 6,192 structures/cm^2 identified in the EPA *World Trade Center Background Study Report Interim Final* (April 2003). The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and the 40th/41st floor mechanical room. Asbestos was detected in dust at concentrations in excess of 6,192 str/cm^2 in 24 of the 31 floors sampled by TEM analysis (77%). The samples containing asbestos ranged from a minimum concentration of less than 891 str/cm^2 (from Floors 5, 24, 25, 28, 34, and 41) to a maximum concentration of 4,879,200 str/cm^2 (from Floor 2). These results are relatively greater than the curtain wall cavity SI results.

TRC reviewed the *Deutsche Bank Damage Assessment Report: Contamination Report Pursuant to Testing Protocol-07 (TP-07), Interior Aluminum Surface of the Curtain Wall Data Report* RJ Lee Group, Inc. dated May 2003. The average and maximum asbestos concentrations of samples collected in the non-gash areas of this report were 448,400 str/cm^2 and 10,370,000 str/cm^2, respectively. The concentrations reported in the RJ Lee report are significantly higher than the concentrations found in the curtain wall cavity SI.

3.2 Lead

Six wipe, five microvacuum, two field blanks, one duplicate, and five lead bulk samples were collected on various floors of the Building as detailed below. Wipe and microvacuum sample results ranged from 10 ug/ft^2 to 220 ug/ft^2 with an arithmetic average of 60 ug/ft^2. Five of the eleven samples exceeded the USEPA Tier I residential health-risk based benchmark value of 40 ug/ft^2. No lead was detected in the five bulk samples. Sample results are provided in the attached Tables 3 and 4.

Sample ID	Floor	Location	Zone
Wipe			
KD-26-WIPE-EXTDRIPPANLEAD-006	26	Drip Pan, NE Area H-6	3
KD-24-WIPE-EXTALWALLLEAD-009E	24	Aluminum, NW Area A-4	3
KD-29-WIPE-EXTALWALLLEAD-010E	29	Aluminum, NE Area GH-78	3
KD-10-W-PB-EXTWALL-007E	10	Aluminum, GH-56	2
KD-2-W-EXTWALL-PB-008E	2	Aluminum, ED-12	2
KD-001-PB-EXT-WALL7FL-W-ALUMINUM WALL	7	Aluminum wall	2
Microvacuum			
ZD-01-PB	14	Drip pan	2
ZD-02-PB	10	Column	2
ZD-03-PB	7	Drip pan	2
ZD-04-PB	4	Column	2
ZD-05-PB	2	Column	2
Bulk			
KD-7-BULK-EXT.FIREPROOFING-001	7	E side GH-56	2
KD-4-BULK-EXT.FIREPROOFING-002	4	E side HG-34	2
KD-20-BULK-EXT.FIREPROOFING-003	20	E side AB-34	2
KD-16-W-BULK-PB-DRIP PAN-EXT WALL-004E	16	HG-56	2
KD-14-W-BULK-EXT-WALL-DRIP PAN-PB-005E	14	AB-24	2

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes. Potential uncertainty exists for two lead bulk non-detect results and two lead wipe sample results due to laboratory duplicate nonconformance and variability in the field duplicate pair, respectively. The non-detect results are designated with a "J" indicating the value is an estimate.

According to the *Initial Building Characterization Report*, there was significant variation in the lead testing results collected from the Building dust samples. Lead was detected in 122 of 125 samples tested. Lead results of samples collected above the plenum ranged from 350 ug/m^2 (32.52 ug/ft^2) to 10,900 ug/m^2 (1,012.6 ug/ft^2). Lead results from samples collected below the plenum ranged from 150 ug/m^2 (13.92 ug/ft^2 - in Zone 3) to 101,000 ug/m^2 (9,383.2 ug/ft^2 - in Zone 1). These results are almost two orders of magnitude higher than the curtain wall results of this SI.

TRC reviewed the *TP-07 Interior Aluminum Surface of the Curtain Wall Summary Report* and *Deutsche Bank Damage Assessment report: Contamination Report Pursuant to Testing Protocol-08, Curtain Wall Insulation Summary Report* dated May 2003. According to the aluminum surface report, the average and maximum lead concentrations of samples collected in the non-gash areas of this report were 87 ug/ft^2 and 1,170 ug/ft^2, respectively, which are relatively higher than the curtain wall cavity results found in the SI. The curtain wall insulation reports bulk sample average and maximum concentrations of 323.8 parts per million (ppm) and 6,900 ppm lead, respectively. These results are considerably greater than the bulk results in this SI, which did not detect lead at a detection limit of 100 ppm.

3.3 Silica

Three bulk samples were collected from the fireproofing within the curtain wall on various floors of the Building as described below. The silica sample results ranged from less than 5,100 milligrams per square foot (mg/ft^2) to 11,600 mg/ft^2 with an arithmetic average of 7,400 mg/ft^2. These relatively high silica results are expected since silica is commonly found in fireproofing. In fact, silica comprised 6.0% to 8.0% of the fireproofing material. Sample results are provided in the attached Table 5.

Sample ID	Floor	Location	Zone
KD-7-SILICA-BULK-EXT-F.P.-001	7	GH-56	2
KD-4-SILICA-BULK-EXT-F.P.-002	4	GH-34	2
KD-20-SILICA-BULK-EXT-F.P.-003	20	AB-34	2

A limited data validation was performed on the three bulk samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

3.4 Dioxin

Seven dioxin wipe, one field blank, and three bulk samples were collected within the curtain wall at various floors of the Building as detailed below. The World Health Organization (WHO) has established a convention whereby the results for all dioxin compounds are expressed as a toxicity equivalency concentration (TEQ). The TEQ is based upon TEF referenced to 2,3,7,8 TCDD, which is the most toxic of the dioxin compounds. The TEQ is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the toxicity equivalent factors (TEFs) are then added to obtain the TEQ for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. Wipe results ranged from 0.99 nanograms per square meter (ng/m^2) to 17.8 ng/m^2 with an arithmetic average of 7.35 ng/m^2. This average is above the USEPA average background (0.693 ng/m^2) and USEPA Tier III concentrations (2 ng/m^2) but below the USEPA Tier I residential health-risk based benchmark value (120 ng/m^2). The three dioxin bulk fireproofing sample results were converted to mass of dioxins per unit surface area utilizing the total sample weight and surface area sampled. Two of the bulk fireproofing samples resulted in a concentration of 13.5 ng/m^2 and one was at 436 ng/m^2. The one bulk fireproofing sample collected from the 7th floor exceeded the USEPA Tier I value. Sample results are provided in the attached Tables 6 and 7.

Sample ID	Floor	Location	Zone
Wipe			
KD-16-W-DX-DripP-ExtWall-004E	16	Drip pan	3
KD-14-W-DX-ExtWall DripP-005E	14	Drip pan	3
KD-10-W-DX-ExtWall-007E	10	Aluminum wall	3
KD-2-W-DX-Ext.Wall-008E	2	Aluminum wall	2
KD-26-W-Ext.Wall DripPan-DX-006E	26	Drip Pan	3
KD-24-W-Ext.Wall AL.DX-009E	24	Aluminum wall	3
ZD-29-W-Ext.Wall DX-010E	29	Aluminum wall	3
Bulk			
KD-7-Bulk-Diox-FP-Ext.Wall-001	7	GH-56	2
KD-4-Bulk-Diox-FP-Ext.Wall-002	4	GH-34	2
KD-20-Bulk-Diox-FP-Ext.Wall-003	20	AB-34	2

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes. Select results were qualified as non-detects due to blank contamination. Potential high bias exists for HxCDD and HxCDF cogeners in sample KD-14-W-DX-ExtWall-DripPan-005E due to high recoveries of cleanup standards. There were no adverse affects on the data usability on the basis of these issues as the affected results were still significantly below the USEPA Tier I residential health-risk based benchmark value.

According to the *Initial Building Characterization Report*, there was significant variation in the dioxin testing results collected from the Building dust samples. Dioxin was detected in all 124 samples tested. The samples containing dioxin ranged from a low concentration of 1 ng/m^2 (from Zone 2) to a maximum concentration of 214 ng/m^2 (in Zone 5). These results are consistent with the highly variable nature of WTC dust. Results of wipe samples collected in this study were generally greater than the concentrations found in the SI, however SI results of one of the three bulk fireproofing samples was greater than the maximum concentration found in the *Initial Building Characterization Report.*

TRC reviewed the *TP-07 Interior Aluminum Surface of the Curtain Wall Summary Report* and the *TP-08 Curtain Wall Insulation Summary Report.* According to the aluminum surface report, the average and maximum silica concentrations of samples collected in the non-gash areas of this report were 136 ng/m^2 and 5,175 ng/m^2, respectively, which are at least two orders of magnitude greater than the results found in this SI. According to the curtain wall insulation report, the average and maximum dioxin/furan concentrations were 24.3 picograms per grams (pg/g) and 1,295 pg/g, respectively. These results are generally comparable to the results found in this SI, which have an average and a maximum of 56.92 pg/g and 158 pg/g, respectively.

3.5 Polycyclic Aromatic Hydrocarbons (PAHs)

Seven PAH wipe, one field blank, and three bulk samples were collected within the curtain wall at the same locations as dioxins detailed in Section 3.4. The PAH sample results were converted using the sample weight and the surface area sampled. The carcinogenic PAHs results were used to calculate the benzo(a)pyrene (BaP) equivalent to measure the relative potency. The BaP equivalent is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the TEFs are then added to obtain the BaP equivalent for that sample.

For this investigation, one-half of the detection limit was used for compounds that were not detected. Of the seven wipe samples, only one sample detected PAHs. The BaP equivalent result of this sample was 171.75 micrograms per square meter (ug/m^2). All other wipe results were less than 57.8 ug/m^2. The arithmetic average of the sample set was 74 ug/m^2. Bulk BaP results ranged from 105.03 ug/m^2 to 122.48 ug/m^2 with an arithmetic average of 112 ng/m^2. These concentrations and averages are below the USEPA average background (290 ug/m^2) and USEPA Tier III (300 ug/m^2) and Tier I residential health-risk based benchmark values (9,000 ug/m^2). Sample results are provided in the attached Tables 8 and 9.

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes. Potential low bias exists for anthracene and benzo(a)pyrene in the samples KD-26-W-ExtWall-DripPan-PAH-006E, KD-24-W-ExtWall-AL-PAH-009E, and KD-29-W-ExtWall-PAH-010E due to low LCS recoveries. This has minimal effect on the data usability since all results are still approximately two orders of magnitude lower than the Tier III criteria.

According to the *Initial Building Characterization Report*, there was significant variation in the PAH testing results collected from the Building dust samples. The samples containing PAH ranged from a low concentration of 3 ug/m^2 (from Zone 1) to a maximum concentration of 11,555 ug/m^2 (in Zone 2). These results are considerably greater than the results of the SI.

TRC reviewed the *TP-07 Interior Aluminum Surface of the Curtain Wall Summary Report* and the *TP-08 Curtain Wall Insulation Summary Report.* According to the aluminum surface report, the average and maximum PAH concentrations of samples collected in the non-gash areas of this report were 209 ug/m^2 and 11,333 ug/m^2, respectively, which are considerably greater than the results of this SI. According to the curtain wall insulation report, the average and maximum PAH concentrations were 329.1 micrograms per kilogram (ug/kg) and 5,769 ug/kg, respectively. These results are higher than the results found in this SI, which have an average and a maximum of 116.91 ug/kg and 138.15 ug/kg, respectively.

3.6 Man Made Vitreous Fibers (MMVF)

Three MMVF bulk samples were collected at the same locations as silica detailed in Section 3.3. MMVF was expected to be detected because it is inherently part of fireproofing. Of the three samples, MMVFs were detected in two samples at 15% (4.22

grams) and 10% (2.18 grams) concentrations. Sample results summary is provided in the attached Table 10.

Asbestos Sample ID	Floor	Location	Zone
KD-7-Bulk-MMVF-FP-001	7	Exterior wall GH-56	2
KD-7-Bulk-MMVF-FP-002	4	Exterior wall GH-34	2
KD-7-Bulk-MMVF-FP-003	20	Exterior wall AB-34	2

A limited data validation was performed on the three bulk samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

4. FINDINGS

Sample results were compared to criteria provided in Section 1.2 and 1.3 and identified on the bottom of each table as well as the result of previous studies.

This SI has identified average concentrations less than the USEPA Tier I risk based criteria, the *Initial Building Characterization Report* and the *TP-07 and TP-08 Summary Reports* for asbestos, dioxin wipe, and PAH samples. The USEPA Tier I values represent a one-year health risk-based residential value. No asbestos or lead was detected in the bulk samples. One of the three bulk fireproofing samples for dioxin exceeded the USEPA Tier I value.

Lead concentrations on curtain wall surfaces exceeded the benchmark criteria provided in the May 2003, September 2002 Tier I values, and the April 2003 Background Study, however, were lower than the concentrations identified in the *Initial Building Characterization Report* and the *TP-07 and TP-08 Summary Reports.*

Silica and MMVF bulk samples collected from the fireproofing were detected in high concentrations as expected, as they are inherent to fireproofing.

While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

5. CONCLUSIONS AND RECOMMENDATIONS

COPCs were found within the dust on the surfaces of the curtain wall cavity and fireproofing located within the Building. Concentrations were generally lower than the COPC levels for the dust in the accessible areas discussed in the *Initial Building Characterization Report,* however multiple samples and some arithmetic average results exceeded the USEPA residential health-based benchmark and background criteria. The results of the sampling and testing performed for this Supplemental Investigation revealed levels of contaminants that should be considered in connection with the deconstruction of the Building. Therefore, TRC recommends review of the results by federal, state, and local regulators and the curtain wall cavity be handled in a manner that complies with applicable laws.

6. REFERENCES

Damage Assessment, 130 Liberty Street Property, Contamination Report Pursuant to Testing Protocol-07, Interior Aluminum Surface of the Curtain Wall, Summary Report. RJ Lee Group, Inc., May 2003.

Damage Assessment, 130 Liberty Street Property, Contamination Report Pursuant to Testing Protocol-08, Curtain Wall Insulation, Summary Report. RJ Lee Group, Inc., December 2003.

Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part A). Interim Final. Office of Emergency and Remedial Response, Washington, D.C. United States Environmental Protection Agency, December 1989.

Initial Building Characterization Study Report, 130 Liberty Street, New York, New York. The Louis Berger Group, Inc., September 14, 2004.

Sampling, Analysis, and Quality Assurance Project Plan, Supplement Investigation of 130 Liberty Street, New York, New York. TRC Environmental Corp., November 15, 2004.

Settled Asbestos Dust Sampling and Analysis. James R. Millette, Steven M. Hays, 1994.

World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

World Trade Center Background Study Report, Interim Final. United States Environmental Protection Agency, Region 2, April 2003.

Curtain Wall
LMDC
130 Liberty Street
New York, New York
February 10, 2005

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Table 1
Curtain Wall - Asbestos
Asbestos Wipe (SW 6480-99)
Asbestos Microvacuum (ASTM D5755-03)
Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Asbestos (str/cm^2)
KD-16-W-ASB-EXT.WALL-DP-004E	030423849-0005	12/2/2004	Wipe	16	Drip pan, Exterior wall tent location HG-56	25,600
KD-14-W-ASB-DP-EXT-005E	030423849-0008	12/2/2004	Wipe	14	Drip pan, Exterior wall tent location AB-24	<6,970
KD-10-W-ASB-EXT.WALL-007E	030423849-0010	12/2/2004	Wipe	10	Aluminum wall, Exterior wall tent location HG-56	<6,250
KD-2-W-EXT.WALL-ASB-008E	030423849-0012	12/2/2004	Wipe	2	Aluminum wall, Exterior wall tent location ED-12	<14,900
KD-26-WIPEEXT.DRIP PAN-ASB-006E	030423953-0001	12/3/2004	Wipe	26	Drip pan, NE area H-6	<14,900
KD-24-WIPEEXT.AL.WALL-ASB-009E	030423953-0002	12/3/2004	Wipe	24	Aluminum wall, NE area A-4	19,900
KD-29-WIPEEXT.AL.WALL-ASB-010E	030423953-0005	12/3/2004	Wipe	29	Aluminum wall, NE area H-8	<6,970
KD-00-WBLANK-0000	030423953-000	12/3/2004	Wipe		Blank	Blank
KD-001-ASB-EXTWALL7FL-W-ALUMINUMWALL	030424770-0001	12/13/2004	Wipe	7	Aluminum Wall	55,900
KD-002-ASB-EXTWALL7FL-W-QAQC-ALUMINUMWALL	030424770-0002	12/13/2004	Wipe	7	Aluminum Wall	20,900
KD-003-ASB-EXTWALL7FL-W-BLANL-ALUMINUMWALL	030424770-0003	12/13/2004	Wipe		Blank	<1,560
ZD-01-ASB	030425105-0001	12/16/2004	Microvacuum	14	Fireproofing	6,990
ZD-02-ASB	030425105-0002	12/16/2004	Microvacuum	10	Fireproofing	6,990
ZD-03-ASB	030425105-000	12/16/2004	Microvacuum		Fireproofing	Blank

	str/cm2
Arithmetic Mean (ND=1/2)	14,038
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	6,192
September 2002 WTC Indoor Assessment[3]	
Tier I	>30,000
Tier II	>30,000 to background
Tier III	Background

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 2
Curtain Wall - Asbestos
Asbestos Bulk PLM (NYS ELAP 198.1)

Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Asbestos (% by weight)
KD-7-BULK-FIREPROOFING-ASBESTOS-001	030423845-0001	12/2/2004	Bulk	7	Tent location HG-56	NAD
KD-4-BULK-FIREPROOFING-ASBESTOS-002	030423845-0002	12/2/2004	Bulk	4	Tent location HG-34	NAD
KD-20-BULK-FIREPROOFING-ASBESTOS-003	030423845-0003	12/2/2004	Bulk	20	Tent location, AB-34	NAD
ZD-29-BULK-EXT.WALL-DUST-001E	030423956-0002	12/3/2004	Bulk	29	NE area H-8	NAD
KD-7-ASB-EXT.DUST-001E	030423846-0002	12/2/2004	Bulk	7	Concrete/metal inside tent GH-56	NAD
KD-4-BULK-EXT.WALL-DUST-002E	030423846-0003	12/2/2004	Bulk	4	Concrete/metal inside tent GH-34	NAD
KD-20-DUST-EXT-003E	030423846-0004	12/2/2004	Bulk	20	Concrete/metal inside tent AB-4	NAD
KD-16-DUST-DRIPPAN-004E-BULK-EXT.	030423846-0005	12/2/2004	Bulk	16	Concrete/metal inside tent H-5	NAD
KD-14-DUST-DRIPPAN-005E-BULK-EXT.	030423846-0006	12/2/2004	Bulk	14	Concrete/metal inside tent A-3	NAD
KD-10-BULK-EXT.WALL-DUST-006E	030423846-0007	12/2/2004	Bulk	10	Concrete/metal inside tent H-5	NAD
KD-02-BULK-EXT.WALL-DUST-007E	030423846-0008	12/2/2004	Bulk	2	Concrete wall, inside tent D-1	NAD

Table 3
Curtain Wall - Lead
Lead Wipe (SW 846-7420) and
Lead Microvacuum (NIOSH 7082)
Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Lead (ug/ft2)	Lead (ug/m2)
KD-26-WIPE-EXTDRIPPANLEAD-006	030423954-0001	12/3/2004	Wipe	26	Drip Pan, NE Area H-6	220	2,368
KD-24-WIPE-EXTALWALLLEAD-009E	030423954-0002	12/3/2004	Wipe	24	Aluminum, NW Area A-4	15	161
KD-29-WIPE-EXTALWALLLEAD-010E	030423954-0004	12/3/2004	Wipe	29	Aluminum, NE Area GH-78	21	226
KD-000-W-BLANK-0000	030423954-0006	12/3/2004	Wipe		Field Blank	<10	<108
KD-10-W-PB-EXTWALL-007E	030423947-0007	12/2/2004	Wipe	10	Aluminum, tent location GH-56	56	603
KD-2-W-EXTWALL-PB-008E	030423947-0010	12/2/2004	Wipe	2	Aluminum, tent location ED-12	180	1,938
KD-001-PB-EXT-WALL7FL-W-ALUMINUM WALL	030424771-0001	12/13/2004	Wipe	7	Aluminum wall	57 J	614
KD-002-PB-EXT-WALL7FL-W-QAQC-ALUMINUM WALL	030424771-0002	12/13/2004	Wipe	7	Aluminum wall	130 J	1,399
ZD-01-PB	030425106-0001	12/16/2004	Microvacuum	14	Exterior wall, drip pan	21	226
ZD-02-PB	030425106-0002	12/16/2004	Microvacuum	10	Exterior wall, column	10	108
ZD-03-PB	030425106-0003	12/16/2004	Microvacuum	7	Exterior wall, drip pan	15	161
ZD-04-PB	030425106-0004	12/16/2004	Microvacuum	4	Exterior wall, column	49	527
ZD-05-PB	030425106-0005	12/16/2004	Microvacuum	2	Exterior wall, column	15	161
ZD-06-PB	030425106-0006	12/16/2004	Microvacuum		Blank	<4	<43

	ug/ft2
Arithmetic Mean	60
May 2003 Benchmark[1]	25
April 2003 Background Assessment[2]	1.78
September 2002 WTC Indoor Assessment[3]	
Tier I	>40
Tier II	40 to 25 (or background)
Tier III	<25 (or background)

J - Estimated value due to variability in the field duplicate pair.

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 4
Curtain Wall - Lead
Lead Bulk (SW 846-7420)

Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Lead (% by weight)
KD-7-BULK-EXT.FIREPROOFING-001	030423847-0004	12/3/2004	Bulk	7	Tent location, E side GH-56	<0.01
KD-4-BULK-EXT.FIREPROOFING-002	030423847-0005	12/3/2004	Bulk	4	Tent location, E side HG-34	<0.01
KD-20-BULK-EXT.FIREPROOFING-003	030423847-0006	12/3/2004	Bulk	20	Tent location, E side AB-34	<0.01
KD-16-W-BULK-PB-DRIP PAN-EXT WALL-004E	030423848-0014	12/2/2004	Bulk	16	Tent location HG-56	<0.01
KD-14-W-BULK-EXT-WALL-DRIP PAN-PB-005E	030423848-0015	12/2/2004	Bulk	14	Tent location AB-24	<0.01

J - Estimated value due to laboratory duplicate nonconformance.

Table 5
Curtain Wall - Silica
Silica Bulk (NIOSH 7500)

Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Silica (mg/ft2)
KD-7-SILICA-BULK-EXT-F.P.-001	040423812-0001	12/2/2004	Bulk	7	GH-56	11,600
KD-4-SILICA-BULK-EXT-F.P.-002	040423812-0002	12/2/2004	Bulk	4	GH-34	5,100
KD-20-SILICA-BULK-EXT-F.P.-003	040423812-0003	12/2/2004	Bulk	20	AB-34	5,500

Area sampled is one foot squared.

	mg/ft2
Arithmetic Mean	7,400
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	>0.0796 (expressed as quartz)
September 2002 WTC Indoor Assessment[3]	
Tier I	--
Tier II	above background
Tier III	background

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 6
Curtain Wall - Dioxin
Dioxin Wipe (SW 846-8290)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	WHO TEQ (ND=1/2; ng/m2)
KD-16-W-DX-DripPan-ExtWall-004E	G220-29-5C	11/26/2004	Wipe	16	Drip Pan	14.30
KD-14-W-DX-ExtWall DripP-005E	G220-29-8C	11/26/2004	Wipe	14	Drip Pan	17.8 J
KD-10-W-DX-Ext.Wall-007E	G220-29-9C	11/26/2004	Wipe	10	Aluminum wall	9.44
KD-2-W-DX-Ext.Wall-008E	G220-29-12C	11/26/2004	Wipe	2	Aluminum wall	2.34
KD-26-W-Ext.Wall DripPan-DX-006E	G220-30-1B	12/3/2004	Wipe	26	Drip Pan	4.78
KD-24-W-Ext.Wall AL.DX-009E	G220-30-2B	12/3/2004	Wipe	24	Aluminum wall	1.29
ZD-29-W-Ext.Wall DX-010E	G220-30-4B	12/3/2004	Wipe	29	Aluminum wall	1.51
KD-000-DX-W-Blank-000	G220-30-6B	12/3/2004	Wipe		Blank	0.99

	ng/m2
Arithmetic Mean	7.35
May 2003 Benchmark[1]	2.0
April 2003 Background Assessment[2]	0.693
September 2002 WTC Indoor Assessment[3]	
Tier I	>120
Tier II	120 to 4 (or background)
Tier III	<4 (or background)

J - Value is an estimate.

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 7
Curtain Wall - Dioxin
Dioxin Bulk (SW 846-8290)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	WHO TEQ (ND=1/2; ng/m2)
KD-7-Bulk-Diox-FP-Ext.Wall-001	G220-26-1B	12/2/2004	Bulk	7	Exterior wall GH-56	436
KD-4-Bulk-Diox-FP-Ext.Wall-002	G220-26-2B	12/2/2004	Bulk	4	Exterior wall GH-34	13.5
KD-20-Bulk-Diox-FP-Ext.Wall-003	G220-26-3B	12/2/2004	Bulk	20	Exterior wall AB-34	13.5

	ng/m2
Arithmetic Mean	154.33
May 2003 Benchmark[1]	2.0
April 2003 Background Assessment[2]	0.693
September 2002 WTC Indoor Assessment[3]	
Tier I	>120
Tier II	120 to 4 (or background)
Tier III	<4 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 8
Curtain Wall - Polycyclic Aromatic Hydrocarbons (PAH)
PAH Wipe (SW 846, 8270C)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	PAH (ug/m2)	Benzo(a)Pyrene Equivalent (ug/m2)
KD16-W-PAH-DripPn-ExtW-004E	G220-27-5B	12/2/2004	Wipe	16	Drip pan	<800	<57.78
KD-14-W-PAH-ExtWal-DrpPn-005E	G220-27-8B	12/2/2004	Wipe	14	Aluminum wall	1,260.00	171.75
KD-10-W-PAH-Ext.Wall-007E	G220-27-9B	12/2/2004	Wipe	10	Aluminum wall	<800	<57.78
KD-2-W-PAH-Ext.Wall-008E	G220-27-11B	12/2/2004	Wipe	2	Aluminum wall	<800	<57.78
KD-000-W-PAH-000-F-Blank	G220-27-13B	12/2/2004	Wipe		Blank	<800	<57.78
KD-26-W-Ext.Wall DP-PAH-006E	G220-28-1B	12/2/2004	Wipe	26	Drip pan, GH-56	<800	<57.78
KD-24-W-Ext.Wall-AL.PAH-009E	G220-28-2B	12/2/2004	Wipe	24	Aluminum wall, AB-34	<800	<57.78
ZD-29-W-Ext.Wall-PAH-010E	G220-28-4B	12/2/2004	Wipe	29	Aluminum wall, HG-78	<800	<57.78

Each area sampled is 100 square inches.
Benzo(a)Pyrene Equivalent determined using 1/2 the detection limit.

	ug/m2 - BaP Equivalent
BaP Arithmetic Mean (ND=1/2)	74
May 2003 Benchmark[1]	150
April 2003 Background Assessment[2]	–
September 2002 WTC Indoor Assessment[3]	
Tier I	>9,000
Tier II	9,000 to 300 (or background)
Tier III	<300 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 9
Curtain Wall - Polycyclic Aromatic Hydrocarbons (PAH)
PAH Bulk (SW 846, 8270C)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	PAH (ug/m2)	Benzo(a)Pyrene Equivalent (ug/m2)
KD-7-BULK-EXT.FIREPROOFING-001	G220-25-1B	12/2/2004	Bulk	7	Exterior wall GH-56	226.90	<105.03
KD-4-BULK-EXT.FIREPROOFING-002	G220-25-2B	12/2/2004	Bulk	4	Exterior wall GH-34	283.30	<108.96
KD-20-BULK-EXT.FIREPROOFING-003	G220-25-3B	12/2/2004	Bulk	20	Exterior wall AB-34	373.00	<122.48

Each area sampled is 100 square inches.
Benzo(a)Pyrene Equivalent determined using 1/2 the detection limit.

	ug/m2 - BaP Equivalent
BaP Arithmetic Mean (ND=1/2)	<112
May 2003 Benchmark[1]	150
April 2003 Background Assessment[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>9,000
Tier II	9,000 to 300 (or background)
Tier III	<300 (or background)

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 10
Curtain Wall - Man Made Vitreous Fibers (MMVF)
MMVF Bulk (EMSL MSD 0310)

Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Percent MMVF	Sample Weight (grams)
KD-7-Bulk-MMVF-EXT-FP-001	360401087-0001	12/3/2004	Bulk	7	GH-56	15.00	28.13
KD-4-Bulk-MMVF-EXT-FP-002	360401087-0002	12/3/2004	Bulk	7	GH-34	ND	25.21
KD-20-Bulk-MMVF-EXT-FP-003	360401087-0003	12/3/2004	Bulk	7	AB-34	10.00	21.76

130 Liberty Street

New York, New York

Supplemental Investigation Summary Report

Building Exterior Sampling Summary Results

Prepared for:
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan
Development Corporation

Prepared By:

TRC
Customer-Focused Solutions

TRC Environmental Corp.
1430 Broadway, 10th Floor
New York, New York 10018

February 10, 2005

1. INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents the results of the supplemental investigation and testing of the Building exterior surface.

1.1 Background

The Building is located across the street and south of the WTC site and is a former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

In addition, Berger recommended performing preliminary waste characterization.

This supplemental investigation summary presents the results of additional inspection and

sampling performed by TRC of the Building exterior facade. Supplemental investigations regarding curtain wall cavity, heating, ventilation, and air conditioning (HVAC) ductwork, cell systems within floors, interstitial spaces within interior walls and column cavities, fireproofing, waste characterization, and visual inspection of the Building for mold and asbestos containing building materials (ACBM) are addressed in separate summaries.

As part of the supplemental investigation, TRC collected the following samples:

COPC	Asbestos	Lead	Silica	Dioxin	PAH	MMVF
Total Samples	126	106	35	55	55	27

For the building exterior at 130 Liberty Street, TRC collected ten representative surface wipe samples for asbestos, lead, silica, dioxins, polycyclic aromatic hydrocarbons (PAHs), and man-made vitreous fibers (MMVF) analysis. A bulk sample for asbestos was also collected where sufficient quantities existed. Asbestos, lead, silica, PAHs, dioxins, and MMVF make up the United States Environmental Protection Agency (USEPA) contaminants of potential concern (COPCs) list.

TRC did not utilize a tiered approach to sample analysis as was done for other SI components tested. All COPCs were analyzed and the results reviewed. Results of this study were compared to the findings in the *Initial Building Characterization Report*, benchmark and background concentrations presented in previous environmental studies as detailed in the following sections.

1.3 Previous Environmental Studies

Several studies concerning WTC-related contaminants have been performed by, or with the review of, the federal, state, and local regulatory authorities in the aftermath of the events of September 11, 2001. In particular, the USEPA has been responsible for studies associated with the development of the EPA's list of COPCs, as discussed in this section.

The USEPA COPC Committee developed, in their *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health Based Benchmarks, Peer Review Draft (September 2002),* a tiered approach to evaluate the health risks posed by contaminants that might be present in an indoor environment (air and settled dust) for residential reoccupancy. For each COPC, three levels were developed:

Tier I - Level above which, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), aggressive clean-up action should be taken expeditiously along with follow-up sampling to confirm attainment of Tier III level.

Tier II - Range where diligent cleaning should continue, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), with follow-up sampling to confirm attainment of Tier III level.

Tier III - Level below which the risk is negligible or consistent with the New York City background level found in the USEPA Background Study as identified below.

These levels were established for residential reoccupancy. The Tier I screening level was intended to be protective of a resident who may have been exposed to WTC-related contaminants in their residence for one year. The Tier III clearance level was intended to be protective of a resident who is exposed to WTC-related contaminants in their residence for 30 years, which was the upper-bound estimate for residency in one dwelling. For COPCs in settled dust, the tiered values are as follows:

	Settled Dust		
COPC	**Tier I**	**Tier II**	**Tier III**
Asbestos (str/cm2)	>30,000	30,000 to background	Background
Lead (ug/ft2)	>40	40 to 25 (or background)	<25 (or background)
Silica	--	Above background	Background
PAH (mg/m2)	>9	9 to 0.3 (or background)	<0.3 (or background)
MMVF (str/cm2)	>100,000	100,000 to background	Background
Dioxin (ng/m2)	>120	120 to 4 (or background)	<4 (or background)

These levels were developed to be risk-based levels for residential settings. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

Subsequent to peer review of the September 2002 report, the USEPA COPC Committee developed, in their *World Trade Center Indoor Environmental Assessment: Selecting Health-Based Benchmarks (May 2003)* report, health based benchmarks that reflected only the Tier III levels.

The USEPA, Region 2, also developed the *World Trade Center Background Study Report (April 2003).* The objective of this study was to determine and/or estimate indoor baseline levels or background concentrations for the presence of specific contaminants in

residential buildings unaffected by the WTC disaster. The average background concentrations for COPCs in settled dust on hard surfaces are summarized below.

COPC	Average Background
Asbestos (str/cm2)	6,192
Lead (ug/ft2)	1.78
Silica (ug/ft2)	79.6 (expressed as quartz)
PAH (mg/m2)	<0.29
MMVF (str/cm2)	52
Dioxin (ng/m2)	0.693

Based on the text by Millette and Hays, *Settled Asbestos Dust Sampling and Analysis*, levels of asbestos in settled dust as determined by the microvacuum techniques are considered low if less than 1,000 str/cm^2. Levels above 10,000 str/cm^2 are considered generally above background. Levels above 100,000 str/cm^2 are considered high and in the range of significant accidental release from an abatement site.

1.4 Purpose and Objectives

The objective of the SI is to provide additional information relative to the concentrations of COPCs within previously inaccessible spaces. This SI summary presents the results specifically for the Building exterior investigation.

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

2. METHODOLOGY

This section presents the methodologies implemented for the Building exterior characterization. These tasks were implemented in general accordance with the *Sampling Analysis and Quality Assurance Project Plan* (SAQAPP) developed by TRC dated November 15, 2004.

TRC collected representative wipe samples for the COPCs from the glass windows and aluminum surfaces located at the Building exterior. Building exterior sampling was conducted on the West, East, and, North Building faces.

Asbestos and MMVF wipe samples were collected following American Society for Testing and Materials (ASTM) 6480-99. Lead and silica wipe samples were collected following the United States Department of Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, Appendix 13.1. Dioxin and PAH samples were collected following ASTM D6661-01. Samples were analyzed as per the following methods:

COPC	Analytical Method
Asbestos	ASTM 6480-99
Lead	USEPA SW 846 7420
Silica	NIOSH 7500 (XRD)
Dioxin	USEPA SW 846-8290
PAH	USEPA SW 846-8270C
MMVF	EMSL MSD 0310

Bulk asbestos samples were analyzed per method New York State Environmental Laboratory Approval Program (NYS ELAP) 198.1.

All samples were properly labeled as per the SAQAPP. Asbestos, lead, silica, and MMVF samples were delivered to the EMSL Analytical Inc. laboratory, an independent New York State Department of Health certified laboratory (NYSDOH ELAP # 11506). PAH and dioxin samples were delivered to Paradigm Analytical Labs in Wilmington, North Carolina (NYSDOH ELAP # 11685).

3. RESULTS

3.1 Asbestos

Ten asbestos wipe, one blank, and one bulk sample were collected at various heights designated by the Building floor as detailed below. Samples were divided up by Zone, as described in the Initial Building Characterization Report. Zone 6, exterior façade building materials, applies to this part of the supplemental investigation.

Wipe sample results ranged from less than 1,580 structures per square centimeter (str/cm^2) to 731,000 str/cm^2, with an arithmetic mean of 105,245 str/cm^2 using one-half the detection limit for non-detected sample results. Six of the ten samples exceeded the Tier I Indoor Assessment value of 30,000 str/cm^2. No asbestos was detected in the bulk sample. Sample results are provided in the attached Tables 1 and 2.

Asbestos Sample ID	Floor	Location	Zone
RR02ASB-WEXTW-03	2	Aluminum bldg ext west side Group 1 NW	6
RR02ASB-WEXTW-09	2	Aluminum bldg ext west side Group 2 Center	6
RR02ASB-WEXTW-15	2	Aluminum bldg ext west side Group 3 SW	6
RR02ASB-WEXTWBLK		Field Blank	6
RR07ASBWEXTE03	7	East Side, approx 100' S of N bldg face	6
RR10ASBWEXTE09	10	East Side, approx 100' S of N bldg face	6
RR16ASBWEXTE15	16	East Side, approx 100' S of N bldg face	6
RR08ASBWEXTN03	8	North Side, approx 50' E of W bldg face	6
RR14ASBWEXTN09	14	North Side, approx 50' E of W bldg face	6
RR21ASBWEXTN15	21	North Side, approx 50' E of W bldg face	6
RR29ASBWEXTN21	29	North Side, approx 50' E of W bldg face	6
ASB-Bulk-EXT-01		Ledge at North face of bldg, W of gash	6

A limited data validation was performed on the wipe and bulk samples in accordance with the U*SEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

TRC reviewed the *Initial Building Characterization Report*. This report presents the results of 40 supplemental screening samples of the settled dust from porous and non-porous surfaces and analyzed for asbestos using TEM. The samples were collected from various locations within the Building, including, but not limited to carpeting, counters, vent units, and above the ceiling tiles. The results revealed detectable levels of asbestos above the residential background level of 6,192 structures/cm^2 identified in the EPA

World Trade Center Background Study Report Interim Final (April 2003). The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and the 40th/41st floor mechanical room. Asbestos was detected in dust at concentrations in excess of 6,192 structures/cm^2 in 24 of the 31 floors sampled by TEM analysis (77%). The samples containing asbestos ranged from a minimum concentration of less than 891 structures/cm^2 (from Floors 5, 24, 25, 28, 34, and 41) to a maximum concentration of 4,879,200 structures/cm^2 (from Floor 2). These results are generally greater than but within an order of magnitude of the SI results.

3.2 Lead

Ten wipe and one blank sample were collected at various heights designated by the Building floor as detailed in Section 3.1. The sample results ranged from 19 ug/ft^2 to 390 ug/ft^2 with an arithmetic average of 73 ug/ft^2. Four of the ten wipe samples exceeded the Tier I Indoor Assessment value of 40 ug/ft^2. Sample results are provided in the attached Table 3.

A limited data validation was performed on the samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes. The positive result for lead found in the data package associated with the three wipe samples and one blank may be biased high due to high recovery in the quantitation limit standard. Since all results are still below the Tier I Residential Background Level, the high bias does not adversely affect the data usability. These samples are designated with a "J" value in Table 3, indicating the value is an estimate.

According to the *Initial Building Characterization Report*, there was significant variation in the lead testing results collected from the Building dust samples. Lead was detected in 122 of 125 samples tested. Lead results of samples collected above the plenum ranged from 350 ug/m^2 (32.52 ug/ft^2) to 10,900 ug/m^2 (1,012.6 ug/ft^2). Lead results from samples collected below the plenum ranged from 150 ug/m^2 (13.92 ug/ft^2 - in Zone 3) to 101,000 ug/m^2 (9,383.2 ug/ft^2 - in Zone 1). These results are generally greater than the results of this SI.

3.3 Silica

Ten wipe and one field blank sample were collected at various heights designated by the Building floor as detailed in Section 3.1. The silica sample results ranged from 0.260 milligrams per square foot (mg/ft^2) to 179.042 mg/ft^2 with an arithmetic average of 18.39 mg/ft^2. Sample results are provided in the attached Table 4.

A limited data validation was performed on the ten wipe and field duplicate samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the quartz, a natural form of silica, testing results collected from the Building dust samples. Quartz was detected in 115 of the 118 samples tested. The samples containing quartz ranged from a low concentration of 500 ug/m^2 (0.4645 mg/ft^2 - from Zone 2) to a maximum concentration of 10,000,000 ug/m^2 (929.03 mg/ft^2 - in Zone 1). These results are generally higher but within an order of magnitude of the SI results.

3.4 Dioxin

Ten wipe and one field blank samples were collected at various heights designated by the Building floor as detailed in Section 3.1. The World Health Organization (WHO) has established a convention whereby the results for all dioxin compounds are expressed as a toxicity equivalency concentration (TEQ). The TEQ is based upon TEF referenced to 2,3,7,8 TCDD, which is the most toxic of the dioxin compounds. The TEQ is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the toxicity equivalent factors (TEFs) are then added to obtain the TEQ for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. TEQ results ranged from less than 0.848 nanograms per square meter (ng/m2) to 1.93 ng/m2 with an arithmetic average of 1.46 ng/m2. These results are all below USEPA Benchmark concentrations. Sample results are provided in the attached Table 6.

A limited data validation was performed on the wipe and field blank samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the dioxin testing results collected from the Building dust samples. Dioxin was detected in all 124 samples tested. The samples containing dioxin ranged from a low concentration of 1 ng/m^2 (from Zone 2) to a maximum concentration of 214 ng/m^2 (in Zone 5). These results are consistent with the highly variable nature of WTC dust. Results of this study were relatively higher than the concentrations found in the SI by at least one order of magnitude.

3.5 Polycyclic Aromatic Hydrocarbons (PAHs)

Ten PAH and one field blank samples were collected at various heights designated by the Building floor as detailed in Section 3.1. The carcinogenic PAHs results were used to calculate the benzo(a)pyrene (BaP) equivalent to measure the relative potency. The BaP equivalent is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the TEFs are then added to obtain the BaP equivalent for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. No PAHs were detected in the samples collected from the Building surface, resulting in an arithmetic mean BaP equivalent of less than 57.78 micrograms per square meter (ug/m^2), which is lower than USEPA Benchmark concentrations. Sample results are provided in the attached Table 7.

A limited data validation was performed on the wipe and field blank samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the PAH testing results collected from the Building dust samples. The samples containing PAH ranged from a low concentration of 3 ug/m^2 (from Zone 1) to a maximum concentration of 11,555 ug/m^2 (in Zone 2). These results are significantly greater than the SI results.

3.6 Man Made Vitreous Fibers (MMVF)

Ten MMVF wipe and one field blank samples were collected at various heights designated by the Building floor as detailed in Section 3.1. The sample results ranged from 6.21 str/cm^2 to 198.7 str/cm^2 with an arithmetic average of 38.18 str/cm^2. Results were at least three orders of magnitude less than the USEPA Tier I and Benchmark

concentrations and the average was less than the Background concentration of 52 str/cm^2. Sample results summary is provided in the attached Table 7.

A limited data validation was performed on the wipe and field blank samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

4. FINDINGS

Building exterior sample results were compared to criteria provided in Section 1.2 and 1.3 and identified on the bottom of each table as well as the results of previous studies.

This SI has identified average asbestos and lead concentrations on the Building surface that exceed the benchmark criteria provided in the May 2003 and September 2002 USEPA WTC Indoor Environmental Assessment studies, April 2003 Background Study, and are generally consistent (although generally lower) with the concentrations identified in the *Initial Building Characterization Report.*

Silica concentrations on the Building surface exceeded the April 2003 Background Study, and are generally consistent (although generally lower) with the concentrations identified in the *Initial Building Characterization Report.* Dioxin TEQs, PAH BaP equivalents, and MMVF were all below the Tier I Indoor Assessment Values, which represent a one-year risk-based residential value. Dioxins and PAHs were relatively lower than the concentrations identified in the *Initial Building Characterization Report.*

While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

5. CONCLUSIONS AND RECOMMENDATIONS

COPCs were found within the dust on the Building exterior surfaces. Concentrations were generally lower than the COPC levels for the dust in the accessible areas discussed in the *Initial Building Characterization Report,* however multiple samples and some arithmetic average results exceeded the USEPA residential health-based benchmark and background criteria. The results of the sampling and testing performed for this Supplemental Investigation revealed levels of contaminants that should be considered in connection with the deconstruction of the Building. Therefore, TRC recommends review of the results by federal, state, and local regulators and that the Building exterior be handled in a manner that complies with applicable laws.

6. REFERENCES

Initial Building Characterization Study Report, 130 Liberty Street, New York, New York. The Louis Berger Group, Inc., September 14, 2004.

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Settled Asbestos Dust Sampling and Analysis. James R. Millette, Steven M. Hays, 1994.

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World Trade Center Background Study Report, Interim Final. United States Environmental Protection Agency, Region 2, April 2003.

Curtain Wall
LMDC
130 Liberty Street
New York, New York
February 10, 2005

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Table 1
Curtain Wall - Asbestos
Asbestos Wipe (SW 6480-99)
Asbestos Microvacuum (ASTM D5755-03)
Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Asbestos (str/cm^2)
KD-16-W-ASB-EXT.WALL-DP-004E	030423849-0005	12/2/2004	Wipe	16	Drip pan, Exterior wall tent location HG-56	25,600
KD-14-W-ASB-DP-EXT-005E	030423849-0008	12/2/2004	Wipe	14	Drip pan, Exterior wall tent location AB-24	<6,970
KD-10-W-ASB-EXT.WALL-007E	030423849-0010	12/2/2004	Wipe	10	Aluminum wall, Exterior wall tent location HG-56	<6,250
KD-2-W-EXT.WALL-ASB-008E	030423849-0012	12/2/2004	Wipe	2	Aluminum wall, Exterior wall tent location ED-12	<14,900
KD-26-WIPEEXT.DRIP PAN-ASB-006E	030423953-0001	12/3/2004	Wipe	26	Drip pan, NE area H-6	<14,900
KD-24-WIPEEXT.AL.WALL-ASB-009E	030423953-0002	12/3/2004	Wipe	24	Aluminum wall, NE area A-4	19,900
KD-29-WIPEEXT.AL.WALL-ASB-010E	030423953-0005	12/3/2004	Wipe	29	Aluminum wall, NE area H-8	<6,970
KD-00-WBLANK-0000	030423953-000	12/3/2004	Wipe		Blank	Blank
KD-001-ASB-EXTWALL7FL-W-ALUMINUMWALL	030424770-0001	12/13/2004	Wipe	7	Aluminum Wall	55,900
KD-002-ASB-EXTWALL7FL-W-QAQC-ALUMINUMWALL	030424770-0002	12/13/2004	Wipe	7	Aluminum Wall	20,900
KD-003-ASB-EXTWALL7FL-W-BLANL-ALUMINUMWALL	030424770-0003	12/13/2004	Wipe		Blank	<1,560
ZD-01-ASB	030425105-0001	12/16/2004	Microvacuum	14	Fireproofing	6,990
ZD-02-ASB	030425105-0002	12/16/2004	Microvacuum	10	Fireproofing	6,990
ZD-03-ASB	030425105-000	12/16/2004	Microvacuum		Fireproofing	Blank

	str/cm2
Arithmetic Mean (ND=1/2)	14,038
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	6,192
September 2002 WTC Indoor Assessment[3]	
Tier I	>30,000
Tier II	>30,000 to background
Tier III	Background

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 2
Curtain Wall - Asbestos
Asbestos Bulk PLM (NYS ELAP 198.1)

Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Asbestos (% by weight)
KD-7-BULK-FIREPROOFING-ASBESTOS-001	030423845-0001	12/2/2004	Bulk	7	Tent location HG-56	NAD
KD-4-BULK-FIREPROOFING-ASBESTOS-002	030423845-0002	12/2/2004	Bulk	4	Tent location HG-34	NAD
KD-20-BULK-FIREPROOFING-ASBESTOS-003	030423845-0003	12/2/2004	Bulk	20	Tent location, AB-34	NAD
ZD-29-BULK-EXT.WALL-DUST-001E	030423956-0002	12/3/2004	Bulk	29	NE area H-8	NAD
KD-7-ASB-EXT.DUST-001E	030423846-0002	12/2/2004	Bulk	7	Concrete/metal inside tent GH-56	NAD
KD-4-BULK-EXT.WALL-DUST-002E	030423846-0003	12/2/2004	Bulk	4	Concrete/metal inside tent GH-34	NAD
KD-20-DUST-EXT-003E	030423846-0004	12/2/2004	Bulk	20	Concrete/metal inside tent AB-4	NAD
KD-16-DUST-DRIPPAN-004E-BULK-EXT.	030423846-0005	12/2/2004	Bulk	16	Concrete/metal inside tent H-5	NAD
KD-14-DUST-DRIPPAN-005E-BULK-EXT.	030423846-0006	12/2/2004	Bulk	14	Concrete/metal inside tent A-3	NAD
KD-10-BULK-EXT.WALL-DUST-006E	030423846-0007	12/2/2004	Bulk	10	Concrete/metal inside tent H-5	NAD
KD-02-BULK-EXT.WALL-DUST-007E	030423846-0008	12/2/2004	Bulk	2	Concrete wall, inside tent D-1	NAD

Table 3
Curtain Wall - Lead
Lead Wipe (SW 846-7420) and
Lead Microvacuum (NIOSH 7082)
Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Lead (ug/ft2)	Lead (ug/m2)
KD-26-WIPE-EXTDRIPPANLEAD-006	030423954-0001	12/3/2004	Wipe	26	Drip Pan, NE Area H-6	220	2,368
KD-24-WIPE-EXTALWALLLEAD-009E	030423954-0002	12/3/2004	Wipe	24	Aluminum, NW Area A-4	15	161
KD-29-WIPE-EXTALWALLLEAD-010E	030423954-0004	12/3/2004	Wipe	29	Aluminum, NE Area GH-78	21	226
KD-000-W-BLANK-0000	030423954-0006	12/3/2004	Wipe		Field Blank	<10	<108
KD-10-W-PB-EXTWALL-007E	030423947-0007	12/2/2004	Wipe	10	Aluminum, tent location GH-56	56	603
KD-2-W-EXTWALL-PB-008E	030423947-0010	12/2/2004	Wipe	2	Aluminum, tent location ED-12	180	1,938
KD-001-PB-EXT-WALL7FL-W-ALUMINUM WALL	030424771-0001	12/13/2004	Wipe	7	Aluminum wall	57 J	614
KD-002-PB-EXT-WALL7FL-W-QAQC-ALUMINUM WALL	030424771-0002	12/13/2004	Wipe	7	Aluminum wall	130 J	1,399
ZD-01-PB	030425106-0001	12/16/2004	Microvacuum	14	Exterior wall, drip pan	21	226
ZD-02-PB	030425106-0002	12/16/2004	Microvacuum	10	Exterior wall, column	10	108
ZD-03-PB	030425106-0003	12/16/2004	Microvacuum	7	Exterior wall, drip pan	15	161
ZD-04-PB	030425106-0004	12/16/2004	Microvacuum	4	Exterior wall, column	49	527
ZD-05-PB	030425106-0005	12/16/2004	Microvacuum	2	Exterior wall, column	15	161
ZD-06-PB	030425106-0006	12/16/2004	Microvacuum		Blank	<4	<43

	ug/ft2
Arithmetic Mean	60
May 2003 Benchmark[1]	25
April 2003 Background Assessment[2]	1.78
September 2002 WTC Indoor Assessment[3]	
Tier I	>40
Tier II	40 to 25 (or background)
Tier III	<25 (or background)

J - Estimated value due to variability in the field duplicate pair.

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 4
Curtain Wall - Lead
Lead Bulk (SW 846-7420)

Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Lead (% by weight)
KD-7-BULK-EXT.FIREPROOFING-001	030423847-0004	12/3/2004	Bulk	7	Tent location, E side GH-56	<0.01
KD-4-BULK-EXT.FIREPROOFING-002	030423847-0005	12/3/2004	Bulk	4	Tent location, E side HG-34	<0.01
KD-20-BULK-EXT.FIREPROOFING-003	030423847-0006	12/3/2004	Bulk	20	Tent location, E side AB-34	<0.01
KD-16-W-BULK-PB-DRIP PAN-EXT WALL-004E	030423848-0014	12/2/2004	Bulk	16	Tent location HG-56	<0.01
KD-14-W-BULK-EXT-WALL-DRIP PAN-PB-005E	030423848-0015	12/2/2004	Bulk	14	Tent location AB-24	<0.01

J - Estimated value due to laboratory duplicate nonconformance.

Table 5
Curtain Wall - Silica
Silica Bulk (NIOSH 7500)

Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Silica (mg/ft2)
KD-7-SILICA-BULK-EXT-F.P.-001	040423812-0001	12/2/2004	Bulk	7	GH-56	11,600
KD-4-SILICA-BULK-EXT-F.P.-002	040423812-0002	12/2/2004	Bulk	4	GH-34	5,100
KD-20-SILICA-BULK-EXT-F.P.-003	040423812-0003	12/2/2004	Bulk	20	AB-34	5,500

Area sampled is one foot squared.

	mg/ft2
Arithmetic Mean	7,400
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	>0.0796 (expressed as quartz)
September 2002 WTC Indoor Assessment[3]	
Tier I	--
Tier II	above background
Tier III	background

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 6
Curtain Wall - Dioxin
Dioxin Wipe (SW 846-8290)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	WHO TEQ (ND=1/2; ng/m2)
KD-16-W-DX-DripPan-ExtWall-004E	G220-29-5C	11/26/2004	Wipe	16	Drip Pan	14.30
KD-14-W-DX-ExtWall DripP-005E	G220-29-8C	11/26/2004	Wipe	14	Drip Pan	17.8 J
KD-10-W-DX-Ext.Wall-007E	G220-29-9C	11/26/2004	Wipe	10	Aluminum wall	9.44
KD-2-W-DX-Ext.Wall-008E	G220-29-12C	11/26/2004	Wipe	2	Aluminum wall	2.34
KD-26-W-Ext.Wall DripPan-DX-006E	G220-30-1B	12/3/2004	Wipe	26	Drip Pan	4.78
KD-24-W-Ext.Wall AL.DX-009E	G220-30-2B	12/3/2004	Wipe	24	Aluminum wall	1.29
ZD-29-W-Ext.Wall DX-010E	G220-30-4B	12/3/2004	Wipe	29	Aluminum wall	1.51
KD-000-DX-W-Blank-000	G220-30-6B	12/3/2004	Wipe		Blank	0.99

	ng/m2
Arithmetic Mean	7.35
May 2003 Benchmark[1]	2.0
April 2003 Background Assessment[2]	0.693
September 2002 WTC Indoor Assessment[3]	
Tier I	>120
Tier II	120 to 4 (or background)
Tier III	<4 (or background)

J - Value is an estimate.

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 7
Curtain Wall - Dioxin
Dioxin Bulk (SW 846-8290)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	WHO TEQ (ND=1/2; ng/m2)
KD-7-Bulk-Diox-FP-Ext.Wall-001	G220-26-1B	12/2/2004	Bulk	7	Exterior wall GH-56	436
KD-4-Bulk-Diox-FP-Ext.Wall-002	G220-26-2B	12/2/2004	Bulk	4	Exterior wall GH-34	13.5
KD-20-Bulk-Diox-FP-Ext.Wall-003	G220-26-3B	12/2/2004	Bulk	20	Exterior wall AB-34	13.5

	ng/m2
Arithmetic Mean	154.33
May 2003 Benchmark[1]	2.0
April 2003 Background Assessment[2]	0.693
September 2002 WTC Indoor Assessment[3]	
Tier I	>120
Tier II	120 to 4 (or background)
Tier III	<4 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 8
Curtain Wall - Polycyclic Aromatic Hydrocarbons (PAH)
PAH Wipe (SW 846, 8270C)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	PAH (ug/m2)	Benzo(a)Pyrene Equivalent (ug/m2)
KD16-W-PAH-DripPn-ExtW-004E	G220-27-5B	12/2/2004	Wipe	16	Drip pan	<800	<57.78
KD-14-W-PAH-ExtWal-DrpPn-005E	G220-27-8B	12/2/2004	Wipe	14	Aluminum wall	1,260.00	171.75
KD-10-W-PAH-Ext.Wall-007E	G220-27-9B	12/2/2004	Wipe	10	Aluminum wall	<800	<57.78
KD-2-W-PAH-Ext.Wall-008E	G220-27-11B	12/2/2004	Wipe	2	Aluminum wall	<800	<57.78
KD-000-W-PAH-000-F-Blank	G220-27-13B	12/2/2004	Wipe		Blank	<800	<57.78
KD-26-W-Ext.Wall DP-PAH-006E	G220-28-1B	12/2/2004	Wipe	26	Drip pan, GH-56	<800	<57.78
KD-24-W-Ext.Wall-AL.PAH-009E	G220-28-2B	12/2/2004	Wipe	24	Aluminum wall, AB-34	<800	<57.78
ZD-29-W-Ext.Wall-PAH-010E	G220-28-4B	12/2/2004	Wipe	29	Aluminum wall, HG-78	<800	<57.78

Each area sampled is 100 square inches.
Benzo(a)Pyrene Equivalent determined using 1/2 the detection limit.

	ug/m2 - BaP Equivalent
BaP Arithmetic Mean (ND=1/2)	74
May 2003 Benchmark[1]	150
April 2003 Background Assessment[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>9,000
Tier II	9,000 to 300 (or background)
Tier III	<300 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 9
Curtain Wall - Polycyclic Aromatic Hydrocarbons (PAH)
PAH Bulk (SW 846, 8270C)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	PAH (ug/m2)	Benzo(a)Pyrene Equivalent (ug/m2)
KD-7-BULK-EXT.FIREPROOFING-001	G220-25-1B	12/2/2004	Bulk	7	Exterior wall GH-56	226.90	<105.03
KD-4-BULK-EXT.FIREPROOFING-002	G220-25-2B	12/2/2004	Bulk	4	Exterior wall GH-34	283.30	<108.96
KD-20-BULK-EXT.FIREPROOFING-003	G220-25-3B	12/2/2004	Bulk	20	Exterior wall AB-34	373.00	<122.48

Each area sampled is 100 square inches.
Benzo(a)Pyrene Equivalent determined using 1/2 the detection limit.

	ug/m2 - BaP Equivalent
BaP Arithmetic Mean (ND=1/2)	<112
May 2003 Benchmark[1]	150
April 2003 Background Assessment[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>9,000
Tier II	9,000 to 300 (or background)
Tier III	<300 (or background)

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 10
Curtain Wall - Man Made Vitreous Fibers (MMVF)
MMVF Bulk (EMSL MSD 0310)

Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Percent MMVF	Sample Weight (grams)
KD-7-Bulk-MMVF-EXT-FP-001	360401087-0001	12/3/2004	Bulk	7	GH-56	15.00	28.13
KD-4-Bulk-MMVF-EXT-FP-002	360401087-0002	12/3/2004	Bulk	7	GH-34	ND	25.21
KD-20-Bulk-MMVF-EXT-FP-003	360401087-0003	12/3/2004	Bulk	7	AB-34	10.00	21.76

130 Liberty Street

New York, New York

Supplemental Investigation Summary Report

Preliminary Waste Characterization Sampling Summary Results

Prepared for:
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan Development Corporation

Prepared By:

TRC
Customer-Focused Solutions

TRC Environmental Corp.
1430 Broadway, 10th Floor
New York, New York 10018

February 10, 2005

1.0 INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents the results of the preliminary characterization of anticipated waste streams generated during Phase I Deconstruction Activities.

1.1 Background

The Building is located across the street and south of the WTC site and is a former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

In addition, Berger recommended performing preliminary waste characterization.

This supplemental investigation summary presents the results of preliminary waste characterization performed by TRC within the Building. Supplemental investigations regarding curtain wall cavity, cell systems within floors, heating, ventilation, and air conditioning (HVAC) ductwork, interstitial spaces within interior walls and column cavities, inside vertical shafts, exterior building surfaces, fireproofing, and visual inspection of the Building for mold and asbestos containing building materials (ACBM) are addressed in separate summaries.

As part of the supplemental investigation, TRC collected the following samples:

COPC	Asbestos	Lead	Silica	Dioxin	PAH	MMVF
Total Samples	126	106	35	55	55	27

TRC collected fourteen representative samples of dust and anticipated waste streams for analysis to provide a preliminary determination if dust/waste materials meet the criteria for characterization as a hazardous waste. Samples were collected on November 15, 2004 and were analyzed for Toxicity Characteristic Leaching Protocol (TCLP) and Resource Conservation and Recovery Act (RCRA) characteristics.

1.3 Purpose and Objectives

This SI summary presents the results of dust and anticipated building waste stream characterization to provide a preliminary assessment of the potential requirements for waste disposal during Phase I Deconstruction Activities.

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

2.0 METHODOLOGY

This section presents the methodologies implemented for the dust and waste stream characterization within the Building. These tasks were implemented in accordance with the *Sampling Analysis and Quality Assurance Project Plan* (SAQAPP) developed by TRC dated November 15, 2004.

TRC collected representative bulk samples from dust, fireproofing, gypsum board, carpeting, and ceiling tile from ten different floors within the Building.

Samples were collected and analyzed via full parameter TCLP United States Environmental Protection Agency (USEPA) Test Methods for Evaluating Solid Wastes (SW 846) per the following methods:

- 8260B for volatile organic compounds (VOCs)
- 8270C for semi-volatile organic compounds (SVOCs)
- 6010B and 7470A for metals
- 8082 for polychlorinated biphenyls (PCBs)
- 8081A for pesticides
- 8151 for herbicides
- 9040B for RCRA characteristic corrosivity
- CHAP 7 for RCRA characteristics ignitability and reactivity

Samples were properly labeled as per the SAQAPP and delivered to Accutest Laboratories, located in Dayton, New Jersey, an independent laboratory certified under the New York State Department of Health Environmental Laboratory Approval Program (NYSDOH ELAP # 10983).

3.0 RESULTS

Fourteen representative composite bulk dust and anticipated waste stream samples were collected on various floors of the Building as detailed below. Samples were divided by Zone, as described in the *Initial Building Characterization Report*. Zones 2 and 3 apply to TRC's study and are defined as follows:

Zone 2: Office space located at or below the 24th Floor that may have been subjected to dust entering the Building through the Gash, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows.

Zone 3: Office space located above the 24th Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows.

Sample ID	Floor	Sample Material	Zone
GM-WC-BULK-05-DUST-002	5	Dust	2
KD-WC-BULK-08-FIREPROOFING-002	8	Fireproofing	2
GM-WC-BULK-12-FIREPROOFING-001	12	Fireproofing	2
GM-WC-BULK-18-B1(GYPSUM BP)-001	18	Gypsum Board	2
GM-WC-BULK-CARPET-101	18	Carpeting	2
GM-WC-BULK-18-CLGTILE-002	18	Ceiling Tile	2
GM-WC-BULK-39-GYPSUM BD-002	39	Gypsum Board	3
GM-WC-BULK-39-CARPET-002	39	Carpeting	3
GM-WC-BULK-39-CEILINGTILE-001	39	Ceiling Tile	3
GM-WC-BULK-40-DUST-001	40	Dust	3
GM-WC-BULK-02-DUST-003	2	Dust	2
GM-WC-BULK-01-DUST-004	1	Dust	2
GM-WC-BULK-MEZ-DUST-005	Mezzanine	Dust	2
GM-WC-BULK-BA-DUST-006	Basement	Dust	2

Sampling and analysis included six composite dust, two fireproofing, two carpet, two ceiling tiles, and two gypsum board samples.

3.1 TCLP

All TCLP samples results are presented in Tables 1 through 5. Results were compared to 40 CFR 261.24 Maximum Concentration of Contaminants for the Toxicity Characteristics. Of the fourteen samples collected, no pesticides or herbicides were detected. One VOC was detected in sample GM-WC-BULK-01-DUST-004, which had a benzene reading of 0.0101 milligrams per liter (mg/L), well below the 40 CFR 261.24 benzene standard of 0.5 mg/L. Also, one SVOC was detected in sample GM-WC-

BULK-40-DUST-001, which had a pentachlorophenol reading of 0.076 milligrams per liter (mg/L), well below the 40 CFR 261.24 pentachlorophenol standard of 100 mg/L. Of the metals, cadmium, chromium, and mercury were detected in eleven out of fourteen samples. Of these eleven most were at least one order of magnitude lower than the maximum concentration; however, there was one exceedance of the maximum concentration. Sample GM-WC-BULK-40-DUST-001 had a cadmium exceedance of 6.2 mg/L. This sample was of dust located on the mechanical 40th floor within the Building.

3.2 RCRA Characteristics

All RCRA Characteristic results are provided in Table 6. Results were compared to 40 CFR 261 parts 21 through 23. In addition, the cyanide and sulfide reactivity results were compared to SW 846 Chapter 7, Characteristics Introduction and Regulatory Definitions Interim Guidance Values. The RCRA Characteristic sample results did not exhibit the characteristics of reactivity, ignitability, or corrosivity.

3.3 Data Validation Summary

A limited data validation was performed on all samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA 540/R-99-008* (October 1999) and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). These guidelines were modified to accommodate the non-Contract Laboratory Program (CLP) methodologies and specific requirements outlines in the SAQAPP.

In general, the data appear to be valid as reported and may be used for decision-making purposes. Potential uncertainty exists for the corrosivity results in all samples and potential low bias exists for reactive cyanide and reactive sulfide results in all samples due to a holding time exceedance. Potential uncertainty exists for the 2-butanone and/or 2,4-D results in select samples due to calibration nonconformances. Potential low bias exists for the mercury results in samples GM-WC-Bulk-Carpet-101 and GM-WC-Bulk-39-Carpet-002 due to low recovery in the matrix spike analysis. Potential uncertainty exists for the cadmium results in samples GM-WC-Bulk-Carpet-101 and GM-WC-Bulk-39-Carpet-002 due to high recovery in the quantitation limit standard and a serial dilution nonconformance. Potential uncertainty exists for the chromium results in samples GM-WC-Bulk-39-CeilingTile-001 and GM-WC-Bulk-18-CLGTile-002 due to serial dilution nonconformances. These qualifications have minor impacts on the data usability since the affected results were significantly below the project action levels.

4.0 FINDINGS

Results of the 14 samples were compared to criteria provided in 40 CFR 261 parts 21 through 24 and SW 846 Chapter 7. None of the 14 samples collected exceed the criteria provided in 40 CFR 261 parts 21 through 23 or SW 846 Chapter 7. None of the eight building material samples exceeded Maximum Concentration of Contamination for the Toxicity Characteristics provided in 40 CFR 261.24. One of the six dust samples collected on the 40th floor exhibited levels of cadmium that exceeded 40 CFR 261.24. This sample exceeded the cadmium maximum concentration of 1.0 mg/L with a result of 6.2 mg/L.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the preliminary waste characterization sampling and testing performed for this Supplemental Investigation revealed levels of contaminants that should be addressed in connection with the deconstruction of the Building. One of the six dust samples exhibited levels of cadmium that exceeded criteria provided in 40 CFR 261.24. As concentration of contaminants in the dust are highly variable the potential exists that dust and dust-impacted waste streams generated could exceed TCLP for metals. Therefore, additional waste characterization is warranted both pre-waste stream generation and as waste is being generated prior to transportation and disposal.

6.0 REFERENCES

Initial Building Characterization Study Report, 130 Liberty Street, New York, New York. The Louis Berger Group, Inc., September 14, 2004.

Sampling, Analysis, and Quality Assurance Project Plan, Supplement Investigation of 130 Liberty Street, New York, New York. TRC Environmental Corp., November 15, 2004.

Supplemental Investigation Summary Report HVAC Distribution Duct Sampling Summary Results, 130 Liberty Street, New York, New York. TRC Environmental Corp., December 17, 2004

Supplemental Investigation
Preliminary Waste Characterization Sampling
LMDC
130 Liberty Street
New York, New York
February 10, 2005

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Table 1
Preliminary Waste Characterization Sampling
Volatile Organic Compounds, Toxicity Characteristic Leaching Protocol (SW 846 8260B)

Anticipated Waste Streams Sample Results
LMDC
130 Liberty Street
February 10, 2005

VOC (mg/L)	Toxicity Regulatory Level (mg/L)	GM-WC-BULK-05-DUST-002 N83650-1 15-Nov-04	KD-WC-BULK-08-FIREPROOFING-002 N83650-2 15-Nov-04	GM-WC-BULK-12-FIREPROOFING-001 N83650-3 15-Nov-04	GM-WC-BULK-18-B1(GYPSUM BP)-001 N83650-4 15-Nov-04	GM-WC-BULK-CARPET-101 N83650-5 15-Nov-04	GM-WC-BULK-18-CLGTILE-002 N83650-6 15-Nov-04	GM-WC-BULK-39-GYPSUM BD-002 N83650-7 15-Nov-04
Sample ID / Lab ID / Date								
1,1-Dichloroethene	0.7	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
1,2-Dichloroethane	0.5	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
1,4-Dichlorobenzene	7.5	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
2-Butanone (MEK)	200	< 0.05	< 0.05	< 0.05 J	< 0.2 J	< 0.2 J	< 0.05 J	< 0.1 J
Benzene	0.5	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
Carbon tetrachloride	0.5	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
Chlorobenzene	100	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
Chloroform	6	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
Tetrachloroethene	0.7	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
Trichloroethene	0.5	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
Vinyl chloride	0.2	< 0.025	< 0.025	< 0.025	< 0.1	< 0.1	< 0.025	< 0.05

VOC (mg/L)	Toxicity Regulatory Level (mg/L)	GM-WC-BULK-39-CARPET-002 N83650-8 15-Nov-04	GM-WC-BULK-39-CEILINGTILE-001 N83650-9 15-Nov-04	GM-WC-BULK-40-DUST-001 N83650-10 15-Nov-04	GM-WC-BULK-02-DUST-003 N83650-11 15-Nov-04	GM-WC-BULK-01-DUST-004 N83650-12 16-Nov-04	GM-WC-BULK-MEZ DUST-005 N83650-13 16-Nov-04	GM-WC-BULK-BA-DUST-006 N83650-14 16-Nov-04
Sample ID / Lab ID / Date								
1,1-Dichloroethene	0.7	< 0.02	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichloroethane	0.5	< 0.02	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
1,4-Dichlorobenzene	7.5	< 0.02	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
2-Butanone (MEK)	200	< 0.2 J	< 0.05 J	< 0.1 J	< 0.05 J	< 0.05 J	< 0.05 J	< 0.05 J
Benzene	0.5	< 0.02	< 0.005	< 0.01	< 0.005	0.0101	< 0.005	< 0.005
Carbon tetrachloride	0.5	< 0.02	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
Chlorobenzene	100	< 0.02	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
Chloroform	6	< 0.02	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
Tetrachloroethene	0.7	< 0.02	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
Trichloroethene	0.5	< 0.02	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
Vinyl chloride	0.2	< 0.1	< 0.025	< 0.05	< 0.025	< 0.025	< 0.025	< 0.025

mg/L - Milligrams per liter
J - Value is an estimate.

Table 2
Preliminary Waste Characterization Sampling
Semi-Volatile Organic Compounds, Toxicity Characteristic Leaching Protocol (SW 846 8270C)

Anticipated Waste Streams Sample Results
LMDC
130 Liberty Street
February 10, 2005

SVOC (mg/L)	Sample ID / Lab ID / Date / Toxicity Regulatory Level (mg/L)	GM-WC-BULK-05-DUST-002 N83650-1 15-Nov-04	KD-WC-BULK-08-FIREPROOFING-002 N83650-2 15-Nov-04	GM-WC-BULK-12-FIREPROOFING-001 N83650-3 15-Nov-04	GM-WC-BULK-18-B1(GYPSUM BP)-001 N83650-4 15-Nov-04	GM-WC-BULK-CARPET-101 N83650-5 15-Nov-04	GM-WC-BULK-18-CLGTILE-002 N83650-6 15-Nov-04	GM-WC-BULK-39-GYPSUM BD-002 N83650-7 15-Nov-04
2-Methylphenol	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
3&4-Methylphenol	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pentachlorophenol	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4,5-Trichlorophenol	400	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4,6-Trichlorophenol	2	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1,4-Dichlorobenzene	7.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
2,4-Dinitrotoluene	0.13	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Hexachlorobenzene	0.13	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Hexachlorobutadiene	0.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Hexachloroethane	3	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	2	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Pyridine	5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

SVOC (mg/L)	Sample ID / Lab ID / Date / Toxicity Regulatory Level (mg/L)	GM-WC-BULK-39-CARPET-002 N83650-8 15-Nov-04	GM-WC-BULK-39-CEILINGTILE-001 N83650-9 15-Nov-04	GM-WC-BULK-40-DUST-001 N83650-10 15-Nov-04	GM-WC-BULK-02-DUST-003 N83650-11 15-Nov-04	GM-WC-BULK-01-DUST-004 N83650-12 16-Nov-04	GM-WC-BULK-MEZ DUST-005 N83650-13 16-Nov-04	GM-WC-BULK-BA-DUST-006 N83650-14 16-Nov-04
2-Methylphenol	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
3&4-Methylphenol	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pentachlorophenol	100	< 0.2	< 0.2	0.076 J	< 0.2	< 0.2	< 0.2	< 0.2
2,4,5-Trichlorophenol	400	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4,6-Trichlorophenol	2	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1,4-Dichlorobenzene	7.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
2,4-Dinitrotoluene	0.13	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Hexachlorobenzene	0.13	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Hexachlorobutadiene	0.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Hexachloroethane	3	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	2	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Pyridine	5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

mg/L - Milligrams per liter
J - Value is an estimate.

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Table 3
Preliminary Waste Characterization Sampling
Metals, Toxicity Characteristic Leaching Protocol (SW 846 6010B and 7470A)

Anticipated Waste Streams Sample Results
LMDC
130 Liberty Street
February 10, 2005

Metals (mg/L)	Toxicity Regulatory Level (mg/L)	GM-WC-BULK-05-DUST-002 N83650-1 15-Nov-04	KD-WC-BULK-08-FIREPROOFING-002 N83650-2 15-Nov-04	GM-WC-BULK-12-FIREPROOFING-001 N83650-3 15-Nov-04	GM-WC-BULK-18-B1(GYPSUM BP)-001 N83650-4 15-Nov-04	GM-WC-BULK-CARPET-101 N83650-5 15-Nov-04	GM-WC-BULK-18-CLGTILE-002 N83650-6 15-Nov-04	GM-WC-BULK-39-GYPSUM BD-002 N83650-7 15-Nov-04
Arsenic	5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Barium	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	1	0.2	< 0.005	< 0.005	< 0.005	0.006 J	< 0.005	< 0.005
Chromium	5	0.09	< 0.01	< 0.01	0.016	0.011	0.03 J	< 0.01
Lead	5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Selenium	1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Silver	5	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Mercury	0.2	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002 J	< 0.0002	< 0.0002

Metals (mg/L)	Toxicity Regulatory Level (mg/L)	GM-WC-BULK-39-CARPET-002 N83650-8 15-Nov-04	GM-WC-BULK-39-CEILINGTILE-001 N83650-9 15-Nov-04	GM-WC-BULK-40-DUST-001 N83650-10 15-Nov-04	GM-WC-BULK-02-DUST-003 N83650-11 15-Nov-04	GM-WC-BULK-01-DUST-004 N83650-12 16-Nov-04	GM-WC-BULK-MEZ DUST-005 N83650-13 16-Nov-04	GM-WC-BULK-BA-DUST-006 N83650-14 16-Nov-04
Arsenic	5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Barium	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	1	0.0052 J	< 0.005	**6.2**	0.021	0.038	0.034	0.025
Chromium	5	< 0.01	0.014 J	< 0.01	0.069	< 0.01	< 0.01	0.061
Lead	5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Selenium	1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Silver	5	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Mercury	0.2	< 0.0002 J	0.00023	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002

mg/L - Milligrams per liter
J - Value is an estimate.

Table 4
Preliminary Waste Characterization Sampling
Pesticides, Toxicity Characteristic Leaching Protocol (SW 846 8081A)

Anticipated Waste Streams Sample Results
LMDC
130 Liberty Street
February 10, 2005

Pesticides (mg/L)	Sample ID / Lab ID / Date / Toxicity Regulatory Level (mg/L)	GM-WC-BULK-05-DUST-002 N83650-1 15-Nov-04	KD-WC-BULK-08-FIREPROOFING-002 N83650-2 15-Nov-04	GM-WC-BULK-12-FIREPROOFING-001 N83650-3 15-Nov-04	GM-WC-BULK-18-B1(GYPSUM BP)-001 N83650-4 15-Nov-04	GM-WC-BULK-CARPET-101 N83650-5 15-Nov-04	GM-WC-BULK-18-CLGTILE-002 N83650-6 15-Nov-04	GM-WC-BULK-39-GYPSUM BD-002 N83650-7 15-Nov-04
gamma-BHC (Lindane)	0.4	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chlordane	0.03	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Endrin	0.02	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor	0.008	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor epoxide	0.008	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Methoxychlor	10	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Toxaphene	0.5	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025

Pesticides (mg/L)	Sample ID / Lab ID / Date / Toxicity Regulatory Level (mg/L)	GM-WC-BULK-39-CARPET-002 N83650-8 15-Nov-04	GM-WC-BULK-39-CEILINGTILE-001 N83650-9 15-Nov-04	GM-WC-BULK-40-DUST-001 N83650-10 15-Nov-04	GM-WC-BULK-02-DUST-003 N83650-11 15-Nov-04	GM-WC-BULK-01-DUST-004 N83650-12 16-Nov-04	GM-WC-BULK-MEZ DUST-005 N83650-13 16-Nov-04	GM-WC-BULK-BA-DUST-006 N83650-14 16-Nov-04
gamma-BHC (Lindane)	0.4	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chlordane	0.03	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Endrin	0.02	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor	0.008	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor epoxide	0.008	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Methoxychlor	10	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Toxaphene	0.5	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025

mg/L - Milligrams per liter
J - Value is an estimate.

Table 5
Preliminary Waste Characterization Sampling
Herbicides, Toxicity Characteristic Leaching Protocol (SW 846 8151)

Anticipated Waste Streams Sample Results
LMDC
130 Liberty Street
February 10, 2005

Herbicides (mg/L)	Toxicity Regulatory Level (mg/L)	Sample ID / Lab ID / Date	GM-WC-BULK-05-DUST-002 / N83650-1 / 15-Nov-04	KD-WC-BULK-08-FIREPROOFING-002 / N83650-2 / 15-Nov-04	GM-WC-BULK-12-FIREPROOFING-001 / N83650-3 / 15-Nov-04	GM-WC-BULK-18-B1(GYPSUM BP)-001 / N83650-4 / 15-Nov-04	GM-WC-BULK-CARPET-101 / N83650-5 / 15-Nov-04	GM-WC-BULK-18-CLGTILE-002 / N83650-6 / 15-Nov-04	GM-WC-BULK-39-GYPSUM BD-002 / N83650-7 / 15-Nov-04
2,4-D	10		< 0.005 J	< 0.005 J	< 0.005 J	< 0.005 J	< 0.005	< 0.005 J	< 0.005
2,4,5-TP (Silvex)	1		< 0.0015	< 0.0015	< 0.0015	< 0.0015	< 0.0015	< 0.0015	< 0.0015

Herbicides (mg/L)	Toxicity Regulatory Level (mg/L)	Sample ID / Lab ID / Date	GM-WC-BULK-39-CARPET-002 / N83650-8 / 15-Nov-04	GM-WC-BULK-39-CEILINGTILE-001 / N83650-9 / 15-Nov-04	GM-WC-BULK-40-DUST-001 / N83650-10 / 15-Nov-04	GM-WC-BULK-02-DUST-003 / N83650-11 / 15-Nov-04	GM-WC-BULK-01-DUST-004 / N83650-12 / 16-Nov-04	GM-WC-BULK-MEZ DUST-005 / N83650-13 / 16-Nov-04	GM-WC-BULK-BA-DUST-006 / N83650-14 / 16-Nov-04
2,4-D	10		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
2,4,5-TP (Silvex)	1		< 0.0015	< 0.0015	< 0.0015	< 0.0015	< 0.0015	< 0.0015	< 0.0015

mg/L - Milligrams per liter
J - Value is an estimate.

Table 6
Preliminary Waste Characterization Sampling
Resource Conservation and Recovery Act Characteristics (SW 846 CHAP7, 7.3.4.2, 7.3.4.2, and 9040B)

Anticipated Waste Streams Sample Results
LMDC
130 Liberty Street
February 10, 2005

RCRA	Toxicity Regulatory Level	Sample ID / Lab ID / Date: GM-WC-BULK-05-DUST-002 / N83650-1 / 15-Nov-04	KD-WC-BULK-08-FIREPROOFING-002 / N83650-2 / 15-Nov-04	GM-WC-BULK-12-FIREPROOFING-001 / N83650-3 / 15-Nov-04	GM-WC-BULK-18-B1(GYPSUM BP)-001 / N83650-4 / 15-Nov-04	GM-WC-BULK-CARPET-101 / N83650-5 / 15-Nov-04	GM-WC-BULK-18-CLGTILE-002 / N83650-6 / 15-Nov-04	GM-WC-BULK-39-GYPSUM BD-002 / N83650-7 / 15-Nov-04
Ignitability/Flashpoint (Deg. F)	<140	> 200	> 200	> 200	> 200	> 200	> 200	> 200
Cyanide Reactivity (mg/kg)	250	< 10 J	< 10 J	< 5 J	< 5 J	< 5 J	< 5 J	< 5 J
Sulfide Reactivity (mg/kg)	500	< 100 J	< 100 J	< 50 J	< 50 J	< 50 J	< 50 J	< 50 J
Corrosivity as pH	2-12.5	7.14 NC J	7.17 NC J	7.84 NC J	7.47 NC J	8.45 NC J	8.27 NC J	7.70 NC J

RCRA	Toxicity Regulatory Level	Sample ID / Lab ID / Date: GM-WC-BULK-39-CARPET-002 / N83650-8 / 15-Nov-04	GM-WC-BULK-39-CEILINGTILE-001 / N83650-9 / 15-Nov-04	GM-WC-BULK-40-DUST-001 / N83650-10 / 15-Nov-04	GM-WC-BULK-02-DUST-003 / N83650-11 / 15-Nov-04	GM-WC-BULK-01-DUST-004 / N83650-12 / 16-Nov-04	GM-WC-BULK-MEZ-DUST-005 / N83650-13 / 16-Nov-04	GM-WC-BULK-BA-DUST-006 / N83650-14 / 16-Nov-04
Ignitability/Flashpoint (Deg. F)	<140	> 200	> 200	> 200	> 200	> 200	> 200	> 200
Cyanide Reactivity (mg/kg)	250	< 5 J	< 5 J	< 5 J	< 6.6 J	< 5.4 J	< 5 J	< 5.6 J
Sulfide Reactivity (mg/kg)	500	< 50 J	< 50 J	< 50 J	79.7 J	65.3 J	< 50 J	< 56 J
Corrosivity as pH	2-12.5	6.63 NC J	8.66 NC J	7.44 NC J	8.24 NC J	7.86 NC J	7.89 NC J	8.40 NC J

mg/kg - Milligrams per kilogram (parts per million)
NC - Non-corrosive
J - Value is an estimate.

130 Liberty Street

New York, New York

Supplemental Investigation Summary Report

Visual Mold Inspection Summary

Prepared for:
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan
Development Corporation

Prepared By:

TRC
Customer-Focused Solutions

TRC Environmental Corp.
1430 Broadway, 10th Floor
New York, New York 10018

February 22, 2005

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APPENDICES

1.0 INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents a summary of the visual mold and mold precursors inspection conducted within the accessible and previously inaccessible spaces within the Building.

1.1 Background

The Building is located across the street and south of the WTC site and is a former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas with mold growth. These areas included mold-impacted building materials on exposed surfaces only in seven locations distributed over five different floors (11th, 7th, 3rd, Basement A and Basement B). The extent of mold at each location ranged from six to 24 square feet (SF), and in total, 105 SF of mold-impacted building materials were identified. No evidence of significant water-damaged materials was noted in the Building, although active water infiltration was noted in Basement B. In addition, the *Initial Building Characterization Report* identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

TRC also reviewed the fall 2003 *Report on Microorganisms at 130 Liberty Street*, prepared for Deutsche Bank by Mr. Brian G. Shelton, MPH. This report included a narrative description of the microbiological conditions in the Building, as well as photographs of areas of the Building with identified mold contamination, including several formerly inaccessible areas.

The TRC survey was conducted on January 4, 5, 6, 7 and 14, 2005. It included a visual assessment of the accessible and previously inaccessible interior areas of the Building to identify the locations and determine the quantities of visible mold, areas of visible moisture and water-damaged materials. All floors, including the basement areas, were accessed by TRC. This assessment addresses observations of moisture infiltration and mold contaminated areas, including those areas previously documented in the *Report on Microorganisms at 130 Liberty Street.*

1.3 Purpose and Objectives

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

1.4 Survey Team

The survey for visible mold and water-damaged materials was performed by Mr. Keith Darocha and Mr. Donald Hoeschele. Messrs. Darocha and Hoeschele are appropriately experienced and qualified industrial hygienists who performed this investigation under the guidance and supervision of Mr. Edward Gerdts, who is certified as an Industrial Hygienist (CIH) by the American Board of Industrial Hygiene.

2.0 METHODOLOGY

TRC conducted a visual inspection within the Building to determine the presence of mold or mold precursors (e.g., water-damaged building materials, or water infiltration) in accordance with the EPA Office of Air and Radiation, Indoor Environments Division published *Mold Remediation in Schools and Commercial Buildings*, and the NYCDOH published *Guidelines on*

Assessment and Remediation of Fungi in Indoor Environments. The presence of mold, water-damaged building materials, and/or water infiltration, as well as the approximate extent of the impact was noted on floor plans and in tabular form.

3.0 RESULTS

Mold

Based on the visual assessment, the following locations were confirmed for visible mold (see Table 1 for specific locations and affected areas):

- Floors: cellar "B", Cellar "A" (northerly exterior vault), 1, 4, 9, 11, 27, 28, 32, 40 and 41

Water Damage

Based on the visual assessment, the following locations were confirmed for visible water damage (see Table 2 for specific locations and affected areas):

- Floors: cellar "B" & "A", 1, 5, 20, 22, 23, 24, 25, 26, 27, 32, 35, 36, 37, 38, 39, 40 and 41

TRC conducted this assessment during January 2005 when temperatures were generally below freezing (32 degrees Fahrenheit) and ranged from approximately 26 to 39 degrees Fahrenheit. Upon review of the Academic Press publication *The Fungi*, cold temperatures slow fungal growth by slowing the chemical reactions in the cells as well as decreasing the availability of moisture in the substrate. It should be noted that most molds do not actively grow when temperatures are below freezing. Although, under moist conditions some mold species begin growth at temperatures above freezing, most molds begin to flourish at temperatures between 59 and 86 degrees Fahrenheit. In addition, information obtained from the EPA publication *Mold Remediation in Schools and Commercial Buildings,* the key to mold control is moisture control. During warmer months, higher humidity and temperature levels can result in a greater amount of available moisture, thereby fostering mold growth. With a continuous source of moisture, molds will continue to grow unabated.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the supplemental investigation for visible mold and water damage materials revealed additional mold and water damaged building materials that should be properly addressed in connection with the deconstruction of the Building. In addition, further mold/moisture inspections should be conducted prior to and during deconstruction activities. These inspections should be conducted, with more frequent inspections during warmer months, as the changing conditions of the Building temperatures and humidity levels can result in more optimal conditions for mold growth. Furthermore, sources of water infiltration should be

promptly repaired and water impacted materials dried and removed prior to the onset of mold growth, which can occur within 48 to 72 hours under optimal conditions.

5.0 REFERENCES

Initial Building Characterization Study Report, 130 Liberty Street, New York, New York. The Louis Berger Group, Inc., September 14, 2004.

Sampling, Analysis, and Quality Assurance Project Plan, Supplement Investigation of 130 Liberty Street, New York, New York. TRC Environmental Corp., November 15, 2004.

Report on Microorganisms at 130 Liberty Street. Shelton, Brian, G., Fall 2003.

Mold Remediation in Schools and Commercial Buildings. Environmental Protection Agency Office of Air and Radiation, Indoor Environments Division. March 2001

Guidelines on Assessment and Remediation of Fungi in Indoor Environments. New York City Department of Health, January 2002

Guidelines for the Assessment of Bioaerosols in the Indoor Environment. American Conference of Governmental Industrial Hygienists (ACGIH), 1999

The Fungi (2nd Edition). Carlisle, M., Watkinson, S., & Gooday, G., Academic Press, 2001.

TABLE 1

VISIBLE MOLD LOCATIONS

TABLE 1
Visible Mold Locations

Floor	Mold Contaminated-Material Description	Floor Location	Damage Area Approximate Total Quantities (in square feet (SF))
Cellar "B"	Books/papers on two steel shelving units. Mold on adjacent concrete flooring and walls. Mold on walls of elevator shaft pits (3)	Southeast and elevator shafts	10 SF total on floors and walls. 2 shelving units of books/papers
Cellar "A"	Decontamination unit walls, floors and ceilings. Vault concrete walls and floor	Northerly exterior vault	500 SF
1	Sheetrock walls	Southeast	20 SF
4	Exterior and interior of ovens in the kitchen area and in washroom sink	South (ovens) and east (sink)	50 SF
9	Sheetrock walls	South-central reception room	20 SF
11	Sheetrock walls	Southwest and northwest (4 areas)	80 SF
27	Flooring, carpeting, sheetrock walls, and 2' x 2' drop ceiling tiles	Northeast	2300 SF
28	Ceramic floor tile and associated grout-lines	Central men's restroom	600 SF
32	Flooring, carpeting, sheetrock walls, and 2' x 2' drop ceiling tiles	Office, conference, reception and open areas in the Southeast-west and Northwest	2000 SF
40	Mechanical equipment, vertical piping at ceiling, concrete walls, floors and concrete and steel column painted sections	North and northeast	60 SF
40	Mechanical shaft insulation/fireproofing and air handler interior insulation	Central mechanical shaft, air handler units	500 SF
41	Spray-on fireproofing, concrete floor, and vertical piping at ceiling	Central mechanical equipment room	20 SF

Prepared by: DH

Checked by: EG

TABLE 2

VISIBLE WATER DAMAGE/WATER INFILTRATION LOCATIONS

TABLE 2
Visible Water Damage/Water Infiltration Locations

Floor	Water Damage/Infiltration Description	Floor Location
Cellar "B"	Cellar "B" is an exposed area with visible water infiltration. Standing water visible in elevator-shaft pits (3)	Exposed area along Northerly side of floor. Elevator-shaft pits.
Cellar "A"	Cellar "A" is an exposed area with visible water infiltration	Exposed area along Northerly side of floor
Floors 1-39	Moisture on interior curtain wall aluminum siding	Exposed curtain wall areas throughout Floors 1-39
1	Floor 1 is an exposed area with visible water infiltration	Exposed area along Northerly side of floor
5	Entire floor area flooded with several inches of standing water	Entire floor area
20	Pipe leak impact to ceiling tile and carpet (approximately 2,500 square feet of damage)	Southerly open area
22	Pipe leak impact on sheetrock wall (approximately 120 square feet of damage)	Easterly open area
23	Pipe leak impact to ceiling tile, waste bags and carpet (approximately 5,625 square feet of damage)	Southerly open areas and offices
24	Pipe leak impact to ceiling tile, waste bags and carpet (approximately 4,375 square feet of damage)	Southerly open areas and offices
25	Pipe leak impact to ceiling tile and carpet (approximately 8,750 square feet of damage)	Southerly open areas and offices
26	Water damaged sheetrock (approximately 10 square feet of damage)	Southeasterly corner office
27	Pipe leak impact to ceiling tile, radiator covers and carpet (approximately 2,285 square feet of damage)	Northeasterly open areas and offices
32	Pipe leak impact to ceiling tile, carpet and sheetrock walls (approximately 700 square feet)	Northeast and southwest open areas and offices. Southeast office. Central service hall.
35	Pipe leak impact to ceiling tile, carpet and sheetrock walls (approximately 625 square feet)	Central service areas and conference room
36	Fire hose valve leak impact to carpet and sheetrock wall	Central hallway area
37	Pipe leak impact to ceiling tile and carpet (approximately 1,900 square feet)	Central offices and easterly trading floor areas
38	Water damaged carpet and floor tile. Moist areas beneath raised floor	Southerly central corridor and central-west open floor area
39	Pipe leak impact to ceiling tile and carpet (approximately 220 square feet)	Central corridor area
40	Standing water (approximately 1 foot deep) in central area. Six visible pipe leaks. Impact to concrete floors and mechanical equipment	Throughout central, northerly and westerly areas.
41	Two areas of visible pipe leaks (approximately 20 square feet). Impact to spray-on fireproofing and concrete walls/floors	Central mechanical equipment rooms

Prepared by: DH

Checked by: EG

APPENDIX A

PHOTOGRAPHS

130 Liberty Street – Visible Mold/Water Supplemental Investigation Summary

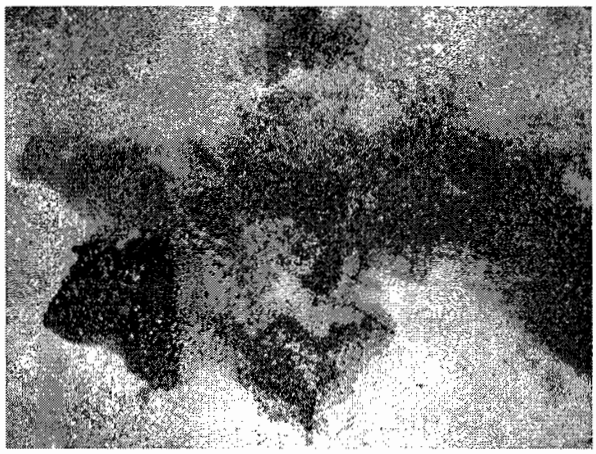

Figure 1: Floor 41 mold on flooring near pipe leak.

Figure 2 : Floor 40 water damage and mold.

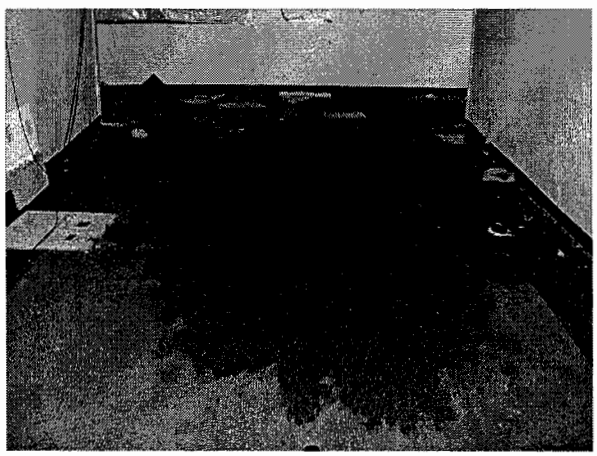

Figure 3: Floor 39 water damage

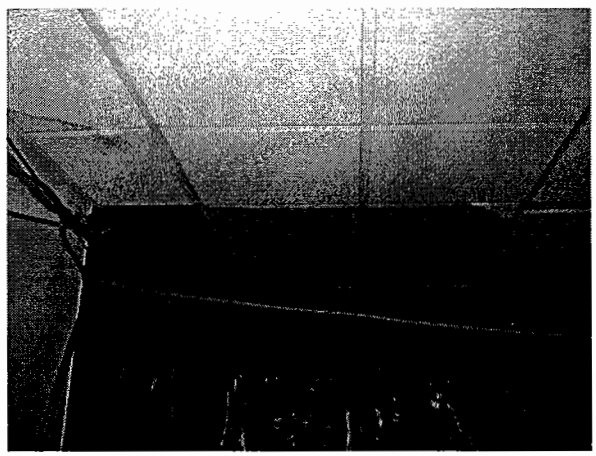

Figure 4: Floor 39 water damage.

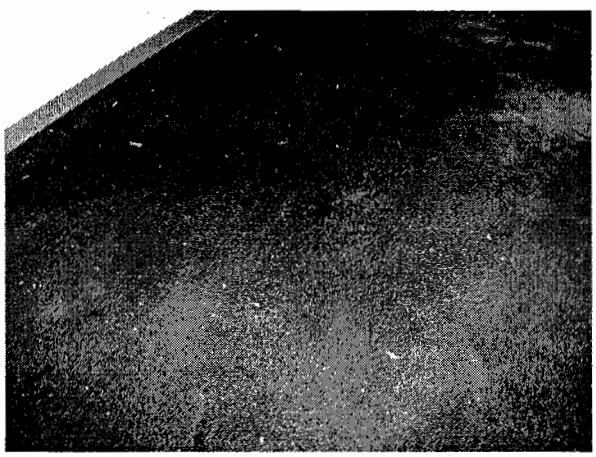

Figure 5: Floor 27 carpet water damage

Figure 6: Floor 32 sheetrock mold

130 Liberty Street – Visible Mold/Water Supplemental Investigation Summary

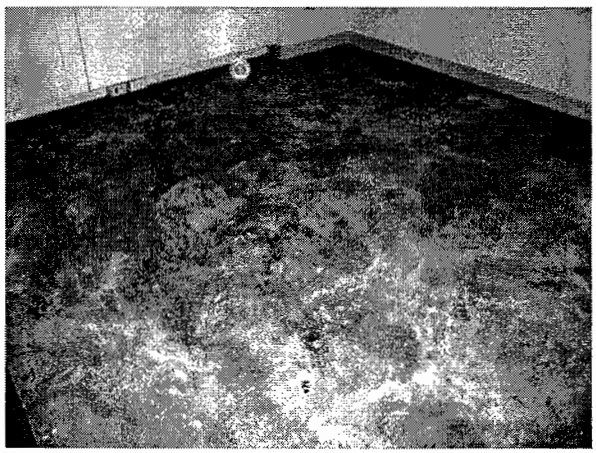

Figure 7: Floor 27 carpet water damage and visible mold

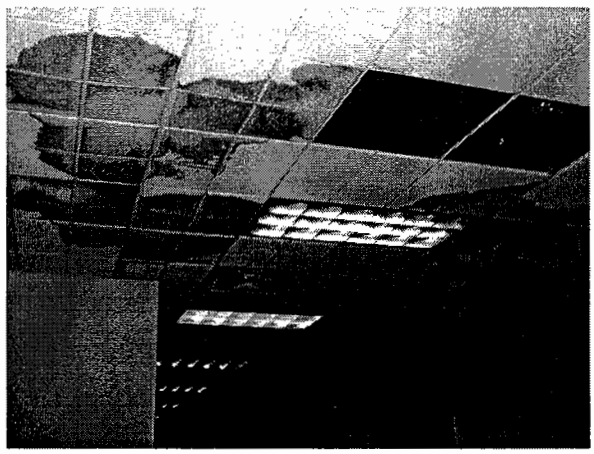

Figure 8: Floor 32 water damage

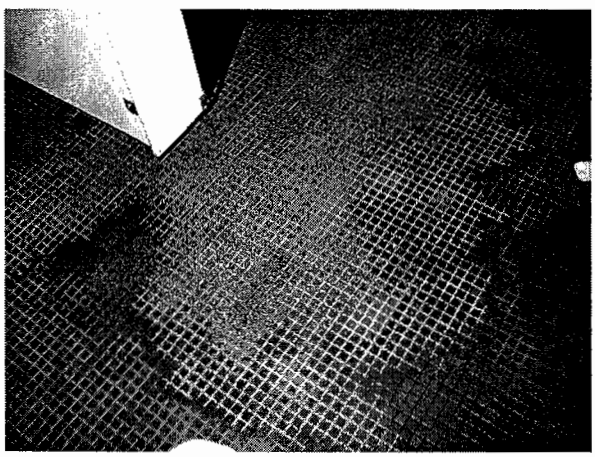

Figure 9: Floor 28 mold on flooring

Figure 10: Floor 23 water damage

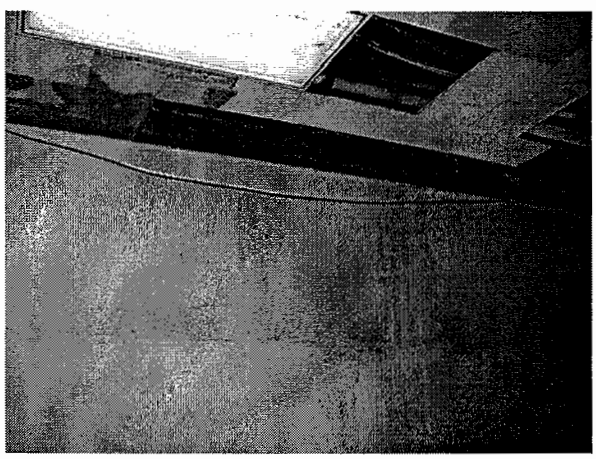

Figure 11: Floor 22 water damage

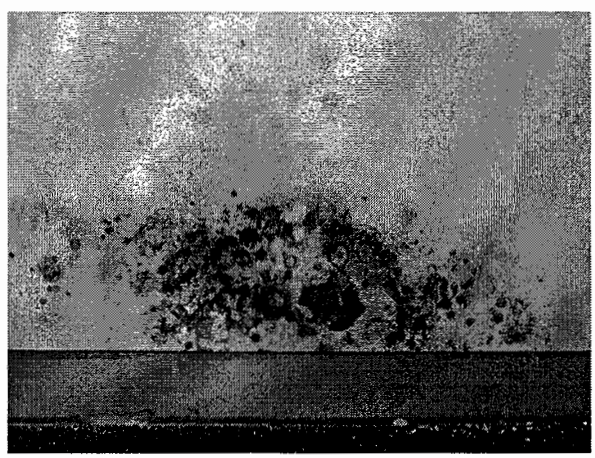

Figure 12: Floor 11 visible mold on sheetrock

130 Liberty Street – Visible Mold/Water
Supplemental Investigation Summary

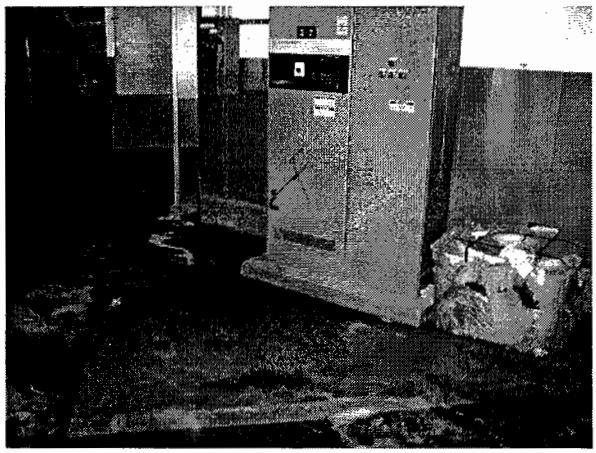

Figure 13: 5th Floor water damage

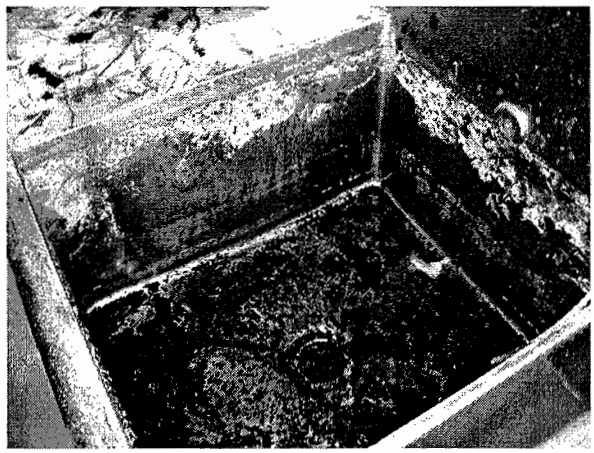

Figure 14: 4th Floor mold in sink

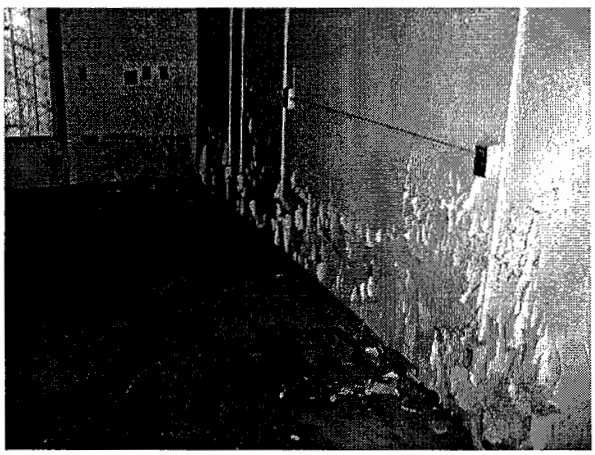

Figure 15: Floor 1 water damage

Figure 16: Floor 1 mold on sheetrock

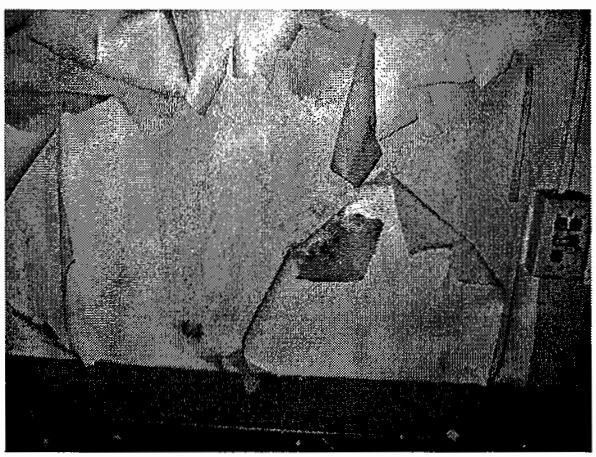

Figure 17: Floor 1 water damage

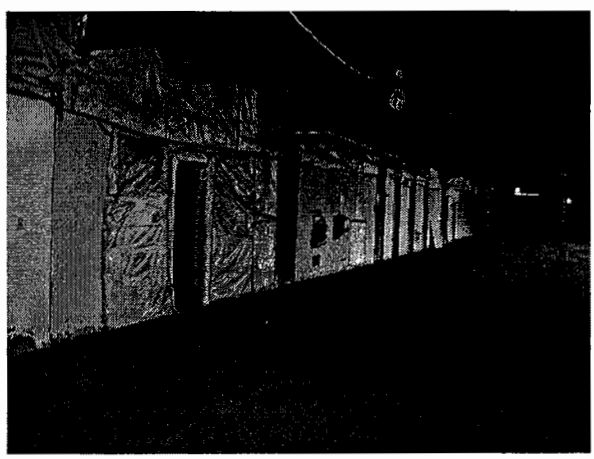

Figure 18: Floor 3 open area

ATTACHMENT 3

NYSDOL VARIANCE DECISION FILE NO. 05-0427

DATED 5/11/05

STATE OF NEW YORK
DEPARTMENT OF LABOR
Engineering Services Unit
Room 154 Building 12
Governor W. Averell Harriman State Office Building Campus
Albany, New York 12240

FACSIMILE TRANSMITTAL SHEET

TO: _____ FROM: Christopher Alonge

COMPANY: _____ DATE: 5/11/05

FAX NUMBER: _____ TOTAL NO. OF PAGES INCLUDING COVER: 60

PHONE NUMBER: _____ SENDER'S FAX NUMBER: (518) 457-1301

RE: _____ SENDER PHONE NUMBER: (518) 457-1536

NOTES/COMMENTS:

Robert Lewin
Robert Iulo
Gil Gillen
Pat Evangelista
Krish Radhakrishnan
Amy Peterson
Richard FRAM

George E. Pataki, Governor

NYS Department of Labor
Workforce New York
Put us to work for you

Linda Angello, Commissioner

May 11, 2005

Weston Solutions Inc
85 Wellington Court
Yorktown Heights NY 10598

RE: File No. 05-0427

Dear Sir/Madam:

STATE OF NEW YORK
DEPARTMENT OF LABOR
DIVISION OF SAFETY AND HEALTH

The attached is a copy of Decision, dated 5/11/2005, which I have compared with the original filed in this office and which I DO HEREBY CERTIFY to be a correct transcript of the text of the said original.

If you are aggrieved by this decision you may appeal within 60 days from its issuance to the Industrial Board of Appeals as provided by Section 101 of the Labor Law. Your appeal should be addressed to the Industrial Board of Appeals, Empire State Plaza, Agency Building 2, 20th Floor, Albany, New York, 12223 as prescribed by its Rules and Procedure, a copy of which may be obtained upon request.

WITNESS my hand and the seal of the NYS Department of Labor, at the City of Albany, this 11th day of May Two thousand five.

Blaise Thomas, P.E.
Associate Safety and Health Engineer
Engineering Services Unit

cga

Phone: (518) 457-1538 Fax: (518) 457-1301
W. Averell Harriman State Office Campus, Bldg. 12, Room 154, Albany, NY 12240

www.labor.state.ny.us

STATE OF NEW YORK
DEPARTMENT OF LABOR
STATE OFFICE BUILDING CAMPUS
ALBANY, NEW YORK 12240-0100

Variance Petition

of

Weston Solutions, Inc.

On Behalf of

Lower Manhattan Development Corporation

Petitioner

in re

Premises: Vacant High Rise Office Building
130 Liberty Street
New York, New York

Phase I Interior Friable and Non-friable ACM Removals, WTC Dust/Residue Removals and Cleanup, Limited Exterior Non-friable Caulking Removals and Limited Exterior WTC Dust Residue Removal/Cleanup

File No. 05-0427

DECISION

Cases 1- 18

ICR 56

The Petitioner, pursuant to Section 30 of the Labor Law, having filed Petition No. 05-0427 on April 13, 2005 with the Commissioner of Labor for a variance from the provisions of Industrial Code Rule 56 as hereinafter cited on the grounds that there are practical difficulties or unnecessary hardship in carrying out the provisions of said Rule; and the Commissioner of Labor having reviewed the submission of the petitioner dated April 11, 2005, along with additional information received on May 7, 2005; and

Upon considering the merits of the alleged practical difficulties or unnecessary hardship and upon the record herein, the Commissioner of Labor does hereby take the following actions:

Case No. 1	ICR 56-2.1 DENIED
Case No. 2	ICR 56-2.2 DENIED
Case No. 3	ICR 56-5.1 **limited**
Case No. 4	ICR 56-6.1(j)
Case No. 5	ICR 56-7.1(c)
Case No. 6	ICR 56-7.1(j) **limited**
Case No. 7	ICR 56-8.1(g, h, i))
Case No. 8	ICR 56-8.1(k1-k5) **limited**
Case No. 9	ICR 56-9.1(a) **limited**
Case No. 10	ICR 56-10.1(a) **limited**
Case No. 11	ICR 56-11.1(b)
Case No. 12	ICR 56-12.1(c-e) **limited**
Case No. 13	ICR 56-15.2(b-e)
Case No. 14	ICR 56-17.1 (backgrounds)
Case No. 15	ICR 56-17.2(a1)
Case No. 16	ICR 56-17.3(a) DENIED
Case No. 17	ICR 56-17.3(a4)
Case No. 18	ICR 56-17.8(a) clearance criteria

VARIANCE GRANTED. The Petitioner's proposal for removal of interior friable and non-friable ACM, WTC dust/residue including contaminated components, limited exterior non-friable ACM caulking and limited exterior WTC dust/residue cleanup, with quantities and locations as listed by the petitioner, at the subject premises in accordance with the attached 42-page stamped copy of the Petitioner's marked-up submittals, is accepted; subject to the Conditions noted below:

THE CONDITIONS

Remote Personal and Waste Decontamination Units

1. A personal decontamination enclosure system that complies with Subpart 56-9 shall be utilized. A waste decontamination enclosure system that fully complies with Subpart 56-10 shall be utilized. These enclosure systems can be remote, but must be located on-site within the structure that is subject to abatement. These enclosure systems shall be removed only after satisfactory clearance air monitoring results have been achieved or the abatement project is complete. The walkway from the regulated abatement work area to the decontamination system or next work area shall have a cleared pathway. This walk way must be restricted to certified personnel access only.

2. If remote decontamination units are to be used, workers shall don two (2) suits, as described in ICR 56-4.1(d). Each containment shall have an attached air lock within which workers shall remove their outer suit, wipe

off their inner suit and don a clean outer suit prior to proceeding to another work area or to the remote decontamination unit over a walk way as defined above.

3. If remote decontamination units are to be used, an airlock as defined in Subpart 56-1.4(e) of this Code Rule shall be constructed at the entrance to each regulated abatement work area, and shall be large enough to serve as a changing area. This area shall not be used as waste decontamination area or a waste storage area.

4. The regulated abatement work areas, decontamination units, airlocks, and dumpster areas shall be cordoned off at a distance of twenty-five feet (25') and shall remain vacated except for certified workers until satisfactory clearance air monitoring results have been achieved or the abatement project is complete. These areas shall have Signage posted in accordance with Subpart 56-8.1(b) of this Code Rule.

Work Area Electric Power

5. All electric for the removal project shall be brought into each work area through a separate GFCI panel box located outside the work area.

General Building Access Restrictions

6. Any firm and their employees may access the cleaned and decontaminated portions of the building to complete their work.

7. Firms and their employees that require occasional access to the contaminated portions of the building for maintenance of building systems, and related work may enter as building owner authorized visitors/representatives. Entry to and exit from the contaminated portions of the building shall proceed using the established procedures within the petitioner's proposal and the building owner's Health and Safety Plan (HASP). Copies of all documents referenced within the HASP shall be posted on-site in the immediate vicinity of the personal decontamination enclosure. No disturbance to ACM or WTC dust/residue is allowed by these authorized visitors/representatives.

8. Any firm requiring routine access to the contaminated portions of the building to perform maintenance of building systems shall be a NYS DOL licensed asbestos contractor and their employees accessing the contaminated portions of the building shall be a minimum of NYS DOL/NYC DEP restricted asbestos handler (allied trades) certified. Entry to and exit from the contaminated portions of the building shall proceed using the established procedures within the petitioner's proposal and the

building owner's HASP. No disturbance to ACM or WTC dust/residue is allowed by individuals with restricted asbestos handler certification.

General Handling of Generated Waste

9. All ACM and asbestos contaminated waste must be appropriately bagged/containerized within the regulated abatement work area and attached waste decontamination system enclosure. ACM and asbestos-contaminated materials on detachment from the substrate shall be directly bagged/containerized or dropped into a flexible catch basin and subsequently bagged/containerized.

10. The use of a portable shredder within the regulated abatement work area or negative pressurized containment repackaging area to reduce the volume of generated waste is allowed. However, the portable shredder must be located within a secondary negative pressure containment, wet methods must be utilized, and all processed asbestos-contaminated waste must be adequately wet within the sealed waste bags/containers when removed from the secondary containment.

11. The portable shredder must be designed for wet processing of waste, and adequate power must be supplied from outside the work area on a GFCI circuit.

12. No sealed bags/containers of ACM waste or asbestos-contaminated waste may be opened for repackaging once transferred from the regulated abatement work area, unless the bags/containers are opened within a HEPA filtered, negative pressurized hard wall containment enclosure, with attached personal and waste decontamination system enclosures in compliance with ICR 56. This repackaging area must be located within the building/structure.

13. Dust-free inclined chutes are only allowed for waste transfer within an interior one-floor or two-floor negative pressurized containment waste repackaging regulated area at the mezzanine level. All waste repackaging regulated areas utilizing chutes for asbestos-contaminated waste material shall have a minimum of 8 air changes per hour once the negative air has been established. A minimum of 4 air changes per hour must be maintained within the chute/waste container combination. In addition, within all negative pressurized containment repackaging regulated work areas a manometer shall be used to document a minimum of –0.02 column inches of water pressure differential, relative to pressure outside the regulated area. Once installed, on an hourly basis per workshift, the asbestos abatement contractor's supervisor shall document the manometer reading within the daily project log.

Negative Air Machine Exhaust Location & Make-up Air Source(s)

14. If the requirements of Subpart 56-6.1(j) cannot be met, the negative air machine exhaust(s) shall be installed in conformance to the following condition:

    a. Negative air machines shall be exhausted to the outdoors, with each exhaust duct termination point being located a minimum of fifty (50) feet from all nearby building/structures, including tunnels and subway HVAC system intakes.

15. Negative air exhaust tubes may be banked together in groups of no more than five (5) tubes, discharged at a single location. However, each negative air machine shall have its own independent exhaust tube, to reduce the potential of exhaust airflow short-circuiting. Only one daily abatement air sample is required to be collected at each exhaust bank discharge location per workshift.

16. Sufficient backup units must be available to maintain the minimum required air changes per hour, during any required shutdown of a bank of units due to an elevated air sample result. If an elevated exhaust air sample is obtained, the bank of 5 units must be shut down, the units and filters inspected, repaired/changed out as necessary, and then put back into service. Each of those five units must be sampled independently for a minimum of three days to ascertain if any problems still exist. Upon receipt of additional elevated air sample results, the affected unit(s) must be taken out of service and removed from the work area for appropriate repair.

17. All make-up air for each regulated abatement work area must enter the work area from uncontaminated areas through the decontamination enclosures. Supplementary non-contaminated make-up air, if required, shall be provided through HEPA-filtered exterior air sources.

Interior Negative Pressurized Containment Sequential ACM Removals

18. Once the regulated abatement work area is occupied by the abatement contractor, the asbestos project begins and PPE shall be worn at all times even during Preparation.

19. A personal decontamination enclosure system that complies with Subpart 56-9 shall be utilized. A waste decontamination enclosure system that fully complies with Subpart 56-10 shall be utilized. These enclosure systems **must be attached** to each regulated abatement work area and shall be removed only after satisfactory clearance air monitoring results have been achieved for the regulated abatement work area.

20. (Pre-cleaning) The floors, walls, ceilings, fixtures, and movable and fixed objects contaminated with asbestos debris shall be either removed or cleaned(non-porous materials only) as part of this abatement project. **Prior to removal of Debris (ACM materials) necessary for preparation work, installation of isolation barriers as per ICR 56-8.1(j) and establishment of negative air as per ICR 56-6.1(a-c) shall be completed. All visible Debris (accumulations of ACM) shall then be misted and bagged for disposal and then any remaining polyethylene shall be installed.**

21. Isolation Barriers to each room/area/space where work is being performed shall be installed in conformance to Subpart 56-8.1(j). All openings shall be wet-cleaned and covered with two (2) layers of (6) six-mil fire retardant plastic sheeting or for around pipes or similar openings an expandable foam or other sealant may be used.

22. All openings and penetrations to exterior curtain walls, shafts/stairwells and non-asbestos project buffer floors, from the regulated abatement work area shall be isolated in compliance with ICR 56-8.1(j) and ICR 56-8.1(k1-k4).

23. A minimum of 4 air changes per hour must be observed once the negative air has been established. A minimum eight-hour pre-abatement settling period shall be required.

24. For mechanical floor work areas with removal of exterior wall transite panels, a minimum of 6 air changes per hour must be maintained, and a maximum opening of 64 sq. ft. is allowed at any one time during transite panel intact removal. No other ACM or WTC dust/residue disturbance is allowed during exterior wall transite panel removal and hardwall isolation barrier installation. In addition, for these mechanical floor work areas a manometer shall be used to document a minimum of –0.02 column inches of water pressure differential, relative to pressure outside the regulated abatement work area. Once installed, on an hourly basis per workshift, the asbestos abatement contractor's supervisor shall document the manometer reading within the daily project log.

25. All movable and fixed objects shall be either decontaminated if non-porous and cleanable, or wrapped/containerized and disposed of as asbestos waste.

26. When multiple types of abatement work are done in a common area or enclosure, a sequential order of removal is required as shown below.

27. Simultaneous removal of multiple types of ACM within a single containment, as requested, shall, nevertheless, allow for only one type of removal of ACM at a time (sequential order) within a containment until that type of material is completely removed and a clean up is performed. Thereafter, another type of ACM can be removed within the same containment. A complete clean up of each material is required (NOTE Poly Removal is not required) prior to proceeding to the next type of removal.

28. **Relief from plasticizing as per ICR 56-8.1(k5) is for contaminated surfaces and the surfaces to be abated only.**

29. Before any removal of drywall or plaster systems, all surfaces shall be inspected to insure they are free of any penetrations and are a closed system.

30. For the purpose of the variance, the following example of sequence of removal within a containment unit is given. Note removal shall be from the ceiling down and or from most friable type to least friable type.

31. Example:

    a. First. The friable pipe and fitting insulations and other friable types of ACM shall be removed so that no visible asbestos remains and the area shall be cleaned of all debris using HEPA vacuuming and wet wiping. Glovebags shall be utilized within the work area for all pipe/fitting insulation removals and for wrap-and-cut removal cut locations, consistent with ICR 56-16.1(b), AV-108, and OSHA 29 CFR 1926.1101. Dropcloths shall be used on the floors below the removal surfaces during gross or glovebag removals.

    b. Second. Porous WTC dust/residue contaminated components shall be removed so that no component remnants remain and the area shall be cleaned of all debris using HEPA vacuuming and wet wiping. Dropcloths shall be used on the floors below the removal surfaces during gross removals.

    c. Third. Non-friable material shall be removed. Transite, interior caulking/sealant, and other non-friable types of ACM other than flooring materials shall be removed so that no visible asbestos remains and the area shall be cleaned of all debris using HEPA vacuuming and wet wiping. Dropcloths shall be used on the floors below the removal surfaces during gross removals.

    d. Fourth. Flooring removals may be completed next. Floor tile and mastic shall be removed so that no visible asbestos remains and

the area shall be cleaned of all debris using HEPA vacuuming and wet wiping. Floor Tile and mastic may be removed first, provided adequate floor protection and isolation barriers are installed to ensure the floor of the work area is watertight. Beadblaster methods or similar type of abrasive removal methods shall not be used.

e. Last. Cleaning and Decontamination of Walker Ducts and Raceways.

32. Power tools used to drill, cut or otherwise disturb ACM or WTC dust/residue within the work area, shall be manufacturer equipped with HEPA filtered local exhaust ventilation. The only exception to this requirement is for powered floor buffers using low abrasion pads at speeds lower than 300 rpm to aid with chemical mastic removal.

33. Torch cutting is not allowed within any negative pressurized containment enclosure.

34. Use of a pressure washer for gross removal of ACM or asbestos-contaminated materials is not allowed.

35. Only battery powered heavy equipment shall be utilized within each asbestos project work area, as concerns regarding exhaust emissions have been raised by all pertinent regulatory agencies. The use of diesel-powered heavy equipment or other emission-generating heavy equipment is not allowed within any negative pressurized containment work area. Upon submission of a reopening request which provides adequate details regarding "reasonable and appropriate measures" to be undertaken by the contractor, the Department will review the information and render a decision regarding additional heavy equipment use. Regardless of the type of heavy equipment to be utilized within the work area, an equipment decontamination area must be constructed and utilized within the regulated abatement work area. This equipment decontamination area shall be configured for adequate control of all generated wastewater during equipment decontamination procedures.

36. Dry removals of ACM materials will not be allowed. Amended water shall be used to thoroughly wet the asbestos-containing materials during the abatement process. Materials removed shall be bagged/containerized within 6-mil ACM waste bags, non-porous cleanable hardwalled containers, or immediately wrapped in 6 mil plastic sheeting and secured air tight prior to passing through the waste decontamination facility where they shall be cleaned and containerized again as applicable, then labeled and prepared for waste transport. No uncontainerized ACM waste or

asbestos contaminated waste is allowed to remain within the regulated abatement work area at the end of the workday.

37. On completion of each type of asbestos removal within these containment enclosures, a cleaning will be done as defined in Part 56-15.2(b) except for the encapsulation requirements. No clearance air samples will be required for each type of asbestos removal, until the last type of asbestos is removed. Prior to dismantling the enclosure, clearance air sampling shall be conducted as per the requirements of ICR 56.

38. The contractor shall observe, at a minimum, eight-hour waiting (settling/drying) periods.

39. Encapsulation of any asbestos removal surfaces **shall not** be performed, until satisfactory clearance air sample results have been obtained.

40. Prior to final air clearance samples being taken, a full cycle of cleanup of the entire area – ceiling, walls and floors - shall be performed by HEPA vacuuming and/or wet wiping, during each multiple clean-up stage as defined in Subpart 56-15.2(b,d,e) of this Code Rule. When relief is granted to not plasticize floor, wall and ceiling surfaces, one thorough cleaning as described in ICR 56-15.2(e) and one settling, waiting period shall suffice,

41. After a minimum waiting/drying period has elapsed, an authorized and certified individual; independent of the removal Contractor, (i.e.: the Project Monitor; Design Engineer; Air Monitoring Technician or other appropriately certified representative of the Owner), shall determine if the area (including internal surfaces of walker ducts and raceways) is dry and free of visible debris/residue. If the area is determined to be acceptable, this qualified individual may authorize clearance air sampling to be performed.

42. A reopening request regarding the method of visual inspection of Walker Duct and Raceway internal surfaces must be submitted to the Department and approved prior to commencement of cleaning procedures. Adequate information must be provided regarding the method of visual inspection to be utilized, as well as sufficient manufacturer information regarding equipment to be utilized for the inspections.

43. Clearance air monitoring shall comply with Industrial Code Rule 56-17.2(f).

44. Acceptable TEM clearance criteria shall be as per the petitioner's proposal for each work area.

45. All proposed clearance air monitoring for contaminants other than asbestos must be submitted to the appropriate regulatory agency for their review and approval. The Department will not grant or deny approval for any proposed non-asbestos contaminant clearance air monitoring procedures.

Negative Pressure Tent Enclosure Friable and Non-friable Removals:

46. Remote Decontamination Units **are allowed** for minor size gross removals of friable ACM, any quantity of glovebag or wrap-and-cut removal of friable ACM, or any quantity removal of non-friable ACM within negative pressurized tent enclosure regulated abatement work areas. **If gross removal of friable quantities of ACM and/or WTC dust/residue greater than 10 sq. ft. or 25 lin. ft. is scheduled within a specific tent enclosure, attached decontamination units must be installed and utilized, consistent with the requirements of ICR 56.** Where available space for contiguous decontamination systems is limited, small project decontamination system enclosures may be constructed and utilized for the tent enclosure regulated abatement work area.

47. For all negative pressure tent work areas within contaminated floors/rooms/spaces, uncontaminated make-up air shall be provided through HEPA-filtered exterior air sources, and routes for entry/exit of personnel and waste bags/containers to/from the tent enclosure shall be provided in a manner that will not recontaminate the environment and surfaces within the negative pressure tent enclosure. A reopening request regarding the project design for these tent enclosures must be submitted to the Department and approved prior to commencement of tent enclosure preparation.

48. Tents shall be constructed of two layers of six-mil fire-retardant polyethylene sheeting and shall include walls, ceiling and a floor (except for portions of floors, walls and ceilings that are the removal surfaces) with double-folded seams and used in accordance with Subparts 56-16.1(c & d). Where an existing non-porous ceiling or wall exists, the tent enclosure may be sealed to the existing non-plasticized ceiling. The tent shall be adequately supported for the duration of the abatement activities. This plastic sheeting will be treated as contaminated material and properly disposed of asbestos waste at the end of the project. Each tent enclosure shall be large enough to accommodate workers, equipment, removal and cleaning operations as well as the piping, component or surface subject to removal activities.

49. At all penetrations and openings to the tent work area, isolation barriers shall be installed in conformance to Subpart 56-8.1(j). All openings shall be covered with two (2) two layers of (6) six-mil fire retardant polyethylene

or for around pipes or similar openings an expandable foam or other sealant may be used.

50. Negative air shall be established as per ICR 56-6.1(a-c) once each tent has been constructed. A minimum of 4 air changes per hour for tent work areas must be observed once the negative air has been established.

51. Glovebags shall be utilized within the tent enclosure for all pipe/fitting insulation removals and for wrap-and-cut removal cut locations, consistent with ICR 56-16.1(b), AV-108, and OSHA 29 CFR 1926.1101.

52. Torch cutting is not allowed within any negative pressurized tent enclosure.

53. Use of a pressure washer for gross removal of ACM or asbestos-contaminated materials is not allowed.

54. Dry removals of ACM materials will not be allowed. Amended water shall be used to thoroughly wet the asbestos-containing materials during the abatement process. Materials removed shall be bagged/containerized within 6-mil ACM waste bags, non-porous cleanable hardwalled containers, or immediately wrapped in 6 mil plastic sheeting and secured air tight prior to passing through the waste decontamination facility where they shall be cleaned and containerized again as applicable, then labeled and prepared for waste transport. No uncontainerized ACM waste or asbestos contaminated waste is allowed to remain within the tent enclosure at the end of the workday. As waste bags/containers are generated each workshift within the tent enclosure work area, waste bag/container transfer shall occur as needed, so accessibility within the work area is not impeded.

55. Lockdown encapsulant shall not be applied to any removal surface until satisfactory clearance air results have been obtained.

56. When relief is granted to not plasticize or when a tent/enclosure unit is used, one thorough cleaning as described in ICR 56-15.2(e) and one settling, waiting period shall suffice, except if clearance air sampling is unsatisfactory, then a recleaning and another waiting period is required.

57. The contractor shall observe, at a minimum, four-hour waiting (settling/drying) periods.

58. At a minimum, once tent enclosure work area preparation has been completed and abatement activities commence, on a daily basis and per workshift, an air sample shall be collected within 10 feet of the tent enclosure entrance/exit, and one air sample shall be collected within 10

feet of the tent enclosure isolation barriers. Negative air exhaust sampling is not required for tent enclosures with HEPA vacuum negative air pressure ventilation systems.

59. Clearance air monitoring shall comply with Industrial Code Rule 56-17.2(f).

60. The tent, shroud or airlock shall not be dismantled until final clearance sampling has been performed and acceptable results obtained.

61. Actions that shall be taken in the event of a loss of tent integrity that are as outlined in Subpart 56-15.4.

62. After a minimum waiting/drying period has elapsed, an authorized and certified individual; independent of the removal Contractor, (i.e.: the Project Monitor; Design Engineer; Air Monitoring Technician or other appropriately certified representative of the Owner), shall determine if the area is dry and free of visible debris/residue. If the area is determined to be acceptable, this qualified individual may authorize clearance air sampling to be performed.

63. Acceptable TEM clearance criteria shall be as per the petitioner's proposal for each work area.

64. A minimum of one clearance air sample shall be collected from inside and one clearance air sample outside of each tent enclosure. The quantity of ACM and/or WTC dust/residue removed within each tent enclosure determines the required number of clearance air samples for that enclosure (i.e. small = 3 in & 3 out, large = 5 in & 5 out).

65. All proposed clearance air monitoring for contaminants other than asbestos must be submitted to the appropriate regulatory agency for their review and approval. The Department will not grant or deny approval for any proposed non-asbestos contaminant clearance air monitoring procedures.

66. For interior negative pressure tent enclosure work areas necessary for installation of interior concrete chutes (to be used for transport of "Clean" concrete slab debris from non-asbestos project work areas), the entire intended path of the chute within contaminated floors/areas/spaces must be abated, cleaned and cleared prior to chute installation. The project design for this work must be submitted to the Department and approved prior to commencement of tent enclosure preparation. It is recommended that appropriate approvals be obtained from applicable federal, state and local agencies regarding use and installation of cranes, hoists and non-asbestos project chutes proposed to be used on the project.

67. Tents or tent-like structures or enclosures, when used, shall be adequately supported and reinforced to withstand local environmental conditions and the negative pressures developed within the abatement structure.

Exterior Non-friable ACM Caulking Removals & WTC Dust/Residue Cleanup:

68. Exterior point attachments for installation of exterior hoist(s) and tower crane(s) which require disturbance of asbestos-containing caulk must be completed within a HEPA-filtered negative pressurized mini-enclosure. A reopening request regarding the project design for these type of mini-enclosures must be submitted to the Department and approved prior to any disturbance of asbestos-containing caulk.

69. All necessary roof and façade WTC dust/residue cleanup for the Phase I portion of the project shall be completed in compliance with the attached three-page procedural document provided by NYC DEP.

70. Usage of this variance is limited to those asbestos removals identified in this variance or as outlined in the Petitioner's proposal.

In addition to the conditions required by the above specific variances, the Petitioner shall also comply with the following general conditions:

GENERAL CONDITIONS

1. A copy of this DECISION and the Petitioner's proposals shall be conspicuously displayed at the entrance to the personal decontamination enclosure.

2. This DECISION shall apply only to the removal of asbestos-containing materials and WTC dust/residue from the aforementioned areas of the subject premises.

3. The Petitioner shall comply with all other applicable provisions of Industrial Code Rule 56-1 through 56-18.

4. The Department reserves the right to issue reopenings and/or amendments to this DECISION, based upon additional information submitted by the petitioner or site conditions observed by enforcement personnel.

5. The final say as to interpretation of this variance rest solely with the NYS Dept of Labor Engineering Services Unit. Any deviation from variance conditions shall render this variance Null and Void pursuant to 56-18.2.

6. Prior to commencement of "Phase I Pre-demolition Cleaning and Abatement" asbestos project work, revised plans for Phase I of the project shall be submitted to all pertinent federal, state and local regulatory agencies, and all necessary approvals obtained.

7. This DECISION shall terminate on May 31, 2007.

Date: May 11, 2005

LINDA ANGELLO
COMMISSIONER OF LABOR

By

Per Blaise Thomas, P.E.
Associate Safety and Health Engineer

PREPARED BY: Christopher G. Alonge, P.E.
Senior Safety and Health Engineer

REVIEWED BY: Blaise Thomas, P.E.
Associate Safety and Health Engineer

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130 LIBERTY STREET, NEW YORK, NY
REQUEST FOR VARIANCE
FOR PHASE I: PRE-DEMOLITION CLEANING AND ABATEMENT

EXECUTIVE SUMMARY

On September 11, 2001, the 130 Liberty Street building ("Building") was severely damaged when debris from the World Trade Center broke hundreds of windows and cut a fifteen story gash in the north façade of the Building. Since September 11, 2001, the Building has been unoccupied. The current owner of the Building, Lower Manhattan Development Corporation ("LMDC"), plans to abate and deconstruct the Building as part of the redevelopment and rebuilding of the larger World Trade Center ("WTC") Site. Currently, plans for the 130 Liberty Street site include underground truck security and bus parking away from the locations of the former WTC Towers 1 and 2 and a proposed fifth office tower which will reduce the building density on the WTC Site and create approximately 30,000 square feet of open space for public use.

This request for a variance arises from the commitment by LMDC, its consultants, and its contractor to comply in all respects with federal, state, and local laws applicable to the deconstruction of 130 Liberty Street. By doing so, LMDC, its consultants and its contractor will prevent potential exposure of workers and the public to asbestos fibers and other contaminants in the Building, safeguard workers and the public from construction debris and materials, and maintain a safe working and neighborhood environment. Accordingly, LMDC, its consultants and its contractor propose to (i) conduct the abatement work in a protective and expeditious manner in full compliance with applicable law, thereby protecting workers and the public; (ii) to the extent feasible, bulk load waste materials to minimize truckloads, traffic congestion, and air pollution and noise concerns associated with vehicles servicing the site; and (iii) address letters from the regulatory agencies concerning the previously submitted draft Phase I Deconstruction Plan.

This Request for Variance was developed and is intended to meet the spirit and intent of the law, by protecting workers and the general public from exposure to asbestos fibers and other contaminants of potential concern (COPC), both inside and outside the Building, in the vicinity of 130 Liberty, and during shipment and ultimate disposal of the deconstruction debris and wastes. This Request for Variance, at the same time, addresses unprecedented operational opportunities and challenges arising from unique conditions caused by the events of September 11th and the logistical realities of cleaning and deconstructing a high-rise building in an active urban setting.

This Request for Variance is being submitted to the New York State Department of Labor ("NYSDOL") due to the presence of asbestos in the Building. Eventually, due in part to the presence of contaminants in the Building other than asbestos, the revised Deconstruction Plan for the Building will be submitted to NYSDOL as well as other federal, state, and city regulatory agencies prior to the start of deconstruction.

NATURE OF THE WORK

The proposed cleanup and abatement will be conducted so that the Building can be safely deconstructed to allow for redevelopment of the WTC Site. This project entails: (i) the general area cleanup of WTC dust and debris, which as stated by the regulators must be treated as asbestos, (ii) removal and disposal of installed porous and certain non-porous building materials and

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components contaminated by WTC dust and debris, (iii) cleaning and salvage of certain installed non-porous building equipment and components contaminated by WTC dust and debris, and (iv) removal of building materials containing asbestos which were present in the Building prior to September 11th, 2001 (referred to herein as "ACBM"), primarily within the Building interior. During the cleanup and abatement, a minimum buffer zone of two floors, as previously required by NYSDOL, will be maintained between the active abatement (Phase I) area and the exterior abatement/structural demolition (Phase II) portion of the project.[1] This variance request primarily addresses Phase I of the cleaning and deconstruction; it is anticipated that an additional variance request will be submitted in the future addressing Phase II.

REASON FOR REQUESTING A VARIANCE

LMDC, its consultants and its contractor are committed to compliance with applicable law throughout the cleaning and deconstruction of the Building. Accordingly, the Request for Variance is intended to comply with applicable federal, state and local law. It is the goal of LMDC, its consultants, and its contractor to conduct the proposed cleanup and abatement in a manner which (i) will not expose the general public to asbestos, (ii) will minimize worker exposure to asbestos through the use of appropriate controls and personal protective equipment, (iii) will minimize adverse impacts of the project on the adjacent community, (iv) will address the practical operational opportunities and challenges presented by the Building and the Building conditions, and (v) will prepare the Building for exterior cleaning, abatement and deconstruction to be conducted during Phase II.

PROPOSED EXEMPTIONS * SEE VARIANCE CONDITION 3 CJM 5/10/05

We are requesting exemption from the following sections of Title 12 NYCRR Part 56, also known as Industrial Code Rule ("ICR") 56:

56-2.1, 56-2.2 – Limited Exemption for Specialty Trades

We are requesting limited exemption from this section based on the following:

a. The Building has been vacant for a period in excess of three years. Therefore, concern exists about the reliability and operability of various Building system components necessary to support the project.

b. ~~NYSDOL and other regulatory agencies have stated that~~ the interior of the entire structure (with the exception of previously cleaned areas of ~~the "Gash Area"~~, Cellar A Decon Areas and Loading Dock) is contaminated with asbestos. Therefore, no non-contaminated access route exists to access Building systems to repair or replace system components to ensure the operability of critical system components for the duration of the project. CJM 5/10/05

c. Specialty building trades which are not normally required to support abatement projects may be required to support operation, repair or maintenance of critical Building systems during the project. These specialty trade personnel may require access to or through contaminated areas.

d. The contractor who employs specialty trade personnel might not possess a valid asbestos handling license issued by NYSDOL.

OCCASIONAL ACCESS CJM 5/10/05

[1] NYSDOL letter to USEPA dated January 7, 2005, page 4, 1st bullet.

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To address the above, the following is proposed:

I. **Specialty Trade Contractor**

1. The contractor who employs specialty trade personnel requiring either occasional ~~or routine~~ access to the Building shall be exempted from the NYSDOL and New York City Department of Environmental Protection (NYCDEP) licensing requirements and procedures and will not need to possess a valid asbestos handling license issued by NYSDOL or NYCDEP. However, all specialty trade personnel entering the Building shall comply with the site specific Health and Safety Plan ("HASP").

II. **Specialty Trade Personnel – Occasional Access** (Building Owner's Authorized Visitors) OK 5/10/05

1. Specialty trade personnel with expertise in maintenance or repair of critical Building system components who are not required to support routine on-going operations, but who nonetheless require periodic access to the Building, shall be exempted from NYSDOL and NYCDEP certification requirements.

2. Specialty trade personnel shall receive asbestos awareness and site-specific HASP safety training prior to commencing such work. Safety training topics shall include the scope of the abatement project, project specific requirements as detailed in the site-specific HASP, proper selection and use of Personal Protective Equipment ("PPE") and precautions to observe during the performance of their work.

3. Prior to performance of specialty trade work, certified abatement personnel possessing all NYSDOL and NYCDEP required certifications will inspect the floor and equipment surfaces in the immediate area where work will be performed. Suspect debris identified on floor or equipment surfaces shall be thoroughly wetted and bagged for disposal as asbestos material/asbestos waste prior to work by specialty trade workers.

4. Personnel assigned solely to specialty trade work shall not disturb intact ACBM ~~but may incidentally disturb~~ other non-intact ACBM or WTC dust. OR OK 5/10/05

III. **Specialty Trade Personnel – Routine Access**

1. Specialty trade personnel performing limited or special tasks in preparation for or ancillary to the project, or as necessary to support routine on-going operations, shall be trained and certified by NYSDOL as Restricted Asbestos Handler - Allied Trades, at a minimum.

2. Personnel assigned solely to specialty trade work shall not disturb intact ACBM ~~but may incidentally disturb~~ other non-intact ACBM or WTC dust. OR OK 5/10/05

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56-5.1 - Handling of Waste *SEE VARIANCE CONDITIONS CJK 5/10/05

We request exemption from this section based on the following:

a. It is anticipated that a high volume of asbestos waste, including ACBM, WTC dust and asbestos-contaminated waste, will be generated during this project. Therefore, conventional bagging of all asbestos waste on a project of this size would result in the generation of very large waste volumes for handling and packaging, an increase in the number and/or size of trucks required for waste transportation, an increase of off-site burial volume, and a requirement that workers hand process waste in a time- and labor-intensive manner. Therefore an exemption is being requested to reduce the volume of asbestos waste trucked through Lower Manhattan, reduce the volume of waste to be placed in landfills, and minimize workers' direct handling and packaging of asbestos-contaminated waste.
b. Given the size and layout of the Building, the use of carts for the removal of waste via the stairwell or elevators is extremely inefficient.
c. Accordingly, a portable shredder may be utilized for processing of compatible building materials waste streams (except for ACBM, which will not be processed through the shredder) contaminated with WTC dust such as, for example, wall board. All such materials will be treated and disposed of as asbestos wastes.
d. Certain materials when wetted may result in blockage within the portable bulk shredder system. Therefore, these waste streams may be processed utilizing a double lined bulk transfer container with a closing lid and transferred directly into a double lined disposal container using a dust-free inclined chute. All such materials also will be handled and disposed of as asbestos wastes in accordance with applicable federal, state and local laws.
e. Upon removal, ACBM and contaminated spray-on fire-proofing will be packaged into properly labeled leak-tight containers (e.g., bags, gaylord boxes, drums) for handling and disposal as asbestos wastes in accordance with applicable federal, state and local laws.

Based on the above, the following is proposed:

I. Use of a Portable Shredder *SEE VARIANCE CONDITIONS CJK 5/10/05

1. If a portable shredder is utilized, upon removal from the substrate, waste materials identified above (other than ACBM) shall be thoroughly wetted and placed into a portable bulk shredder. These materials shall be wetted while in the portable bulk shredder.

2. Waste processed through the portable bulk shredder shall be packaged into properly labeled leak tight containers for disposal as asbestos waste in accordance with applicable federal, state and local laws. Local High Efficiency Particulate Air ("HEPA") ventilation exhaust equipment shall be utilized to minimize and filter emissions from the portable bulk shredder system.

3. Porous waste material that is not compatible with use of a portable bulk shredder shall be bagged, boxed or drummed directly or, processed in accordance with Item II of this section, in each case as asbestos waste.

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4. Removal of non-porous, non-movable salvage shall be performed in compliance with 56-8.2(a).

II. **Use of a Dust-Free Inclined Chute Directly into a "Bladder" Bag Installed within the Waste Container**— FOR USE WITHIN A NEGATIVE PRESSURIZED CONTAINMENT WASTE REPACKAGING REGULATED AREA —X SEE VARIANCE CONDITIONS CJK 5/10/05

1. If the bladder bag waste container option is utilized, the removed ACBM (and other asbestos waste if deemed suitable by the contractor) shall be transported for disposal in a hinged-top six-sided hard wall container ("disposal container") lined with a "bladder" bag. The "bladder" bag shall consist of a pre-fabricated fire-retardant multi-layered leak-tight container with a nominal 20-millimeter ("mil") thickness.

2. The chute shall be air and dust tight along its lateral perimeter and at the terminal connection to the "bladder" bag at ground level.

3. Prior to transport from the site, the bladder bag within the disposal container shall be wrapped and sealed and the top of the disposal container shall be closed and sealed over the top of the load. The upper end of the chute shall be furnished with a hinged lid, to be closed when the chute is not being used. CJK 5/10/05

4. Disposal containers staged and loaded ~~exterior to~~ WITHIN the Building or active work area shall be enclosed within a fully framed and sheathed enclosure of sufficient size to accommodate the entire disposal container. The interior of the disposal container enclosure shall be fully lined with at least two layers of six millimeter (6-mil) polyethylene sheeting ("poly") and sealed with tape. A minimum of ~~four~~ 8 air changes per hour shall be maintained within the disposal container enclosure. CJK 5/10/05

5. Prior to transport from the work site, the disposal container will be disconnected from the chute and sealed air and dust tight utilizing 6-mil poly and tape. The asbestos waste will be transported in the disposal container in accordance with applicable federal, state and local laws.

6. Asbestos contaminated tools and equipment shall be decontaminated by utilizing the ATTACHED WASTE decontamination enclosure system (~~"personal decon"~~) in conjunction with the applicable requirements of Subpart 56-5.1. Storage of waste materials in the clean room area of the personal decon shall be prohibited. CJK 5/10/05

7. The exterior surfaces of waste containers shall be thoroughly decontaminated by wet wiping and/or HEPA vacuuming prior to release from the site.

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III. Use of a Dust-Free Inclined Chute Directly into a Double Lined Waste Container *SEE VARIANCE CONDITIONS
-FOR USE WITHIN A NEGATIVE PRESSURIZED CONTAINMENT WASTE REPACKAGING REGULATED AREA

1. If the chute to double-lined container option is utilized, removed ACBM and other asbestos wastes shall be transported for disposal in a hinged-top six-sided hard wall container ("disposal container") lined with a two layers of 6-mil fire-retardant poly. CK 5/10/05

2. The chute shall be air and dust tight along its lateral perimeter and at the terminal connection to the Double Lined Waste Container at ground level.

3. Prior to transport from the site, the 6-mil poly within the disposal container shall be wrapped and sealed and the top of the disposal container shall be closed and sealed over the top of the load. The upper end of the chute shall be furnished with a hinged lid, to be closed when the chute is not being used.

4. Disposal containers staged and loaded ~~exterior to~~ within the Building or active work area shall be enclosed within a fully framed and sheathed enclosure of sufficient size to accommodate the entire disposal container. The interior of the disposal container enclosure shall be fully lined with at least two layers of 6-mil poly and sealed with tape. A minimum of ~~four~~ 8T air changes per hour shall be maintained within the disposal container enclosure. CK 5/10/05

5. Pending disposal, asbestos-contaminated waste shall be placed in the disposal container with at least 6-mil plastic draped loosely over the sides to facilitate being wrapped over the top of the load and sealed prior to transport from the site.

6. Prior to transport from the work site, the disposal container will be disconnected from the chute and sealed air and dust tight utilizing 6-mil poly and tape. The asbestos waste will be transported in the disposal container in accordance with applicable federal, state and local laws.

7. Asbestos contaminated tools and equipment shall be decontaminated by utilizing the ~~personal~~ ATTACHED WASTE decon in conjunction with the applicable requirements of Subpart 56-5.1. Storage of waste materials in the clean room area of the personal decon shall be prohibited. CK 5/10/05

8. The exterior surfaces of waste containers shall be thoroughly decontaminated by wet wiping and/or HEPA vacuuming prior to release from the site.

56- 6.1(i) - Exhaust Location *SEE VARIANCE CONDITIONS CK 5/10/05

We seek exemption from the minimum distance requirement of 50 feet from a facility air intake receptor based on the following:

a. The subject facility is a 40 floor high-rise office building in Manhattan.

b. Negative ventilation exhausts will be installed to ensure the minimum distance of 50 feet is maintained from air intake receptors in adjacent buildings, TUNNELS & SUBWAY HVAC SYSTEM INTAKES
CK 5/10/05

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c. Existing windows within the facility contain fixed pane glass which is sealed to the Building exterior.

Based on the above, the following is proposed:

1. Exterior louvers associated with mechanical room fresh air intakes will be sealed from the Building interior using two layers of 6-mil poly and tape.
2. Missing windows will be sealed using rigid sheathing, caulk and tape in compliance with ICR 56-8.1(k)(1) and ICR 56-8.1(k)(2), adhering to requirements approved by a New York State Licensed Professional Engineer. The interior surface of the rigid sheathing will be covered with two layers of 6-mil poly and sealed with tape.

3. Exhaust duct hose will be installed and maintained in the work area to avoid damage to the extent possible and shall be inspected on a daily basis to ensure no damage has occurred. Any damage noted shall require the immediate shut down of that negative air machine to allow for repair or, if repair is not possible, the length of exhaust duct shall be replaced prior to placing the unit back into service.

4. Sufficient HEPA ventilation units shall be installed to maintain at least 4 air changes per hour during abatement and clean up activities.

5. Air outlet from the work area shall be at or near floor level. Power tools used to drill, cut into or otherwise disturb asbestos material shall be equipped with HEPA filtered local exhaust ventilation. ↑ MANUFACTURER CMA 5/10/05

6. HEPA ventilation units shall be operated at a maximum of 2 air changes per hour during clearance sampling.

7. HEPA ventilation exhaust will be installed within exterior building openings, where practical. In areas where there are no exterior building openings available, ventilation exhaust will occur at existing window locations. To facilitate those exhausts points, the following procedure will be utilized:
   - The window pane will be secured from the interior and cut along the interior framing.
   - The window will be angled and brought into the work area and either cleaned of WTC dust or disposed of as an asbestos-contaminated material. AND HEPA VACUUMS CMA 5/10/05
   - The interior frame area will be cleaned using wet methods. A rigid barrier with cutouts to accommodate up to ~~air~~ negative air exhaust flex hoses will be inserted into the opening of the interior frame area and all seams shall be sealed using caulk or foam. Flex hose penetrations shall be sealed airtight using caulk, foam or 6-mil poly and tape, as needed.

56-8.1(g) – Movable Objects *SEE VARIANCE CONDITIONS CMA 5/10/05

Exemption from this section is requested for moveable objects remaining within the work area based on the following:

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a. Moveable equipment remaining within the negative pressure work area will be either cleaned or removed during the abatement phase (Phase I) of the project. Covering these surfaces with poly will restrict access to these surfaces for cleaning or removal and will not enhance worker safety.

56-8.1(h) – Fixed Objects *SEE VARIANCE CONDITIONS CJK 5/10/05

We request exemption from this section for fixed objects remaining within the work area based on the following:

a. Fixed objects within the negative pressure work area will be either cleaned or removed during the abatement phase (Phase I) of the project. Covering these surfaces with poly will restrict access to these surfaces for cleaning, crating or removal and will not enhance worker safety.

56-8.1(i) - Precleaning *SEE VARIANCE CONDITIONS CJK 5/10/05

Exemption is requested from pre-cleaning of all interior surfaces and the prohibition of disturbing asbestos during pre-cleaning. Pre-cleaning shall consist of cleaning of surfaces over which isolation barriers will be installed and removal of large debris (e.g., building components, materials, wastes) that may inhibit the installation of isolation barriers, the negative pressure system equipment or the movement of personnel on a floor. Once negative pressure work areas have been established, all ACBM and WTC dust and debris will be removed within that work area during the abatement phase of the project.

The Building interior was impacted by WTC dust and debris, and ~~NYSDOL and other regulatory agencies have stated that~~ the interior of the entire structure is contaminated with asbestos. Accordingly, pre-cleaning of the work area would require wetting and removal of WTC dust and debris. However, pre-cleaning of the walls, floors and ceiling surfaces prior to establishing negative pressure work areas provides no additional benefit to either worker or public health and safety since such cleaning will occur under negative pressure during subsequent Phase I abatement activities. Traditional pre-cleaning as required by 56-8.1(i) without negative pressure would actually increase potential exposures and would provide no benefit to workers or the public. CJK 5/10/05

Based on the above, the following is proposed:

1. Loose material on exposed surfaces over which isolation barriers and negative pressure ventilation exhaust duct manifolds will be installed shall be wetted thoroughly with amended water prior to disturbance and/or HEPA vacuumed. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters, shall be prohibited.
* #1 COMPLETE BEFORE COMMENCEMENT OF #2 WITHIN EACH WORK AREA CJK 5/10/05
2. Large pieces of debris (e.g., building components, building materials) on the floor that may inhibit the installation of isolation barriers, the negative pressure system equipment or the movement of personnel on a floor will be removed and either containerized for proper disposal or, if non-porous material, may be staged for cleaning and salvage during subsequent Phase I abatement activities.

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3. Pre-cleaning shall consist of cleaning of surfaces over which isolation barriers will be installed. HEPA vacuuming or wet wiping of surfaces throughout the work area to clean WTC dust, to remove pieces of debris that inhibit work process as described above, or to remove installed building components/materials will be performed within a negative pressure enclosure during subsequent Phase I abatement activities.

56- 8.1(j) – Isolation Barriers *SEE VARIANCE CONDITIONS CA 5/10/05

Isolation barriers conforming with the requirements of 56-8.1(j) shall be constructed. The isolation barriers shall consist of two layers of 6-mil fire retardant poly sealed individually with tape. Small openings may be sealed with expandable foam.

56-7.1(c) and (i) – General Removal Requirements;
56-8.1(k)(1) Through (5) – Isolation Barriers;
56-11.1(b) – Preabatement Settling Period;
56-15.2(b) through (e) – Post Abatement Requirements;
56-17.2(a) – Drying Time
} *SEE VARIANCE CONDITIONS CA 5/10/05

LIMITED CA 5/10/05 Exemption from these sections is requested based on the following:

a. The Building exterior construction is fixed pane windows and sealed spandrel panels. Plasticizing of Building and equipment surfaces will restrict access to surfaces requiring cleaning and impede access to building materials and areas requiring abatement.
b. All interior non-structural building materials will be removed under negative pressure during subsequent Phase I abatement activities.
c. The project involves concurrent decontamination of non-porous Building and equipment surfaces, disposal of building materials contaminated with WTC dust and debris, and removal of ACBM from within the same negative pressure work area.
d. Installed ACBM, located above or behind contaminated building materials, will be exposed during interior demolition to permit removal of this material inside of the existing negative pressure work area.
e. All remaining non-porous interior surfaces/equipment shall be cleaned as part of the post-abatement cleaning process.

Based on the above, the following is proposed:

1. No demolition or abatement shall occur within a negative pressure work area until area preparations and pre-cleaning activities as previously defined are completed.

2. Building materials will be removed using the following general sequencing within each designated work area, as applicable. However, within a given work area or floor several aspects of this sequence may be underway concurrently and/or, to the extent that a safe workplace can be maintained, out of sequence work may occur to facilitate the overall project. Out of sequence work may occur to address field conditions, preferences and/or to improve the

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overall efficiency of the abatement process. The following are the general anticipated sequences of work:

- TYPICAL OFFICE FLOOR GENERAL SEQUENCE: *SEE VARIANCE CONDITIONS CMM 5/10/05
  - Pre-cleaning as described;
  - Area preparation consisting of the installation of HEPA ventilation equipment and isolation barriers in accessible openings along the exterior boundary of the negative pressure work area and establish waste load out decons as desired;
  - Limited demolition of walls and ceilings to facilitate work area preparation;
  - Installation of isolation barriers in penetrations exposed along the exterior boundary of the negative pressure work area;
  - Removal of ACBM flooring and any ancillary demolition of walls required to access such ACBM flooring;
  - Demolition of remaining walls and ceilings;
  - Removal of ACBM pipe insulation;
  - Removal of installed utilities (i.e., conduit, piping, HVAC duct);
  - Removal of HVAC duct flange sections containing non-friable ACBM duct seal;
  - Removal for decontamination or disposal of large non-porous fixed equipment and components;
  - Installation of drop cloths to facilitate removal of spray-on fireproofing and fireproofing removal;
  - Decontamination of walker duct and raceways;
  - Removal of flooring mastic;
  - Detail cleaning of work area; and
  - Clearance air monitoring shall be performed at the completion of all work within each negative pressure work area.

- MECHANICAL EQUIPMENT ROOM GENERAL SEQUENCE: *SEE VARIANCE CONDITIONS CMM 5/10/05
  - Pre-cleaning as described;
  - Area preparation consisting of the installation of HEPA ventilation equipment and isolation barriers in accessible openings along the exterior boundary of the negative pressure work area and establish waste load out decons as desired;
  - Removal of transite panels serving as louver blanks and installation of isolation barriers in penetrations exposed along the exterior boundary of the negative pressure work area;
  - Installation of isolation barriers in penetrations exposed along the exterior boundary of the negative pressure work area;
  - Demolition of walls and ceilings;
  - Removal of ACBM flooring and any ancillary demolition of walls required to access such ACBM flooring;
  - Removal of remaining transite panels;
  - Removal of ACBM mechanical insulation;
  - Removal of installed utilities (i.e. conduit, piping, HVAC duct);
  - Removal of HVAC duct flange sections containing non-friable ACBM duct seal;
  - Decontamination or disposal of large non-porous fixed equipment and components;

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- Installation of drop cloths to facilitate removal of spray-on fireproofing and fireproofing removal;
- Removal of flooring mastic;
- Detail cleaning of work area; and
- Clearance air monitoring shall be performed at the completion of all work within each negative pressure work area.

➢ EXTERIOR GASH AREA GENERAL SEQUENCE: *SEE VARIANCE CONDITIONS cyk 5/10/05

- Area preparation consisting of the installation of a caulked, sealed barrier with rigid sheathing covered with two layers of fire retardant 6-mil poly on the Building interior side in compliance with ICR 56-8.1(k)(1) and ICR 56-8.1(k)(2), adhering to requirements approved by a New York State Licensed Professional Engineer. This barrier shall enclose the opening in the exterior façade;
- Installation of HEPA ventilation equipment as required;
- Demolition of the existing wall separating the gash area from the remaining floor space in order to access the ACBM wall/floor joint tar paper existing at its base;
- Cleaning of walker ducts/raceways in these areas will be done in conjunction with cleaning of these systems in the adjacent interior containment;
- Detail cleaning of work area; and
- Clearance air monitoring shall be performed at the completion of all work within each negative pressure work area.

➢ INSTALLATION OF EXTERIOR HOIST(S) AND TOWER CRANE GENERAL SEQUENCE: *SEE VARIANCE CONDITIONS cyk 5/10/05

- Prior to initiating exterior work the abatement subcontractor shall ensure that there is a scaffold bridge on the sidewalk below the installation point.
- Exterior building façade surfaces directly impacted by the installation will be cleaned in conformance with the following façade cleaning protocol: IN ACCORDANCE WITH PROVIDED NYCDEP PROCEDURES cyk 5/10/05
    - Access to the area below the façade cleaning shall be restricted and marked with caution tape. Cleaning shall not be performed during wind speeds greater than 20 mph. The area below the façade cleaning shall be covered with a layer of polyethylene sheeting.
    - Directly upon removal from the surface, all debris shall be placed in an appropriate waste bag for proper disposal as asbestos waste.
    - All impacted horizontal and vertical surfaces that are required to be removed to install the hoist(s) and/or tower crane shall be cleaned of large bulk material by wetting and hand brushing, scraping with non-metallic bristle brushes or non-metallic scrapers, by wet-wiping and /or HEPA vacuuming from the top to bottom. Only water shall be used for wet wiping. Removed materials shall be placed in appropriate waste bag for proper disposal as asbestos waste.
    - Windows and panels shall be wet-wiped. Free running water shall not be evident during this procedure. Power for HEPA vacuums shall be supplied through ground fault interrupters.

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- At the completion of the work, a visual inspection of the abated surfaces, sidewalk and scaffold bridge shall be performed to verify the absence of visible debris.

Column covers and aluminum fascia at various locations on floors where necessary connections for this equipment must be made may be breached in the process of this installation and therefore care will be taken in the removal of the aluminum sheetmetal covering.

- The abatement subcontractor shall identify the joints located on these column covers and inspect for the presence of asbestos containing caulking material. If caulking is present, the abatement subcontractor shall utilize a non-abrading cutting tool to cut the required portion of the sheetmetal covering while wetting the material with amended water. Any dust generated in this process shall be immediately HEPA vacuumed. The removed sheetmetal covering shall be placed in an appropriate waste bag for proper disposal as asbestos waste.
- Interior attachment points: the abatement subcontractor shall establish an enclosure using one layer of 6-mil poly and appropriate support structures surrounding the interior attachment points.
- The enclosure shall be attached and sealed to the exterior wall inside the Building at the location where windows will be removed and/or other openings to the exterior environment must be created.
- Once the enclosure is established, the abatement subcontractor shall clean all dust and surfaces within the area via HEPA vacuuming and wet wiping.
- The Project Monitor shall then perform a visual inspection and clearance air sampling within the attachment point enclosure prior to allowing the opening to the exterior to be established.
- Once the opening to the exterior has been established and the necessary connections are made for the erection of the hoist and tower crane, the abatement subcontractor shall temporarily seal the exterior opening with a rigid barrier covered with 6-mil poly with appropriate supports to ensure the barrier will remain in place until completion of Phase I activities on that floor.

SEE VARIANCE CONDITIONS CJA 5/10/05

➢ INSTALLATION OF INTERIOR CONCRETE CHUTE TO BE USED TO TRANSPORT CONCRETE SLAB DEBRIS GENERATED DURING CLEAN PHASE II ACTIVITIES ONLY *SEE VARIANCE CONDITIONS CJA 5/10/05

- For the purpose of transporting clean concrete floor slab debris that is generated during the clean Phase II structural deconstruction activities only, steel debris chutes shall be installed from the top down at four (4) locations which do not breech the raceway and walker duct system. These debris chutes shall be used for clean concrete only and shall not be used to transport asbestos.
- Every effort will be made to locate the 4 shaft locations to avoid interference as it transverses the mechanical floor (5th floor). However, the possibility exists that some out of sequence work must occur to relocate equipment.
- Chute dimensions shall be approximately 36 inches in diameter.

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- On floors where Phase I work has not yet been completed, work shall be performed in a controlled manner by a licensed asbestos abatement subcontractor utilizing licensed personnel and sequenced as follows: *SEE VARIANCE CONDITIONS CSE 5/10/05
  - Tent enclosures, with a nominal dimension of 8' x 8', shall be constructed with one layer of fire retardant 6-mil poly to contain the areas where the chute is to be installed. The tent enclosures shall extend from the top of the floor slab to the underside of the concrete ceiling slab above. The tent enclosures shall be placed under negative air and the abatement work shall be performed out of sequence.
  - The area immediately below the proposed penetration location shall be prepared in a similar manner
  - Localized removal of ACBM, WTC dust and obstructions potentially interfering with chute installation (such as ducts, conduits and black iron) existing within the tent enclosures shall be performed. Debris generated shall be bagged and handled as asbestos-contaminated waste. Non-porous materials may be removed from the tent enclosure and staged for cleaning and salvage during subsequent Phase I abatement activities.
  - Chute sections will be capped at both ends before bringing them into the work area.
  - Jackhammers will be used to create concrete slab openings of sufficient size to accommodate the installation of the chute. Concrete rubble will be picked up and then the Q deck will be removed.
  - Chute sections shall be incrementally installed, fitting conically shaped fore sections into larger aft sections of each chute.
  - Chute sections shall be secured to the Building's structure adhering to requirements approved by a New York State Licensed Professional Engineer.
  - Floor penetrations around the chute shall be sealed using spray foam, 6-mil poly and tape or similar means.
  - Where chute sections have been joined, seams shall be sealed with duct tape to ensure the chute remains airtight.
  - The exterior surface of the chute shall be fully plasticized, from slab to slab, with two layers of fire retardant 6-mil poly; as a means of further segregating it from any ongoing Phase I work activities.
  - Clearances air samples shall be required, within the individual tent enclosure, only when Phase I abatement activities and satisfactory clearance air monitoring results have been achieved on the floor above. If Phase I abatement activities have not been completed on the floor immediately above and below the tent enclosure, clearance air monitoring shall not be required within the individual tent enclosure prior to disassembly. Clearance air monitoring for the tent enclosure area shall be performed at the completion of Phase I abatement activities within the applicable negative pressure work area.
  - The Phase I abatement subcontractor shall perform daily inspections, within the active abatement area, to verify the integrity of the poly covering the chute. Any defects identified will be repaired immediately.

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- The Phase I abatement subcontractor will remove the polyethylene covering the chute as part of its final cleaning work within each work area prior to performance of air clearance sampling.

– In building areas where Phase I abatement activities have been completed and satisfactory clearance air monitoring results have been achieved, on that floor and the floor directly below, slab penetrations and installation of chute sections shall not require use of a tent enclosure. Disposal of removed concrete and Q deck in these areas shall be as clean material.

3. Each floor may be segregated into one or more negative pressure work areas. Multiple floors may be interconnected to form a single work area. Work areas within or between floors may be segregated by constructing an isolation barrier consisting of two layers of at least 6-mil poly within existing structural openings (e.g., doorways, corridors). & ICR 56-8.1(k1-k4) AS APPLICABLE (SEE VARIANCE CONDITIONS) CMK 5/10/05

4. All openings and penetrations to the exterior of the work area shall be sealed in accordance with ICR 56-8.1(j). Small penetrations around piping, conduit, etc., may be sealed with expandable foam. Floor drains shall be covered with two layers of 6-mil poly.

5. Prior to the start of abatement activities, the contained work area shall be inspected to ensure that it is free of any penetrations to outside the work area and is a closed system. Should any penetrations be found, they shall be properly sealed. Smoke testing of barriers and enclosure systems will be performed in conformance with ICR 56-11.1(e).

6. If during the removal operations a penetration is found, work shall stop immediately and the penetration shall be properly sealed.

7. Materials containing asbestos shall be wetted frequently with amended water. No dry removal or disturbance of asbestos shall be permitted.

8. Floor tile and mastic will be removed via the following work practices: * SEE VARIANCE CONDITIONS CMK 5/10/05
   - Floor tiles and mastic shall be periodically misted with amended water prior to, during and subsequent to removal
   - Floor tiles will be removed using manual methods only, to the extent practical.
   - Floor tiles shall be directly containerized for disposal.
   - Chemical mastic remover using manual methods and or a mechanical buffer may be used to remove gross residual mastic from areas.
   - Concrete staining or discoloration caused by absorption of liquefied petroleum based mastics will be visually inspected to verify that all residual mastic has been removed from the concrete substrate. Upon verification that residual mastic has been removed, concrete staining or discoloration may remain.

9. ACBM pipe insulation shall be removed within an existing negative pressure work area and will be removed either using glovebags or a "wrap & cut" procedure. The abated area of the pipe to be cut need not be plasticized. Pipe sections to be removed with the ACBM insulation intact shall be wrapped with two layers of 6-mil poly and sealed with tape. A label shall be

WITH GLOVEBAG REMOVALS AT CUT LOCATIONS CMK 5/10/05

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placed on each length of pipe. Pipe shall be adequately supported prior to cutting and shall be cut only on abated or clean surfaces.

10. Sprayed-on Fireproofing ("SOFP") shall be removed within an existing negative pressure containment as follows: *SEE VARIANCE CONDITIONS CMK 5/10/05
    - The floor within the active SOFP removal area shall be covered utilizing a single layer 6-mil poly drop cloth extending beyond the active SOFP removal area by at least ten feet in every direction; CMK 5/10/05
    - ~~Bulk removal of SOFP may be performed using a pressure wash system~~. If a pressure wash system is used, waste water will be collected, filtered through a system with at least 5.0 micron particle size capability prior to discharge in accordance with all applicable regulations. FOR FINAL CLEANING CMK 5/10/05

11. Walker Duct and raceways will be cleaned as follows: *SEE VARIANCE CONDITIONS CMK 5/10/05
    - Remove all wires and cables from ducts and raceways.
    - Marker holes shall be drilled in the raceways at the junction points of the walker ducts and raceways, as required.
    - Openings will be made in the raceways at the location of the marker holes. The openings should be of sufficient size to permit passage of water and debris from the walker duct cleaning. ALL GENERATED WASTEWATER SHALL BE CONTROLLED & COLLECTED. CMK 5/10/05
    - Interior surfaces of the walker ducts shall be thoroughly rinsed using water.
    - Additional openings shall be made in the underside of the raceways, as required, to permit access to interior surfaces for cleaning.
    - Local negative ventilation shall be utilized in the section of the raceway actively being cleaned.
    - The interior surfaces of the raceways should be cleaned using a combination of manual and mechanical means.
    - All methods used shall incorporate the use of vacuum collection devices that are operated continuously during cleaning. A vacuum device shall be connected to the downstream end of the section being cleaned through a predetermined opening. The vacuum collection device must be of sufficient power to render all areas being cleaned under negative pressure.
    - All vacuum devices shall be equipped with HEPA filters (minimum efficiency), including hand-held vacuums and wet-vacuums.
    - All methods require mechanical agitation devices to dislodge debris adhered to interior duct/raceway system surfaces, such that debris may be safely conveyed to vacuum collection devices.

12. Large non-porous unventilated equipment that cannot be moved manually may be cleaned in place and left uncovered during clearance air monitoring. This equipment will be removed as clean material after the completion of the abatement phase of this project.

13. Large non-porous ventilated equipment that cannot be internally cleaned or moved manually may be (i) packaged in a double lined hardwall container, properly labeled as asbestos

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contaminated waste, and staged for removal by mechanical means after the completion of the abatement phase; or (ii) ~~torch~~ cut, as needed, to reduce the size of these components for handling and/or complete decontamination.

MECHANICALLY CM 5/10/05

14. Porous demolition debris and porous material within the work area shall be disposed of as asbestos-contaminated waste.

15. Non-porous salvage items may be decontaminated and released as specified in Industrial Code Rule 56-8.2.

16. Torch cutting and welding shall be performed in accordance with the contractor's standard cutting and welding safety procedures and in accordance with applicable federal, state and local laws, including but not limited to the following requirements:

* NOT ALLOWED WITHIN CONTAINMENT CM 5/10/05

- All cutting and welding will be performed under a Hot Work (Welding/Cutting) Permit Program;
- All work will be performed by personnel who possess the appropriate New York City Fire Department Flammable Gas Torching/Welding Certificate of Fitness;
- All work will be performed under firewatch supervision by personnel who possess the New York City Fire Department Flammable Gas Torching/Welding Fire Guard Certificate of Fitness;
- Protection from fire hazards with guarding will be required to confine heat, sparks and slag generated by operation;
- Prior to cutting/welding, inspections will be conducted by experienced and certified personnel authorized to issue Hot Work Permit; and
- Additional special precautions will be taken when combustible materials are located within 35 feet of the point of operation or wall or floor openings that are within a 35 foot radius of operation.

17. ~~Diesel-powered~~ heavy equipment (e.g., bobcat, forklift) may be utilized to move and ~~remove~~ debris, perform ~~some interior~~ demolition and place debris in containers, ~~provided~~ the contractor can take reasonable and appropriate ~~measures~~ to ~~demonstrate~~ that safety issues such as potentially harmful emissions can be adequately controlled ~~in accordance~~ with applicable ~~federal, state and local~~ occupational requirements. Prior to removal from the work area, ~~heavy~~ equipment used on the project shall be cleaned as follows: CM 5/10/05

* SEE VARIANCE CONDITIONS CM 5/10/05

- An equipment decontamination area shall be cordoned off within the work site for cleaning heavy equipment, e.g. backhoes, excavators, loaders. The floor surface in this decontamination area shall be plasticized and banked on the side to confine the contaminated wastewater.
- Equipment shall be washed with water after which all exposed surfaces of the equipment shall be manually wet wiped. Upon completion of the decontamination procedures, the interior of the equipment decontamination area shall be wet wiped.

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- The floor surface below the equipment decontamination area shall be cleaned and any residual asbestos contamination shall be removed and disposed of as asbestos-contaminated waste.
- Wastewater shall be confined within the equipment wash area and shall be collected and filtered through a system with at least 5.0 micron particle size capability prior to discharge.

18. Upon completion of all work within each floor of the negative pressure work area the following work practices will apply: *SEE VARIANCE CONDITIONS CMK 5/10/05
    - The entire work area shall be thoroughly washed (a pressure wash system may be used) using amended water and HEPA vacuumed dry.
    - All standing water shall be collected by HEPA vacuuming or mopping the area. All standing water shall be removed.
    - Wall/Floor poly, as applicable, shall be encapsulated and removed. All standing water shall be removed.

19. Following a minimum drying time of four hours after wet cleaning has been completed, an authorized and qualified individual, independent of the removal project, such as the Project Monitor or Design Engineer, shall determine if the surfaces in the work area are dry and free of dust and debris. ~~The exception to this would be the raceways and walker ducts, which cannot be visually inspected~~. Once the ~~accessible~~ work area has been inspected and found to be clean and dry, aggressive clearances may be performed. CMK 5/12/05

56-9.1(a) – Large Project Decontamination Enclosure System *SEE VARIANCE CONDITIONS LIMITED CMK 5/10/05 A PORTION OF TENT ENCLOSURE CMK 5/10/05

An ~~*~~exemption is requested from portions of this section as ~~the~~ areas where removal of ACBM and asbestos-contaminated materials will occur are not contiguous.

We are proposing that:

1. A large project personal decontamination enclosure system, which may be remote from the TENT work area but otherwise complies with the provisions of ICR 56-9, shall be utilized. The large project personal decontamination enclosure system shall be fully framed and sheathed. CMK 5/10/05

2. Personnel shall don two layers of protective clothing prior to entering the work area.

3. Provided that workers are moving from a contaminated work space to another contaminated work space or from a contaminated work space through the yet uncleaned remainder of the Building (which NYSDOL and other regulatory agencies have stated is contaminated with asbestos), they need not return to the decon or remove/change their protective clothing.

56-10.1(a)(1) – Waste Decontamination Enclosure System; and 56-12.1(c) through (e) – Handling and Removal Procedures *SEE VARIANCE CONDITIONS CMK 5/10/05

Exemption from portions of these sections is requested based on the following:

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a. It is anticipated that a high volume of asbestos waste, including ACBM, WTC dust and asbestos-contaminated waste, will be generated during this project. Therefore, conventional bagging of all asbestos waste on a project of this size would result in generation of very large waste volumes for handling and packaging, an increase in the number and/or size of trucks required for waste transportation, an increase of off-site burial volume, and require workers to hand process waste in a time- and labor-intensive manner. This exemption is being requested to reduce the volume of asbestos waste trucked through Lower Manhattan, reduce the volume of waste to be placed in landfills, and minimize workers' direct handling and packaging of asbestos-contaminated waste.
b. The project may be performed using a portable bulk shredder for processing of the asbestos-contaminated waste in order to facilitate its transport to a waste packaging station.
c. The removal of large sheet metal sections and steel components will require use of heavy equipment to move and lower them to grade level.
d. The majority of the large sheet metal and steel components will be washed and decontaminated for release as clean salvage. Porous materials will be properly packaged for disposal as asbestos waste and lowered to the ground using controlled methods (e.g., hoists).

Based on the above, it is proposed that: *SEE VARIANCE CONDITIONS CJK 5/10/05

1. No dry removal or disturbance of asbestos shall be permitted.

2. Asbestos shall be wetted frequently with amended water. Sufficient time shall be allowed for penetration to occur prior to abatement activities. All friable asbestos shall be saturated. All non-hygroscopic asbestos shall be wetted on a continuous basis.

3. If a portable bulk shredder is utilized, it shall remain within the active negative pressure work area during use. Asbestos-contaminated waste material within the portable bulk shredder shall be wetted during system operation.

4. Asbestos contaminated tools/equipment shall be decontaminated by utilizing the ~~personal or~~ waste decontamination enclosure system. CJK 5/10/05

5. A waste decontamination enclosure system ("waste decon") ~~may~~ SHALL CJK 5/10/05 be constructed within the ~~negative pressure~~ work area at the exit from the contained area. The waste processing area shall be fully framed and the interior floor, wall and ceiling surfaces shall be lined with two layers of 6-mil reinforced fire-retardant poly.

6. The interior ~~and exterior~~ CJK 5/10/05 entrance to the waste ~~processing~~ REPACKAGING CJK 5/10/05 area shall be of sufficient size to accommodate large metal components, to permit safe entry and exit of heavy equipment and contain "flaps" or a curtain drape to assist in maintaining negative pressure within the waste processing area.

7. All removed ~~ACBM~~ ACM & ASBESTOS-CONTAMINATED MATERIALS CJK 5/10/05 must be packaged at the time of removal and will not remain in the work area, unpackaged at the end of the work day. ~~All other removed asbestos waste not packaged~~ CJK 5/10/05

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~~for disposal during the shift, shall be thoroughly wetted and covered with poly during non work periods. Poly used to cover asbestos waste piles shall be disposed of as asbestos waste.~~ CJK 5/10/05

8. The floor surface in the waste process area shall be banked on the side to confine the contaminated waste water. Waste water shall be drained, collected and filtered through a system with at least 5 micron particle size collection capability. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid rapid clogging of the filtration system by large particles. Filtered wastewater shall be discharged in conformance with applicable codes. Contaminated filters shall be disposed of as asbestos waste.

9. Non-porous materials may be decontaminated utilizing wet methods (a pressure wash system may be used). Removal of non-porous, movable salvage shall be performed in compliance with 56-8.2(a). NON-POROUS, SEALED CJK 5/10/05

10. Any loaded Gaylord type boxes will be placed on pallets and passed through the waste decon via a pallet jack where they will be wet wiped and HEPA vacuumed.

11. Upon completion of the decontamination procedure, the interior of the waste process area shall be wet cleaned. All standing water shall be collected by HEPA vacuuming or mopping the area. All standing water shall be removed.

56-12.1(d) - Chutes *SEE VARIANCE CONDITIONS CJK 5/10/05

Relief is requested from the maximum vertical distance of 10 feet for the removal of asbestos contaminated materials based on the following:

a. Typical ceiling heights in the finished interior spaces exceed a height of 10 feet. The maximum ceiling height in the finished interior space is 21 feet.
b. The typical ceiling height in the finished interior space, from Floors 6–36, is approximately 12 feet.
c. Ceiling heights in the Mechanical Rooms located on Floors 5, 38 & 39 are 28 feet, 17 feet and 15 feet, respectively.
d. Ceiling height in the first floor atrium area is approximately 21 feet.
e. Ceiling in the cellar B, Cellar A and Floors 2-5 range from approximately 16 feet to 18 feet.

We propose to do the following: *SEE VARIANCE CONDITIONS CJK 5/10/05

1. Asbestos contaminated materials shall be thoroughly wetted prior to disturbance. Upon removal from the substrate, contaminated materials will be wetted and properly packaged for disposal. Packaging of waste shall be performed concurrent with on-going removal activity. Accumulations of unpackaged waste shall be minimized. All removed materials shall be properly packaged by the end of the work day for disposal as asbestos waste.

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56-17.1 – Background Air Samples

Relief is requested from the requirement to perform Background Air Sampling (prior to start of project) based on the following:

a. Static area air sampling has been performed on an on-going basis at the site since 2001.

56-17.2 - Post Abatement Air Monitoring

The asbestos abatement portion of the project shall be considered complete within each work area when the area is visually clean of all dust ~~(with the exception of walker ducts and raceways which, as noted, can not be visually inspected)~~ and the results of aggressive interior air clearance sampling are below the asbestos clearance criteria of 70 structures/mm^2 (collected and analyzed in accordance with AHERA TEM protocols). Where areas fail the visual inspection or any asbestos clearance air sample is found to be above 70 structures/mm^2, the work area must be re-cleaned and re-tested until successful air clearance is achieved. Final air samples will be collected following "aggressive" air sampling techniques, as per ICR 56 17.2 (f). A minimum of five (5) air samples shall be collected and analyzed per work area. A minimum of five (5) asbestos air samples per floor will be collected. The asbestos abatement clearance air sampling criteria will be deemed to have been met in a work area when all samples, collected and analyzed in accordance with AHERA TEM protocols, are less than 70 structures/mm^2.

In addition to the asbestos abatement clearance air sampling, a minimum of five (5) air samples shall be collected per work area following "aggressive" air sampling techniques and analyzed for all of the contaminants listed below. The sampling may be performed concurrent with or subsequent to asbestos abatement clearance air monitoring. Although the asbestos abatement cleanup portion of the project under ICR 56 will be deemed complete following receipt of successful TEM clearance air sample results, containments will remain and the area will be sampled and re-cleaned, as and if necessary, to achieve the following supplemental air clearance levels:

* NOT APPROVED BY NYS DOL

Metals (NIOSH protocols)	Clearance Level
Antimony	250 ug/m^3
Barium	250 ug/m^3
Beryllium	1.0 ug/m^3
Cadmium	5.0 ug/m^3
Chromium (III)	250 ug/m^3
Copper	500 ug/m^3
Lead	25 ug/m^3
Manganese	100 ug/m^3
Mercury	12.5 ug/m^3
Nickel	50 ug/m^3
Zinc	1,000 ug/m^3

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56-17.3 – Air Sampling During Abatement

~~Relief is requested from the requirements for daily air monitoring during non-work periods.~~ CMA 5/10/05
We propose the following:
CMA 5/10/05 FULL WORKSHIFT CMA 5/10/05

1. Daily air monitoring shall be performed each ~~working~~ day. Daily air monitoring shall be conducted during any period of asbestos disturbance (including pre-cleaning, set up, abatement/cleaning, final cleaning and waste removal).

2. On days when the above activities are not performed, daily air monitoring will ~~not~~ be conducted. If work is temporarily suspended for this project, daily air monitoring will ~~not~~ be required under this Site Specific Variance. CMA 5/10/05

3. Independent of this request for variance, during deconstruction, air monitoring conducted by LMDC's consultant outside of the Building will continue on a daily basis, 24-hours per day, regardless of whether work is or is not occurring in the Building. The nature and scope of this monitoring will be set forth in the revised Deconstruction Plan.

56-17.3(4) – Air Monitoring on Negative Filtration Unit Exhaust * SEE VARIANCE CONDITIONS CMA 5/10/05

Exemption from portions of this section is requested based on the following:

a. Each floor in the work area is approximately 35,000 SF with a nominal ceiling height of 13 feet. More than 20 operating HEPA negative ventilation units will be required to maintain the required air change rates on each floor.
b. The subject facility is a 40 floor high-rise office building in Manhattan. Exterior windows are fixed pane with no existing exterior access for sampling.

We propose the following:

1. Negative ventilation unit exhausts shall be placed into groups of not to exceed ~~six~~ 5 units. CMA 5/10/05

2. An access port will be cut into the rigid barrier to provide access for placement of an exterior sample. The access port shall remain sealed during sampling and when not in use.

3. One area sample shall be taken within ten feet of each unobstructed negative pressure ventilation equipment "group" exhaust.

4. In the event that results of exhaust samples exceed 0.01 f/cc or background, whichever is greater, negative pressure ventilation exhausts within the affected "group(s)" shall be SHUTDOWN INSPECTED, REPAIRED ~~separated~~ and sampled individually. Negative pressure ventilation exhausts within the affected "group(s)" shall ~~remain separated~~ BE SAMPLED INDEPENDENTLY until either a defective unit is identified or sample CMA 5/10/05 CMA 5/10/05

CMA 5/10/05

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results for three consecutive days of sampling are less than 0.01 f/cc or background, whichever is greater.

Independent of this request for variance, air monitoring conducted during deconstruction by LMDC's consultant outside of the Building, both at ground level and at elevation, will take place on a daily basis, 24 hours per day. The nature and scope of this monitoring will be set forth in the revised Deconstruction Plan.

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ATTACHMENT #1

TABLE 1
SUMMARY OF INSPECTION RESULTS
FOR CONFIRMED ASBESTOS-CONTAINING MATERIALS

CONFIRMED ACM	APPROXIMATE QUANTITY		CONDITION and FRIABILITY	NOTES / LOCATION
	SF	LF		
Floor Materials (Linoleum, 9"x 9" and 12" x 12" Floor Tile) and Associated Mastic including Baseboard Mastic	138,940		Damaged, Non-friable	Approximately 138,940 SF of asbestos-containing "Floor Tiles & Associated Mastic Including baseboard Mastic" were identified in the following locations: 28th up to 39th Floor; 22nd up to 26th Floor; and Basement B up to the 20th Floor.
Sealant at Cable Entrances	50		Damaged, Non-friable	Located in Basement A.
Pipe Insulation, Greater than 8"		600	Damaged, Friable	Located in Basement A pipe shaft up to the 40th floor
Pipe Insulation, Greater than 6"		550	Damaged, Friable	Located on the 20th Floor
30" Pipe Insulation	400		Damaged, Friable	Located in Basement A above ceiling tiles.
Transite Board	110,200		Good, Non-friable	Located on the Roof Cooling Tower, 40/41st and 5th / 6th Floor MERs, Basement B.
Pipe Insulation, Greater Than 12"		1,200	Damaged, Friable	Located on the 5th and 6th Floor MER.
Gash: Wall/Floor Joint Tar Paper	2,250		Good, Non-friable	Located in the North Side Gash area: 7th Floor up to the 12th Floor; 15th Floor up to the 17th Floor.
HVAC Duct Caulking Material (Joint)		1510	Good, Non Friable	Located on the 23rd Floor and 40/41st Floor MER.
Black Fan Room Wall Insulation	11,600		Damaged, Non- Friable	40th & 41st Floor MER
Caulking at Fans		50	Minor Damage, Non-friable	Located on the Roof.
Window Caulking		40	Minor Damage, Non-friable	
Gray Caulking/sealant on column and beam aluminum covers	145,000		Minor Damage, Non-friable	Located on the Exterior Façade. (Estimated quantity for 38 Floors and excludes material quantity from Gash area).
Brown/Red Sealant on High Pressure Supply Duct System and	30,000		Good, Non-Friable	Located inside each radiator unit from 7th Floor up to 34th Floor; Supply Duct System located in the plenum area from 7th Floor up to 34th Floor; and four 36" diameter

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TABLE 1
SUMMARY OF INSPECTION RESULTS
FOR CONFIRMED ASBESTOS-CONTAINING MATERIALS

CONFIRMED ACM	APPROXIMATE QUANTITY		CONDITION and FRIABILITY	NOTES / LOCATION
	SF	LF		
Convector Units,				supply duct system from the 5th Floor up to the 40th Floor (from two Pipe/HVAC shafts).
WTC Dust/Residue Contamination	1,900,000		Damaged, Friable	Located on all surfaces within Building and on exterior of building.

Note:

1. All quantities are approximate.

TABLE 2
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
ROOF				
	Exhaust Fans & West Side/ BC-45	Caulking at Fans		50
	Tank Bulkhead Window/ED-45	Window Caulking		40
40TH AND 41ST FLOORS MECHANICAL ROOM				
	Mechanical Room/CD-56	12" x 12" Floor Tile (Black) and Associated Mastic on Floor Tiles	3,700	
	Elevator Machine Room/CD-34			
	Equipment Room/CD-45			
	North/Area of the Exposed Steel Deck/GF-56	12" x 12" Floor Tile (Grey) and Associated Mastic on Floor Tiles	1,000	
	East/Area of the Exposed Steel Deck/GF-56			
	Room Next to Louvers/EF-34			
	Cooling Tower Transite/CD-23	Transite Wall/slats	20,000	
	Mechanical Room Perimeter Wall	Transite Wall	37,000	
	HVAC Units at North Side of Bldg./BC-78	Fan Room Walls Insulation (Black)	11,600	
	Mechanical Space/BC-56	HVAC Duct Joint Caulking		10

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TABLE 2
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
39TH FLOOR				
	South Corridor/East/ED-34	12" x 12" Floor Tiles 2 Layers (Pink and Tan) and Associated Mastic on Floor Tiles	400	
	South Corridor/Middle/ED-34			
	Vending Machine Room/CB-34			
	North Corridor/West/CD-67	12" x 12" Floor Tiles (Grey) and Associated Mastic on Floor Tiles	2,300	
	South Corridor/East/CD-67			
	South Corridor/Middle/CD-34			
38TH FLOOR				
	South Corridor/BC-34	12" x 12" Floor Tiles (Grey) and Associated Mastic on Floor Tiles	3,000	
	North Corridor/DC-34			
	South Corridor/Middle/DC-67			
	Room by S.Corridor/W.Side/BC-34	12" x 12" Floor Tiles Composite 3 Layers (Blue) and Mastic	120	
	Room by S.Corridor/W.Side/BC-34			
37TH FLOOR				
	North Corridor/DC-67	12" x 12" Floor Tiles (Brown/Beige/Blue) and Mastic	2,550	
	North Corridor Storage Room/ED-56			
	North Corridor Storage Room/DC-56			
	Elevator Hallway/CD-45			
	South Corridor/DC-34			
	Storage Room North/CB-56			
36TH FLOOR				
	Small Storage at W.Side/BC-45	12" x 12" Floor Tiles (Black) and Mastic	170	
	Elevator Base			
35TH FLOOR				
	Storage Room North/ED-56	12" x 12" Floor Tiles 2 Layers (Beige)	800	
	North Corridor/DC-67			
34TH FLOOR				
	Small Office at E.Side/ED-23		1,500	
	Room in the Middle/ED-34			
	Room in the Middle/ED-45	12" x 12" Grey Floor Tiles [2-layer composite]		
	North Corridor Storage Room/ED-56	Mastic associated with 12" x 12" Grey Floor Tiles		
	North Corridor Storage Room/DC-56			
	Office in The Middle/ ED-34			

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TABLE 2
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
	North Hallway E.Side/ CB-78			
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	
	Office W.Side/ AB-56	12" x 12" Black Floor Tiles [1 layer]	3,500	
33RD FLOOR				
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	
	Small Office S.Side/ GF-12	12" x 12" Floor Tiles (Tan) Associated Mastic with 12" x 12" composite Floor Tiles	1,500	
	Small Office S.Side/ GF-23			
	Large Office S/E Side/ FE-23			
	East Hallway Small Office/ ED-23			
	S. Corridor Frate Elevator/ DC-34			
	N/E Small Storage Room/ GF-78			
	N.Side Small Office/ ED-78			
	W.Side Small Storage Room/ CB-34			
	W.Side Small Storage Room/ AB-34			
	S/W Small Storage Room/ CB-23			
	East Hallway Electrical Room/ ED-34	12" x 12" Black Floor Tiles Associated Mastic	1,000	
	Electrical Room/ N. Middle/ ED-56			
	Large Office/ N.Side/ ED-56			
	S.Hallway Electrical Room/ ED-34			
	W.Side AIV Room/ AB-34			
	Room Adj To Freight Elevator/ ED-23			
	N.Corridor Small Storage Room/ DC-56	12" x 12" Floor Tiles (Grey)	200	
32ND FLOOR				

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TABLE 2
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FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	
	S/E. Small Room/ FE-34	12" x 12" Black/Beige Floor Tiles Mastic Associated with 12" X 12" Floor Tiles	850	
	Conference Room E.Side/ GF-45			
	N/E Small Room/ FE-56			
	Stairwell B / ED-56			
	N.Corridor Small Storage Room/ DC-56			
31ST FLOOR				
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	
	East Side Small Office/ HG-45	12" x 12" Black and Beige Floor Tiles and Mastic	4,200	
	East Hallway Into Open Area/ HG-45			
	Conference Room E.Side/ GF-45			
	East Side Small Office N./ GF-56			
	East Side Small Office S./ GF-56			
	EP. Room N.Corridor/ FE-56			
	Middle Elevator Room/ ED-45			
	North Corridor Small Storage Room/ ED-56			
	Conveyor Room North/ DC-56			
	West Side Small Office/ CB-34			
	West Side Small Office/ CB-45			
30TH FLOOR				
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	

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TABLE 2
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
	S Corridor Electrical Panel Room/ DC-34		500	
	S. Small Room By Stairway A/ FE-34	12" x 12" Pink Floor Tiles		
	N. Corridor Small A/C Room/ FE-56	Mastic associated with 12" X 12" Pink Floor Tiles		
	Conveyor Room North/ DC-56			
	Open Area North/East/ GF-67		3,600	
	North Side Small Office/ FE-67			
	North Side Small Office/ FE-67			
	North Side Small Office/ ED-67			
	North Side Small Office/ GF-78			
	North Side Small Office/ GF-78	12" x 12" Black Floor Tiles		
	North Side Small Office/ FE-78	Mastic associated with 12" X 12" Black Floor Tiles		
	North Side Small Office/ FE-78			
	North Side Small Office/ FE-78			
	North Side Small Office/ ED-78			
	North Side Stairwell B / ED-56			
	South Side Telecom Room/ ED-34			
	South Open Area by Stairs/ DC-23			
29TH FLOOR				
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	
	East Side Room/ GF-34		2,200	
	East Side Room/ GF-45			
	North East Side Small Office/ GF-56			
	North East Side Small Office Storage/ GF-56			
	Kitchen N. Side Room/Middle/ DE-67	12" x 12" Floor Tiles (Grey)		
	N. Side Room/Middle/ ED-78	Associated Mastic on Floor Tiles		
	N. Corridor Storage Room/ DC-56			
	N. Corridor Small Room/ CB-56			

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FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
	S/W Side Small Room/ BC-34			
	S/W Side Small Room/ BC-34			
28TH FLOOR				
	North Side Small Office/ DC-67	12x12" Floor Tiles (Grey)	1,500	
	North Side Small Office/ DC-67			
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	
	Mechanical Space/AB-34	12" x 12" Floor Tiles (Light Brown)	120	
27TH FLOOR				
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	
	Entire	Brown Seal inside each convector unit	230	
26TH FLOOR				
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	
	N/E Side Office/GF-67	12" x 12" Floor Tiles (Beige) and Mastic	750	
	Room Adjacent to Men's Room E./DC-56			
	Room Adjacent to Men's Room W./DC-56			
25TH FLOOR				
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	

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TABLE 2
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
	South Hall / Open Area / Middle / FE-23	12" x 12" Floor Tiles (Black)	2,000	
	South Hall / Small Office / Middle / FE-34			
	Room Adj. To Men's Room/West/ CD-56			
24TH FLOOR				
	Entire	Brown Seal inside each convector unit	200	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	By Women's B/Room/Middle/ DC-34	12" x 12" Floor Tiles (Grey) and Mastic	120	
23RD FLOOR				
	South Corridor Conveyor hall/ ED-34	12" x 12" Floor Tiles 2nd Layer (Black) and Mastic	500	
	South Corridor Women's Room/ FE-34			
	South Side Corridor/ DC-34			
	Vending Machine Room/DC-34	12" x 12" Floor Tiles (Grey)	900	
	East Hall / Room 2304 / CB-34			
	East Hall / Open Area / AB-34			
	Office 2307 W. Side / AB-56			
	Above ceiling tiles, restricted area	HVAC Duct Caulking (Joint)		1,500
	Entire	Brown Seal inside each convector unit	200	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	West Open Area / AB-34	Associated Mastic on Baseboard (Brown)	300	
	South Open Area / DC-23			
	East Open Area / GF-34			
22ND FLOOR				

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TABLE 2
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
	Entire	Brown Seal inside each convector unit	200	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Hallway 2254 SE Side / GF-23	12" x 12" Floor Tiles 2 Layers (Grey) and Mastic	400	
	Hallway 2253 / FE-23			
	SW Corner Room / AB-12			
21ST FLOOR				
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
20TH FLOOR				
	Large South Hall West / ED-12	Pipe Insulation at 6"-12" Pipe		500
	Large South Hall Middle / FE-12			
	Large South Hall East / FE-12			
	Vending Machine Room / GF-34	Pipe Joint Insulation at 1" Pipe		50
	South Corridor / DC-34			
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	West Small Office / GF-34	12" x 12" Floor Tiles 2nd Layer (Black)	300	
	Stairwell at South Corridor / GF-23			
19TH FLOOR				
	Storage Adj. to Stair 3/GF-23, closet adj. to vending machine	12" x 12" Floor Tiles 1st Layer (Beige)	350	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	

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TABLE 2
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
	Vending Machine Room, Stair 3, closet adj. to vending machine	12" x 12" Floor Tiles 2nd Layer (Black)	600	
18TH FLOOR				
	Stair 3 Stairwell/ GF-23	12" x 12" Floor Tiles 2nd Layer (Black)	200	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	West Side Small Storage Room/ GF-34	Linoleum Sheeting and Mastic	100	
	South Side Men's Room/ CD-34			
17TH FLOOR				
	SE From Hallway At Stair A/ FE-34	12" x 12" Floor Tiles (Black) and Mastic	300	
	Room At NE Gash/ GH-56			
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	
16TH FLOOR				
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	Mens Bathroom	Linoleum and Mastic (Brown)	500	
	Womens Bathroom			
15TH FLOOR				
	Room in Front Of Stair A/ GF-34	12" x 12" Floor Tiles 2nd Layer (Black)	150	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	

05 U422

130 LIBERTY STREET, NEW YORK, NY
REQUEST FOR VARIANCE
FOR PHASE I: PRE-DEMOLITION CLEANING AND ABATEMENT

TABLE 2
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
	Entire	Brown Seal inside each convector unit	200	
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	
14TH FLOOR				
	S. Small Office Adj To Large Hallway /FE-23	12" x 12" Floor Tiles 2 Layers (Beige)	500	
	E. Side Room / Middle / GF-23			
	East Corridor Storage Room / GF-34	12" x 12" Floor Tiles (Black)	1,250	
	East Open Area / GF-45			
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	West Small Office / CB-34	12" x 12" Floor Tiles 2 Layers (Gray)	1,250	
	West Small Kitchen / CB-34			
	S. Room Adj. To Large Hallway/ FE-12			
	Room South To Hallway At Stair A / FE-34			
	S. Room Adj. To Hallway Small Office/ FE-12			
12TH FLOOR				
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	
	Mens Bathroom	Linoleum and Mastic (Brown)	500	
	Womens Bathroom			
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	West Corridor Storage Room / FE-34	Associated Mastic on Baseboard (Brown)	50	

05 04231

130 LIBERTY STREET, NEW YORK, NY
REQUEST FOR VARIANCE
FOR PHASE I: PRE-DEMOLITION CLEANING AND ABATEMENT

TABLE 2
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
11TH FLOOR				
	Small Office W. Side/ AB-45	12" x 12" Floor Tiles 2nd Layer (Black) and Mastic	6,000	
	Large Office W. Side/ AB-34			
	West Corridor / AB-34			
	Large Office W. By Open Area / GF-34			
	SE in Fr. Of Corner Room / CB-23			
	SE Small Storage Room/ GF-34			
	West Side Large Office/ GH-34			
	West Side Small Office/ GH-45			
	West Side Small Office/ GH-45			
	West Side Small Office/ GH-45			
	West Side Small Office/ GH-45			
	West Side Small Office/ GH-45			
	Large Office Adj. To Small Office's / GF-45			
	East Corridor / GH-45			
	Large Office Adj. To Small Office's / GF-56			
	W. Corridor / 2nd Room From S. / AB-34			
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	
10TH FLOOR				
	Column locations FG-34, FE-23, BC-23, BC-34,	12" x 12" Floor Tiles (Beige)	600	
	Storage by Main Corr. EF-34	12" x 12" Floor Tiles (Black)	200	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	

05 0422

130 LIBERTY STREET, NEW YORK, NY
REQUEST FOR VARIANCE
FOR PHASE I: PRE-DEMOLITION CLEANING AND ABATEMENT

TABLE 2
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
9TH FLOOR				
	Entire South West Section: Column locations AE-16	12" x 12" Floor Tiles (Beige) and Mastic		
		12" x 12" Floor Tiles 2 Layers (Grey/Composite) and Mastic	9,000	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	
8TH FLOOR				
	SE Corner: FH-23, GF-34	12x12 Gray/Black VAT and Mastic	350	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	
7TH FLOOR				
	SW Section AD-14, Hallway ED-34, ED-34 Small Office, FE-23 Small Offices	12" x 12" Floor Tiles	6,000	
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
		Associated Mastic on Baseboard (Brown)	500	
5TH AND 6TH FLOORS MECHANICAL ROOM				
	Along Perimeter South, East, North, and West Wall	Transite Board Wall	53,000	
	Upper Level of Maintenance Shop BC-56	Pipe Insulation (white Block), Greater Than 12"		1,200
	Entire North Section AH-68, AB-18, Interior Corridor OC-36	12" x 12" Floor Tiles (Gray, Beige) and Mastic	11,600	

05 U427

130 LIBERTY STREET, NEW YORK, NY
REQUEST FOR VARIANCE
FOR PHASE I: PRE-DEMOLITION CLEANING AND ABATEMENT

TABLE 2
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
4TH FLOOR				
	Small Offices GH-54, DG-13	12x12 Beige and Mastic	300	
3RD FLOOR				
	SE Section and Corridors: CG-16	12" x 12" Floor Tiles and Mastic	4,500	
2ND FLOOR				
	Small Office: GH-56	12x12 Floor Tiles and Mastic	200	
MEZZANINE				
	Corridor: FE-36	12" x 12" Beige Floor Tiles	800	
1ST FLOOR				
	South Section AH-14, Corridors CH-46, and NW section AD-68	12" x 12" Floor Tile [2 Layers]	13,500	
BASEMENT A				
	Mid Section of the Entire Floor AH-37	12" x 12" Floor Tile/3rd Layer (Black)	15,500	
		12" x 12" Floor Tile/3rd Layer (Light Brown)		
		Associated Mastic on Floor Tiles		
		12" x 12" Floor Tile/2nd Layer (Dark Gray) and Mastic		
		12" x 12" Floor Tile (Black)		
	Vault Area (DF-69)	9x9 black and Beige Floor Tile and Associated Mastic	3,500	
	Security Area BE-12	12x12 White Floor Tiles	720	
	Electrical Room	Sealant at Cable Entrances	50	
	Above ceiling tiles	30" Pipe Insulation (White Block Insl.)	400	
BASEMENT B				
	Entire Vault Area: AH-13, and Storage Room FH-56	12x12 Beige (2 layers) and Mastic	9,250	
	Small Room ED-45, Hallway, Vault Area, and Exterior Space Underneath Cellar A Exterior Vault.	12" x 12" Floor Tile (Black) and Mastic	10,690	
	Main Lobby ED-57	Transite Pipe	200	
HVAC/PIPE SHAFTS				

05 04 27

130 LIBERTY STREET, NEW YORK, NY
REQUEST FOR VARIANCE
FOR PHASE I: PRE-DEMOLITION CLEANING AND ABATEMENT

TABLE 2
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
	Pipe Shaft (HVAC #1) by Service Elevator: Cellar A up to 40th Floor	>8" Diameter Pipe Insulation (White Block Insulation)		600
	Pipe/HVAC Shaft, from 5th Floor to 40th Floor (There are 2 supply duct units in Pipe Shaft #1 and 2 supply duct units in Pipe Shaft #3).	Red Sealant on Seams of 36" Diameter Supply Duct Unit. On each seam, red sealant is approximately 6" to 8" wide.	5,000	
INTERIOR/EXTERIOR SURFACES				
	Located on all surfaces within Building and on exterior of building.	WTC Dust Residue Contamination -	1,900,000	
EXTERIOR				
	Exterior Facade	Caulking/sealant between Spandrel Panel and Column Metal Parts/Covers	145,000	
TOTAL			2,336,407	3,950

05 0427

May 7, 2005

05-0427

Christopher Alonge, P.E.
NYS Department of Labor
Engineering Services Unit
State Campus Bldg. 12, Room 154
Albany, NY 12240

Subject: **Additional Information Submittal (1) Regarding File No. 05-0427; 130 Liberty Street, New York, NY**

Dear Mr. Alonge,

We respectfully submit this additional information regarding the referenced File No. for this project. Please note the following:

Portable Shredder:
REPACKAGING CMA 5/10/05
The feasibility of small portable shredders for use within the active abatement areas is currently being evaluated. Consideration is also being given to use of a truck mounted shredder(s) as part of centralized waste ~~processing~~ area. Therefore, specific information relating to manufacturer specification is under review. However, either approach will include construction of secondary containment which encloses the area surrounding the shredding equipment and the bagging/containerization area. Use of supplementary engineering controls is also planned for use with this equipment. Supplementary engineering controls may include, but not be limited to, use of HEPA equipped negative ventilation for general area ventilation within the secondary containment, HEPA equipped negative ventilation equipment for localized ventilation and/or use of ~~misting or~~ other dust suppression techniques.
WET METHODS & CMA 5/10/05

Removal of Window Panes for Exhaust Termination Manifolds
ACM window pane caulk was not identified during conduct of the ICR 56-1.9/EPA NESHAPS Pre-demolition asbestos survey conducted at the site. Removal of window pane will not impact asbestos containing aluminum panel caulking. It is anticipated that disturbance of asbestos will be minimized, to the extent practical, prior to installation of negative ventilation units. Window removal and manifold installation will occur prior to any other preparation or potential asbestos disturbance, including debris removal within work area. Precleaning of window removal locations will occur prior to manifold installation activities. Visible gross debris, existing on interior and exterior window surfaces, that will be impacted by installation of negative ventilation units/manifolds will be wetted and placed directly into a disposal container. All impacted window surfaces will be HEPA vacuumed and/or wet-wiped prior to disturbance. Work area preparation and cleanup of gross debris will commence upon completing installation of negative ventilation equipment. No dry removal or disturbance of asbestos shall be permitted.

Typical Office Floor General Sequence
Flooring Mastic will be removed in sequence immediately following floor tile removal. Per clarification above, negative air systems and isolation barriers will be completed prior to bulk debris removal.

Typical Mechanical Floor General Sequence
Flooring Mastic will be removed in sequence immediately following floor tile removal. Per clarification above, negative air systems and isolation barriers will be completed prior to bulk debris removal.

05 04 27

Transite panels serving as louver blanks will be removed manually as part of the isolation barrier installation process. Localized negative exhaust will be used during the removal process. Transite panels will be removed intact, to the extent feasible. As transite panels are removed, louvers will be HEPA vacuumed and/or wet-wiped and isolation barriers installed. At no time will greater than ~~one louver unit~~ ↑64 SQ. FT. be open at any one time prior to installation of isolation barriers. CM 5/10/05

Access to Interior Tent Enclosures From Contaminated Areas *SEE VARIANCE CONDITIONS CM 5/10/05

Tents constructed within the contaminated area will be constructed and maintained utilizing appropriate engineering and contamination controls. Use of proper contamination control techniques are proposed to minimize the potential for contamination of interior surfaces of clean installed equipment (e.g. steel chutes) during equipment installation. Exterior openings on installed equipment, which will remain within contaminated areas, will be sealed prior to disassembly of the interior tent enclosures.

*POSITIVE PRESSURE TENT ENCLOSURES ARE NOT ALLOWED CM 5/10/05

Interior tent areas will be constructed with an attached 3'x 3' airlock. Upon completion of the tent construction, the exhaust of a HEPA filtered ventilation unit or vacuum will be attached to the tent to create a slight positive pressure within the tent enclosure. Positive pressure within the tent interior will be maintained through a HEPA filtration system; this system will operate continuously until satisfactory air sampling results are achieved within the tent. The interior surfaces of the tent shall be HEPA vacuumed and wet-wiped.

- Personnel entering the interior tent enclosures from a contaminated area shall proceed as follows:
  - Prior to entering the attached airlock, personnel shall remove the outer layer of protective clothing.
  - The exterior surface of the respirator shall be wet-wiped or HEPA vacuumed.
  - Upon entering the airlock, personnel shall don a clean exterior layer of PPE prior to entering the tent.
- Transport of clean material through contaminated areas shall be as follows:
  - Prior to being brought into the contaminated area, clean material shall either be placed into two clear plastic 6-mil poly bags or two layers of 6-mil poly which are to be individually sealed with tape.
  - Clean packaged equipment may be staged on a clean drop placed outside the entrance to the airlock
  - Personnel shall enter the interior tent enclosure following the above procedure and remain within the enclosure.
  - Personnel remaining outside the airlock should put on a clean pair of gloves.
  - Personnel outside the airlock should remove the outer package, wet-wipe the inner package and place the item into the airlock.
  - Personnel within the tented enclosure should reach into the airlock and bring the packaged material into the interior tent enclosure.
  - The outer package should be removed and the clean equipment may be installed within the interior tent enclosure. CM 5/10/05

Sprayed-on Fireproofing Removals *SEE VARIANCE CONDITIONS CM 5/10/05

The lowest elevation within each active work area shall be rendered water tight. Clean-up of waste water shall be on-going during pressure washing. Absorbent materials and/or plasticizing will be utilized within the containment, as required, to control water during cleaning activities. Waste water will be contained within the active work area during pressure washing activities. Pressure washer may be used to assist in detail work area cleaning only.

.05 0427

Relief of ICR 56-12.1(d) – Chutes * SEE VARIANCE CONDITIONS CM 5/10/05
This exemption is requested based solely on the fact that typical floor to ceiling height within the facility exceeds ten feet. Typical ceiling heights within the building are 1) Office Floor 12'-13', 2) Data Center Floor 13'-15' and 3) Cellar 16'. Exceptions to these typical ceiling heights are Tenant Floor Nos. 1 (21'), 2 (17.7'), 3 (18'), 5 (28') and 40 (17.2'). Therefore, throughout the building, materials removed from near ceiling height would require construction of a flexible catch basin or chute to lower materials to the floor level approximately 12' to 28 feet below. There is no intent to drop waste materials in an uncontrolled fashion. Asbestos materials and asbestos-contaminated materials on detachment from the substrate shall be directly bagged/containerized.

Negative Air Exhausts and Associated Air Monitoring * SEE VARIANCE CONDITIONS CM 5/10/05
An additional secondary bank of five (5) negative exhaust air units will be installed in each work area as a back-up to maintain the minimum required air changes per hour should a primary bank of five (5) units be taken out of service during required shutdowns. If an elevated exhaust air sample is obtained, the bank of 5 units with the elevated result will be shut down, the units and filters inspected, repaired/changed out as necessary, and then put back into service. Each of those five units will be sampled independently for a minimum of three days to ascertain if any problems still exist. Upon receipt of additional elevated air sample results, the affected unit(s) will be taken out of service and removed from the work area for appropriate repair.

A NEGATIVE PRESSURE
~~An~~ Interior Tent Enclosure, ~~as described above,~~ will be used and maintained to create the air sampling access port for negative air exhaust air sampling at each bank of negative exhaust air filtration unit manifolds. This tent enclosure will also used to access the air sampling port to facilitate negative air exhaust air sampling exterior to the building. The interior tent enclosure will be maintained until final clearance air sampling is performed.

If you have any questions please feel free to contact us on my cell phone at (917) 549-6197.

Sincerely,

Edward Gerdts CIH, CSP
Vice President

cc: Amy Peterson - LMDC
Vincent Lander – QUEST
Robert Lewin – WESTON

05 0427

May 7, 2005 File No. 05-427

Christopher Alonge, P.E.
NYS Department of Labor
Engineering Services Unit
State Campus Bldg. 12, Room 154
Albany, NY 12240

Subject: **Additional Information Submittal (2) Regarding File No. 05-0427; 130 Liberty Street, New York, NY**

Dear Mr. Alonge,

We respectfully submit the additional information regarding the referenced File No. for this project. Please note the following:

Sequencing Of Asbestos Project Work Within Shafts And Stairwells

The current approach provides for conducting a wall to wall gut on each floor within the active work area. CMU walls are limited to 1) building core stairwells, elevators, MEP shafts (vertical shafts) between Cellar B to 3rd Floor, 2) some limited walls at the 39th floor and above and 3) minor continuous vertical utility shafts (three). *SEE VARIANCE CONDITIONS CMS 5/10/05

The balance of vertical shaft walls are constructed with a 1" gypsum core board on the interior side and two layers of 5/8" sheetrock on the exterior (Tenant Side). One or more interior vertical shafts will be maintained for use by abatement personnel during the project. Airlock(s) with a minimum dimension of 3'x3' will be constructed at each entrance to these vertical shafts. Visible debris shall be wetted and bagged, and exposed building and equipment surfaces within these vertical shafts shall be cleaned using HEPA vacuuming and or wet-wiping. Upon completion of wet-cleaning activities within the shaft, a four hour drying period will be observed. At the completion of the four hour drying period aggressive clearance sampling shall be performed within the cleaned vertical shafts. Upon satisfactory completion of clearance air sampling, exposed surfaces within the vertical shaft shall be sealed with encapsulant.

Use of cleaned vertical shafts by abatement personnel shall be limited to work area exit to the remote decon constructed at the lower building level and removal of properly packaged waste to the remote waste decon. Exterior surfaces of properly packaged waste shall be wet-wiped prior to placing in the airlock for transfer to the cleaned vertical shaft. Prior to entering the cleaned vertical shafts and while within the airlock, personnel shall remove the outer layer of PPE and wipe the exterior surfaces of their respirators. Bulk waste material containers shall not be transported through these cleaned vertical shafts.

The exterior layers of 5/8" sheetrock shall be removed from the exterior of these vertical shafts as part of the Phase I project and disposed of as asbestos waste. Following removal of the exterior sheetrock layer, the exposed core board surface shall be inspected for penetrations to the vertical shaft interior. Any observed penetrations shall be properly sealed. The exposed interstitial space and the back side of the 1" core board shall be thoroughly cleaned using HEPA vacuuming and wet wiping. Upon satisfactory completion of clearance air monitoring the exposed exterior surface of the 1" core board will be encapsulated. Core board within the cleaned vertical shafts shall be removed as clean debris during Phase II demolition. CMS 5/10/05

05 U428

Non-Contaminated Make-Up Air Source For All Work Areas *SEE VARIANCE CONDITIONS CJH 5/10/05

Non-contaminated make-up air will be drawn from cleaned vertical shafts and areas which have been previously cleaned and released which exist above the active work area. ~~Airlock(s) with a minimum dimension of 3'x3' will be constructed at the isolation barrier on the "cleaned" floor immediately above the upper most floor within the active abatement area.~~ Supplementary non-contaminated make-up air, if required, will be provided using temporary "duct runs" or HEPA filtered make-up air vestibules from either cleaned areas or exterior sources.

Entry/Exit to Asbestos Project Work Areas *SEE VARIANCE CONDITIONS CJH 5/10/05

Material Transport: Inclined chutes will not be utilized for transfer of asbestos-containing or asbestos-contaminated waste from the asbestos project work areas. Waste materials from the abatement project will be wetted with amended water and placed into lined and covered bulk material containers staged within the active work area. The containers shall be lowered using controlled methods (hoist, elevator) to the waste ~~processing~~ area which is tentatively proposed to be on the Mezzanine Level. The containers will be moved into the secondary containment area constructed around the waste processing area. The use of an "inclined dust-free chute" shall be in conformance with the requirements of ICR 56-12(d) and will be limited to transport of waste ~~from~~ the waste ~~processing~~ area ~~to the waste transport container~~. It is anticipated that the secondary containment enclosing the waste ~~processing~~ area will be located on the Mezzanine level ~~and the waste container will be located at ground level~~. The exact location of the waste ~~processing~~ area ~~and~~ transport container will be determined upon finalization of both the site traffic and staging logistics plan.

REPACKAGING CJH 5/10/05 — INCLUDING — WITHIN — REPACKAGING CJH 5/10/05

Personnel Transport: ~~With the exception of the first grouping of work areas on the upper floors, abatement personnel will enter the active abatement areas from an air lock established on the cleaned floor(s) above~~. Transport of workers will be through use of an exterior hoist. Abatement personnel will enter the remote personnel decon ~~and shall don two layers of PPE; without their respirators.~~ Personnel will exit the hoist and enter the clean area through an opening in the curtain wall. ~~Prior to entering the airlock at the entrance to the vertical shaft, abatement personnel shall don their respirators.~~

ATTACHED CJH 5/10/05

VIA ATTACHED DECONTAMINATION ENCLOSURES CJH 5/10/05

Access between floors within the active abatement area will be primarily through interior stairwells; which have not been cleaned. Work area egress shall be ~~as stated previously in the section entitled, "Sequencing of asbestos project work within shafts and stairwells"~~. CJH 5/10/05 CJH 5/10/05

~~With the exception of Specialty Trade personnel involved in abatement project support activities~~, non-certified worker access to non-asbestos project areas above the floors still subject to abatement and cleaning will be primarily by use of an exterior hoist(s) or stair tower(s) through established exterior access openings. Construction of tunnels within cleaned stairwell(s) may also be utilized for interior access.

If you have any questions please feel free to contact me on my cell phone at (917) 549-6197.

Sincerely,
Edward Gerdts, CIH, CSP
Vice President

cc: Amy Peterson - LMDC
Vincent Lander – QuES&T
Robert Lewin – WESTON

NYC DEP WTC Dust/Residue Roof & Façade Cleaning Procedures

05 04 23

Roof Clean-Up

Application: This procedure utilizes wet methods and careful hygiene protocol for cleaning roofs contaminated with asbestos containing material (ACM).

1. The entire roof shall be considered the work area for entry/access determinations. All abatement will be performed by NYSDOL licensed contractors with NYC DEP certified workers.

   For non-gravel or stone covered roofs with localized accumulations of visible debris, the clean-up areas shall be specified ("specified area") by DEP.

   For gravel/stone covered roof surfaces, the entire roof shall be included in the specified roof area for clean-up. The gravel/stone shall be taken to a clean-up staging area on the roof and washed. Water shall be collected, filtered, and discharged into the drain/sewer as applicable.

2. A changing area consisting of two adjacent step-off pads located on the roof immediately adjoining the roof entrance/exit. This area shall consist of a clean pad and a change pad. The clean pad shall be adjacent to the building interior access way (or at the point of entry to the roof for exterior access). The change pad shall be adjacent to the contaminated roof areas. Each pad (change pad and clean pad) shall consist of two layers of 10-mil reinforced plastic on the roof/access way surface and shall be large enough to facilitate changing and decontamination as described herein. A minimum of 4' x 4' is recommend, though the exact configuration will be specific to the roof.

3. Workers shall first step from the building interior (or exterior at the point of entry to the roof) directly onto the clean pad. On the clean pad, each worker shall be double suited with disposable coveralls, plastic booties, gloves, and head coverings. Rubber boots may be used instead of the plastic booties. The boots shall be wet wiped and HEPA vacuumed prior to leaving the roof. Each worker shall wear a minimum of a half-face air-purifying respirator equipped with HEPA cartridges.

4. All penetrations at the roof within 10 feet of the specified roof area included in the clean-up shall be cleaned by wet methods/HEPA vacuum and sealed with 6-mil polyethylene sheeting.

5. Roof cleanup shall begin at the entrance/exit and proceed in a path working away from the entrance/exit. Amended water shall be the primary engineering control to minimize the potential for fiber release.

6. Roof surfaces shall be wetted and then wet cleaned using wet wiping techniques with amended water, mops, rags, brushes, etc. HEPA vacuuming may also be used as alternative to or in combination with wet cleaning.

7. Throughout the procedure, all personnel entering or existing the roof shall observe the personal decontamination practices. Attention shall be paid to limiting unnecessary walking on or disturbance of material on the roof. These personal decontamination procedures shall be strictly adhered to, in order to minimize the potential for spreading contamination to the interior of the buildings.

8. Solid nonporous objects, such as metal patio furniture, plant potters, and plastic furniture cushions, shall be wet wiped with damp rags. Wooden objects such as decking shall be HEPA vacuumed, wet wiped, and lightly brushed with a bristle brush utilizing simultaneous misting and local HEPA exhaust. Woven materials shall either be disposed as ACM or bagged and removed off-site for

proper laundering in accordance with 29 CFR 1901. 1001. Potted plants with visual contamination should be disposed as ACM waste unless the owner requests decontamination. Potted plants will be repeatedly rinsed, and provisions shall be made to catch the runoff water (i.e. into ACM disposal bags or by using rags and HEPA wet-vacuums).

9. After completion of the above, the specified area roof shall be carefully washed.

10. Some common outdoor spaces (i.e. alleys, yards, setbacks) may be included in this clean-up. They have been included in the quantity estimates and shall be cleaned using the same procedures as the roof clean-up.

11. Air Monitoring shall be performed by NYSDOL licensed a Third Party Air Monitoring firm with certified workers. The Third Party Air monitoring firm shall perform a visual inspection to confirm the absence of ACM or debris after the areas are completely dry. Clearance air monitoring shall not be required if all samples collected during the work were found to be below 70 s/mm^2.

NYC DEP WTC Dust/Residue Roof & Façade Cleaning Procedures

05 0428

Building Facade Clean-up

Work shall be performed by a NYSDOL licensed asbestos contractor with NYCDEP and NYSDOL asbestos certified workers.

The contractor performing the cleaning should be experienced in cleaning building facades.

The clean up area shall be specified ("specified area") by DEP. The area below the façade cleaning shall be covered with a layer of polyethylene sheeting. All debris must be collected for disposal as ACM directly upon removal from the surface. (i.e. All waste must be double bagged in ACM waste labeled bags.) Running water or water runoff on the building façade is not permitted.

Building occupants shall be notified prior to the façade cleaning. Access to the street below the façade cleaning shall be restricted and marked with caution tape. Cleaning shall not be performed during wind speeds greater than 20 mph.

All HVAC systems and air conditioners shall be turned off. All windows shall be closed during the cleaning of the building. Some air conditioners and windows may require sealing with duct tape to prevent water penetration.

> In cases where equipment is rigged from the roof: All clean-up activities on the roof must be completed prior to rigging equipment from the roof.

All horizontal surfaces and all windows on the facade shall be cleaned of large bulk material by wetting and hand brushing or scraping with non-metallic bristle brushes or non-metallic scrapers, by wet wiping and/ or by HEPA vacuuming from top to bottom. Only amended water shall be used for wet wiping and low-pressure washing. Solvents, and any other chemical cleaning agents are prohibited. The removed material shall be immediately placed into containers (e.g. bags). Windows shall be wet wiped. Free running water shall not be evident during this procedure. Power for HEPA vacuums shall be supplied through ground fault interrupters.

After completion of debris removal, the specified area shall be carefully washed. A low pressure washing technique, moving from top to bottom, shall be employed to minimize water bounce-back. Facades shall be washed with a low-pressure wash not to exceed 250 psi.

At the completion of work, a visual inspection of the abated surfaces and sidewalk shall be performed to verify the absence of visible debris.

Air monitoring shall be performed by an independent NYSDOL licensed third party air monitoring firm with certified workers.

In order to minimize disruption to the public and to the building occupants, it is recommended this work be performed during off-hours.

ATTACHMENT 4

DELIVERABLES AND CONTRACT MILESTONES – SCAFFOLDING CONTRACT

Attachment 4

Deliverables and Contract Milestones – Scaffolding Contract

Advertisement	May 31, 2005
Document Pick-up	May 31, 2005
Pre-Bid Conference and Walk-Thru	June 8, 2005
Last Date Pre-Bid RFI's	June 15, 2005
Final addendum Issued	June 21, 2005
Bid Date	June 27, 2005
Interviews with Finalists	June 28 – 30, 2005
Notice of Award / Notice to Proceed	July 01, 2005
All Shop Drawings / Submittals (Complete)	July 29, 2005
Permits / Filings Complete	July 29, 2005
Mobilization / Commencement	August 1, 2005
Completion of Scaffold / Hoist / Bridging	October 30, 2005
Complete Dismantling Scaffold, Hoist(s), Bridging	December 29, 2006
Site Cleanup/ Demobilization	January 12, 2007