BROOKHAVEN NATIONAL LABORATORY

Value Engineering Study Report

BNL Center for Functional Nanomaterials

Office of Basic Energy Sciences
Office of Science
05-R-321

December 19, 2003

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managed by Brookhaven Science Associates
for the U.S. Department of Energy

BROOKHAVEN NATIONAL LABORATORY

Value Engineering Study Report

Project Name: **BNL Center for Functional Nanomaterials**

Project Location: **South of Brookhaven Ave. and East of Rochester Street and North of Bell Ave. and West of Groves Street**

Project Number: **Office of Basic Energy Sciences - Office of Science**

Job Number : **9899**

Date of Study: **December 19, 2003**

Team Members:

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Project Description:

This project will establish a Nanoscale Science Research Center (NSRC) at BNL. The scientific theme of the BNL Center for Functional Nanomaterials (CFN) is 'atomic tailoring of functional nanomaterials to achieve a specific response'. The CFN will be a user facility designed to provide a wide range of tools for the preparation and characterization of nanomaterials. The CFN will seek to integrate these unique capabilities with other BNL facilities, including the broad range of synchrotron characterization techniques available at the National Synchrotron Light Source (NSLS).

A facility is planned to include offices, laboratories, and scientific equipment. The structure will be located in proximity to the NSLS, the Materials Science Dept., the Instrumentation Division, and the Physics Dept, and a short distance from Chemistry. By focusing the efforts of organizations within BNL, the CFN will promote interdisciplinary work on nanomaterials synthesis and characterization, serving as a focal point for collaborations among BNL staff and the user community.

The mission of the Office of Basic Energy Sciences (BES) at DOE is to foster and support fundamental research in focused areas of the natural sciences in order to expand the scientific foundations for new and improved energy technologies and for understanding and mitigating the environmental impacts of energy use. The BNL Center for Functional Nanomaterials will complement the other NSRCs proposed as part of the DOE nationwide initiative in nanoscale research. The intent is to provide a nanoscience user facility serving universities and research institutions. Significant new opportunities for materials and chemical nanoscience research at BNL will be available to CFN users.

The design and scope of the CFN will fulfill DOE mission needs and incorporate input from potential users, gained through many channels including outreach efforts such as workshops. An essential component of the project is to establish an organizational infrastructure open to external users based on peer review. In this way a truly national nanomaterials effort can create breakthrough opportunities. The laboratory areas are organized into seven 'clusters' established to provide the necessary primary user service. Cluster functions cover a wide range of physical and chemical synthesis and characterization. They are designated Nanopatterning, Ultrafast Optical Sources, Electron Microscopy, Materials Synthesis, Proximal Probes, Theory and Computing, and CFN Endstations at NSLS. The CFN will allow users to control processes, tailoring the properties of materials structured on the nanoscale. Some of these materials, all relevant to the BES mission, include piezoelectrics, ferroelectrics, organic films and conductors, magnetic nanocomposites, and catalysts.

This effort will begin with preliminary engineering (Title I) and detailed engineering design (Title II) necessary to construct a BNL Center for Functional Nanomaterials. The engineering effort includes all engineering phase activities, including field investigation, preliminary design, specifications and drawings for conventional construction, final design, preparation of procurement documents for experimental equipment, and construction/equipment procurement estimates.

The completed design will enable construction of a new two-story Laboratory/Office. The facility will include clean rooms, general laboratories, wet and dry laboratories for sample preparation, fabrication, and analysis. Included will be some of the equipment necessary to explore, manipulate and fabricate nanoscale materials and structures. Also included are individual offices and landscape office areas, seminar area, transient user space for visiting collaborators with access to computer terminals, conference areas on both floors, and vending/lounge areas. In addition it will include circulation/ancillary space, including mechanical equipment area, toilet rooms, corridors, and other support spaces.

The new Laboratory/Office building will consist of a structural steel frame with bays of metal decks with concrete fill, all supported on reinforced concrete footings and foundations. The ground floor will contain vibration isolated concrete slabs for clean room and optics laboratories and a partial concrete slab on grade. The curved roofs will be exposed standing-seam metal. Flat roofs will utilize an insulated built-up membrane. Exterior wall treatment will be insulated metal panels and operable double-glazed aluminum windows complimenting the exterior of the existing adjacent NSLS. Utilities will include steam and condensate; electrical power; communication; fiber-optic data-link; fire protection and detection; sanitary system; potable water; and storm water drainage.

Technical procurement for the project will include laboratory equipment for the CFN laboratory clusters Nanopatterning, Ultrafast Optical Sources, Electron Microscopy, Materials Synthesis, Proximal Probes, and Theory and Computing as well as for the cluster designated CFN Endstations at the NSLS.

The building will incorporate human factors into its design to encourage peer interactions and collaborative interchange by BNL staff and CFN users and visitors. In addition to flexible office and laboratory space it will provide “interaction areas”, a seminar room and a lunch room for informal discussions. This design approach is considered state-of-the-art in research facility design as it leverages opportunities for the free and open exchange of ideas essential to creative research processes.

Executive Summary:

Value Engineering is a management tool used to ensure realistic budgets, identify and remove nonessential capital and operating costs, and improve and maintain optimum quality of program and acquisition functions. The Value Engineering team was selected to conduct a complete review of all project functional requirements. This review was based on 75% complete Title I Preliminary Design Drawings consisting of eighteen drawings and a Basis of Design Narrative document prepared by consulting architects HDR Henningson, Durham & Richardson Architecture and Engineering, P.C. in association with HDR Architecture, Inc. A second VE Study will be performed during the Title II design. Ove Dyling, the CFN Conventional Construction Design Manager was the VE-team leader and presented the project scope to the other team members. The VE Team did an exhaustive review of the project as designed. The VE Team reviewed the civil, architectural, mechanical and electrical systems of the building. The VE Team looked at reducing project costs, constructability issues, and functionality issues. The Value Engineering Study Report includes 43 brainstorming or speculation ideas all of which were reviewed and responded to by HDR, see appendix. As a result of the HDR responses and further discussions 12 value engineering proposals were further evaluated and have been recommended to HDR for inclusion in the final construction documentation.

Cost Distribution:

Project Cost Estimate at year $		
WBS 1.3.1	Improvements to Land	$ 1,876,000
WBS 1.3.2.1	Building - Architectural	$11,048,000
WBS 1.3.2.2	Building - Mechanical	$ 4,057,000
WBS 1.3.2.6	Building - Plumbing	$ 955,000
WBS 1.3.2.7	Building - Fire Protection	$ 223,000
WBS 1.3.2.8	Building - Electrical	$ 2,578,000
Total Estimated Construction Cost;*		$20,737,000

* (EDIA, ORE, Staff relocation, Demolition and contingency not included)

Value Engineering Proposal:
at year $

Proposal No. **9899-3**

Description: Ground fault monitoring

Function of Item: Ground fault monitoring

Criteria Challenge: No *Criteria No:* N/A

Original Design: Original design did not call for ground detection monitoring

Proposed Change: Install ground fault detection

Advantages: Monitors any stray ground currents that can be created by improper equipment installation

Disadvantages: Cost

Savings Summary:

	Total labor/material	Mark up	First Cost
Original design:	$ 0	$ N/A	$ 0
Proposed Change:	$ 57,750	$ N/A	$ 57,750
Savings:			($ 57,750)

Proposal No. **9899-8**

Description: Capability for Roll-up of Stand-by Generator

Function of Item: Provide provision to have stand-by power

Criteria Challenge: No *Criteria No:* N/A

Original Design: The original design does not have emergency or stand-by power provisions

Proposed Change: Provide external connection and interior power distribution for critical loads that would benefit from stand-by power.

Advantages: Allows for a diesel-generator to be connected to building and feed loads during a power outage that can not wait days for power to be restored.

Disadvantages: Cost

Savings Summary:

	Total labor/material	Mark up	First Cost
Original design:	$ 0	$ N/A	$ 0
Proposed Change:	$ 21,736	$ N/A	$ 21,736
Addition:			($ 21,736)

Proposal No. **9899-10**

Description: Provide double-bus 15 kV switch to feed building

Function of Item: Provide redundancy

Criteria Challenge: No *Criteria No:* N/A

Original Design: The original design calls for a simple loop switch for a single feeder to feed the facility.

Proposed Change: The proposed change calls for a double bus switch that would allow for a second feeder to be looped through switch.

Advantages: Provides the ability to add a second 15 kV feeder to the facility. With the second feeder, down time to the building can be kept to a minimum when maintenance is required on the feeder and associated equipment. Also, if one feeder is lost, transferring the load to the alternate feeder will be accomplished in minutes versus a day or two.

Disadvantages: Cost

Savings Summary:

	Total labor/material	Mark up	First Cost
Original design:	$ 30,000	$ N/A	$ 30,000
Proposed Change:	$ 41,000	$ N/A	$ 41,000
Addition:			($ 11,000)

Proposal No. **9899-12**

Description: Storm water routed to north side of building

Function of Item: Provide storm water runoff from project site

Criteria Challenge: No *Criteria No:* N/A

Original Design: The original design provides for a southerly routing of storm water piping.

Proposed Change: Redesign storm water routing to northern part of site

Advantages: Reduce cost and maintenance of buried runs of storm piping and eliminate manholes and drains located in grass areas.

Disadvantages: None.

Savings Summary:

	Total labor/material	Mark up	First Cost
Original design:	$ 100,777	$ N/A	$ 100,777
Proposed Change:	$ 70,919	$ N/A	$ 70,919
Savings:			$ 29,858

Proposal No. **9899-16**

Description: Take steam from existing manhole.

Function of Item: Provide steam to building

Criteria Challenge: No *Criteria No:* N/A

Original Design: The original design calls for tie in to existing steam line in middle of run, requiring a new manhole for tie in.

Proposed Change: Tie in to existing steam line in existing manhole eliminating construction of new manhole.

Advantages: Eliminating potential dangerous condition of tying into existing line in middle of run and saving initial construction cost of new manhole.

Disadvantages: Availability of convenient tie in point and increasing piping run

Savings Summary:

	Total labor/material	Mark up	First Cost
Original design:	$ 185,980	$ N/A	$ 185,980
Proposed Change:	$ 215,650	$ N/A	$ 215,650
Savings:			($ 29,670)

Proposal No. **9899-17**

Description: Put valves in manhole 24 to improve reliability

Function of Item: Increase reliability

Criteria Challenge: No *Criteria No:* N/A

Original Design: The original design provides for no additional steam valves.

Proposed Change: Provide steam valves to increase reliability of future outages

Advantages: Increase reliability of steam supply to building by re-routing steam with new valves.

Disadvantages: Cost.

Savings Summary:

	Total labor/material	Mark up	First Cost
Original design:	$ 185,980	$ N/A	$ 185,980
Proposed Change:	$ 201,445	$ N/A	$ 201,445
Addition:			($ 15,465)

Proposal No. **9899-24**

Description: Do not remove sanitary line.

Function of Item: Existing sanitary underground sanitary line

Criteria Challenge: No *Criteria No:* N/A

Original Design: The original design calls for removal of existing buried sanitary line

Proposed Change: Do not remove existing buried underground sanitary pipe.

Advantages: Existing buried sanitary line is relatively new and does not interfere with building footprint and potentially could be used in the future

Disadvantages: Could get damaged during construction and not be useful in future

Savings Summary:

	Total labor/material	Mark up	First Cost
Original design:	$ 41,087	$ N/A	$ 41,087
Proposed Change:	$ 35,439	$ N/A	$ 35,439
Savings:			$ 5,648

Proposal No. **9899-25**

Description: Provide exterior access to Building service area

Function of Item: Provide access to building service area

Criteria Challenge: No *Criteria No:* N/A

Original Design: The original design calls for no exterior access to service area.

Proposed Change: Provide exterior access to service area and reduce interior access corridor to service area.

Advantages: Increases amount of useful interior space.

Disadvantages: Reduces access to service area from inside building.

Savings Summary:

	Total labor/material	Mark up	First Cost
Original design:	$ 0	$ N/A	$ 0
Proposed Change:	$ 65,511	$ N/A	$ 65,511
Savings:			$ 65,511

Proposal No. **9899-26**

Description: Pave exterior access to Building service area.

Function of Item: Provide smooth paved access to service area

Criteria Challenge: No *Criteria No:* N/A

Original Design: The original design calls no paving of exterior area outside service area

Proposed Change: Pave area near service area.

Advantages: Provide smooth clean access to service area

Disadvantages: Cost`

Savings Summary:

	Total labor/material	Mark up	First Cost
Original design:	$ 0	$ N/A	$ 0
Proposed Change:	$ 3,430	$ N/A	$ 3,430
Addition:			($ 3,430)

Proposal No. **9899-33**

Description: Create a graphics and signage system

Function of Item: Provide graphics and signage system

Criteria Challenge: No *Criteria No:* N/A

Original Design: The original design provides for no signage/directory graphic design.

Proposed Change: Provide new signage/directory graphic design that are user friendly and easily updated if personnel and or room changes occur

Advantages: Increase flexibility and reduces life cycle cost by eliminating BNL standard brass signage by BNL shops, using signage/directory that can be revised using local printers.

Disadvantages: Deviates from BNL standards.

Savings Summary:

	Total labor/material	Mark up	First Cost
Original design:	$ 0	$ N/A	$ 0
Proposed Change:	$ 8,079	$ N/A	$ 8,079
Savings:			($ 8,079)

Proposal No. **9899-39**

Description: Consider elimination humidification in office areas

Function of Item: Provides humidification to office area

Criteria Challenge: No *Criteria No:* N/A

Original Design: The original design provides for humidification of Office areas

Proposed Change: Removing humidification from office areas

Advantages: Reducing construction and operation cost.

Disadvantages: May introduce unwanted humidity into the very stringent atmospheric controlled laboratories thereby reducing the instrumentation capability required for this state-of-the-art facility.

Savings Summary:

	Total labor/material	Mark up	First Cost
Original design:	$ 13,493	$ N/A	$ 13,493
Proposed Change:	$ 0	$ N/A	$ 0
Savings:			$ 13,493

Proposal No. **9899-40**

Description: Consider units less expensive than Miller-Picking

Function of Item: Provide HVAC units

Criteria Challenge: No *Criteria No:* N/A

Original Design: The original design calls for Miller-Picking units

Proposed Change: Provide less expensive HVAC units.

Advantages: Reduce cost

Disadvantages: Reducing quality HVAC unit required for this state-of-the-art facility

Savings Summary:

	Total labor/material	Mark up	First Cost
Original design:	$ 30,311	$ N/A	$ 30,311
Proposed Change:	$ 0	$ N/A	$ 0
Savings:			$ 30,311

Summary of Implementation & VE Study Costs.

Proposal	Recommendations	Redesign Cost
9899-3	Ground fault monitoring	$ 0
9899-8	Capability for Roll-up of Stand-by Generator	$ 10,000
9899-10	Provide double-bus 15 kV switch to feed building	$ 5,000
9899-12	Storm water routed to north side of building	$ 5,000
9899-16	Take steam from existing manhole	$ 5,000
9899-17	Put valves in manhole 24 to improve reliability	$ 5,000
9899-24	Do not remove sanitary line	$ 0
9899-25	Provide exterior access to Building service area	$ 5,000
9899-26	Pave exterior access to Building service area	$ 0
9899-33	Create a graphics and signage system	$ 0
9899-39	Consider elimination humidification in office areas	$ 0
9899-40	Consider units less expensive than Miller-Picking	$ 0

VE Study Cost:

Team Study Cost:	$8,000
Total Redesign Cost:	$35,000
Total VE Cost:	$43,000

Total VE Savings: $(5,845)

Return on Investment:

ROI = Total VE Savings = $(5,845) **(0.14)***

Total VE Cost $43,000

***** dollars of net spending per dollar invested

Appendix:

Brainstorming or speculation:

No.	Idea.
1.	Consider EMI shielding individual rooms verses entire East Wall
2.	Why do we need isolation transformer for non sensitive loads?
3.	Ground indication monitoring. Is this that critical?
4.	Why are we using "ventilation system emergency shutdown system" in the Clean Room
5.	Access to East side parking. Seems expensive approach for additional parking. Consider adding additional parking on West side or relocate path to additional parking.
6.	Revolving door, security issues of securing door at night? Who does it. Think vestibule should be considered.
7.	Remove walkway arches.
8.	Have a connection for emergency power to allow a generator to be rolled up if a generator is not installed now. Or tap into a second 13.8kV feeder now with the understanding it will only be used in emergency
9.	Has anyone responded to the VitaTech report? For Site #2, he recommends breaking the 13.8 kV loop, that is, re-routing the 13.8 kV feeders. The resulting magnetic field (B) from the loop is 0.12 mG to 0.04 mG in the z direction. Is this a problem?
10.	Have provisions for alternate electrical feeder. Provide double bus switch. This would provide redundancy which may be appropriate for this type of building.
11.	Why is parking in front near Brookhaven Avenue?
12.	Storm water should be routed around the north side of the building. The five drain inlets and manholes shown on the south side are probably not needed. Drains are not necessary in grass areas and the truck entrance can be pitched to run off into the detention pond. The inlets in the grass on the north and west sides are probably not needed, also.
13.	The existing grades (contours) need to be shown. A rough review indicates that the grade is being raised substantially to achieve a Floor Elevation 77. Note that existing grades will be 6-12 inches lower when topsoil, asphalt, and sidewalks have been removed.
14.	Inverts or centerlines of utilities are needed to verify that no interferences exist.

15. There's no need to run utilities together as shown. It is actually more difficult due to differing requirements (ie, 5 ft deep for water, 6 ft cover over chilled water, and pitch for steam).

16. The steam supply should be taken from an existing manhole. Constructing a new manhole in the middle of a run is costly, difficult, and potentially dangerous. Manhole 24 on Rochester St. or Manhole 50 on Brookhaven Ave would be likely sources. Manhole 50 is the closest location but would only be practical if steam entered the north side of the building. If utilities must enter through the rear of the building, Manhole 24 is the likely source of steam supply.

17. Manhole 24 is a pass through manhole with no valves. Valves (along with drips and traps) should be added for isolation. This will greatly reduce impacts of system outages in the future.

18. If the steam supply must avoid the future addition, a new steam manhole will be needed in the middle of the run on the south side of the addition. Manholes are relatively large structures and will require clearance from the addition. This will also mean that chilled water and potable water will have to move south.

19. If the future addition could be moved north (to beyond Manhole 24), there is a possibility that the steam could be run to the building without a new manhole.

20. What size are the chilled water lines? There are no connections where shown on the drawing. Wet taps would allow the system to remain in service.

21. If the building requires compressed air, it should be taken from the site distribution system.

22. The sanitary pipe out of the building is shown on the northeast side. The bathrooms are in the northwest and southeast corners. It may be easier to run two pipes out near the bathrooms which would also reduce the amount of inaccessible pipe under the slab.

23. Are there other plumbing needs for laboratories, janitor closets, or kitchen facilities? If so, it would be best to minimize piping under the floor.

24. The existing sanitary line is a new line and does not interfere with the building location. Does it have to be relocated at this time?

25. The Main Electrical Room and the Building Services Room should have double door access to the exterior. Interior access is not as important but a single door may be desirable to provide a second means of egress. The access to the Electric Room could be through the Building Services Room. This could eliminate the need for the corridor next to the machine Shop (~ 300 SF).

26. The access to the service rooms should be paved to facilitate deliveries. Extending the refuse area could achieve this.

27. The Building Services Room probably needs a pit for some utility entrances:

28. Steam on Rochester St. is at roughly El. 75. It will need to pitch down to the CFN. At the building entrance, a drip leg and trap will be required.

29. Chilled water and compressed air entrances to the building will be easier if they penetrate through wall sleeves rather than burying joints under a slab.

30. A condensate return unit may need to be below floor level, depending on heating methods.

31. If a pit is constructed, it may be prudent to isolate it from the building slab and columns. This would mitigate potential vibrations were a water hammer to occur.

32. In lieu of the larger detention ponds, create “Rain Gardens” to intercept the oils, metals. Salts of the parking area runoffs. Plant with water tolerant vegetation that will filter these contaminants out of the storm water prior to entering the storm water system.

33. Create a graphics and signage program that will allow numbers inserts instead of the more costly brass signs used at BNL. Room occupant name changes will be less costly and could be done on any photocopier.

34. Use the newly developed photo-voltaic roofing system that we are developing for the roof replacement, bldg. 912. The system could easily produce 100kW of energy for bldg. power & lighting that would not have to be purchase from NYPA/LIPA.

35. Evaluate parking space requirements. Presently east parking lot has 33 spaces and it is full. Subtracting a total of 49 from the existing 33 leaves only a total of new parking spaces of 16. Add to west parking spaces of 68 for a total of 84. If the intention is to provide parking spaces of 68 plus 40 for a total of 117 additional spaces needs to be provided.

36. Eliminate landscape aisle in parking lot to allow ease of snow removal.

37. Evaluate tree planting, but make sure the LEED credits are maintained.

38. Verify design conditions to reflect ASHRAE Standards that will decrease the unit size. Smaller fan, motors, etc. ASHRAE Standards are for Central Islip @0.4% 88/73 and @ 1.0% 85/72. If not all systems. Consider office systems.

39. Eliminate humidification in office areas. Save first cost and subsequent operating costs. AHU-3 & 4.

40. Consider HVAC units that are not as expensive as Miller-Picking units.

41. HVAC section states: “Insulation of piping system will exceed applicable energy codes”. By how much and is this cost effective?

42. Consider eliminate stainless steel in office units.

43. Eliminate heat recovery units and use runaround loop between Lab Exhaust & Lab Supply units.

Potential Idea Evaluation:

No.	Idea.	Rough Estimate (Implementation costs)
3.	Why Ground fault monitoring	$(60,000)
8.	Rolled up emergency generator connection	$(20,000)
10.	Provisions for electrical redundancy	$(11,000)
12.	Storm water routed to north side of building.	$30,000
16.	Take steam from existing manhole	$(30,000)
17.	Put valves in manhole 24 to improve reliability	$(15,000)
24.	Do not remove existing sanitary line.	$ 5,000
25.	Provide access from exterior to Building service area	$65,000
26.	Pave exterior access to Building service area	$(4,000)
33.	Create a graphics and signage system	$(8,000)
39.	Consider eliminating humidification in office areas	$10,000
40.	Consider units less expensive than Miller-Picking	$30,000

BROOKHAVEN NATIONAL LABORATORY
ENGINEERING & CONSTRUCTION SERVICES
ELECTRICAL COST ESTIMATE

PROJECT TITLE: **CENTER FOR FUNCTIONAL NANOMATERIALS**
WORK ORDER NUMBER:
PROJECT/ACTIVITY NUMBER: **71013**

BUILDING: **735** JOB NUMBER: **9899** BY: **T. NEHRING** DATE: **12/17/03**

DESCRIPTION	MEANS SOURCE DIV.	SEC.	LINE	ADJ.	QTY	UNIT	INCL OH&P TOTAL	MATERIAL UNIT COST	MATERIAL TOTAL	LABOR UNIT COST	LABOR TOTAL	EQUIPMENT UNIT COST	EQUIPMENT TOTAL	TOTAL
DIV 16-Elect - Item 3														
Ground fault monitoring				1	35	EA	52,500							**$52,500**
SUB-TOTAL DIRECT COSTS							52,500							
GENERAL CONDITIONS 10%							5,250							
SUB-TOTAL							57,750							
OVERHEAD & PROFIT								10%		48.70%		10%		
SUB-TOTAL														
CITY COST INDEX								3.00%		50.50%				
ESTIMATED SUB-CONTRACTORS TOTAL COSTS:							57,750							57,750
BNL ECONOMIC CONDITIONS COST MODIFIER:														
ADJUSTED SUB-CONTRACTORS ESTIMATED TOTAL COSTS:														**$57,750**

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DIV 16-Elect - Item 8														
WIRING METHODS	**16100**													
TERM.LUG 600V, 1/0-2/0	16120	230	0200	1	16	EA		2.22	36	19.7	315			**$351**
No. 2/0 AWG WIRE	16120	900	3180	1	3	CLF		98	294	109	327			**$621**
CONDUIT AND TUBING														
TO 15 FEET ELEV														
RGS CDT-1/2"	16132	205	1750	1		LF		1.71		3.5				
RGS CDT-3/4"	16132	205	1770	1	200	LF		1.99	398	3.94	788			**$1,186**
RGS CDT-1"	16132	205	1800	1	200	LF		2.8	560	4.85	970			**$1,530**
SH. MTL, PB NEMA 3R SC														
16"x16"x6"	16136	700	2350	1	1	EA		77	77	70	70			**$147**
TRANSFORMERS DRY	16270													
480-208/120,DT,75KVA	16270	200	3700	1	1	EA		2300	2,300	900	900			**$3,200**
xfer sw	16150	100	0250	1	1	EA		2550	2,550	315	315			**$2,865**
PANELS 120/208V MCB														
225 AMP, 42 CIRCUIT	16440	720	2250	1	1	EA		1725	1,725	1125	1,125			**$2,850**
SUB-TOTAL DIRECT COSTS									7,940		4,810			
GENERAL CONDITIONS 10%									794		481			
SUB-TOTAL									8,733		5,291			
OVERHEAD & PROFIT								10%	873	48.70%	2,577	10%		
SUB-TOTAL									9,607		7,868			
CITY COST INDEX								3.00%	288	50.50%	3,973			
ESTIMATED SUB-CONTRACTORS TOTAL COSTS:									9,895		11,841			21,736
BNL ECONOMIC CONDITIONS COST MODIFIER:														
ADJUSTED SUB-CONTRACTORS ESTIMATED TOTAL COSTS:														**$21,736**

BROOKHAVEN NATIONAL LABORATORY
ENGINEERING & CONSTRUCTION SERVICES
ELECTRICAL COST ESTIMATE

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DESCRIPTION	MEANS SOURCE DIV.	SEC.	LINE	ADJ.	QTY	UNIT	INCL OH&P TOTAL	MATERIAL UNIT COST	MATERIAL TOTAL	LABOR UNIT COST	LABOR TOTAL	EQUIPMENT UNIT COST	EQUIPMENT TOTAL	TOTAL
DIV 16-Electrical - item 10														
Original proposed switch							-30,000							
VE proposed Switch							40,000							
SUB-TOTAL DIRECT COSTS							10,000							
GENERAL CONDITIONS 10%							1,000							
SUB-TOTAL							11,000							
OVERHEAD & PROFIT								10%		48.70%		10%		
SUB-TOTAL														
CITY COST INDEX								3.00%		50.50%				
ESTIMATED SUB-CONTRACTORS TOTAL COSTS:							11,000							11,000
BNL ECONOMIC CONDITIONS COST MODIFIER:														
ADJUSTED SUB-CONTRACTORS ESTIMATED TOTAL COSTS:														**$11,000**

BROOKHAVEN NATIONAL LABORATORY
ENGINEERING & CONSTRUCTION SERVICES

CIVIL COST ESTIMATE

PROJECT TITLE: **CENTER FOR FUNCTIONAL NANOMATERIALS**
WORK ORDER NUMBER:
PROJECT/ACTIVITY NUMBER: **71013**

BUILDING: **735** JOB NUMBER: **9899** BY: **A. RAPHAEL** DATE: **12/17/03**

DESCRIPTION	MEANS SOURCE DIV.	SEC.	LINE	ADJ.	QTY	UNIT	INCL OH&P TOTAL	MATERIAL UNIT COST	MATERIAL TOTAL	LABOR UNIT COST	LABOR TOTAL	EQUIPMENT UNIT COST	EQUIPMENT TOTAL	TOTAL
DIV. 2- Site Work, Item 12														
Drain Inlet				1	3	EA		$425	$1,275					$1,275
SD Manhole				1	2	EA		$2,500	$5,000					$5,000
Drainage Piping				1	700	LF		$34	$23,583					$23,583
SUB-TOTAL DIRECT COSTS														
GENERAL CONDITIONS 10%														
SUB-TOTAL														
OVERHEAD & PROFIT								10%		55.50%		10%		
SUB-TOTAL														
CITY COST INDEX								2.80%		48.50%				
ESTIMATED SUB-CONTRACTORS TOTAL COSTS:														
BNL ECONOMIC CONDITIONS COST MODIFIER:														
ADJUSTED SUB-CONTRACTORS ESTIMATED TOTAL COSTS:														**$29,858**

BROOKHAVEN NATIONAL LABORATORY
ENGINEERING & CONSTRUCTION SERVICES

CIVIL COST ESTIMATE

PROJECT TITLE: **CENTER FOR FUNCTIONAL NANOMATERIALS**
WORK ORDER NUMBER:
PROJECT/ACTIVITY NUMBER: **71013**

BUILDING: **735** JOB NUMBER: **9899** BY: **A. RAPHAEL/OD** DATE: **12/17/03**

DESCRIPTION	MEANS SOURCE DIV.	SEC.	LINE	ADJ.	QTY	UNIT	INCL OH&P TOTAL	MATERIAL UNIT COST	MATERIAL TOTAL	LABOR UNIT COST	LABOR TOTAL	EQUIPMENT UNIT COST	EQUIPMENT TOTAL	TOTAL
DIV. 2- Site Work, Item 16														
Addition of Steam Pipe				1	150	EA		$99	$14,828					$14,828
Addition of Condensate Pipe				1	150	EA		$99	$14,843					$14,843
SUB-TOTAL DIRECT COSTS														
GENERAL CONDITIONS 10%														
SUB-TOTAL														
OVERHEAD & PROFIT								10%		55.50%		10%		
SUB-TOTAL														
CITY COST INDEX								2.80%		48.50%				
ESTIMATED SUB-CONTRACTORS TOTAL COSTS:														
BNL ECONOMIC CONDITIONS COST MODIFIER:														
ADJUSTED SUB-CONTRACTORS ESTIMATED TOTAL COSTS:														**$29,670**

BROOKHAVEN NATIONAL LABORATORY
ENGINEERING & CONSTRUCTION SERVICES
CIVIL COST ESTIMATE

PROJECT TITLE: **CENTER FOR FUNCTIONAL NANOMATERIALS**
WORK ORDER NUMBER:
PROJECT/ACTIVITY NUMBER: **71013**

BUILDING: **735** JOB NUMBER: **9899** BY: **A. RAPHAEL** DATE: **12/17/03**

DESCRIPTION	MEANS SOURCE DIV.	SEC.	LINE	ADJ.	QTY	UNIT	INCL OH&P TOTAL	MATERIAL UNIT COST	TOTAL	LABOR UNIT COST	TOTAL	EQUIPMENT UNIT COST	TOTAL	TOTAL
DIV. 2- Site Work, Item 17														
Add valves in Steam Manhole				1	1	EA								
15% of Steam Piping/Insul				1	1	15%	15,465							$15,465
SUB-TOTAL DIRECT COSTS														
GENERAL CONDITIONS 10%														
SUB-TOTAL														
OVERHEAD & PROFIT								10%		55.50%		10%		
SUB-TOTAL														
CITY COST INDEX								2.80%		48.50%				
ESTIMATED SUB-CONTRACTORS TOTAL COSTS:														
BNL ECONOMIC CONDITIONS COST MODIFIER:														
ADJUSTED SUB-CONTRACTORS ESTIMATED TOTAL COSTS:														**$15,465**

BROOKHAVEN NATIONAL LABORATORY
ENGINEERING & CONSTRUCTION SERVICES

CIVIL COST ESTIMATE

PROJECT TITLE: **CENTER FOR FUNCTIONAL NANOMATERIALS**
WORK ORDER NUMBER:
PROJECT/ACTIVITY NUMBER: **71013**

BUILDING: **735** JOB NUMBER: **9899** BY: **A. RAPHAEL/OD** DATE: **12/17/03**

DESCRIPTION	MEANS SOURCE DIV.	SEC.	LINE	ADJ.	QTY	UNIT	INCL OH&P TOTAL	MATERIAL UNIT COST	MATERIAL TOTAL	LABOR UNIT COST	LABOR TOTAL	EQUIPMENT UNIT COST	EQUIPMENT TOTAL	TOTAL
DIV. 2- Site Work, Item 24														
Retain existing Sanitary Line				1	360	LF		$15.69	$5,648					$5,648
SUB-TOTAL DIRECT COSTS														
GENERAL CONDITIONS 10%														
SUB-TOTAL														
OVERHEAD & PROFIT								10%		55.50%		10%		
SUB-TOTAL														
CITY COST INDEX								2.80%		48.50%				
ESTIMATED SUB-CONTRACTORS TOTAL COSTS:														
BNL ECONOMIC CONDITIONS COST MODIFIER:														
ADJUSTED SUB-CONTRACTORS ESTIMATED TOTAL COSTS:														**$5,648**

BROOKHAVEN NATIONAL LABORATORY
ENGINEERING & CONSTRUCTION SERVICES

CIVIL COST ESTIMATE

PROJECT TITLE: **CENTER FOR FUNCTIONAL NANOMATERIALS**
WORK ORDER NUMBER:
PROJECT/ACTIVITY NUMBER: **71013**

BUILDING: **735** JOB NUMBER: **9899** BY: **A. RAPHAEL/OD** DATE: **12/17/03**

DESCRIPTION	MEANS SOURCE DIV.	SEC.	LINE	ADJ.	QTY	UNIT	INCL OH&P TOTAL	MATERIAL UNIT COST	MATERIAL TOTAL	LABOR UNIT COST	LABOR TOTAL	EQUIPMENT UNIT COST	EQUIPMENT TOTAL	TOTAL
DIV. 2- Site Work, Item 25														
Exterior Access to Utility Rooms				1	300	sf		$218						$65,511
SUB-TOTAL DIRECT COSTS														
GENERAL CONDITIONS 10%														
SUB-TOTAL														
OVERHEAD & PROFIT								10%		55.50%		10%		
SUB-TOTAL														
CITY COST INDEX								2.80%		48.50%				
ESTIMATED SUB-CONTRACTORS TOTAL COSTS:														
BNL ECONOMIC CONDITIONS COST MODIFIER:														
ADJUSTED SUB-CONTRACTORS ESTIMATED TOTAL COSTS:														**$65,511**

BROOKHAVEN NATIONAL LABORATORY
ENGINEERING & CONSTRUCTION SERVICES
CIVIL COST ESTIMATE

PROJECT TITLE: **CENTER FOR FUNCTIONAL NANOMATERIALS**
WORK ORDER NUMBER:
PROJECT/ACTIVITY NUMBER: **71013**

BUILDING: **735** JOB NUMBER: **9899** BY: **A. RAPHAEL/OD** DATE: **12/17/03**

DESCRIPTION	MEANS SOURCE DIV.	SEC.	LINE	ADJ.	QTY	UNIT	INCL OH&P TOTAL	MATERIAL UNIT COST	MATERIAL TOTAL	LABOR UNIT COST	LABOR TOTAL	EQUIPMENT UNIT COST	EQUIPMENT TOTAL	TOTAL
DIV. 2- Site Work, Item 26														
Pave to Service Rooms				1	1,400	SF		$2.45	$3,430					$3,430
SUB-TOTAL DIRECT COSTS														
GENERAL CONDITIONS 10%														
SUB-TOTAL														
OVERHEAD & PROFIT								10%		55.50%		10%		
SUB-TOTAL														
CITY COST INDEX								2.80%		48.50%				
ESTIMATED SUB-CONTRACTORS TOTAL COSTS:														
BNL ECONOMIC CONDITIONS COST MODIFIER:														
ADJUSTED SUB-CONTRACTORS ESTIMATED TOTAL COSTS:														**$3,430**

BROOKHAVEN NATIONAL LABORATORY
ENGINEERING & CONSTRUCTION SERVICES
ARCHITECTURAL COST ESTIMATE

PROJECT TITLE: **CENTER FOR FUNCTIONAL NANOMATERIALS**
WORK ORDER NUMBER:
PROJECT/ACTIVITY NUMBER: **71013**

BUILDING: **735** JOB NUMBER: **9899** BY: **R. AIKMAN** DATE: **12/17/03**

DESCRIPTION	MEANS SOURCE DIV.	SEC.	LINE	ADJ.	QTY	UNIT	INCL OH&P TOTAL	MATERIAL UNIT COST	MATERIAL TOTAL	LABOR UNIT COST	LABOR TOTAL	EQUIPMENT UNIT COST	EQUIPMENT TOTAL	TOTAL
DIV 12-Furniture - Item 33														
Signage				1	110	EA		25	2,750	15	1,650	4.43	487	**$4,887**
SUB-TOTAL DIRECT COSTS									2,750		1,650		487	
GENERAL CONDITIONS 10%									275		165		49	
SUB-TOTAL									3,025		1,815		536	
OVERHEAD & PROFIT								10%	303	48.70%	884	10%	54	
SUB-TOTAL									3,328		2,699		590	
CITY COST INDEX								3.00%	100	50.50%	1,363			
ESTIMATED SUB-CONTRACTORS TOTAL COSTS:									3,427		4,062		590	8,079
BNL ECONOMIC CONDITIONS COST MODIFIER:														
ADJUSTED SUB-CONTRACTORS ESTIMATED TOTAL COSTS:														**$8,079**

BROOKHAVEN NATIONAL LABORATORY
ENGINEERING & CONSTRUCTION SERVICES

MECHANICAL COST ESTIMATE

PROJECT TITLE: **CENTER FOR FUNCTIONAL NANOMATERIALS** WORK ORDER NUMBER: PROJECT/ACTIVITY NUMBER: **71013**

BUILDING: **735** JOB NUMBER: **9899** BY: **P. BLACHER** DATE: **12/17/03**

DESCRIPTION	MEANS SOURCE DIV.	SEC.	LINE	ADJ.	QTY	UNIT	INCL OH&P TOTAL	MATERIAL UNIT COST	MATERIAL TOTAL	LABOR UNIT COST	LABOR TOTAL	EQUIPMENT UNIT COST	EQUIPMENT TOTAL	TOTAL
DIV. 15 - MECHANICAL, ITEM 39														
Steam Humidifiers	1575	050	0104	1	2	EA		$3,075	$6,150	$213	$426			$6,576
Misc piping and fittings				1	2	LS		$1,000	$2,000	$500	$1,000			$3,000
SUB-TOTAL DIRECT COSTS									8,150		1,426			
GENERAL CONDITIONS 10%									815		143			
SUB-TOTAL									8,965		1,569			
OVERHEAD & PROFIT								10%	897	53.40%	838	10%		
SUB-TOTAL									9,862		2,406			
CITY COST INDEX								0.20%	20	50.10%	1,206			
ESTIMATED SUB-CONTRACTORS TOTAL COSTS:									9,881		3,612			13,493
BNL ECONOMIC CONDITIONS COST MODIFIER:														
ADJUSTED SUB-CONTRACTORS ESTIMATED TOTAL COSTS:														**$13,493**

BROOKHAVEN NATIONAL LABORATORY
ENGINEERING & CONSTRUCTION SERVICES
MECHANICAL COST ESTIMATE

PROJECT TITLE: **CENTER FOR FUNCTIONAL NANOMATERIALS**
WORK ORDER NUMBER:
PROJECT/ACTIVITY NUMBER: **71013**

BUILDING: **735** JOB NUMBER: **9899** BY: **P. BLACHER** DATE: **12/17/03**

DESCRIPTION	MEANS SOURCE DIV.	SEC.	LINE	ADJ.	QTY	UNIT	INCL OH&P TOTAL	MATERIAL UNIT COST	MATERIAL TOTAL	LABOR UNIT COST	LABOR TOTAL	EQUIPMENT UNIT COST	EQUIPMENT TOTAL	TOTAL
DIV. 15 - MECHANICAL, ITEM 40														
Replace 5 Miller-Picking units with less expensive units	D3040	110	1050	1	5	EA.		$5,000	$25,000					$25,000
SUB-TOTAL DIRECT COSTS									25,000					
GENERAL CONDITIONS 10%									2,500					
SUB-TOTAL									27,500					
OVERHEAD & PROFIT								10%	2,750	53.40%		10%		
SUB-TOTAL									30,250					
CITY COST INDEX								0.20%	61	50.10%				
ESTIMATED SUB-CONTRACTORS TOTAL COSTS:									30,311					30,311
BNL ECONOMIC CONDITIONS COST MODIFIER:														
ADJUSTED SUB-CONTRACTORS ESTIMATED TOTAL COSTS:														**$30,311**

HDR | ONE COMPANY *Many Solutions*℠

MEMO

To: Ove Dyling - BNL	
From: Alan Walker	Project: BNL-CFN
CC: Mike Schaeffer – BNL, Ahmad Soueid – HDR, HDR Design Team	
Date: 1-26-04	Job No: 000000000005866

RE: BNL Brainstorming or Speculations HDR Responses

Given to HDR on 12/22/03

1. Consider EMI shielding individual rooms verses entire East Wall

   HDR Response*:*
   Shielding of the individual rooms will not be done per BNL, 12/22/03.

2. Why do we need isolation transformer for non-sensitive loads?

   HDR Response:
   We don't specifically need shielded isolation transformers for non-sensitive loads. However, we do need K-Rated transformers. From a manufacturing point of view, a K-Rated transformer is identical to shielded transformers. Therefore, we provide one product, one spec, for both applications.

3. Ground indication monitoring. Is this that critical?

   HDR Response:
   Ground current monitoring is not critical. It is "nice to have" to provide early warning of potential magnetic fields.

4. Why are we using "ventilation system emergency shutdown system" in the Clean Room

   HDR Response:
   Clean Room "ventilation system emergency shut down" is used to prevent cross contamination in case chemical spill.

5. Access to East side parking. Seems expensive approach for additional parking. Consider adding additional parking on West side or relocate path to additional I parking.

HDR Response:
HDR moved the access to the east lot north of the drainage swale to eliminate the need for a bridge; east lot will remain as designed.

6. Revolving door, security issues of securing door at night? Who does it? Think vestibule should be considered.

HDR Response:
Man door to right will be used after hours. Use of swipe cards for access after hours is being considered.

7. Remove walkway arches.

HDR Response:
Still under evaluation.

8. Have a connection for emergency power to allow a generator to be rolled up if a generator is not installed now. Or tap into a second 13.8kV feeder now with the understanding it will only be used in emergency

HDR Response:
Provisions for connecting to a portable generator will be provided.

9. Has anyone responded to the VitaTech report? For Site #2, he recommends breaking the 13.8 kV loop, that is, re-routing the 13.8 kV feeders. The resulting magnetic field (B) from the loop is 0.12 mG to 0.04 mG in the z direction. Is this a problem?

HDR Response:
Additional field testing will be required.

10. Have provisions for alternate electrical feeder. Provide double bus switch. This would
provide redundancy which may be appropriate for this type of building.

HDR Response:
The loop switch will be replaced with a two bus switch. BNL will advice of which campus feeders to connect to.

11. Why is parking in front near Brookhaven Avenue?

HDR Response:
This is the best way to achieve the number of spaces required and the need for a detention pond. We also needed to stay away from the future expansion.

12. Storm water should be routed around the north side of the building. The five drain

inlets and manholes shown on the south side are probably not needed. Drains are not necessary in grass areas and the truck entrance can be pitched to run off into the detention pond. The inlets in the grass on the north and west sides are probably not needed, also.

HDR Response:
It is possible to re-route the drainage from the northwest detention basin around the north side of the building as there would be no increase in the amount of storm drain piping required to change the alignment. Re-routing the storm drainage around the north side of the building would also prevent multi-staging as runoff from the northwest corner of the site would not also need to pass through the 2nd detention basin located southeast of the building. Some of the area inlets can be eliminated in grass areas provided that grades are reworked to provide positive drainage towards other storm drain inlets and/or directly into the detention basins. Note - some of the area inlets also were serving as junction boxes for roof drain connections from the building. These junction boxes should remain although, open inlets can be replaced with solid covers in order to eliminate depressions.

13. The existing grades (contours) need to be shown. A rough review indicates that the grade is being raised substantially to achieve a Floor Elevation 77. Note that existing grades will be 6-12 inches lower when topsoil, asphalt, and sidewalks have been removed.

HDR Response:
We recommend that the existing contours from the survey drawing be shown on the Grading and Drainage Plan and screened so that earthwork (cut/fill) calculations can be done. In further reviewing existing elevations with the proposed Finished Floor Elevation of 77' it appears that most of the building footprint will require at least 2-3' of structural fill. Omaha and Alexandria to advise whether FFE should be lowered depending on exact type of structural foundation selected for building.

14. Inverts or centerlines of utilities are needed to verify that no interferences exist.

HDR Response:
All invents of sanitary sewer and storm drain will be shown on profiles. All other utilities that cross these utilities will be shown schematically on profiles. Applicable details for water, chilled water, steam, electric and telecommunications as provided by BNL can be provided in construction details for clarification purposes if available.

15. There's no need to run utilities together as shown. It is actually more difficult due to differing requirements (ie, 5 ft deep [or water, 6 ft cover over chilled water, and pitch for steam).

HDR Response:
Currently these utilities are shown running parallel with an approximate 5' separation. These utilities can be further separated to 10' to accommodate different depth, cover requirements to ease construction. All of these utilities are coming off of Rochester Street where they are available. Steam and Chilled Water were not identified as being available on Bell Ave. Furthermore, since these utilities have to pass through one of the designated tree save areas it was intended to run them together to minimize the amount of tree loss.

16. The steam supply should be taken from an existing manhole. Constructing a new manhole in the middle of a run is costly, difficult, and potentially dangerous. Manhole 24 on Rochester St. or Manhole 50 on Brookhaven Ave would be likely sources. Manhole 50 is the closest location but would only be practical if steam entered the north side of the building. If utilities must enter through the rear of the building, Manhole 24 is the likely source of steam supply.

HDR Response:
It is our understanding that utilities must enter through the rear of the building. We will modify steam line location to tap off of Manhole 24. BNL will verify if there is adequate room in manhole 24 for the steam connection.

17. Manhole 24 is a pass through manhole with no valves. Valves (along with drips and traps) should be added for isolation. This will greatly reduce impacts of system outages in the future.

HDR Response:
OK. We will require assistance from mechanical engineer for design requirements associated with steam line utility to be shown on civil plans as this is typically a mechanical system.

18. If the steam supply must avoid the future addition, a new steam manhole will be needed in the middle of the run on the south side of the addition. Manholes are relatively large structures and will require clearance from the addition. This will also mean that chilled water and potable water will have to move south.

HDR Response:
Will comply, a new manhole for steam may be required upon design requirements specified by mechanical engineer. Subsequently, chilled water and potable water will also need to shift south to avoid conflict with steam line.

19. If the future addition could be moved north (to beyond Manhole 24), there is a possibility that the steam could be run to the building without a new manhole.

HDR Response:
It is our understanding that the future addition will likely not move.

20. What size are the chilled water lines? There are no connections where shown on the drawing. Wet taps would allow the system to remain in service.

HDR Response:

- The chilled water lines are 10 IN. We will coordinate with mechanical engineer to determine appropriate size of chilled water lines. Wet taps will be provided
- Mechanical engineer to determine if compressed air is required to service building.
- Mechanical engineer to determine feasibility of rerouting plumbing. However, sewer runs along the east side of the building, so if sanitary lateral exits out of the northwest corner there may be additional piping required to connect to main sewer.

21. If the building requires compressed air, it should be taken from the site distribution system.

HDR Response:
Compressed air will be from the site distribution system

22. The sanitary pipe out of the building is shown on the northeast side. The bathrooms are in the northwest and southeast comers. It may be easier to run two pipes out near the bathrooms which would also reduce the amount of inaccessible pipe under the slab.

HDR Response:
Other sanitary connections will be required towards the center of the building from the penthouse floor drains. Therefore it is suggested that the piping remain as presently shown.

23. Are there other plumbing needs for laboratories, janitor closets, or kitchen facilities? If so, it would be best to minimize piping under the floor.

HDR Response:
Every effort will be made to minimize the extent of under slab piping and to run it as straight as possible to aid in cleaning.

24. The existing sanitary line is a new line and does not interfere with the building location. Does it have to be relocated at this time?

HDR Response:
Only the sections of the sanitary sewer line that conflict with building or other proposed site improvements are being relocated.

25. The Main Electrical Room and the Building Services Room should have double door access to the exterior. Interior access is not as important but a single door may be desirable to provide a second means of egress. The access to the Electric Room could be through the Building Services Room. This could eliminate the need for the corridor next to the machine Shop (~ 300 SF).

    HDR Response:
    The Mechanical, Electrical and Receiving/Shop rooms have been reconfigured to eliminate the corridor and provide exterior door to the mechanical room.

26. The access to the service rooms should be paved to facilitate deliveries. Extending the refuse area could achieve this.

    HDR Response:
    The access to the service rooms will be at dock level.

27. The Building Services Room probably needs a pit for some utility entrances

    HDR Response:
    Pit for utility entrance will be provided

28. Steam on Rochester St. is at roughly EI. 75. It will need to pitch down to the CFN. At the building entrance, a drip leg and trap will be required.

    HDR Response:
    - Drip leg and trap will be provided
    - OK; Mechanical engineer to provide design requirements for steam line that need to be shown on civil plans.

29. Chilled water and compressed air entrances to the building will be easier if they penetrate through wall sleeves rather than burying joints under a slab.

    HDR Response:
    - Will comply.
    - Structural engineer will need to provide sleeves in foundation for utilities. Civil plans will show utilities to within 5' of building footprint.

30. A condensate return unit may need to be below floor level, depending on heating methods.

    HDR Response:
    Location of condensate return pump will be coordinated with the steam piping system.

31. If a pit is constructed, it may be prudent to isolate it from the building slab and columns. This would mitigate potential vibrations were a water hammer to occur.

    HDR Response:
    Structural engineer to determine if a concrete vault should be designed/constructed for select utilities entering the building.

32. In lieu of the larger detention ponds, create "Rain Gardens" to intercept the oils, metals. Salts of the parking area runoffs. Plant with water tolerant vegetation that will filter these contaminants out of the storm water prior to entering the storm water system.

    HDR Response:
    Storm water management practices for all local, state and federal construction projects in the State of New York must comply with NYSDEC SPDES requirements. An infiltration basin with extended detention, which is essentially designed as a dry bottom pond, is an acceptable type of post construction measure in terms of improving water quality and reducing storm water runoff volume that we may want to consider for this particular application in order to avoid not having permanent standing water. Infiltration basins capture and temporarily store the water quality volume before allowing it to infiltrate into the soil over a two day period. Generally, these infiltration practices cannot alone meet the detention requirements unless infiltration is unusually high (>5 in/hr). Thus, extended detention storage may be provided above the infiltration basins in order to meet water quantity requirements for the 100 yr 24 hour storm. Infiltration basins usually consist of a flat basin floor with grass turf. Other types of acceptable storm water ponds as defined in the New York State Storm water Management Design Manual must include a permanent pool and extended detention and incorporate some elements of a shallow marsh in order to improve water quality in addition to meeting water quantity requirements.

33. Create a graphics and signage program that will allow numbers inserts instead of the more costly brass signs used at BNL. Room occupant name changes will be less costly and could be done on any photocopier.

    HDR Response:
    HDR will comply with this request during the CD phase.

34. Use the newly developed photo-voltaic roofing system that we are developing for the roof replacement, bldg. 912. The system could easily produce 100kW of energy for bldg. power & lighting that would not have to be purchase from NYP A/LIP A.

    HDR Response:
    A photovoltaic system will not be provided.

35. Evaluate parking space requirements. Presently east parking lot has 33 spaces and it is full. Subtracting a total of 49 from the existing 33 leaves only a total of new parking spaces of 16. Add to west parking spaces of 68 for a total of 84. If the intention is to provide parking spaces of 68 plus 40 for a total of 117 additional spaces needs to be provided.

HDR Response:
HDR will provide a min. of 100 spaces as requested at the Jan. 8/9, 2004 by BNL.

36. Eliminate landscape aisle in parking lot to allow ease of snow removal.

HDR Response:
We need to have some trees in the middle of the parking lot in order to achieve the LEED credit for covering 30% of impervious paving surfaces. Without some sort of island to accommodate this, it may be impossible to meet that requirement. We have concerns about an island without the protection of a curb of some sort because of possible or likely damage to plants and trees by snow plows. Also, without curbs to protect the islands from oils, fuels, antifreeze and salts deposited by vehicles and maintenance crews, survivability of landscaping becomes suspect.

37. Evaluate tree planting, but make sure the LEED credits are maintained.

HDR Response:
Still under evaluation.

38. Verify design conditions to reflect ASHRAE Standards that will decrease the unit size. Smaller fan, motors, etc. ASHRAE Standards are for Central Islip @0.4% 88/73 and @ 1.0% 85/72. If not all systems. Consider office systems.

HDR Response:
Due to the critical nature of the facility, we suggest following BNL's design criteria given to HDR instead of ASHRAE Standards.

39. Eliminate humidification in office areas. Save first cost and subsequent operating costs. AHU-3 & 4.

HDR Response:
Due to the strict humidity control requirements in the adjacent laboratories, we recommend keeping the humidification for the office areas. Humidification also will improve indoor air quality and help in the LEED registration effort.

40. Consider HV AC units that are not as expensive as Miller-Picking units.

HDR Response:
The air handling units specified are 4 IN wall industrial grade units manufactured by many companies and can be bid competitively. They are constructed to minimize noise and vibration and can be constructed to minimize leakage.

41. HV AC section states: "Insulation of piping system will exceed applicable energy codes". By how much and is this cost effective?

HDR Response:
The specified insulation thickness will reduce heat loss/gain of pipes and will minimize the building's energy consumption. We will compare the specified thickness to the minimum code requirements.

42. Consider eliminate stainless steel in office units.

HDR Response:
All air handling units will have aluminum interior lining except for cooling coil and humidifier sections. There, we recommend stainless steel for all units.

43. Eliminate heat recovery units and use runaround loop between Lab Exhaust & Lab Supply units.

HDR Response:
The heat recovery units indicated house the coils in the exhaust air. The unit consist of filters and a coil section with condensate drain pans. As per BNL's request, the coil and the interior of the unit will be corrosion resistant.