4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

The potential direct, indirect and cumulative effects of the Proposed Action and Alternatives to the Proposed Action are discussed in this Chapter. This Chapter also includes a summary of the quantitative risk assessment analysis addressing the public health impacts of a "worst case scenario" involving loss of containment systems of the BSL-4 laboratory. Direct and indirect impacts are those which may result from Project implementation. Cumulative impacts are those that may result from Project implementation combined with past, present and reasonably foreseeable actions. Reasonably foreseeable actions, which are currently underway or planned at the BioSquare Research Park where the Boston-NBL is proposed and the adjacent Boston University Medical Center (BUMC), are identified in Section 4.10.

4.2 SOCIAL RESOURCES

4.2.1 DIRECT AND INDIRECT EFFECTS

4.2.1.1 PROPOSED ACTION

POPULATION AND DEMOGRAPHIC TRENDS

The current economic, racial and ethnic diversity of the South End is not expected to change as a result of this Project. It is anticipated that new employees would be recruited mainly from throughout the City, including the South End, as well as from the larger metropolitan area. No impact is expected on the existing ethnic or gender make-up of the South End population.

HOUSING

In recent years, the South End has emerged as a desirable residential neighborhood and has experienced an increase in sales and home values. This trend is not expected to change as a result of locating the Boston-NBL facility at the BioSquare Research Park.

Temporary impacts during construction are expected to have a minimal effect on the existing residential neighborhoods. The Boston-NBL site is bounded by a regional commercial wholesale florist market on the east, a highway on the south, the Boston University Medical Center (BUMC) on the north and the BioSquare Phase 1 Research Park on the west. Residential neighborhoods are found north of the site on two side streets off of Albany Street and one block north of the site off of Harrison Avenue. Construction traffic would avoid residential areas and rely on Albany Street for access.

Should the Frontage Road connection to the site be in place at the time of construction, this route would also be used.

The Project would create 660 new jobs. New employees are anticipated to reside in patterns similar to the existing BUMC labor force, which, according to BUMC records on employees, would result in 37% of the total or 244 persons residing in the City of Boston and the balance living in the metropolitan area. With over 250,000 housing units in the City of Boston, the Project would have no adverse impact on housing stocks. There would be no detectable impact from the other 420 employees dispersed throughout the metropolitan area.

As required by local ordinance, the Project would participate in the City of Boston's Affordable Housing Program through a contribution to the City's Neighborhood Housing Trust in the amount of approximately $920,000 to be used for the creation of new affordable housing. NIH funds will not be used for this contribution.

EDUCATION

The current public school capacity in the South End would be adequate to accommodate the expected minimal growth caused by the Boston-NBL facility. The employment-related population growth is expected to be small, only 244 persons in the City of Boston as a whole.

TRANSPORTATION AND PARKING

The results of a traffic analysis conducted for the BioSquare Phase II Final Environmental Impact Report/Project Impact Report (EIR/PIR) demonstrate that the transportation infrastructure is adequate to support the Project (Fort Point Associates, Inc. 2004). The 70 trips entering and leaving the site during each of the A.M. and P.M. peak hours that are specifically attributed to the NBL represent only 15–16 percent of the additional peak-hour traffic; they are not sufficient in and of themselves to change operations significantly at any of the study area locations. The potential introduction of new access to and from the regional highway system would remove existing and future vehicle trips from the congested corridors of Massachusetts Avenue and Albany Street. Traffic flow on the Massachusetts Avenue Connector (MAC) is limited by the signalized intersections at Massachusetts Avenue/Southampton Street/Melnea Cass Boulevard/MAC and Massachusetts Avenue/Albany Street, which are presently at capacity. By creating an access point to BioSquare from the highway system, the Project would reduce existing and future site-generated traffic from these critical intersections. Transportation of select agents to the Boston-NBL would meet the requirements specified in Chapter 2.

Overall, parking would be supplied for the entire BUMC/BioSquare Research Park area at a ratio of 0.78 spaces/1,000 square feet of floor space, within the range

recommended by the Boston Transportation Department (BTD) for this area of the City. Employee parking turnover is estimated at 1.3 per day (to account for shift workers) and visitor/patient parking turnover at 2.67 per day. Currently, 48% of institution employees arrive in single occupancy vehicles and the remainder walk, take transit or participate in car pools. Sufficient parking for the Boston-NBL employees will be provided through the overall institutional parking management program.

TRANSPORTATION DEMAND STRATEGIES

As described in Chapter 2, Transportation Demand Management strategies will be implemented to ensure that the Project does not result in any adverse effects on transportation and parking.

COMMUNITY SAFETY AND RISK

As mentioned in Chapter 3, the existing BioSquare Research Park has BUMC Security Officers on site at all times and is patrolled by Boston University police officers on a regular basis. Construction of the Boston-NBL facility would not create any extraordinary demands on the existing BUMC public safety functions, nor would it create adverse impacts in the Project area. BUMC would hire and train at least 25 new BUMC security officers as well as systems and management staff to continuously staff the facility. BUMC would manage the security and safety programs affiliated with the building, monitoring and responding to life safety, building automation, and security access systems. Development of the Project site would include safety design features that benefit BUMC and its surrounding community including additional emergency phones, additional perimeter staffing and security patrols, enhanced external security camera systems and increased open space. These improvements would benefit the community, BUMC security and safety staff, and public safety officials responsible for responding to incidents within the area and would also ensure that the Project does not create community safety impacts.

Further, the existing law enforcement and fire protection services provided by the City of Boston public safety officials are outstanding. As mentioned in Chapter 3, the health care services in the City of Boston are more than adequate, and Boston Medical Center, located directly across the street from the Project site, provides the highest caliber Level 1 Trauma facilities. Both the health care and fire protection services described in Chapter 3 are adequate for the Proposed Action.

WORST-CASE RELEASE SCENARIO RISK ASSESSMENT

To ensure that the Project does not create any adverse public health risks, an analysis was prepared to address the public health risk of a "worst-case scenario" involving loss of containment systems at a BSL-4 laboratory that coincides with a release within the facility (see also Appendix 9, Risk Assessment Report).

A quantitative risk assessment was performed with regard to a theoretical infectious agent release to the surrounding community from the Boston-NBL. The risk assessment examined a laboratory accident within the BSL-4 Laboratory that coincided with potential catastrophic failure of containment equipment.

In order to address the concerns about community safety that were raised in public comments, the NIH prepared an additional risk assessment. An additional exposure modeling strategy was applied to the proposed Boston University site to supplement the conclusions reached in the original risk assessment that the proposed Boston-NBL poses negligible risk to the community. The "Maximum Possible Risk" or MPR model was developed by the NIH with the input of concerned citizen advocates. The model was developed using the CDC report entitled Public Health Assessment of Potential Biological Terrorism Agents; "weight of evidence" or WOE methodology; conservative estimates at each decision point; and was based on laboratory data generated in simulated "drop" studies. The report containing the modeling data and results can be found in Appendix 12.

The MPR model uses a highly conservative, aerosol-delivered dose to estimate risk to individuals who inhabit space, walk or reside in areas surrounding the proposed BU site. Based on work done by Brachman and co-workers (Brachman, et.al.1966) a conservative estimate of 500 spores over an 8-hr period was utilized as the pathogenic dose in the MPR model. The MPR model utilized 15 scenarios and was flexibly applied across the urban environment surrounding the site. In the MPR model, simplifying assumptions are made that are more unfavorable than analogous "credible" assumptions. The MPR model assumes that the spores, once released, disperse in simple but restrictive geometric patterns. In reality, spores released in the scenarios would disperse in a far more complex pattern (impacted by wind-speed, direction, environmental condition, etc.) resulting in significant dilution. The simple MPR model represents the concentrated eddy situation, thereby representing a maximized, though highly unlikely, risk. This approach makes calculations easier to understand by eliminating complex turbulence/dispersion models. It gives extra confidence that the actual risks to the community are less than the calculated risks presented in the analysis.

Upon a review of the possible known agents to be studied within the Boston–NBL, anthrax was selected to be the agent modeled in the worst-case release scenario based on its public health impact and dissemination potential (Rotz, et al. 2002). Anthrax, although an agent that may be studied in BSL–3 laboratories due to known treatments, has many properties that warrant its selection. Because Anthrax is a spore, it is highly resistant to adverse environmental conditions including sunlight, temperature and lack of humidity. Additionally, a single anthrax spore is of a size, shape and weight that can remain airborne for extended periods of time.

Other BSL-4 agents pose lower community risk than Anthrax due to the lack of environmental stability and the known methods of transmission. Such agents are extremely susceptible to both temperature and humidity, and can only survive outside of a host under very specific ranges of conditions. An equally important environmental factor is sunlight; most agents are destroyed under prolonged exposure to natural ultra-violet light. Mathematical predictions of the potential survival of microorganisms in the environment estimate that approximately 0.01% are able to resist the chemical or physical inactivation found in the outside environment (USDOE 2002). These factors contribute significantly to the primary transmission methods of these infectious diseases. Infection through airborne dissemination, although possible, is not the documented primary method of exposure. Other select agents require direct cutaneous contact with the agent and thus pose less of a risk of transmission. For example, BSL-4 agents such as Ebola and Marburg virus require a host in order to survive, and it has been documented that these viruses are principally transmitted by direct physical contact with an ill person or their body fluids.

There has been community discussion related to the amount of spores that represent an infectious dose of inhalation of anthrax. The 9 spores that some have cited as the infectious dose was derived from a computer model of the Sverdlovsk Anthrax Outbreak of 1979 (Meselson et al., 1994). Experimental models however, indicate that thousands of spores are needed to establish infection.

The 9 spore minimal infectious dose reported by M. Meselson resulted from a computational model of the Sverdlovsk release of weaponized *Bacillus anthracis* spores from a biologic weapons production facility. While the Meselson analysis of the Sverdlovsk release factored in environmental conditions (*e.g.*, wind speed and direction from the local airport), putative size of the release, and the epidemiologic profile of patients who succumbed to infection, several points should be noted.
First, the Meselson analysis of 9 spores as the LD_2 dose (lethal dose for 2% of the exposed individuals) is based on an estimated release of 4 billion spores; however, the size of the release was not known. As a consequence, the authors concede that were the release 150 times larger, then the LD_{50} (lethal dose for 50% of the exposed individuals) would be in the range of 45,000 spores. This latter number is consistent with the experimentally determined LD_{50} for rhesus monkeys.

In the case of human exposure, it has been estimated by the Department of Defense that between 8,000 - 10,000 spores are required to reach an LD_{50}, based on non-human primate studies (DIA 1986). While the precise dose of *Bacillus anthracis* spores required to cause human pulmonary anthrax is not known, documented evidence suggests the pathogenic level is greater than 500 spores over an 8 hour period (Brachman et. al. 1966).

The quantity of agent being studied for release in the quantitative risk assessment is the result of a laboratory accident involving 10 Billion ($1 X10^{10}$) spores. Preliminary range finding studies were performed simulating accidental laboratory releases to determine the number of particles that become airborne. Approximately 400,000 ($4 X 10^{5}$) particles were produced in the range finding studies of simulated laboratory accidents and were available to become airborne (Wilson, 2004).

It is important to note the worst-case scenario assumes a laboratory accident involving 10 Billion spores. This assumed quantity is estimated to be approximately 10 times larger than the actual amount of Anthrax expected to be used in experiments within the Boston NBL. In addition, the samples used in the range finding studies were in a dry powder form, while those which would be used in the Boston–NBL would be in a liquid solution. Furthermore, the manipulation of samples in the liquid form minimizes the ability for the sample to become airborne in the event of an actual laboratory accident.

The exposure is calculated in the risk assessment based on an elevated breathing rate, 30 liters per minute (Ditmer, 1958), and would be representative of a person undertaking strenuous activities for the entire event duration. This breathing was selected as a conservative upper bound, and is expect to be unachievable given the expected duration of the event (30 Minutes).

Methodology and Approach

The risk assessment was performed to evaluate the potential dispersion of accidentally released Anthrax generated within the Boston-NBL facility through a laboratory accident. The analysis evaluated the potential exposure to the community at the location of the most-dense dispersion.

A three stage quantitative risk assessment was performed by RWDI Inc., of Guelph Canada for an infectious agent release from the Boston-NBL. The risk assessment evaluated the potential community exposure due to a laboratory accident resulting in Anthrax being dispersed through the atmosphere. A total of three models were used in performing the assessment.

In the first phase a screening-level assessment was initially performed using SLAB, a U.S. EPA-approved dispersion model. The model predicted maximum ground-level concentrations under a variety of environmental conditions. The second phase analysis involved a series of wind tunnel tests on a scale model of the Boston-NBL facility. The wind tunnel simulation accounted for the complex interaction between buildings and airflows, and considered the effects of the down wash of laboratory exhaust plumes from the Boston-NBL. The time weighted averages and the peak concentrations due to emissions from the laboratory exhausts on the Boston-NBL were

measured at a wide range of sensitive locations (24 in total) around the site. The most sensitive (highly impacted) locations were analyzed for the risk assessment.

In the third phase of the quantitative risk assessment, the impact of emissions from the facility's laboratory exhausts was analyzed using ISC-Prime, a U.S. EPA-approved dispersion model. This use of this model was recommended by the U.S. EPA to analyze localized effects in proximity to the facility to account for the effect of plume down wash. The ISC-Prime model analyzed the atmospheric dispersion under a range of environmental conditions. The maximum concentrations were estimated at receptor locations both at elevated and ground levels.

The results presented in the worst-case scenario identify the receptor location that the models predict would experience the highest concentrations of exposure. The model that calculated the highest predicted exposure was the wind tunnel testing and the location that this model predicts would experience the highest concentration of exposure is the roof level of the proposed adjacent BioSquare Phase 2 Building G located east of the Boston-NBL site.

Event Description

The quantitative risk assessment was based on the following assumed worst case scenario. A laboratory worker is manipulating a 15 cc conical tube containing 10 Billion Anthrax spores within the BSL–4 facilities. The researcher drops the sample while attempting to fasten the cap, and the sample falls out of the Biosafety cabinet to the floor of the laboratory. A visible cloud of Anthrax is seen as the sample hits the floor.

During the release event the room air is assumed to remain perfectly mixed as a result of the ventilation system wherein incoming air mixes immediately with the room air to create a homogenous mixture. With this assumption the exiting spore concentration decays exponentially with the lapse of time even as all spores are evacuated from the laboratory (Ventilation for the Control of the Work Environment, Burgess, Ellenbecker and Treitman). The entire event is assumed to take place over approximately a half hour.

The worst-case scenario assumes the laboratory accident coincides with a catastrophic and total failure of the facility's double HEPA filtration within the laboratory exhaust system and that the HVAC system continues to operate despite multiple monitoring, alarming, and automated safety sequences. The entire airborne release within the laboratory is assumed to be available to be released from the facility based on the following assumptions:

1. No reduction of spore concentration due to precipitation or impaction within the laboratory or the ventilation system and
2. No reduction of spore concentration associated with the HEPA filtration of the functional BSC(s) within the laboratory.

The results are presented in terms of number of spores that may be inhaled by an individual standing at the location of predicted maximum exposure. The exposure is calculated based on an elevated breathing rate of 30 liters per minute (Ditmer, 1958), which is representative of a person undertaking strenuous activities for the entire event duration.

Results

The predicted maximum exposure to any member of the community from the worst-case scenario is 0.29 spores over the entire duration of the event. As the exposure to a partial spore is not feasible, the risk of public harm is so minute that it may be described as negligible (see also Appendix 9, Risk Assessment Report). It is important to note that due to the pressure monitoring, maintenance, testing and HEPA filtration programs the probability of the release described in the worst-case scenario is practically zero. What is a more probable scenario is the same release scenario with the double HEPA filtration properly installed, certified, and fully operational. Under this scenario, representing normal operational conditions, the total release into the environment is calculated as 0.036 spores. As the release of a partial spore is not feasible, the risk of public harm is so minute it could be described as zero.

OTHER POTENTIAL RISK SCENARIOS

Theoretically, accidental release of biological materials could occur through human error, mechanical failures or other reasons. The Boston-NBL facility would be designed to ensure that such a risk is insignificant. The mechanical and electrical equipment would be designed with redundant systems and the building security systems would ensure that only security-cleared personnel are allowed to enter the building. Access to select agents would require that two persons are present at all times. Staff within the facility would only have access to areas that they are authorized to work within.

Direct Transmission

The highest risk of exposure concerns accidental laboratory exposure of a researcher, not to the community. Due to this risk, BSL-4 agents are studied under intense engineering, administrative and work practice controls. Proper design, construction and operation of the proposed Boston-NBL facility would reduce the potential risk for direct transmission of infectious agents to workers. Engineering controls include an impermeable airtight building design, working within biological safety cabinets and isolatable laboratory zones designed to be readily decontaminated. A researcher

within BSL-4 is protected by a one-piece, air supplied positive pressure personnel suit protected by HEPA filtration. To prevent possible exposure due to punctures/tears in protective suites, glass and most sharp objects would not be permitted in BSL-4 laboratories. Administrative controls would include intense hands-on training for all BSL-4 researchers. Work practice controls would include requirements for chemical and body showers upon each exit from the BSL-4 laboratory. Therefore, the likelihood of a worker inhaling or otherwise becoming exposed (e.g. through cuts in the skin or ingestions) of an infectious agent would be remote.

While it is highly unlikely that a worker would be exposed to an infectious disease agent, if exposure did occur at a sufficient dose, it would be possible for the exposed worker to become a carrier and, through direct contact, expose others. The potential for direct transmission to others would be reduced through the intervention of effective vaccine and therapeutic measures. Workers exposed to infectious agents for which there are no licensed vaccines would be isolated, treated and observed at the existing isolation areas at the Boston Medical Center. The plan of care would involve collaboration with the Boston Public Health Commission, the Centers for Disease Control and Prevention and other experts in the field of infectious diseases. These controls for work at BSL-4 level would maintain a safe work environment.

In an effort to verify the potential exposure to a researcher a qualitative risk assessment was undertaken including a review of safety records of three BSL-4 laboratories with 20 or more years of combined operating experience (Johnson, 2004) as well as reviewing the safety record of biocontainment laboratories at BUMC. Appendix 4 includes a summary of these reviews. The qualitative risk assessment demonstrates that not only is the community risk resulting from the potential release of infectious agents negligible, the risk to a researcher working within a BSL-4 laboratory is negligible as well.

The results of these assessments, as well as BUMC's laboratory experiences, lead to the conclusions found in the following paragraphs (a) through (e) below

a) Laboratory acquired infections

BUMC currently includes approximately 268 BSL-2 laboratories and five BSL-3 laboratories and considers the maintenance of a safe and healthy work environment to be one of its highest priorities. All laboratories are inspected by the Office of Environmental Health and Safety (OEHS) and the Office of Facilities Management on a regular basis to assure compliance with institutional policies and procedures as well as all related local, state and federal regulations.

OEHS requires initial orientation and annual laboratory safety training for all research staff including training in biosafety, chemical safety, blood-borne pathogens,

regulatory requirements, spill response, fire safety, waste management, disaster response, employee injury protocols, and security policy. Specialized training for appropriate staff includes mandatory annual BSL-3 laboratory training, shipping training, safety and infection control training.

BUMC has a strong history of constructing and managing safe biomedical laboratories, similar to existing facilities at the CDC. Researchers at BUMC work with a variety of BSL-2 agents, including bacteria, viruses, and toxins. The main toxins that are studied at BUMC include Botulinum neurotoxin, Ricin, Tetrodotoxin, and Conotoxin. Bacterial agents include: *Brucella abortus, Brucella melitensis, Staphylococcal enterotoxin, Anthrax,* and *M. tuberculosis*. The main virus work at BUMC is on HIV research. BSL-3 research agents include the HIV virus, and the bacteria: *Brucella melitensis, Francisella tularensis,* and *M. tuberculosis*.

The BUMC employee accident records from the last ten years covering some 14 million hours of laboratory personnel exposure have been thoroughly reviewed and it has been confirmed that, with one exception, no laboratory-acquired infections from research work in BSL-2 and BSL-3 laboratories have occurred**.** BUMC has reported that last year, three research laboratory workers at Boston University Medical Center (BUMC) were accidentally infected with tularemia bacteria in their lab while seeking to develop a vaccine for the disease. This tularemia incident occurred in a laboratory that operated at BSL-2 safety precautions. See Appendix 4, Safety Record of Biocontainment Laboratories at BUMC and at NIAID's Intramural Facilities.

All accidents and injuries are reported to the OEHS which compiles a database of all employee accidents and potential injuries including an OSHA 300 log of all OSHA-reportable employee injuries, as required by the Occupational Safety and Health Administration. The information reported on individual exposures is followed up with safety training and education to prevent reoccurrences. Corrective actions which have been taken in the past and which would be implemented in the future include:

- Increased safety training and procedures for lab workers;
- Strengthened laboratory safety procedures;
- Unannounced safety inspections of BUMC laboratories;
- Applying additional tests and safeguards to infectious material sent to BUMC for research purposes;
- Outside, expert review of BUMC research controls and procedures; and,
- Working with the Boston Public Health Commission to improve the notification process regarding exposures to infectious agents.

The numbers of laboratory-acquired infections are extremely low worldwide, and with the development of new design and construction standards the number has been even lower in the last few years. In the history of BSL-4 laboratories, no laboratory-acquired infection has caused a secondary infection to surrounding workers or posed a risk to the community. With the longest running experience with a BSL-4 (33 years), Ft. Detrick, Maryland has an outstanding safety record. Recently however, in February of 2004, the U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID) BSL-4 laboratory reported that a civilian staff member had been exposed to Ebola virus through a needle stick. The staff member was isolated and treated through proper protocols at USAMRIID, and again, never posed any danger to fellow staff or the community as a result of this personal exposure. Previous documented exposures at Ft. Detrick in their original lab facilities mention one laboratory-acquired infection between 1959-1969 and no clinical or other infections in the more recently constructed USAMRIID facility. In total, with a combined 344,000 BSL-4 research hours logged over a period of 33 years, there have been no infections, environmental releases, or community risk from the BSL-4 facilities at Ft. Detrick, MD. In summary, these laboratories have exceptional safety records and would serve as a model for worker safety at BUMC's National Biocontainment Laboratory.

b) Release from Decontamination of Exhaust Air

The BSL-4 laboratories would be designed to have air exhausted through a series of HEPA filters prior to release. Because two HEPA filters are used in series in BSL-4 labs with active monitoring, alarming, and automated safety protocols, the likelihood of infectious microorganisms being exhausted from a BSL-4 lab in an amount that would cause harm to the public or the environment is negligible. HEPA filters acceptable for biological safety installations routinely give collection efficiencies greater than 99.97% when tested with 0.3 μm diameter particles (Edwards, 2002). This is the most difficult particle size to capture, aerodynamically. The filters are even more efficient above and below this size range for a variety of technical reasons related to interception of the particle, the effect of inertial forces and capture by diffusion. Therefore they capture a full size range of organisms, from very tiny viruses to much larger bacteria (approximately 20 nm- 200 μm).

HEPA filter installations, whether in containment equipment such as biological safety cabinets or in building mechanical systems, are tested in place at least once per year using National Sanitation Foundation (NSF) Standard 49 procedures that provide quantitative assurance that the installations do not contain defects that reduce microbiological safety. HEPA filters are known to have long functional lives; however age can play a factor in decreasing tensile strength of the filter media. For this reason, the Boston-NBL would use a conservative service life of five years for HEPA filters in biological safety cabinets and other ventilation system applications. Perhaps the best and most practical proof that HEPA filters are effective is that they are used in

respirators worn by researchers working with high concentrations of infectious organisms (bacteria and viruses). These HEPA filtered respirators are uniformly protective in the laboratory and in field applications.

c) Escape of an Infected Animal

Both the facility design and standard operating procedures for animal caretakers and researchers at BUMC are designed to minimize the likelihood of an escape of an infected animal from the containment facility. The controls can be classified into both engineering and operational controls. They begin with construction of the facility and follow through to daily operating procedures.

The proposed Boston-NBL facility and systems would be designed to significantly reduce the potential for possible vector-borne transmission through insects and rodents. The design of BSL-2, BSL-3, and BSL-4 containment laboratories and BSL-2, BSL-3, and BSL-4 animal containment laboratories would comply with recommendations and requirements of the 4th Edition Biosafety in Microbiological and Biomedical Laboratories (U.S. DHHS 1999), NIH Design Policy and Guidelines – Animal Research Facilities (U.S. DHHS 2003c), and the current Guide for the Care and Use of Laboratory Animals (National Research Council 1996).

Insects would be housed in specialized insectarium rooms. There would be complete segregation of uninfected insects from those insects that contain vector borne pathogens. Different insect species would be kept segregated.

The construction and operation of the Arthropod Containment Level laboratory would comply with the recommendations and requirements of the Arthropod Containment Guidelines, Version 3.1 by the American Committee of Medical Entomology of the American Society of Tropical Medicine and Hygiene (ASTMH 2002). Infected arthropod work would be conducted in the innermost rooms under negative pressure conditions and all air supply and exhaust terminal devices would be screened to prevent arthropod escape. In insectary manipulation areas, cooler temperatures would be maintained to slow arthropod movement to reduce the potential for escape. Surfaces in all insectary spaces would be white to allow for quick identification of arthropods that escape primary containment. In addition, implementation of a pest management program would limit the potential for transmission of infectious agents from animals to humans.

There would be multiple barriers from the insectaria designed to prevent the escape of any insects. Primary containment in the room would include at least 3 barriers including filtered containers, screens and doors. Additional room barriers would depend on the types of insects. For example an oil filled moat would be installed in locations where non-flying insects would be contained since they move by crawling.

Multiple additional barriers would be in place outside of the primary containment rooms including multiple additional doors, sealed windows, filtered air intakes and exhausts. In addition, all insects would be inventoried before and after each experiment to ensure that no insects are unaccounted for.

The primary engineering controls or physical barrier to be used at the Boston-NBL is the containment laboratory itself. The construction and finish of the animal facility at the BSL-3 and BSL-4 facilities would maintain a uniform seamless construction with all penetrations sealed. Infected animals would always be separated from exterior spaces by an at least an air lock with a series of two interlocked inward swinging doors. The interlocking doors allow only one side of the airlock to be opened at a time which would accommodate visual inspection prior to sequencing the operation of the second door.

The doors of the animal laboratories would be designed to swing inward, thus minimizing the ability of an escaped animal from passing the handler. The doors would be equipped with sweeps, eliminating the opportunity of even small animals such as mice from escaping through a closed door. The perimeter isolation doors of a BSL-4 laboratory would include positive pressure gasket doors creating an airtight laboratory environment.

All materials within the BSL-3 and BSL-4 laboratories would require decontamination prior to removal from the containment suite. This protocol of sterilizing all materials leaving the suite allows for even the unlikely event a rodent being accidentally left in the bedding during a cage change, as the animal would not survive the sterilization process and the carcass would no longer be considered infectious. The possibility of a simultaneous breakdown of multiple engineering and operational controls for the escape of any live infectious animal is so minimal it can be described as negligible.

d) Biological Material Shipment

The packaging, labeling and transport of etiologic agents are highly regulated by several federal agencies and associations. Recent legislation (the U.S. PATRIOT Act, and the Public Health Preparedness and Bioterrorism Response Act of 2001) have further strengthened the regulations controlling transport of certain etiologic agents, referred to as select agents, to include controls over possession and use. BUMC would implement stringent protocols to ensure safe and secure transport of select agents to and from the facility. Transporters of any select agents to the Boston-NBL must be registered for possession, use and transportation of agents with the CDC and U.S. Department of Agriculture (USDA), under the select agent rule. A Responsible Official would be designated at the facility and approved by the regulating agencies to oversee and approve all shipping, receipt and use of any select agent. Packing requirements would be strictly implemented in accordance with U.S. Department of

Transportation (DOT) and International Civil Aviation Organization (ICAO) regulations. See Appendix 7, for a copy of BUMC's High Hazard Material Management (HHMM) Policy.

According to the World Health Organization, worldwide, there have never been any cases of illness attributable to the release of infectious materials during transportation (WHO, 1997). There have been reports of damage to outer packaging. The risk to the community from transport of infections agents or other biological derived material is negligible.

e) Unauthorized Removal of Biological Material from Containment Area

The systems that would be designed for access to, and egress from, the Boston-NBL containment areas would minimize the opportunity for an individual to intentionally or unintentionally remove any biological materials from the containment areas without authorization.

BUMC would utilize a combination of proximity and biometric access controls, closed circuit television systems, mandatory two-person rule systems, ongoing scheduled and unscheduled audits and drills, background checks and security/safety staffing plans to ensure that opportunities for unauthorized activities of this type do not occur.

Security systems that provide access to different areas and storage containers would be utilized as audit tools and would be programmed to ensure that all areas or storage containers accessed prior to work within containment areas are used to replicate access steps at the conclusion that work. Failure to comply with these protocols would result in immediate notification to security staff within the building who would secure the area remotely until all protocols are complied with or other actions are taken.

Other Threats

The public has questioned terrorist-related bombing of the proposed Boston-NBL facility. BUMC continues to meet with local, state and federal law enforcement agencies to collect, share and interpret information related to threats that could be initiated by individuals or groups on a local, national and international scale. The assessment of risk, as it relates to threats and vulnerabilities would be applied, as necessary, to the design and construction of the building, the types of access control and personnel/bag screening equipment as well as the construction of the building and design of the site. The Boston-NBL is being constructed to meet federal guidelines for blast protection, which include a 150-foot setback from unchecked vehicles. Security officers would enforce this setback at both the vehicle and the pedestrian entrances to the site.

Paths of potential release have been in the forefront throughout the design of the facility, as highlighted by the security and the redundant mechanical, electrical and plumbing systems previously described. Many design concepts are being incorporated into this facility that would not normally be considered for a private facility. The building as a whole has been designed to resist progressive collapse by sustaining structural integrity with the total loss of key structural elements.

The BSL-4 "Containment Block" is designed as a box within a box concept. A non-containment corridor would serve as a buffer to the facility and would encircle the BSL-4 facilities. This first physical barrier or outer box would be a combination of building façade and internal partition walls. The containment structure or primary box would be a composite structure, or multi part. The containment barrier, which would be applied to a concrete substrate, is a monolithic material such as an epoxy resin, that is intrinsically smooth, easily cleaned and disinfected. The substrate would be eight-inch thick concrete specified and rigorously tested for strength, shrinkage, and density standards specific to the Boston-NBL facility.

These physical measures would be implemented not in response to any known or anticipated threat, but in response to the inability to rule out such an event with absolute certainty. In the event, however unlikely, that both the inner and outer boxes were breached, the release would be limited to an amount of agent being used in an ongoing experiment, as all other agents would be stored in sealed containers within locked freezers. The agent being used in an experiment would be manipulated within an operating biological safety cabinet, which would contain the spill, and work to filter the air of any aerosolized agent. These factors, combined with an operational HVAC system maintaining directional airflow with HEPA filtration, would have a potential impact of less than the "worst case scenario" previously described.

4.2.1.2 NO ACTION

POPULATION AND DEMOGRAPHIC TRENDS

Under the No Action Alternative, the population would not change and the economic benefits associated with the Proposed Action would not occur.

HOUSING

Similar to the population and demographics trends, temporary construction impacts in the adjacent residential neighborhoods would not occur and no additional demand for housing would result. In addition, the $920,000 contribution to the housing fund would not occur.

EDUCATION

Under the No Action Alternative, the addition of new Boston-NBL employees' school age children to the existing school system would not occur.

COMMUNITY SAFETY AND RISK

Currently levels of community services, emergency response training and programs and infrastructure would not change under the No Action Alternative. The negligible risks associated with the construction of the BSL-4 laboratories would not occur.

TRANSPORTATION AND PARKING

The current use of streets by neighborhood residents and existing business and industries in the Project vicinity would occur under the No Action Alternative. The new vehicle trips associate with the Proposed Action would not be generated. There would be no parking demand generated by the Project. Parking would continue to be supplied at the Project site within the existing at-grade parking lot.

4.3 ECONOMIC RESOURCES

4.3.1 DIRECT AND INDIRECT EFFECTS

An organization's economic impact on a region results from a complex combination of inter-industry relationships involving both corporate and consumer spending. Contributing to the total economic impact are the salaries that the organization pays to its employees, and the dollars that it spends to purchase goods and services from local vendors.

4.3.1.1 PROPOSED ACTION

EMPLOYMENT

The Boston-NBL facility would create approximately 1,300 temporary construction jobs and 660 new permanent positions. These new positions include all types and levels including environmental services, lab technicians, scientists and administrative staff; the majority would require skilled and experienced workers.

During construction, the Project would comply with the City of Boston Jobs Policy through the creation of a Boston Residents Construction Plan, establishing goals for the recruitment of local residents for construction employment.

BUMC is committed to working with City agencies to ensure that Boston residents have the opportunity to benefit from the new employment generated at the facility. Toward this end, there would be opportunities for local residents to obtain training for various positions, such as laboratory staff, which would in turn benefit the local

economy. The Boston-NBL facility would contribute approximately $185,000 to the City of Boston's Neighborhood Jobs Trust for job training purposes.

The anticipated 660 new positions represent only 0.1% of the total work force (657,000 persons) working in the City of Boston. Based upon existing employment patterns, it is expected that approximately 244 employees or 37% of the 660 Boston-NBL employees would be City of Boston residents.

Because of the specialized nature of the work of Boston-NBL employees, some of the work force would likely be recruited at the national level and from existing research facilities including current BUMC employees (which would create replacement employment opportunities) as well as area colleges and universities.

INCOME

The Boston-NBL facility, like other BUMC facilities, would bring large infusions of outside money to the area to finance the laboratory's work. The mere presence of a laboratory of this level in an expanding field of bioscience research would create an environment that would attract bioscience-related business associated with the laboratory's work, similar to presence of the existing facilities at BUMC and the BioSquare Research Park. The scientific sophistication of research to be undertaken at the Boston-NBL requires that such businesses have high quality and highly trained workers. This would create an opportunity for expansion of jobs at all levels, including higher-paying, higher-quality jobs and support workers.

The Proposed Action would have positive economic impacts on the South End and surrounding neighborhoods throughout the construction and operational phases. When the facility is fully operational, up to 660 new positions would be created. The total direct wages to be paid per year at the Boston-NBL is projected to be $33,000,000, of which 21.4%, or a total of $7,062,000, is expected to go to Boston residents Total direct spending (based on the calculation of total economic impact using regional input and output multipliers provided by the Regional Input-Output Modeling System (RIMS II) of the U.S. Department of Commerce), including non-salary expenses and indirect expenses, including fringe benefits, overhead, building expenses and insurance is estimated to be $72 million annually, of which $19.7 million would be within the City of Boston. Total economic impact of the facility, including direct, indirect and induced activity, is projected to be $130.5 million annually.

GOVERNMENT AND PUBLIC FINANCE

The Boston-NBL facility would make a positive contribution to the City of Boston and its economy. The Proposed Action capitalizes on previous infrastructure investment in the area and on the planning and development of the existing BioSquare Research

Park. The new facility would not overburden current infrastructure or social services in the area, and its location provides a "smart growth" alternative to undeveloped sites. It would bring increased economic activity in the form of new jobs and investment to the City of Boston and its metropolitan economy.

The City of Boston, similar to other large cities, is currently experiencing fiscal challenges in meeting the growing demand for the basic services, especially education. While the facility would place little or no new demand on City services, the facility would provide substantial financial contributions to the City treasury. As required by local ordinance, approximately $1 million would be contributed to the City's Housing and Jobs Trust Funds. NIH funds will not be used for this contribution.

The Boston-NBL facility would provide increased state taxes to the Commonwealth of Massachusetts from payroll and income taxes. Boston University would continue its Payment in Lieu of Taxes (PILOT) and other tax payments to the City of Boston. Currently these payments are $3.2 million in PILOT payments and $3 million in other taxes.

Overall, the Proposed Action has no requirements for new public infrastructure investment. Adequate housing, education, health care, water, wastewater, first response, fire, and police services are in place to serve the Project area once the construction of the Boston-NBL facility is complete and the facility is operational. Any new infrastructure needed to serve the Project Area, such as construction and transportation services, would be privately funded and therefore not adversely affect government fiscal resources.

4.3.1.2 NO ACTION

EMPLOYMENT

Under the No Action Alternative, the creation of construction-related and new employment opportunities would occur.

INCOME

Under the No Action Alternative, no direct economic benefits to the City of Boston or State of Massachusetts would occur.

GOVERNMENT AND PUBLIC FINANCE

A No Action Alternative would not generate income taxes for the State of Massachusetts or payments in lieu of taxes to the City of Boston.

4.4 ENVIRONMENTAL JUSTICE

4.4.1 DIRECT AND INDIRECT EFFECTS

4.4.1.1 PROPOSED ACTION

As discussed in Section 3.4, the Project area is considered an Environmental Justice (EJ) area because its population on average is made up of more than 25% minorities. It should be noted that while the communities in the Project area are designated an EJ community, the South End neighborhood is not an economically stressed area. As discussed in Chapter 3, the median household income in the South End is greater than the median household income of the City of Boston and is close to the statewide average.

The Boston-NBL facility is a compatible land use with the surrounding community and similar to the already existing research facilities. As previously described, the site is located within the BioSquare Research Park which was specifically planned and zoned by the City of Boston for the development of biomedical research use to serve the needs of the medical services industry, educational institutions, and hospitals in the area. The Project complies with the use, dimensional, design and other requirements of the City's South End EDA/South District and conforms with the Biosquare Phase II Planned Development Area Master Plan. Further development of the BioSquare Research Park would bring many benefits to the surrounding community, including enhancing the local economy and bringing increased employment opportunities and tax revenues to the area. Furthermore, the South End was developed as a residential area with commercial, industrial and institutional uses and sufficient precedent in the South End exists for the development of large institutional and/or commercial properties.

The minority population and existing asthma rates of the EJ area are not expected to change with the Proposed Action. The Project would not displace any minority populations or facilities and housing that service such populations nor will it exacerbate the existing asthma rates found in some of the communities. It is unlikely that the Proposed Action would have proportionately greater impact on the disadvantaged (e.g. minority) population than any other population in the area.

ANALYSIS OF THE POTENTIAL FOR DISPROPORTIONATE EFFECTS

CONSTRUCTION IMPACTS

During the construction phase of the Project, neighborhoods immediately abutting the Project site, including EJ communities, may experience temporary impacts from construction because of their location and proximity. Thus there is no disproportionate effect on EJ communities. Furthermore, as described in Chapter 2,

the Project will develop a Construction Management Plan to minimize construction related transportation impacts.

ENVIRONMENTAL AND HUMAN HEALTH HAZARDS

A worst-case analysis is presented in Section 4.2.1 of Chapter 4 which details the public risk of exposure due to a worst-case loss of containment systems of the BSL-4 laboratory. This analysis demonstrates that there is negligible health risk to the community. The analyses presented in this Chapter provide documentation that the Project would not create any undue adverse impact on health, traffic, noise, air quality, wastewater, water supply, visual or historical resources. For this reason, potential environmental and health effects of the Project would not adversely affect the neighborhood populations in the EJ area.

A cumulative impact analysis was performed for all state Department of Environmental Protection (DEP)-registered sources within a one-mile radius of the proposed site, using an EPA refined dispersion model to predict air concentrations for both criteria and non-criteria pollutants at receptors. The results of the dispersion modeling demonstrate that air concentrations from Boston-NBL operations and construction will be insignificant for all pollutants in the EJ area and are also far below the maximum levels that would occur on the site property line. It should be noted that even the maximum property line levels are safely in compliance with state and federal air quality health criteria. Operation of the Boston-NBL would not result in adverse human health effects or negative environmental consequences in any of the EJ areas near the proposed Boston-NBL site. None of the extremely low air concentrations of particulate matter or VOC compounds predicted in the analysis of Boston-NBL operations and construction outlined in Section 4.7 would aggravate asthma in persons living near the site.

The proposed Boston-NBL therefore does not create disproportionately high and adverse human health effects on minority populations.

4.4.1.2 NO ACTION

There would be no impact on minority populations from the No Action Alternative

4.5 VISUAL QUALITY

4.5.1 DIRECT AND INDIRECT EFFECTS

4.5.1.1 PROPOSED ACTION

The Project has been designed to complement the existing urban design context of the Project Area. The proponent and its architects have considered carefully the views to

and from adjacent South End streets and regional highway system. By virtue of its location, the Project establishes an "edge condition" between the South End and the Southeast Expressway (see "Figure 4-1, Photographs of Project Vicinity"). The scale, massing, materials and architectural detail of neighboring South End institutional buildings inform the architectural design of the proposed Project.

Additionally, the site plan and massing of the proposed Project would help to mend the irregular urban edge that now exists along Albany Street. By developing the existing underutilized lots, the proposed Project helps give definition to the southern section of the South End while screening the major negative effect of the Southeast Expressway.

The site design and building massing have been reviewed with the Boston Redevelopment Authority (BRA) urban design staff as part of the design review process to assure compliance with BRA guidelines and recommendations. The building's placement on the site and treatment of the façade has projected the image of three "front doors": Albany Street to the north, the expressway to the south, and the BioSquare Research Park to the west. In addition, the facility has been configured to maximize the open space on the site and future development potential (see "Figure 4-2, Building Perspective", "Figure 4-3 Elevation View from Albany Street" and "Figure 4-4, Elevation View from BioSquare Phase I"). Thus, the Project will improve the visual quality of the area.

4.5.1.2 NO ACTION

Under the No Action alternative, the Boston-NBL facility and its associated public realm improvements would not be constructed. The site would remain as an at grade parking lot.

FIGURE 4-1
Photographs of Project Vicinity
source: Fort Point Associates, Inc

FIGURE 4-2
Building Perspective
source: CUH2A, Inc.

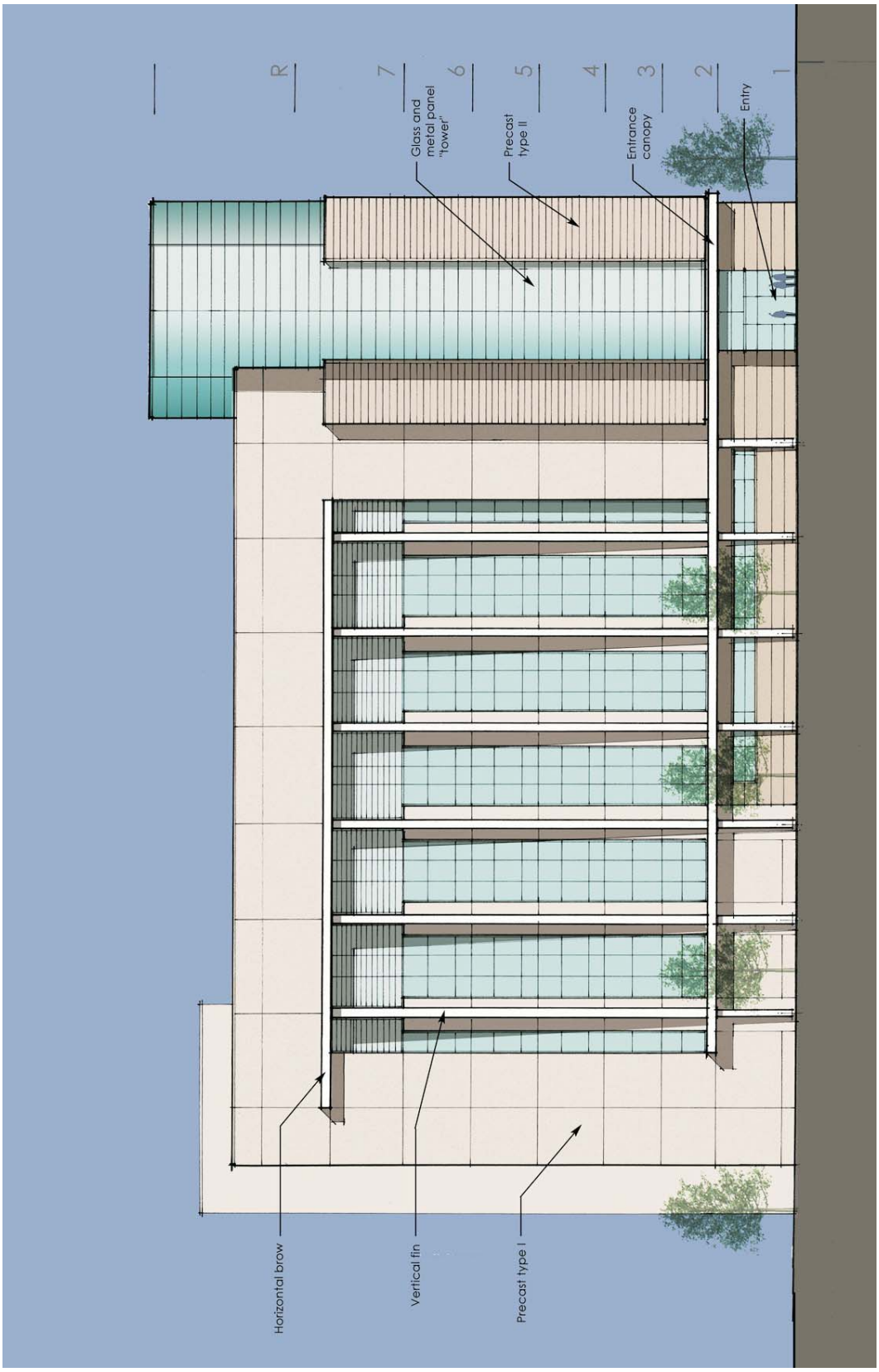

FIGURE 4-3
Elevation View from Albany Street
source: CUH2A, Inc.

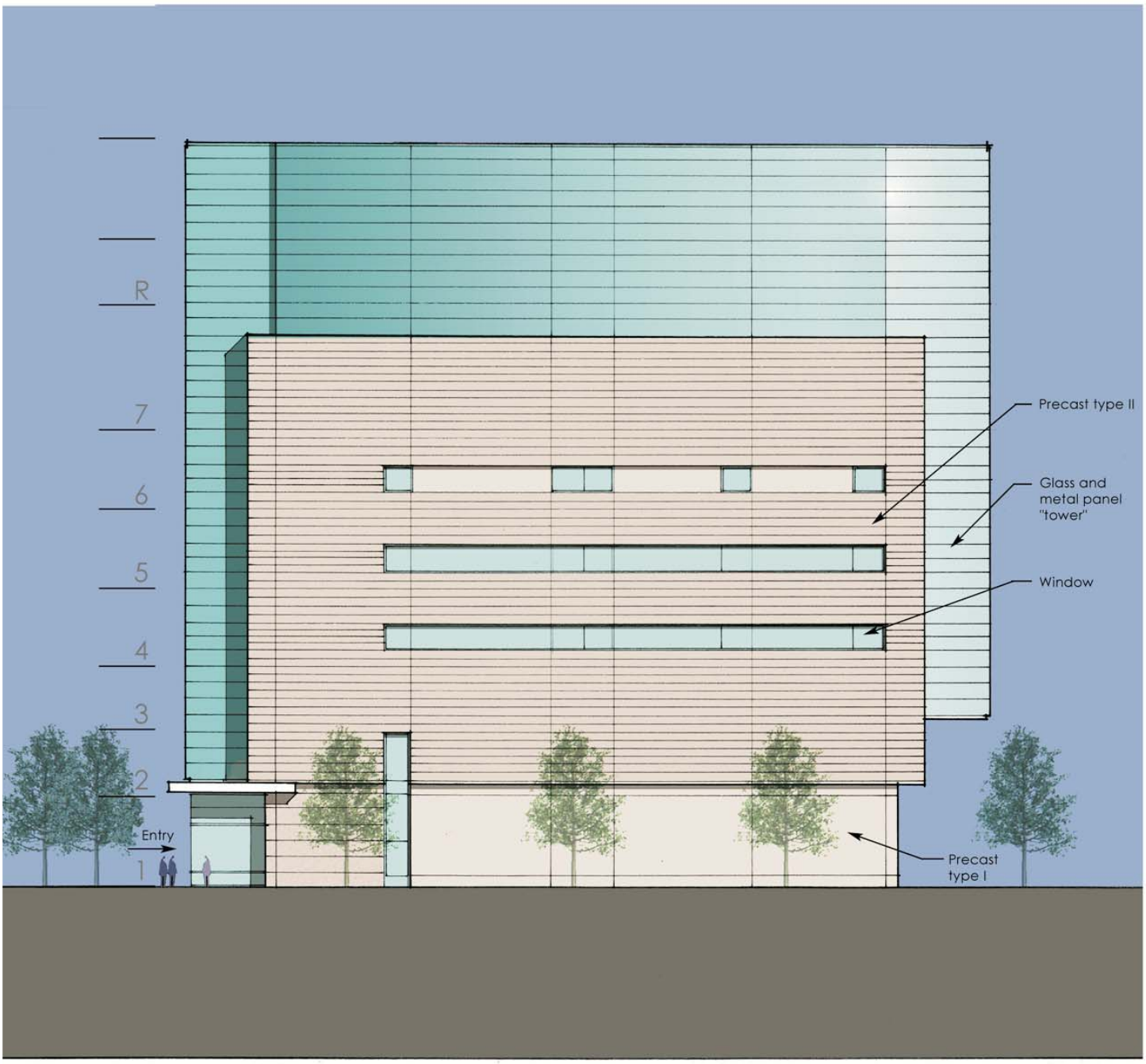

FIGURE 4-4
Elevation View from BioSquare Phase I
source: CUH2A, Inc.

4.6 NOISE

4.6.1 DIRECT AND INDIRECT EFFECTS

4.6.1.1 PROPOSED ACTION

Construction of the Project would result in a temporary increase in daytime sound levels near the site. The maximum L_{10} (Sound level exceeded 10% of the time) during construction is estimated to be 71 dBA, which complies with City of Boston Noise Control Regulation that permits L_{10} levels from construction operations not to exceed 75 dBA. This noise level was predicted for the closest location to the site, the Boston Flower Exchange. The peak noise impacts estimated for the Project would only occur for brief periods during pile driving and during the excavation period of the Project, when it is conservatively estimated that two heavy-duty vehicles would be operating simultaneously on the site. Mitigation measures such as hours of operation, pre-augering of piles and monitoring and maintaining mufflers on noise generating equipment would be employed as necessary to minimize the potential impact of noise generated by construction operations on all locations surrounding the Project site. Construction activities at the Project site would comply with state DEP Regulations that forbid unnecessary emissions of sound due to neglect or through failure to provide the necessary equipment or maintenance (310 CMR 7.10: U Noise).

Construction activities would also comply with the City of Boston's Noise Regulation which sets quantitative limits on noise from construction devices, applicable at the lot line of the construction site, but no closer than 50 feet from the nearest active construction device.

An operational noise analysis was conducted as part of the BioSquare Phase II Draft PIR/EIR. The analysis included two research laboratory buildings, the Boston-NBL building, and another medical research facility, (Building K, located on Albany Street), as well as a naturally ventilated, above ground parking garage structure (Building H). The details of the noise calculation are summarized in Tables 4-1 and 4-2.

These predictions are worst-case sound levels that are assumed to apply for all hours of the daytime or nighttime, although actual sound levels from the mechanical equipment may be reduced during late night periods and on holidays.

Table 4-1: Summary of Predicted Noise Impacts Compared To City Of Boston Noise Limits

Receptor	Maximum Predicted Sound Level Impacts from the Proposed Project (dBA)	City of Boston Residential Noise Limits [daytime/nighttime] (dBA)
Worst-Case Property Line – Northwest Side of the Project, at Ground Level, on Albany Street Sidewalk	33	60/50
Worst-Case Residence – Top Floor of 109 E. Canton Street	33	60/50
Worst-Case Hospital – Top Floor of the Newton Pavilion Building, at the Boston Medical Center	30	60/50

Table 4-2: Summary of Predicted Sound Level Impacts Compared To Massachusetts DEP Criteria (For the Period with Minimum Background Noise)

Receptor	Measured Background Sound Level (L_{90}) (dBA)	Maximum Predicted Sound Level Impact from Project (dBA)	Total Predicted Sound Level (dBA)	Predicted Sound Level Increase (dBA)
Worst-Case Property Line – Northwest Side of the Project, at Ground Level, on Albany Street Sidewalk	54	33	54	No Change
Worst-Case Residence – Top Floor of 109 E. Canton Street	54	33	54	No Change
Worst-Case Hospital – Top Floor of the Newton Pavilion Building, at the Boston Medical Center	54	30	54	No Change

The primary sources of external mechanical noise would be the cooling towers, the laboratory ventilation fans and the emergency generators; therefore, this equipment was included in the sound level impact analysis. The chillers and Air Handling Units (AHUs) are not expected to have a significant sound level impact, compared to

equipment to be included in the sound impact analysis, due to their location inside the buildings.

The sound level impact analysis, presented in Table 4-1, shows that the sound level impact at the worst-case property line (Albany Street sidewalk) would be 33 decibels (dBA). The largest sound level impact at any of the two worst-case sensitive locations (the residences at 109 E. Canton Street) was also predicted to be 33 dBA. Sound level impacts predicted at all three locations are in compliance with the City of Boston's nighttime noise limit (50 dBA) for a residential area. The predicted sound level impacts at the worst-case property line and the worst-case residences were added to an L_{90} value measured during the daily period with the least amount of background noise to test compliance with DEP's noise criteria. As shown in Table 4-2, a zero increase in sound level is predicted for all three modeled locations. These results indicate that the Project would be easily in compliance with the state DEP allowed noise increase of 10 dBA, during the quietest nighttime periods.

As described in Section 2.2.3 of Chapter 2, during the final design of the Project, appropriate low noise equipment and noise control measures would be selected, as necessary, to ensure compliance with the City of Boston and the state DEP noise regulations at all nearby sensitive locations.

To reduce noise from construction, the following measures would be used to mitigate for temporary construction noise:

- Install high-grade mufflers on the diesel-powered construction equipment and generators;
- Combine noisy operations to occur for short durations during the same time periods; and
- Construction activities would only occur from 7:00 am to 5:00 pm.

4.6.1.2 NO ACTION

Under the No Action alternative, the noise associated with the operation of the Boston–NBL facility would not occur however, the noise associated with the existing parking lot use would continue to exist.

4.7 AIR QUALITY

4.7.1 DIRECT AND INDIRECT EFFECTS

4.7.1.1 PROPOSED ACTION

The preferred plan for the Project has the laboratory exhaust vented through vertical stacks located on the top of the building.

The laboratory exhaust system would be designed to avoid any air quality impacts inside or outside the building under normal operations or in the event of a major chemical spill inside one of the laboratories. .

The potential air quality effects from the laboratories would be minimized with the following procedures:

- The exhaust vents from the internal laboratory hoods would be ganged (combined) into groups before connecting to rooftop exhaust fans (one for each stack). Ganging the exhaust vents would provide enhanced dilution of any laboratory chemical emissions before they reach the ambient air.
- The rooftop stacks would be designed to have exit velocities of at least 3,000 feet per minute. Stack exit velocities of this magnitude would be sufficient to avoid stack tip downwash, a phenomenon where the emissions from the stack are drawn downward as strong winds blow by the stack. These stack velocities would also increase the height of exhaust above the building.
- Carefully controlling and limiting the storage of all chemicals within the building would minimize chemical emissions. Liquid chemicals would not be left exposed to the air and would always be contained and transferred within closed glassware. Valves, fittings, and tubing for any gaseous chemicals would be checked for leaks periodically.
- Liquid chemicals would be stored and handled in small quantities to reduce the potential air quality impacts in the event of an accidental spill.
- Filters or scrubbers would be used to trap emissions of any contaminants in the laboratory vents, if appropriate.

The DEP requires a Limited Plan Approval Application for any laboratory with air emissions of 2,000 pounds (one ton) of volatile organic compounds (VOC) per year. As discussed below, the potential VOC emissions from the laboratory operations would be below this threshold; therefore a Plan Approval Application would not be required for the laboratory operations.

DISPERSION MODELING

An air quality dispersion modeling analysis was performed for the proposed generators, boilers, and laboratory vents at the Boston-NBL in accordance with the U.S. EPA and state Department of Environmental Protection (DEP) modeling guidelines. The EPA ISC-PRIME model was used for the analysis with downwash parameters calculated with Building Profile Input Program- Prime. Modeling of criteria air pollutants from the Boston-NBL sources, and other interacting sources identified by the Massachusetts DEP, were modeled for locations within one mile of the Project. The maximum cumulative air quality effects were added to background concentrations and the total concentrations were compared to the Massachusetts and National Ambient Air Quality Standards (NAAQS). Maximum cumulative 24-hour and annual VOC concentrations were compared to Massachusetts Threshold Exposure Limits (TELs) and Allowable Ambient Limits (AALs) for existing and proposed sources immediately surrounding the Project. See Appendix 10 for additional detailed analysis.

The dispersion modeling results demonstrate that the maximum cumulative concentrations of criteria air pollutants from the proposed boilers and generators, modeled with the existing interactive sources, and with background air pollutant concentrations added, will be safely in compliance with the NAAQS for all of the criteria air pollutants analyzed including nitrogen dioxide (NO_2), sulfur dioxide (SO_2), coarse particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and carbon monoxide (CO) (see Appendix 10). The NAAQS were established to protect public health and welfare, with a margin for safety.

The dispersion modeling results demonstrate that the maximum cumulative concentrations of VOC from the laboratory exhaust stacks, modeled with the existing and proposed laboratories in the BioSquare Research Park, will be safely in compliance with the Massachusetts DEP 24-hour average TELs and annual average AALs (see Appendix 10). The TELs and AALs were established by the Massachusetts DEP as concentrations that an individual source of air pollution should not exceed to protect public health, with a margin for safety.

During the construction period, the project will comply with the state DEP Diesel Retrofit Program to reduce emissions from construction-related vehicle exhaust.

4.7.1.2 NO ACTION

Under the No Action alternative, the air emissions associated with the operation of the Boston–NBL facility would not be generated.

4.8 WASTEWATER/WATER SUPPLY

4.8.1 DIRECT AND INDIRECT EFFECTS

4.8.1.1 PROPOSED ACTION

The peak sewage flows are estimated at 45,825 gpd based on existing flows at similar BUMC labs. The Project does not require improvements to existing sewerage infrastructure. Sanitary sewage for the proposed Project would be carried by the New Albany Street Interceptor, which is designed to carry a theoretical flow of 16 mgd. This Project anticipates a total new daily flow of 45,825 gpd**,** or approximately 0.29% of the theoretical capacity of the interceptor. Based on a peaking factor of 3, the estimated peak sewage flow of 137,475 gpd would be approximately 0.86% of the system capacity. At the time the New Albany Street Interceptor was designed, much larger flows were expected from this area. Accordingly, there is more than sufficient capacity in the system to accommodate the additional flows from this Project and the Project will have no adverse effects on existing wastewater systems.

The Boston-NBL would have a segregated plumbing system that would carry laboratory wastewater from every non-BSL-4 area to mixing tanks in the basement where pH adjustment and compliance sampling would occur prior to discharge to the sanitary system. The BSL-4 areas of the Boston-NBL building would feature a sterilization system designed to use heat sterilization to kill any biological agents that might exist in the wastewater from these BSL-4 areas. At a minimum the sterilized effluent from the BSL-4 areas must be cooled before it can be discharged. It is estimated that 4,800 gallons of this waste stream would be produced over each 8-hour operating period. Thus, the discharges from the facility will have no adverse effect on the wastewater treatment system.

As discussed in Section 3.8 of Chapter 3, existing public water supply system has been significantly upgraded in the past several years and has more than adequate capacity to service the Boston-NBL facility. Thus the Project will have no adverse effect on water supply.

4.8.1.2 NO ACTION

Under the No Action Alternative, water consumption and sewage generation would be supported by existing infrastructure. Under the No Action alternative, the water consumption and additional flows to the sewage system would not occur.

4.9 HISTORIC RESOURCES

4.9.1 DIRECT AND INDIRECT EFFECTS

4.9.1.1 PROPOSED ACTION

The proposed Project would be sited in an area of large commercial, industrial and institutional uses near the South End Landmark District and National Register District. The Project is located within the South End Harrison/Albany Protection Area, which covers a transitional area adjacent to the above districts. The proposed Project meets the goals of the Protection Area and all of the specific standards and criteria for projects located within the Protection Area and thus has no adverse effects on historic resources.

The Project would be designed to provide first-class research and development facilities in a building which is compatible with the existing context of the area. The Project design would complement the context of the South End Landmark District in a manner that respects the street patterns, landscaping, amenities such as benches and lighting, building materials, and opportunities for pedestrian use of the site.

The architectural design of the proposed Project would be informed by the scale, massing, materials and architectural detail of neighboring South End institutional buildings at BUMC and BioSquare Research Park.

Additionally, the site plan and massing of the proposed Project would help to mend the irregular urban edge that now exists along Albany Street. By developing the existing underutilized lots, the Project would define the southern section of the South End and screen the major negative effect of the Southeast Expressway.

The Project compliance with the specific standards and criteria of the South End Harrison/Albany Protection Area is detailed below.

DEMOLITION

No demolition would be required in association with the proposed Project, as the site is currently vacant. Most of the buildings that previously occupied the site were demolished in the 1970's.

LAND COVERAGE

To comply with federal safety requirements, the Boston-NBL building would be set back approximately 150 feet from Albany Street. The open space created between the building and the street would be adequately landscaped, in compliance with the Protection Area standards and criteria. The building design and massing have been

reviewed with the Boston Redevelopment Authority's design staff to ensure that the urban design goals for the area are met.

HEIGHT OF STRUCTURES

The Boston-NBL building would be 111 feet high with a 15-foot high screen wall for rooftop equipment, which is well below the 150-foot building height maximum allowed under the Protection Area standards and criteria.

TOPOGRAPHY

The site is nearly flat, resulting from mid-19th century landfill activities. No substantial change in topography is proposed, resulting in no effect on topography.

LANDSCAPE

Landscape elements would not obstruct views of the elements of the adjacent South End Landmark District from public ways. Landscaping would be designed to soften building, sidewalk and vehicular circulation areas.

4.9.1.2 NO ACTION

Under the No Action Alternative, there would be no impact on historic resources.

4.10 REASONABLY FORESEEABLE ACTIONS

The reasonably foreseeable actions that are underway or planned in proximity to the Project site include the buildout of the BioSquare Phase I and Phase II Projects, completion of the Moakley Building at the adjacent BUMC and the Crosstown Center Project located at the corner of Melnea Cass Boulevard and Massachusetts Avenue. These actions are described below and shown on "Figure 4-5".

BUILD OUT OF THE BIOSQUARE PHASE I AND PHASE II PROJECTS

The BRA and the state Executive Office of Environmental Affairs (EOEA) originally approved the BioSquare Phase I project in 1991. The Phase I project is the first phase of the BioSquare Research Park, and is comprised of a 5.2-acre site and includes an existing 1,000 car parking garage, the 160,000 square foot (sf) Evans Biomedical Research Center and the 180,000 sf Center for Advanced Biomedical Research. Two additional medical research buildings are also proposed, including Building D, a 160,000 sf building, which is currently under construction and Building E, an 180,000 sf building which will be constructed based on market demand. The Boston-NBL facility is located in the BioSquare Phase II site immediately adjacent to and east of the BioSquare Phase I site. The BioSquare Phase II build out also includes a 234,700 sf medical research building and a freestanding 1,400 space parking garage.

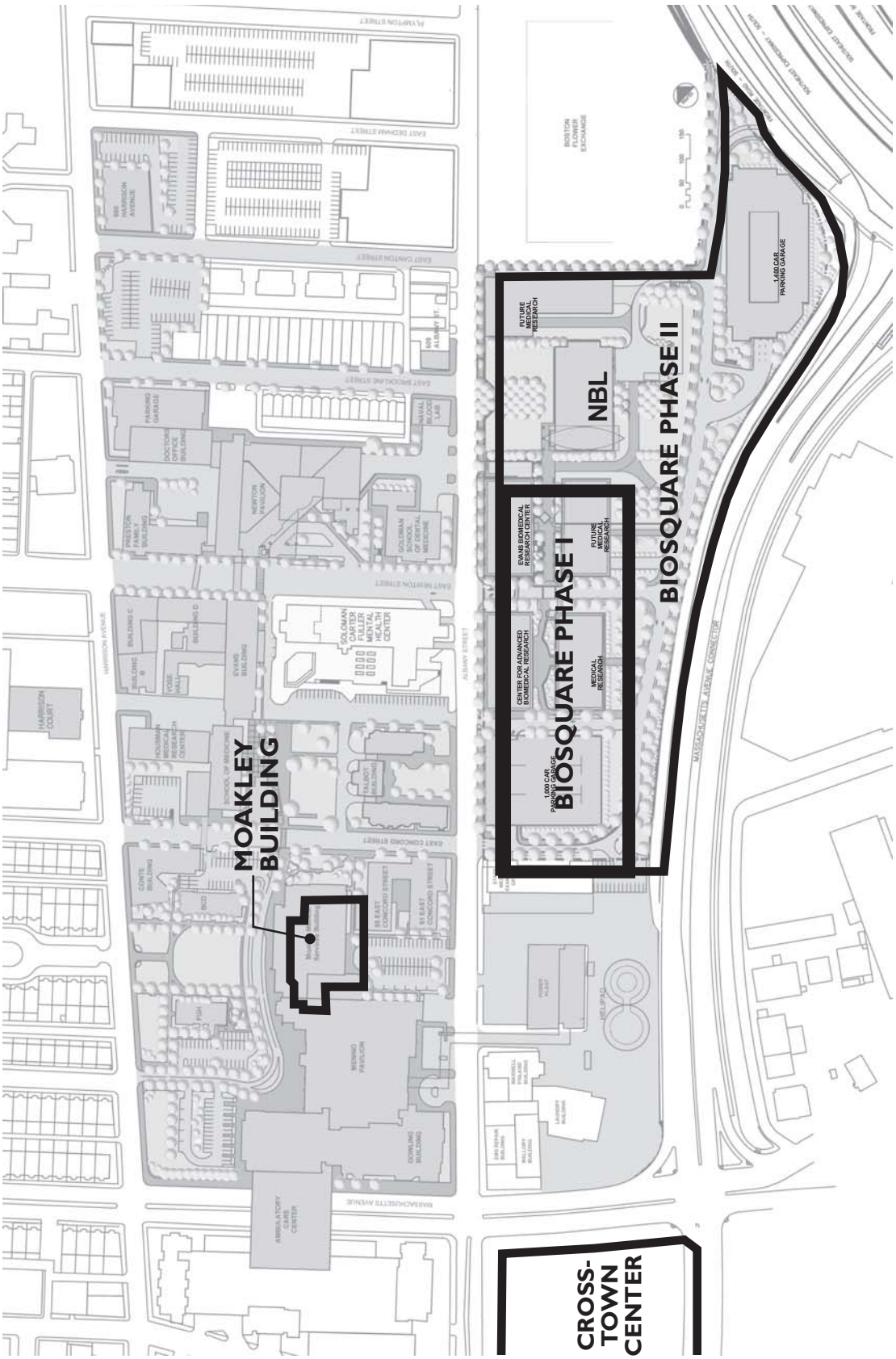

FIGURE 4-5
Proposed Action and Reasonably Foreseeable Actions
source: Stubbins Associates, Fort Point Associates, Inc.

MOAKLEY MEDICAL SERVICES BUILDING

The Moakley building is a three-story 105,205 sf outpatient cancer care center currently under construction at BUMC. The building is expected to be completed in the summer of 2006 and will house an array of cancer care services.

The BioSquare and Moakley projects were contemplated in the Master Plan developed by BUMC and approved by the BRA.

CROSSTOWN CENTER

The Crosstown Center Project is a brownfield redevelopment with four buildings including a 173 room hotel (90,589 sf) with 70,000 sf of retail space, a 3,200 seat Cineplex, a 160,000 sf office building and a 1,200 car parking garage.

TUFTS UNIVERSITY REGIONAL BIO-CONTAINMENT LABORATORY (RBL)

In September, 2005, the National Institute of Allergy and Infectious Disease (NIAID), a component of the National Institutes of Health, announced that it had given a grant to construct a 31,000 square foot RBL at Tufts University School of Veterinary Medicine campus. The purpose of the proposed facility would be to develop vaccines, diagnostics, and therapeutics against emerging and re-emerging infectious diseases. The proposed Tufts RBL project will undergo a separate NEPA review.

The proposed facility would be located in the Grafton Science Park, Grafton Massachusetts. The science park is a 106 acre parcel located on the western portion of the Tufts University School of Veterinary Medicine campus. The proposed site is approximately 50 miles west of Boston.

The facility would be developed on Tufts University owned land designated and approved on the campus master plan as the "Grafton Science Park". As part of an overall Tufts Grafton Campus Master Plan approval process, Grafton Science Park has received overall site plan approval from the town's planning board. The proposed facility would require individual site plan zoning from the Town of Grafton.

4.11 CUMULATIVE EFFECTS

The regulations of the Council on Environmental Quality (CEQ) at 40 CFR 1508.25(c) require analysis of direct, indirect and cumulative impacts The reasonably foreseeable actions in the vicinity include the build out of BioSquare Phases I and II (excluding the Boston-NBL), the Moakley Medical Services Building, and the Crosstown Center Project and completion of the Central Artery/Tunnel highway system improvements. A discussion of cumulative impacts of these actions along with the Boston-NBL is provided below. In the event that the cumulative impacts of the reasonably foreseeable actions, including the

proposed RBL at Tufts University, are greater than currently expected, the NIH will evaluate any significant new circumstances or information relevant to the proposed Boston-NBL and take any actions necessary to ensure compliance with NEPA and the CEQ regulations.

4.11.1 SOCIAL RESOURCES

4.11.1.1 PROPOSED ACTION

The proposed Boston-NBL project and the five identified reasonably foreseeable actions would not result in any direct or indirect adverse impacts on housing, education or community safety and risk. The City of Boston has an adequate housing supply to accommodate current and future residents who may be employed at these facilities. Similarly, the existing school system has adequate capacity to accommodate any increase in school age children resulting from these facilities. The City of Boston has adequate Police and Fire Protection services in the areas where the build out of the BioSquare Phase I and II projects, the Moakley Medical Services Building, and the Crosstown Center would be located. These projects would maintain their own safety and security staff which would be enlarged to accommodate any security needs of the project. The proposed facility at Tufts University would not rely on Police or Fire Protection services from the City of Boston, and would have its own independent safety and security staff. Since there are no direct or indirect effects from the five reasonably foreseeable actions, the proposed Boston-NBL project would have no cumulative impacts.

4.11.1.2 NO ACTION

Since there are no direct or indirect effects, the No Action) alternative would have no cumulative effects.

4.11.2 TRANSPORTATION

4.11.2.1 PROPOSED ACTION

A joint Final Environmental Impact Report/Project Impact Report (EIR/PIR) was prepared for the BioSquare Phase II Project and filed with the state MEPA Office and the BRA on July 30, 2004. This document, together with the Draft EIR/PIR which preceded it, addresses the environmental impacts of the build out of the entire BioSquare Phase I and BioSquare Phase II projects, along with other planned development projects in the vicinity including the Moakley Project and the Crosstown Center. The transportation analysis, which was based on the total impact of the proposed Boston-NBL, combined with other existing and proposed development, indicates there would be no unacceptable adverse impacts, given proposed mitigation.

The proposed Tufts University project location is approximately 50 miles west of Boston. It is anticipated that there would be no direct or indirect effect on transportation in Boston from the proposed Tufts University RBL. Since there are no impacts from the proposed Boston-NBL and the four reasonably foreseeable actions located in the City of Boston, there would be no accumulation of impacts from the proposed Tufts University RBL

.

The Final EIR/PIR analyzed traffic impacts for BioSquare Phase I development elements not yet built, as well as BioSquare Phase II, including the proposed NBL. The NBL accounts for 21 percent of proposed floor space and only 15–16 percent of A.M. and P.M. peak-hour vehicular traffic of the additional development, as shown in Table 4-3, BioSquare Development Phases and Vehicle Trips.

NO-BUILD (2008) CONDITIONS

No-Build peak-hour traffic volumes were calculated by increasing existing volumes by a 0.5 percent growth rate over 5 years to account for background traffic, plus adding specific volume estimates from Crosstown Center and the Moakley Medical Services Building. The effects on traffic of the new Central Artery/Tunnel (CA/T) Ramps AS and FL were also taken into account and the CA/T's TRANPLAN traffic forecasting model, Version HA5 (2020 Full Build), was used as the basis for the estimates.

BUILD (2008) CONDITIONS

Build Conditions were developed for the un-built Phase I plus Phase II development program shown in Table 4-3, of which the NBL is a part**.** Several site access alternatives were analyzed. Following discussions with the Massachusetts Highway Department (MHD) and the BTD, the access alternative chosen for the Build analysis assumed a site driveway at Southbound Frontage Road that would allow only right turns in and out, in addition to site drives on Albany Street at East Newton Street, East Concord Street, and the former Stoughton Street, now a parking lot driveway. Existing vehicle site access at Albany Street/East Brookline Street would be discontinued.

Table 4-3: BioSquare Development Phases and Vehicle Trips

Phase	Square Footage	Percent	Vehicle Trips			
			A.M. Peak	Percent	P.M. Peak	Percent
Proposed Action	194,000	21%	70	15%	70	16%
Phase I additional build-out	340,000	58%	228	50%	219	50%
Phase II additional build-out	234,700	21%	161	35%	151	34%
Total	**768,700**	**100%**	**459**	**100%**	**440**	**100%**

LEVEL OF SERVICE COMPARISON

No-Build and BioSquare Build traffic operations for 2008 are compared in Table 4-4. As coordinated with BTD and MHD, 24 surrounding intersections, covering local streets and regional roadways, are included in the analysis. Overall intersection Level of Service (LOS) is provided for signalized intersections; LOS by approach is provided for unsignalized intersections. It should be noted that the impact analysis was based on total un-built BioSquare Phase I and proposed BioSquare Phase II vehicle trips, as presented in Table 4-3. The 70 trips entering and leaving the site during each of the A.M. and P.M. peak hours that are specifically attributed to the NBL represent only 15–16 percent of the additional peak-hour traffic; they are not sufficient in and of themselves to change operations significantly at any of the study area locations.

As shown in the table below, the only changes from No-Build to Build operations occur during the P.M. peak hour. During this time period, the overall level of service for two intersections at Albany Street/Massachusetts Avenue and Southbound Frontage Road/South Bay Service Road worsens from LOS D to LOS E under Build Conditions. The Moakley Building parking lot driveway at Albany Street also worsens from LOS D to LOS E, however, this affects primarily patrons leaving the parking lot and not through traffic on Albany Street.

The Union Park Street approach at Albany Street goes from LOS B to LOS C, and the Southbound Frontage Road/South Boston Bypass Road intersection goes from LOS A to LOS B. The section below presents a mitigation plan for Albany Street intersections.

Table 4-4: Comparison of No-Build and Build Conditions Intersection Level of Service

Intersection		No-Build		Build	
		(A.M.)	(P.M.)	(A.M.)	(P.M.)
1.	Harrison Ave./Massachusetts Ave.	C	C	C	C
2.	Harrison Ave./E. Springfield St./BMC Driveway (in only)				
	EB E. Springfield left/thru/right	C	D	C	D
	NB Harrison thru/right	A	A	A	A
	SB Harrison left/thru	A	A	A	A
3.	Harrison Ave./E. Concord St.	B	B	B	B
4.	E. Concord Mid-block				
	EB E. Concord thru	A	A	A	A
	NB Driveway right	B	B	B	B
5.	Albany St./Massachusetts Ave.	D	D	D	E
6.	Albany St./Moakley Lot				
	EB Moakley left/right	D	D	D	E
	NB Albany thru	A	A	A	A
	SB Albany thru	A	A	A	A
7.	Albany St./E. Concord St.	D	D	D	C
8.	Albany St./East Newton St./Site Exit	B	C	A	D
9.	Albany St./East Brookline St./Parking Lot				
	EB East Brookline left/thru	F	F	F	F
	EB East Brookline right	B	C	B	C
	WB Parking Lot left	F	F	*	*
	WB Parking Lot right	C	E	*	*
	NB Albany thru/right	A	A	A	A
	SB Albany left	B	B	*	*
	SB Albany thru	A	A	A	A
10.	Albany St./Malden St.				
	EB Malden left/right	F	F	F	F
	NB Albany left/thru	A	A	A	A
	SB Albany thru/right	A	A	A	A
11.	Albany St./Union Park St.				
	EB Union Park right	C	B	C	C
	NB Albany thru | thru/right	A	A	A	A
	SB Albany thru	A	A	A	A
12.	Albany St./Frontage Rd./MBTA Dr.	B	B	B	B
13.	MAC/Massachusetts Ave./Melnea Cass Blvd./Southampton St.	D	D	D	D
14.	**				
15.	SB Frontage Rd./I-93 Off-ramp/MAC	B	B	B	B
16.	SB Frontage Rd./Site Drive				
	Site Drive right	N/A	N/A	B	B
	SB Frontage thru | thru/right	N/A	N/A	A	A
17.	SB Frontage Rd./MAC	***	***	***	***
18.	SB Frontage Rd./S. Boston Bypass Rd.	A	A	A	B
19.	Southampton St./South Bay	B	B	B	B
20.	SB Frontage Rd./South Bay/Service Rd.	B	D	B	E
21.	Southampton St./NB Frontage Rd./ Driveway	C	C	C	C
22.	NB Frontage Rd./Widett Circle	A	A	A	A
23.	NB Frontage Rd./S. Boston Bypass Rd.	A	B	A	B
24.	NB Frontage Rd./MAC	C	B	C	B

* = Movement eliminated in Build Condition.
** = Intersection 14 represents a proposal not included in final access alternative
*** = LOS not calculated; no vehicle conflicts.

TRANSPORTATION SYSTEM IMPROVEMENTS

The BUMC is working with BTD to finalize a package of transportation improvements to be implemented as part of the traffic mitigation for the BioSquare Project. At this time, the Proponent has committed to the following measures, subject to BTD and MHD approval:

- Right-turn-in, right-turn-out site driveway at Southbound Frontage Road;
- Modification of the East Newton Street/Albany Street intersection as a four-way intersection, including associated traffic signal upgrades;
- Improvements at East Concord Street/Albany Street, including any required traffic signal upgrades;
- A traffic and parking management plan for Albany Street between East Newton Street and Union Park Street. Subject to BTD approval, the plan would convert Albany Street to a 3-lane cross-section that typically consists of a single travel lane in each direction and a center left-turn lane. No widening of the street is proposed. The plan would also include recommendations for changes to the existing on-street parking regulations.
- Installation of fiber optic communications cable and conduit within the Albany Street sidewalks that are scheduled to be rebuilt as part of the BioSquare Project;
- Directional signage for employees, hospital patients, and visitors on and near the campus;
- The provision of up to 2 variable message boards in the area to provide opportunities for real-time traffic information.

TRANSPORTATION DEMAND MANAGEMENT

Additionally, the Project has committed to implement Transportation Demand Management measures as described in Section 2.2.9 of Chapter 2 which, when combined with the transportation system improvements described above, will ensure that the project does not result in adverse effects on transportation.

The effects of the cumulative impacts on transportation have been described above. There are some intersections with limited but acceptable increases in traffic.

4.11.2.2 NO ACTION

The No Action alternative would result in the Boston-NBL Project not being constructed, which represents about 16% of the total build out considered in the cumulative traffic impacts. Therefore, the traffic impacts would be proportionately reduced and still remain within acceptable limits.

4.11.3 ECONOMIC

4.11.3.1 PROPOSED ACTION

The proposed action would create positive effects on employment, income, and government finance as does the build out of the BioSquare Phase I and Phase II project, the Moakley Medical Services Building project, and the Crosstown Center project. These four projects considered in terms of cumulative impacts will provide both construction-period and permanent employment opportunities (see Table 4-5, Cumulative Effects- Employment). Based on the estimated average of $50,000 per job, the cumulative effect of income generated from the identified projects would be in excess of $100 million annually. These projects would also pay, as required, real estate taxes to the City of Boston and sales tax to the Commonwealth of Massachusetts.

The proposed Tufts University project would possibly have a slight positive impact on the City of Boston. It is possible that some people will choose to live in Boston and work in Grafton, the site of the proposed Tufts University RBL. Since there are no impacts from the proposed Boston-NBL and the four reasonably foreseeable action located in the City of Boston, there will be no accumulation of impacts from the proposed Tufts University RBL.

Table 4-5: Cumulative Effects - Employment

	Employment	
Project	**Construction**	**Permanent (2008)**
Proposed Action	1,300	660
Phase 1	N/A	N/A
Phase II	800	740
Moakley Medical Services	150	N/A*
Crosstown Center	300	740
Total	>2,500	>2,140

* N/A – Not available

4.11.3.2 NO ACTION

The positive impacts of the No Action alternative on employment, income and government and public finance would be similar to, but proportionately reduced from the Proposed Action. Construction employment would be reduced by 48% and permanent employment would be reduced by 30%.

4.11.4 ENVIRONMENTAL JUSTICE

4.11.4.1 PROPOSED ACTION

An environmental justice analysis was performed for the proposed Boston-NBL using a one-mile radius. This area includes all the reasonably foreseeable actions within the City of Boston. The proposed Boston-NBL project and the four identified reasonably foreseeable actions, located within the City of Boston, would not result in any direct or indirect adverse health effects on the minority populations located within a one mile radius of the Project.

The proposed facility at Tufts University is located approximately 50 miles west of the City of Boston and would not have any direct or indirect environmental justice impacts to the City of Boston. Since there are no impacts from the proposed Boston-NBL and the four reasonably foreseeable actions located in the City of Boston, there will be no accumulation of impacts from the proposed Tufts University RBL. Tufts University would prepare an environmental assessment to study the area surrounding the proposed RBL for any potential environmental justice impacts.

4.11.4.2 NO ACTION

Since there are no direct or indirect effects, the No Action alternative would have no cumulative effects.

4.11.5 VISUAL QUALITY

4.11.5.1 PROPOSED ACTION

The proposed Boston-NBL project and the four identified reasonably foreseeable actions, within the City of Boston, would improve the visual quality of the surrounding area. The Project would redevelop an existing surface parking lot and create a new building along Albany Street with public works improvements including public sidewalks, lighting and landscaping. The build out of BioSquare Phase I and Phase II would also redevelop existing surface parking lots into new buildings with similar public realm improvements. The buildings in the BioSquare Phase I and Phase II would be designed to complement the existing urban design features of the area. The proposed Moakley Buildings would improve the visual quality of the Boston University Medical Center Complex by developing a new medical research building that would create a visual terminus to the historic Worcester Square landscape and block the view of the existing Power Plant on Albany Street. The Moakley Project would also create and reinforce pedestrian connections through the BUMC campus and provide an improved landscaped area and pedestrian path along East Concord Street. The Crosstown Center Project would be a "Gateway Project" sited on

Massachusetts Avenue and Melnea Cass Boulevard along the edges of Roxbury, the South End, and the BUMC. Crosstown Center would be located along major arterials in an area that has minimal pedestrian activity with poor lighting. Construction of the Crosstown Center would redevelop an existing brownfield site into a new mixed use development which would enliven the pedestrian environment and create a new public realm. The cumulative visual effect of these four projects is overwhelmingly positive.

The proposed facility at Tufts University would be located in Grafton, Massachusetts, approximately 50 miles west of the City of Boston. There would be no direct or indirect impact from the proposed Tufts University RBL on the visual quality of the City of Boston.

4.11.5.2 NO ACTION

The No Action alternative would have similar positive effects on visual quality, save for the specific Boston–NBL Project location.

4.11.6 NOISE

4.11.6.1 PROPOSED ACTION

The proposed Boston-NBL project and the four identified reasonably foreseeable actions within the City of Boston would not result in any direct or indirect adverse noise effects. None of the projects would generate sound levels that would violate the City of Boston or the state DEP noise criteria, which establish maximum allowable sound levels and allowable increases (see Table 4-6 Cumulative Effects- Anticipated Nighttime Noise). The City of Boston's nighttime noise limit for a residential area is 50 dBA while the state DEP allows an increase of 10dBA over existing levels.

Table 4-6: Cumulative Effects - Anticipated Nighttime Noise

	Anticipated Nighttime Noise
Proposed Action	33 dBA with zero increase over existing levels
Phase 1	30 dBA
Phase II	28 -46 dBA with zero to one dBA increase over existing levels
Moakley	Below 50 dBA threshold
Crosstown	Below 50 dBA threshold
Total	

The proposed facility at Tufts University is located approximately 50 miles west of the City of Boston. It is not anticipated that any noise would be generated of a significant frequency to be heard in Boston. Since there are no impacts from the proposed

Boston-NBL and the four reasonably foreseeable actions located in the City of Boston, there will be no accumulation of impacts from the proposed Tufts University RBL.

4.11.6.2 NO ACTION

Since there are no direct or indirect effects, the No Action alternative would have no cumulative effects

4.11.7 AIR QUALITY

4.11.7.1 PROPOSED ACTION

The proposed Boston NBL project and the four identified reasonably foreseeable actions, within the City of Boston, would comply with the state DEP air quality limits. A cumulative air quality analysis was conducted for the Proposed Action which included emission sources within a one mile radius of the project site. This area includes all the reasonably foreseeable actions within the City of Boston. The dispersion modeling results demonstrate that the maximum cumulative concentrations of VOC from the laboratory exhaust stacks, modeled with the existing and proposed laboratories in the BioSquare Research Park, will comply with the Massachusetts DEP 24 hour average Threshold Exposure Limits (TEL) and annual average Allowable Ambient Limits (AALs). The TELs and AALs were established by the Massachusetts DEP as concentrations that an individual source of air pollution should not exceed to protect public health, with a margin for safety.

The proposed facility at Tufts University is located approximately 50 miles west of the City of Boston. The facility would comply with all local and state regulations pertaining to air quality and air emissions. Any emissions from the proposed facility, Grafton Science Park, would not have any direct or indirect effect on the City of Boston. Since there are no impacts from the proposed Boston-NBL and the four reasonably foreseeable actions located in the City of Boston, there will be no accumulation of impacts from the proposed Tufts University RBL.

4.11.7.2 NO ACTION

Since there are no direct or indirect effects, the No Action would have no cumulative effects.

4.11.8 WASTEWATER/WATER SUPPLY

4.11.8.1 PROPOSED ACTION

The existing municipal wastewater and water supply systems are more than adequate to support the Project and the four identified reasonably foreseeable actions, within

the City of Boston (see Table 4-7, Cumulative Effect- Wastewater Generation). Sanitary sewage for all projects within Boston would be carried by the New Albany Street Interceptor, which is designed to carry a theoretical flow of 16 mgd, much greater than what is projected. As discussed in Section 3.8 of Chapter 3, the existing public water supply system has been significantly upgraded in the past several years and has more than adequate capacity to service the Boston-NBL facility. Thus, the Project will have no adverse effect on wastewater or water supply.

Table 4-7: Cumulative Effects - Wastewater Generation

	Wastewater Generation (gallons per day)	Water Consumption (gallons per day)
Proposed Action	45,825	50,000*
Phase 1	121,000	135,000*
Phase 2	17,527	20,200
Moakley	18,000	22,000
Cross-town	56,500	62,000*
Total	258,852	287,200

- Estimated based on wastewater generation.

The proposed facility at Tufts University is located approximately 50 miles west of the City of Boston and would not be using the wastewater and water supply system in the City of Boston. The proposed facility would be served by the available water and public sewer near the Grafton Science Park campus. Therefore the proposed facility at Tufts University would have no direct or indirect impact on the City of Boston.

4.11.8.2 NO ACTION

Since there are no direct or indirect effects, the No Action would have no cumulative effects.

4.11.9 HISTORIC RESOURCES

4.11.9.1 PROPOSED ACTION

The project and the four identified reasonably foreseeable actions, within the City of Boston, would not result in any direct or indirect adverse effects on historic resources. None of the projects are located within existing historic districts or propose the demolition of any historic structures. Three of the four projects within the City of Boston are located within the South End Harrison/Albany Protection Area which was established in 1975 by the Boston Landmarks Commission as a buffer to the South End Historic District. Each of these three projects has been designed to comply with the standards and criteria specified in the South End Protection District and has been approved by the South End Landmarks Commission. Therefore there are no direct or

indirect impacts on historic resources from the proposed Boston NBL or the four reasonably foreseeable actions, located within the City of Boston.

The proposed facility at Tufts University is located approximately 50 miles west of the City of Boston, and therefore will have no direct or indirect impact on historic resources in Boston.

4.11.9.2 NO ACTION

Since there are no direct or indirect effects, the No Action would have no cumulative effects.

4.12 UNAVOIDABLE ADVERSE EFFECTS

Unavoidable adverse effects are undesirable effects that cannot be avoided if the Proposed Action or any alternative is implemented. Based on the foregoing analyses, the Proposed Action and the No Action do not result in any unavoidable adverse effects.

4.13 RELATIONSHIP BETWEEN SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

The facility is being constructed in an area planned and programmed for medical and research uses. The short-term use of the site would create construction jobs and would generate some construction related transportation impacts. The Proposed Action would likely result in long-term benefit to the quality of human life based on the scientific research that would be conducted at the facility, including the development of vaccines, diagnostics, and treatments of infectious diseases.

4.14 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The Project would result in irreversible commitment of resources in the form of building materials used to construct the building.

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