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Acknowledgements

Consultant Team

The following report was prepared for the Belmont Memorial Library from October of 2004 through April of 2005. The study was produced by the following members of the project team.

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The library retained Richard Marks of Daedalus Projects, Inc. under a separate contract to serve as Project Manager for the study.



The following people participated in the development of the study in their various capacities for the Town of Belmont.

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Staff Members

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Library Sub- Committee

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Pool Sub-Committee

Pat Brusch MaryAnn Johnson Dan MacAuley Bill McKenney Lorraine Benoit Kathy Ruane



Executive Summary

This study was commissioned by the Board of Library Trustees of the Belmont Public Library to evaluate options for expansion of the Belmont Memorial Library. A previous study had been prepared in 2001 to evaluate options for expansion of the library on the present library site. The intent of this study was to reexamine the options evaluated in that study, and to examine additional options for expansion on an expanded site and in combination with the adjacent pool.

The Library Building Program prepared by the Library Director and library staff served as the basis for the study. The Belmont Recreation Commission provided programming information for the pool facility.

Five options were initially considered for meeting the requirements of the building program.

Option 1 investigated the possibility of expanding the existing library building and parking on the existing library site.

Option 2 investigated options for demolition of the current library building and construction of a new facility on the existing library site.

Option 3 investigated options for expansion of the current library building and parking by utilizing an expanded site including the existing library site and the portion of the Underwood Pool site known as the "bowl."

Option 4 investigated options for demolition of the existing library building and construction of a new library facility on an expanded site including the existing library site and the portion of the Underwood Pool site known as the "bowl."

Option 5 investigated options for combining the library site with the pool site and creating new facilities for both the library and pool as a single project.

Following review of the initial five options a sixth option (Option 6) was added to evaluate the possibilities for creation of a new library on the library site and a new pool on the pool site to answer the needs of both facilities, while allowing the projects to happen independently.

Option 6 was selected as the preferred option.

Schematic Design of a new library based on the Option 6 concept was developed in detail to form the basis of a grant application to the Massachusetts Board of Library Commissioners Construction Grant program in February of 2005.





Option 2 Site Plan



Option 6 Site Plan



Existing Conditions Review

J. Stewart Roberts Associates reviewed the existing conditions of the current Belmont Memorial Library and site. In addition to a visual inspection of the facility, original construction documents and site plans were reviewed. The adjacent park and pool site were also reviewed as a part of the combined site investigations

Existing Conditions Review Belmont Memorial Library



Site

The current Belmont Memorial Library site consists of approximately 1.92 acres located on Concord Avenue. A park and community swimming pool on the east, a church to the west, and a private residence to the south bound the site. The Belmont High School is located nearby on Concord Avenue. An MBTA commuter rail station is located a short walk away near the Belmont Town Hall and a small town center commercial district.

The site has served as the location of the Belmont Memorial Library since 1965 when the current library was built. The site is viewed by the community to be an ideal location for the library due to its proximity to the high school and town center, making it convenient for patrons.

When the library was built, an artificial berm was created along with a set of steps from Concord Avenue to provide access to the upper level of the library on the north side of the building. Two additional public entrances are provided at the lower level on the east and west sides of the building. Staff entrances and deliveries are provided at the lower level on the south side of the building. The front steps form Concord Avenue to the main entrance have suffered from structural problems over the years and have currently been closed to the public.

Prior to construction of the current library building the site was a part of the residential property located to the south of the site. At that time the Wellington Brook ran through the middle of the site. When the library was built the Wellington Brook was relocated into a man-made waterway at the south side of the site. As the brook leaves the property it enters a culvert that runs underneath the adjacent pool site.









Because the brook is a perpetually flowing waterway the site is subject to a two hundred foot buffer zone by the Rivers Protection Act, which prohibits further development. Because the property has already been developed, any future development must not encroach on the undeveloped portions of the site adjacent to the brook.

On-site parking is provided for the public on the east and west sides of the building, the lot on the west side contains twenty five cars and the lot on the east provides parking for another ten cars. Nine parking places for staff are provided on the south side of the building. The current on-site parking is clearly inadequate to serve the need of library patrons. Additional parking is available on Concord Avenue.

Currently vehicular traffic circulates through the site on the south side of the library building adjacent to the brook. The drive and associated parking lots are not provided with drainage structures so surface water from the asphalt runs directly into the brook.

Per the Belmont zoning regulations the building is located in a single residence SR-C zone. This zone requires a twenty-five foot front yard setback, ten-foot side-yard setbacks, and a thirty-foot rear property line setback. The building height is limited to thirty-six feet measured to the highest portion of a flat roof or the average of a sloping roof.

Geotechnical investigations have revealed a high groundwater table at the site. A copy of the geotechnical report is included in this report.

Site Issues

While the location of the site is considered to be ideal for the location of the library, the limited size of the parcel and its proximity to the Wellington Brook pose challenges for expansion of the library. Groundwater and surface drainage issues must be addressed with any future library expansion on the site.













Belmont Memorial Library Building

The Belmont Memorial Library was built in 1965 and was designed by Kilham, Hopkins, Greeley Architects. The library has the original construction drawings as well as drawings of a previous version of the design which was not constructed. The library was built to provide basic functional space on a modest budget. The entrance lobby, which serves as a memorial to war casualties, with stone cladding, stone columns and a marble plaque, is the exception to the basic character of the building.

The building was constructed as a load bearing masonry structure with load bearing exterior walls of exposed concrete with brick cladding. The floor structure of the lowest level is framed with precast pre-stressed structural T's over a crawl space. The main floor and mezzanine levels are framed with open web steel joists and concrete on form deck slabs. The roof structure is framed of wood and is sloped around the perimeter of the building and flat in the middle.

Exterior masonry appears to be in good condition with the exception of the front steps from Concord Avenue. Existing slate roofs are in good condition but gutters and downspouts are in need of repair in some areas.

The lower level of the library houses the children's room, a medium sized meeting room, a large meeting room, staff work areas, staff lounge and mechanical and electrical rooms. The Main level of the library houses the circulation desk, circulation work room, library administration, reference room, young Adults, AV collections, and the adult collections. A small mezzanine contains special collections and the older fiction collection.

Renovation and Addition Issues

Expansion of the existing library building is difficult but not impossible to achieve. A number of constraints limit the feasibility of addition to the existing building.

Renovations to Load Bearing Masonry

The existing building was built as a load bearing masonry structure. The current Massachusetts State Building Code requires that the structure be seismically reinforced if the structure is significantly modified. The cost of seismic reinforcement is cost prohibitive. This means that if the building were to be added on to, no walls could be removed to open the existing building up to the addition. Existing windows would be enlarged to the floor to provide doorways into the new addition. Any addition must be structurally isolated and may not bear on the structure of the existing building.

(See the structural engineer's report, included in this report for additional information.)









Floor to Floor Heights

The existing library structure was built with approximately eleven feet of floor-to-floor height between the lower level and the main level and between the main level and the mezzanine.

The floor structure is approximately sixteen inches deep leaving only about nine and a half feet clear. Renovation of the existing structure to meet today's standards would involve running a number of mechanical and electrical services between the floor structure and the ceiling further lowering the ceiling.

Renovations would require at a minimum that a fire suppression system and new lighting be installed. This would result in a ceiling height of approximately eight and a half feet.

Ideally libraries today are served by HVAC systems with air distribution. Such a system allows for efficient operations through the use of heat exchange equipment to extract heat from exhaust air and transfer it to fresh incoming air. An air distribution system would not be possible in renovated portions of the existing library because the floor-to-floor height does not allow for the required air ducts.

Site Constraints

Area available for adding on to the existing library is limited by the zoning setbacks and wetland restrictions.

The existing building is set back approximately forty feet from the front property line. Zoning requires a twenty-five foot setback. This provides for the possibility of an addition to the front of the building approximately fifteen feet in depth.

Additions to the sides and rear are constrained by the areas of the site that have not been previously disturbed. Because the entire site is subject to the 200-foot buffer zone of the Rivers Protection Act, additions going beyond the line of the existing asphalt paving are not feasible. This limits the depth of potential additions to the rear and side of the building.

Long narrow additions, which wrap the existing structure with new construction, must be structurally isolated and would be expensive to construct because of the high ratio of exterior wall to enclosed interior area.

Parking Constraints

The need for additional on-site parking in conjunction with library expansion puts further constraints on site development. Any new parking areas must be within areas that have been previously disturbed. Because the area available for development is limited provision for on-site parking in conjunction with building additions requires a multi-level parking structure.











Existing Conditions Review Underwood Pool

The current historic Underwood Pool is the oldest public swimming pool in the United States.

Pool Site

Underwood Pool is sited in a park containing a playground structure, a hillside with mature trees, and a depressed area called the "bowl". An underground culvert runs between the pool structure and the "bowl," containing water from the Wellington Brook as it leaves the library site.

Historically the site has been subject to flooding. Recent improvements to the debris catching grate at the entrance to the culvert have improved the performance of the culvert, and no flooding of the property has recently occurred.

The bowl area was originally planned to accommodate excess run off and flooding from the Wellington Brook. The elevation of the bottom of the bowl is only a few inches above ground water, resulting in a lawn area that is spongy to walk on. During many times of the year surface water is present in the bowl. During winter months, surface water freezes and provides an area for ice skating.

Because the pool site is currently used for recreational purposes it is subject to Article 97 restrictions. Reuse of the site for a purpose other than recreation requires the town to set aside an additional park or recreation land of and equivalent size and quality to offset the loss of the current recreation land, and would require a Town Meeting vote.

Pool Facilities

The pool was designed as an oval with a diving board located on an island in the middle. The Pool is currently divided into two sections, for older and younger children. The Belmont Recreation Commission considers the configuration of the pool to be ideal for the recreational swimming programs offered by the town. The pool is also considered to be a good size for the programs required by the town.

The pool structure is suffering from age and deterioration.

In addition to the pool, the facility has a small bathhouse and a pump house.

Both surface drainage and groundwater problems contribute to











difficulties in maintaining properly conditioned water in the pool. Ground water (documented in the geotechnical report) is higher than the bottom level of the pool. This untreated groundwater seeps into the pool through cracks in the bottom of the pool structure, and the pool cannot be completely drained during the winter due to the groundwater.

In addition, surface run-off from the adjacent hillside flows into the pool during periods of high precipitation, compromising water quality.

Because the facility does not have a separate wading pool for small children, "accidents" caused by small children can require closing of the entire pool to the public.

The Belmont Recreation Commission has identified a strong sentiment in the community for maintaining the egg shape of the current pool if a new pool is to be constructed









Existing Conditions Engineering Reports

LeMessurier Consultants

675 Massachusetts Avenue, Cambridge, MA 02139 Tel: (617)868-1200 Fax: (617)661-7520

January 13, 2005

Mr. J. Stewart Roberts Stewart Roberts Associates, Inc. 48 Grove Street Somerville, MA 02144

Reference: Belmont Public Library Study - Belmont, MA LeM File No. 24254

Dear Stewart:

This letter summarizes our findings regarding the present condition of the structure of the Belmont Public Library Building in Belmont, Massachusetts, as well as our recommendations regarding future uses of this structure. These observations and recommendation are based on information provided to us by your office, as well as our field observations of December 2004. The existing structural drawings for this building are very complete, and as such we have a thorough understanding of the building's framing, and load-carrying capacities. Our field observations were only visual surface observations; we have not cut any holes in building finishes to verify structure, nor have we done any testing to determine the structure's underlying condition.

Existing Conditions

The existing Belmont Public Library is a three-story, steel-framed structural with exterior masonry bearing walls with a brick veneer. This building was built in 1964 to be the Town's Public Library and has functioned as such ever since. The structure has a basic "H" shape, a central section with symmetrical wings. The ground floor is framed with precast prestressed double T's with a 2" concrete topping slab supported on concrete foundation walls and spread footings. Below this level is a crawl space with a dirt floor. The first floor and balcony levels are each framed with open-web steel joists and concrete on form deck slabs. The building has a flat, wood-framed roof over the center section, and a steep gable wood-framed roof covered with slate on the wings at each end.

The existing floor live load capacities are listed on the structural drawings as 125 psf for the ground floor and 100 psf for the first floor and balcony levels. While these load-carrying capacities are below the code required loading of 150 psf mandated by today's code for library stack rooms, they appear to be adequate for the present library setup. Should there be future changes to the stack density, these would need to be reviewed, so as not to overload the structure.

While the structure of most of this building is not visible, as walls and ceiling finishes cover the framing, there is no evidence of major structural distress. The central flat section of roof has a membrane roof covering that looks to be in relatively good condition. However, it appears that the addition of a number of roof-top mechanical units has deflected the wood framing to the extent that the roof pitches are no longer adequate to fully drain the roof. The slate roofing on the wing gables is in good condition with only some very minor areas that need repair. The exterior of the building looks good, with only some very minimal cracking of masonry and areas that need repointing. Generally the building appears to be well maintained and in good condition.



LeMessurier Consultants

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Addition/Renovation Feasibility

It is our understanding that you are interested in a number of possible options for renovating and adding to the existing structure, in an effort to add needed space to the library. Our review of the existing drawings indicates that any minor renovations to the existing structure are possible, as long as the masonry bearing walls on the exterior of the building are basically left intact. Any additions attached directly to the existing structure would have to be kept small, so as not to trigger a complete seismic upgrade of the building (see below). A small roof over some outside parking at the rear of the building would be small enough so that it could be connected directly to the existing structure and not pose any structural complications. Any larger addition would need to be separated from the existing structure by an expansion joint, and be configured so as to avoid cutting any new large openings in the exterior walls of the existing building.

Generally, minor structural changes required to add or modify stairs, elevators, add mechanical openings, or add roof skylights are fairly simple, and do not have a major impact on the structure. However, any additions and alterations to the existing structures must be kept to less than 10% of the existing building's area and mass, or a major seismic upgrade would be required by the State Building Code. Such an upgrade to the structure would require that all the existing bearing walls be reinforced and a new lateral load-bracing system be installed. This work is technically possible, but would probably be prohibitively expensive and architecturally undesirable. Any proposed new additions should, therefore, be separated from the existing building structure by an expansion joint. The new structure could then be as large as desired and still be in accordance with the latest codes. We would recommend that any new addition be framed in structural steel, with composite steel and metal deck floors and steel roof deck for a roof. Based on the information that we were able to glean from the existing drawings, it appears that any new foundations would be spread footings.

In summary, the main points are:

- The existing building can continue in service as is.
- Any addition should be separated from the existing structure by an expansion joint.
- Changes to the exterior walls will require that the existing building be seismically upgraded, which we believe would be prohibitively expensive.

If you have any further questions, or if we can be of any further assistance, please do not hesitate to call.

Very truly yours, LeMessurier Consultants

Philip R. Banning, P.E.

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EXISTING CONDITIONS

• BELMONT MEMORIAL LIBRARY •

PLUMBING

- Presently, the plumbing systems serving the building are cold water, hot water, sanitary waste and vent system, storm drain piping, and natural gas.
- The Library is serviced by Town Sewer and Town Water. Storm drainage from flat roof areas is disposed of by a system of roof drains, and rain water conductors which discharge to a piped storm drainage system which discharges to a municipal storm drain.

FIXTURES:

- Fixtures in the building appear to be original to the 1965 era construction. Water closets are wall hung, flush valve vitreous china, with elongated bowls.
- Urinals are wall hung, flush valve, vitreous china some are extended shield and others are straddle type urinals.
- Lavatories are generally wall hung vitreous china, two handle center set faucets.
- Drinking fountains are vitreous china wall hung non-refrigerated, recessed and semi-recessed.
- Janitor's sinks are wall hung, cast iron sinks supported on enameled iron trap standard. Faucets generally lack vacuum breakers.
- There is a unisex, accessible toilet facility retrofitted at the ground level.

DRAINAGE SYSTEMS:

- Cast iron is used for sanitary and storm drainage. The exposed piping runs in the crawl space which is formed by a series of grade beams and the lower level concrete ribbed slab. The floor of this space is exposed first and due to the moisture problems, the piping and hangers exhibit a significant amount of corrosion.
- The flat roof is formed by wood trusses which have apparently sagged. There are significant ponding areas on the roof and these areas flood before the water drains into the roof drains. The two roof drains on the main roof are therefore not properly draining.
- There is an area way on the street side of the library which houses some mechanical equipment. Reportedly this area has flooded in the past. It appears from old documents that this area drains to an old foundation drain which we surmise may be partially clogged over time.



WATER SYSTEMS:

- Domestic water piping is copper, insulated. Insulation on valves and fittings are cementitious and should be evaluated for asbestos.
- The water service is a 2" service with 1 ½" disc meter and a separate meter for garden club.
- Water pressure was read at 90 psi.
- Domestic water heating is provided with an original 65 gallon all-copper, natural gas fired hot water heater storage tank combination. The unit lacks proper thermostatic controls.
- Hot water is piped from this location to the additions.
- Hot water is generated in winter with submersible coils fed from the boilers within the tanks. The tanks appear to have exceeded their useful life.
- System does not have adequate temperature control. An upgrade is indicated.

NATURAL GAS:

- There is a natural gas service.
- Gas feeds the boiler, water heater and all emergency generators.
- The gas piping appears suitable for reuse depending of course on size considerations of new load.

PLUMBING RECOMMENDATIONS:

- The plumbing systems are well maintained, however the fixtures and layouts do not meet current standards for accessibility, water and energy conservation, and backflow prevention.
- Regardless of the expansion program the plumbing system requires the addition of a pressure regulator, to reduce system pressure to below 80 psi and thermostatic controls on the water heater to limit the delivered temperature to 120°F.
- In terms of the water conservation fixtures, their use is governed by the provisions of the Plumbing and Building Code. Essentially, the code does not require these fixtures to be upgraded, but, where new fixtures are installed, as may be required by other codes or concerns, then the new fixtures need to be water conserving types of fixtures.
- The question of accessibility is somewhat more complex. The impact on the Plumbing is fairly simple but can be rather expensive.
- The Mass. Architectural Access Board Regulations are found at 521CMR and as relates to Plumbing would, in our interpretation, provide as follows:
- The level of Plumbing Compliance is determined by the value of total work being performed.



- If the total work is less than \$100,000.00 and if this work were to include any Plumbing, then the Plumbing Work would need to comply.
- If the total work is over \$100,000.00 and less than 30% of the full and fair cash value of the building, then an accessible toilet and drinking fountain <u>must</u> be part of the work.
- If the cost of the work exceeds 30%, then all of the existing and new Plumbing Facilities need to be accessible.
- MAAB takes this to mean that at every location where there are toilet rooms, the toilet rooms need to be made to comply with MAAB. This can be accomplished by providing accessible facilities in each toilet or unisex accessible toilets reasonably close to the core toilets. Unisex toilets usually are not programmatically acceptable, and therefore every toilet room needs to be reconstructed to conform to current MAAB dimensional standards.
- The water piping could be reused in a major renovation.
- The drainage systems in the crawl space would need total replacements and the crawl space should be fixed to include a vapor barrier, new slab, and ventilation in order to prevent further deterioration of piping.

FIRE PROTECTION RECOMMENDATIONS:

- The library does not have a Fire Protection System.
- Currently, sprinklers are required by State Statutes under MGL Chapter 148, Section 26G, only in additions of 7,500 s.f. and only where a public water supply is present.
- Under Article 9 of the new Sixth Edition of Mass Building Code, all library uses of 12,000 s.f. or greater are required to be sprinklered whether or not there exists municipal Water. Article 34 cross referenced back to Article 9 requires under 3404.12 that Fire Protection Systems are required in "substantially renovated" buildings. Under Article 9 it appears that the determination would be made by the Building Inspector as to the term "substantial renovation".
- In essence, any addition of 7,500 s.f. will need sprinklering and an extensive renovation will require complete sprinkler systems throughout.
- A standpipe system conforming to NFPA 14 may also be required if per 780 CMR-914.2.1 use Group A-3 which is (2) stories in height and greater than 300 occupants.
- The building will require in the upper levels several levels of sprinkler heads and in all likelihood will also require a dry system in areas subject to freezing.
- The wooden truss system framing the attic creates one level of combustible construction in the attic, as well as a concealed space above the ceiling.
- The addition of an automatic sprinkler system will require installation of a dedicated fire protection service.

EXISTING BUILDING CONSIDERATIONS:



The renovation of an existing building can lend itself to many construction problems as well as higher construction costs. Also, by renovating an existing building as compared to new construction, it can be very difficult to conceal piping, as it may be required to be surface mounted. In addition, surface mounted HVAC equipment and lighting present obstructions to sprinkler spray patterns, which requires additional heads be installed.



EXISTING CONDITIONS

BELMONT MEMORIAL LIBRARY

ELECTRICAL

ELECTRICAL DISTRIBUTION SYSTEM:

The existing electrical service consists of a main switch rated at 600amp, 120/208 volt, 3Ø, 4wire. The fuse size could not be determined without disassembling the main switch enclosure. For the purpose of this study the trip rating of the main switch is not critical. The equipment is located in a custodian work room space adjacent to the boiler. The equipment is in fair condition. In fact the equipment has been well maintained and physical appearance is excellent.

Existing lighting and power panels are circuit breaker type and are rated at 120/208 volt, 3Ø, 4wire. The existing panels do not appear to have spare circuit breakers for the addition of new lighting and power circuits. The panels and service equipment are manufactured by Cutler Hammer.

The service equipment and remote panels are original 1965 construction.

INTERIOR LIGHTING SYSTEM:

Existing stack lighting consists of acrylic lens fixtures perpendicular with the stacks. The fixtures are in fair/ poor condition. Corridors are equipped with wrap around fluorescent fixtures.

The Library personnel reported that several ballast failures have occurred. The main lobby space has globe type incandescent fixtures. Office areas are equipped with wraparound fluorescent fixtures.

The interior lighting system appears to be original 1965 construction with few modifications.

EMERGENCY LIGHTING SYSTEM:

The existing emergency lighting system is through a natural gas generator rated at 4KW, 120/240v, 1Ø, 3W and is manufactured by Onan. An automatic transfer switch manufactured by Onan is present. The system is not code compliant and the equipment is in poor condition.

SITE LIGHTING SYSTEM:

Existing site lighting is by building mounted flood light fixtures. Walkway lighting is by Cooley-Hat fixtures mounted on poles.

WIRING DEVICES:

Generally offices have one receptacle, per interior wall. Additional outlets should be provided to serve computer equipment. Several extension cords are being used to serve computers.

The distribution system is original and was not designed for computer loads. Generally, 200% neutral feeders to panels are used. In addition, neutral conductors should not be shared.



FIRE ALARM SYSTEM:

The building is equipped throughout with an automatic fire alarm system. Existing strobes do meet ADA. Notification to the fire department is by a flush master box.

The spacing of smoke detectors does not meet code.

Toilets do have ADA Strobes but do not have automatic detection.

Strobe lights, in some cases, are mounted higher than 80" above floor as is required by ADA.

The fire alarm control panel is manufactured by Silent Knight. The panel does both intrusion alarm and security.

DATA/TELEPHONE//CLOCK SYSTEM/SECURITY SYSTEM:

System clocks are manufactured by Simplex. The clocks appear to be fully functional.

A computer network is installed. The library is connected to Minuteman Library Network (MLN).

The library is also a central hub for a wide area network. The equipment is located in Tech Services.

Recommendations

ELECTRICAL DISTRIBUTION SYSTEM:

The continuous capacity of the existing service (80% of service rating) is 600 amperes or 172.8 KW. The total square footage is approximately 23,000 s.f. yielding approximately 7.5 watts/s.f. for lighting and power.

New construction service ratings are generally designed for a demand load of 15 watts/s.f. The service capacity may not be adequate for the addition of future computers. It is recommended that a new 1200 amp, 120/208 volt, 3Ø, 4wire service be installed to serve the library. New lighting and power panels will be required to accommodate added loads.

The existing distribution system should be replaced to accommodate computer loads and full air conditioning. In addition, the service would need to be altered to accommodate additions. Generally if the building is greater than 35,000 sq. ft. a 277/480V, 3Ø, 4 wire service should be provided.

INTERIOR LIGHTING SYSTEM:

New lighting fixtures should be installed with low glare type fixtures such as Parabolic 1'x4' with low iridescent louvers in the stacks. Office areas should have 2' x 2' parabolic fixtures installed. Common spaces/lobby should have pendant fixtures and downlights with fluorescent lamps for energy savings and long life.

Where 10 ft. ceilings can be provided pendant linear fixtures should be installed. Day lighting controls should be provided along exterior wall.



EMERGENCY LIGHTING SYSTEM:

A new emergency generator and light fixtures should be installed to serve all egress areas such as corridors, intervening spaces, toilets, and above exterior doors.

The generator should be sized to include heating system and communications system.

WIRING DEVICES:

The office will require a minimum of (1) duplex receptacles per wall and (1) double duplex receptacles at each computer workstations.

FIRE ALARM SYSTEM:

The Control panel should be replaced with an addressable type. The control panel power supply should be sized to accommodate ADA strobes in toilets and horn/strobes in corridors and public spaces.

DATA/TELEPHONE/CLOCK SYSTEM:

The existing data system is modular in construction and can be re-used. The existing telephone system appears to be Centrex service. The telephone system may be upgraded to a key switch. The existing clock system should be replaced due to its life expectancy.

EXISTING BUILDING CONSIDERATIONS:

Renovations to existing buildings do not impact electrical systems as much as HVAC, Plumbing and Fire Protection. The impact is generally additional cost for added conduit and cable due to restricted paths of travel. Fire alarm devices, receptacles, and light switches are located to accommodate the existing building construction and are generally not ideal for the user due to cost implications. In addition, telephone and data cabling is run through surface conduit flush to walls. Both conditions are generally not desirable.

Lighting is also a consideration when renovating existing buildings. Generally, the proper ceiling heights (10 ft. \pm) cannot be achieved resulting in less efficient lighting systems.



EXISTING CONDITIONS

BELMONT MEMORIAL LIBRARY

<u>HVAC</u>

GENERAL:

- The HVAC equipment appears to have been installed in two general stages. The original equipment including the boiler and chiller were installed in the mid sixties generally conforming to the 1964 drawings.
- Additional air conditioning systems were installed in the early seventies generally conforming to the 1972 drawings.

HEATING:

- Heating source is natural gas. Fuel oil tanks have been removed and the dual firing burners are operating strictly on gas.
- Boiler is a 2.3 million BTUH unit, Weil McLain sectional cast iron boiler with an induced draft fan and is original to the building.
- Generally the Building is heated with fin tube radiation & convectors. The children's library area is heated with self contained unit vents using hydronic heating and self contained cooling DX units.
- The building is reportedly not able to be properly controlled during the heating season.
- As part of the original construction air-conditioning was provided for portions of the building. Included were 2 pipe fan coils and a central heating and air-conditioning unit. Essentially the work areas and administrative areas were fed with air-conditioning, remainder of building was not.
- The original system includes a fifteen (15) ton chiller and a cooling tower which is located in an exterior areaway.
- In the early seventies, air-conditioning was added to the remainder of the building utilizing direct expansion condensers and air handlers located in the attic.
- Basement area assembly room is cooled with a York air handler with a condenser mounted in the areaway.
- There is a series of five (5) air handlers located in the attic area. Three (3) of these units supply air to the lower level and two (2) units supply air to the balcony area.
- There is a series of five (5) air-cooled condensers located on the roof. One (1) unit has been recently replaced. Remaining four (4) units are in poor condition.
- The building is not mechanically ventilated. The air handlers installed in 1972 did not include outside air. The 1964 system included minimal outside air to the air-conditioning unit.



- The attic ventilation system which consisted of pre-set thermostats in the attic has been inoperable for years.
- The existing pneumatic control system is in need of replacement.

RECOMMENDATIONS:

- The heating and cooling systems have far exceeded their life expectancy and should be replaced.
- The building generally lacks mechanical ventilation. While code can be met with sufficient operable windows, current practice dictates the use of mechanical ventilation systems to provide a proper indoor air quality. The tight floor to floor heights severely limit the ability to provide proper ventilation as ductwork distribution is severely hampered.
- The crawl space needs to be improved if proper indoor air quality is to be maintained.

EXECUTIVE SUMMARY/RECOMMENDATIONS

The objective set forth is to consider alternate systems which could apply and through economic and life cycle evaluation select the most desirable mechanical system with consideration given to building applicably lowest first cost, lowest operating cost, lowest maintenance cost, and overall level of automatic temperature control. A brief system description of each alternative is provided for reference, along with advantages and disadvantages of each system as well as historical experience with each of the studied systems.

With consideration given to all of the variables outlined, for this building we recommend a (2) pipe changeover console fan coil system approach with a hot water heating coil with modulating valve, chilled water coil with (2) position valve and filter. Outside air for ventilation will be through individual wall louvers at each fan coil unit due to the limited ceiling space available for mechanical utilities. A central exhaust system will be provided for exhausting of all introduced ventilation air. This design offers a very desirable installed first cost as well as low energy and maintenance cost with proper attention given to the introduction and volume of outside ventilation air. We believe that this system will offer a very good automatic temperature control as well as acceptable overall air quality conditions.

EXISTING BUILDING CONSIDERATIONS:

The renovation of an existing building can lend itself to many construction problems as well as higher construction costs. Also, by renovating existing building as compared to new construction many times the choices for different mechanical systems can be limited. In addition it can be very difficult to conceal many of the different mechanical devices for example piping, control wiring and much of the equipment has to be surface mounted.



Existing Conditions Site Review Judith Nitsch Engineering, Inc

Library Site

Water

Fire protection and domestic water services for the preferred library alternative would come from the municipal water main located in Concord Avenue. Telephone interviews with Water Department personnel indicated that there are no known issues with the main in Concord Avenue that would preclude new connections. Typical projects of this size would be served by a new 4-inch domestic water service and a new 6-inch fire protection service. New taps to the main would be recommended even if the existing services were in appropriate locations for reuse. The reasons for a recommendation of new services include: the age of the existing services, the fact that the services probably consist of unlined ductile iron pipe, and the relatively small cost of providing new services.

Sanitary Sewer

Sanitary sewer service for the preferred library alternative would tie into municipal sewer main located in Concord Avenue. A typical sewer service for a project this size would be either 4 or 6 inches. Sanitary sewer flows from site would see a slight increase due to the library expansion but relative to the capacity of the main in the street this increase would be minimal. If the sanitary sewer service for the existing library is in an appropriate location and of sufficient size it could be reused for the preferred alternative provided a video inspection of the service indicated that it was still structurally sound.

Stormwater

Storm water runoff from the library site could be handled in a variety of ways depending on the project's level of desire for "green" solutions. At the most basic level runoff from the parking areas would be directed through a pretreatment device such as a Stormceptor. Stormceptors and other similar devices work to remove suspended solids and oils and grease from the runoff. After pretreatment the runoff could be directed to a detention system which works by providing a storage volume for the runoff which will slow the rate at which the runoff leaves the site. Massachusetts Department of Environmental Protection stormwater regulations require that for any project subject to Wetlands Protection Act jurisdiction (such as the library site) that the rate of runoff from a site not be increased post-development. For a site with limited open space such as the library site, the detention system could consist of a series of storage pipes located under the parking lot. Depending on groundwater levels the detention system could also have an infiltration component that works to recharge the runoff into the groundwater. After treatment and detention the runoff could be discharge to Wellington Brook.

Potential enhanced ("greener") stormwater management options could include such things as: green roofs, stormwater recycling for irrigation, the creation of rain gardens and constructed wetlands. On many projects these enhanced stormwater management options are used as an educational opportunity and to promote environmental awareness.

Regulatory Issues

Wellington Brook and its associated riverfront area, which is defined as the first 200 feet from the top of the bank, are resource areas protected under the Massachusetts Wetland Protection Act. As a result, any work in those resource areas or in any buffer zone associated with a resource area, is subject to review and approval by the Belmont Conservation Commission. Typically new development is not allowed in the first 100 feet of any riverfront area, which in this case would be an extensive part of the existing site. However, the Wetlands Protection Act does allow for redevelopment of previously disturbed areas within the riverfront area. In a preliminary meeting with the Belmont Conservation Commission it



was indicated that redevelopment of the existing site up to back edge of the existing pavement would be acceptable.

A Flood Insurance Study prepared by the Federal Emergency Management Agency indicates that 100year flood elevation (a flood that has a 1% chance of happening in any given year) varies across the site from elevation 18 to elevation 17. A preliminary review of the sites indicate that for those elevations the 100-year flood would be contained within the bank of Wellington Brook and would not effect redevelopment of the site.

Pool Site

Water

Domestic water and fire protection services could be provided from either Concord Avenue or Cottage Street. For the same reasons listed for the library it would be recommended that new services be provided and that any existing water service be abandoned. Also, since new water services to the pool from Concord Avenue would require crossing the culvert the preferred alternative would be to bring in new services from Cottage Street.

Sanitary Sewer

Sanitary sewer service for the pool, concession stand and pool house could be provided through connection to either the sewer mains in either Concord Avenue or Cottage Street. Again, due to the need to cross the culvert, the preferred alternative for the sewer service would be to connect to Cottage Street.

Stormwater

Due to the absence of any vehicle parking or drives, stormwater runoff from the pool site would not need to be treated to the level of runoff from the library site. Pretreatment prior to detention could consist of just providing catch-basins with sumps to catch debris and hoods to restrict oils and grease. Detention, due to the increase in impervious area would also need to be provided. After detention the stormwater could be directed to the culvert through one of the existing connections from the site. The intensive use of the pool site and presence of the culvert under the lower portion of that site could make locating an area for detention difficult. A potential solution could involve using the portion of the park closest to Concord Avenue as stormwater storage by intentionally restricting the rate that runoff leaves that portion of the site.

Regulatory Issues

Article 97 of the Massachusetts Constitution provides protection to land held by a public entity and used for parks, open space or recreation. Article 97 land, such as the pool parcel, cannot be transferred or used in a manner contrary to Article 97 without the unanimous approval of the Belmont Recreation Commission, unanimous approval of the Belmont Conservation Commission, a two-thirds approval at Town Meeting and a two-thirds vote of both houses of the legislature.





Geotechnical Engineers

January 6, 2005

J. Stewart Roberts Associates, Inc. 48 Grove Street Somerville, MA 02144

Attention: Mr. J. Stewart Roberts

Reference:

nce: Belmont Public Library; Belmont, Massachusetts Preliminary Foundation Engineering Report

Gentlemen:

This letter report documents the results of our subsurface exploration and preliminary foundation design study for the proposed Belmont Public Library project located in the Town of Belmont, Massachusetts. Refer to the Project Location Plan (Figure 1) for the general site location.

This preliminary report was prepared in accordance with our proposal dated December 2, 2004 and the subsequent authorization of Mr. J. Stewart Roberts on December 3, 2004. These services are subject to the limitations contained in Appendix A.

Available Information

Information provided to McPhail Associates, Inc. and prepared by the Project Architect, J. Stewart Roberts Associates, Architects, included a 50-scale site plan, entitled "Belmont Public Library" provided electronically on December 3, 2004. Additional information provided to McPhail Associates, Inc. on December 24, 2004 included 20-scale drawings entitled "Memorial Library" and "The Belmont Public Library" dated January 29, 1964 and July 1963, respectively, prepared by Kilham, Hopkins, Greeley & Brodi Architects.

Elevations as noted herein are referenced to the lowest level slab of the existing library, which is understood to be at Elevation +27.0. It is unknown what base datum the elevations are referenced to.

Existing Site Conditions

The subject site consists of an L-shaped parcel which is bounded to the north by Concord Avenue, to the east by Cottage Street, and to the south and west by residential properties. The existing 2-1/2 story library structure is located within the western site limits and occupies an approximate 13,000 square-foot plan area. An existing pool and pool house are located to the east of the existing library structure and the Wellington Brook traverses the site in an east-west direction.

The portion of the site west of the existing library generally consists of paved parking. Grassed borders abut the existing structures elsewhere. The ground surface surrounding the existing library structure generally varies from about Elevation +24 to +26, with the exception of the north side where existing site grades slope downward from south to north from about Elevation +34 to +26 across a horizontal distance of about 40 feet. The existing ground surface across the eastern portion of the site generally slopes downward from south to north, varying from about Elevation +44 to approximately Elevation +20, across a horizontal distance of about 310 feet.

30 Norfolk Street Cambridge, Massachusetts 02139 617 / 868-1420 617 / 868-1423 (Fax)





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Proposed Site Development

Tentative plans for the redevelopment of the site include the construction of a new library structure that would be benched into the hillside near the location of the existing pool and pool house. A new pool and pool house would be constructed on the western portion of the site in the vicinity of the existing library.

Investigation Procedures

Our preliminary subsurface investigation consisting of six soil borings was conducted at the site on December 15 through 17, 2004. The boreholes were performed by Carr-Dee Corp. of Medford, Massachusetts under contract to McPhail Associates, Inc. Logs of the recent soil borings are contained in Appendix B. Approximate locations of the explorations are as indicated on the enclosed Subsurface Exploration Plan, Figure 2.

The recent subsurface explorations were monitored by a representative of McPhail Associates, Inc. who performed field layout, prepared field logs, obtained and visually classified soil samples, monitored groundwater conditions in the completed explorations and the groundwater observation wells, made minor adjustments to the exploration locations and determined the required exploration depths based upon the actual subsurface conditions encountered.

Field locations of the recent subsurface explorations were determined by taping from existing site features identified on the referenced site plan. The existing ground surface elevation at each boring location was determined by a level survey performed by McPhail Associates, Inc. utilizing vertical control provided by J. Stewart Roberts Associates, Inc. The vertical control provided was the top of the existing lowest level slab of the library structure which is understood to be at Elevation +27.0.

The recent borings were generally advanced utilizing 2-1/4-inch and 3-3/4-inch hollow stem augers powered by track-mounted hydraulic drilling equipment, with the exception of boreholes B-4 and B-6 which were advanced utilizing NW casing and the wet rotary drilling technique. Standard 1-3/8-inch I.D. split-spoon samples and standard penetration tests were obtained at 5-foot intervals of depth in accordance with the standard procedures described in ASTM D1586.

To permit continued monitoring of groundwater levels across the site, groundwater observation wells were installed within completed boreholes B-1 and B-2. Groundwater Monitoring Reports are presented in Appendix C. During the subsurface investigation an existing monitoring well was observed on-site and was determined to be operational. The approximate location of the existing observation well is indicated on the enclosed Subsurface Exploration Plan and a Groundwater Monitoring Report is contained in Appendix C.

Subsurface Conditions

Detailed descriptions of the subsurface conditions encountered within each of the recent boreholes are presented on the boring logs contained in Appendix B. The information obtained from the recent subsurface investigation was supplemented with ten borings performed for the existing library which were completed by others during March, 1963. Logs of the previous borings are contained in Appendix D. The





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generalized subsurface conditions across the site were inferred primarily from these explorations, but also from our knowledge of the local geology.

The recent borings indicate that the site is underlain by a 4 to 10-foot thickness of fill, which generally consists of a very loose to compact, brown to gray silt with a trace to some sand, also containing traces of brick, wood, and organics. Underlying the fill deposit, recent boring B-1 encountered a 4-foot thick organic deposit at a depth of 8.5 feet below ground surface, which generally consists of a soft, dark gray organic silt with a trace of fine sand. An organic deposit is also indicated to have been encountered within previous borings B63-3, B63-7A, B63-8, and B63-11.

Beneath the fill and organic deposits, the explorations encountered an alluvial clay deposit with intermittent granular layers of variable thickness. The surface of the alluvial deposit was encountered within the recent borings at depths varying from 4 to 10 feet below the existing ground surface, corresponding to Elevation +24.5 at boring B-6 and Elevation +16.0 at boring B-5, respectively. The cohesive portion of the alluvial deposit generally consists of a soft to very stiff, blue silty clay varying to a silt and clay. The granular portion of the alluvial deposit generally consists of a compact to dense, brown fine sand with a trace to some gravel and a trace of clay. A granular layer consisting of a compact, silty fine sand was encountered at the top of the alluvial deposit in boring B-2 at a depth of 8 feet below the ground surface and was observed to be about 17 feet in thickness. A 4 to 14-foot thickness of hard to very stiff, yellow silty clay was encountered at the top of the alluvial deposit in portion B-1, the recent boring B-6 and previous borings B63-11 and B63-14. With the exception of boring B-1, the recent boreholes were terminated within the alluvial deposit at depths ranging from 31.5 to 46.2 feet below the existing ground surface.

The previous boring logs, prepared by others, indicate that the alluvial deposit is underlain by a dense deposit of glacial till at depths varying from 10 to 53 feet below the ground surface corresponding to Elevation +13.5 in Boring B63-11 and Elevation -29.1 in boring B63-7, respectively. Based on the descriptions from the previous boring logs, the glacial till deposit generally consists of a sand and gravel with a trace of silt and clay, containing occasional cobbles. Where it was penetrated by the previous boreholes, the glacial till deposit was observed to vary from 2 to 7 feet in thickness.

Refusal, believed to be representative of the bedrock surface, was generally encountered in the previous soil boring explorations at depths generally ranging from 44.5 to 57.5 feet below the existing ground surface, corresponding to Elevation -21.3 at borehole B63-2 and Elevation -33.6 at borehole B63-7, respectively. Recent borehole B-1 and previous borehole B63-11 were terminated upon practical refusal at relatively shallow depths of 12.5 and 16 feet below the ground surface which correspond to Elevation +16.6 and Elevation +7.5, respectively.

Stabilized groundwater levels within the observation wells installed in completed boreholes B-1 and B-2 were observed to vary from 5.2 to 18 feet below the existing ground surface, corresponding to Elevation +23.9 and Elevation +22.5, respectively. Groundwater within the existing observation well was observed at a depth of 4.8 feet below the existing ground surface, corresponding to Elevation +17.6. It is anticipated that future groundwater levels across the site may vary from those reported herein due to factors such as normal seasonal changes, periods of heavy precipitation, and alterations of existing drainage patterns. Monitoring reports of the groundwater observation wells are contained in Appendix C.





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Preliminary Foundation Design Recommendations

Based upon the anticipated subsurface conditions indicated by the preliminary subsurface investigations, the site appears to be well suited for utilization of spread footing foundations in conjunction with slab-ongrade construction for the proposed structures. Spread footings should bear directly on the undisturbed, natural alluvial deposit. Utilization of a moderate design bearing pressure on the order of 2 tons per square-foot appears to be reasonable, however, selection of the final design bearing pressure should be made during the final design period. Recommended minimum footing widths for continuous and isolated spread footings are 24 and 30 inches, respectively.

All soil bearing surfaces adjacent to unheated areas should be provided with a minimum 4-foot thickness of soil cover as frost protection. Interior footings should be located such that the top of the foundation concrete is at least 6 inches below the underside of the slab-on-grade.

We recommend that future lowest level floor slabs located above the observed groundwater level be designed as slabs-on-grade underlain by polyethylene vapor barriers. The slabs located below the adjacent exterior grade should have a minimum 9-inch thickness of 3/4-inch crushed stone underling the vapor barrier, while the slabs located above the adjacent exterior grade should have a minimum 6-inch thickness of gravel fill underlying the vapor barrier. The underslab crushed stone should be underlain by a thickness of filter fabric, such as Mirafi 140N, spread across the excavated subgrade. Future floor slabs located below the observed groundwater level must be structurally designed to resist the resulting hydrostatic uplift pressures and should include a waterproofing membrane.

It is recommended that below-grade space be provided with perimeter and underslab drainage to protect occupied below-grade areas against groundwater intrusion. Based on the groundwater levels observed at the site varying from about Elevation +17.6 to +23.2, and in the interest of minimizing the quantity of groundwater which enters the perimeter and underslab drainage systems, it is recommended that the most economical building construction would include lowest level floor slabs located at or above Elevation +25.

Given that the structures will be supported on a moderately compressible silty clay deposit, long-term building settlement may result from consolidation of the clay due to the structural load transfer from the new spread footings to the clay. A settlement analysis should be performed during the final design phase to determine that the magnitude of total settlement and angular distortion are acceptable for the proposed structures.

For purposes of determining the total lateral seismic force or base shear for earthquake design, the site is considered to be an S_2 soil site as defined by Section 1612.4.2 of the Massachusetts State Building Code. Therefore, the soil factor "S" should be 1.2. The bearing stratum is not considered to be subject to liquefaction during the design earthquake based on the criterion of Section 1805.3 of the State Building Code (6th Edition).





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Final Comments

Based on our current understanding of the project scope, a final subsurface exploration program may need to be conducted once the final location and configuration of the proposed structures are selected. In addition, a final foundation engineering report should be prepared in conjunction with the final subsurface exploration program which provides final foundation recommendations based on the specific project

We trust that the above preliminary information is sufficient for your present requirements. Should you have any questions concerning the recommendations presented herein, please do not hesitate to call us.

Very truly yours,

design.

MCPHAIL ASSOCIATES, INC.

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Robert C. Hoyler, P.E.

J. Stewart Roberts Associates, Inc. January 6, 2005 Page 5



Programming

Library Building Program

A detailed building program that outlines all of the space needs for the Belmont Memorial Library was prepared by library staff and trustees. This building program, which identified space requirements, required seating, and required material capacities, was used as the basis for planning both the alternative options and the final schematic design.

In general the building program calls for approximately 46,000 gross square feet containing approximately 163,000 volumes and 219 reader seats. Library book collections will remain approximately the same size as the current collection, but seating for adults and children will be increased significantly.

The program calls for a large meeting room which can be divided into two smaller meeting rooms that can be made available to the public when the library is closed.

The building program calls for a Children's Department that is significantly larger than that of the current facility. A separate room is provided for children's programs to accommodate fortyeight children at a time.

A Computer Lab open to the public will provide both additional computers for public use and a dedicated area for computer instruction.

The Claflin Historical Room will be accommodated in the new facility. Additional comfortable seating in reading areas for adults is included in book stack areas. A Café area and an area for the friends book sale are also included in the program.

Based on the program prepared by the library, J. Stewart Roberts Associates prepared a program summary, and a program diagram illustrating program requirements, which are included in this report.

Pool

The Belmont Recreation Commission provided program information for the new pool facility based on the current recreational programs provided at the pool.









Site Design Options

To evaluate options for both the Belmont Memorial Library and the Underwood Pool, the architects and the consultant team were initially asked to investigate five options. Following that investigation, a sixth option was identified for consideration.

The Options are as follows:

Option 1 investigated the possibility of expanding the existing library building and parking on the existing library site.

Option 2 investigated options for demolition of the current library building and construction of a new facility on the existing library site.

Option 3 investigated options for expansion of the current library building and parking by utilizing an expanded site including the existing library site and the portion of the Underwood Pool site known as the "bowl."

Option 4 investigated options for demolition of the existing library building and construction of a new library facility on an expanded site including the existing library site and the portion of the Underwood Pool site known as the "bowl."

Option 5 investigated options for combining the library site with the pool site and creating new facilities for both the library and pool as a single project with the library located on the current pool site, and a new pool located on the current library site.

Option 6 was included as an additional option to evaluate the possibilities for creation of a new library on the library site and a new pool on the pool site to answer the needs of both facilities, while allowing the projects to happen.











Option 1B Site Plan

independently.

Option 1 – Existing Site – Library Additions and Renovations

Expansion of the existing building and expansion of parking on the existing site creates a number of significant challenges that were explored through the development of a number of alternative approaches.

The area available for expansion of the library building and parking is severely limited by conservation restrictions and zoning regulations

Site Constraints

Because the Wellington Brook at the rear of the site is a continually flowing stream the entire site falls within the two hundred foot zone of the Rivers Protection Act. Because the site has been previously developed it is possible to build on the site, with Belmont Conservation Commission approval. However, any new development must not have a negative impact beyond the current condition. Hopefully any new development can improve



the current impact on the Wellington Brook.

Because of the conservation restriction, new development on the site is restricted to areas that have already been developed. New development should not go over the line established by the edge of the current pavement.

Zoning Restrictions

The building is located in a single residence SR-C zone. Zoning requires a twenty-five foot front yard setback, a ten-foot sideyard setback, and a thirty-foot rear property line setback. The building height is limited to thirty-six feet measured to the highest portion of a flat roof or the average of a sloping roof

The existing building is set back approximately forty feet from the front property line. Current zoning requires a twenty-five foot setback. This provides for the possibility of addition to the front of the building approximately fifteen feet in depth.

Additions to the sides and rear are constrained by the areas of the site that have not been previously disturbed. Because the entire site is subject to the 200-foot buffer zone of the Rivers Protection Act, additions going beyond the line of the existing asphalt paving are not feasible. This limits the depth of potential additions to the rear and side of the building.

Long narrow additions, which wrap the existing structure with new construction, must be structurally isolated and would be expensive to construct because of the high ratio of exterior wall to enclosed interior area.

Renovation and Addition Issues

Expansion of the existing library building is difficult but not impossible to achieve. A number of serious constraints limit the feasibility of addition to the existing building.

Renovations to Load Bearing Masonry

The existing building was built as a load bearing masonry structure. The current Massachusetts State Building Code requires that the structure be seismically reinforced if the structure is significantly modified. The cost of seismic reinforcement is prohibitive. This means that if the building were to be added on to, no walls could be removed to open the existing building up to the addition. Existing windows would be enlarged to the floor to provide doorways into the new addition. Any addition must be structurally isolated and may not bear on the structure of the existing building.

See the structural engineer's report in the appendix of this report for additional information.



Option 1A Site Plan



Floor to Floor Heights

The existing library structure was built with approximately eleven feet of floor-to-floor height between the lower level and the main level and the main level and the mezzanine. The floor structure is approximately sixteen inches deep leaving only about nine and a half feet clear. Renovation the existing structure to today's standards would involve running a number of mechanical and electrical services between the floor structure and the ceiling further lowering the ceiling.

Renovations would require at a minimum that a fire suppression system and new lighting be installed. This would result in a ceiling height of approximately eight and a half feet.

Ideally libraries today are served by HVAC systems with air distribution. Such a systems allow for the efficient operations through the use of heat exchange equipment to extract heat from exhaust air and transfer it to fresh incoming air. An air distribution system would not be possible in renovated portions of the existing library because the floor-to-floor height does not allow for the required air ducts.

Parking Constraints

The need for additional on-site parking in conjunction with library expansion puts further constraints on site development. Any new parking areas must be within areas that have been previously disturbed. Because the area available for development is limited, provision for on-site parking in conjunction with building additions would require a multi-level parking structure.

Alternatives

A number of alternatives were considered for expansion of the library building and parking. After review of alternative diagrams with the Library Building Sub-committee, it was determined that Option 1B was the preferred approach for Option 1.

Option 1B wraps the existing library building with additions on three sides. Because of the configuration of spaces within the existing structure and the constraints on areas for expansion, accommodating the building program requires more square footage than the building program calls for due to the inefficiency created by those constraints. For instance, areas within the existing structure are divided by bearing walls that cannot be modified creating some rooms that are larger than program requirements. The narrow additions dictated by the site constraints result in rooms that are difficult to efficiently utilize.

The mezzanine level of the existing building is difficult to use programmatically. The narrow dimension of the floor makes it difficult to efficiently utilize the space. Because it is on a separate level from the main library services, supervision and provision of services to patrons is difficult on this level. The lack



Option 1B Site Plan



Option 1A Site Plan



of windows makes use of this level for library workspaces less than ideal. Because of these constraints it was determined that storage was the best use of the existing mezzanine.

Because of these constraints Option 1B contains 51,300 Sf as opposed to the 46,000 sf called for in the building program.

The building is expanded to the front with removal of the berm to create a new accessible entrance at street level. The front zone of the addition would contain a new stair and elevator as well as the circulation desk. The lower level contains library workspaces, the Children's department and the Meeting Room. The upper level contains the adult departments. Book stacks are contained in the side addition to provide the required structural floor loading.

Parking

Parking is provided in a parking structure located to the west of the existing building. The structure contains two levels of parking providing approximately 50 spaces.

The area available for parking is constrained by the limit established by the existing paving.

Option 1 Pros and cons

Pros

Provides for expansion of both library and parking on the existing site.

Cons

Constraints prevent efficient layout, thus creating a building larger than the program calls for.

Existing structural elements result in a plan that limits the ability of staff to supervise public areas.

Limitations in developable site area creates the need to fully build out the site.

Limitations on the expansion area create narrow additions that would be expensive to build, with lots of perimeter for the enclosed area.

Limitations created by the existing floor-to-floor heights compromise the options for efficient HVAC systems.

Above grade parking structure was seen to be potentially unattractive, expensive, and difficult to maintain.



Option 1B Upper Level



Option 1B Lower Level



Option 1A Upper Level



Option 1A Lower Level



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Option 2B Site Plan

Option 2 – Existing Site – New Library

A number of alternatives for providing a new library facility and expanded parking on the existing site were reviewed with the library building sub-committee. After review of several options illustrating differing configurations of library services and differing options for parking Option 2B was selected as the preferred Option for Option 2.

Because of the limited area available for development of both building and parking, options for provision of on site parking were key to the selection of Option 2B as the preferred alternative.

Site Design Options

Option 2B proposes a new two story library structure constructed over one level of underground parking. This approach permits a scheme that meets the library building program while minimizing the visual impact of on site parking.

Location of the bulk of the parking below grade reduces the necessity to build out the site as fully as in other alternatives. Impervious coverage on the site can actually be reduced from the current conditions, which has been positively received by the


conservation commission

Geotechnical investigations revealed ground water at an elevation approximately six feet below the lower floor level of the existing building. This means that the parking level would need to be constructed approximately two feet below the ground water level. Both waterproofing and an under slab drainage system would be provided for the facility.

While anecdotal evidence indicates that the Wellington Brook has not overflowed its banks on the library site, site grading would be developed to divert water away from the entrance to the garage in the event of flooding.

In addition to the underground parking approximately twenty two on site parking spaces would be provided at grade adjacent to the library.

The main entrance to the library would be at sidewalk level fronting Concord Avenue. Patrons parking in the underground garage could access the library via stairs or elevator from a lobby at garage level. Library deliveries are accommodated at a loading area to the rear of the building.

Building Design

The structure of the building is conceived as a steel frame in a 20' \times 30' grid to accommodate parking in the garage. The steel frame provides future flexibility because no bearing walls will constrain future modifications. The footing and columns of the steel frame can be sized to allow for addition of a future third floor.

The main level of the library contains library administration and workspaces, the circulation desk, children's services, meeting room, and book sale room.

The upper level contains the adult reading areas, book stacks, popular materials and historical collections.



Option 2B Site Plan



Option 2B Section



Option 2B Parking Level



Option 2B Parking Level



Option 2B Parking Level





Option 3 Site Plan

Option 3 – Expanded Site – Library Additions and Renovations

A number of alternatives were explored for options for expansion of the existing library and parking on an expanded site including the bowl area of the pool site.

Key issues of concern with Option 3 were the requirements of Article 97 restrictions on use of parkland for other purposes and the appearance of parking on grade.

Alternatives for Option 3 focused on the provision of parking in the area of the bowl. The bowl area is defined by the location of the underground culvert separating it from the pool. Because the bowl parcel is relatively narrow it appears more practical to develop it for parking than for library building expansion.

Options were developed for both on-grade parking and a two level parking structure with parking a half level above and below the street. The bowl area is capable of providing parking for approximately one hundred cars.



Because parking is accommodated in the area of the bowl, library expansion can be accommodated where the current parking is located. This approach allows for all additions to be located in one area to the west of the current library.

Additions and renovations are easier to accommodate in this configuration than in Option 1, but many of the difficulties inherent in renovation of the existing building remain.

The most significant drawback to Option 3 expressed by the building committee was the appearance of parking in either a garage or a surface lot and it's visual impact from Concord Avenue and the park.

Article 97 restrictions also pose a significant challenge to the feasibility of Option 3. Article 97 requires converting land of equivalent size and quality somewhere else in town into parkland in order to use the current parkland as parking for the library. In addition Article 97 land, such as the pool parcel, cannot be transferred or used in a manner contrary to Article 97 without the unanimous approval of the Belmont Recreation Commission, unanimous approval of the Belmont Conservation Commission, a two-thirds approval at Town Meeting and a two-thirds vote of both houses of the legislature.



Option 3 Site Plan





Option 4A Site Plan

Option 4 – Expanded Site – New Library

A number of alternatives were explored for options for a new library and parking on an expanded site including the bowl area of the pool site.

Options explored included both surface parking and a parking structure to be located in the area of the bowl and a new twostory library to be located on the site of the existing library building.

Option 4 schemes raised the same concerns with the visual impact of surface parking or parking structures that were expressed about Option 3.

Option 4 also has the same Article 97 restrictions, which make feasibility of this option challenging.



Option 4B Site Plan





Option 5B Site Plan

Option 5 – Combined Site – New Library & New Pool

Options were developed to investigate the feasibility of combining the library site and the entire pool site and constructing a new library in the general location of the current pool and constructing a new pool in the general vicinity of the current library.

Conceptually Option 5 appears to offer a number of advantages. It addresses the needs of both the pool and the library. It allows for a coordinated development of access parking and landscaping for both facilities.

If timed properly, Option 5 would allow the new library to be built on the pool site while the current library was occupied, this would eliminate the need for a temporary library facility during construction. It would allow the library to move only once, into the new library, instead of twice, once to the temporary facility and then again into the new library.

Option 5 would necessitate elimination of the pool during at least two summer seasons during construction.



Timing for Option 5 could also prove to be problematic. The current pool facility is not in good shape. If the pool were to fail in the immediate future, construction of a new facility would have to wait until after construction of the library. This could result in a situation where the community would be without the use of the pool for several years.

Site Design

The combined site was designed to allow for one entrance point for both the pool and the library. A drop-off area and limited parking was developed for the pool, and parking for the library is provided in a structure under the building. A drop-off drive was also developed for the front entrance to the library. A landscape plan was prepared by Carol Johnson Associates for Option 5B.

Swapping the library and pool sites falls under Article 97 guidelines. While the areas to be swapped are equivalent in size and quality, the swap will still require unanimous approval of the Belmont Recreation Commission, unanimous approval of the Belmont Conservation Commission, a two-thirds approval at Town Meeting, and a two-thirds vote of both houses of the legislature.

Library Design

A number of options were investigated for construction of a new library and parking on the pool site. Options included: a scheme where the library would be wrapped around two sides of a two-level parking structure built into the hillside; a new twostory library with a new two-story parking structure built into the hillside; and, a three-story structure built into the hillside, containing a level of parking at grade at the lowest level and a two-and-a-half-story library.

Of the options considered 5B was selected as the preferred option. This option creates a new three-story structure built into the hillside with one level of parking at grade at the lowest level. The lowest level also contains an entrance lobby loading facilities and mechanical spaces with the balance of library functions on the upper two floors.

The Building Committee expressed several advantages of this option, over the others considered for Option 5. Option 5B is less bulky in appearance than the other schemes because it is built into the hillside. It was preferred by the adjacent neighborhood because it keeps the bulk of the building away from most adjacent residences it has less impact on the park because it lets the open area of the park flow around it.



Option 5B Site Plan



Option 5B Section



Option 5A Site Plan



Option 5C Site Plan



Option 5C.1 Section



Option 5C.2 Section



Pool

The Belmont Recreation Commission feels that the size and shape of the current pool work well for the recreational swimming programs offered. The commission also feels that a significant sentiment has also been expressed by citizens of the town for maintaining the current pool shape and configuration.

A separate wading pool should be provided in addition to the main pool, and the pool house should be expanded to provide better locker facilities.

Option 5B calls for a new pool of the same size and shape as the current pool with an additional wading pool. The pool house provides a controlled entrance point into the pool area.



Option 5B Site Plan - Pool





Option 6 Site Plan

Option 6 – Separate Sites – New Library & New Pool

Following development of the previous five schemes and after review and discussion with the Library Building Committee and Recreation Commission, it was decided to evaluate options for a sixth option, which had not been initially considered. Option 6 evaluated the feasibility of construction a new library on the library site and construction a new pool on the pool site.

Conceptually, Option 6 offered potential advantages over Option 5. Option 6 still satisfies the needs of both the library and the pool and coordinates planning for both, but would allow each project to move forward on a separate timetable. Maintaining the pool in the existing park setting was considered an advantage by many.

Library

The proposed library for Option 6 is essentially the same as the new library proposed in Option 2B.



Pool

Development of a new pool on the current pool site presents a number of challenges and advantages.

Geotechnical analysis has identified high groundwater on the pool site. The bottom of the current pool is below the watertable. In addition run off from the hillside has contaminated the pool during periods of high rainfall. The new pool shown on Option 6 would be constructed approximately three to four feet higher than the elevation of the existing pool. A drainage swale would be created to divert water running off the hillside. Raising the elevation of the pool and reinforcing it to resist any hydrostatic pressure will solve problems experienced with the current pool.

The pool proposed in Option 6 is the same size and configuration as the current pool but has moved a few feet to the south of its current location. A separate wading pool is provided. A new pool house provides a secure entrance point into the pool area.

Option 6 proposed to develop the bowl area to create an addition amenity for the town. The bowl area is to be developed into an area which functions a spray park in the summer and an ice rink in the winter. The pool house is located between the bowl area and the pool to serve both areas.





Option 6 Landscape Plan

Carol Johnson Associates prepared a landscape plan for Option 6.

Preferred Option

After review by the Joint Study Committee, Library Building Committee, Library Trustees, and the Recreation Commission Option 6 was selected as the preferred option.

Option 6 provides the benefits of the combined site option while allowing the projects to happen on an independent timetable. It maintains the pool in its park-like setting and minimizes the impact on the neighborhood.

Because the library remains on library property and does not require the use of parkland, Article 97 regulations do not apply.

The Belmont Conservation Commission reviewed Option 6 and was pleased that it reduces the impact on the Wellington Brook by eliminating vehicular circulation directly adjacent to the brook and reducing the amount of impervious surfaces from the current condition. In addition new development will eliminate the current condition where run off from the parking goes directly into the brook.



Option 6 Parkiing Level



Option 6 Main Level



Option 6 Upper Level



Landscape Design Concepts

Landscape design concepts were prepared for Option 5 alternatives and for Option 6. They are included in the Drawings section of this report

Comparative Cost Estimates

Comparative Cost Estimates were prepared for Options 1 through Option 5. After development of Option 6 as the preferred option, a separate, more detailed estimate was prepared.

Comparative Cost estimates for Options 1 through Option 5 identify construction cost for the library, construction costs for the pool separately. Other project costs such as fees, furnishings, project expenses, contingency, and escalation were also included to develop a comprehensive project estimates.



Option 5A Landscape Plan



Option 5B Landscape Plan



Option 5C Landscape Plan



Option 6 Landscape Plan



Comparative Cost Estimate

Belmont Public Library Belmont , Massachusetts

Option 1B Existing Site Renovation & Addition

Comparative Cost Estimate 11/9/04	1B Existing Site	- Renovation/Addition	
	Quantity	Unit \$	Cost
Construction			
Demolition	0 Sf		\$0
Site Development			
Utilities	Allow	\$20,000	\$20,000
Roads	Allow	\$20,000	\$20,000
Walk	Allow	\$15,000	\$15,000
Construction			
Renovation	29,300 Sf	\$170.00/Sf	\$4,981,000
Architectural		\$60.00/Sf	
Finishes		\$55.00/Sf	
Mechanical		\$28.00/St	
Electrical		\$22.00/Sf	
Plumb & Fire		\$5.00/51	
New Construction	22,000 St	\$270.00/St	\$5,940,000
Architectural		\$160.00/St	
Finisnes		\$55.00/St	
		\$28.00/51	
Electrical & Tech		\$22.00/Sf	
Plumb & Fire		\$5.00/51	
Parking			
Surface Parking	18,750 St	\$8.50/51	\$159,375
Parking Deck	18,750 Sf	\$60.00/St	\$1,125,000
Underground Parking			\$0
Subtotal Construction	51,300 Sf	\$239.0/Sf	\$12,260,375
Furnishings		\$00.0C	****
Furniture	44,000 Sf	\$20/Sf	\$880,000
Subtotal	44,000 Sf	\$24.55	\$1,080,000
Equipment			
Computers	Allow	\$60,000	\$60,000
Library Equipment	Allow	\$20,000	\$20,000
Misc	Allow	\$15,000	\$15,000
Subtotal			\$95,000
Professional Fees			
Architectural		11.00%	\$1,348,641
Furnishings		10.00%	\$108,000
Subtotal			\$1,456,641
Project Expenses			
Project Manager / Clerk	Allow	\$225,000	\$225,000
Printing Bid Documents	Allow	\$25,000	\$25,000
Survey & Testing	Allow	\$30,000	\$30,000
Misc Expenses	Allow	\$50,000	\$50,000
Moving	Allow	\$100,000	\$100,000
Temporaty Facility	Not Included		
Subtotal			\$430,000
Project Contengency		7.000/	A. 070 F.L.
Contengency		7.00%	\$1,072,541
Total Comparative Budget Estimate of Project Costs in Current Dollars	51,300 Sf	\$319.58/Sf	\$16,394,557
Escalation			
Escalation 5%/Year 60 Months	S		\$4,098,639
Subtotal		\$399/Sf	\$20,493,197
Escalation 5%/Year 120 Months			\$8,197,279
Subtotal	835.	\$479/Sf	\$24,591,836



Comparative Cost Estimate

Belmont Public Library Belmont , Massachusetts

Comparative Cost Estimate		2B		
11/9/04		Existing Site -	New Building	
Construction		Quantity	Unit \$	Cost
Demolition		29,300 Sf	\$12.00/Sf	\$351,600
Cite Development				
Litilition		Allow	\$20,000	\$20,000
Boads		Allow	\$20,000	\$20,000
Walk		Allow	\$15,000	\$15,000
Walk		Allow	φ15,000	\$15,000
Construction				
Renovation		0 Sf		\$0
Architectural				
Finishes				
Mechanical				
Electrical				
Plumb & Fire			100000000000000000000000000000000000000	
New Construction		44,000 Sf	\$225.00/Sf	\$9,900,000
Architectural			\$115.00/Sf	
Finishes			\$55.00/Sf	
Mechanical			\$28.00/St	
Electrical & Tech			\$22.00/Sf	
Plumb & Fire			\$5.00/51	
Parking				
Surface Parking		10,000 Sf	\$8.50/Sf	\$85,000
Parking Deck			\$0.000.0	\$0
Underground Parking		22,000 Sf	\$90.00/Sf	\$1,980,000
			A00.101	A
Subtotal Construction		44,000 St	\$281/St	\$12,371,600
Furnishings				
Furniture		44,000 Sf	\$20/Sf	\$880,000
Stacks				\$200,000
Subtotal		44,000 Sf	\$24.55	\$1,080,000
Equipment				
Computers		Allow	\$60,000	\$60,000
Library Equiipment		Allow	\$20,000	\$20,000
Misc		Allow	\$15,000	\$15,000
Subtotal				\$95,000
Professional Fees				
Architectural			10.00%	\$1,237,160
Furnishings			10.00%	\$108,000
Subtotal				\$1,345,160
Project Expenses				
Project Manager / Clerk		Allow	\$225,000	\$225,000
Printing Bid Documents		Allow	\$25,000	\$25,000
Survey & Testing		Allow	\$30,000	\$30,000
Misc Expenses		Allow	\$50,000	\$50,000
Moving		Allow	\$100,000	\$100,000
		Not Included		¢ 400.000
Subtotal				\$430,000
Project Contengency				
Contengency			5.00%	\$766,088
Total Comparative Budget Estimate	\$	44 000 Sf	\$366/Sf	\$16 087 848
of Project Costs in Current Dollars			4000101	2.0,007,040
Escalation				
Escalation 5%/Year	60 Months			\$4,021.962
Subtotal			\$457/Sf	\$20,109.810
Escalation 5%/Year	120 Months			\$8,043,924
Subtotal			\$548/Sf	\$24,131,772

Option 2B Existing Site New Building



Belmont Public Library Belmont , Massachusetts

Comparative Cost Estimate	3A			
11/9/04	Expanded Site	- Renovation/	Addition	
	Quantity	Unit \$	Cost	
Construction				
Demolition			\$0	
Site Development				
Utilities	Allow	\$20,000	\$20,000	
Roads	Allow	\$20,000	\$20,000	
Walk	Allow	\$20,000	\$20,000	
Construction				
Renovation	29,300 Sf	\$170.00/Sf	\$4,981,000	
Architectural		\$60.00/Sf		
Finishes		\$55.00/Sf		
Mechanical		\$28 00/Sf		
Flectrical		\$22 00/Sf		
Plumb & Fire		\$5.00/Sf		
Now Construction	22 000 St	\$320.00/Sf	\$5,060,000	
Architecturel	22,000 31	\$230.00/31	\$5,000,000	
Architectural		\$120.00/51		
Finisnes		\$55.00/St		
Mechanical		\$28.00/St		
Electrical & Tech		\$22.00/Sf		
Plumb & Fire		\$5.00/Sf		
Parking				
Surface Parking	40,250 Sf	\$8.50/Sf	\$342,125	
Parking Deck			\$0	
Underground Parking			\$0	
Subtotal Construction	51,300 Sf	\$204/Sf	\$10,443,125	
Furnishings				
Furniture	44.000 Sf	\$20/Sf	\$880.000	
Stacks			\$200,000	
Subtotal	44,000 Sf	\$24.55	\$1,080,000	
Equipment				
Computers	Allow	\$60,000	\$60.000	
Library Equipment	Allow	\$20,000	\$20,000	
Misc	Allow	\$15,000	\$15,000	
Subtotal	74101	<i></i>	\$95,000	
Professional Fees				
Architectural		11 00%	\$1 148 744	
Furnishings		10.00%	\$108,000	
Subtotal		10.0070	\$1,256,744	
Project Expenses	A.H	#005 000	600F 000	
Project Manager / Clerk	Allow	\$225,000	\$225,000	
Printing Bid Documents	Allow	\$25,000	\$25,000	
Survey & Testing	Allow	\$30,000	\$30,000	
Misc Expenses	Allow	\$50,000	\$50,000	
Moving	Allow	\$100,000	\$100,000	
Temporaty Facility	Not Included			
Subtotal			\$430,000	
Deline Oraling				
Contengency		7.00%	\$931 341	
Contengency		7.0070	<i>\\\</i> 001,041	
Total Comparative Budget Estimate of Project Costs in Current Dollars	51,300 Sf	\$278/Sf	\$14,236,210	
Escalation				
Escalation 5%/Year 60 Months			\$3,559,052	
Subtotal		\$347/Sf	\$17,795,262	
Escalation 5%/Year 120 Months			\$7,118,105	
Subtotal		\$416/Sf	\$21,354,314	

Comparative Cost Estimate

Option 3A Expanded Site Renovation & Addition



Belmont Public Library Belmont , Massachusetts

Comparative Cost Estimate	4B			
11/9/04	Expanded Sit	te - New Build	ing	
Construction	Quantity	Unit \$	Cost	
Demolition	29,300 Sf	\$12.00/Sf	\$351,600	
Site Development				
Utilities	Allow	\$20,000	\$20,000	
Roads	Allow	\$20,000	\$20,000	
Walk	Allow	\$20,000	\$20,000	
Construction				
Renovation			\$0	
Architectural				
Finishes				
Mechanical				
Electrical				
Plumb & Fire				
New Construction	44,000 Sf	\$225.00/Sf	\$9,900,000	
Architectural		\$115.00/Sf		
Finishes		\$55.00/Sf		
Mechanical		\$28.00/Sf		
Electrical & Tech		\$22.00/Sf		
Plumb & Fire		\$5.00/Sf		
Parking				
Surface Parking	40,250 Sf	\$8.50/Sf	\$342,125	
Parking Deck			\$0	
Underground Parking			\$0	
Subtotal Construction	44,000 Sf	\$242/Sf	\$10,653,725	
Furnishings				
Furniture	44 000 Sf	\$20/Sf	\$880.000	
Stacks	11,000 01	\$L0/01	\$200,000	
Subtotal	44,000 Sf	\$24.55	\$1,080,000	
Equipment				
Computers	Allow	\$60,000	\$60,000	
Library Equipment	Allow	\$20,000	\$20,000	
Misc	Allow	\$15,000	\$15,000	
Subtotal	5		\$95,000	
Professional Fees				
Architectural		10.00%	\$1,065,373	
Furnishings		10.00%	\$108,000	
Subtotal			\$1,173,373	
Project Expenses				
Project Manager / Clerk	Allow	\$225,000	\$225,000	
Printing Bid Documents	Allow	\$25,000	\$25,000	
Survey & Testing	Allow	\$30,000	\$30,000	
Misc Expenses	Allow	\$50,000	\$50,000	
Moving	Allow	\$100,000	\$100,000	
Temporaty Facility	Not Included			
Subtotal			\$430,000	
Contengency		5.00%	\$671.605	
of Project Costs in Current Dollars	44,000 Sf	\$321/Sf	\$14,103,702	
Escalation				
Escalation 5%/Year 60 Months			\$3,525,926	
Subtotal		\$401/Sf	\$17,629,628	
Escalation 5%/Year 120 Months			\$7,051,851	
Subtotal		\$481/Sf	\$21,155,554	

Comparative Cost Estimate

Option 4B Expanded Site New Building



Comparative Cost Estimate

Belmont Public Library Belmont , Massachusetts

Comparative Cost Estimate	5B			
11/9/04	Combined Sit	e - Undergrour	nd Parking	
Construction	Quantity	Unit \$	Cost	
Demolition	29,300 Sf	\$12.00/Sf	\$351,600	
Cite Development				
	Allow	\$20,000	\$20,000	
Boade	Allow	\$60,000	\$60,000	
Walk	Allow	\$30,000	\$30,000	
		,	+,	
Construction				
Renovation			\$0	
Architectural				
Finishes				
Mechanical				
Electrical				
Plumb & Fire		4005 00 IDI	******	
New Construction	44,000 Sf	\$225.00/Sf	\$9,900,000	
Architectural		\$115.00/St		
Finisnes		\$55.00/51		
		\$28.00/SI		
Electrical & Tech		\$5.00/SI		
Fidilib & File		\$5.00/SI		
Parking				
Surface Parking	0 Sf	\$8.50/Sf	\$0	
Parking Deck		\$60.00/Sf	\$0	
Underground Parking	18,000 Sf	\$90.00/Sf	\$1,620,000	
Subtotal Construction	44,000 Sf	\$272/Sf	\$11,981,600	
Fundahiana				
Furniture	45 000 Sf	\$20/Sf	\$900.000	
Stacks	40,000 01	\$20/01	\$200,000	
Subtotal	45,000 Sf	\$24.44	\$1,100,000	
Equipment				
Computers	Allow	\$60,000	\$60,000	
Library Equipment	Allow	\$20.000	\$20,000	
Misc	Allow	\$15,000	\$15,000	
Subtotal			\$95,000	
Professional Fees				
Architectural		10.00%	\$1,198,160	
Furnishings		10.00%	\$110,000	
Subtotal			\$1,308,160	
Project Expenses				
Project Expenses	Allow	\$005 000	COOF 000	
Project Wallager / Clerk	Allow	\$25,000	\$225,000	
Survey & Testing	Allow	\$30,000	\$30,000	
Misc Expenses	Allow	\$50,000	\$50,000	
Moving	Allow	\$100,000	\$100,000	
Temporaty Facility	741017	\$100,000	\$0	
Subtotal			\$430,000	
Project Contengency				
Contengency		5.00%	\$745,738	
Total Comparative Budget Estimate of Project Costs in Current Dollars	45,000 Sf	\$348/Sf	\$15,660,498	
Escalation				
Escalation 5%/Year 60 Months			\$3,915,125	
Subtotal	у .	\$435/Sf	\$19,575,623	
Escalation 5% Near 120 Months			\$7 830 240	
Subtotal		\$522/Sf	\$23,490,747	
		40LLIOI	+_0, roo, r-rr	

Option 5B Combined Site

New Library New Pool



Schematic Design

A Schematic Design for a new library on the current site, in keeping with Option 6 was developed in sufficient detail to form the basis of a grant application to the Massachusetts Board of Library Commissioners Construction Grant program in February of 2005.

A Site Plan, Schematic Design Floor Plans showing proposed furnishings, building elevations, a building section, three dimensional computer study models, an exterior rendering, a series of interior renderings, a detailed cost estimate, and a takeoff of seating and volume capacities were prepared as part of the grant submission.

Site Plan

Because of the Wetlands Protection Act, development of the site is limited to areas within the current paved area. The building is set back twenty-five feet from the street to meet the zoning set back. Side and rear yards exceed the required rear and side yard set backs.

The main entrance to the library building faces Concord Avenue at street level. A vehicular entrance to the site is located near the location of the current entrance with surface parking for 21 cars. Deliveries are accommodated at the rear of the building. Access for service vehicles only is provided at the rear of the building to allow for maintenance of the brook and the culvert. This access way also provides fire truck access to the rear of the building.

The grade drops approximately three feet from the street to the back of the building. A ramp is located at the side of the building to provide access to the parking level.

An outdoor story garden is planned at the east end of the library building adjacent to the pool site. Located just outside of the children's department, this area will provide an outdoor place for children's programs in nice weather.



Schematic Design Site Plan



Schematic Design Section



Schematic Design Model



Schematic Design Model



Schematic Design Model



Library Building

The library building is designed as a two-story library with one level of parking below.

The parking level is designed to accommodate 62 cars. An elevator lobby provides elevator and stair access to the main level lobby of the library.

The floor of the parking level is located approximately six feet below existing grade. Geotechnical borings indicated groundwater to be about four feet below grade at this location, so the floor of the garage is about two feet below the level of ground water. Because of this, the parking level will be waterproofed and will have an under-slab drainage system to divert ground water from the slab.

Because the parking level is mostly below grade it will be provided with an exhaust system to remove carbon monoxide and other vehicular exhaust.

The building is a steel frame with a masonry veneer. The building is supported on concrete spread footings. The column bay spacing is 20' x 30' to allow for parking spaces at the parking level. The steel frame is intended to be designed to support future third floor expansion.

The main level of the library will house the main entrance, circulation desk, library administration areas, book processing and technical servcices, book sale area, café, meeting rooms, and the children's department.

The main level is arranged to provide after hours access to the meeting room, the conference room, and toilets. The lobby may be accessed after hours through either the front entrance or the parking lobby. Security to the second level is maintained by locking off the elevator to the upper level, and by securing the stairs to the second level, circulation desk, and information desk, with a pull down gate. The children's department, administration and work areas may be secured by locking doors.

Deliveries will come in through the back door directly into the Maintenance Delivery Area.

The upper level will house the reference collection, reference workroom, genealogy research room, fiction and non-fiction book stacks, browsing areas, audiovisual collections, computer lab, study rooms, periodical reading area, staff lounge, and the Claflin Historical Room.

The upper level features a main space containing reference, browsing, and reading areas with a high ceiling area and clerestory windows that provide natural daylight.



Concord Avenue View



View of Lobby



View of Children's Department



View of Children's Story Crafts Room



View of Reference





Exterior wall materials are brick veneer with precast trim and copper cladding. Roof materials are asphalt shingles and membrane roofing.

Interior finishes are commercial grade carpeting in most library areas, gypsum board walls and soffits, and acoustic tile ceilings.

It is intended to pursue 'Green Design' strategies in development of the design. A LEED rating chart is included in this report outlining possible 'green" options for consideration as the design progresses.



Parking Level Plan



Main Level Plan



Upper Level Plan



Yes

? No

Site Selection and Schematic Design Study Belmont Memorial Library Belmont, Massachusetts



Belmont Memorial Library

4	4	6	Sustain	nable Sites	14 Points
Y			Prereq 1	Erosion & Sedimentation Control	Required
		X	Credit 1	Site Selection	1
		x	Credit 2	Development Density	1
		x	Credit 3	Brownfield Redevelopment	1
x			Credit 4.1	Alternative Transportation, Public Transportation Access	1
		x	Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
	Х		Credit 4.3	Alternative Transportation, Alternative Fuel Refueling Stations	1
	Х		Credit 4.4	Alternative Transportation, Parking Capacity	1
		x	Credit 5.1	Reduced Site Disturbance, Protect or Restore Open Space	1
		x	Credit 5.2	Reduced Site Disturbance, Development Footprint	1
x			Credit 6.1	Stormwater Management, Rate or Quantity	1
	Х		Credit 6.2	Stormwater Management, Treatment	1
х			Credit 7.1	Landscape & Exterior Design to Reduce Heat Islands, Non-Roof	1
	Х		Credit 7.2	Landscape & Exterior Design to Reduce Heat Islands, Roof	1
x			Credit 8	Light Pollution Reduction	1
Yes	?	No			
1	2	2	Water E	Efficiency	5 Points
v	_		Credit 1 1	Water Efficient Londonnian Deduce by 500/	

x			Credit 1 1	Water Efficient Landscaning Reduce by 50%	1
~	х		Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
		x	Credit 2	Innovative Wastewater Technologies	1
	Х		Credit 3.1	Water Use Reduction, 20% Reduction	1
		x	Credit 3.2	Water Use Reduction, 30% Reduction	1
Yes	?	No			

4	11	2	Energy	& Atmosphere	17 Points
Y	1		Prereq 1	Fundamental Building Systems Commissioning	Required
Υ	1		Prereq 2	Minimum Energy Performance	Required
Y	1		Prereq 3	CFC Reduction in HVAC&R Equipment	Required
x			Credit 1.1	Optimize Energy Performance, 20% New / 10% Existing	2
x			Credit 1.2	Optimize Energy Performance, 30% New / 20% Existing	2
	Х		Credit 1.3	Optimize Energy Performance, 40% New / 30% Existing	2
	Х		Credit 1.4	Optimize Energy Performance, 50% New / 40% Existing	2
	Х		Credit 1.5	Optimize Energy Performance, 60% New / 50% Existing	2
	Х		Credit 2.1	Renewable Energy, 5%	1
		x	Credit 2.2	Renewable Energy, 10%	1
		x	Credit 2.3	Renewable Energy, 20%	1
	Х		Credit 3	Additional Commissioning	1
	Х		Credit 4	Ozone Depletion	1
	Х		Credit 5	Measurement & Verification	1
	Х		Credit 6	Green Power	1



? No

Yes

Site Selection and Schematic Design Study Belmont Memorial Library Belmont, Massachusetts



Belmont Memorial Library

2	7	7 4	4 Materials & Resources	Is & Resources	13 Points
Y			Prereq 1	Storage & Collection of Recyclables	Required
		X	Credit 1.1	Building Reuse, Maintain 75% of Existing Shell	1
		x	Credit 1.2	Building Reuse, Maintain 100% of Shell	1
		x	Credit 1.3	Building Reuse, Maintain 100% Shell & 50% Non-Shell	1
	Х		Credit 2.1	Construction Waste Management, Divert 50%	1
	Х		Credit 2.2	Construction Waste Management, Divert 75%	1
	Х		Credit 3.1	Resource Reuse, Specify 5%	1
	Х		Credit 3.2	Resource Reuse, Specify 10%	1
x			Credit 4.1	Recycled Content, Specify 25%	1
	Х		Credit 4.2	Recycled Content, Specify 50%	1
	Х		Credit 5.1	Local/Regional Materials, 20% Manufactured Locally	1
		x	Credit 5.2	Local/Regional Materials, of 20% Above, 50% Harvested Locally	1
	Х		Credit 6	Rapidly Renewable Materials	1
x			Credit 7	Certified Wood	1

Yes ? 11 4 No

0

Indoor Environmental Quality

Y			Prereq 1	Minimum IAQ Performance	Required
Υ			Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required
x			Credit 1	Carbon Dioxide (CO ₂) Monitoring	1
x			Credit 2	Increase Ventilation Effectiveness	1
	Х		Credit 3.1	Construction IAQ Management Plan, During Construction	1
x			Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1
x			Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	1
x			Credit 4.2	Low-Emitting Materials, Paints	1
x			Credit 4.3	Low-Emitting Materials, Carpet	1
x			Credit 4.4	Low-Emitting Materials, Composite Wood	1
	Х		Credit 5	Indoor Chemical & Pollutant Source Control	1
x			Credit 6.1	Controllability of Systems, Perimeter	1
	Х		Credit 6.2	Controllability of Systems, Non-Perimeter	1
x			Credit 7.1	Thermal Comfort, Comply with ASHRAE 55-1992	1
	Х		Credit 7.2	Thermal Comfort, Permanent Monitoring System	1
x			Credit 8.1	Daylight & Views, Daylight 75% of Spaces	1
x			Credit 8.2	Daylight & Views, Views for 90% of Spaces	1
Yes	?	No			

1	1 0 0		Innovat	tion & Design Process	5 Points
			Credit 1.1	Innovation in Design: Specific Title	1
			Credit 1.2	Innovation in Design: Specific Title	1
			Credit 1.3	Innovation in Design: Specific Title	1
			Credit 1.4	Innovation in Design: Specific Title	1
х			Credit 2	LEED™ Accredited Professional	1
Yes	?	No			
23	28	14	Project	Totals	69 Points

Certified 26-32 points Silver 33-38 points Gold 39-51 points Platinum 52-69 points



Outline Specifications

DIVISION 1

GENERAL REQUIREMENTS

Project Description: The New Belmont Memorial Library consists of demolition of the existing library facility, and construction of three level, steel framed addition. The project includes installation of sprinklers throughout the entire building as well as new HVAC, electrical and data systems.

<u>Temporary Facilities and Controls</u>: Furnish install and remove all temporary utilities, field offices and sheds, hoisting equipment, driveways, barriers, rodent control, and project identification signage.

<u>Cleaning and Disposal of Debris</u>: Dispose of all debris and excess rubble in a legal manner. Pay for all costs of hauling and fees for dumping. Perform clean-up as frequently as required to keep the work, the site, and adjacent properties free from accumulation of waste materials, rubbish and wind blown debris.

DIVISION 2

DEMOLITION

<u>Building Demolition:</u> Demolish and remove all structures, finishes, equipment and materials which are indicated for demolition or required to be removed to permit the construction of the work, including all additions to the original building and the adjacent foundations

<u>Salvage</u>: Salvage and store at the owners direction and as otherwise directed; items of historical significance which are designated to be removed from the building. Items to be salvaged for reinstallation as indicated on the drawings include but not limited to Bronze memorial plaques, stained glass, wood trims, assemblies, and other elements.

EXCAVATION AND EARTHWORK

<u>Description of Work:</u> Provide all earth work complete in place as indicated on the drawings or required for the completion of the work. Provide all excavation, trucking, filling, backfilling and compaction required for preparation of subgrades, construction of structures and improvements and installation of site utilities.



<u>Drainage</u>: Remove by pumping, drainage or bailing all water which may accumulate at the site within the contract limits where excavation and grading is done.

<u>Excavation</u>: Excavate sufficient material so as to allow ample space for construction operations and provide proper bearing for structures thereupon. Surplus excavated materials not required or suitable for further use shall become the property of the contractor and shall be removed from the site and legally disposed of.

<u>Trenching</u>: Trenching and backfilling for mechanical and electrical work shall be provided as shown on drawings and/or as required for the placement of site utilities, drainage and other underground lines as shown on the drawings.

<u>Base Courses</u>: Base courses for slabs on grade shall be approved structural fill of 8" maximum lift depth with a compaction of 95%.

<u>Backfilling and Grading</u>: Approved ordinary fill for backfilling and grading shall be stored on site and redistributed to a depth of not less than 6".

<u>Paving and Surfacing</u>: Walkways shall be Portland cement concrete with a compressive strength of 4000 PSI. A reinforcing of 6" by 6" welded steel wire mesh shall be provided. The base course shall be 6" of processed gravel compacted to 90%. A 1/4" type 2, non-extruded and resilient bituminous type premolded joint filler shall be provided for every 30' of walkway surface. Walkways and curb cuts shall have a broom finish.

LANDSCAPING

<u>Landscaping</u>: The work of this Section consists of all planting work and related items as indicated on the Drawings and/or as specified herein and includes but is not limited to, the following: loam borrow, preparation of backfill mix, planting, transplanting, maintenance, guarantee.

DIVISION 3

CONCRETE

<u>Description of the Work:</u> Perform all concrete work as necessary and required for the construction of the project as shown on the drawings. Concrete work includes but is not limited to poured in place footings and foundation walls, slab on grade floors, concrete fill at steel floor decks and metal pan stairs, and exterior sidewalks, curbs, stairs and site walls.

<u>Formwork:</u> Formwork shall be constructed of sufficient strength and so braced and tied together that the movement of men, equipment materials or placing and vibrating of concrete will not move them out of position.

<u>Form Ties and Spreaders:</u> Standard metal form clamp assembly, of type acting as spreaders and leaving no metal within 1 inch of concrete face.

<u>Tolerances:</u> Variation from plumb in lines and surfaces of columns and walls shall not exceed 1/8" in 10 feet

Embedded Items: Provisions shall be made for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, waterstops, and other features. All embedded items shall be securely anchored in



correct location an alignment prior to placing concrete.

<u>Reinforcing bars</u>: Reinforcing bars shall be new, deformed billet steel bars, conforming to ASTM A 615.

<u>Welded Wire Fabric</u>: Provide and install as indicated, new rectangular welded steel wire fabric conforming to ASTM A 185.

<u>Accessories:</u> Reinforcement accessories consisting of spacers, chairs, ties and similar items shall be provided and installed as required for spacing, assembling and supporting reinforcement in place.

<u>Concrete at Footings and Foundations and Columns:</u> Provide concrete in place with a minimum compressive strength at 28 days of 3,000 psi. Maximum aggregate size of 3/4" Maximum slump of 4".

<u>Concrete at Exterior and Interior Slabs and Stairs:</u> Provide concrete in place with a minimum compressive strength at 28 days of 4,000 psi. Maximum aggregate size of 3/4" Maximum slump of 4".

<u>Portland Cement</u>: Portland Cement shall be ASTM C150. Only one type and brand of cement shall be used on the project.

<u>Aggregates:</u> Aggregates_shall be ASTM C33 clean and graded from 1/4 inch of fines.

All concrete shall be ready mixed concrete delivered to the site in accordance with the requirements of "Specifications for ready-Mixed Concrete", ASTM C94.

DIVISION 4

MASONRY

<u>Description of the Work:</u> The extent of unit masonry work is shown on the drawings. Provide all unit masonry complete, in place, as shown, specified or required for proper installation. Install all elements of the precast concrete provided under another section according the installation requirements and tolerances set forth in this section. New masonry walls are intended to match in color and texture the existing building.

Unit Masonry work includes:

- A. Brick and precast concrete masonry veneer on steel stud back up.
- B. Installation of all through-wall flashings.
- C. Cutting and patching of existing masonry.
- D. Building in metal frames loose lintels anchors and bearing plates furnished by other trades

<u>Sample Panel:</u> Prior to installation of masonry work erect a sample wall panel mock up, using the approved face brick, precast concrete, mortar and CMU back-up, for the architects approval.

Quality Assurance: Comply with referenced standards and recommendations of the Brick Institute



of America (BIA) and the Prestressed Concrete Institute (PCI).

Exterior Face Brick: Exterior face brick shall be modular units meeting the requirements of ASTM C-216, grade SW in a color to match the existing building as approved by the Architect.

<u>Mortar:</u> Mortar Shall be Portland Cement ASTM C-150, Type I, non-staining, without air entrainment, with a mortar pigment to produce a color as approved by the Architect.

CAST STONE

<u>Description of the Work:</u> The extent of cast stone work is shown on the drawings. Provide all cast stone complete, including all reinforcing, imbedded items and anchorage, as shown, specified or required for proper installation.

<u>Quality Assurance:</u> Comply with referenced standards and recommendations of the Prestressed Concrete Institute (PCI), and the Cast Stone Institute.

<u>Cast Stone Trim</u>: Cast Stone trim is intended to match in color and texture, the natural limestone trim of existing building and shall be fabricated to the profiles indicated in a color to match the existing building stone work as approved by the Architect.

<u>Anchorage:</u> All anchorage provided shall be hot dipped galvanized, including any cast in elements that will be exposed to weather when set in their final location.

PRECAST CONCRETE

<u>Description of the Work:</u> The extent of precast concrete work is shown on the drawings. Provide all precast concrete complete, including all reinforcing, imbedded items and anchorage, as shown, specified or required for proper installation by masonry.

<u>Quality Assurance:</u> Comply with referenced standards and recommendations of the Prestressed Concrete Institute (PCI), and the Precast Concrete Institute

<u>Precast concrete Trim</u>: Precast concrete trim is intended to match in color and texture, natural limestone and shall be fabricated to the profiles indicated, with a light sandblasted finish as approved by the Architect.

<u>Anchorage</u>: All anchorage provided shall be hot dipped galvanized, including any cast in elements that will be exposed to weather when set in their final location.

DIVISION 5

MISCELLANEOUS METALS

<u>Description of the Work:</u> The extent of miscellaneous metal fabrications are shown on the drawings. The metal fabrications include Steel Pan Stairs, Stringers, Handrails, ornamental railings, elevator pit ladder and all other light iron or non-ferrous metal work necessary for a complete job.

<u>Galvanizing</u>: All ferrous metal work which will be exposed to the weather shall be hot-dipped galvanized.



STRUCTURAL STEEL

Description of the Work: Provide a complete structural system in place as indicated on the drawings.

Structural Steel: Structural steel shall conform to the following standards:

- A. Bolted and Welded Structures: ASTM A36
- B. High Strength Bolts and Nuts: ASTM A325
- C. Structural Steel Tubing: ASTM A500 Grade B
- D. Steel Pipe: ASTM A 53 Grade B
- E. Steel Joists: Steel Joist Institute (SJI) Standard Specification

<u>Shear Stud Connectors:</u> Shall be made of cold finished carbon steel bars conforming to ASTM A 108 requirements. The steel shall have a minimum tensile strength of 60,000 psi.

<u>Fabrication</u>: Structural materials shall be shop fabricated to the greatest extent possible. Shearing flame cutting and chipping shall be done carefully and accurately.

<u>Shop painting</u>: Shop prime all structural steel fabrications.

<u>Exposed Structural Steel</u>: Exposed to view structural steel shall be manufactured as such, with no unsightly bent, twisted, or burned steel. All welds are to be continuos and solid, brought up above the level of the surrounding material and then ground down flush, removing all burrs and weld splatter. Bolts and bolt holes shall be aligned and properly sized to avoid burning holes out bigger.

METAL DECKING

<u>Description of the Work:</u> Provide a metal decking systems in place as indicated on the drawings or required.

<u>Metal Floor Decking</u>: Decking shall be zinc coated, 20 gauge 3 1/2 deep composite units conforming to ASTM A446.

<u>Metal Roof Decking</u>: Decking shall be zinc coated, 22 gauge 1 1/2 deep units conforming to ASTM A446.

Accessories: Provide and install all closures and accessories required for a complete job.

<u>Fastening</u>: Fastening of deck units to supports shall be by electric arc welding. Fastening of decking units shall be by plug welding through curved washers to supporting top chords.

LIGHT GAUGE METAL FRAMING

Light gauge metal framing: Consisting of 16 and/or 18 gage "see" studs, and runners ASTM A-446 grade C & B size as noted. 6" 18 ga. galvanized steel studs. 6" 16 ga. galvanized steel studs at corners and as required.



DIVISION 6

ROUGH CARPENTRY

<u>Blocking</u>: Provide solid wood blocking at perimeters of all roof planes, and as required at all door and window openings, where required for nailers behind wood trims, ornament, wall hung lavatories, wall cabinets, wall hung grab bars, wall mounted railings and any other wall mounted load requiring support. Do not depend on GWB to support any load.

<u>Rough hardware</u>: Rough hardware shall be hot-dip galvanized for exterior use and hardware to be exposed in the finished interior work shall be paint grade steel.

FINISH CARPENTRY

<u>Finish Carpentry:</u> Finish carpentry shall include all interior running and standing wood trim, window and door casings, wood case work and plastic laminate covered countertops, cabinet hardware, glass and glazing for glass fronted cabinets, and circulation desk case work., built in book cases, and built in carrells

Paint grade standing and running trim shall be of custom grade poplar, or birch. Blind finished work wherever possible. Set surface nails and fill with plastic wood. Fit trim with tight joints. Scribe trim tightly to walls and soffits.

Stain grade standing and running trim, window and door casings and custom millwork and casework shall be of custom grade cherry. Blind finished work. Set surface nails and fill with plastic wood. Countersink and plug screws with cherry. Fit trim with tight joints. Scribe trim tightly to walls and soffits.

Wood case work shall be of the "Overlay" type, and be constructed of cherry veneer plywood cases with solid cherry, raised panel doors and drawer fronts, face frames, and reinforcing frames.. Plastic laminate covered counter tops shall be high pressure, 1/16" horizontal grade adhered to a substrate of 1 1/4 inch nine ply birch veneer core plywood, grade BD or better, with an exterior type waterproof glue. 1/32" plastic laminate may be used on vertical surfaces cabinet hardware shall be solid brass knob type with a mirror polished finish.

DIVISION 7

WATERPROOFING

<u>Description of Work:</u> Provide all waterproofing, dampproofing and sealants complete, in place for a proper watertight installation. Waterproofing includes

- A. Cementious waterproofing at elevator pit
- B. Dampproofing of foundation walls
- C. Dampproofing of masonry back up in cavity walls
- D. Sealing of interior and exterior isolation and expansion joints including paving.
- E. General exterior sealing between concrete, masonry, etc. and penetrations or abutting construction such as windows, louvers etc.
- F. Interior caulking to close gaps and to provide a smooth surface for painting.



<u>Dampproofing</u>: Provide trowel applied emulsion dampproofing, fibrated or mastic type, asbestos free.

<u>General Exterior Sealants:</u> Provide gun grade one-part polysulfide or one part polyurethane sealant complying with ASTM C-920, Type S, Grade NS, Class 12-1/2

Interior Sealants at non movement joints: Provide paintable acrylic Latex ASTM C-834

<u>Air Barrier</u>: Shall be a Self-adhering, self-sealing and self-healing rubberized asphalt integrally bonded to polyethylene film, nominal 40 mil thickness overall. Provide compatible membrane joint tape recommended by manufacturer. CCW-705 Membrane by Carlisle Coatings and Waterproofing, Inc

SINGLE PLY ROOFING

<u>Description of Work:</u> Provide a complete single ply sheet roofing system complete in place including all accessory materials, elastic sheet flashings, and all other roofing related flashings.

<u>Single-Ply Roofing System</u>: EPDM roofing system shall be used on flat and concealed from view sloped roofs. The membrane shall have a thickness of 60 mils and fully adhered to a 1/2" glass fiber board.

Provide prefabricated rubberized traffic pads suitable for use without cracking or breaking and compatible with the roofing system, as shown on roof plan.

Where indicated on drawings provide 4 mil. carbonated polyethylene film vapor barrier. Vapor barrier shall have lapped seams with self adhesive tape as recommended by manufacturer.

LOCK SEAM COPPER ROOFING

<u>Description of Work:</u> Provide a complete standing seam roofing system complete in place including all accessory materials, lead-coated copper flashings, gutters, scuppers, downspouts, snowguards, and all other roofing related flashings.

<u>Sheet Copper</u>: Sheet copper: Sheet copper shall be standard copper for building construction or equivalent. Unless otherwise specified, copper shall be 16 oz. cold rolled copper. Sheets shall conform to ASTM specifications B370 or Federal Specification QQ-C-576.

<u>Fasteners</u>: Nails used for fastening all copper, including flashing, shall be copper or hardware bronze of Stronghold type, or equal, with large flat head. They shall not be smaller than No. 12 Stubs gauge (0.109 inch) and of sufficient length to penetrate roof sheathing not less than 3/4 inch. Rivets shall be of hard copper, brass, or bronze. Screws and bolts used for fastening copper shall be copper, brass or stainless steel (passive).

Expansion inserts: Expansion inserts shall be lead, nylon or suitable plastic.

<u>Cleats</u>: Cleats shall be 2 inches wide by about 3 inches long and shall be made of 20 oz. cold rolled copper, unless otherwise specified. One end shall be locked into seams or into folded edge of copper sheets. Other end shall be nailed with two nails and folded back over nail heads, unless



otherwise noted on drawings. When expansion cleats are used, they shall be the same overall dimensions as fixed cleats.

DIVISION 8

DOORS AND WINDOWS

<u>Description of Work:</u> The extent of the windows and doors is shown on the drawings. Provide all doors and frames complete in place with hardware required for a proper job.

<u>Steel Doors:</u> Provide hollow metal doors and pressed metal frames at all exterior openings of the new addition, all exterior openings of the existing building calling for new doors, and all interior doors leading to exit stairs and back-of-house or mechanical spaces. Sheet steel shall be ASTM A366, free from scale pitting or other defects. Steel doors shall be shop primed. Interior doors shall be 18 ga..

<u>Steel Frames:</u> Provide shop primed steel frames for doors and sidelights as indicated on the drawings. Steel frames shall have welded and ground smooth corners. Interior frames shall be 16 ga.. Exterior frames shall be 14 ga..

<u>Wood Doors:</u> Interior doors unless otherwise noted shall be 1 3/4" solid core hardwood veneer stile and rail doors with wood raised panels. Typical doors are 3'-0" wide by 7'-0" tall. Wood doors shall meet the requirements of American Woodworking Institute (AWI) section 1300 "Custom" grade Cherry for transparent finish.

<u>Overhead Coiling Grilles:</u> Provide machine operated overhead rolling grille assemblies, complete including hardware as indicated on the drawings for night time security.

<u>Curtain Wall:</u> Curtain wall glazing system shall be a thermal break aluminum framing system with Kynar 500 coating glazed with 1" clear insulating glass tempered as required by code.

<u>Windows</u>: Windows shall be a factory assembled, factory glazed, prefinished aluminum exterior/ wood interior, operable sash unit with 1 inch insulated glass lights and integral hardware. For installation into all new masonry window openings, with the exception of fixed stained glass and custom built wood windows to remain. Provided with insect screens, all additional reinforcing required for larger spans as required by the manufacturer, and integral flashings and panning as shown on the drawings. All windows shall be custom made to the dimensions indicated on the drawings.

DIVISION 9

FINISHES

<u>Interior partitions:</u> Interior partitions shall consist of a steel drywall framing system with gypsum wallboard. Typical partition shall consist of 25 ga. steel studs with one layer of 5/8 inch Fire Code Gypsum wallboard on each side, with a two coat veneer plaster system applied to all surfaces.

Partitions in toilet rooms and janitors closet shall receive water resistant gypsum wall board.



<u>Ceiling and Soffitts</u>: As indicated on the reflected ceiling plan ceilings and soffits shall consist of hung and directly fastened Type X, 5/8" gypsum wallboard, with a two coat veneer plaster system applied to all surfaces.

<u>Acoustical Ceilings</u>: Provide acoustical ceilings as indicated on the drawings consisting of an exposed grid 2'x2' steel suspension system with lay-in acoustical ceiling panels. Steel suspension grid shall comply with ASTM C-635 requirements for intermediate duty. Acoustical Ceiling Panels shall be mineral fiber lay in type 2" x 2" x 3/4", lightly textured, tegular edged.

<u>Ceramic Tile:</u> Toilet Room floors shall be $2 \ge 2$ cushion edge thin set ceramic mosaic tile. All ceramic tile floors shall be accompanied by a coved ceramic tile base which coordinates with the wall tile.

<u>Ceramic Wall Tile:</u> Toilet Room walls shall be 4 1/4" x 4 1/4" matte glazed, cushioned edge thin set ceramic wall tile.

Atrium Floor: 2x2 Slate pavers

<u>Vinyl composition tile</u>: Vinyl composition tile flooring shall be 12" x 12", 1/8" thick and equal in appearance to Kentile "Hanover Slate".

<u>Carpet:</u> Floors in public areas shall be 30 ounce level loop pile commercial grade carpet, with a heavy duty backing, installed by direct glue down method.

<u>Paint:</u> Unless otherwise noted, wall, ceilings, wood doors, and trim shall be primed and receive two coats of eggshell enamel.

DIVISION 10

SPECIALTIES

<u>Toilet Partitions:</u> Toilet partitions shall be ceiling hung baked enamel, on steel, partitions with latching doors and coat hooks.

<u>Toilet Accessories</u>: Toilet rooms shall receive shelf at mirror, paper towel dispensers and receptacles, toilet paper dispenser, and soap dispenser. Provide napkin dispenser at Women's Toilet Room and Staff Toilet. Provide a folding baby changing table and table cover dispenser in both the Men's and Women's rooms at the children's library.

<u>Residential Appliances:</u> Provide two burner electric cooktop, microwave, dishwasher and 16 Cu ft refrigerator at the Staff Lounge. Provide two burner electric cooktop with an emergency shut-off switch, and 16 Cu ft refrigerator at the Crafts area of the children's library. Provide two burner electric cooktop with an emergency shut-off switch, at the meeting room kitchen



DIVISION 14

HYDRAULIC ELEVATOR

<u>Description of Work:</u> Furnish and install two, three stop, Oil Hydraulic elevator systems complete and operable as specified herein and as required to comply with governing codes and ordinances.

Elevator work includes the following:

- A. Cylinder casing and plunger, include in excavation and backfilling for casing.
- B. Motor, pump and controller.
- C. Guide rails, including furnishing of inserts to be built-in to other work.
- D. Elevator car platform and elevator cab.
- E. Hoistway entrances
- F. Signals, controls and miscellaneous operation and detection devices
- G. Electrical wiring, except as specified in the electrical section.

Door opening: Side opening

DIVISION 15

FIRE PROTECTION

<u>Building Services:</u> The sprinkler system for the building will be an automatic, wet pipe system that will provide coverage for 100% of the entire building. A new fire protection main will be brought onto the site and into the basement mechanical room. A double check backflow preventer will be provided at the fire main entrance into the mechanical room. A wet system alarm check valve and trim with dedicated sprinkler riser will be provided for the building. A fire department connection will be provided outside of the building and in an area readily accessible to fire department vehicles. The exact location and type of the fire department connection will be located on the outside wall adjacent to each fire department connection. Each floor of the building will be on a separate zone with its own isolation valve and flow switch. A zone control valve and flow switch will be located on each floor on the standpipe. All fire sprinkler systems will be designed, installed and tested in accordance with NFPA-13, NFPA-24 and the State Building Code 6th edition.



PLUMBING

<u>Building Services:</u> All plumbing systems for the building will be completely new. A new domestic water service will be provided and brought into the existing basement mechanical room and be connected to the existing street water main. A new underground sanitary drainage main will be installed for the plumbing fixtures in the building. The new underground sanitary drainage main will be connected to the existing street sewer main.

The plumbers work shall terminate at a point 10'-0" beyond the building. Piping beyond 10'-0" from the building shall be continued by the site contractor to the site sewer system. Cleanouts will be provided in the sanitary piping system in accordance with code.

<u>Plumbing Fixtures:</u> All plumbing fixtures shall be code mandated water conservation type. Water closets shall be wall mounted fixtures with concealed carriers and shall utilize 1.6 gpf manual flush valve devices. Lavatories shall be wall mounted fixtures with concealed wall carriers and exposed piping beneath the fixture. Faucets for all lavatories shall be single lever mixing / metering type with 0.5 gpm operation for water conservation and anti-scald protection. Kitchen sinks shall be stainless steel, counter mounted, single bowl and shall be ADA accessible in all cases. Sinks shall be standard design with goose neck, swing spout faucets and wrist blade handles. All water coolers shall be ADA compliant stainless steel finish double bowl, Hi-Low type with electric chiller. Urinals, if used, shall be wall mounted with concealed carriers and shall utilize 1.0 gpf manual flush valve devices. Floor drains shall be provided in all toilet rooms and mechanical rooms and as required by code. ADA accessible plumbing fixtures shall be located in the toilet rooms as required by the architectural drawings and in accordance with code. A floor outlet mop basin will also be provided on each level of the building.

HEATING VENTILATING & AIR CONDITIONING

<u>Boilers:</u> Provide new gas fired, cast-iron boilers, for space heating. Provide provisions for combustion air, hot water specialties and lead/standby circulating pumps with variable frequency drives. Provide a complete hot water distribution piping system to all heating terminal units, coils, etc. throughout the proposed library..

<u>Distribution</u>: Provide all pipe insulation, valves, ductwork, louvers, automatic temperature controls and appurtenances for complete and operable systems

<u>System Description:</u> Provide air handling or rooftop units for heating, ventilating and air conditioning for library areas in accordance with applicable code requirements. Supply air ductwork shall be run above drop ceiling area to variable air volume terminal units for zoning terminating in supply diffusers in each space; and return ductwork from new return registers to returns air ductwork system to each unit. Provide each unit with heating coil interconnected with heating hot water distribution piping system for heating. Provide each unit with a DX



cooling coil interconnected with an insulated refrigerant piping system to the remote air cooled condensing unit.

BASIS OF DESIGN: Heating, Ventilation and Air Conditioning

- A. Interior Design Conditions:
 - 1. Heating: 72 F occupied, 55 F unoccupied.
 - 2. Cooling: 78 F Db/65 F Wb occupied; No cooling during unoccupied hours.
- B. Outdoor Ambient Design Conditions: Climate Zone 14a
 - 1. Heating: -1 F
 - 2. Cooling: 86 F db/73 F wb
- C. Occupancy: In accordance with 1996 BOCA National Mechanical Code
- D. Ventilation: In accordance with 1996 BOCA National Mechanical Code

DIVISION 16

ELECTRICAL

<u>Service</u>: Provide a new (3) phase service to a new electric room within the basement. This service shall be 3 Phase, 4 Wire and shall be connected to a new pad mounted transformer located outside the building. All conduits shall be underground including those from the pole to the pad mounted transformer.

The elevators shall be (3) phase 208V and shall be connected to the main service panel.

<u>Fire Alarm:</u> A new fire alarm system shall be provided, the fire alarm control panel shall be located at the main entrance of the building. This panel shall be connected to the Belmont fire department via town notification devices.

<u>MDF (main communications closet)</u> This MDF shall be service from the exterior utility pole, all cables shall be run underground and serviced directly into the MDF. The MDF shall house all of the data equipment, telephone equipment and cable TV. The data equipment shall be rack mounted, the telephone shall be properly terminated on 110 blocks or similar industry standard. A plywood backboard will be supplied and the cable TV connection shall be mounted to the backboard.

<u>Lighting</u>: Lighting shall be energy efficient fluorescent. Fixtures shall be selected based on the ceiling types and function of space. All lighting shall be connected via a lighting control system. This system is required by code and shall shut off all lighting within the building at a designated time. Night lighting will be provided for security and safety and this fixtures would by pass the lighting control system. Night lighting will be provide in the Night Lobby and on the exterior



for book drops. A motion sensor shall be utilized for energy savings. Local switching will be provided in all areas, dual level lighting will be provided for all spaces as allowed by the fixtures selected.

<u>Receptacles:</u> General receptacles shall be provided through out the space based on the furniture layout. Floor mounted receptacles are recommended under tables in the main library area, meeting room, craft room, work room, local history and in the conference room. Receptacles for the circulation desk shall be provided within the furniture and serviced from conduits in the slab. Ground fault protected devices shall be utilized in the kitchen area, the bathrooms, exterior, and within the mechanical spaces.

<u>Communications</u>: Communications cables shall be run above ceiling in J hooks or other approved support method. Devices shall be provided for all equipment as required. Each office, conference room, meeting room, circulation desk, will be provided with Data and Phone. Data will be provide at the computer desks (one per computer) and at the reading desks (one for every 2 chairs). Phone will be provide in the elevator machine room as required, wall phone will be provide in area such as the craft room, the conference room and local history.

<u>Fire alarm</u>: Fire alarm will be provided in accordance with NFPA, Massachusetts State Building Code and all local ordinances. Fire alarm documents will be reviewed with the fire department prior to permit.





ARCHITECTS

48 GROVE STREET SOMERVILLE, MA 0 2 1 4 4 - 2 5 0 0

February 7, 2005

Ms. Brona Simon, Deputy SHPO Massachusetts Historical Commission 220 Morrissey Boulevard Boston, MA 02125

RECEIVED

FEB 0 8 2005 MASS. HIST. COMM RC. 36591

RE:

Belmont Memorial Library Belmont, MA

Dear Ms Simon:

Enclosed please find our project notification form for the above referenced project.

Please feel free to contact me if you have any questions or need additional materials.

Sincerely,

J. Stewart Roberts AIA Principal

After review of MHC files and the materials. you submitted, it has been determined that this project is unlikely to affect significant historic or archaeological resources.

3 1105 11

Date

Jeffrey Harris **Preservation Planner** Massachusetts Historical Commission

Tel: 617.666.8585 Fax: 617.666.8484 www.jsrob.com

J. Stewart Roberts, AIA Karla S. Johnson, AIA Philip F. O'Brien, Jr.



Preliminary Budget Estimate of Probable Project Costs Cost

3/15/05										
Construction										
Construction					* + * * *					
I otal Costruction			\$13,317,154		\$189/St					
Escalation	5%/Year	60 Months	\$3,679,284							
Subtotal Construct	tion			\$16,996,438	\$241/Sf					
Furnishings										
Furniture	45 000 Sf		\$780,000							
Stacks	10,000 01		\$300,000							
Computers			\$60,000							
Subtotal			φ00,000	\$1,140,000						
				<i>Q</i> 1,1 10,000						
Project Expenses										
Printing	Allow		\$25,000							
Survey & Testing	Allow		\$30,000							
Misc Exp	Allow		\$50,000							
Moving	Allow		\$100,000							
Temporary Facility	/ Allow		\$0							
Renderinas			\$1.500							
Project Mar SD			\$10,000							
Project Manager			\$300,000							
Subtotal				\$516,500						
Professional Fees										
Architecture SD			\$78,355							
Architecture DD,C	D Bid		\$1,100,000							
Architecture CA			\$450,000							
Furnishings	Allow		\$100,000							
Subtotal				\$1,728,355						
Project Contingency										
Contingency		10%		\$2 038 129						
Contingency		1070		φ2,000,120						
Total Budget Estimate	of Probable F	Project Cost		\$22,419,422	\$318/Sf					
.										
Grant Award				\$4,659,185	20.78%					
Balance				\$17,760,237						