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October 9, 2015

Ms. Martha Keenan
City of Burlington
Department of Public Works
645 Pine Street, Suite A
P.O. Box 849
Burlington, VT 05402

Dear Ms. Keenan:

Reference: Burlington Memorial Auditorium; Masonry Wall Deterioration

The following is a summary of my observations and opinions regarding the deterioration of the exterior masonry walls at the Burlington Memorial Auditorium. This summary is intended to supplement a more comprehensive Facilities Assessment Report on the Auditorium that was prepared by Stantec in April 2009 (see Attachment 2).

Masonry Walls – Description and Existing Conditions

The exterior walls of the building are multi wythe brick masonry, with ornate cast stone (concrete) belt and cap courses, sills and trim (see Photo 1). A 12" wide brick parapet wall extends above the roof level. There are 6 brick pilasters in the north and south walls of the building. 12" deep steel columns are embedded in these pilasters to support the steel roof trusses. There are also 6" deep horizontal steel beams embedded in the brick walls, just above the upper window level. The steel members that are embedded in the wall are corroding in some areas, due to moisture in the wall. Since there is no insulation or air barrier in the wall, moisture migration is likely occurring from the interior and exterior depending on seasonal and diurnal temperature and humidity differentials. In areas of the wall where the masonry is in tight contact with the steel, the steel corrosion is exerting pressure on the masonry, resulting in cracks in the brick walls (see Photos 2, 3 &4). The worst locations are the upper portions of the pilasters and the area of the horizontal steel beams that are located above the upper windows. The steel lintels for the upper windows are also corroding badly and exerting pressure on the window units (see Photo 5). Additionally, the cast stone elements have deteriorated significantly in some locations (see Photo 6). These problems mainly exist in the north and south walls of the building. The north wall is in worse condition than the south wall, likely due to warming and drying effect of the sun on the south side. The corrosion of the vertical steel columns is also worse on the outside flange of the columns, probably due to the generally colder temperatures on the outside face. The east and west ends of the building do not have embedded steel members in the wall, so they do not exhibit similar problems.

In April of 2008, repairs to the west end of the north wall were made to correct the problems noted above (see Photos 9-12). This work included removal of the brick around the top portion of the

Reference: Burlington Memorial Auditorium; Masonry Wall Deterioration

steel columns, removal of the brick on the outside face of the steel column down to about 20' from the top of the column, and removal of the brick wall above the top of the upper windows. The 6" deep horizontal steel beams between the tops of the columns were in very poor condition and were replaced with new steel beams. The outside flanges of the columns were cleaned and painted with a protective coating and new steel lintels were installed over the windows. Pre-cast stone elements were also replaced, as needed.

Additional Repairs

Based on my observations of the current condition of the north and south walls, it is my opinion that additional repairs need to be made to complete the work that was started in 2008. This basically involves removal and reconstruction of the walls from the top of the upper windows to the top of the parapets. The brick around the outside flange of the columns also needs to be removed below this level to a point where corrosion of the steel ends. All the embedded steel members should be inspected by an engineer when the masonry is fully removed for repairs and a determination made on what should be done with each member (clean and paint, repair, or replace). From a structural standpoint, the condition of the embedded steel columns is the main concern, since those are the primary load bearing members for the building. The condition of the outside flange of the column that was recently exposed (Photo 3) appears to be consistent with what was found with the other columns during the 2008 repairs. So it is likely that the column flange can be cleaned and painted with a protective coating. At some point, the section loss in the columns due to corrosion will become a significant structural concern and they will either need to be reinforced or replaced. Therefore, the repair work should be performed as soon as possible to avoid the need for additional work.

Estimated Repair Costs

Costs for the additional wall repairs includes the cost to remove and reconstruct the masonry (brick and stone elements), repair and or replace steel members, replace steel lintels, apply a protective coating to the steel members, roofing repairs, inspection, and engineering/architectural services. Since the full extent of the work is difficult to know until the masonry is removed and embedded steel exposed, a significant contingency fund should also be included. Based on the cost to perform the limited repairs in 2008, we would estimate the project costs to be as follow:

- Wall construction costs - $700,000
- Construction Inspection - $30,000
- Engineering/Architectural Services - $70,000
- Contingency (20%)- $140,000

Total $940,000

Reference: Burlington Memorial Auditorium; Masonry Wall Deterioration

The estimated time to perform the work is approximately 8 months, but this would be dependent on the size of the crew performing the work.

If you should have any questions, please do not hesitate to contact me.

Sincerely,

STANTEC CONSULTING SERVICES INC.

Michael J. Chenette, PE
Associate
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ATTACHMENT 1

Photos

Photo 1: North Wall

Photo 2: Pilaster Vertical Crack

Photo 3: Steel Column Corrosion

Photo 4: Horizontal Masonry Crack

Photo 5: Steel Lintel Corrosion

Photo 6: Concrete Cap Deterioration

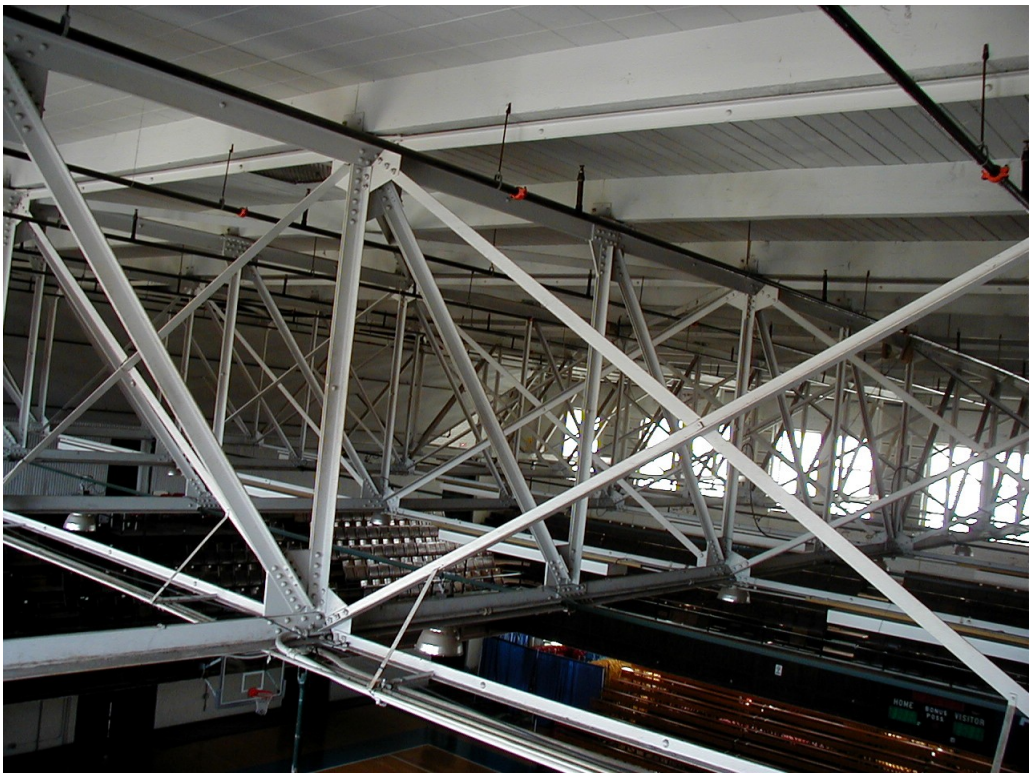

Photo 7: Steel Roof Trusses

Photo 8: Roof Membrane

Photo 9: 2008 Repairs

Photo 10: 2008 Repairs

Photo 11: 2008 Repairs

Photo 12: 2008 Repairs

ATTACHMENT 2

2009 Facilities Assessment Report

Stantec

FACILITIES ASSESSMENT REPORT
For
Burlington Memorial Auditorium
Burlington, Vermont

April, 2009

FACILITIES ASSESSMENT REPORT
For
Burlington Memorial Auditorium
Burlington, Vermont

April, 2009

Study Conducted By:

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North Springfield, VT 05156-0029
&
Banwell Architects
6 South Park Street
Lebanon, NH 03766

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BURLINGTON MEMORIAL AUDITORIUM

INTRODUCTION

This Facilities Assessment Report has been commissioned by the City of Burlington. This report is intended as an analysis of Burlington Memorial Auditorium to serve as a resource in decision-making, planning its continued use and maintenance. Issues of market position, program accommodation and potential to accommodate growth or change are not considered in this report.

Information was gathered from existing drawings, maps and reports where available, interviews with maintenance personnel as well as visits and inspections conducted in October 2008.

The facility is considered under the following general criteria:

Site	*(ST)* abbreviation used in project descriptions
Building Envelope	*(BE)*
Fire Safety	*(FS)*
Handicapped Accessibility	*(HC)*
Structural Systems	*(SS)*
Mechanical Systems	*(MS)*
Electrical Systems	*(ES)*

These criteria are further considered and classified in Project Summaries database included with the reports and are provided in electronic format for ongoing use by the City of Burlington in on-going capital and maintenance planning.

Projects are ranked by priority:

1	immediate need
2	required improvement
3	recommended improvement
4	enhancement project

The project cost estimates are for use in budget planning; they are based on current dollars and should be adjusted as needed for work beyond 12 months of report date.

In general, the estimates consider projects undertaken individually; there may be significant economies of scale if projects are combined. Some projects, however, are interdependent, or will require further architectural or engineering analysis and design. Unless otherwise noted, cost estimates do not include design fees or other soft project costs such as land surveys, bond counsel, permit fees, bidding expenses, construction testing or contingency funds. Depending on the size, type and complexity of the project, total soft costs can range from 15% to 20% of construction cost. It should also be noted that maintenance level projects can be undertaken without architectural or engineering design work. Projects that warrant further architectural or engineering (A/E) analysis and design are identified in Project Summaries.

BURLINGTON MEMORIAL AUDITORIUM

EXISTING

Facility	Burlington Memorial Auditorium Main and South Union Streets
Site	approximately .9 acres Downtown Transition (DT) Zone
Year Constructed	1927
Additions, Alterations	internal only
Construction Type IBC Table 601	IIIB, non-combustible unprotected, wood roof decking with masonry bearing walls, steel floor and roof framing
Occupancy NFPA 101 15-1.2.2 IBC 302.2.1	A-3: Assembly
Assessed Value:	$_____ (tax exempt)
Floors	3 floors plus basement and partial sub-basement

SITE

The following observations on this site are based on available maps, discussions with users and visit observation.

LOCATION/SIZE

Northwest corner of Main and South Union Streets
0.9 acres

UTILITIES

The site is served by municipal water and sewer.

RETAINING WALLS

Existing concrete retaining walls next to the access drive from South Union Street have some cracks and areas of spalling. The concrete with the most deterioration is generally at the base of railing posts. The posts are significantly rusted at those locations.

Project #: ST.1 Priority: 3
Concrete repair and new railing.
$4,000

TRAFFIC/PARKING

Site is accessed from service drives on the east from South Union Street, the south from Main Street, and the north from College Street. These lead to service entries at the north side of building. There is limited on site parking, approximately 24 vehicle spaces. The paved areas have cracked and heaved in spots and have been cut and patched in several locations. Curbs around dumpster area have moved and are broken up. The drainage basin near the northwest corner of the parking area is set too high and is unable to collect runoff.

Project #: ST.2 Priority: 3
Reconstruct parking lot subbase and paving in some areas, reconstruct damaged curbs, reset drainage basin.
$35,000

PEDESTRIANS

Public lobby access to main entry at east from South Union Street. In addition, Main Street slope provides pedestrian entries to Burlington City Arts Print & Clay Studio at lower level, 250 Main Street and Teen Center, 242 Main Street. The concrete sidewalk leading from South Union Street to the exterior stairs on the north side of the building have heaved and cracked in several locations.

Project #: ST.3 Priority: 3
Remove and reconstruct exterior sidewalk.
$7,000

LANDSCAPING

Minimal lawn and shrubs adjoining building. Lawn slopes toward foundation near southeast corner of the building. There is also a depression in the lawn next to the foundation, located below the fire sprinkler drain.

Project #: ST.4 Priority: 3
Regrade lawn area near southeast corner to drain away from foundation. Construct concrete splash pad under sprinkler drain.
$2,000

BUILDING ENVELOPE

The following notes and recommendations on this facility's building envelope are based on review of existing construction documents where available, reports from building users and maintenance personnel, as well as observations made during visits. Unless noted otherwise, no excavation, testing or intrusive investigations have been made.

ROOF

Low slope structural deck with perimeter masonry parapet walls, internally drained by eight (8) roof drains, current roof surface is 1997 ballasted membrane roof installed by Burrell Roofing, Williamstown, VT. Currently performing well, warranty coverage (typically 10-15 years) not known.

Recommended that City maintain a capital reserve fund for roof maintenance and replacement, timed and funded to correspond with membrane warranty period (10-20 years is industry standard range).

EXTERIOR WALLS

Exterior walls are multi wythe bearing brick masonry ranging from 28" to 16" in width, 12" at parapets, with ornate and distinctive cast stone (concrete) belt and cap courses, sills and trim. Considering its age, brick and its mortar joints are generally in fair condition with few signs of differential settlement or widespread cracks but in areas adjacent to steel bearing points, water infiltration, oxidation and steel expansion has opened joints allowing further water infiltration that will, unchecked accelerate deterioration. This is especially apparent adjoining roof truss locations near top of north and south walls. Cast stone elements show signs of significant spalling and advanced deterioration in a wide range of locations.

These issues have been examined in detail in 1/16/08 evaluation/rehabilitation proposal by Liszt Historical Restoration, Essex Junction, VT (see appendix). A partial repair, involving reconstruction of an upper portion of north wall has been successfully completed. This masonry repair and reconstruction should be continued around the building's entire upper perimeter. In addition, deteriorated cast stone elements, an essential feature of the building's historically significant character, located throughout the exterior walls should be removed and replaced. This work may continue to be phased as currently begun but a single mobilization allowing multiple use of ornate precast concrete forms should be considered for cost-effectiveness.

A related issue is the thermal performance and moisture management of the exterior walls. Built without insulation or air barriers, these walls allow moisture migration from both the interior and exterior depending on seasonal and diurnal temperature and humidity differentials. For reduced energy consumption, and the ability to add interior air conditioning, see MECHANICAL SYSTEMS, consideration should be given to adding interior insulation and vapor barrier. Interior, not exterior to preserve the building's historically important exterior appearance. This would of course be a major retrofit project but would allow a wider range of use without relying on open windows and noise for occupant comfort

as well as better energy performance, meeting or exceeding current codes.

*Project #: **BE.1** Priority: **1***
Continue and complete masonry wall repair program including treatment of oxidized embedded steel member treatment as well as exterior chemical waterproofing application with re-application at recommended intervals to prevent re-occurrence.
In addition, remove and replace deteriorated precast concrete wall elements.
$500,000 - $750,000

*Project #: **BE.2** Priority: **4***
Insulate exterior walls at interior including vapor and air barrier.
$400,000 - $800,000

DOORS/WINDOWS

Original windows are steel frame, single glazed, with poor energy and noise control characteristics. Some have been replaced with insulating glass in thermally broken frames but without much attention to maintaining historic appearances. Recommended that all windows be replaced with historically consistent windows (match original glazing pattern including diagonal muntins) with high performance glazing and thermally broken aluminum frames.

Main exterior doors at Lobby are glazed wood frame, aluminum storefront at BCA Clay and Print Studio, serviceable condition. Wide service doors at north have been replaced with insulated upward acting doors, good condition.

Main auditorium entries at South Union Street would benefit from weather protection. Original suspended steel frame canopies, with ornate decorative pressed metal edging have been removed and should be replaced for functional protection of doors and hardware, will lessen tracked-in water and dirt and restore the Auditorium's historically significant appearance. Original drawings of these canopies are available and would provide an historically authentic template for replacement as well as a significant and highly visible upgrade to the building's appearance.

Existing stairs at main auditorium entry has been replaced but concrete steps are showing signs of deterioration and will need replacement soon. Steel frame at adjoining access ramp for is badly rusted and will needs replacement.

*Project #: **BE.3** Priority: **2***
Replace windows
$400,000 - $600,000

*Project #: **BE.4** Priority: **2***
Rebuild auditorium entry including new ramp, stairs and replacement suspended steel canopies
$600,000 - $800,000

Many interior doors are original wood panel types, in good to very good condition. Existing knob hardware will present increasing difficulty in future maintenance, see also HANDICAPPED ACCESSIBILITY.

*Project #: **BE.5** Priority: **3***
Replace existing mortise lock hardware with lever hardware masterkeyed with balance of building.
$50,000 - $80,000

FLOORS Main auditorium floor is strip maple, recently refinished, very good condition. It's reported to be original and considering its age, there may be only a limited number of re-sandings possible without exposing tongue strips and nailers. Close monitoring of this condition is suggested, with re-finishing only by highly qualified flooring contractors familiar with gymnasium wood floor systems.

Existing terrazzo at Lobby in very good condition, other floors, vinyl, painted concrete in fair to good condition, repair or replace as needed.

INTERIOR PARTITIONS Existing interior walls are primarily brick; aside from efflorescence or stains from previous leaks, they are in good condition.

HAZARDOUS EXPOSURES Survey existing facility for radon, asbestos and lead paint; abate identified hazardous exposures. Maintain management plan and update as improvement projects are undertaken.

FIRE SAFETY

The following findings on fire safety are made comparing existing construction with model uniform building code requirements in use by the City of Burlington: VT Fire & Building Safety Code including adopted model codes; National Fire Protection Association (NFPA) 101 Life Safety Code, 2003 edition and International Building Code (IBC), 2003 edition.

HEIGHT AND AREA

Existing building; 3 story plus basement and sub-basement, approximately 50' average height, approximately 17,200 sf at the largest floor. With bearing masonry walls and wood decking at roof it most closely matches Type IIIB construction as outlined in IBC Table 601. Use Group is Assembly A-3.

These exceed allowable area and height limits from IBC Table 503 for Type IIIA construction: 2 story, 55' height, 9,500 sf per floor. However the facility's sprinkler coverage and full perimeter access for firefighting, increases allowable area, 9,500sf (IBC 506) to over 28,500 sf and number of floors, 3 story, 75' height (IBC 504) to remain within allowable limits

MEANS OF EGRESS

Occupant Load: posted limit; 2,500 occupants
based on egress capacity
including 812 balcony seats

Number of Exits: 4 required, occupant load >1,000 (NFPA 7.4.1.2), meets

Exit access travel distances meet 250' limit with sprinklers (NFPA 13.2.6).

Festival Seating, with occupant load >1,000 allowed (NFPA 13.2.5.4) only with approved life safety evaluation (NFPA 13.4). Confirm and update current written life safety evaluation with Burlington code authorities.

Stair enclosures are 1 hr rated (IBC 1019), masonry walls match tested assemblies. The masonry wall construction is based on tested assembly ratings for fire resistance, doors are rated and equipped with closers to maintain required fire and smoke separation.

However, hand- and guardrails in exit stairs will require replacement to meet current code requirements (NFPA 7.2.2.4.4 and 7.2.2.4.5).

The existing exterior fire escape stairs, not allowed as approved exits under current codes can remain if they are less than 50% of required means of egress (NFPA 7.2.8.1.2.1). Considering main entry/exits at South Union Street and west enclosed stairwells, this exemption applies. However adjacent door and window openings are required to be fire-resistive rated (NFPA 7.2.8.2) unless with sprinkler protection, local code authorities can modify (NFPA 7.2.8.2.2). Considering their age, these

stairs, their steel framing supports and structural wall connections should be regularly maintained to prevent corrosion and monitored.

*Project #: **FS.1** Priority: **2***
Replace hand- and guardrails in exit stairs
$80,000 - $120,000

FIRE DETECTION — A fire alarm system is required (NFPA 101, 12.3.4.1) for this building type and size and is present, see ELECTRICAL SYSTEMS for discussion on its capability and condition.

FIRE PROTECTION — Provide additional portable fire extinguishers (IBC 906).

*Project #: **FS.5** Priority: **3***
Provide additional extinguishers and cabinets
$5,000 - $6,000

HANDICAPPED ACCESSIBILITY

The following findings on handicapped accessibility are made comparing existing conditions with VT Access Rules (2007) and its adopted model code, American with Disabilities Act Accessibility Guide (ADA AG)

SITE Adjacent sidewalks include cub cuts. No accessible on-site parking is provided.

CIRCULATION The main entry on South Union Street is accessible by means of an exterior wood deck/steel framed ramp. The steel framing exhibits advanced rust deterioration, see STRUCTURAL SYSTEMS. Other building entries, such as BCA and Annex are not accessible.

Lobbies and corridors are of adequate width and provide access to primary program areas within this building. However no access is provided between floors or to stage or to balcony seating.

Most doors to other program areas are 36" wide and appear to provide adequate clear operating areas.

Knob type door hardware, present only at most door openings requires grasp for operation; those on accessible path should be replaced with locksets with levers. Depending on extent, hardware replacement presents opportunity for increased building security and access control with a new keying system.

The fire alarm system should be tested to ensure hearing or vision impaired occupants are aware of alarm condition. This may require addition or horn, strobe or combination devices, see ELECTRICAL SYSTEMS.

Project #: ***HC.1*** *Priority:* ***2***
Install new hydraulic passenger elevator at one or more locations between floor levels for public and presenter use; size for passenger use, stretchers and limited freight moving, include hands free emergency phone.
$200,000 - $400,000

Project #: ***HC.2*** *Priority:* ***3***
Replace existing door hardware with locksets outfitted with levers
$ refer to ***BE.5***

PROGRAM FUNCTIONS Provisions for handicapped users should be made at fixed casework used for required administrative, public or presenter functions such as dressing rooms. These typically involve lower counter height with open knee clearance below.

Room identification signage with contrasting colored raised text and braille should be provided.

*Project #: **HC.3** Priority: **3***
Adapt existing counters for access
$20,000 - $40,000

*Project #: **HC.4** Priority: **2***
Add engraved plastic room identification signage
$3,000 - $5,000

TOILETS Existing multi-fixture rooms at lower level are not accessible. Single occupancy toilet rooms have been provided off main lobby and meet accessibility requirements.

STRUCTURAL SYSTEMS

The following notes on this facility's structure are based on review of existing construction documents where available, as well as observations made during a site visit. Unless otherwise noted, no excavation, testing or intrusive investigations have been made.

SEISMIC Without invasive investigation of masonry bearing walls, little is known about likely building performance in an earthquake or severe seismic event. Current codes include provisions for masonry reinforcement that this building likely does not meet. Under-reinforced or unreinforced masonry buildings are susceptible to damage and potential collapse under extreme lateral loads from seismic activity. Minor renovations to older structures do not necessitate that the buildings be brought to full compliance with current seismic code requirements. The authority having jurisdiction (AHJ) might invoke that authority for buildings having substantial renovations or additions, and require that the entire facility be made to comply with the current seismic requirements should the building be upgraded.

ROOF FRAMING The roof is framed with six ten-foot deep steel trusses spanning across the building to the north and south masonry bearing walls. The trusses are on 16 ft.- 2 inch centers. Roof purlins, 6x14 "Hard Pine" (HP), span between trusses at panel points, generally, 8 ft.-9 ½ inches on center. A 3 inch HP Deck spans between purlins.
From the loading diagram found on sheet 13 of the original construction drawings, labeled "Corrected To March 18, 1927, we conclude that the trusses were designed for a total load of about 83 pounds per square foot (psf). With allocations for the dead loads of the roofing, decking and purlins, there is an apparent live load capacity of about 60 psf. Depending on the specific quality of the lumber used, the decking may have a similar capacity, whereas the purlins may only rate to 45-50 psf live load. Although there was water staining of the roof deck over the balcony, we understand that the latest re-roofing about 12 years ago may have addressed those areas of concern.

FLOOR FRAMING Floor framing is indicated to be 3 inch HP Plank on steel beams, except over the boiler room where a 4 inch concrete slab on steel beams. From limited information on the available drawings and limited access to details of the floor framing, we are unable to load rate the floors. However, with no indications of problems with the floor framing, i.e. sagging, deflection, etc., these elements appear appropriate to the current assembly use.

MASONRY BEARING WALLS The building is constructed with brick bearing walls of various thicknesses, and with significant historical detail, primarily near the top. In our inspection, in the lower regions of the exterior brick walls we found no cracking of significance, nor any evidence of settlement.
We were made aware of previous repairs to the top area of the wall on the north side of the building, which we understand were extensive and expensive. We were told that the damages were first indicated by a

horizontal crack in the masonry near the top of the wall; as repair to the masonry was undertaken, it was found that a steel beam had expanded with rusting delaminations causing the crack and horizontal displacement of the masonry. Apparently all of this damage was precipitated by leaks in the roof parapet above. Further work to the exterior walls is anticipated; refer to "Exterior Walls" above.

FOUNDATION

The building is founded on cast-in-place concrete foundations that appear to be well proportioned for the building loads. The drawings indicate that all footings and pilasters were reinforced. We did not observe any settlement or movement of the foundation walls. However, in the boiler room and in the adjacent coal room there was surface spalling of the concrete walls, likely indicating water penetration from the outside. These areas should be brought to a sound surface, and be brought back to level with a cementitious repair product.

*Project #: **SS-1** Priority: **4***
Foundation wall repairs- prepare surfaces, and apply cementitious repair material to restore wall level.
$2,000.

EXTERIOR STAIR WALLS

The facings of the cheek walls of the exterior stairs are in various states of disrepair. Some precast concrete face panels have significant spalling, other panels are dislodged, creating open joints between panels. The damaged panels need to be replaced, the others reset and joints sealed.

Project #: **SS-2** Priority: **3**
Exterior stair walls repairs- Replace damaged precast face panels; reset dislodged panels and seal joints.
$15,000.

EXTERIOR STEEL RAMP

The existing handicap access ramp, framed with structural steel is badly rusted and does not conform to current handicap access requirements. A new ramp conformant ramp should replace the existing ramp.

Project #: **SS-3** Priority: **2**
Exterior Handicap Ramp Replacement- Replace non-conforming, rusted handicap access ramp.
$25,000.

MECHANICAL SYSTEMS

The present heating, ventilating and plumbing systems date from the buildings construction in 1927 with a few upgrades in recent years.

HEATING DISTRIBUTION SYSTEM

The building heating system is primarily a two pipe low pressure steam distribution system with radiators and unit heaters throughout the facility and is primarily original to the building. There is a condensate receiver and with dual pumps located in the boiler room. This was originally a vacuum system, but is currently not functioning. Some of the return piping in the rear of the building was replaced two years ago.

Project #: ***MS.1*** *Priority:* ***2***
The condensate reviver and pumps are over thirty years old and nearing the end of its useful life. The unit should be scheduled for replacement in the immediate future.
$15,000 - $25,000.

HEATING PLANT

The buildings heating plant is made up of two 1970's H. B. Smith 4500 12 section low pressure (10 psi) steam boilers with natural gas burners. Each boiler has a heating capacity of 1,885,000 btuh. Boilers are set up for lead-lag with manual changeover.

Project #: ***MS.2*** *Priority:* ***3***
The boilers are about thirty years old and consideration should be given to their eventual replacement. The burners are newer that the boilers but also should be replaced along with the boilers.
$50,000 - $75,000.

FUEL OIL TANK

There is an abandoned underground fuel oil storage tank on site. Its size and condition are unknown.

HEATING CONTROLS

The building was originally one zone but has been divided into five heating zones comprised of electric zone valves controlled by area thermostats. The heating system can remain with only minor repairs anticipated.

VENTILATION SYSTEM

A recently installed Renew Air energy recovery system provides fresh air exchange to the print making room in the art studio.
The clay studio tends to overheat when the kilns are in operation even though there is and wall exhaust fan.
The main auditorium and stage have gravity mounted roof ventilators that are either inoperable or blocked up. The windows are operable in may cases and can be used to provide ventilation on hot days. There is no air conditioning in most of the building.
The server or hub room located in the back of the lower level Annex is and air conditioning system dedicated to that equipment. This is maintained by the Burlington Telecom.

*Project #: **MS.3** Priority: **4***
The installation of a mechanical ventilation and air conditioning system for the main gym/auditorium/stage area would greatly enhance the comfort during large performances.
$100,000 - $150,000.

*Project #: **MS.4** Priority: **3***
The installation of a mechanical ventilation and air conditioning system for the main gym/auditorium/stage area would greatly enhance the comfort during large performances.
$100,000 - $150,000.

PLUMBING SYSTEM

The plumbing system also dates from the buildings original construction with some modifications and modernizations throughout the years. The main entry area has ADA toilets but without lavatories. The intermediate woman's toilets do not have any hot water connected to the lavatories. The dressing room toilets have ADA accommodations and the shower rooms appear to be in good condition.

WATER HEATING

There is a gas fired hot water heater/storage tank that serves the showers and most of the toilet rooms. This system appears to be in good operating condition. There is an electric water storage heater located in the lower level woman's under the front entry. The intermediate level woman's room has cold water only.

*Project #: **MS.5** Priority: **1***
The installation of hot water to the woman's lavatory should be added to bring this room up to code compliance.
$1,500 - $2,500.

FIRE PROTECTION SYSTEM

The entire building is protected by and automatic wet sprinklers system that appears to be in good operating condition. There are no standpipes in the building.

ELECTRICAL SYSTEMS

The following descriptions of the electrical systems including service, distribution, branch circuits, lighting, fire alarm, intercom and life safety systems.

ELECTRICAL SERVICE AND MAIN DISTRIBUTION

The electric service for the memorial auditorium is 208Y/120 Volts with a rated capacity of 800 amperes, located in the boiler room. Additionally two other electric services enter the building one is for the pottery studio and another for Burlington telecom equipment. A Burlington Electric Department (BED) medium voltage vault is located in an adjacent room to the electric distribution panels. Life safety power is provided for by a city water cooled 30 kW natural gas fired generator set which feed both life safety lighting and no life safety loads. A label on the transfer switch indicates an installation date of 1974, and the other distribution equipment appears to be of the same installation date.

The distribution equipment is in fair condition and is still serviceable, but it has exceeded a normal expected useful life of 20-25 years.

Two major code items need to be addressed with any significant building upgrades. The first issue is the BED vault it being in the building basement by code the room is required to have a three hour fire rating. The access door on the vault is not fire rated, it is only of wood panel construction, and needs to be replaced. The second issue is the emergency power system not meeting current life safety codes requirements. Life safety systems are required to be separated from the other loads on the generator, requiring separate dedicated transfer switch and panelboard. The other issue is a new requirement to the 2008 National Electric Code (NEC article 700.12) which requires the life safety equipment to be supplied from on site fuel sources for 2 hours for system reliability. City supplied water and gas are not considered reliable sources; since either may become unavailable during an emergency. It is possible to make the emergency power system more reliable to meet current codes, but the costs maybe greater than replacement the 30+ year old generator.

*Project #: **ES.1** Priority: **2***
Install a fire door at the BED vault.
$10,000 - $20,000.

*Project # **ES.2** Priority **3***
Replace the emergency generator.
$30,000 - $50,000.

*Project # **ES.3** Priority **3***
Separate the Life Safety Systems to meet the 2008 National Electric Code (NEC article 700.12).
$25,000 - $35,000.

*Project # **ES.4** Priority **4***
Upgrade the electrical distribution system.
$150,000 - $200,000.

BRANCH CIRCUIT PANELS AND BRANCH CIRCUITS

Branch panelboards are located at the stage to provide power for the lighting and equipment. Two separate feeders 208Y/120 Volt supply the stage equipment panels one circuit rated at 400 amperes and second rated at 200 Amperes. The panels appear to be installed at the same time as the main distribution equipment.

The distribution equipment is in fair condition and is still serviceable, but it has exceeded a normal expected useful life of 20-25 years.

The branch circuit wiring throughout the building is within metal conduit and is of varying age. For the most part the conduit is run exposed through the building attached to the masonry.

FIRE ALARM SYSTEM

The fire alarm system is based upon a zoned FCI fire alarm panel with external voice evacuation system and radio master box located at the front of the building. Installation date of the equipment was not evident; it is assumed to be installed at the same time as the electrical distribution. Fire detection through the building is mainly with heat detectors and a limited number of smoke detectors. Pull stations are located at each of the egress points as well as horn/strobe notification devices. Sprinkler flow and tamper switches are connected to the fire alarm panel.

The fire alarm system has exceeded it expected life and is an obsolete model.

The fire alarm detection system has deficiencies with placement of the heat detectors in the high ceilings and quantities. The spacing of the heat detectors should have been reduced per NFPA 72, increasing the total number of detectors that are required to be installed. In the spaces with 12" deep or greater ceiling beams, each bay area should have been treated as a separate space, with the requirement of additional detectors.

*Project # **ES.5** Priority **3***
Upgrade the building fire alarm system.
$40,000 - $60,000.

INTERIOR LIGHTING

The interior lighting systems for the building is old but functional. The lighting in most of the spaces needs to be upgraded for better function and energy savings as well most of it has exceeded it life expectancy. Each space has differing issues and will be addressed separately by each area below;

Life Safety Lighting system: The building is partially feeding emergency lighting from both the emergency generator and battery power lights. The battery lights are mainly located at building entry locations to provide light during the 10 second generator start time. The egress exit paths are indicated by red incandescent exit signs. Most of the exit signs are

recessed into the masonry walls. The exit signs should be upgraded with new LED types to save electric costs.

The Auditorium and Balcony areas are illuminated by a mixture of fixture types including; T8 fluorescent wraps, high bay metal halide and incandescent pendants lamped with fluorescent spiral bulbs. The lighting should be upgraded for additional energy savings, and improved illumination for events. The metal halide light could be replaced with either fluorescents or pulse start metal halide with electronic dimming ballast. The auditorium fluorescent should be upgraded with new fixtures with high output T5 or T8 lamps and dimming ballasts. The balcony lighting should be upgraded with dimmable fluorescents for improved event lighting. A simple lighting control system should be added to the space to allow for better lighting control during events.

The stage lights are functional and if fair condition but they are nearing the end of their expected useful life. Stage lighting upgrades or improvements need to be determined based upon the use planned for the Auditorium space. General area lighting fluorescent should be provided above the stage for general ambient lighting.

The stairwells are currently light by a combination of industrial vapor tight fixtures and pendant style single lamp fixtures design for incandescent bulbs. These lights are operated nearly continuously during the day. The lights could be upgraded fluorescent stairwell light with motion sensing and daylight harvesting for energy savings.

Annex lighting is provided by both low bay metal halide fixtures and dimmed incandescent lights. The fixtures types and layout for the space is inefficient and could be improved to meet the use. The lights in this area should be upgraded with fluorescent fixture with dimming ballast to improve lighting and meet the use. A simple lighting control system should be added to the space to allow for better lighting control during events.

The remaining spaces, offices, dance studio, dressing rooms, toilets, etc. are fixed fluorescents or have screw in replacements lamps. The areas could be upgraded for further energy efficiency with more efficient lights and motion sensors for further energy savings.

*Project # **ES.6** Priority 3*
Upgrade the buildings lighting system.
$100,000 - $300,000. Cost depends on the extent of changes and the amount of energy rebates available.

EXTERIOR LIGHTING

The facility has minimal exterior lights which are located on the side and front of the building. Street lighting is used to illuminate most of the building entrances.

Communications

The front office and maintenance rooms are supplied with telephone and network lines which are in functional condition. Expansion of these systems should be addressed as part of the planned use for the buildings.

Rental Spaces	The clay and print studios are in good condition and meet the current use. Electrically if the use changes the electrical equipment would need to be reorganized to the demands of the new users.

APPENDICES

January 16, 2008

Erin L. Demers E.I.T.
Department of Public Works
645 Pine Street, Suit A
Burlington, VT 05402

Re: Memorial Auditorium restoration

Dear Erin,
As per our meeting and discussion regarding the current condition of the exterior masonry of the Memorial Auditorium on Main Street in Burlington, Vermont, we offer the following evaluation of the current conditions and proposal for immediate emergency repairs.

Current conditions at critical areas:

This structure suffers from sever neglect, and several architectural details that are now resulting in large quantities of water damage in the forms of liquid, ice and rust. Water saturation of the masonry has been allowed to make long-term contact with the unprotected structural steel elements imbedded in the masonry walls and pylons, including I-beams and angle iron window lintels resulting in high-pressure expansion and sever masonry failure of the surrounding areas. The results are large portions of the masonry pylons and pre-cast stone cornice detail becoming unstable fall hazards. (See photo 1)

Although the pre-cast stone element deterioration is the most obvious from the ground, it is not the most dangerous and life threatening condition overall. The most critical areas are the main pylons and top level window header areas, and the masonry above these areas including the pre-cast cornice and copping stones at the top of the parapet wall at the roof level. (See photo 2, 3)

Expanding rust of an embedded horizontal I-beam unit that ties the main roof truss system together at the top has pushed the upper 10'(+/-) masonry ¾ inch up from it original position. This has produced a continuous opening that runs the length of the building on both the north and south elevations from pylon #2 to pylon #9 as indicated on the drawings. (See photo 4) In addition to this, each pylon that contains vertical steel I-beam has corroded/rusted from the top down approximately 15 feet through the pylon, resulting in masonry failure in the form of a large vertical fracture through the center of each pylon. (See photo 5)

Additionally, the window lintels at the top floor have sever corrosion damage and are exerting destructive pressure on the window units and have caused the complete masonry failure of the lock row header course over each window and these failed brick units are an immediate fall hazard. (See photo 6)

At this point in the project, it isn't necessary to look any further into the general condition of the structure, as these areas are, by far, the greatest risk to the City of Burlington in their potential to cause death or serious injury to pedestrian traffic below.

Although Liszt Historical Restoration has contracted with the City of Burlington for the amount of $10,000.00 to explore and evaluate the current conditions of this structure, in good faith we are willing to end this phase of the work now with no cost to the City of Burlington after three days of evaluation, having

discovered the dire nature of the current conditions and elect to put the whole of the City of Burlington's budgeted moneys directly to addressing the most dangerous and unstable areas, as we anticipate working closely with the City of Burlington to provide a long-term restoration program that puts this historic structure back into a safe and attractive condition over the next 5 years.

Proposal for restoration:

We propose to provide all necessary labor, materials, equipment, planning and other goods and services required for the restoration of the most critical masonry and steel elements of this structure in a limited budget capacity that is in line with a long-term plan for the rehabilitation of this structure where no funds are wasted in temporary measures. This insures that the City of Burlington is investing every dollar toward the end product from the beginning. Realizing that the City of Burlington has only $100,000.00 to spend toward this project in the current fiscal year, it is necessary to focus these funds on the areas most critical to life/safety issues that require immediate attention.

The most critical areas in need of repair are on the north elevation where sunlight is extremely limited; resulting in an advanced condition of what has been described above. The north elevation is well beyond the southern exposure in terms of deterioration, as the southern side is allowed the warming and drying benefits of the sun. However, the southern elevation will require the same work as the northern elevation, but it must be put off for the immediate need to address sever and dangerous conditions on the northern elevation. Both the western and eastern elevations are less unstable by virtue or their being less reliant upon embedded steel components, as their structures are more traditional load-bearing masonry, so rust has not affected them to the extreme that it has where structural steel elements were required to span great distances with a flat roof: over the gymnasium area.

Work shall be focused on the north wall from pylon #7 to pylon #9, from the top of the windows at the upper level of windows to the copingstones on the parapet wall. Work shall include the total dismantling of the top 10(+/-) feet of the #9 pylon, the single window span between #9 and #8 to the top of the window, # 8 pylon to expose rusted vertical I-beam, the double window span between #8 and #7 pylon down to the top of the windows. These areas will be dismantled, all window lintels removed and where needed replaced with treated steel angle iron. The steel horizontal I-beam units that connect the top of the trusses will be removed and replaced with units approved by Knight Consulting Engineers. These steel elements will be properly painted for rust prevention and attached to the trusses as per the engineer's specifications. These areas will be rebuilt with like in kind brick masonry units, salvaging as many original units as possible, new pre-cast elements provided by ST Griswold. All cement pre-cast stone elements will be coated with a portland cement based protective coating to achieve uniform appearance and provide long-term weather protection.

Work area will be thoroughly sealed off from the interior above the lower truss angle iron and intrude into the gymnasium area a minimum distance to insure no appreciable interference with normal auditorium operations. Exterior areas will be limited to a small area for staging footprint and although the fire escape stairs will be incorporated as necessary there will be no interference with emergency egress. Staging access will be at the roof level and materials to be reused such as brick and pre-cast stones will be stored on the roof in areas well able to bear the load and/or at Liszt Restoration's Essex Jct. shop location.

Liszt Restoration will remove all debris and ensure the ground area is free from material and supplies, and a trash shoot will be provided to insure the controlled delivery into the truck below.

Roofing will be temporarily pulled back a minimum distance and a curbing constructed well within the tented and heated area on the roof to ensure no water intrusion and roofing will be reinstalled into new masonry as per it original design.

Interior reconstructed masonry wall will be repainted with a breathable elastomeric (flexible) coating/paint, white, to provide a durable and attractive finish that will not easily peel or blister and allow normal water vapor transfer.

Product date sheets will be provided for every material used on this project for owner's approval and for future reference.

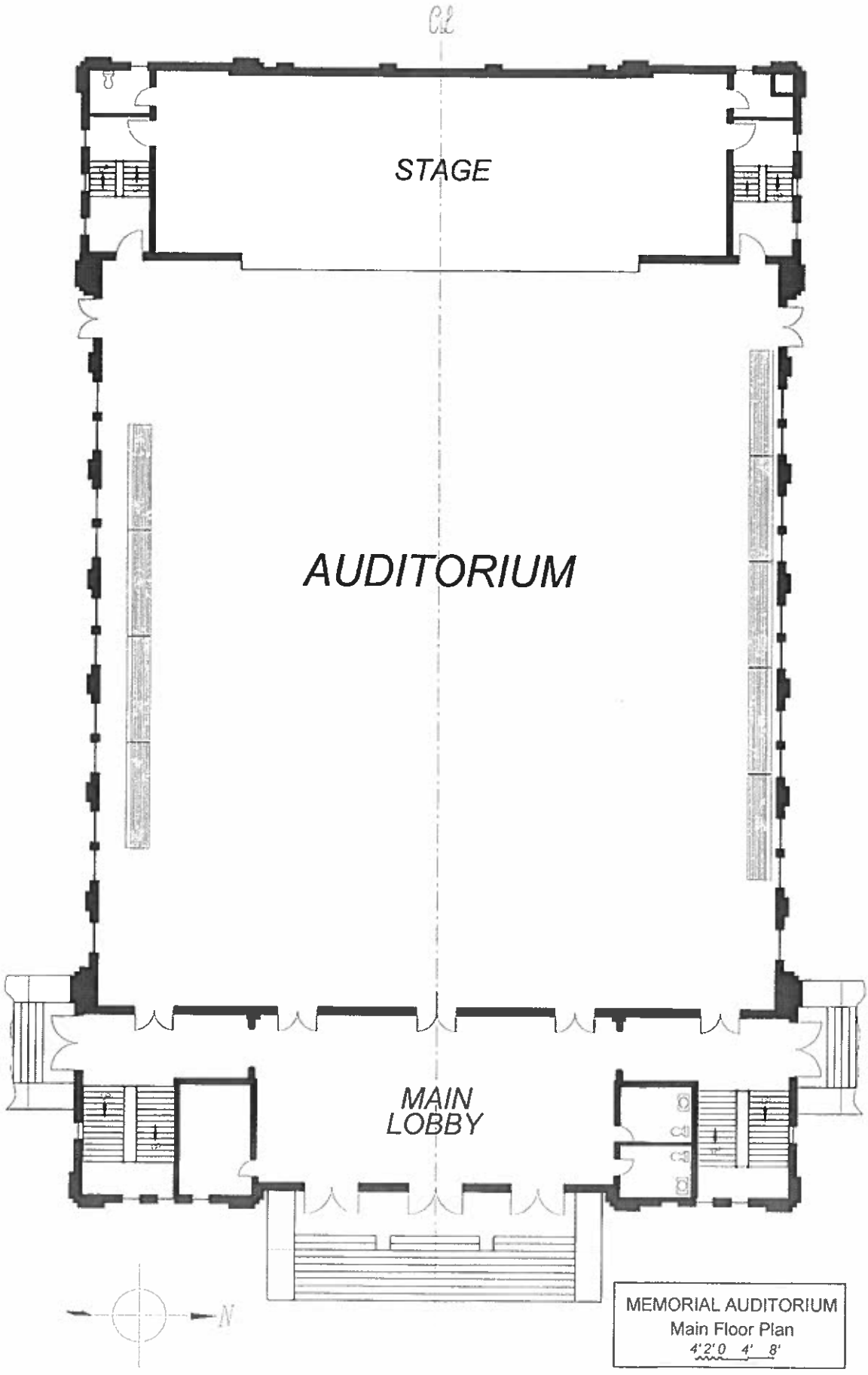
Project cost—Not to exceed $100,000.00 unless approved and directed by the City of Burlington to perform additional work above and beyond this scope. Although the investigation and evaluation is detailed and thorough there is not guarantee that unforeseen conditions can arise during the construction process, these conditions will be met and resolved with the written approval of the owner's representative in agreement with Liszt Historical Restoration, Inc.

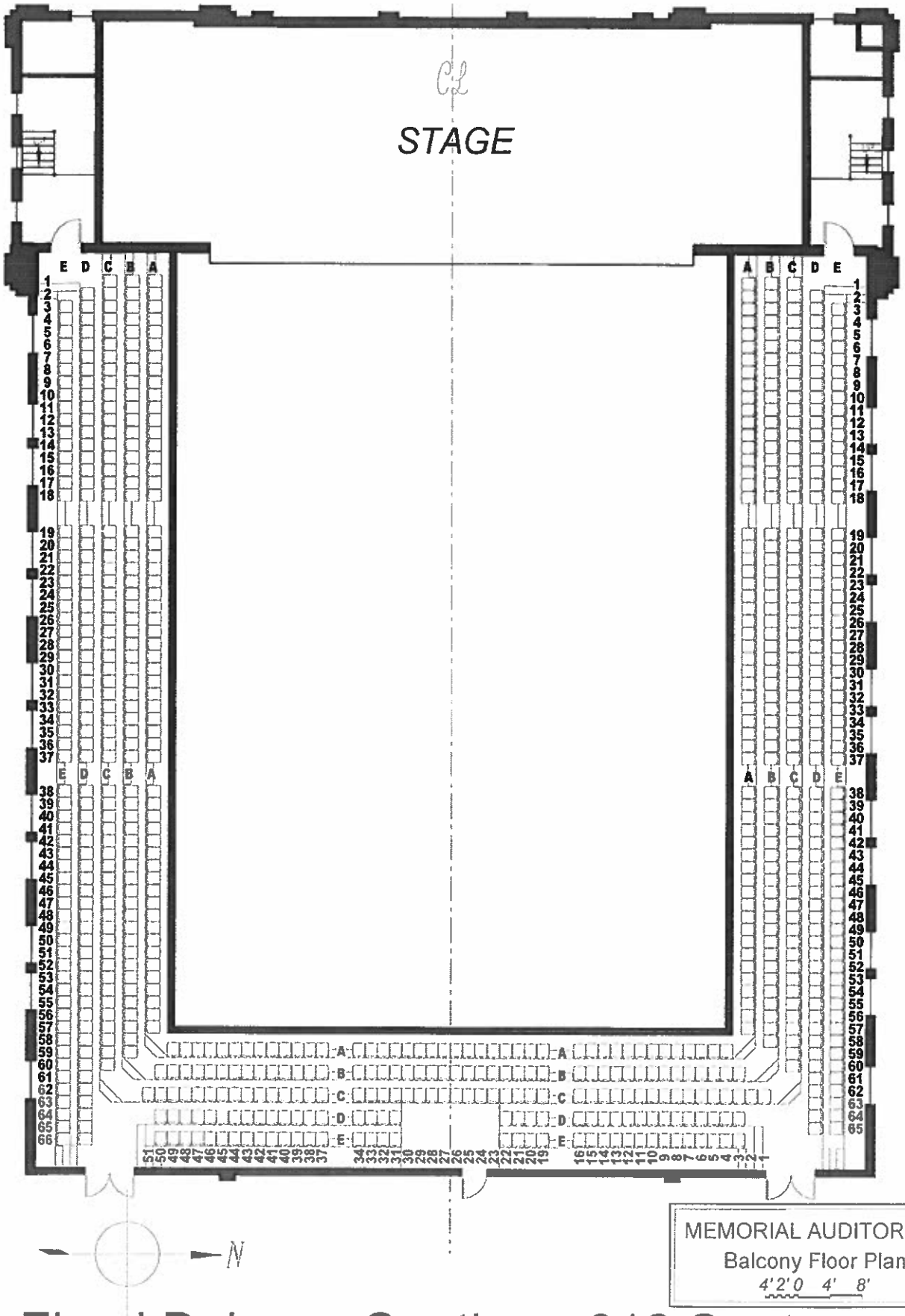
Project start date—As soon as possible, as weather conditions are currently favorable and there is a minimum of snow on the roof to contend with. It is estimated that the project will be completed by the end of March 2008.

Thank you for the opportunity to work with the City of Burlington in this important restoration project. We look forward to a long term working relationship with the City in this and many future projects.

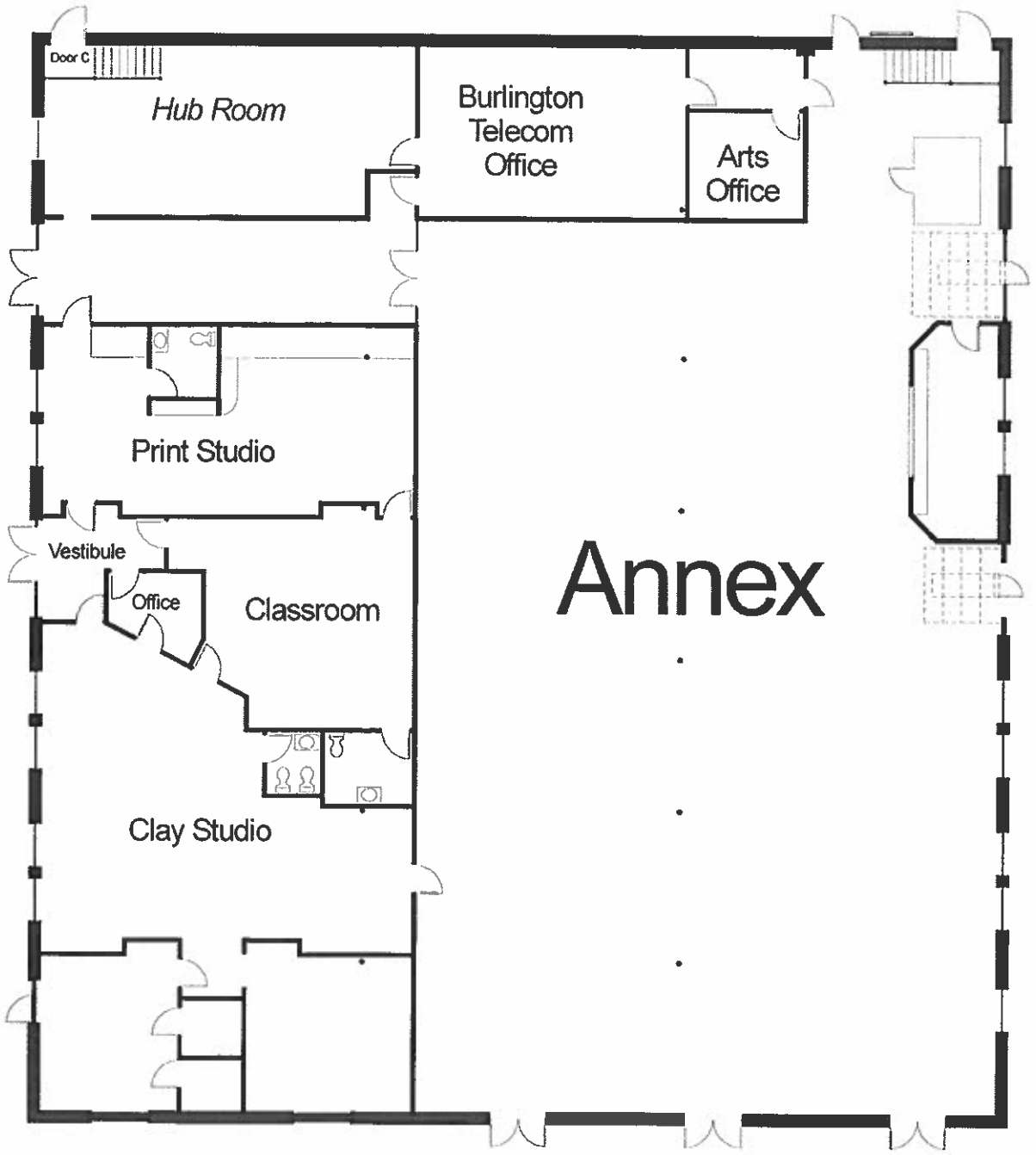
Sincerely,

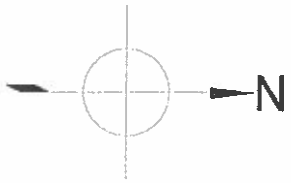
Liszt Historical Restoration, Inc.
Paul List President


STAGE
AUDITORIUM
MAIN
LOBBY
N
MEMORIAL AUDITORIUM
Main Floor Plan
4' 2' 0 4' 8'

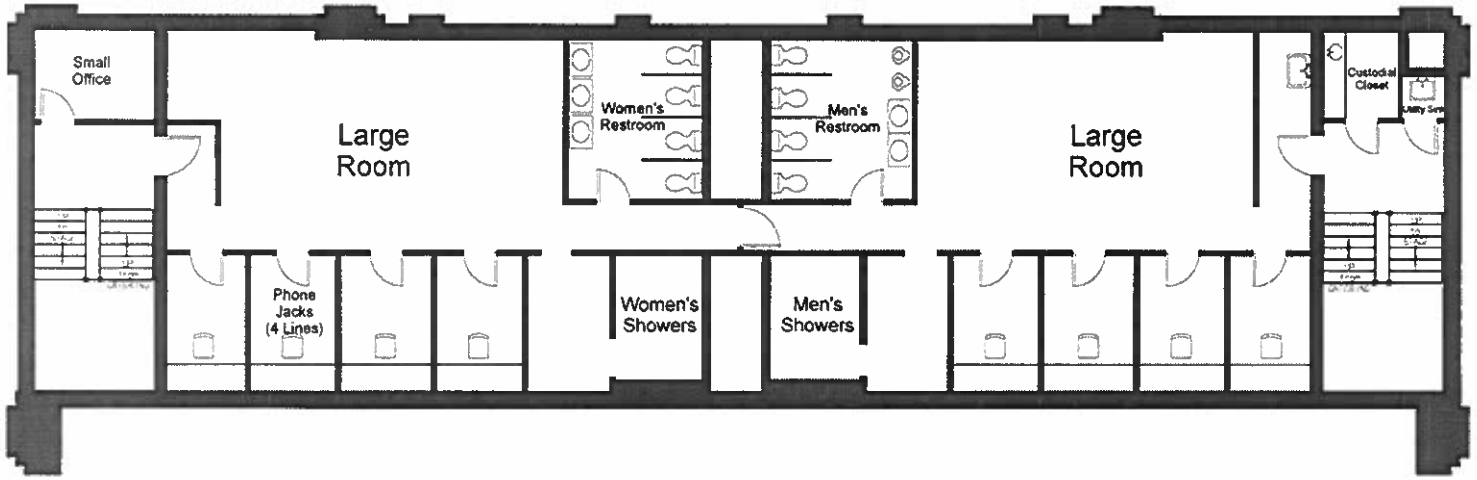


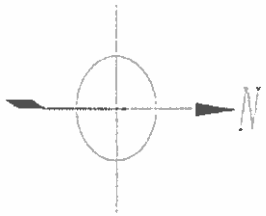
Fixed Balcony Seating - 812 Seats



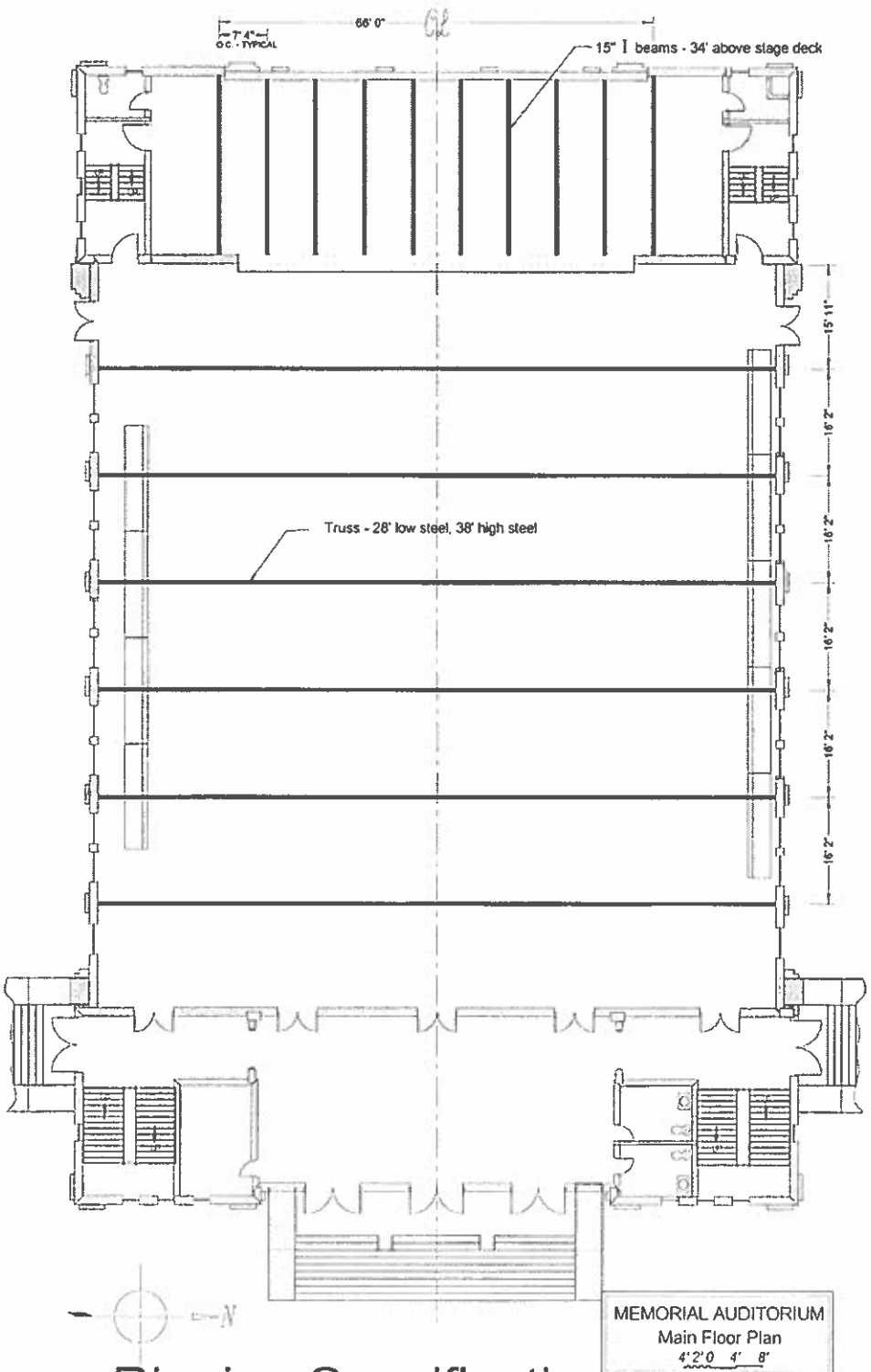


MEMORIAL AUDITORIUM
Annex Floor Plan
4' 2' 0 4' 8'

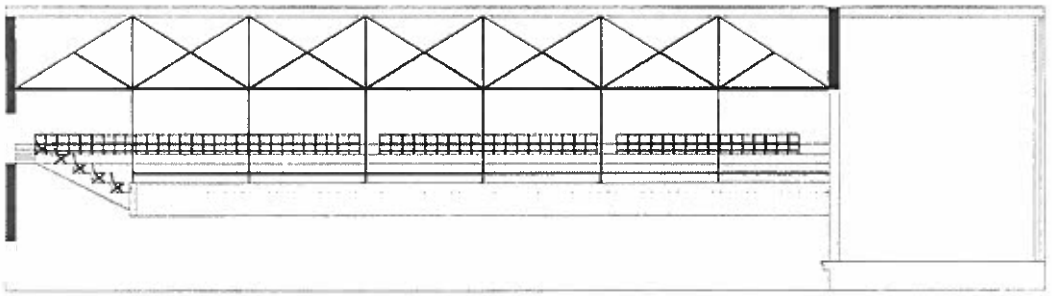




MEMORIAL AUDITORIUM
Dressing Room Floor Plan
Scale: 3/32 inch = 1 foot



Rigging Specifications



MEMORIAL AUDITORIUM
Stage Section
4' 2' 0 4' 8'