



**North Façade Evaluation  
Portsmouth City Hall  
1 Junkins Avenue  
Portsmouth, NH 03801**

**D e c e m b e r 1 7 , 2 0 1 4**

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**Prepared For:**

**City of Portsmouth  
Public Works Department  
680 Peverly Hill Road  
Portsmouth, NH 03801**

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**North Façade Evaluation  
Portsmouth City Hall  
1 Junkins Avenue  
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**Gale JN 828490**

Prepared for:  
City of Portsmouth  
Portsmouth, NH

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**NORTH FAÇADE EVALUATION  
PORTSMOUTH CITY HALL  
PORTSMOUTH, NH  
GALE JN 828490**

**PURPOSE AND SCOPE**

In accordance with our Contract, Gale Associates, Inc. (Gale) has performed an evaluation of the exterior building envelope components on the north facing façade at Portsmouth City Hall, located at 1 Junkins Avenue in Portsmouth, New Hampshire. The purpose of this evaluation is to provide the City of Portsmouth (Portsmouth) with a better understanding of the current conditions of the walls, and window systems, and to comment on the potential sources of reported moisture infiltration at the north elevation. Included in this report are Gale’s observations related to defective or deteriorated exterior masonry and concrete accents, photographic documentation to aid in describing defects, elevation drawings depicting defect locations, test cut sketches, and preliminary budget estimates. Gale’s evaluation was limited to the north elevation only.

**BACKGROUND**

Prior to being utilized as Portsmouth City Hall, the buildings were originally designed and utilized as “Portsmouth Cottage Hospital”. The north building was constructed circa 1962 and is a four (4) story building (with a basement level) comprised of brick masonry and precast concrete panel exterior walls over concrete masonry unit (CMU) interior walls, aluminum windows, and low slope roof coverings. While the building is not registered as a historic structure, it is adjacent to the “Portsmouth Cottage Hospital” complex which is listed on the National Register of Historic Places.

Drawings have been provided by Portsmouth to Gale for review. The drawings provided are as follows:

- “Alterations & Additions Portsmouth Hospital” by James H. Ritchie & Associates, dated April 13, 1962

**LEAK AUDIT**

Representatives of Gale and Portsmouth toured the interior of the building on Wednesday July 23, 2014 in an attempt to locate reported active leak locations. The audit was performed during a period of non-precipitation and therefore active leakage was not observed. However, Portsmouth indicated that there are currently multiple leak locations, during wind driven rain events, specifically at the jambs and sills of the window openings along the north elevation. Evidence of moisture infiltration was typically noted by peeling paint, bubbled plaster/drywall around the window heads, jambs and sills. Additionally, moisture staining was noted on ceiling tiles throughout the north elevation.

## **FIELD OBSERVATIONS**

On July 23, 2014, representatives from Gale conducted visual field evaluations of the exterior north elevation façade, and observed destructive testing of select masonry components. Evaluations of the façade were performed utilizing high powered binoculars from the ground level and an additional up close evaluation via aerial lift. Gale utilized the services of Construction Specialists, Inc. (masonry contractor) to perform the destructive test cuts and patching of the masonry components. The following outlines Gale's observations. Note that the observations made during the destructive test cuts of the masonry walls are not listed below, as they will be addressed in a separate section. Refer to the photographic documentation and plans in the Appendix for additional information:

### ***Exterior Masonry Walls***

1. Exterior walls are clay brick masonry with interior CMU or concrete spandrel. Walls typically appear to be 13 inches thick. In general, the wall construction consists of the following, from exterior to interior: brick masonry or precast concrete panel, 1-1/2 inch cavity (filled with mortar), building paper (kraft type with asphaltic coating and reinforcement), 8" wide concrete masonry unit or concrete spandrel at floor slab locations, drywall and/or plaster interior finishes.
2. Brick and mortar are typically in satisfactory condition. Brick masonry units are a standard modular red clay brick with typical dimensions of 7-3/4" long, 3-1/2" wide, and 2-1/4" tall. Mortar joints are typically 3/8" to 5/8" wide and are tooled to a "concave" finish.
3. The exterior masonry wall construction is laid in a common bond pattern with a header every sixth course. However, based on destructive test cuts, many of these headers are no longer engaged within the backup wall or have snapped due to the relative displacement of the outer wythe of masonry and the backup wall. Furthermore, original drawings include the note "dovetail inserts & masonry anchors" at concrete spandrel locations. False headers, which do not extend into the backup wall, are incorporated where concrete floor slabs/spandrel occur.
4. Portions of brick masonry and precast concrete panels, primarily located at the second and third floor levels towards the west end, are not plumb and in plane with the surrounding wall construction. Displacement of the outer wythe of brick masonry and precast panel is apparent.
5. Isolated areas of cracked or deteriorated mortar joints were identified throughout the north elevation. Typically, step cracking of the mortar joints was observed adjacent to building corners or above window heads and below sills.
6. Cracked or spalled brick were also noted in isolated areas along the north elevation. Cracking and spalling of brick masonry did not appear to be widespread.

7. Rusted and abandoned anchors were noted throughout the north elevation. Additionally, it appears that previous attempts at providing mechanical ties from the outer wythe into the backup wall were made. Approximately twenty (20) locations on the west side of the north elevation were identified as having a cored hole through the brick masonry with a 9" threaded rod and lock nut/washer combination installed in an apparent attempt to provide a face anchor through the displaced wall sections. The repair attempts were randomly spaced and at one test cut location, the tie assembly was removed by hand from the backup wall and did not appear to be set in any form of adhesive or epoxy nor was it engaged into the backup wall rendering the anchor ineffective.
8. Staining, which appears to be efflorescence, was noted and typically occurs below each precast panel onto the brick masonry.
9. Ribbed precast panels are typically in satisfactory condition. Isolated areas of cracked or spalled stone were observed, but did not appear to be widespread. On the east end of the north elevation wall, the precast panel ribs extend above the building's roof line at ten (10) locations. The interface between the roof fascia and the precast components appears to be a sheet metal flashing sealed to the precast stone. The detail creates a trough for moisture to collect and potentially travel to the interior of the wall components.
10. Building sealants, including, but not limited to, window perimeters, masonry control joints, and precast panel joints are cohesively and adhesively failed throughout the north elevation.
11. No form of head joints weeps or baffles were noted above the window lintels. In general, continuous window lintels are in satisfactory condition, with the exception of the upper floors on the east end of the north elevation. Corrosion was noted at these locations.
12. The City reported that the outer wythe of masonry between the basement and ground floor of the north elevation was rebuilt approximately 10 years ago. The City indicated that brick ties to the backup wall were sporadically installed and found to be rusted during the construction. The new wall is reportedly constructed with masonry ties, control joints, and weeps.
13. The existing window systems are constructed of 4-inch wide non-thermally broken aluminum framed sliding windows with an integral aluminum sub-sill. Insect screens and storm sliders were observed at some window locations. Window openings incorporate two (2) sliding sashes per rough masonry opening. Pile type weatherstripping exists at the window jambs and is typically aged. The aluminum window assemblies are in poor condition, thermally inefficient, difficult to operate, and typically have evidence of moisture infiltration on the interior finishes surrounding the existing frames.



## **Hazardous Material Test Results**

Gale retained representative samples of the sealants, and building paper that were encountered at the north elevation of Portsmouth City Hall to determine if any hazardous materials are present that may be impacted by the renovations. The results indicated that the precast panel and brick masonry sealant do not contain asbestos.

Testing for materials containing Polychlorinated Biphenyls (PCB's) was also performed as part of this evaluation. The results indicated that the following materials tested positive for PCB's in a level which is greater than the Environmental Protection Agency (EPA)'s regulated threshold of fifty (50) parts per million:

- Precast panel sealant

Please note that Gale's samples are small in comparison to the overall project. Each of these materials can be properly removed, handled, and disposed of under this project. It is recommended that materials tested and found to be hazardous be removed as hazardous components during the renovations. All of these items can be abated safely if the correct actions are taken during the renovations.

The asbestos and PCB reports can be found in the Appendix of this report.

## **DESTRUCTIVE TEST CUTS**

To aid in determining possible causes for the observed defects, destructive test cuts were required to review the general methods and materials of construction including substrate wall configurations, and material conditions at concealed locations. Gale utilized contractor assistance to perform destructive testing, as well as to repair all openings that were made. It should be noted that the test cuts were performed to reveal a relatively small portion of the overall building, and may, or may not, represent the majority of the building systems' conditions. The critical field conditions have been documented and described within this report.

Please refer to the elevations in the Appendix for specific test cut locations. Refer also to the Appendix for photographs and field sketches obtained from these test cuts for additional information. The following outlines Gale's test cut findings:

- **Test Cut No. 1**

Test Cut No. 1 was performed on the western end of the north elevation above a second floor window head adjacent to the control joint. This location was selected based on reports and observations that the masonry is experiencing displacement from the backup wall. Therefore, a section of brick masonry (2.5 bricks long by 9 bricks high) was removed exposing the steel lintel, and the following was noted:

1. The backup materials at this location appeared to be the face of the concrete spandrel beam of the first floor framing slab. The face of concrete has a sheet applied dampproofing on the surface similar to a kraft paper with asphalt. The dampproofing is aged and brittle.
  2. A 2-1/2" to 3" cavity space between the exterior brick masonry and face of concrete was observed to have mortar droppings, potentially obstructing moisture from traveling outside of the wall system.
  3. One (1) galvanized dovetail masonry anchor was observed at the test cut location. The dovetail was set into a slot cast into the concrete backup wall. The dovetail was no longer engaged within the masonry mortar joint as the displacement of the outer wythe had occurred. No other dovetail anchors were noted within the cavity of the wall, therefore, spacing could not be confirmed.
  4. The header brick of the veneer are false, set to match the pattern of the façade (i.e. header bricks at the test cut location do not extend into the backup wall).
  5. The steel angle (window lintel) was 6" x 4" and appeared to be continuous along the length of the elevation. The dampproofing laps onto the horizontal leg of the angle to act as a flashing. Non-significant rust was noted at this lintel location. No form of weeps were noted within the masonry joints above the lintel.
  6. Brick masonry and mortar components were otherwise in satisfactory condition at the test cut location.
  7. Previous repair attempts in the form of threaded rod, washers and nuts were noted adjacent to the test cut. The threaded rod assembly was not set into the backup wall with any form of adhesive/epoxy and was easily removed by hand.
- **Test Cut No. 2**

Test Cut No. 2 was performed above Test Cut No. 1, below the sill of a third floor window. This location was selected based on reports and observations that the masonry is experiencing displacement from the backup wall. Therefore, a section of brick masonry (2.5 bricks long by 7 bricks high) was removed, and the following was noted

    1. The backup materials at this location are a combination of brick masonry and CMU. The face of the backup wall has a sheet applied dampproofing on the surface similar to a kraft paper with asphalt. The dampproofing is not continuous at the header course and is set into the mortar joint directly below the brick header course.

2. The header brick, spaced at every 6<sup>th</sup> course vertically, is tied into the CMU/brick masonry backup wall. All brick headers exposed by the test cut (three in total) are broken. The break occurs within the cavity of the wall. The gap/cavity between the exterior brick masonry and CMU and masonry backup wall varies from 2-1/2" to 3".
3. The aluminum sill above the test cut location is displaced, resulting in a negative slope towards the building interior. The brick is laterally displaced towards the building exterior, 1-1/2" to 2" from the drip edge of the aluminum window sill.

- **Test Cut No. 3**

Test Cut No. 3 was performed on the brick masonry directly below a precast panel at the third floor. This location was selected based on reports and observations that the masonry is experiencing displacement from the backup wall. Therefore, a section of brick masonry (4 bricks long by 3 bricks high) was removed, and the following was noted

1. The exterior brick veneer and precast panel is backed up by CMU inner wythe. The face of backup wall has a sheet applied dampproofing on the surface similar to a kraft paper with asphalt. The dampproofing appears to be continuous at the test cut location.
2. The width of the cavity varies between 3-1/2" and 4".
3. Evidence of a precast panel anchor was noted at the lower limits of the panel above the test cut opening. The anchor appears to be an inverted "U" steel shape set into the precast unit. There was no form of dowel or steel rod to connect the precast panel into the backup wall at the test cut location.
4. One (1) galvanized dovetail masonry anchor was observed at the test cut location. The dovetail was set into a slot cast into the concrete column. The dovetail was no longer engaged within the masonry mortar joint as the displacement of the outer wythe had occurred. No other dovetail anchors were noted within the cavity of the wall, therefore, spacing could not be confirmed.
5. Steel shims were noted at the base of the precast panel. The shims are severely corroded resulting in an expansive force of the rusted steel. The horizontal sealant joint at this location has widened and an approximately 1/2" gap between the brick and sealant has occurred.

## **DISCUSSION**

Gale's evaluation of the north elevation of Portsmouth City Hall revealed a variety of conditions. Where displacement of the brick masonry and precast panels was observed, it is apparent that broken headers and inadequate masonry ties are a result of the observed deficiencies.



The exterior wall of this building is constructed in a manner where the inner CMU, concrete columns, and floor slabs are the load bearing components capable of withstanding lateral loads. The exterior brick veneer and precast concrete panels are constructed as non-structural components and must be properly supported to withstand external and internal loads including thermal stresses and moisture freeze/thaw. In the instance of the north elevation, the brick veneer and precast panels are tied to the CMU and concrete backup components with brick headers and/or dovetail anchors which are broken or no longer engaged. Without the headers and anchors for support, the veneer wythe can become unstable and subject to failure.

While it is not possible to determine the exact cause for the failure of the header bricks and masonry ties, it is likely a combination of factors. Thermal stresses in the brick veneer are concentrated around window openings, along with discontinuities resulting in differential stresses. These stresses along with moisture infiltration through failed building sealants, at window perimeters, inadequate flashings/lack of end dams at window heads, and no weeps for moisture resulting in freeze/thaw damage and lateral displacement of the veneer over time.

The type of construction utilized for the exterior walls is defective for a number of reasons. Brick and CMU respond differently to environmental conditions. When clay brick masonry is exposed to moisture it swells, shrinking as it dries. CMU do not respond in this manner. Due to this condition, the cyclical wetting and drying of the brick veneer would induce stresses in the brick headers that rigidly connect the veneer into the CMU wythes. In addition, the two wythes respond differently to thermal changes. CMU expands at 1-1/2 times the rate of brick masonry over the same temperature range. This also induces stresses in the headers as the temperature of the two wythes varies through the seasons. This condition is exacerbated at the thermal extremes such as when the brick veneer is heated by the solar radiation whereas the CMU wythe is tempered by the climate controlled interior of the building along with the air cavity between the brick and CMU.

In a typical cavity wall configuration, the thermal movement of the masonry wall is managed through the inclusion of control joints. Control joints in veneer walls are joints where the brick veneer is terminated at a predetermined location. The veneer is terminated to create an opening between wall sections often times of a soft joint. The width of this opening is determined based upon the anticipated movement within the veneer assembly. The resulting cavity between the masonry is in turn filled with a preformed expansion joint material or with backer rod and sealant. This flexible soft joint permits the sections of the exterior veneer to move under thermal changes or due to swelling without inducing excessive stress on the backup wall. On the north elevation, a control joint can be seen approximately 5 feet from the west corner of the building. The size and spacing of these joints are typically chosen based upon site conditions and the layout of each elevation. However, as a rule, such joints are typically recommended at a spacing of no more than 40-feet.

Due to all of these movement conditions, the construction methodology recommended by the Brick Industry of America (BIA) is to utilize flexible wall ties for the attachment of the brick veneer to the backup CMU wall. This connection is typically obtained in new construction through the use of horizontal wire reinforcing within the bed joints of the CMU wall. This reinforcing either contains rectangular ties that project into the brick veneer or alternatively horizontal reinforcing with eyes hoops formed in to the reinforcing. These eyes accept wire pintles that are installed into the brick veneer. In existing construction, anchorage of the brick veneer can be achieved through the use of brick ties that are mechanically fastened to the CMU backup wall and built into the veneer wythe. In the situation at Portsmouth City Hall where both inner and outer wythes are in place, expanding mechanical fasteners are available that are drilled through the brick mortar joints into the backup CMU or concrete. The fastener is then expanded by tightening to the CMU and to the brick. The limitations to this system are the long term durability of such a repair and the dependence upon the quality of both the backup wall and exterior brick masonry. Field mock up testing of such a repair method would be required to confirm anchor capacity.

To exacerbate the movement issues noted above, the brick veneer wall was found to be lacking weep joints. Weeps are open head joints between bricks at a regular spacing to permit the drainage of moisture from the wall cavity between the veneer and backup wall. BIA recommends that weep holes be provided at 24-inches on center. Typically, weep holes should be present at horizontal breaks in the vertical cavity space such as at window lintels, relieving angles and at the base of the wall as it rests upon the foundation wall. The absence of these weep joints results in the potential for moisture to be absorbed by the brick veneer and then be trapped within the cavity. Additionally, test cuts performed above the window lintel confirmed that dampproofing is utilized as the main flashing material and does not incorporate end dams to redirect moisture out of the wall cavity. Since there is no direct path to drain the absorbed moisture, the accumulation of moisture in winter months raises the potential for entrapped moisture to freeze. In instances such as this the freezing water expands and potentially induces additional stress on the header brick and may result in displacement of the veneer components.

Additionally, the aluminum framed window systems are in poor condition, thermally inefficient and allow air and moisture infiltration into the building due to the deteriorated condition of perimeter sealants and lack of sill pan flashings.

The aluminum window units are single glazed and do not have thermally broken frames or sashes. The greatest disadvantage of aluminum is its high thermal conductivity as it readily conducts heat and cold through the frame system reducing its thermal performance. This can also cause condensation or frost to occur on the inside of the window frame when extreme changes in temperature occur between the conditioned interior space and the exterior air. The operability of the slider windows is also difficult at the majority of the locations on the north elevation. Over time, the weatherstrippings and tracks accumulate dirt and debris and no longer seal properly, allowing for additional air infiltration.

The window sealants at the perimeter of the aluminum windows are aged and deteriorated and should be replaced. Large gaps between the masonry or precast concrete window opening and aluminum frame were noted at various locations. Deteriorated sealants allow for air and moisture infiltration around the window frame which will lead to a decreased thermal performance of the window unit or moisture damage to interior finishes.

Typically window systems have a service life of between 20 to 30 years depending on the type of system, frequency of use and exposure to weather. The current windows are in excess of 30 years. Therefore, due to the poor thermal performance of the frames and deterioration of the weather-stripping and perimeter sealants, it is recommended that these systems be replaced.

### **RECOMMENDATIONS**

As described above, the extensive amount of broken headers will require extensive repair or replacement of the masonry veneer. Because of the amount of broken headers and displacement of the masonry and precast components, Gale recommends full replacement of the brick masonry/precast panel veneer on the north elevation.

In reconstructing the exterior veneer, proper through-wall flashings, weeps, backup wall dampproofing/protection and veneer construction joints should be incorporated into the new veneer. The new veneer should not utilize brick headers as a method of attachment, but should instead use metal wire ties mechanically fastened to the face of the CMU or concrete backup wall. By utilizing appropriately designed ties within the wall system, the brick veneer will be permitted to respond to internal and external loads and isolate the internal stresses within the veneer while also transmitting applied loads to the backup wall. During the veneer reconstruction, installation of a proper moisture barrier should be performed as the currently installed damp proofing and flashing is an incomplete and unreliable barrier for moisture intrusion into the interior of the building.

Portions of the north elevation, particularly at the west end were found to have more advanced displacement of the veneer components. Should Portsmouth elect to perform a short term solution in the near future while exploring the veneer reconstruction described above, metal expansion anchors could be set into the wall system to tie the brick veneer and precast panels to the backup wall. The size and spacing of the anchors should be chosen based upon in field pull tests to determine the ultimate in place capacity of the anchors.

Gale also recommends that the existing window units be replaced with insulated double-glazed, thermally broken aluminum window systems. Portsmouth may consider various operability types. Typically Gale recommends double hung, or project-in operable units with exterior insect screens. The new windows can be horizontally and/or vertically divided into several sections with one or more operable units at the bottom portions or near the window head. Various types of configurations of fixed lites, and operable units can be selected and considered by Portsmouth.



In conjunction with the new window systems, it is recommended that new sheet metal pan flashing systems be used that will turn up behind and on the sides of the window frames. The flashings will direct moisture within the frames to the exterior of the building. The flashings are installed in mastic and continuously back sealed to reduce the potential of wind-blown moisture and air leakage.

### **ENGINEERING COST ESTIMATE**

Gale's preliminary engineering cost estimate was compiled from various sources of information and is based on our experience with projects similar in size and complexity to Portsmouth City Hall. This estimate is considered to be preliminary at best, as the actual cost depends upon the construction schedule, scope of work and construction details that have not been fully defined. These estimates are intended as budgets to give Portsmouth an indication as to what construction costs may be, given the existing conditions and Gale's recommendations. Note that these estimates are based on cost of materials and labor in the year 2014. The project cost may increase or decrease at the actual time of construction due to the fluctuation in various material costs and inflation.

Please be reminded that these costs are specific to the exterior envelope, north elevation only, and do not include renovations associated with interior, administrative costs or engineering design fees at this time. Gale does not recommend utilizing these estimates for sensitive funding. Gale has included a twenty percent (20%) contingency within the recommended construction budget cost in the event that unforeseen conditions are encountered at the site

### **Recommended Scope of Work:**

The following recommendations are based on Gale's research, the conditions observed in the field and our experience in exterior building envelope renovations. Representatives of Portsmouth have indicated that funding may be of concern, and therefore, Portsmouth has requested that the recommendations be prioritized so that repairs can be selected based on funding. Note that partial repairs of the building envelope will not prevent or reduce moisture infiltration that may occur through other portions of the building.

Note that the recommendations have been prioritized based on defective building components that appear to be associated with life safety, and active moisture infiltration to the interior of the building. Priority repair items are divided into Immediate Recommendations: 0-3 Years (items associated with life safety), Short Term Recommendations: 3-5 Years, Long Term Recommendations: 5-10 Years.

Based on the available funding, the recommended repairs are listed in order of priority to reduce the potential for moisture intrusion at the site. Also note that the repairs noted below are specific to the north elevation only:



**Immediate Recommendations: 0-3 Years**

*Stabilization of displaced veneer (approximately 250 square feet)*

- Install mechanical tie anchors at displaced brick and precast veneer

**Total Cost .....\$9,000**

**Short Term Recommendations: 3-5 Years**

*Stabilization of entire veneer (approximately 3,910 square feet)*

- Install mechanical tie anchors

**Total Cost .....\$175,000**

**Long Term Recommendations: 5-10 Years\***

*Remove and replace exterior veneer and windows*

**Total Cost .....\$870,000**

\*For budgetary purposes, detailing, and installation logistics it is recommended that window replacement occur in conjunction with the scope of work associated with the Long Term Recommendations. Gale does not recommend performing window replacement should the Immediate/Short Term Recommendations be considered in preparation and prior to Long Term Recommendations.

\*\*Note that the costs presented above do not include hazardous material removal and disposal as the scope of work and construction details have not been fully defined.



**APPENDIX A**

**Cost Estimates**

**PRELIMINARY COST ESTIMATE**

**Summary Sheet**

Date: August 5, 2014	Job Number: 828490						
Project: North Façade Evaluation	Estimated/checked by: kam/srm						
Location: Portsmouth, NH			File Name: i:\828490\excel\828490 cost estimate.xls				
		10% Overhead and Profit	Subtotal	20% Contingency	Subtotal		
<b>Immediate Recommendations: 0-3 Years</b>							
<i>Stabilization of displaced veneer</i>	\$6,700	\$670.0	\$7,370	\$1,474	\$8,844		
<b>Short Term Recommendations: 3-5 Years</b>							
<i>Stabilization of entire veneer</i>	\$131,162	\$13,116.20	\$144,278	\$28,856	\$173,134		
<b>Long Term Recommendations: 5-10 Years</b>							
<i>Remove and replace exterior veneer &amp; windows</i>	\$659,558	\$65,955.75	\$725,513	\$145,103	\$870,616		

**PRELIMINARY COST ESTIMATE**

**Immediate Recommendations: 0-3 Years**

Date: August 5, 2014	Job Number: 828490							
Project: North Façade Evaluation	Estimated/checked by: kam/srm							
Location: Portsmouth, NH			File Name: i:\828490\excel\828490 cost estimate.xls					
<b>Item Description</b>	<b>Quantity</b>		<b>Material Cost</b>		<b>Labor Cost</b>		<b>Engineering Estimate</b>	
	Number	Unit	Unit Cost	Total	Unit Cost	Total	Unit Cost	Total
<b>General Conditions</b>								
Lift Rental	1	week	\$1,200.00	\$1,200.00	\$0.00	\$0.00	\$1,200.00	\$1,200
<b>Total General Conditions</b>								<b>\$1,200</b>
<b>Masonry Repairs</b>								
Install mechanical tie anchors at displaced brick and precast	250	square feet	\$4.00	\$1,000.00	\$18.00	\$4,500.00	\$22.00	\$5,500
<b>Total Masonry Repairs</b>								<b>\$5,500</b>
<b>Subtotal</b>								<b>\$6,700</b>









## **APPENDIX B**

### **Photographic Documentation**

**PHOTOGRAPHIC DOCUMENTATION**  
North Façade Evaluation, Portsmouth City Hall  
Portsmouth, NH  
Gale JN 828490



1. View of Portsmouth City Hall, north elevation. The building façade is comprised of brick masonry and precast concrete panel veneer.



2. Masonry and precast veneer was observed to be displaced at the west end of the north elevation. Three (3) test cuts were performed within the boxed area.

**PHOTOGRAPHIC DOCUMENTATION**

North Façade Evaluation, Portsmouth City Hall

Portsmouth, NH

Gale JN 828490



3. View of Test Cut No. 1 above a window lintel. Note the brittle and aged dampproofing. Arrow indicates a previous repair attempt with a threaded rod set into the backup wall without epoxy or adhesive.



4. View of Test Cut No. 2 below a window sill. Note the discontinuous dampproofing. Arrow indicates broken header from the backup wall to the masonry veneer.



## PHOTOGRAPHIC DOCUMENTATION

North Façade Evaluation, Portsmouth City Hall

Portsmouth, NH

Gale JN 828490



5. The brick masonry and precast panel adjacent to Test Cut No. 2 is displaced from the plane of the wall (and edge of window sill) by approximately 2 inches. Note large gap between precast panel and window jamb. Evidence of moisture infiltration was typically noted on the interior of the window jambs and sills.



6. View of Test Cut No. 3 below a precast panel. One clip was noted on the interior face of the precast panel, however, the clip was not tied/secured into the backup wall.

## PHOTOGRAPHIC DOCUMENTATION

North Façade Evaluation, Portsmouth City Hall

Portsmouth, NH

Gale JN 828490



7. Separation of the sealant joint between the precast panels and brick masonry. Building sealants throughout the north façade are typically failed.



8. Vertical step cracking below a window opening (left) and horizontal cracking of a mortar joint which appears correlate to the floor slab (right).



**PHOTOGRAPHIC DOCUMENTATION**  
North Façade Evaluation, Portsmouth City Hall  
Portsmouth, NH  
Gale JN 828490



9. Precast panel ribs extend above the roofline on the east side of the north elevation. The existing configuration of the roof fascia onto the precast panel may result in accumulation of water in the gap between the panel and sheet metal.



10. Precast panel spall along the aluminum window jamb. It appears that small portions of precast panel have been replaced





## **APPENDIX C**

### **Test Cut Sketches**



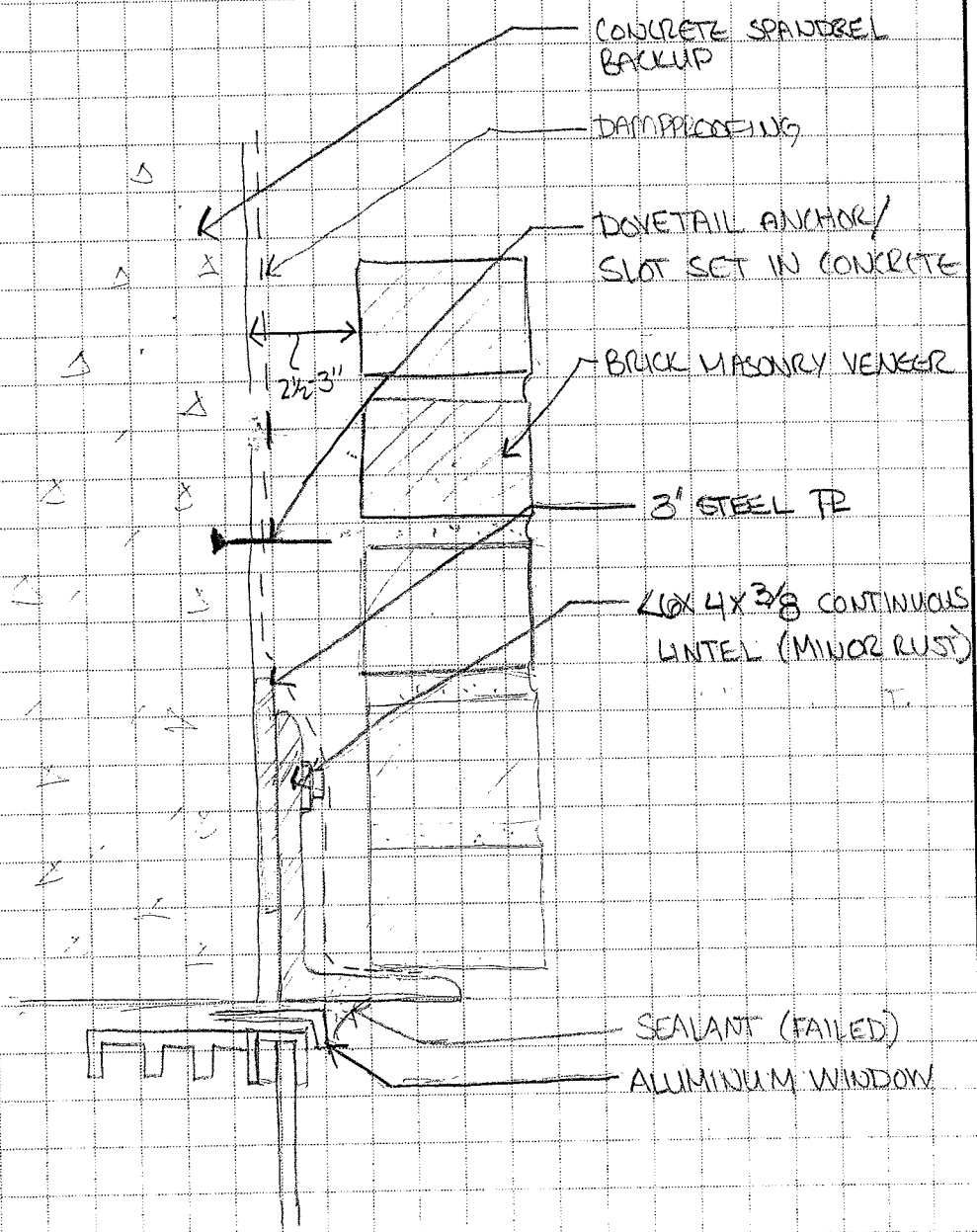
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Weymouth, MA 02189-0004  
Phone: (781) 335-6465  
Fax: (781) 335-6467

828490-  
JOB PORTSMOUTH CITY HALL  
SHEET NO. 1 OF 3  
CALCULATED BY KAM DATE 7/23/14  
CHECKED BY SRM DATE 8/6/14  
SCALE 3"=1'-0"

TC-#1 - WINDOW HEAD

- NOTES:
- DOVETAIL ANCHOR @ 8" COURSE 'IP-LOGIC' REMOVED BY HAND
  - CONCRETE SPANDREL BACKUP WALL
  - THREADED ROD TIE → NO EPOXY IN DRILLED HOLE & REMOVED BY HAND
  - MINOR SURFACE RUST ON LINTEL
  - NO BRICK HEADERS @ CUT, AND OTHER TIES NOTED



TC#2 - @ WINDOW SILL

- BLOCK = 7<sup>3</sup>/<sub>4</sub> x 3<sup>1</sup>/<sub>2</sub> x 2<sup>1</sup>/<sub>4</sub>
- SNAPPED HEADER @ CUT
- OUTER COURSE DISPLACED  $\approx 1"$

ALUMINUM SILL

ALUMINUM WINDOW

NEE. SLOPE

DAMP PROOFING STRIPS  
 @ HEADER COURSE

BROKEN HEADER

CMU / BRICK MASONRY BACKUP

\*NO TIES OBSERVED @ TEST CUT

TC#3 - BOTTOM OF PRECAST PANEL

° PRECAST SHIM - SEVERE CORROSION

CMU BACKUP

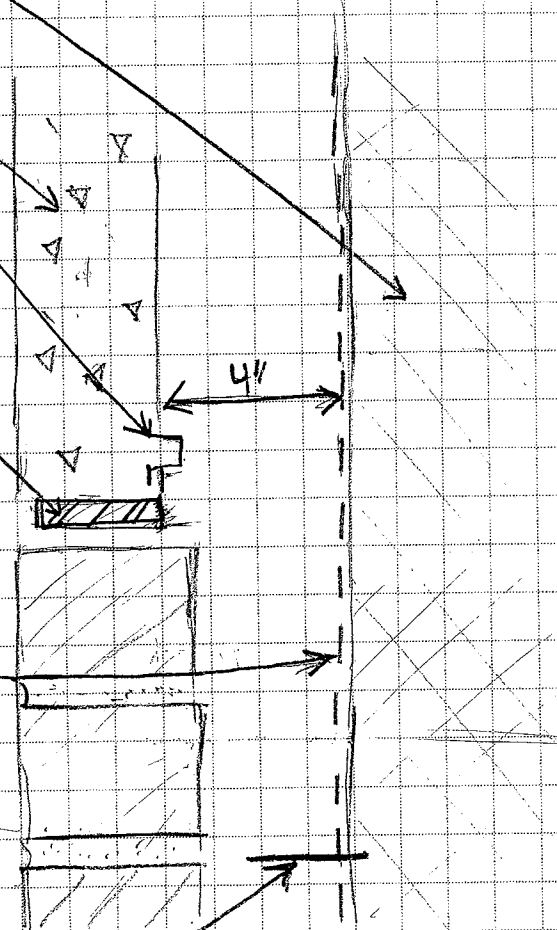
PRECAST PANEL  
(DISPLACED  $\approx 1\frac{1}{2}$ " )

ANCHOR CAST INTO PANEL  
(NO TIE INTO BACKUP WALL)

STEEL SHIM - 3" WIDE  
(CORRODED)

DAMP-PROOFING  
(AGED/BRITTLE)

WIRE-TYPE BRICK TIE  
(NOT IN MORTAR JOINT  
OF VENEER)





## APPENDIX D

### Hazardous Materials Test Results

**EMSL Analytical, Inc.**

200 Route 130 North, Cinnaminson, NJ 08077  
 Phone/Fax: (800) 220-3675 / (856) 786-5974  
<http://www.EMSL.com> [cinnaslab@EMSL.com](mailto:cinnaslab@EMSL.com)

EMSL Order: 041422864  
 CustomerID: GALA25  
 CustomerPO: 14002-828490  
 ProjectID:

Attn: **KATIE MATATHIA**  
**Gale Associates, Inc.**  
**163 Libbey Industrial Parkway**  
**Weymouth, MA 02189**

Phone: (781) 335-6465  
 Fax:  
 Received: 08/07/14 3:05 PM  
 Analysis Date: 8/13/2014  
 Collected: 7/23/2014

Project: **Portsmouth City Hall**

**Test Report: Asbestos Analysis of Non-Friable Organically Bound Materials by PLM via EPA 600/R-93/116 section 2.3**

SAMPLE ID	DESCRIPTION	APPEARANCE	% MATRIX MATERIAL	% NON-ASBESTOS FIBERS	ASBESTOS TYPES
1 041422864-0001	- Dampproofing @ TC #1	Brown/Black Fibrous Homogeneous	100	None	No Asbestos Detected
2 041422864-0002	- Brick Control Joint Sealant	Gray/Red Non-Fibrous Homogeneous	100	None	No Asbestos Detected
3 041422864-0003	- Precast Panel Sealant	Gray Non-Fibrous Homogeneous	100	None	No Asbestos Detected

Analyst(s)  
 \_\_\_\_\_  
 Thomas Schwab (3)

Stephen Siegel, CIH, Laboratory Manager  
 or other approved signatory

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. This report contains data that is (are) not covered by the NVLAP accreditation. Samples received in good condition unless otherwise noted. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample.  
 Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NYS ELAP 10872, PA ID# 68-00367

Initial report from 08/14/2014 06:37:43



**EMSL Analytical, Inc.**

200 Route 130 North, Cinnaminson, NJ 08077

Phone: (856) 303-2500 Fax: (856) 858-4571 Email: EnvChemistry2@emsl.com

---

Attn:

**KATIE MATATHIA**  
**Gale Associates, Inc.**  
**163 Libbey Industrial Parkway**  
**Weymouth, MA 02189**

8/14/2014

Phone: (781) 335-6465

Fax:

The following analytical report covers the analysis performed on samples submitted to EMSL Analytical, Inc. on 8/7/2014. The results are tabulated on the attached data pages for the following client designated project:

**Portsmouth City Hall**

The reference number for these samples is EMSL Order #011404169. Please use this reference when calling about these samples. If you have any questions, please do not hesitate to contact me at (856) 303-2500.

Reviewed and Approved By:

---

Julie Smith - Laboratory Director



The test results contained within this report meet the requirements of NELAP and/or the specific certification program that is applicable, unless otherwise noted.

NELAP Certifications: NJ 03036, NY 10872, PA 68-00367

EMSL Analytical does not hold SHW certification in the state of New Hampshire.

The samples associated with this report were received in good condition unless otherwise noted. This report relates only to those items tested as received by the laboratory. The QC data associated with the sample results meet the recovery and precision requirements established by the NELAP, unless specifically indicated. All results for soil samples are reported on a dry weight basis, unless otherwise noted. This report may not be reproduced except in full and without written approval by EMSL Analytical, Inc.

**EMSL Analytical, Inc.**

200 Route 130 North, Cinnaminson, NJ 08077

Phone/Fax: (856) 303-2500 / (856) 858-4571

<http://www.EMSL.com>[EnvChemistry2@emsl.com](mailto:EnvChemistry2@emsl.com)

EMSL Order:	011404169
CustomerID:	GALA25
CustomerPO:	14002-828490
ProjectID:	

Attn: **KATIE MATATHIA**  
**Gale Associates, Inc.**  
**163 Libbey Industrial Parkway**  
**Weymouth, MA 02189**

Phone: (781) 335-6465  
 Fax:  
 Received: 08/07/14 3:05 PM

Project: **Portsmouth City Hall****Analytical Results**

**Client Sample Description** 4 **Collected:** 7/23/2014 **Lab ID:** 0001  
 Masonry Control Joint

Method	Parameter	Result	RL	Units	Prep Date	Analyst	Analysis Date	Analyst
3540C/8082A	Aroclor-1016	ND	0.99	mg/Kg	8/12/2014	AB	8/14/2014	EH
3540C/8082A	Aroclor-1221	ND	0.99	mg/Kg	8/12/2014	AB	8/14/2014	EH
3540C/8082A	Aroclor-1232	ND	0.99	mg/Kg	8/12/2014	AB	8/14/2014	EH
3540C/8082A	Aroclor-1242	5.7	0.99	mg/Kg	8/12/2014	AB	8/14/2014	EH
3540C/8082A	Aroclor-1248	ND	0.99	mg/Kg	8/12/2014	AB	8/14/2014	EH
3540C/8082A	Aroclor-1254	ND	0.99	mg/Kg	8/12/2014	AB	8/14/2014	EH
3540C/8082A	Aroclor-1260	ND	0.99	mg/Kg	8/12/2014	AB	8/14/2014	EH
3540C/8082A	Aroclor-1262	ND	0.99	mg/Kg	8/12/2014	AB	8/14/2014	EH
3540C/8082A	Aroclor-1268	ND	0.99	mg/Kg	8/12/2014	AB	8/14/2014	EH

**Client Sample Description** 5 **Collected:** 7/23/2014 **Lab ID:** 0002  
 Precast Panel

Method	Parameter	Result	RL	Units	Prep Date	Analyst	Analysis Date	Analyst
3540C/8082A	Aroclor-1016	ND	480	mg/Kg	8/12/2014	AB	8/14/2014	EH
3540C/8082A	Aroclor-1221	ND	480	mg/Kg	8/12/2014	AB	8/14/2014	EH
3540C/8082A	Aroclor-1232	ND	480	mg/Kg	8/12/2014	AB	8/14/2014	EH
3540C/8082A	Aroclor-1242	ND	480	mg/Kg	8/12/2014	AB	8/14/2014	EH
3540C/8082A	Aroclor-1248	4200	480	mg/Kg	8/12/2014	AB	8/14/2014	EH
3540C/8082A	Aroclor-1254	ND	480	mg/Kg	8/12/2014	AB	8/14/2014	EH
3540C/8082A	Aroclor-1260	ND	480	mg/Kg	8/12/2014	AB	8/14/2014	EH
3540C/8082A	Aroclor-1262	ND	480	mg/Kg	8/12/2014	AB	8/14/2014	EH
3540C/8082A	Aroclor-1268	ND	480	mg/Kg	8/12/2014	AB	8/14/2014	EH

**Definitions:**

ND - indicates that the analyte was not detected at the reporting limit  
 RL - Reporting Limit





**APPENDIX E**

**Reduced Elevations**



Gale Associates, Inc.  
Engineers and Architects  
183 LIBBY PARKWAY WENKINCHAM, NH  
02786-7813 603-781-3354 FAX 781-335-6467  
www.galeinc.com  
Boston Baltimore Orlando San Francisco

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PROJECT  
**NORTH FACADE EVALUATION  
PORTSMOUTH CITY HALL  
PORTSMOUTH, NEW HAMPSHIRE 03801**

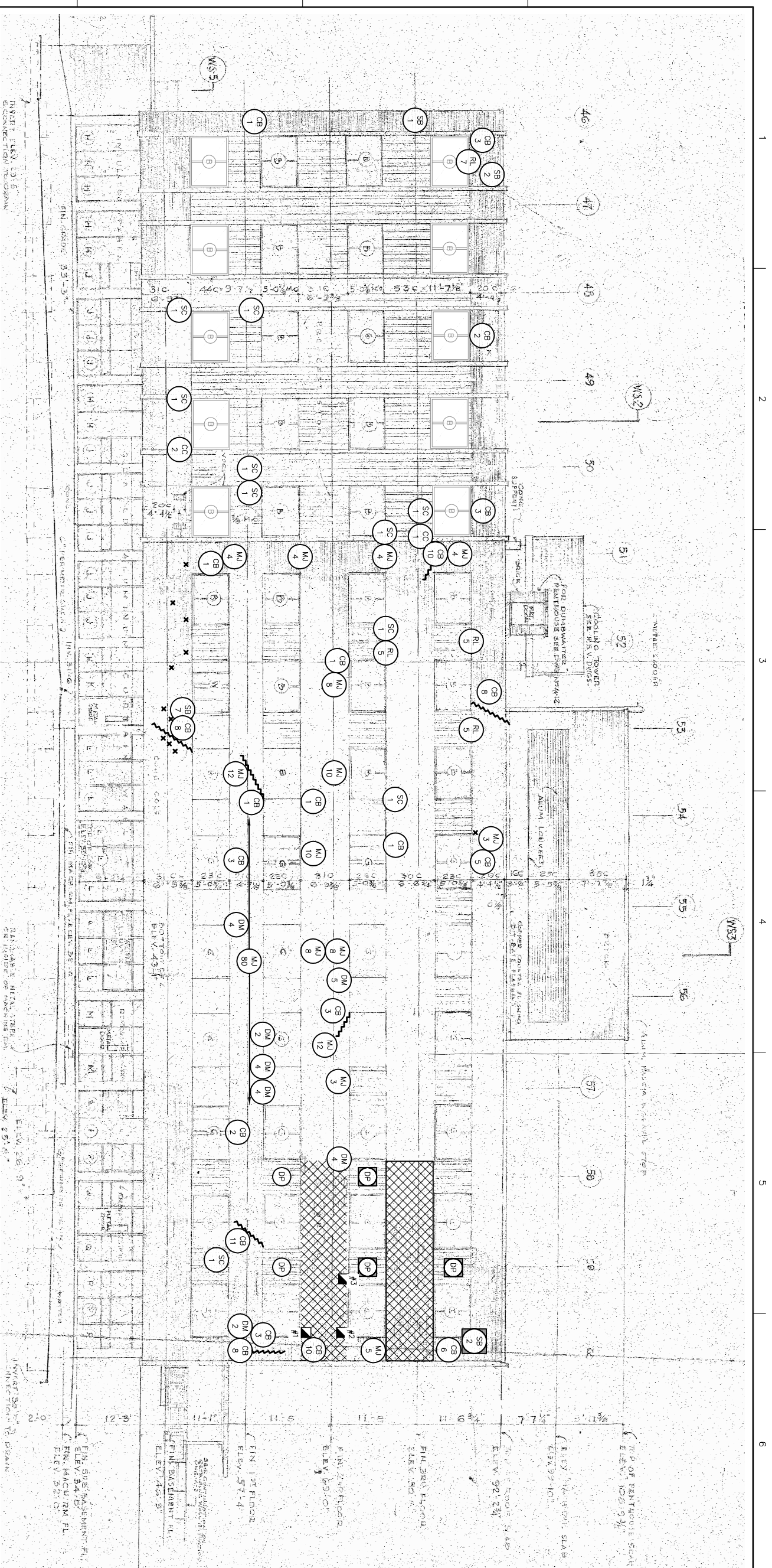
OWNER  
**CITY OF PORTSMOUTH PUBLIC WORKS DEPARTMENT  
680 PEVERLY HILL ROAD  
PORTSMOUTH, NEW HAMPSHIRE 03801**

NO.	DATE	DESCRIPTION	BY
PROJECT NO.	828490		
CADD FILE	828490 A2004		
DESIGNED BY	KAM		
DRAWN BY	CAM		
CHECKED BY	SRM		
DATE	AUG. 11, 2014		
DRAWING SCALE	3/16"=1'-0"		
GRAPHIC SCALE			
0' 4' 8' 12'			
SHEET TITLE			

**NORTH  
ELEVATION**

DRAWING NO.  
**A201**

1 OF 1



**1 NORTH ELEVATION**  
SCALE: 3/16"=1'-0"

**TYPICAL DEFECT NOTES**

- ① BUILDING SEALANTS INCLUDING BUT NOT LIMITED TO WINDOW PERIMETERS, CONTROL/EXPANSION JOINTS, PRECAST PANEL JOINTS ARE TYPICALLY FAILED 100%
- ② EFFLUESCENCE STAINING ON BRICK, BELOW PRECAST PANELS, TYPICAL

**DEFECT LEGEND**

- APPROXIMATE LIMITS OF DISPLACED BRICK MASONRY (PRIORITY DEFECT)
- DEFECT
- PRIORITY DEFECT
- DETERIORATED MORTAR: # INDICATES SQUARE FEET
- CRACKED MORTAR JOINT: # INDICATES LINEAR FEET
- RUSTED LINTEL: # INDICATES LINEAR FEET
- CRACKED BRICK: # INDICATES UNITS
- SPALLED BRICK: # INDICATES UNITS
- CRACKED CONCRETE: # INDICATES SQUARE FEET
- SPALLED CONCRETE: # INDICATES SQUARE FEET
- ABANDONED FASTENER THROUGH BRICK MASONRY UNIT
- STEP CRACK
- DISPLACED PRECAST PANEL
- MASONRY TEST CUT LOCATION

**KEY PLAN**

NOT TO SCALE

