

# **STRUCTURAL ASSESSMENT**

FOR

## **Full Metal Jacket Building 0 Prince Street, Alexandria, VA**

Prepared by:

ALPHA CORPORATION (Alpha)  
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Winchester, VA 22601

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September 22, 2010

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## **INTRODUCTION AND PURPOSE**

The Full Metal Jacket building is a historic structure located at 0 Prince Street in the City of Alexandria, Virginia. The foundation system consists of reinforced concrete piers which continue above grade to elevate the structure and form a crawl space. Reinforced concrete beams join the piers together and support the rough sawn lumber first floor framing. Exterior walls are load bearing concrete masonry units (CMU) which, along with interior steel columns, support the second floor and roof framing. The second floor and roof is framed from rough sawn lumber and steel girders. The purpose of this report is to assess the structural elements of this building and to identify any visual deficiencies.

## **BACKGROUND**

On August 3, 2010 Alpha Corporation ("Alpha") performed a visual structural assessment of the existing building at 0 Prince Street. At the time of inspection, roof access was not available, thus, all visual inspections were limited to the street level perspectives and from within the building at the first and second floor levels. An inspection below the first floor from within the building's crawl space was also performed.

At the time of inspection, City of Alexandria personnel were present on-site to answer questions pertaining to the history of the Full Metal Jacket building. At that time, Alpha was informed that the initial construction of the building had taken place in the early 1950's and the current building site consists of reclaimed land formerly part of the Potomac River. The building had been occupied continuously since initial construction onward until only three to five years ago, at which time the most recent occupant, Potomac Arms, moved out. The building is currently unoccupied and closed to the public.

The Full Metal Jacket building lies immediately west of the Potomac River with only several yards between the shoreline and the building. To the immediate north lies a public sidewalk and Prince Street. To the west and south of the building there are asphalt parking lots. At the west end of the building is an attached loading dock. The building also includes elevated second floor wood framed covered porches supported by knee braces on the north, south and east elevations.

## **OBSERVATIONS**

While performing a visual investigation of 0 Prince Street on August 3, 2010, several observations were made.

### **Foundations:**

All foundation piers were also observed to be in good to fair condition with only one pier at the center girder significantly out of plumb. Photograph 1 was taken within the crawl space and the out of plumb pier is visible. It is possible that the pier was installed out of plumb and does not indicate movement over time.

Out of Plumb  
Pier



**Photograph 1**

**Exterior Walls:**

From outside of the building, a large stepping crack was found in the north wall. Photograph 2 was taken of the north wall. The crack was found to extend from the roof level down to the window sill elevation of the first floor windows.

Large stepping  
crack



**Photograph 2**

The crack in the north wall was also visible from inside of the building at the second floor level. Exterior sunlight was visible for most of the crack's length indicating full penetration of the crack and separation of the wall. Hairline to 1/16" wide stepping cracks were also found to be present at each first floor level window extending from window sill elevation down to the wall's concrete support girder. Photograph 3 was taken of the north wall at the first floor elevation. Vertical cracking through the concrete masonry units is visible. Vertical cracking through a unit indicates higher stresses experienced by the CMU as compared to step cracking along grout lines and is most likely caused by differential settlement of the supporting elements.

Vertical cracking  
through CMU



**Photograph 3**

The west and south exterior walls were observed to contain stepping cracks located at most windows extending from window sill elevation down to floor level and into the concrete beam below. Cracks occurred at both first and second floor level windows and are visible in Photograph 4. Cracks in these walls appeared to be limited to 1/16" wide or less and to follow existing masonry grout lines. At the time of observation, the east wall was found to be generally without cracking at both at the first and second floor levels.



**Photograph 4**

**Floor and Roof Systems:**

The perimeter concrete bands at the first floor level were observed to be in fair to good condition, with exception at the north exterior wall. At the north wall, numerous cracks were found. These cracks were generally found to be aligned with the wall cracks above in the masonry walls and ranged in size from hairline to 1/8" wide. From inside the crawl space, the center reinforced concrete girder supporting the first floor framing was found to be in good condition.

The first and second floors along with the roof were found to be constructed of 2x wood floor planking laid flat over 2x non-pressure-treated wood joists. Floor joists at the first floor level were observed to be supported directly by the reinforced concrete girder system. At the second floor and roof levels, joists were observed to be supported by the exterior masonry walls and by a multi-span steel girder line running east to west that bisects the building. The steel girders at each of these levels were supported by steel tube columns on approximate 9' centers.

The floor planking at each level appeared to be in generally good structural condition with only localized areas of buckling and warping or water damage found at each level. Photograph 5 was taken of the first floor showing warped floor planks. Photograph 6 was taken from the second floor level looking up at the roof framing showing water damage.

**Warped floor plank**



**Photograph 5**

**Moisture Damage**



**Photograph 6**

Floor and roof framing appeared to be in generally good condition with only a few locations indicating minor to moderate moisture damage. Photograph 7 was taken of a typical connection showing the wood to be in good condition.



**Photograph 7**

At the first floor level, the first 27' of the floor measured from the east exterior wall was observed to slope down toward the exterior wall approximately 1/4" in every 30" of run. Photograph 8 was taken of the level measurement. Other areas of the first and second floors appeared to be generally flat with little measurable slope.



**Photograph 8**

**Loading Dock:**

The loading dock is constructed of a steel plate over structural steel columns and horizontal framing members. The condition is very poor with columns, connections and framing members having severe deterioration to the point of major section loss. Photograph 9 is taken from under the loading dock showing deteriorated framing. Photograph 10 shows a girder to column connection with rust and warping. The loading dock includes a set of pressure-treated wood stairs. These stairs and their connections were also observed to be in poor condition showing signs of moderate to severe deterioration and weathering.



**Photograph 9**



**Photograph 10**

**Elevated Covered Porches:**

The elevated porches floors were observed to be constructed of 2x pressure-treated wood floor decking spanning over 2x wood floor joists. The floor joists appeared to be part of the primary floor framing system inside the building extending through the exterior walls and cantilevering out as support for the exterior porch floor. These non-pressure-treated joists were paired up at some locations with pressure-treated wood 2x floor joists spanning between the exterior wall and the porches band board around the perimeter. Also supporting the floor are 6x6 knee braces bolted to the exterior wall and extending up to support the exterior deck edge.

The porch floor decking was observed to be in good to fair condition. The cantilevered floor joists were observed to be in poor condition, while the pressure-treated floor joists spanning between wall and porch perimeter were observed to be in fair to good condition. However, the non-pressure-treated knee braces and porch band boards were found to be in a state of severe deterioration with large splits and checks at connection locations and severe deterioration of metal fasteners. Photographs 11-13 were taken from street level looking at the underside of the porches showing the deteriorated braces and connections.



**Photograph 11**



**Photograph 12**



**Photograph 13**

The porch roofs were observed to be constructed of 2x roof decking laid flat over sloped 2x wood rafters. Rafters were supported by the exterior masonry walls and by wood girders over 4x4 vertical posts at the porch perimeter. The porch roof system was found to be in a severely deteriorated condition with large areas of roof decking section loss, severe framing member

weathering, and connection failures. Photograph 14 was taken of the east porch showing holes in the porch roof.



**Photograph 14**

## **RECOMMENDATIONS**

In general, the building is in moderate condition. Two structural options are available – the first is to repair and replace the structural elements that are deficient and the second is to demolish the existing structure.

### ***OPTION 1:***

Based on the field inspection and subsequent analysis, the following minimum structural repairs are required. Additional repair costs will be required of the building before occupancy including mechanical, electrical, and plumbing efforts. Estimated costs for mechanical renovation are \$72,000. Estimated costs for electrical renovation are \$68,000. Estimated costs for plumbing renovation are \$52,000.

#### **Foundations:**

The foundation is in good condition; however, the masonry wall and concrete beam cracking indicates that the structure is undergoing differential settlement and requires repair implementation. It is our recommendation that new drilled piers be installed to support the existing concrete beams that are located at the first floor level. To install these new piers, sections of the existing floor will need to be removed to allow for pier installation from inside the building at the first floor level. Once piers have been installed, they would then need to be attached to the existing girders to stabilize the building. After the foundation is stabilized, the removed sections of floor will require replacement. The foundation rehabilitation efforts won't jack the structure back to original;

however, the work will stabilize and alleviate any future movement. Estimated costs for foundation stabilization are \$75,000.

**Exterior Walls:**

The exterior CMU bearing walls show significant signs of cracking and likely indicate foundation differential settlement. Once foundation repairs as described above have been completed, we recommend that all walls be repointed with new mortar and vertical control joints be added at a maximum of 40' to help alleviate and control any future cracking. Estimated costs for repointing and control joint installation are \$40,000.

**Floor and Roof Systems:**

Existing floor and roof systems appear to be in good condition overall with only localized member replacement required. Where floor decking has buckled and warped, the individual planks should be removed and replaced. Where signs of prolonged moisture exposure occur, the planking and supporting joists should be replaced in kind. Estimated planking that requires replacement is 20%. Where the floor is sloped excessively in the first floor room to the East, the floor system will require re-leveling. Estimated costs for shimming and re-leveling are \$5,000.

**Loading Dock:**

The loading dock is in a severely deteriorated state and is no longer able to support its required loading. We recommend that the existing loading dock be demolished and removed. Estimated costs for demolition are \$5,000.

**Elevated Covered Porches:**

Overall the elevated covered porches are in poor condition and can no longer safely support building code required loads. With the current condition of primary framing members and their connections, we recommend that the existing porches be demolished and removed in the near future. Estimated costs for demolition are \$15,000. Immediate concern exists for the exterior stairs along the north wall which are in danger of failure and dropping to the public sidewalk below. Removal is highly recommended and has already been discussed with City of Alexandria personnel.

**OPTION 2:**

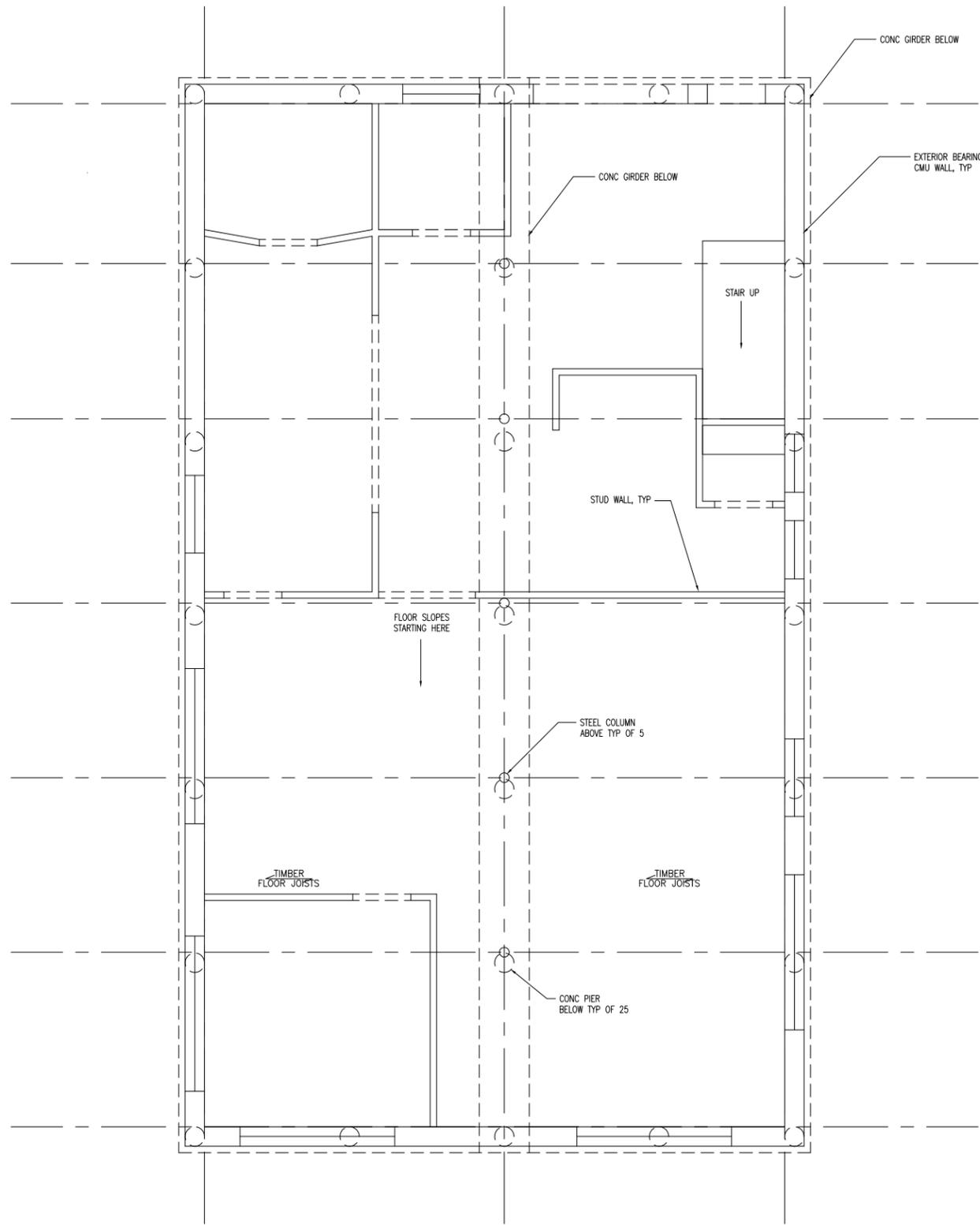
Demolition of the structure would include removing the piers to grade. It is possible to keep the existing piers and first floor concrete beams; however, the cost of repairing the effects of differential settlement does not make salvage a viable option. Also, removing the existing foundation system to grade would allow for the most flexibility in the design of a new structure because load bearing elements will not need to coordinate with the existing pier locations. Estimated costs for demolition of the structure are \$75-90,000.

**CONCLUSIONS**

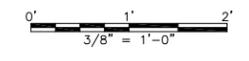
In conclusion, the Full Metal Jacket building is in moderate structural condition and could be rehabilitated or demolished. Rehabilitating efforts will require addressing the foundation differential settlement. While not in immediate danger of collapse, the existing foundation system requires strengthening to reduce the potential for further settlement and damage to any future repairs. The exterior attachments such as the covered porches and loading dock have outlived their useful life and are no longer capable of supporting their required loads and, thus, should be removed.

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## **APPENDIX A - SKETCHES**



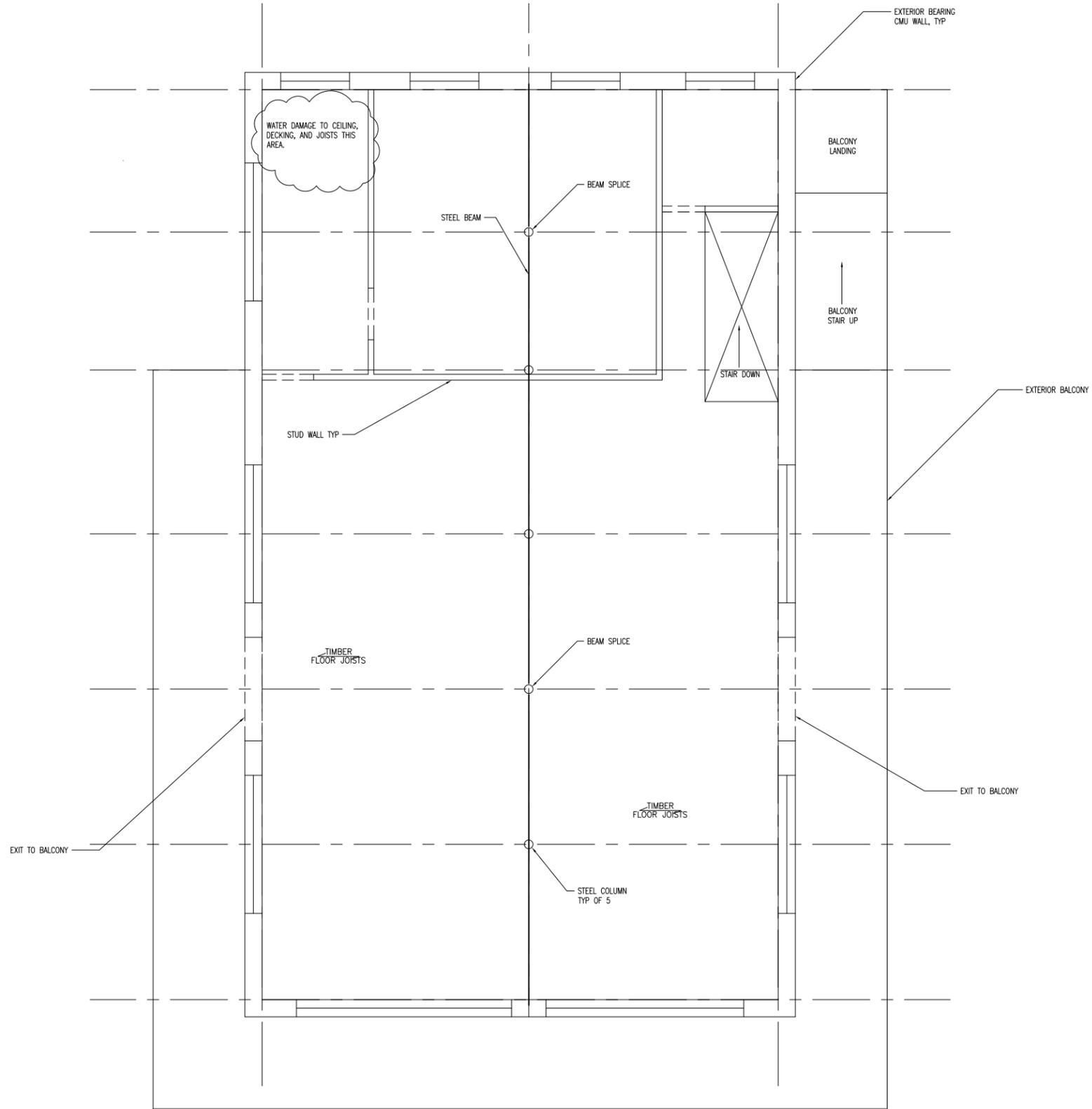
1  
S1|S1  
**FOUNDATION & FRIST FLOOR PLAN**  
SCALE: 3/8" = 1'-0"



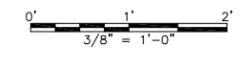
SEAL

PROJECT INFORMATION  
CITY OF ALEXANDRIA  
FULL METAL JACKET BUILDING  
0 PRINCE STREET  
FOUNDATION AND FIRST FLOOR FRAMING PLAN

DATE	08/23/2010	
REVISIONS	TITLE	DATE
DESIGN		
DRAWN	PRD	
CHECKED	MAB	
CLIENT NUMBER		
ALPHA PROJECT NUMBER	424-030	
SHEET	1 OF 3	
<b>S-1</b>		



1  
S2 | S2  
**SECOND FLOOR PLAN**  
SCALE: 3/8" = 1'-0"



SEAL

PROJECT INFORMATION  
CITY OF ALEXANDRIA  
FULL METAL JACKET BUILDING  
0 PRINCE STREET  
SHEET TITLE  
SECOND FLOOR PLAN

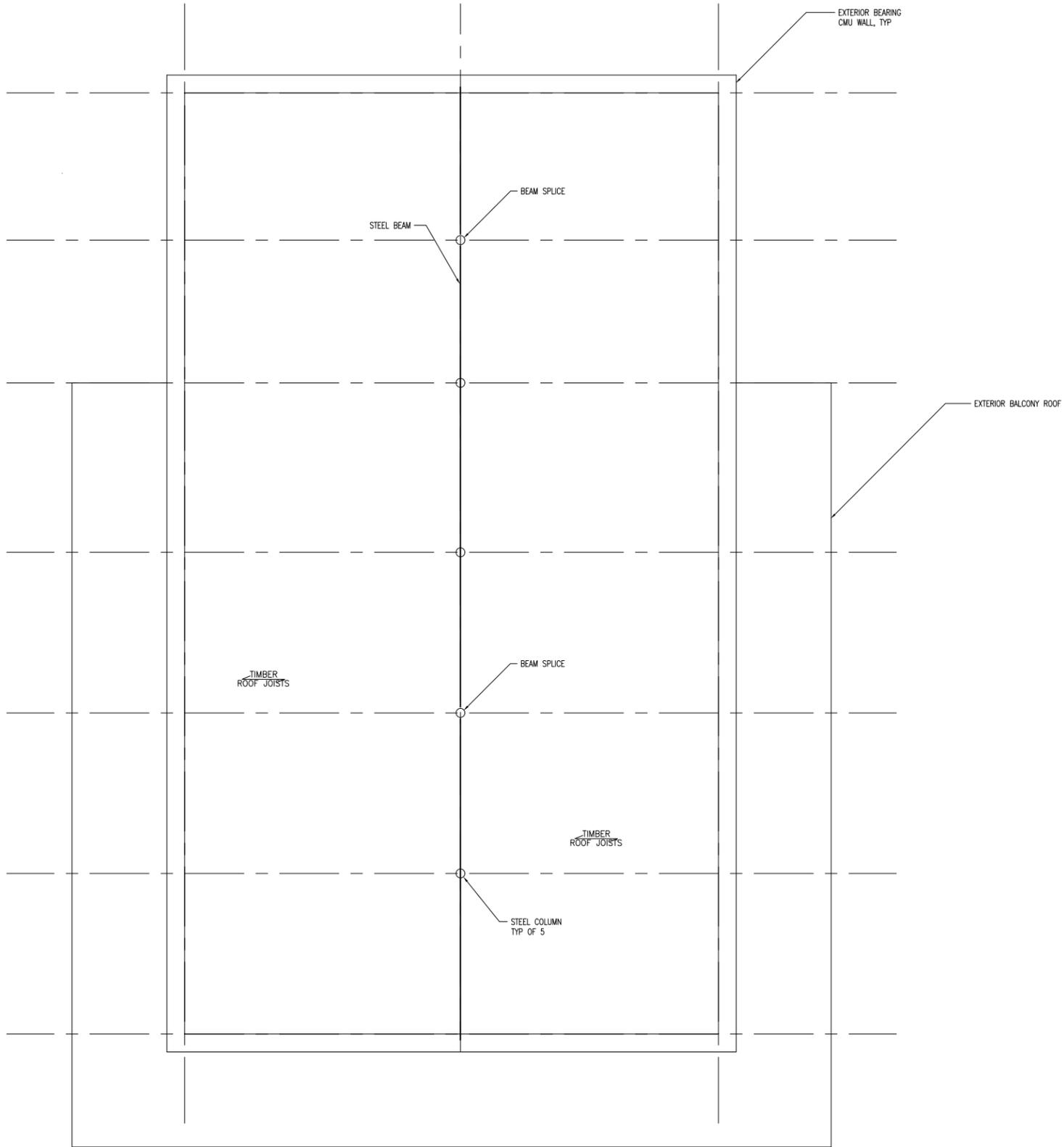
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REVISIONS	TITLE	DATE

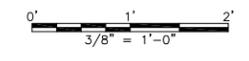
DESIGN  
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CLIENT NUMBER  
ALPHA PROJECT NUMBER  
424-030

SHEET 2 OF 3  
**S-2**



1  
S3 | S3  
**ROOF FRAMING PLAN**  
SCALE: 3/8" = 1'-0"



SEAL

PROJECT INFORMATION  
CITY OF ALEXANDRIA  
FULL METAL JACKET BUILDING  
0 PRINCE STREET  
SHEET TITLE  
ROOF FRAMING PLAN

DATE  
08/23/2010

REVISIONS	
TITLE	DATE

DESIGN  
DRAWN PRD  
CHECKED MAB  
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ALPHA PROJECT NUMBER  
424-030

SHEET 3 OF 3  
**S-3**