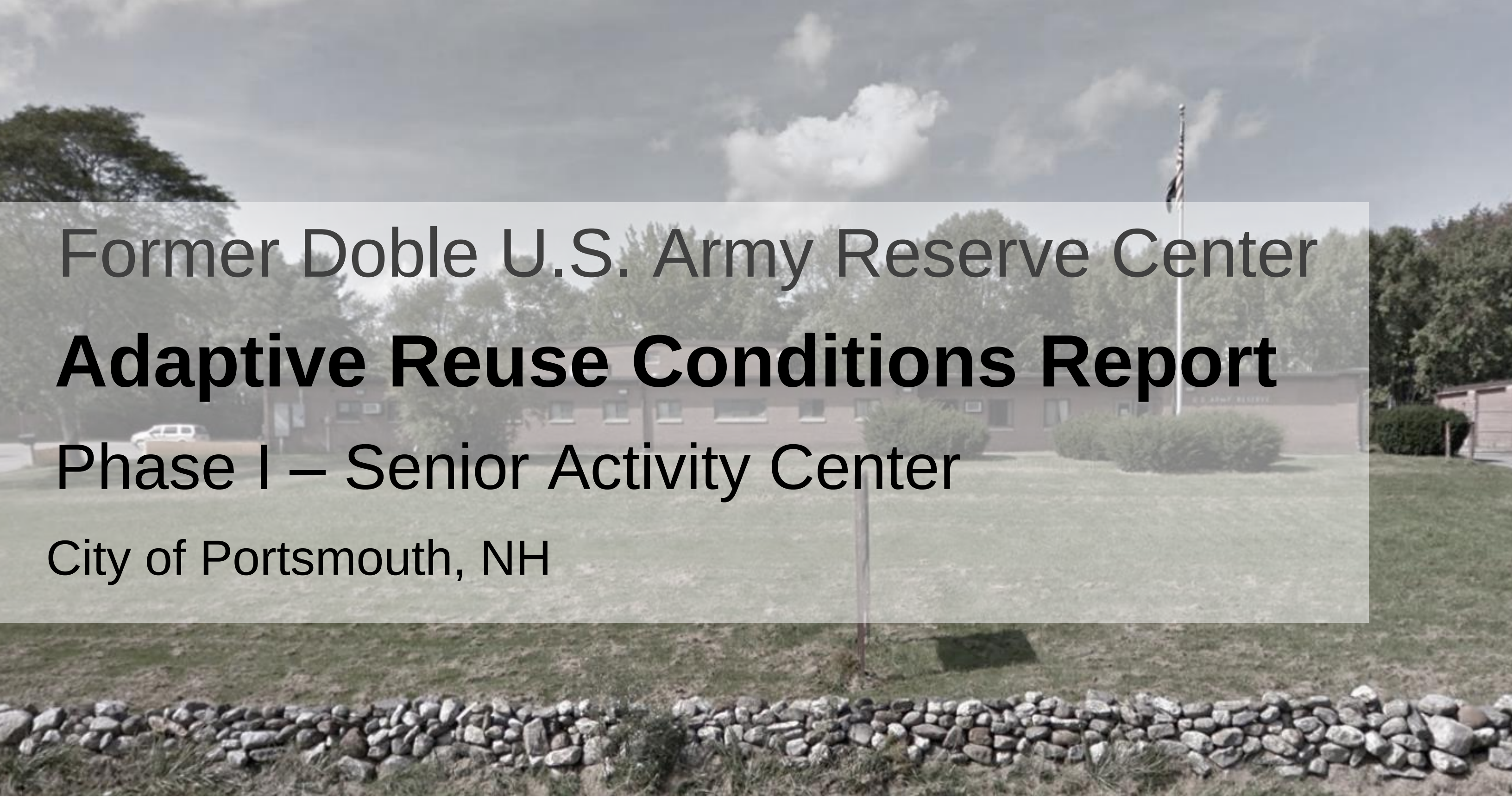

Former Doble U.S. Army Reserve Center

Adaptive Reuse Conditions Report

Phase I – Senior Activity Center

City of Portsmouth, NH

Prepared for:

City of Portsmouth, NH
1 Junkins Avenue
Portsmouth, NH 03801

Prepared by:

AECm
13 Water Street
Newmarket, NH 03857

EXECUTIVE SUMMARY

AECm was commissioned by the City of Portsmouth to develop construction documents for renovation of the former Doble U.S. Army Reserve Center located on Cottage Street in Portsmouth. In a phased approach for adaptive reuse of the facility, this Phase I plan will renovate the building spaces to accommodate the existing Senior Activity Center programs. Future phases may include redevelopment plans for broader, programmatic community-use.

Integral to the design process, AECm has completed an assessment of the existing facility to obtain essential knowledge of building systems and conditions. The objective of this report is to present the assessment findings and to identify issues relevant to the planned Phase I renovations including:

- **Program Review**: Establish the existing Senior Community Center programs and associated functional needs.
- **Environmental Conditions Review**: Review the past environmental investigations completed by the U.S. Army Reserve and identify any potential issues.
- **Land Survey**: Develop a current site plan identifying property boundaries, features, and topographic contours.
- **Archive Document Review**: Review all archive documents provided by the U.S. Army Reserve to the City of Portsmouth to identify issues relevant to adaptive reuse of the property and buildings.
- **Facility Assessment**: Complete an assessment of the existing buildings and infrastructure.

While the existing Senior Activity Center programs and use profiles are relatively defined, projected program characteristics are difficult to determine. Presumably, the program will expand once relocated from the current location (which is not central to the community and is difficult to access). As the median age continues to rise in New Hampshire, user volume is expected to continue trending upward. The existing Doble facility provides significantly more space than the current facility and can accommodate current and expanded user volume and programs.

An environmental site investigation was completed by the U.S. Army Reserve in 2007. This investigation included sampling and testing of impacted soils and groundwater associated with leaking underground petroleum storage tanks (previously removed). The investigation also identified an oil-water separator structure and stone infiltration trench associated with the Doble Organizational Maintenance Shop. The investigation concluded that there are no contaminated soils or groundwater exceeding regulatory standards. In a memorandum dated July 27th, 2007, the Environmental Chief of the 94th Regional Readiness Command notified the City of Portsmouth that no remedial actions are required.

Studies completed by the U.S. Army Reserve verify the presence of Asbestos-Containing Materials inside the Doble facility. This includes floor tiles and mastic, pipe insulation fittings and wrapping, and transite panels. Asbestos-Containing Materials will require abatement or encapsulation. Other potential hazardous materials not studied at Doble include lead, mercury, and polychlorinated biphenyls (PCBs). Testing of suspect building materials commonly found to contain these compounds should be completed prior to commencing building demolition or renovations.

When discussions regarding property transfer began in 2014, the U.S. Army Reserve provided numerous archive documents to the City. They include reports, survey plans, and drawings. In addition to the archive documents, the City provided AECm with additional internal documents relevant to the Doble property acquisition and adaptive reuse.

Between February and April of 2017, AECm completed an assessment of the existing Doble facility. The objective was to determine existing conditions and to identify any potential issues relative to the planned Phase I renovations. Following is a summary of the building systems and required improvements:

Structural Systems: The existing structures are not expected to meet current IBC code standards. Increasing any building loads will likely require substantial structural modifications. A significant crack is evident in the masonry wall at the northeast corner of the Assembly Hall. The cause of the crack and remedial measures should be determined if the Hall scheduled for long-term reuse. A rigorous structural investigation and building model should be developed prior to increasing any loads on the buildings including framing (walls and roof) and foundations.

Building Enclosure: Overall integrity of the existing building enclosure is poor. Thermal insulation, vapor barrier, and air barriers are not present. Improving the enclosure will reduce energy consumption, enhance occupant comfort, improve indoor air quality, and improve overall building durability. Many of the existing windows have failed as evidenced by condensation formation between the double panes. Operation of the sliding window units is difficult and overall quality is poor. Entry doors do not meet current standards for thermal integrity or air-sealing. Whole replacement of windows and entry door systems is recommended.

Fire Protection Systems: A relatively modern fire detection and alarm system exists in the main building. Some system modifications will be necessary if the floorplans are changed. No automatic fire suppression systems exist. A new sprinkler system will be required for the planned reuse of the facility. This includes a new dedicated main service supplied by the municipal water service in the street.

Building Monitoring Systems: There are no security or building monitoring systems in the existing Doble buildings. New systems are recommended for the intended adaptive reuse. The system should include entry control (doors and windows), video surveillance (interior and exterior), and third-party monitoring. In addition to security monitoring and entry control, the system will provide remote occupant monitoring.

Lighting Systems: Based on the quality of existing lighting fixtures and planned changes to floorplans, whole replacement of lighting fixtures in the main building is recommended. Replacement of fixtures in the Assembly Hall should consider future use disposition of the space. Central lighting control systems enable event scheduling and remote monitoring and control.

Mechanical Systems: Mechanical systems at Doble include heating and ventilation. Heating is currently provided by several gas-fired hydronic boilers. Distribution is provided by baseboard registers and fan-coil units. Recommendations include maintaining the existing hydronic systems for secondary, redundant heating. New heating systems include variable refrigerant flow heat pump systems with improved zoning and control. These systems will also provide cooling for the building. Existing ventilation is limited to rooftop mounted exhaust fans in the lavatories. A rooftop air-handling unit provides exhaust for the commercial stove in the kitchen. New building ventilation systems include energy recovery units ducted throughout the occupied spaces. Web-based HVAC controls will provide event scheduling and remote monitoring and control.

Electrical Systems: The existing underground electrical service is relatively modern (230 volt, 3-phase, 400 amp). The service may require upgrade depending on the design loads for the new mechanical systems. The existing system will be verified with the local electrical utility company. No emergency power systems exist at the facility. Based on future use plans (e.g., emergency shelter) a new generator system will be required.

Plumbing Systems: A municipal water service exists in the building. Age and condition of the service-line should be verified to determine if replacement is necessary. Unless the water service is relatively new, it should be replaced when the new fire service is installed.

Egress: Required egress improvements to comply with current code standards include reversing the swing direction on some entry doors. The Assembly Hall requires additional entry door(s) to meet minimum egress requirements. Presently, the overhead rollup door must remain open during high-occupancy events to comply with egress code requirements.

Accessibility: The Doble buildings do not comply with current accessibility standards for public occupancy. Necessary improvements include new lavatory and plumbing fixture configurations, door handles, and door thresholds. The south and west entryways to the main building have several barriers including steps and narrow door widths. A new south entryway is planned which will mitigate the barriers. New doors for the west entry will also be required.

Site Infrastructure: Site infrastructure includes paved driveways, paved parking, gates, chain-link fencing, flagpole, and buried utility services. Pavement condition varies by location. The west parking area is in satisfactory condition but does require maintenance. The east parking pavement is failing and sections will require replacement. Primary access for the new south entryway will be from the east side (future phases may improve access from the west). Parking will be provided in the east parking area and a pedestrian walkway will connect parking to the entryway. Site infrastructure improvements for the planned reuse include repairs to the east parking area pavement. This includes patching, crack filling, sealcoating, and new striping for parking. Site demolition items include signage, gates, and landscape plantings.

Sustainability Considerations: Redevelopment of the Doble facilities offer many opportunities to incorporate sustainable design elements. This includes community connections, user accessibility, sustainable building materials, stormwater quality, greenspace preservation, energy conservation, indoor air quality, and renewable energy technologies. Materials and systems durability and maintenance requirements are also elements that define building sustainability. All mechanical and HVAC equipment will be considered high-efficiency and will comply with energy and indoor air quality code standards. Considering the site orientation (expansive southern exposure), unobstructed landscape, and general site layout, Doble is an ideal candidate for solar PV collector arrays.

TABLE OF CONTENTS

LIST OF FIGURES

1.0 INTRODUCTION

1.1 Approach

The City of Portsmouth (the City) is in the process of acquiring the former Lt. Paul A. Doble U.S. Army Reserve Center (Figure 1). In a phased development, the facility will provide community uses for senior activity center programs, recreation, and other community uses. The initial phase of redevelopment includes readapting the existing building to support the existing Senior Activity Center Programs. This requires renovation of the existing facility and the construction of a new main entryway. Other community-based functions will be integrated in a phased approach as the building is renovated and building modifications and additions are completed.

AECm was retained by the City to complete the Phase I design for adaptive reuse. This includes several tasks:

1. Program Review (Senior Activity Center)
2. Environmental Conditions Review
3. Land Survey
4. Archive Document Review
5. Facility Assessment
6. Schematic Design
7. Final Design / Construction Documents
8. Meetings and Presentations

Figure 1: Aerial View of Doble Facility

This report presents the information and findings associated with tasks 1 through 5. The focused objective of this report is to present the general design criteria, existing facility conditions, and to convey any impacts affecting the Phase I basis of design for adaptive reuse.

1.2 Facility Overview

The former Lt. Paul A. Doble U.S. Army Reserve Center (Doble) is sited on a 3.38-acre parcel located at 125 Cottage Street in Portsmouth, New Hampshire. The site has two permanent structures and two parking lots. Construction of the 11,492 square-foot main training facility and the 2,592 square-foot Organizational Maintenance Shop (OMS) were completed in 1958. The facility provided training and administrative functions for the U.S. Army Reserve 399th Combat Support Hospital unit. Following the commissioning of a new 20,600 square-foot facility in 2014 (Lt. Paul A. Doble facility located on Lafayette Road in Portsmouth), the existing facility was vacated. The USARC 99th Regional Command has continued to maintain the facility.

The main facility is comprised of two building structures (Main Building and Assembly Hall) connected with a hyphen corridor. The main building is a rectangular shaped, single-story masonry structure. The main structure provided administrative and training functions. Dimensions measure approximately 158 feet by 48 feet. The main structure is connected to an

Assembly Hall measuring 72 feet by 52 feet. The independent structures are connected with a narrow 20-foot long corridor and storefront entry. All exterior walls are constructed with cement masonry units (CMUs) clad with full brick on the exterior. Interior walls are primarily constructed of exposed CMU with some framed partition walls clad with gypsum board (dividing office spaces).

The OMS building is approximately 90 feet northeast of the drill hall. The building is a two-bay, single-story, vehicle maintenance garage measuring 53 feet by 46 feet. Similar to the main building, the OMS is constructed with CMU and brick.

1.3 Zoning and Use

The Doble facility is zoned for Municipal uses (City of Portsmouth Zoning Map, 2017) (Figure 2). Historic uses include administration (offices), training, and vehicle maintenance.

As defined by the IBC, existing Building Use Groups include: A-3 (Assembly), B (Office), and S-1 (Storage). NFPA 101 Building Occupancy classifications include Assembly, Business, and Storage (ordinary hazard). Construction Types for the steel and masonry structures include III-B (IBC) and III(200) (NFPA).

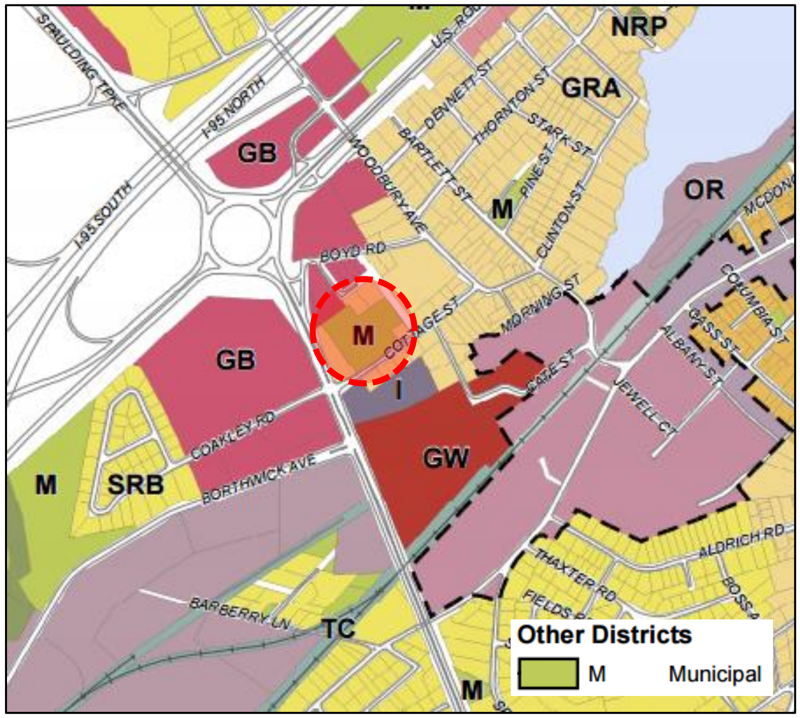

Figure 2: City of Portsmouth Zoning Map (focus)

Uses for the proposed Senior Activity Center (Phase I) are presumed to be consistent with the existing use categories and classifications. Future phase uses may change based on use expectations and building modifications and additions.

2.0 PROGRAM REVIEW

In 2015, AECm commenced a review of the existing Senior Activity Center programs in cooperation with the Program Director (Ms. Brinn Sullivan). This effort was renewed and intensified as part the design planning process in 2017. This review included:

- Existing facilities at the Campus Drive complex.
- Program user count.
- Space and functional needs.
- Existing programs.
- Parking loads.
- Transportation modes.

Based on current statistics, the current average daily number of program users ranges from 40 to 66. Peak user volume occurs on Tuesdays and Thursdays and Sunday is the lowest user day. Mornings are the peak volume period and user volume subsides by mid-afternoon. Special events attract between 150 and 200 users.

Most users (approximately 95%) drive their personal vehicles and park at the facility. Carpooling is generally limited to spouses commuting together (1 to 3 couples daily). Few users are either dropped-off or utilize public transportation.

Current program user growth projections are 25% annually. This is a reflection of an aging population and increasing median age in New Hampshire (notably the Seacoast region).

Growth projections for the new Doble facility are difficult to predict. For the following reasons, the new facility is expected to appeal to more users:

1. Location
   a. Centralized location (enhanced sense of community).
   b. Access to public transportation (Coast bus line).
   c. Proximity to complimentary local services, retail, and other municipal facilities.
   d. High visibility facility.
   e. Public location with abutting neighborhood (sense of safety).
2. Facilities
   a. New construction and interior finishes (new, exciting venue).
   b. Ease of navigation, parking, and building access.
   c. Larger, more accommodating facilities (drop-in lounge, activity rooms, lavatories, lunch-bunch, meals on wheels).
   d. Improved occupant comfort (wayfinding, indoor air quality, interior finishes).
   e. City-owned and supported facility.
3. Programs
   a. Expanded program space and opportunities.
   b. Outdoor program opportunities.
   c. Expanded program hours (evening programs).
   d. Attraction to community volunteers (supporting expanded programs).
   e. Multi-generational, community interaction.

It is realistic to presume that program users will increase by as much as 400% within years 1 to 5. That yields an average daily volume of 160 users. An increase of 300% is realistic for peak volume resulting in 210 daily users. Special event loads are projected to increase by 150% resulting in 300 users. It is expected that the future potential for the program will be defined within the initial 1 to 2 years of operation at the Doble facility.

3.0 ENVIRONMENTAL CONDITIONS REVIEW

3.1 Site Conditions

In 2007, CH2M Hill performed an investigation of the Doble Army Reserve Center in conformance with the Department of Defense Base Redevelopment and Realignment Manual.

A detailed report was prepared and presented to the U.S. Army Corps of Engineers, Louisville District. Areas identified as a potential concern were:

- A release of methyl ethyl ketone (MEK) from a 1,000-gallon underground storage tank. CH2M Hill performed three rounds of groundwater sampling and concentrations of MEK were below cleanup standards.
- A buried gravel infiltration chamber that receives stormwater runoff from a parking area via several oil/water separators and a vehicle wash pad that drains to the storm sewer. No evidence of a release was identified and therefore did not contribute to overall properly classification.

In a memorandum dated July 27th, 2007, the Environmental Chief of the 94th Regional Readiness Command notified the City of Portsmouth that the Environmental Condition Assessment for the Doble property had been completed by CH2M Hill. The memorandum indicates that no remedial actions are required (BRAC Environmental Condition Type 3).

3.2 Asbestos-Containing Materials

The U.S. Army Reserve 99th Regional Support Command commissioned two consulting firms to provide sampling and testing of all potential asbestos-containing materials (ACMs) in the Doble facility. The initial event was completed in 1994. In 2013, a second inspection and testing event was completed to verify the previous results.

Of the sixteen building materials sampled, the following building materials were confirmed to contain asbestos:

- 9-inch square brown and tan checker floor tile and underlying mastic (Main Reserve Building).
- 9-inch square tan floor tile and underlying mastic (Main Reserve Building).
- Mudded pipe fittings on fiberglass and layered paper pipe (Main Reserve Building).
- Layered paper pipe insulation (Main Reserve Building).
- Asbestos-cement transite board (OMS Building).
- Layered paper pipe insulation (OMS Building).

The tan 9-inch square floor tiles were identified in the kitchen and appear to have been removed / abated. All other ACMs should be abated prior to demolition or substantial renovations.

3.3 Hazardous Building Materials

Other hazardous compounds commonly used in building materials and equipment manufactured in the 1950's era include lead, mercury, and polychlorinated biphenyls (PCBs). Lead was used in paint and coating products, pipe solder, and electrical cable sheathing. Mercury was commonly used in fluorescent lamps and electrical actuators (e.g., low-voltage thermostats). PCBs were used in electrical transformers, fluorescent lamp ballasts, caulking, and paint and coating products. PCBs also can migrate into solids that they contact. This includes masonry, mortar, and concrete.

Particulates containing lead and PCBs can become airborne under normal building operations and may contaminate surfaces in the form of accumulated dust. This may result in an inhalation hazard if the source dust is disturbed and becomes airborne. Landfills and recycling facilities have specific permit restrictions that regulate the concentrations and amounts of hazardous building materials that they can accept.

Based upon the historical environmental reports provided by the USAR to the City of Portsmouth, screening and testing of lead, mercury, or PCBs has not been performed at the Doble facility to date. This will have to be completed prior to commencing demolition / removals or significant renovations involving suspect building materials.

4.0 LAND SURVEY

Under subcontract to AECm, Doucet Survey of Newmarket, NH completed a boundary, feature, and topographic survey of the Doble property (March-April 2017). The purpose of the survey was to locate and mark property boundaries and to develop a current site plan depicting all surface features and topographic contours (elevations). This included locating all site structures and floor elevations. This site plan will be used as the base map for all future site engineering and design.

5.0 ARCHIVE DOCUMENT REVIEW

Discussions involving transfer of the Doble facility from the USARC to the City where initiated in 2014. Since 2014, the City has accumulated a comprehensive database of drawings, reports, and other facility-specific and programmatic documents for the Doble facility.

The following relevant reports were reviewed and were considered when planning the facility assessment.

- *Fire Protection, Life Safety, and Accessibility Report*, December 2014, SFC Engineering
- *Asbestos-Containing Material Re-Inspection Report*, June 2013, Alliant Corporation
- *Environmental Condition of Property Report*, March 2007, CH2M Hill

It is noted that many of the original building drawings provided by the USAR are for a facility located in Rochester, NH. The dimensions and layout are consistent with the Doble facility and it was commonplace to develop standardized building plans for federal buildings for reproduction at multiple sites. It is also possible that the building was originally intended to be sited in Rochester and was relocated to Portsmouth. Designers should carefully review the drawings and field verification may be required for critical features and building elements (e.g., structural framing). Elevations shown on the drawings should also be presumed to vary from actual.

6.0 FACILITY ASSESSMENT

Between February and April of 2017, AECm completed an engineering assessment of the Doble facility. The objective of the assessment was to obtain baseline knowledge of existing systems and conditions. This information is necessary to identify any existing issues that affect current or proposed building systems function or operation. The following subsections present the findings for each building system.

6.1 Structural Systems

Structural support for the Doble buildings is provided by the bearing masonry block perimeter and corridor walls. A steel reinforced bond beam extends the perimeter of the exterior wall upper and lower (at-grade) sections to resist lateral shear forces.

The roof is supported by three sections of steel open-web joists that span from the perimeter walls to the corridor walls (Figure 3). Joists are orientated perpendicular to the east-west building plane (long length). The primary joist sections (2) span from the north and south perimeter walls to the main corridor CMU walls. A shorter truss section spans the corridor supported by the interior corridor walls. Field verification of the joist-to-joist connections is required for any structural modifications.

Figure 3: Open-Web Steel Truss System (Typ.)

The open-web joists are set at 24-inches on center and are approximately 10-inches wide in section. Steel cross-bracing (bridging) connects joists to resist lateral (bending) stresses. Structural roof decking consists of plywood panels and timber planking connected to the joist flanges.

The original design drawings identify perimeter and interior shallow foundation systems. The perimeter system consists of a steel reinforced cast-in-place concrete spread footing and CMU stem wall with a steel-reinforced grade bond beam (Figure 4). This system extends the perimeter of the building and is located below the two corridor walls extending the length of the main building.

No indications of overstressing of the bearing masonry walls or the steel joists is evident in the main building. Significant vertical cracking exists on the northwest corner of the Assembly Wall (exterior). The stress cracks may be a result of developed shear stresses within the wall. These stresses may be attributed to differential settlement of the shallow foundation system, or horizontal wind shear loading. Further investigation of the cracking should be completed to identify the cause and necessary structural improvements.

Prior to adding any loads to the existing structure wall or roof systems, a rigorous structural evaluation should be completed by a licensed Professional Structural Engineer. This includes developing a model of the existing structures to determine the structural integrity as it exists. Additional structural engineering is necessary to accommodate building modifications and associated increases in loading.

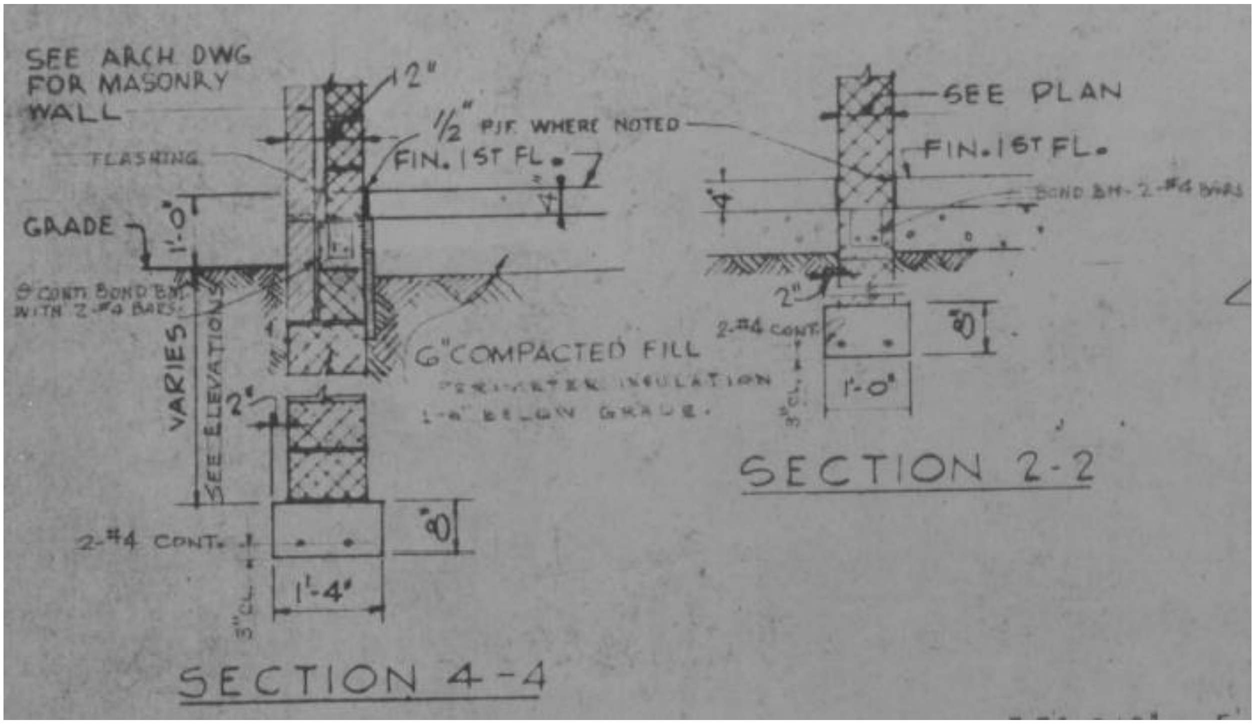

Figure 4: Design Details for Perimeter and Interior Walls and Foundations (c. 1955)

Typical of structures constructed in this circa (1950's), the existing structures likely do not meet current IBC design requirements for snow, wind, and earthquake loads. Structural modifications would be required to comply with current building standards.

6.2 Building Enclosure

6.2.1 Walls

The existing wall sections are constructed of un-grouted cement masonry units (CMU) clad with full brick to the exterior. Interior sections of the CMU walls are exposed. The walls do not contain any insulation, air barrier, or a vapor barrier. The water barrier is comprised of the full-brick and mortar cladding with an intermediate drainage gap or plane separating it from the CMU surface. Thermal resistance rating for the as-constructed masonry wall assembly is less than R-5.

Insulation, air barrier, and vapor barrier should be added to the wall assembly as part of any renovation work for adaptive reuse. While there are several means and methods that accomplish this, the most practical approach (considering the interior renovation plans), is to insulate from the interior of the building. This approach preserves the historic exterior elevation and mitigates concerns regarding the drainage and durability of insulation materials exposed to exterior conditions.

6.2.2 Roof

Existing roofing assemblies are composed of a mechanically fastened rubber membrane applied to rigid insulation board (Figure 5). Drainage of the low-pitch roofs is provided by gutter and downspout systems. Condition of the roof membrane appears satisfactory and evidence of leakage is not evident.

Figure 5: Rubber-Membrane Roofing System

Adding roof-mounted equipment (HVAC equipment, solar-panels, etc.) to the existing roofing systems is not recommended. Increased loading resulting from equipment weight and snow-drift loads will require a structural analysis. Considering the existing open-web roof joist system, it is presumed that structural modifications will be required to support any additional loading.

Future replacement of the membrane roofing system should include additional rigid insulation. Ideally, the new insulation value will surpass the existing building code minimum requirements. Inspection of the existing plywood and timber plank decking system should also be completed to determine if replacement or repair is necessary.

6.2.3 Floor

The slab-on-grade concrete floor and intersecting foundation walls do not have any insulation. Insulating the perimeter foundation wall with rigid insulation board will reduce thermal transfer through the wall and the intersecting floor. This should be considered as part of any site improvement project.

6.2.4 Windows

The original windows have been replaced with operating aluminum clad, double-pane units. Based on the window design and condition, the units were installed in the 1990s. Issues with the existing windows include failed seals (as evidenced by condensation between glazing), poor weather-sealing to masonry opening, and inoperability of sliding units (Figure 6).

Replacement of all windows in the main building is recommended. Future uses of the Assembly Hall should be determined prior to investing in new window systems.

Figure 6: Window with Failed Seals (Typ.)

6.2.5 Doors

Entry doors on the Doble facility vary in composition and style. Doors for the main entries on the south elevation and the west elevation consist of double steel-framed units with full glazing. Surface corrosion on the steel frames is evident and the weather-seals are deteriorated. Thermal values for the doors are very low and do not meet current code standards for energy performance. A second pair of wood-framed, fully glazed entry doors are located to the interior creating an air-lock. Air sealing of these units is poor.

An aluminum-framed storefront entry exists at the east elevation in the corridor connecting the main building to the Assembly Hall. This double-pane system does not comply with current energy code standards.

Solid steel doors are located on the kitchen entry and the Assembly Hall northeast entry. The units do not comply with current energy code standards for thermal or air-sealing integrity.

A metal roll-up garage door is located in the east wall of the Assembly Hall. This unit does not contain any insulation and the seals are poor (all four sides).

6.3 Fire Protection Systems

In 2014 the City of Portsmouth commissioned SFM Engineering to complete a Fire Protection evaluation of the Doble facility. This evaluation considered the adaptive reuse of the Doable facility for Senior Activity Center functions. AECm has reviewed the report dated December 29, 2014 and concur with the findings as summarized below.

6.3.1 Fire Detection and Notification

Fire detection and notification systems within the building consisted of manual pull alarms, heat detectors, and smoke detectors in each room. Detectors are integrated and connected to a fire alarm panel, Simplex Model 2080-9024, at the west entrance (Figure 7). Notification devices horn and strobes) are located throughout the corridors. It could not be determined if the alarm system is integrated with a central control.

Figure 7: Fire Alarm Panel

6.3.2 Fire Suppression Systems

Fire suppression equipment include hand-held ABC fire extinguishers located throughout the building. Type A and K fire extinguishers are installed in the kitchen. A wet chemical system is installed in the commercial stove exhaust hood located in the kitchen. This system will require testing and recertification to verify operation. The rooftop mounted stove exhaust unit is currently inoperative. No automatic fire suppression systems (sprinklers) exist in the main building or Assembly Hall.

Adaptive reuse of the Doble facility for public assembly use will require installation of an automatic fire suppression system (sprinkler). This will require a new dedicated main service (estimated 4-inch diameter) extending from the municipal street service to the mechanical room. Connection will likely require an active tap to prevent public service disruption.

6.4 Building Monitoring Systems

There are no security or building monitoring systems in the existing Doble buildings. New systems are recommended for the intended adaptive reuse. The system should include entry control (doors and windows), video surveillance (interior and exterior), and third-party monitoring. In addition to security monitoring and entry control, the system will provide occupant safety monitoring. Occupant video surveillance allows administrative staff to monitor occupant safety from remote locations.

6.5 Lighting Systems

Existing lighting fixtures include recessed and suspended linear fluorescent units. Relative to modern illumination standards, lighting quality is poor and the fixtures are not energy efficient. Most lighting controls are conventional manual switches. Whole replacement of the lighting fixtures in the main building area is recommended as part of planned renovations. A new lighting layout plan is necessary for revised floor plans. Lighting systems should include smart controllers including daylight controls, motion controls, and schedule-based control systems.

The fixtures in the Assembly Hall may remain pending disposition of the space for future use. If the Hall is scheduled to remain in long-term use, then the fixtures can be replaced in future phases.

Exterior fixtures include sodium lamp wallpack units with daylight controls. Replacement of these units with LED packs is recommended.

Emergency lighting was identified in hallways. The units provide automatic illumination in the event of loss of power (battery backup). Illuminated exit signs are present in corridors and are fixed above exit doors. Functionality of the battery backup systems (lighting and signage) must be verified prior to re-occupancy of the facility.

6.6 Mechanical Systems

The below-grade mechanical room is located on the western side of the office corridor. The room houses a large boiler (Figure 8) and five smaller capacity direct-venting boilers (Figure 9). Three floor drains located in the boiler room are connected to a floor sump. A formerly used chimney is located in the southeast corner of the room. A chase-way was observed in the boiler room designed to drain groundwater welling up through the basement into the sanitary sewer.

Figure 8: Central Gas-Fired Boiler Unit

The heating system in the main building is a hydronic hot water distribution system. A main distribution loop is networked throughout the building with individual heating emitters located in each office and a dedicated ceiling-mounted air-handler with a hot-water fan-coil in the Assembly Hall. For the main building office spaces, a single thermostat controls the hot water loop temperature and individual office temperature can be adjusted with a thermostatic valve on each heat emitter. Two separate thermostats control the air-handler and the fan-coil heater In the Assembly Hall.

Figure 9: Supplemental Boilers (5)

Hot water is supplied by five boilers located in the main building boiler room. A single large boiler rated at 1,517 MBH feeds the hot water supply header in conjunction with four smaller boilers rated at 250 MBH each. The hot water loop is a closed-loop with an air-separator and high point vents installed in various locations.

Individual window air-conditioning units are located in each office space for local cooling. Air conditioners are mounted in a cut wall opening.

No fresh air ventilation was identified for the office section of the building. Within the drill hall, the air handler supplied fresh air to the space. To bring the building into compliance with *ASHRAE 62 The Standards for Ventilation and Indoor Air Quality*, fresh air ventilation will need to be added.

In addition to no existing ventilation system, the boiler room did not have dedicated air intake for combustion air for the larger boiler. The four smaller boilers have individual direct piped combustion air intakes. Combustion makeup air is supplied through the fixed louvers in the exterior boiler room entry doors, however, they have been covered. Therefore, the main boiler obtains combustion air from indoor air and leakage through the doors and walls of the boiler room. This may result in a negative air situation when the boiler is in operation.

Figure 10: Rooftop Air Handler and Exhaust Fan (Typ.)

The two bathrooms on the first floor share a rooftop mounted ventilator. The ventilator is controlled by lavatory light switches. Two additional rooftop ventilators were identified in the kitchen preparation area. A rooftop air handler is dedicated to the kitchen exhaust hood (Figure 10).

6.7 Electrical Systems

A buried electrical service (400 amp, 230 volt, 3-phase) is fed from Cottage Street to the service entrance at the southwest corner of the main building (Figure 12). The main distribution panel (MDP) is located in the utility room adjacent to the boiler room (Figure 11). Six subpanels are located throughout the facility. Each subpanel has spare breakers available. Subpanels exist in the following spaces:

- Front Entrance
- Main Corridor
- Boiler Room
- Assembly Hall
- Kitchen
- Maintenance Shop

Figure 11: Main Circuit Panel

Figure 12: Electrical Service

The existing 400 amp electrical service may have to be upgraded as part of future renovation projects. Relocating the service entrance to the west elevation (near the boiler room) should be considered.

Renewable energy systems for electrical generation should be considered in future phase developments. Potential renewable energy sources include solar photovoltaic (PV) and wind. Renewable energies are discussed in greater detail in Section 6.12.

No emergency power systems (EPS) exist at the Doble facility. EPS is not a code requirement for the planned reuse for a Senior Activity Center. Future functions for the facility may include emergency shelter operations. Prior to emergency shelter operation, an EPS is required. Conventional EPS systems include stand-by generators. Other EPS systems include solar photovoltaic (PV) and battery storage systems. As a hybrid system, PV can be integrated with a conventional gas-fired generator.

6.8 Plumbing Systems

Municipal water is supplied to the building on the southwest corner of the building into the boiler room. The main service provides cold water and domestic hot water (DHW) to fixtures throughout the facility (Figure 13). Condition of the existing service should be verified as part of any major site construction project planning. If the water service is original to the building (60-70 years old), replacement / upgrade is recommended. This should be completed in parallel with the new fire sprinkler service required for the building.

The DHW distribution system incorporates a recirculation system to decrease water consumption and to reduce the lag time for hot water to supply the fixtures. DHW is generated using a 75-gallon natural gas fired storage tank with a maximum input of 75,100 BTH.

Functionality of the hot water heater was verified. Replacement, or augmentation, of the unit should be considered based on the projected DHW demand for lavatories, shower facilities, and cooking. Potential gas-fired units include conventional tank, demand tankless, and indirect tanks (boiler). Units may be configured as single source individual or in combination. Other potential heating sources include solar thermal systems.

Figure 14: Sump Pump System

Figure 13: Main Water Service

All sanitary waste plumbing is connected to the municipal sewer system. Sewer piping is located under the concrete floor slab exiting the main building in the southwest quadrant. A recessed sump pit and pump are located in the boiler room under the stairway (Figure 14). Although the plumbing configuration for the sump pump could not be verified, it is likely connected to the municipal sewer system.

6.9 Egress

In 2014, SFC Engineering completed an evaluation of egress-ways for the building. This evaluation considered the adaptive reuse of the Doble facility for Senior Activity Center functions. The following key items were noted:

The building has a total of five exit doors that all discharge directly to the exterior of the building. All of the exits with the exception of one are one step above grade. All of the exit doors with the exception of the side entrance have a single step down to grade ranging from 4 ¼-inches to 6-inches in height. Exterior exits on existing buildings are permitted to have a single step to grade up to 8-inches in height.

None of the doors from the offices along the corridor swing in the direction of egress, if these spaces are altered to have an occupant load of 50 or more persons then the door swing must be reversed.

The Assembly Hall is provided with two remote means of egress that provide an egress capacity of 236 occupants. The egress capacity could be increased to 405 occupants if the doors separating corridor 1 and 2 are reversed to swing in the direction of egress. It should be noted that the rolling overhead door separating corridor 2 from the Assembly Hall must be kept open when the assembly hall is occupied. A second rolling overhead door separates the assembly hall from the kitchen. When the door is open there is a direct egress path through the kitchen, but egressing through a kitchen is prohibited per IBC.

The existing building layout complies with the common path of travel and maximum travel distance limitations and does not have non-compliant dead-end corridors.

6.10 Accessibility

In 2014, SFC Engineering completed and accessibility evaluation of the existing Doble facility. This evaluation considered the adaptive reuse of the Doble facility for Senior Activity Center functions. Their findings conclude that all newly constructed elements must comply with the accessibility requirements of ANSI A117.1 and ADA 2010. Because the renovations will affect an area of primary function, an accessible route must be provided to the renovated area. The following items are not compliant with current IBC requirements:

The following features of the current main entrance are not accessible:

- The front (main) entrance is not provided with a ramp and is 5-¼ inches above grade.
- Each door leaf provides 30-inches of clear width, not the required 32-inches. Only one of the door leafs is required to provide a 32-inch clear width.

The side entrance is provided with a compliant accessible ramp but each door leaf provides 30-inches of clear width, not the required 32-inches. Only one door leaf is required to provide a 32-inch clear width. The corridor leading to the assembly hall has a double set of doors with each door leaf providing 27 ½-inches of clear width, not the required 32-inches. Only one door leaf is required to provide a 32-inch clear width.

The three existing lavatories are not accessible. All of the lavatory doors have a threshold that exceeds the allowed ½-inch maximum height. Lavatory fixtures must be altered to be compliant with the requirements of ANSI A117.1 Chapter 6.

The majority of the existing doors have standard door knobs which is not a compliant door hardware as it can require tight grasping and twisting of the wrist.

Accessible parking spaces and required clear spaces require restriping and signage.

All of the accessibility issues are expected to be mitigated with the renovation design for Phase I. The new main entryway (south elevation) and new doors on the west entry will alleviate entry barriers. Lavatory renovations will include a new layout and fixtures.

6.11 Site Infrastructure

Existing site infrastructure includes paved driveways and parking areas, paved walkways, landscaping (lawn and plantings), chain-link fencing, steel gates, jersey barriers, and a flag pole. All utilities are buried and water and sewer are municipal services.

Primary access for the new south entryway will be from the east side (future phases may improve access from the west). Parking will be provided in the east parking area and a pedestrian walkway will connect parking to the entryway. Site infrastructure improvements for the planned reuse include repairs to the east parking area pavement. This includes patching, crack filling, sealcoating, and new striping for parking. Phase I site demolition items include signage, gates, limited fencing, and landscape plantings.

6.12 Sustainable Design Considerations

There are many opportunities to improve sustainability of the Doble facility as part of the Phase I renovations and future redevelopment. The Phase I design will consider all sustainable elements and best-practice for modern planning and development including:

- Building material reclamation.
- Recycled and renewable materials.
- Locally derived materials.
- Community integration.
- Public transportation.
- Pedestrian and bicyclist facilities.
- Naturalized landscaping.
- Outdoor attractions and connections.
- Facility access and waypointing.
- Stormwater quality.

- Energy conservation.
- Indoor air quality.

Building materials selections for the adaptive reuse design will consider preservation of existing materials as practical. This reduces the need for demolition, the volume of materials disposed in landfills, and costs associated with newly sourced materials. Some demolished materials can be recycled to reduce landfill volumes. New materials will have a high-recyclable material content and/or derived from renewable sources. Locally derived and manufactured materials are preferred over imported or non-regionally sourced products.

The site setting is unique as it is proximate to intensive commercial development (Lafayette Road) with residential neighborhoods abutting to the north and east. The location is highly visible and easily accessible for many Portsmouth residents. Design will consider the local setting and will be considerate of the existing community setting and architecture. Connection to the community will increase the appeal of the facility and will consider waypointing, vehicular traffic flows, pedestrian accessibility, and bicyclist accessibility. Low Impact Design (LID) standards will be used for site design considering stormwater quality and greenspace.

Reducing energy consumption will achieved in several means. Improving the thermal enclosure of the buildings will reduce heating and cooling loads. New windows and doors will be high-efficiency units. Floorplan revisions (wall removals and glass partition walls) will allow greater natural light flow into spaces. New HVAC systems will include high-efficiency equipment and improved zoning and controls. Renewable energy systems will also reduce energy consumption.

In addition to improving efficiency, new HVAC systems will improve indoor air quality and occupant comfort. Adding central cooling will eliminate the need for local window air conditioning units and provide evenly distributed cooling. New energy recovery ventilators (ERVs) will exchange stale indoor air with fresh outdoor air. Improved zoning and automated demand-based controls will maintain temperatures at comfortable setpoints according to the zone use.

Figure 15: Solar Hot Water Panels - NH Army National Guard, Franklin Readiness Center

Renewable energy systems will reduce energy consumption and operating costs. Potential systems include geothermal (heating and cooling), solar photovoltaics (PV), solar thermal, and solar domestic hot water.

Considering the site orientation (expansive southern exposure), unobstructed landscape, and general site layout, Doble is an ideal candidate for solar PV collector arrays. Collector panels can be roof-mounted or ground-mounted and configured in parallel.

Installation of rooftop panels on the existing rooftops (main building and Assembly Hall) will likely require structural modifications to support the racking, collector panels, and snow drift loads. Roof-mounted systems are more practical for new buildings or additions which can be designed to accommodate them. Ground-mounted array systems include static (fixed), single-axis rotational tracking, and dual-axis rotational tracking. Panels may be rack-mounted or pole-mounted. Battery storage systems improve the power source availability and reliability.

Figure 16: Geothermal Well Construction - Rye Town Hall

Geothermal heating and cooling (water-source heat pumps) may be an option for future large-scale buildings and major additions. Determining if geothermal is a feasible option requires a subsurface investigation to determine soil and bedrock conditions.

Generally, small-scale wind is not an economically practical renewable energy source. Common concerns and public perceptions associated with wind turbine units include visual detraction, noise, and wildlife impacts. Determining the potential energy source requires a site feasibility study.