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# DDESS Facility Transfer Study Facility Condition Report (Final)

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## Quantico Marine Base, Virginia

December 10, 2003

PSC Project # 03811102

**dodea**  
DEPARTMENT OF DEFENSE EDUCATION ACTIVITY



**Parkhill, Smith & Cooper, Inc.**  
Engineers ■ Architects ■ Planners

QUANTICO SCHOOLS  
QUANTICO MARINE BASE, VIRGINIA  
PROPERTY CONDITION REPORT

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**W.W.ASHURST ELEMENTARY SCHOOL  
QUANTICO US MARINE BASE, VIRGINIA  
PROPERTY CONDITION REPORT  
EXECUTIVE SUMMARY**

1.0 Executive Summary

Data obtained from the survey provides an objective and impartial evaluation of Domestic Dependent Elementary and Secondary Schools (DDESS) schools for the Department of Defense Education Activity (DoDEA) in their object benefit analysis, to ascertain the feasibility of facility transfers to Local Education Agencies (LEAs).

This facility is a 42,400 square foot, one-story masonry veneer building constructed in 1953. Additional classrooms and storage space were subsequent additions. Temporary structures provide additional storage and maintenance facilities. A PTR addition is also under construction. This facility serves 248 students from kindergarten to third grade.

This facility exhibits progressive deterioration of paving, concrete walkways, exterior stucco walls, concrete window soffits, moisture intrusion, roofing and roofing components, finishes, mechanical, plumbing and electrical systems. This facility requires alterations to comply with life safety codes, ADA accessibility and major building systems guidelines.

Opinions of probable costs are calculated for both immediate and long-term remediation planning. Opinions of probable costs are listed in Paragraph 4.0 and are summarized as follows:

1. Immediate Remediation - Items recommended for repairs or replacement within two years to resolve unsafe conditions, life safety fire code requirements, ADA accessibility guidelines and potential system failures:

Total Immediate Remediation Costs           \$704,000

2. Intermediate Remediation – Items such as force protection, additional site paving, Title IX compliance costs, or playground equipment or surfacing. These are items of lower priority than immediate costs, but are higher priority than long-term remediation costs.

Total Intermediate Remediation Costs           \$0

3. Long-term Remediation - Items recommended for repair or replacement within ten years for deferred maintenance of aging systems, non-life-threatening issues, other code requirements and remainder of ADA accessibility guidelines:

Total Long-term Remediation Costs           \$1,597,000

Total remediation project costs are approximately \$ 2,301,000.

The report scope also included the cost of Plant Replacement Value (PRV), defined as the cost of a new facility, including associated sitework and parking. The estimated PRV for this facility is \$5,659,000. By comparing the remediation costs, plant replacement costs and the age of the building, we determined a modified recapitalization metric (MRM) for this facility. This ratio is defined as the required investment to correct deficiencies divided by the target investment required for a new building. The ratio for Ashurst Elementary School is .84. A ratio over one indicates it is more cost effective to build a new school rather than renovate the existing facility. It is our recommendation that the school be scheduled to renovate immediate remediation items within the year and long-term items within the next ten years. A summary of the MRM calculation is shown below.

ESL(yrs)	AGE (yrs)	RUL (yrs)	PRV (\$)	TARGET SUSTAIN. (Annual \$)	REMED. COSTS (\$)	REQUIRED INVEST. (Annual \$)	MRM	RECOMMEND
67	*34.7	*32.3	5,659,000	84,500	2,301,000	71,200	.84	Renovate

\* Indicates Composite Number



**Fire Rated Wall Requiring Sealing Between Top of Wall and Roof Deck**



**Damaged Deck due to Moisture Intrusion**

**WILLIAM WARD BURROWS ELEMENTARY SCHOOL  
QUANTICO US MARINE BASE, VIRGINIA  
PROPERTY CONDITION REPORT  
EXECUTIVE SUMMARY**

1.0 Executive Summary

Data obtained from the survey provides an objective and impartial evaluation of Domestic Dependent Elementary and Secondary Schools (DDESS) schools for the Department of Defense Education Activity (DoDEA) in their object benefit analysis, to ascertain the feasibility of facility transfers to Local Education Agencies (LEAs).

This facility is a 41,900 square foot, two-story masonry veneer building constructed in 1990. Additional classrooms and storage space were subsequent additions. Temporary structures provide additional storage and maintenance facilities. This facility serves 300 students from pre-kindergarten, and fourth and fifth grades.

This facility exhibits minor deterioration or problems with paving, concrete walkways, masonry veneer, drainage moisture intrusion, finishes, mechanical, plumbing and electrical systems. This facility is relatively code-compliant but requires some alterations to comply with life safety codes and ADA accessibility guidelines.

Opinions of probable costs are calculated for both immediate and long-term remediation planning. Opinions of probable costs are listed in Paragraph 4.0 and are summarized as follows:

1. Immediate Remediation - Items recommended for repairs or replacement within two years to resolve unsafe conditions, life safety fire code requirements, ADA accessibility guidelines and potential system failures:

Total Immediate Remediation Costs            \$486,000

2. Intermediate Remediation – Items such as force protection, additional site paving, Title IX compliance costs, or playground equipment or surfacing. These are items of lower priority than immediate costs, but are higher priority than long-term remediation costs.

Total Intermediate Remediation Costs            \$0

3. Long-term Remediation - Items recommended for repair or replacement within ten years for deferred maintenance of aging systems, non-life-threatening issues, other code requirements and remainder of ADA accessibility guidelines:

Total Long-term Remediation Costs            \$333,000

Total remediation project costs are approximately \$ 819,000.

The report scope also included the cost of Plant Replacement Value (PRV), defined as the cost of a new facility, including associated sitework and parking. The estimated PRV for this facility is \$5,599,000. By comparing the remediation costs, plant replacement costs and the age of the building, we determined a modified recapitalization metric (MRM) for this facility. This ratio is defined as the required investment to correct deficiencies divided by the target investment required for a new building. The ratio for Burrows Elementary School is .18. A ratio over one indicates it is more cost effective to build a new school rather than renovate the existing facility. It is our recommendation that the school be scheduled for renovation. A summary of the MRM calculation is shown below.

ESL(yrs)	AGE (yrs)	RUL (yrs)	PRV (\$)	TARGET SUSTAIN. (Annual \$)	REMED. COSTS (\$)	REQUIRED INVEST. (Annual \$)	MRM	RECOMMEND
67	12	55	5,599,000	83,600	819,000	14,900	.18	Renovate



**Damaged Roof**



**Damaged Attic Fire Separation Wall**

**QUANTICO MIDDLE/HIGH SCHOOL  
QUANTICO US MARINE BASE, VIRGINIA  
PROPERTY CONDITION REPORT  
EXECUTIVE SUMMARY**

1.0 Executive Summary

Data obtained from the survey provides an objective and impartial evaluation of Domestic Dependent Elementary and Secondary Schools (DDESS) schools for the Department of Defense Education Activity (DoDEA) in their object benefit analysis, to ascertain the feasibility of facility transfers to Local Education Agencies (LEAs).

This facility is a 72,800 square foot, two-story masonry veneer building constructed in 1962. Additional classrooms and storage space were subsequent additions. Temporary structures provide additional storage and maintenance facilities. This facility serves 400 students from sixth through twelfth grades.

This facility exhibits progressive deterioration of paving and concrete walkways. Face brick masonry veneer and window systems are in good condition. Roofing is new but retains water due to flat surface conditions. Interior finishes are in good condition. Mechanical, plumbing and electrical systems require revisions, especially to the existing geothermal heating/cooling system. This facility requires alterations to comply with NFPA life safety code and ADA accessibility guidelines.

Opinions of probable costs are calculated for both immediate and long-term remediation planning. Opinions of probable costs are listed in Paragraph 4.0 and are summarized as follows:

1. Immediate Remediation - Items recommended for repairs or replacement within two years to resolve unsafe conditions, life safety fire code requirements, ADA accessibility guidelines and potential system failures:

Total Immediate Remediation Costs           \$959,000

2. Intermediate Remediation – Items such as force protection, additional site paving, Title IX compliance costs, or playground equipment or surfacing. These are items of lower priority than immediate costs, but are higher priority than long-term remediation costs.

Total Intermediate Remediation Costs           \$293,000

3. Long-term Remediation - Items recommended for repair or replacement within ten years for deferred maintenance of aging systems, non-life-threatening issues, other code requirements and remainder of ADA accessibility guidelines:

Total Long-term Remediation Costs           \$1,360,000

Total remediation project costs are approximately \$2,612,000.

The report scope also included the cost of Plant Replacement Value (PRV), defined as the cost of a new facility, including associated sitework and parking. The estimated PRV for this facility is \$9,954,000. By comparing the remediation costs, plant replacement costs and the age of the building, we determined a modified recapitalization metric (MRM) for this facility. This ratio is defined as the required investment to correct deficiencies divided by the target investment required for a new building. The ratio for Quantico Junior High and High School is .63. A ratio over one indicates it is more cost effective to build a new school rather than renovate the existing facility. It is our recommendation that the school be scheduled for renovation. A summary of the MRM calculation is shown below.

ESL(yrs)	AGE (yrs)	RUL (yrs)	PRV (\$)	TARGET SUSTAIN. (Annual \$)	REMED. COSTS (\$)	REQUIRED INVEST. (Annual \$)	MRM	RECOMMEND
67	*36.5	*27.8	9,954,000	148,600	2,612,000	94,000	.63	Renovate

\* Indicates Composite Number

Note that the sum of Age and RUL does not equal 67 (ESL) because the lifespan of the portable building on-site has been set at 25 years for the purpose of this study.



**Roof Drainage Problems**



**Stairway to Play Fields in ADA Noncompliance**

**JOHN H. RUSSELL ELEMENTARY SCHOOL  
QUANTICO US MARINE BASE, VIRGINIA  
PROPERTY CONDITION REPORT  
EXECUTIVE SUMMARY**

1.0 Executive Summary

Data obtained from the survey provides an objective and impartial evaluation of Domestic Dependent Elementary and Secondary Schools (DDESS) schools for the Department of Defense Education Activity (DoDEA) in their object benefit analysis, to ascertain the feasibility of facility transfers to Local Education Agencies (LEAs).

This facility is a 40,000 square foot, one-story masonry veneer building constructed in 1953. Additional classrooms and storage space were subsequent additions. Temporary structures provide additional storage and maintenance facilities. This facility serves 235 students from pre-kindergarten to second grade.

This facility exhibits progressive deterioration of site work, foundations, face brick veneer cracking, drainage and moisture problems, roofing and roofing components, and requires substantial upgrades of the mechanical, plumbing and electrical systems. This facility requires alterations to comply with NFPA life safety code and ADA accessibility, and to keep major building systems operational.

Opinions of probable costs are calculated for both immediate and long-term remediation planning. Opinions of probable costs are listed in Paragraph 4.0 and are summarized as follows:

1. Immediate Remediation - Items recommended for repairs or replacement within one year to resolve unsafe conditions, life safety fire code requirements, ADA accessibility guidelines and potential system failures:

Total Immediate Remediation Costs            \$2,482,000

2. Intermediate Remediation – Items such as force protection, additional site paving, Title IX compliance costs, or playground equipment or surfacing. These are items of lower priority than immediate costs, but are higher priority than long-term remediation costs.

Total Intermediate Remediation Costs            \$0

3. Long-term Remediation - Items recommended for repair or replacement within ten years for deferred maintenance of aging systems, non-life-threatening issues, other code requirements and remainder of ADA accessibility guidelines:

Total Long-term Remediation Costs            \$997,000

Total remediation project costs are approximately \$ 3,479,000.

The report scope also included the cost of Plant Replacement Value (PRV), defined as the cost of a new facility, including associated sitework and parking. The estimated PRV for this facility is \$5,342,000. By comparing the remediation costs, plant replacement costs and the age of the building, we determined a modified recapitalization metric (MRM) for this facility. This ratio is defined as the required investment to correct deficiencies divided by the target investment required for a new building. The ratio for Russell Elementary School is 2.32. A ratio over one indicates it is more cost effective to build a new school rather than renovate the existing facility. It is our recommendation that the school be scheduled for replacement within the next ten years. A summary of the MRM calculation is shown below.

ESL(yrs)	AGE (yrs)	RUL (yrs)	PRV (\$)	TARGET SUSTAIN. (Annual \$)	REMED. COSTS (\$)	REQUIRED INVEST. (Annual \$)	MRM	RECOMMEND
67	*48.3	*18.8	5,342,000	79,700	3,479,000	185,100	2.32	Replace

\* Indicates Composite Number



**Damaged Masonry due to Foundation Settlement**



**Stairway to Main Entrance Walkway in ADA Noncompliance**

The MRM ratio for Russell Elementary School exceeds 1 and replacement has been recommended. Almost all of the school was constructed before 1960. The school needs major renovation to comply with current ADA recommendations and life safety issues. In addition, several major building systems appear to be near failure and will need replacement or repair in the next ten years, particularly the mechanical, plumbing, and electrical systems. The current mechanical system utilizes fan coil units or unit heaters. Air conditioning is provided by residential style window units. This equipment is old and in poor condition overall. A large amount of underfloor heating water piping is expected to need replacement within ten years. Sewer piping and plumbing fixtures are also a concern. Maintenance was unplugging a sewer line at the time of our visit. Many fixture connections in the bathrooms were rusted and brittle. The electrical system is also in poor condition overall. The main switchboard is old and is undersized for the needs of a modern classroom. The branch panels are adequate. The lighting levels in the classroom are low. This school has problems with the exterior masonry and the foundations supporting it. Its roof also holds water in several places and will need replacement in

the next ten years. We recommend replacement of this school within the next ten years because a new facility would be more cost effective to operate if fully sustained.

When replacement is recommended, a plant replacement value is useful for determining the cost of a new school. Using the Army Technical Manual resources, we have calculated a per square foot cost of plant replacement value for a middle school at Quantico Marine Base to be approximately \$138.34. Moveable furniture has been added to the PRV cost in this model as directed by DoDEA.

DoDEA has directed that the size building used for replacement cost should be adjusted to reflect the number of students attending school in the building plus 15% for possible enrollment shifts. Total student capacity at Russell Elementary School is 313. Total students enrolled is approximately 235. Considering the fifteen percent additional student potential with the 235 current students, a replacement school should be provided to serve 270 students. An approximate size school for this number of students is assumed at 38,000 square feet for the purpose of this study. Given a size of 38,000 square feet, the cost of replacement would be approximately \$5,257,000 plus the costs of kitchen equipment. For a school of this size, kitchen equipment would likely range from \$250,000 to \$300,000. Therefore, a total budgetary construction cost for the school would be approximately \$5,557,000, excluding design fees and SIOH. The adequacy of the current building square footage has not been evaluated. The State of Virginia may require larger classrooms and core spaces depending on the program needs. These considerations are important to consider, but are beyond the scope of this study. This replacement cost does not match the PRV from the previous page because the cost of kitchen equipment and moveable furnishings has been added.

**QUANTICO SCHOOLS  
QUANTICO US MARINE BASE, VIRGINIA  
PROPERTY CONDITION REPORT**

2.0 Purpose and Scope

2.1 Survey Team

A survey team from Parkhill, Smith & Cooper, Inc., Engineers-Architects-Planners, performed a Property Condition Assessment for these facilities in November 2002. The administration and staff fully cooperated with the survey team. The survey is based on the process, scope and intent of ASTM E 2018-01 - Standard Guide for Property Assessments: Baseline Property Condition Assessment Process.

Parkhill, Smith & Cooper, Inc., working as an independent contractor, staffed the property survey with qualified registered professional architects and engineers as field observers. Each observer has experience commensurate with the subject property type and scope.

2.2 Published Standards

The following published standards, codes and guidelines were used for the property assessment survey:

- a. Americans with Disabilities Act Accessibility Guidelines (ADAAG) - ADA Standards for Accessible Design - 28 CFR Part 36, Revised July 1,1994 (ADAAG) - The Americans with Disabilities Act of 1990

This standard establishes guidelines for accessibility for individuals with disabilities under the Americans with Disabilities Act of 1990. The guideline specifies design tolerances for parking spaces, accessible routes, curb ramps, ramps, detectable warnings, signage, walkways, egress, entrances, exits, aisle and corridor widths, stairs, clear floor areas, toilets, doors, windows, drinking fountains, telephones, elevators, life safety warning systems and play areas.

The guideline specifies that no additions or alterations shall be undertaken which decreases accessibility or usability of a facility below that of new construction. Additions or alterations are not required to achieve greater accessibility than that required for new construction. Remediation recommendations are considered mandatory to achieve an acceptable facility.

The survey included a Tier I: Visual Accessibility Survey to identify possible problems concerning the Americans with Disabilities Act Accessibility Guidelines (ADAAG). The survey was limited to observations during the walk-through survey and included path-of travel, parking, entrances/exits, signage,

public toilet rooms, drinking fountains, elevators/lifts, recreational facilities and alarm systems. The survey did not include physical measurements or counts for any component or system. Opinions of probable costs for ADA remediation are identified separately and are not combined with other physical deficiencies.

- b. ASTM E 2018-01 - Standard Guide for Property Assessments: Baseline Property Condition Assessment Process - American Society of Testing Materials International

This guide defines customary practice for conducting a baseline property condition assessment to identify and communicate physical deficiencies to a user in a Property Condition Report. Walk-through procedures are outlined recommending various systems, components and equipment that should be observed. Physical deficiencies include presence of conspicuous defects or material deferred maintenance of a subject property's material systems, components or equipment.

The resulting Property Condition Report incorporates the information obtained from the walk-through survey, document review, staff interviews and opinions of probable costs for suggested remedies of identified physical deficiencies. Remediation of specific items in non-compliance is mandatory to achieve an acceptable facility.

- c. NFPA 101 Life Safety Code - ASNI/NFPA 101, 1994 Edition, Chapter 11 Existing Educational Occupancies - National Fire Protection Association

This code provides minimum requirements, with regard to function, for the design, operation and maintenance of new and existing buildings and structures to protect occupants by providing for safety from fire and similar emergencies. Safety is achieved by a combination of prevention, protection, warning systems and unobstructed egress. The code addresses construction, protection and occupancy features necessary to minimize danger to life from fire, smoke, fumes and panic. Warning systems are required to conform to ADAAG/ADA guidelines.

The resulting Property Condition Report incorporates the information obtained from the walk-through survey, document review, staff interviews and opinions of probable costs for suggested remedies of identified physical deficiencies. Remediation of specific items in non-compliance is mandatory to achieve an acceptable facility.

- d. Title IX Gender Equality - 34 CFR Part 106, Paragraph 106.41, Federal Register, May 9, 1980 - Nondiscrimination on the Basis of Sex in Education Programs or Activities Receiving Federal Financial Assistance

The major federal law prohibiting sex discrimination in educational institutions receiving financial assistance. A school must provide equal athletic opportunity

for both sexes, including facilities, equipment, supplies, game and practice schedules, travel and per diem allowances, coaching (including assignment and compensation of coaches), academic tutoring, housing, dining facilities and publicity. For the purposes of this study, only comparable facilities for each gender were considered. The facilities investigated were limited to those on each school campus. Off-site athletic facilities are not included in this study.

- e. Technical Manual TM 5-800-4, May 1994 - Programming Cost Estimates for Military Construction - Headquarters, Department of the Army

The basis of estimating opinions of probable costs, including unit cost values, escalation and contingency factors, and application of area location factors for military projects.

- f. RS Means Building Construction Cost Data, 60<sup>th</sup> Edition – 2002

The basis for determining unit and construction assembly values for detailed opinions of probable costs included as an Exhibit in this report.

- g. Guidance from the Under Secretary of Defense, June 3rd, 2002.

This guidance lists the most recent area location factors for each military installation.

- h. Facilities Recapitalization Front-End Assessment, Department of Defense, August 2002.

The basis for determining the recapitalization metric for Department of Defense facilities.

### 2.3 Property Assessment Survey Requirements

A walk-through property assessment survey was conducted during the field observers' site visit of the subject property to ascertain material physical deficiencies of the subject property and opinions of probable costs for remediation. Data obtained from the survey will provide an objective and impartial evaluation of Domestic Dependent Elementary and Secondary Schools (DDESS) schools in the continental United States for the Department of Defense Education Activity (DoDEA), to ascertain the feasibility of facility transfers to Local Education Agencies (LEAs). The data will also aid DoDEA's analysis of associated costs to the Government for the possible transfer of DDESS students, facilities and operations to the corresponding adjacent LEAs.

### 2.4 Analysis

An analysis of each school was required to determine current physical condition, noting deficiencies and providing opinions of probable costs of remediation for each building

and system component in accordance with minimum acceptable standards and guidelines as listed previously.

## 2.5 Observations

The survey was based on the field observers' visual observations of representative areas and materials while walking through the subject property. The survey included interviews with administrative and facilities personnel, review of available construction documents, prior assessment reports and asbestos inspection reports.

## 2.6 Survey Methods

The survey consisted of non-intrusive visual observations, which were readily accessible and easily visible components and systems of the subject property. The survey was not technically exhaustive, excluded the operation of equipment and was conducted without the use of special protective clothing. The scope of work did not include removal of materials, testing, or use of equipment, such as scaffolding, metering/testing equipment or other devices.

## 2.7 Document Review and Interviews

The survey included interviews with administrative and facilities personnel, review of available construction documents, prior assessment reports and asbestos inspection reports. A copy of the Pre-Survey Questionnaire including facilities services responses to various physical conditions is included as Exhibit 7.3.

## 2.8 Out-of Scope Considerations

Out of scope considerations include, but are not limited to:

- a. Temporary maintenance buildings or classrooms.
- b. Entering crawl or confined spaces; walking on pitched roofs or roofs without built-in access.
- c. Determination of plumbing pressures, flow rates or fixture counts.
- d. Observation of flue connections, interiors of chimneys, flues or boiler stacks.
- e. Removal of electrical panel and device covers or operating electrical devices.
- f. Examination of elevator cables, sheaves, controllers, motors inspection tags or entering pits or shafts.
- g. Determining NFPA hazard classifications.
- h. Classifying, or testing fire rating assemblies.
- i. Operating appliances or fixtures.
- j. Determining sound transmission coefficient (STC) ratings, flammability issues or regulations.
- k. Engineering calculations to determine any system's adequacy or compliance with any specific or commonly accepted design requirements.

- l. Adherence with AHERA or other hazardous material identification, abatement or operations and maintenance programs. Information from previous AHERA cost estimates is included in the opinions of probable costs.
- m. Identification, damage assessment or remediation recommendations for any type of mold, mildew or algae formations.
- n. Additional issues are outlined in ASTM E 2018 Paragraph 11.
- o. Force Protection

As no Joint Service Integrated Vulnerability Assessments were provided to the survey team, no costs are shown in this study for any recommendations contained in them. Some costs were included for specific force protection items requested by DoDEA.

## 2.9 Professional Services

The survey is not a professional architecture or engineering service and the resulting report and opinion of probable costs is not subject to laws governing the professional practice of architecture or engineering. Documents will not include an architects' or engineers' seal.

## 2.10 Assumptions

The following assumptions are included in the recommended remediation work and opinions of probable costs:

- a. Professional consulting service fees for remediation actions are excluded from opinions of probable costs.
- b. Replacement of HVAC supply ducting includes costs for removal and replacement of existing ceilings, light fixtures and other accessories with new.
- c. Sealing between the top of walls and roof or floor deck to achieve required fire rating includes costs for sealing all conduit and duct penetrations through the fire rated walls.
- d. Structural systems, general construction and utilities obscured by earth, paving, concrete slabs, solid walls or ceilings may have deterioration that was undiscoverable during the property survey. Remediation costs for undiscoverable conditions are excluded from opinions of probable costs. Contingency factors are included as described in Paragraph 4.0.
- e. New or existing duct penetrations through fire rated walls between rooms and paths of egress will have fire/smoke dampers. Fire rated walls between two spaces that are not utilized as a path of egress will have fire dampers. Costs are included for this work.
- f. Costs are included for future scheduled work not awarded under construction contract as of 1 October 2003. Projects such as replacement of windows at John H. Russell Elementary School, Quantico Marine Base, Virginia, are not included because a construction contract has been awarded.

- g. The exception is that PTR (Pupil-Teacher Ratio) projects are included in the study even though some have not been awarded. Per direction from DoDEA, these additions are included in the overall square footage of each school facility for the purposes of this study.
- h. Opinions of probable costs are expressed in FY04 values. Phase II of the study will incorporate cost escalation for all work scheduled after this time.
- i. Title IX costs are for athletic facilities and associated amenities. Costs for personnel required under the law are not included.
- j. Life safety features such as fire sprinklers, fire alarms, strobes, emergency lighting and other equipment was assumed to be operational unless visible damage was observed. Equipment maintenance, repair and testing were assumed to be the Owner's responsibility.
- k. Costs for ADA compliance are based on current ADAAG accessibility guidelines. Compliance with all laws regarding ADA varies in each jurisdiction and may affect costs accordingly. Within this report, immediate remediation ADA items include the main public route into the building, at least one set of restrooms along the public route and accessible exits out of classrooms. Long-term items include signage, secondary exits and other toilet rooms. It is important to note that ADAAG accessibility guidelines are not immediate action requirements for existing buildings. The immediate priorities listed in this report are reasonable expectations of an LEA's requirements for transfer.
- l. Asbestos abatement costs exclude costs of consulting design, air monitoring, air sampling testing during abatement activities or final clearance or material disposal.
- m. PRV costs are based on the size of the existing building.

## 2.11 Indoor Air Quality

The subject of indoor air quality has been receiving considerable attention by school officials all across the country, whether public, private or DDESS school system. Indoor air quality complaints can be due to a wide variety of factors that include: personal perceptions, a person's health, the amount of fresh air in a building, the humidity of the air in a building, and the building envelope. Some of these factors are difficult to quantify or detect. Terms like mold or mildew are often attached to indoor air quality complaints. It is important to note that there are several thousand types of mold and a relatively small portion have been tied to health problems. The issue of indoor air quality is difficult to address because there is not a set of definable symptoms and it is also difficult to define the source of an individual's discomfort.

People's symptoms are difficult to document. Allergies could be a contributing factor to IAQ complaints. Factors outside the school environment cannot be controlled by school staff. Fresh air, humidity control, and the building exterior envelope are areas school officials concentrate on to try to achieve acceptable indoor air quality. There are recommended guidelines for mechanical systems published by the American Society of Heating, Refrigeration and Air Conditioning Engineers that address fresh air requirements and humidity control. These guidelines have been implemented by building

designers over the past ten to fourteen years. As such, schools designed and constructed before 1989 were not subject to these guidelines. Moisture intrusion in a building can also contribute to the possibility of mold growth. Older buildings in particular can have leaks in roofs, pipes or wall cavities that could allow moisture in a building. It is important for building owners to address moisture intrusion problems promptly.

In the responses received from Local Education Agencies during the course of this study, indoor air quality was listed as a high priority concern. Older schools or schools with older air conditioning systems generally do not comply with the ASHRAE standards and guidelines mentioned previously. In many cases, renovating a building to comply fully with current ASHRAE standards would be so costly as to require building a new school rather than renovating an existing facility. This cost is not economically possible in many school districts. In discussing the approach taken by LEA's, one responded saying their district makes improvements when a piece of mechanical equipment fails. They cannot satisfy all ASHRAE requirements in an older building, but they try to improve the overall air quality when they install new equipment.

The purpose of our study was to document the physical condition of the building and its systems. Indoor air quality testing was beyond the scope of our report. If a facility had IAQ complaints, we asked the school staff to report them to us in their pre-survey questionnaire and provide us an IAQ report if one had been performed. Where IAQ reports were provided, we used them to include costs for repair in the immediate term. In the case where a report was not performed, we recommended an IAQ study report with microbe classification. In the case where staff voiced an IAQ concern and we noticed a physical deficiency in the mechanical system or building envelope, we included cost to repair the physical deficiency. We did not perform any calculations on the mechanical systems.

### 3.0 System Description and Observations

Reference	Immediate	Long-term
<b>3.1 Overall General Description</b>		
This facility is a 38,200 square foot, one-story masonry veneer and stucco veneer building constructed in 1964. Additional classrooms and media center spaces were subsequent additions in 1983. Temporary structures provide additional storage, maintenance and classroom facilities. This facility serves 300 students from kindergarten to third grade.		
<b>3.2 Site</b>		
3.2.1 Topography		
Slopes away from building are gentle with minor water retaining problems. Some damaged downspouts and missing splash blocks create water retention. No remediation recommended.		
3.2.2 Storm Water Drainage		
There is no storm water drainage system at the building perimeter or yard areas. There are no courtyard areas. Most leaders from roof gutters are routed to a storm sewer system which daylights behind the facility. No remediation recommended.		
3.2.3 Ingress and Egress		
The site is accessible by paved roadway. Concrete walkways provide access and egress from the parking area, the street and around the building perimeter. No remediation recommended.		
3.2.4 Paving, Curbing and Parking		
The roadway is asphaltic concrete in fair condition. Parking area is asphalt topping over concrete slab and is in poor condition. Curbs and gutters are concrete in fair condition. Visitors' parking is located off-site, has no designated parking spaces and is not readily accessible to the building. A steep walkway at the curb of the approach drive is the only paved access. Replacement and repair of approach roadway and on-site paving is recommended.		X
3.2.5 Flatwork		
Concrete walkways and ramps are in fair condition. Replacement and repair of damaged walkways is recommended.		X

Reference	Immediate	Long-term
3.2.6 Landscaping and Appurtenances		
Perimeter landscaping is highly developed at main entrance. There are some trees on site. Lawn areas are well maintained. Flowerbeds are located and built up against the existing building, which could introduce moisture into the building. Planting areas should be relocated.	X	
3.2.7 Recreational Facilities and Title IX Compliance		
There are numerous play areas with various types of equipment. Play surfaces include gravel, sand and bark. There is one hard surfaced play area. All play equipment and surface areas are in good condition but do not meet CPSC standards. The school does not sponsor specific team sport programs and appears to be in compliance with Title IX regulations. No remediation recommended.		
3.2.8 Utilities		
3.2.8.1 Water		
3-inch water service enters the boiler room on the south side of the facility. There is no meter or backflow preventer. No fire sprinklers or a fire sprinkler service exists for this facility. A backflow preventer is required.	X	
3.2.8.2 Electrical Service and Metering		
Overhead primary service is extended to a riser pole and then to a pad mounted transformer. The service extends underground to the boiler room. An electric meter is located on the transformer and appears to be in good condition. The number and size of conduits and size of conductors were not observed because of problems with removal of interior panel covers. The main switchboard is a Cutler Hammer 1200 Amp, 120/208 VAC unit. Service appears to be in good condition. No remediation recommended.		
3.2.8.3 Natural Gas		
Natural gas service enters the boiler room on the south side of the facility. The meter and regulators are installed in a fenced enclosure directly outside the east end of the boiler room. Natural gas is fed into the boiler room at elevated pressure and re-regulated to meet equipment requirements. The natural gas meter, service line and regulators appear to be in good condition. No		

<b>Reference</b>	<b>Immediate</b>	<b>Long-term</b>
remediation recommended.		
3.2.8.4 Sanitary Sewer		
No major problems were identified with the sanitary sewer system. Lines may need repair or replacement because of the length of time installed. Kitchen sewerage appears to flow to a manhole outside the building, which is used as a grease trap. It is not a two-compartment unit and does not meet code requirements. It also appears that all flow from the kitchen appears to flow to the grease trap instead of only grease producing equipment. A two-compartment grease trap is required.	X	
3.2.8.5 Storm Sewer		
Some storm sewer inlets are spaced around the facility and most downspouts from roof gutters extend underground to the system. The storm sewer extends to the rear of the facility and daylights to a sloped area. No immediate concerns were identified with this system. No remediation recommended.		
3.2.8.6 Special Utility Systems		
Not applicable.		
<b>3.3 Structural Frame and Building Envelope</b>		
3.3.1 Foundation		
Foundation is reinforced concrete spread footings and concrete masonry unit stem walls. No remediation recommended.		
3.3.2 Building Frame		
Building frame is a reinforced cast-in-place concrete column system. Walls are concrete masonry units in good condition. Roof framing for original roof is reinforced gypsum deck on steel joists and trusses. Roof framing for sloped roofing addition is structural steel with "z" purlin framing. Sloped roofing structural system and underside of metal roof deck has sprayed-on fibrous insulation or fireproofing material that is detaching from substrate. Some was observed to be saturated and wet from leaks in the metal roof. Removal of this material is required.	X	

Reference	Immediate	Long-term
3.3.3 Facades or Curtainwall		
3.3.3.1 Sidewall System		
Building exterior is face brick masonry veneer on concrete masonry unit walls and stucco on concrete masonry unit walls. There are adequate weep holes in the masonry veneer system. Some areas of face brick have cracked grout joints. Some areas of stucco wall have algae growth. Masonry veneer cleaning and stucco repair and refinishing is required.	X	
3.3.3.2 Entrances/Exits		
Main entrance/exit is prefinished aluminum framing with single glazing. One door has automatic opening equipment for ADA accessibility. The main entry entrance/exit system is in good condition. No remediation recommended. Auxiliary exit/entrances are painted hollow metal doors with single glazing in painted hollow metal frames. Sidelights are single glazing in painted hollow metal frames. Auxiliary exit/entrances are in good condition. No remediation recommended.		
3.3.3.3 Fenestration System		
Window system is operable prefinished aluminum metal frame with single glazing in fair condition. Glazing sealant has been identified as ACM, is in poor condition and requires abatement and replacement within the next ten years. Abatement costs are listed in Section 3.8.11.		
3.3.3.4 Soffits		
Soffits at doors are stucco are in fair condition. However, refinishing is recommended. Soffits over windows are cast-in-place structural concrete, are in poor condition, and require repair and refinishing.	X	X
3.3.3.5 Parapets		
Parapets are in good condition and are covered by new standing seam metal as a part of the re-roofing work. Metal copings, flashing, overflow scuppers and downspouts are in good condition.		

Reference	Immediate	Long-term
3.3.4 Roofing		
<p>The original roofing system is a gravel surfaced built-up system with metal copings and flashing in poor condition. The existing roof has been re-roofed with sloped prefinished standing seam metal roofing with metal louver vents in good condition . The old roofing felts and asphalt are still in the attic. Removal of these combustible materials is required. Repair of leaks in the metal and existing roofing is required, particularly over the cafeteria. Kitchen loading area roofing is in poor condition and replacement is required.</p>	X	
<b>3.4 Interior Elements</b>		
3.4.1 Common Areas		
<p>Lobby and corridors have terrazzo flooring, glazed tile wainscot on painted concrete masonry unit walls, solid core wood veneer doors, hollow metal frames and suspended acoustic lay-in ceilings. All surfaces are in good condition.</p> <p>Administrative, media center and classroom areas have carpet or vinyl composition tile flooring, painted concrete masonry unit walls, solid core wood veneer doors, hollow metal frames and suspended acoustical lay-in ceilings. All surfaces are in good condition. Carpet replacement is required after asbestos abatement.</p> <p>The gymnasium/cafeteria area has rubberized-coated flooring, glazed tile wainscot on painted concrete masonry unit walls, solid core wood veneer doors, hollow metal frames and suspended acoustical lay-in ceiling. The stage area has wood flooring, painted concrete masonry walls and exposed structure ceiling. All surfaces are in good condition with the exception of the damaged ceiling.</p> <p>Kitchen areas have non-slip ceramic tile flooring, glazed ceramic wainscot on painted concrete masonry units, solid core wood veneer doors, hollow metal frames and suspended acoustical lay-in ceilings. All surfaces are in good condition.</p> <p>Public toilets have ceramic tile flooring, glazed ceramic tile on painted concrete masonry units and suspended acoustical lay-in ceilings. All surfaces are in good condition.</p>	X	X

Reference	Immediate	Long-term
<b>3.5 ADA Tier I: Visual Accessibility Survey</b>		
3.5.1 Path of Travel		
The path of travel from the parking area is not accessible and is required. The main entry appears to be accessible. Curb cuts at the student drop-off area are not accessible and a marked accessible route is required. Accessibility compliance is required.	X	
3.5.2 Parking		
Parking requires marked spaces designated with signage, one van accessible space and marked accessible route. Costs are included in 3.5.1.		
3.5.3 Entrances/Exits		
The main entrance/exit approach and doors appear to be accessible, with one automatic operating door. Auxiliary exit/entrance doors exit onto porches that do not provide exiting to accessible walkways. Interior doors appear to allow clearance and approach accessibility but require lever type opening devices.		X
3.5.4 Signage		
Accessible signage is required at specified parking spaces and at all doors designating permanent rooms.		X
3.5.5 Public Toilet Rooms		
Public toilets appear to be accessible. No remediation recommended.		
3.5.6 Drinking Fountains		
Drinking fountains are not accessible because they require replacement with corridor protrusion protection.	X	
3.5.7 Telephones		
Not applicable.		
3.5.8 Elevators/Lifts		
Elevators are not required. A chair lift is recommended for stage access.		X

Reference	Immediate	Long-term
3.5.9 Recreational Facilities		
Play areas and equipment are not accessible in each play area group. One accessible play area, with approved surfacing material, is required for each play area group.	X	
<b>3.6 Mechanical and Electrical System</b>		
3.6.1 Overall General Description		
<p>The HVAC system includes one air-cooled chiller and two heating water boilers. A 2-pipe system serves twenty-two unit ventilators, which provide heating and cooling to each classroom and the kitchen. Fancoil units provide heating and cooling to the gym, offices and restrooms.</p> <p>Although complete data has not been obtained on HVAC systems prior to 1995, it appears that when built the school may have only been heated utilizing unit ventilators. Roof mounted air conditioning units appear to have been added but are no longer functional. Air supplied by these air conditioning units was ducted into the ceiling of each classroom and return air passed through wall mounted registers open to the hallway, to the return air duct. Classroom roof mounted equipment is still mounted on the original roof of the school and ductwork remains in place. There are three air-cooled condensers mounted above the gymnasium that apparently served fancoil units mounted above the ceiling.</p> <p>A new elevated steel roof was installed on the building during the summer of 1988 that enclosed air conditioning units. The eave height of the new roof is approximately 10 feet above the original roof, providing abundant space for equipment. When the new roof was installed, ducts were extended from condenser fans to the outside of the new space. All of the air-conditioning units, the air-cooled condensers and ductwork remain although power has been disconnected and wiring removed. Numerous exhaust fans are installed above hallways on the original roof to remove air induced by unit ventilators. Individual exhaust fans have been installed above classroom toilets. These fans exhaust into the space between the original roof and the new roof.</p> <p>Staff has reported humidity concerns and mold growth in eight classrooms. An indoor air quality study including microbial determination is recommended.</p>	X	

Reference	Immediate	Long-term
3.6.2 Plumbing		
3.6.2.1 Supply and Waste Piping		
Water supply and waste piping is over 40 years old. Visible lines did not appear to have excessive corrosion. Replacement of piping and floor drains in toilets is recommended.		X
3.6.2.2 Domestic Hot Water Production		
Domestic hot water is produced by one 50 -gallon, 40,000 Btu water heater, which feeds a hot water storage tank. The hot water storage tank is fairly corroded but is not leaking. A hot water circulator maintains hot water throughout the system. Using a small domestic type water heater for this application generally leads to a very short life expectancy. Replacement of the water heater and storage tank with commercial units is recommended.		X
3.6.2.3 Fixtures		
The existing plumbing system is approximately 40 years old. Fixture connections in the bathrooms are rusted and very brittle. Most of the existing plumbing fixtures do not meet current code requirements and are in poor condition. Replacement of fixtures is recommended.		X
3.6.2.4 Fuel Piping		
Natural gas piping is fairly new and appears to be in good condition. Regulators inside the boiler room are vented to outside the building, as codes require.		
3.6.3 Mechanical System		
3.6.3.1 Heat Generating Equipment		
A 2-pipe system provides heating by feeding water to fancoil units and unit ventilators. The system was updated in approximately 1997. Two Weil-McLain boilers supply heating water. There is a primary loop from each boiler and secondary loop that supplies fan coil units and unit ventilators in classrooms.  All make-up air enters through unit ventilators. Unit ventilators do not have the ability to reduce ambient humidity levels or filter air to provide a proper environment for occupants. A system that will chill outside air below the dew point for dehumidification and reheat with filtration to eliminate outside pollen and other airborne		X

Reference	Immediate	Long-term
<p>contaminates is recommended.</p> <p>Air brought in through the unit ventilators is transferred to the hallway through wall grilles and exhaust through fans mounted on the original roof. Several of these exhaust fans were not working. Wall mounted exhaust fans were installed on roof extension to remove air exhausted from the building. Four of the eight wall exhausters were not operational. Replacement and repair of exhaust fans is required.</p> <p>Insulation was sprayed on the underside of the metal roof when installed but has fallen off and is about 4” deep on the original roof. The value of leaving remaining insulation applied to the bottom of the roof metal deck needs to be evaluated.</p> <p>Remediation of the air conditioning system is recommended.</p>	X	
<p>3.6.3.2 Heating Distribution Equipment</p>		
<p>Piping which distributes heating and cooling water throughout the facility was replaced during the last few years and appears to be in good condition. Unit ventilators and fan coil units also appear to be in functional. No remediation recommended.</p>		
<p>3.6.3.3 Cooling Equipment</p>		
<p>A Trane model CGACD126RNNLL623GM chiller provides chilled water to the 2-pipe system. Maintenance personnel indicate that the chiller capacity is marginal during summer peak usage. Evaluation of the chiller capacity for further remediation is recommended.</p>		
<p>3.6.3.4 Cooling Distribution Equipment</p>		
<p>Common piping and pumps distribute chilled water. Piping is fairly new and appears to be in good condition. No remediation recommended.</p>		
<p>3.6.3.5 Control Systems</p>		
<p>Unit ventilators, fan coil units, heating boilers and pumps and unit heaters are controlled by a Siemens DDC system. This system allows the flexibility to set back room temperatures at night while maintaining freeze protection, scheduling warm up cycles in the morning and generally minimizing excess use of heating equipment. The system is both expandable and can be upgraded to</p>		

<b>Reference</b>	<b>Immediate</b>	<b>Long-term</b>
provide adequate control of existing and future equipment. No remediation recommended.		
3.6.4 Electrical		
3.6.4.1 Main Switchboard		
A 1200 amp Cutler Hammer switchboard provides power. The switchboard is undersized for the long-term needs of the school and is in poor condition. Based on a connected load of approximately 12 watts per square foot and 25% capacity for future growth, a 1600 amp switchboard is required. The switchboard could be sized to provide new air conditioning, make-up air and computer power requirements to meet current standards. Replacement of the main switchboard is recommended.		X
3.6.4.2 Distribution and Panels		
Branch panels are primarily located in corridors throughout the facility. Most panels have been upgraded and are in reasonable working condition. These panels will require replacement or be supplemented with other panels to meet higher electrical demands of current standards.		X
3.6.4.3 Interior Lighting		
Classroom fixtures are pendent mounted and appear to have been manufactured in the 1970's. Lamps have been upgraded to high efficiency T-8 type with energy saving ballasts. Light levels were measured in three classrooms of which two had levels below 50-foot candle (fc). The light level measured in one classroom was approximately 41.8 fc, which is low for the type of activities being conducted. Hallway lighting was adequate with an average of 24 fc.		
Installation of new make-up air ductwork will require lowering the ceilings in classrooms, installation of new lay-in type fixtures providing light levels to current Illumination Engineering Society of North America (IESNA) standards is recommended.		X
Entrance lights, some lights in storerooms and offices, and the multi-purpose room are incandescent required replacement.	X	

Reference	Immediate	Long-term
3.6.4.4 Exterior Lighting		
<p>IESNA recommends that a minimum of .6 fc with a uniformity ratio of 4:1 for exterior security in public areas which are not subject to high levels of crime. Illumination levels around most exterior areas around this school were not detectable with the light meter utilized (well below .6 fc) and the uniformity ratio was well above 4:1. Several light fixtures were not functioning. Most fixtures were type V area lights and were wired using type NM cable that does not meet code. Some cable to area lights was exposed outside the building. Two new storage additions utilize wall packs that operate properly. An exterior lighting system providing adequate security lighting is required.</p> <p>Parking lot lighting was adequate on the parking lot directly adjacent to the building. Off-site overflow parking lot below the facility does not have lighting. Lighting the overflow parking area is recommended.</p>	X	X
<b>3.7 Vertical Transportation</b>		
Vertical transportation is not required in this facility.		
<b>3.8 Life Safety and Fire Protection</b>		
3.8.1 Sprinklers and Standpipes		
The facility has no required sprinklers in janitor closets, above the stage or in the attic and is required.	X	
3.8.2 Alarm Systems		
Visual alarm system is in noncompliance. Visual alarms are required in all common use spaces with more than one occupant. A new system with warnings complying with life safety codes and ADA guidelines is required.	X	
3.8.2.1 Fire Evacuation Alarm System		
The Fire Alarm Control Panel is a Thorn Automated Systems Inc. unit. It is a zone system and appears to be operating properly. However, parts for this system are getting more difficult to obtain because the system is no longer made. This system will require replacement once maintenance costs increase due to unavailability of parts. Fire alarm signals are transmitted to the base fire station using a King-Fisher fire alarm panel in the boiler room. An annunciation panel is in the lobby and a Knox Box outside the		

Reference	Immediate	Long-term
<p>front door with keys for fire personnel.</p> <p>Pull stations are located at each exit and strobes, several with audio, are located throughout hallways. Classrooms, toilets, multiple person offices, workrooms and storage areas do not have any means of notification in case of a fire. These units are required.</p>	X	
<p>3.8.2.2 Kitchen Fire Protection System</p>		
<p>A significant amount of cooking equipment has been added since the school was originally constructed with no change in the kitchen hood, which is required to exhaust grease -laden air. It is required that the kitchen exhaust hood extend 6” beyond cooking equipment installed below. Cooking equipment extends out from underneath the hood approximately 6” in multiple directions, requiring immediate remediation. The existing exhaust fan is not an up-discharge model required by code and is required.</p> <p>The kitchen hood does not have make -up air capability. It does have a chemical fire extinguishing system with local pull station and automatic initiation. The existing Ansul dry type fire suppression system requires replacement with the hood replacement. Proper fire protection could not be determined and is required.</p>	X	
<p>3.8.3 Intercom Systems</p>		
<p>The existing intercom system appears to be working satisfactorily. No remediation recommended.</p>		
<p>3.8.4 Educational Television</p>		
<p>The existing educational television system appears to be working satisfactorily. No remediation required.</p>		
<p>3.8.5 Security Systems</p>		
<p>An IDS security system is used for security. This system works properly and is tied into the base security. No remediation recommended.</p>		
<p>3.8.6 Computer Network</p>		
<p>Quantico schools are interconnected with multi -mode fiber optic cable. This Campus Area Network (CAN) allows schools and the District Office communicate digitally. The multi-mode cable</p>		

Reference	Immediate	Long-term
<p>extends to the main server room where rack mounted fiber optic switches (hubs) distribute signals throughout the facility on a Local Area Network (LAN). Computers within approximately 300 feet of the main server room are each connected with individual CAT-5 cables. For longer runs, single mode fiber optic cable is extended to another HUB located remote from the server room. This HUB connects CAT-5 cables to individual computers in the remote area.</p> <p>A minimum of 5 CAT-5 cable drops to connect 5 computers to the LAN per classroom is desired. The number of drops in each classroom at this school varies but is limited. Increasing the size of the LAN at this school is not within the survey scope; it will likely be required eventually if the school is to remain. No remediation recommended.</p>		
<p>3.8.7 Corridor and Separation Walls</p>		
<p>Exit corridor and separation walls require fireproofing sealing between wall and bottom of roofing system and around all wall penetrations.</p>	X	
<p>3.8.8 Doors</p>		
<p>Exit corridor doors require closing devices, panic devices (if required), smoke-proof sealing systems and reduced glazed area with wired glass. Costs are shown in 3.5.3.</p>	X	
<p>3.8.9 Classroom Emergency Exiting</p>		
<p>Classroom emergency exiting is provided by doorways in exterior walls or by operable window units clearly marked as "Emergency Exit". No remediation recommended.</p>		
<p>3.8.10 Emergency Egress Lighting</p>		
<p>There are few emergency light fixtures, and there are no emergency light fixtures in classrooms, hallways or kitchen. Two emergency fixtures are located in the multi-purpose room and one is not operational. An emergency light is installed at the main entrance. Addition of an emergency lighting system is required.</p>	X	

Reference	Immediate	Long-term
<b>3.9 Asbestos Abatement</b>		
According to the AHERA Report, remaining asbestos -containing material (ACM) is non-friable and is primarily vinyl floor tile and mastic. Some of these areas are covered with carpet. Window sealant is also asbestos and remediation within the next ten years is recommended.		X

## 4.0 Opinions of Probable Costs to Remedy Physical Deficiencies (Ashurst Elementary)

### 4.1 General

Opinions of probable cost are provided to address physical deficiencies in the facility. Physical deficiencies are divided into three categories: Immediate, Intermediate, and Long-term Remediation items as requested in the scope of work. The costs shown are based on visual observations from the walk-through survey. Quantities used in performing the estimate are approximate; no measurements were taken on site. Unit costs are parametric based on gross square footage for major building systems and components.

### 4.2 Parametric Costs

The appendix of each report contains the parametric opinions of probable costs. Each major physical deficiency is listed with the report section number. The unit prices shown were derived from RS Means Building Construction Costs Data, 60<sup>th</sup> Edition, 2002 and from prior experience at the Military Base. Immediate, Intermediate, and Long-term Remediation Costs are based on Fiscal Year 2004 (FY04) values. Each item is marked up for general contractor overhead and profit and escalated for two years at 2.87% per year. It is assumed that these costs will be escalated beyond 2004 by the user. Each cost is also adjusted by a location adjustment factor based on the average nationwide statistical labor costs as established by the office of the Under Secretary of Defense, June 3, 2002 . An estimate contingency is applied to all costs to cover costs for unforeseen conditions and unknown quantities. The contingency amount is contingent upon the level of scope and detail. Typically, budgetary opinions of probable costs provided at a “pre-concept” phase include a 15% contingency. Opinions of probable costs for “construction document” phase projects include 5 - 10% contingencies. A 15% contingency for the opinions of costs, based on the US Army Technical Manual TM 5-800-4 - Programming Cost Estimates for Military Construction, is included in this study due to the broad nature of the survey.

### 4.3 Overall Cost Summary

The total cost summary for remediation of physical deficiencies follows in this section. The summary indicates the distribution of Immediate Remediation costs for the three primary standards used for evaluation: life safety, ADA, and major building system guidelines. Intermediate remediation items fall into categories of Title IX, force protection, play surfacing, and additional sitework for safe traffic flow. Long-term Remediation costs are indicated for additional ADA work and deferred maintenance items. Deferred maintenance is work that cannot be performed by routine maintenance and requires capital improvements. Examples of deferred maintenance include new roofing and asbestos abatement of non-friable materials.

#### 4.4 Detailed Cost Summary

A detailed cost summary is included at the end of this section for Immediate Remediation work recommended for completion within 1 year, and Long-term Remediation recommended for completion within 1 –10 years. Detailed distributions are not given for intermediate costs as they apply to individual line items, in general. Intermediate costs are a lower priority item than immediate costs. Cost distributions for each building system are indicated in tabular form for all items requiring remediation.

#### 4.5 Discussion of Results

Section 3.0 of the report lists the physical deficiencies and associated opinions of probable costs of remediation for each building system. Total costs for Immediate, Intermediate, and Long-term Remediation items are as follows:

Immediate	\$ 704,000
Intermediate	\$ 0
Long-term	<u>\$ 1,597,000</u>
Total Remediation Costs	\$ 2,301,000

A calculation of Plant Replacement Value (PRV) was also performed for this facility. Plant replacement value represents the cost of a new building and associated sitework for FY04 pricing. The PRV for this school is approximately \$5,659,000. This cost was determined based on the following square foot cost escalated from TM 5 -800-4:

\$140.38/sf

These costs were then multiplied by the building square footage and applicable cost escalation and contingency factors. PRV is often used as a comparison to renovation and repair costs for economic feasibility studies.

Before a comparison of remediation costs and Plant Replacement Value (PRV) can be performed, it is important to consider the age of the building. According to the Department of Defense's "Facilities Recapitalization Front End Assessment, August 2002," the government's goal is a 67 year recapitalization rate. Sixty-seven years is the expected service life for a building in the DOD inventory and we have carried that assumption to this analysis. For the purpose of our study, we are utilizing relative useful life of a building, defined as the 67 year expected service life minus the age of the building. In facilities with additions, we have compiled a composite facility age using the areas and ages of each component making up the whole facility.

The above DOD reference calculates recapitalization rate as the plant replacement value divided by the planned annual sustainment costs to determine the number of years of expected life. A number greater than 67 is considered good because it exceeds the government goal. Sustainment in this model is the cost of annual maintenance and improvements. Because our study is based on a large, one-time investment and not

annual maintenance dollars, it does not transfer directly to our study. However, the logic of the method is easily transformed into a Modified Recapitalization Metric (MRM).

For the purpose of this study, the modified recapitalization metric (MRM) is computed considering the following factors:

- Expected Service Life (ESL): 67 years per DOD
- Relative Useful Life (RUL): Expected service life minus the age of the building. Because Ashurst Elementary is a combination of additions and the original building, a composite relative useful life has been used.
- Target Sustainment: The annual investment required to keep the building in good working order to achieve an ESL of 67 years. It is calculated by dividing the plant replacement value by the ESL.
- Plant Replacement Value (PRV): The cost to replace the school building, sitework, furniture and associated assets. It is presented in FY 2004 dollars for this study.
- Remediation Costs: These are the total construction costs associated with correcting deficiencies noted in this study.
- Required Investment: The level of investment required to correct the current deficiencies spread out over the remaining useful life. It is calculated by dividing remediation costs by the RUL.

The MRM is the ratio of required investment to target sustainment (investment). A ratio less than one indicates it may be more cost effective to renovate a facility rather than replacing it. Conversely, an MRM greater than one indicates replacement may be the better option because the government could spend less sustaining a new facility rather than investing in an older, less modern facility.

The following table summarizes the MRM calculation for Ashurst Elementary School.

ESL (yrs)	AGE (yrs)	RUL (yrs)	PRV (\$)	TARGET SUSTAIN (Annual \$)	REMED. COSTS (\$)	REQ'D INVEST. (Annual \$)	MRM	RECOMMEND
67	*34.7	*32.3	5,659,000	84,500	2,301,000	71,200	.84	Renovate

\*Represents Composite Number.

Based on our analysis of the remediation costs, it is our opinion that this school should be renovated to bring it into compliance with applicable codes and repair problems with major building systems.

Refer Appendix for Total Cost Summary

Refer Appendix for Immediate Remediation Item Detail Table

Refer Appendix for Long-Term Remediation Item Detail Table

### 3.0 System Description and Observations

Reference	Immediate	Long-term
<b>3.1 Overall General Description</b>		
This facility is a 41,900 square foot, two-story masonry veneer building constructed in 1990. This facility serves 300 students from pre-kindergarten, and fourth and fifth grades.		
<b>3.2 Site</b>		
3.2.1 Topography		
Slopes away from building are gentle with minor water retaining problems. No remediation recommended.		
3.2.2 Storm Water Drainage		
There is a storm water drainage system at the building perimeter for roofing downspouts in good condition. No remediation recommended.		
3.2.3 Ingress and Egress		
Concrete walkways provide access and egress from the parking area, the street and at some of the building perimeter. No remediation recommend ed.		
3.2.4 Paving, Curbing and Parking		
On-site parking is asphaltic concrete with concrete curbs and gutters in good condition. Employees' parking is across a street on John Quick Road, is asphaltic concrete with concrete curbs and gutters and is in good condition. Kitchen loading area drive paving is in poor condition. The Base is presently constructing repair and extension of existing sidewalks along John Quick Road and addition of several parking spaces. Repair of damaged parking surfacing, curbs and gutters and parking at on-site, off-site parking and kitchen loading area drive is recommended.		X
3.2.5 Flatwork		
Concrete walkways and ramps are in fair condition. Replacement and repair of damaged walkways is recommended.		X

Reference	Immediate	Long-term
3.2.6 Landscaping and Appurtenances		
Perimeter landscaping is highly developed at main entrance. There are some trees on site. Lawn areas are well maintained. No remediation recommended.		
3.2.7 Recreational Facilities and Title IX Compliance		
There are numerous play areas with various types of equipment. Play surfaces include gravel, sand and bark. There is one hard surfaced play area. All play equipment and surface areas are in good condition. The school does not sponsor specific team sport programs and appears to be in compliance with Title IX regulations. No remediation recommended.		
3.2.8 Utilities		
3.2.8.1 Water		
A 2-inch water main enters the mechanical room and is in good condition. No remediation recommended. No backflow preventer has been installed on the water service line. Addition of a backflow preventer to protect against cross contamination is required.	X	
3.2.8.2 Electrical Service and Metering		
Electrical service is 277/480 Volts, 3 phase, 4-wire. Service to the school is by underground primary to a pad mounted 500 KVA transformer mounted in the mechanical equipment yard. Service feeders are underground into the adjacent mechanical equipment room. Original construction documents specify feeders to consist of 2 sets of 4 #500 MCM AWG conductors. The service is in good condition. No remediation recommended.		
3.2.8.3 Natural Gas		
A gas meter with 2-inch service is located at the rear (north end) of the school, immediately behind the kitchen. The service is in good condition. No remediation recommended.		
3.2.8.4 Sanitary Sewer		
Sewer service from the school flows to the south toward John Quick Road. The service appears to be in good condition. No remediation recommended.		

<b>Reference</b>	<b>Immediate</b>	<b>Long-term</b>
3.2.8.5 Storm Sewer		
Drainage from the school is surface to storm water collection system at adjacent streets. No remediation recommended.		
3.2.8.6 Special Utility Systems		
The existing Base Central Plant Steam system enters the mechanical room on the north end of the building. The regulating station inside the mechanical room appears to be in good condition. No remediation recommended.  The replacement of one pneumatic bypass control valve with a new electric control valve feeding the steam to heating water heat exchanger is required. This valve is intended for use during periods when very little heating is required. Connection of this valve to the existing DDC system for secondary operation is recommended.	X	
<b>3.3 Structural Frame and Building Envelope</b>		
3.3.1 Foundation		
Foundation is reinforced concrete spread footings in good condition. No remediation recommended.		
3.3.2 Building Frame		
Building frame is a reinforced concrete masonry unit shearwall system in good condition. Sloped roof framing over classrooms is wood decking on wood trusses with a layer of gypsum board attached to bottom cord of trusses. Sloped roofing over gymnasium/cafeteria is wood deck over laminated wood column system. Flat roof framing is metal deck on steel joists and trusses. No remediation recommended.		
3.3.3 Facades or Curtainwall		
3.3.3.1 Sidewall System		
Building exterior is prefinished concrete masonry unit veneer on concrete masonry units with adequate expansion joints and weep holes. Masonry is in good condition with adequate control joints but requires cleaning. Replacement of control joint sealant is recommended.		X

Reference	Immediate	Long-term
3.3.3.2 Entrances/Exits		
Main entrance/exit is aluminum framing with single glazing. The entrance system is in good condition. No remediation recommended. Auxiliary exit/entrances are painted hollow metal doors in painted hollow metal frames. Sidelights are single glazing in painted hollow metal frames. Auxiliary exit/entrances are in good condition. No remediation recommended.		
3.3.3.3 Fenestration System		
Window system is operable prefinished aluminum frame with double-glazing in good condition. No remediation recommended.		
3.3.3.4 Soffits		
Soffit at the main entry is painted exterior grade gypsum board in poor condition, and requires removal and replacement. Soffits in remainder of building are stucco and are in good condition. Soffit refinishing is recommended.	X	X
3.3.3.5 Parapets		
Parapets are in good condition in most areas. There is continuous leaking where the lower roof meets the parapet wall on the west end of the building. The joint where two parapet walls meet and the roof has been caulked several times with minor success. Repair is required.	X	
3.3.4 Roofing		
Sloped roofing is composition asphalt shingles on underlayment and wood decking in poor condition with major leaks. Flat roofing is modified bitumen on underlayment and metal decking in fair condition with minor leaks. Roof drains are installed at flat areas with roof drain piping to splash blocks and have been clogged by debris. Overflow roof drains have not been provided. Metal gravel guards and flashing are in fair condition and require replacement with re-roofing work. Some scuppers and downspouts are damaged. Roofing replacement work, including addition of overflow drains at flat roof areas, is required.	X	X

Reference	Immediate	Long-term
<b>3.4 Interior Elements</b>		
3.4.1 Common Areas		
<p>Lobby and corridors have vinyl composition tile flooring, painted concrete masonry unit walls, solid core wood veneer doors, hollow metal frames and suspended acoustic lay-in ceilings. All surfaces are in good condition.</p> <p>Administrative, media center and classroom areas have carpet or vinyl composition tile flooring, painted concrete masonry unit walls, solid core wood veneer doors, hollow metal frames and suspended acoustical lay-in ceilings. All surfaces are in good condition.</p> <p>The gymnasium/cafeteria area has vinyl composition tile flooring, painted concrete masonry unit walls, solid core wood veneers doors, hollow metal frames and suspended acoustical lay-in ceiling. The stage area has wood flooring, painted concrete masonry walls and exposed structure ceiling. All surfaces are in good condition.</p> <p>Kitchen areas have nonslip ceramic tile flooring, glazed ceramic wainscot on painted concrete masonry units, solid core wood veneer doors, hollow metal frames and suspended acoustical lay-in ceilings. All surfaces are in good condition. No remediation recommended.</p> <p>Public toilets have ceramic tile flooring, glazed ceramic tile on painted concrete masonry units and suspended acoustical lay-in ceilings. All surfaces are in good condition.</p>		
<b>3.5 ADA Tier I: Visual Accessibility Survey</b>		
3.5.1 Path of Travel		
<p>The path of travel from the parking areas is appears to be accessible. The main entry appears to be accessible. Curb cuts at the student drop off area are not accessible and a marked accessible route from the on-site and off-site parking areas is required. Accessibility compliance is required.</p>	X	
3.5.2 Parking		
<p>There is one designated parking space that does not meet ADA accessibility guidelines. On-site and off-site parking requires</p>	X	

<b>Reference</b>	<b>Immediate</b>	<b>Long-term</b>
marked spaces designated with signage, one van accessible space for each area and a marked accessible route.		
3.5.3 Entrances/Exits		
The main entrance/exit approach and doors appear to be accessible. Auxiliary exit/entrance doors exit onto porches that do not provide exiting to accessible walkways. Interior doors appear to allow clearance and approach accessibility but require lever type opening devices. Achievement of exit accessibility is not required unless specific doors are altered, however, accessibility compliance is recommended.	X	X
3.5.4 Signage		
Accessible signage is required at specified parking spaces and all doors designating permanent rooms.		X
3.5.5 Public Toilet Rooms		
Public toilets are not completely accessible but appear to have adequate space for required renovation. ADA accessible lavatories are not provided with insulation to protect P -traps and water supplies. The wrist blades on many of the lavatories are in contact with the backsplash impairing accessibility. The lavatory faucets and insulation are required.	X	
3.5.6 Drinking Fountains		
Drinking fountains are accessible but require corridor protrusion protection.	X	
3.5.7 Telephones		
Not applicable.		
3.5.8 Elevators/Lifts		
There is one accessible elevator. No remediation recommended.		
3.5.9 Recreational Facilities		
Play areas and equipment are not accessible in each play area group. One accessible play area, with approved surfacing material, is required for each play area group.	X	

Reference	Immediate	Long-term
<b>3.6 Mechanical and Electrical System</b>		
3.6.1 Overall General Description		
<p>Heating and cooling is provided by a 4-pipe system which provides heating water and chilled water to 4 air-handlers mounted on the roof and one located in the ceiling of the kitchen. All air-handlers have heating water and cooling water coils with independently operating flow control valves. Baseboard radiant heating is also utilized on exterior walls near windows to equalize the cooling effect from windows. A base central plant high pressure steam system is used through a heat exchanger to provide heating water while chilled water is provided by two air-cooled chillers. A chilled water pump, heating water pump and one backup pump maintain flow in primary loops. Secondary heating water loops with in-line centrifugal pumps were installed for each air-handler.</p> <p>Domestic hot water is provided by a gas fired premium efficiency boiler. The system has an in-line circulating pump.</p> <p>The electrical service feeds the school underground from a pad-mounted transformer. An electric meter measuring all power provided to the school is located on the transformer. Service voltage is 277/480 VAC – 3 phase – 60 Hz.</p>		
3.6.2 Plumbing		
3.6.2.1 Supply and Waste Piping		
<p>The supply and waste piping system is in good condition. No remediation recommended.</p> <p>There is no grease trap and kitchen grease waste is connected to the sanitary waste system. The sanitary waste system routes toward the south, through the CI assroom Wing down the center of the central corridor. The installation of a two-compartment grease trap is required.</p> <p>No backflow prevention has been installed at the water service entry and is required.</p>	X	
3.6.2.2 Domestic Hot Water Production		
An Aerco brand premium efficiency hot water boiler produces domestic hot water. The controls on the hot water heater indicate a		

Reference	Immediate	Long-term
<p>“fault” condition. The boiler is operational and maintenance personnel who are going to determine the cause of the fault signal and make necessary repairs.</p> <p>Original construction documents indicate a large (6 SF) fresh air louver with the bottom portion (2 SF) of the louver open for combustion air and the top half used for a wall mounted propeller exhaust fan controlled by a thermostat. The fresh air louver in place covers only the supply fan without any opening for relief of supply air. The Aerco domestic hot water boiler is designed so that combustion air is ducted to the unit. Additional combustion air is not required but air brought in for cooling must be allowed to exit the room. Some method of relieving air pressure in the mechanical room is required upon completion of sealing perimeter walls between top of wall and roof deck to obtain required fire rating.</p>	X	
<p>3.6.2.3 Fixtures</p>		
<p>Plumbing fixtures are in fair condition. Replacement of defective fixtures is recommended.</p> <p>No paint or plaster trap has been provided to prevent clogging of the sanitary waste system at art room sinks and is required.</p>	X	X
<p>3.6.2.4 Fuel Piping</p>		
<p>Gas piping serving the hot water heater and kitchen cooking equipment is in good condition. No remediation recommended. A fire alarm panel is located directly above the gas meter and a post indicator valve is in the immediate vicinity. Relocation the fire alarm panel and post indicator valve away from the gas meter is recommended so there is no danger in using them during a fire emergency.</p>	X	
<p>3.6.3 Mechanical System</p>		
<p>3.6.3.1 Heat Generating Equipment</p>		
<p>Medium pressure steam (100 psig) enters the building and is reduced to 10 to 12 psig by a pressure reducing valve station in the mechanical equipment room. A steam-to-water shell and tube heat exchanger is used. Low-pressure steam generates heating water at an exchanger. Equipment is in good condition. No remediation recommended. Insulation of the steam-to-water heat exchanger and significant portions of steam piping is required.</p>	X	

Reference	Immediate	Long-term
3.6.3.2 Heating Distribution Equipment		
<p>Heating water is distributed throughout the facility in a primary loop using a circulating pump located in the main mechanical room. Water is heated using central plant steam through a shell and tube heat exchanger. Two modulating valves were installed to provide better control when heating requirements are reduced. However, the bypass low flow system is not operational. It is recommended that this system be repaired and connected to the existing DDC system. Costs for these repairs are included in 3.6.3.1. The primary loop feeds baseboard radiant heating through 2-way valves located in the ceiling of the first floor. Secondary loops with in-line pumps provide heating water to four roof mounted and one ceiling mounted air -handlers.</p> <p>Baseboard heating systems do not have adequate air bleed systems and it is not possible to calibrate heating water flowing through them. Installation of automatic air vents and circuit setters at each baseboard radiant heating loop is recommended. Secondary loop pumps and valving for air-handling units supplying the two-story area are located above the media center at approximately 22 feet above finished floor. Because of the special equipment required and the difficulty in getting this equipment into the area, maintenance on this part of the system is extremely limited. Relocation of these pumps and valves to the corridor is recommended.</p>		
3.6.3.3 Cooling Equipment		
<p>Two separate air-cooled packaged chillers provide cooling. A Dunham Bush Model AC105A chiller and a smaller McQuay Model AGZ050AS27-ER10 chiller. The McQuay chiller was recently added in a project to handle the increased cooling load required by computer equipment and greater fresh air system input. A circulating pump distributes chilled water throughout the system. There are some split system refrigeration systems consisting of indoor fan and coil units with roof-mounted condensing units. These small systems serve computer rooms and certain office areas. No remediation recommended.</p> <p>The outdoor condensing unit serving the walk -in freezer is icing up and the compressor appears to be failing. Repair of the walk-in freezer equipment is required.</p>	X	

Reference	Immediate	Long-term
3.6.3.4 Cooling Distribution Equipment		
<p>Cooling is generally provided by roof-mounted Temptrol air handling units. Duct connections generally penetrate the roof within the roof curb of the unit, except for the unit serving the gymnasium/cafeteria. Variable air volume type boxes are provided with individual room temperature sensors for classrooms and administrative areas.</p> <p>Exposed ductwork insulation from the Temptrol unit serving the gymnasium/cafeteria has deteriorated. Supply ductwork insulation has failed, allowing moisture to migrate and accumulate inside the insulation enclosure. Portions of the return ductwork have been used as a step platform to gain access to an adjacent roof area and exposed insulation has been torn and crushed. Exposed ductwork inside the gymnasium/cafeteria shows evidence of mold growth. Repair and replacement of exterior and interior ductwork and insulation is required.</p> <p>Roof mounted exhaust fans are not operating and require repair.</p> <p>Fresh air intake is required for proper indoor air quality and requires proper treatment and pre-cooling to prevent excessive humidity.</p>	<p>X</p> <p>X</p> <p>X</p>	
3.6.3.5 Control Systems		
<p>A Siemens Direct Digital Control system was recently installed and appears to be operating properly. Zone temperature sensors for each air-handling unit and individual room sensors provide adequate control of cooling and heating systems. During the past summer, the DDC system for this facility was linked to Russell Elementary and the Middle/High School. System monitoring occurs at the Middle/High School. No remediation recommended.</p>		
3.6.4 Electrical		
3.6.4.1 Main Switchboard		
<p>The main electrical distribution panel (MDP) is an 800 Amp, 277/480 Volt, 3 phase, 4-wire panelboard. The panel appears to be in good condition. No remediation recommended. Historical peak load information was not available, although it is anticipated that an 800 Amp panel would not have much capability for load growth. An analysis of the peak electrical load over a 12-month period is required to determine adequate panel capacity.</p>		

Reference	Immediate	Long-term
3.6.4.2 Distribution and Panels		
Distribution panels and dry type step down transformers provide power. Some conduit and wiring penetrations through the exterior walls are not properly sealed and remediation is required. There is a large amount of MC cable run above the second story ceiling which is not attached to hangers. Replacement of the cable or addition of proper restraints is recommended.		X
3.6.4.3 Interior Lighting		
Typical classroom lighting is recessed fluorescent troffer type lighting fixtures with acrylic lenses, T-8 fluorescent lamps, and electronic ballasts in good condition. No remediation recommended.		
3.6.4.4 Exterior Lighting		
<p>Exterior lighting is a combination of HID and incandescent light fixtures. Entrance soffit areas are served by recessed high-pressure sodium downlights. Pendent hung cylinders with incandescent lamps serve the main entrance. Replacement of incandescent light fixtures with compact fluorescent fixtures is required.</p> <p>Security lighting is metal halide type wall packs serve as general security lighting. Some of the metal halide wall pack fixtures are not operational and require repair.</p> <p>On-site parking lot lighting in front of building has square metal poles with metal halide rectangular fixtures in good condition. No remediation recommended. Off-site parking on John Quick Road has no lighting and is recommended.</p>	X	
<b>3.7 Vertical Transportation</b>		
There is one elevator provided and is in good condition. No remediation recommended.		
<b>3.8 Life Safety and Fire Protection</b>		
3.8.1 Sprinklers and Standpipes		
A combination wet and dry type fire sprinkler system is provided. The dry type system serves the unheated attic. No standpipe system is installed. The sprinkler system appears to be in good condition. No remediation recommended.		

Reference	Immediate	Long-term
3.8.2 Alarm Systems		
<p>Visual alarm system is in noncompliance. Visual alarms are required in all common use spaces and rooms with more than one occupant. A new system with warnings complying with life safety codes and ADA guidelines is required.</p> <p>Smoke detectors are not provided at the Kindergarten and Pre-Kindergarten rooms where sleeping occurs. A smoke detector is also required at the fire alarm control panel. Smoke detectors in rooms and at fire alarm control panel are required.</p>	X	
3.8.2.1 Fire Evacuation Alarm System		
<p>Adequate visual alarms are not installed throughout the facility. However, audiovisual devices in hallways are adequate. Visual alarms are required.</p>		
3.8.2.2 Kitchen Fire Protection System		
<p>A fire suppression panel that includes a gas solenoid valve to shut off gas to cooking equipment and shunt trip circuit breakers to disconnect power serves cooking equipment. The system appears to be in good condition. No remediation recommended.</p>	X	
3.8.3 Intercom Systems		
<p>There is served by a central public address system with intercoms in each classroom. The system appears to be in good condition. No remediation recommended.</p>		
3.8.4 Educational Television		
<p>The cable television system appears to be in good condition. No remediation recommended.</p>		
3.8.5 Security Systems		
Not applicable.		
3.8.6 Computer Network		
<p>Quantico schools are interconnected with multi-mode fiber optic cable. This Campus Area Network (CAN) allows schools and the District Office communicate digitally. The multi-mode cable extends to the main server room where rack mounted fiber optic switches (hubs) distribute signals throughout the facility on a</p>		

Reference	Immediate	Long-term
<p>Local Area Network (LAN). Computers within approximately 300 feet of the main server room are each connected with individual CAT-5 cables. For longer runs, single mode fiber optic cable is extended to another HUB located remote from the server room. This HUB connects CAT-5 cables to individual computers in the remote area.</p> <p>A minimum of 5 CAT-5 cable drops to connect 5 computers to the LAN per classroom is desired. The number of drops in each classroom at this school varies but is limited. Increasing the size of the LAN at this school is not within the survey scope; it will likely be required eventually if the school is to remain. No remediation recommended.</p>		
<p>3.8.7 Corridor and Separation Walls</p>		
<p>Exit corridor and separation walls require fireproofing sealing between wall and bottom of roofing system and around all wall penetrations. There is significant damage of fire separation ceilings and attic smoke separation walls including large holes in the gypsum fire separation ceiling above the media center. Repairs of gypsum smoke separation walls in the attic including fire rated doors for area access and maintenance are required.</p>	X	
<p>3.8.8 Doors</p>		
<p>Exit corridor doors require closing devices, panic devices (if required) and smoke proof sealing systems.</p>	X	
<p>3.8.9 Classroom Emergency Exiting</p>		
<p>Operable window units clearly marked as “Emergency Exit” provide classroom emergency exiting. No remediation recommended.</p>		
<p>3.8.10 Emergency Egress Lighting</p>		
<p>Emergency lights are provided throughout all corridors, large rooms and toilets. Fixtures appear to be in good condition. No remediation recommended.</p> <p>Exit signs are properly located, but some exit direction arrows do not provide proper direction indication. Correction of exit sign arrows is required.</p>	X	

<b>Reference</b>	<b>Immediate</b>	<b>Long-term</b>
<b>3.9 Asbestos Abatement</b>		
This facility was constructed in the 1990's and as such is assumed to be asbestos free.		

## 4.0 Opinions of Probable Costs to Remedy Physical Deficiencies (Burrows Elementary)

### 4.1 General

Opinions of probable cost are provided to address physical deficiencies in the facility. Physical deficiencies are divided into three categories: Immediate, Intermediate, and Long-term Remediation items as requested in the scope of work. The costs shown are based on visual observations from the walk-through survey. Quantities used in performing the estimate are approximate; no measurements were taken on site. Unit costs are parametric based on gross square footage for major building systems and components.

### 4.2 Parametric Costs

The appendix of each report contains the parametric opinions of probable costs. Each major physical deficiency is listed with the report section number. The unit prices shown were derived from RS Means Building Construction Costs Data, 60<sup>th</sup> Edition, 2002 and from prior experience at the Military Base. Immediate, Intermediate, and Long-term Remediation Costs are based on Fiscal Year 2004 (FY04) values. Each item is marked up for general contractor overhead and profit and escalated for two years at 2.87% per year. It is assumed that these costs will be escalated beyond 2004 by the user. Each cost is also adjusted by a location adjustment factor based on the average nationwide statistical labor costs as established by the office of the Under Secretary of Defense, June 3, 2002. An estimate contingency is applied to all costs to cover costs for unforeseen conditions and unknown quantities. The contingency amount is contingent upon the level of scope and detail. Typically, budgetary opinions of probable costs provided at a “pre-concept” phase include a 15% contingency. Opinions of probable costs for “construction document” phase projects include 5 - 10% contingencies. A 15% contingency for the opinions of costs, based on the US Army Technical Manual TM 5-800-4 - Programming Cost Estimates for Military Construction, is included in this study due to the broad nature of the survey.

### 4.3 Overall Cost Summary

The total cost summary for remediation of physical deficiencies follows in this section. The summary indicates the distribution of Immediate Remediation costs for the three primary standards used for evaluation: life safety, ADA, and major building system guidelines. Intermediate remediation items fall into categories of Title IX, force protection, play surfacing, and additional sitework for safe traffic flow. Long-term Remediation costs are indicated for additional ADA work and deferred maintenance items. Deferred maintenance is work that cannot be performed by routine maintenance and requires capital improvements. Examples of deferred maintenance include new roofing and asbestos abatement of non-friable materials.

#### 4.4 Detailed Cost Summary

A detailed cost summary is included at the end of this section for Immediate Remediation work recommended for completion within 1 year, and Long-term Remediation recommended for completion within 1 –10 years. Detailed distributions are not given for intermediate costs as they apply to individual line items, in general. Intermediate costs are a lower priority item than immediate costs. Cost distributions for each building system are indicated in tabular form for all items requiring remediation.

#### 4.5 Discussion of Results

Section 3.0 of the report lists the physical deficiencies and associated opinions of probable costs of remediation for each building system. Total costs for Immediate, Intermediate, and Long-term Remediation items are as follows:

Immediate	\$ 486,000
Intermediate	\$ 0
Long-term	<u>\$ 333,000</u>
Total Remediation Costs	\$ 819,000

A calculation of Plant Replacement Value (PRV) was also performed for this facility. Plant replacement value represents the cost of a new building and associated sitework for FY04 pricing. The PRV for this school is approximately \$5,599,000. This cost was determined based on the following square foot cost escalated from TM 5 -800-4:

\$140.38/sf

These costs were then multiplied by the building square footage and applicable cost escalation and contingency factors. PRV is often used as a comparison to renovation and repair costs for economic feasibility studies.

Before a comparison of remediation costs and Plant Replacement Value (PRV) can be performed, it is important to consider the age of the building. According to the Department of Defense's "Facilities Recapitalization Front End Assessment, August 2002," the government's goal is a 67 year recapitalization rate. Sixty-seven years is the expected service life for a building in the DOD inventory and we have carried that assumption to this analysis. For the purpose of our study, we are utilizing relative useful life of a building, defined as the 67 year expected service life minus the age of the building. In facilities with additions, we have compiled a composite facility age using the areas and ages of each component making up the whole facility.

The above DOD reference calculates recapitalization rate as the plant replacement value divided by the planned annual sustainment costs to determine the number of years of expected life. A number greater than 67 is considered good because it exceeds the government goal. Sustainment in this model is the cost of annual maintenance and improvements. Because our study is based on a large, one-time investment and not

annual maintenance dollars, it does not transfer directly to our study. However, the logic of the method is easily transformed into a Modified Recapitalization Metric (MRM).

For the purpose of this study, the modified recapitalization metric (MRM) is computed considering the following factors:

- Expected Service Life (ESL): 67 years per DOD
- Relative Useful Life (RUL): Expected service life minus the age of the building.
- Target Sustainment: The annual investment required to keep the building in good working order to achieve an ESL of 67 years. It is calculated by dividing the plant replacement value by the ESL.
- Plant Replacement Value (PRV): The cost to replace the school building, sitework, furniture and associated assets. It is presented in FY 2004 dollars for this study.
- Remediation Costs: These are the total construction costs associated with correcting deficiencies noted in this study.
- Required Investment: The level of investment required to correct the current deficiencies spread out over the remaining useful life. It is calculated by dividing remediation costs by the RUL.

The MRM is the ratio of required investment to target sustainment (investment). A ratio less than one indicates it may be more cost effective to renovate a facility rather than replacing it. Conversely, an MRM greater than one indicates replacement may be the better option because the government could spend less sustaining a new facility rather than investing in an older, less modern facility.

The following table summarizes the MRM calculation for Burrows Elementary School.

ESL (yrs)	AGE (yrs)	RUL (yrs)	PRV (\$)	TARGET SUSTAIN (Annual \$)	REMED. COSTS (\$)	REQ'D INVEST. (Annual \$)	MRM	RECOMMEND
67	*12	*55	5,599,000	83,600	819,000	14,900	.18	Renovate

\*Represents Composite Number.

Based on our analysis of the remediation costs, it is our opinion that this school should be renovated to bring it into compliance with applicable codes and repair problems with major building systems.

Refer Appendix for Total Cost Summary

Refer Appendix for Immediate Remediation Item Detail Table

Refer Appendix for Long-Term Remediation Item Detail Table

### 3.0 System Description and Observations

Reference	Immediate	Long-term
<b>3.1 Overall General Description</b>		
This facility is a 72,900 square foot, two-story masonry veneer building constructed in 1962. Additional classrooms and media center spaces were subsequent additions in 1983, 1986 and 1992. Temporary structures provide additional storage, maintenance, athletic field and classroom facilities. This facility serves 400 students from sixth through twelfth grades.		
<b>3.2 Site</b>		
3.2.1 Topography		
Slopes away from building are gentle with minor water retaining problems. No remediation recommended.		
3.2.2 Storm Water Drainage		
There is a storm water drainage system at the building perimeter. There are no courtyard areas. No remediation recommended.		
3.2.3 Ingress and Egress		
The site is accessible by paved roadway. Concrete walkways provide access and egress from the parking area, the street and around the building perimeter. No remediation recommended.		
3.2.4 Paving, Curbing and Parking		
Paving for road access and parking area is asphaltic concrete with concrete curbs in poor condition. Replacement and repair of damaged parking paving, curbs and gutters is recommended.		X
3.2.5 Flatwork		
Concrete walkways and ramps are in fair condition. Replacement and repair of damaged areas is recommended.		X
3.2.6 Landscaping and Appurtenances		
Perimeter landscaping is highly developed at main entrance. There are some trees on site. Lawn areas are well maintained. No remediation recommended.		

Reference	Immediate	Long-term
3.2.7 Recreational Facilities and Title IX Compliance		
<p>There are numerous play field areas available. All play areas are in good condition with the exception of the tennis court. The boy's baseball field has adequate lighting but the girl's softball field does not. Girl's softball field lighting is recommended. Tennis court repair is required. The school sponsors team sports in boy's football, boy's and girl's basketball and boy's and girl's tennis.</p> <p>A new boy's football locker room facility, replacing the under-stage locker room, is scheduled for future construction. Locker facilities for girls appear to be in compliance with Title IX regulations. Costs to renovate boy's locker room are included.</p>	X	X
3.2.8 Utilities		
3.2.8.1 Water		
A 3-inch water main enters the mechanical room through a dual water meter and reduced pressure backflow preventer. All equipment is in good condition. No remediation recommended.		
3.2.8.2 Electrical Service and Metering		
<p>Primary service is by overhead distribution routed along the rear of the property. The overhead primary routes directly over the top of two temporary trailer structures and the corner of the loading dock, creating major safety hazards and remediation is required.</p> <p>Main electrical service to the school is by three 167 KVA electric transformers mounted on an overhead platform. Four underground conduits feed the main electrical switchboard in the mechanical room. There are also two additional electrical services fed from pad mounted transformers serving temporary classroom buildings. Service is in good condition. No remediation recommended.</p>	X	
3.2.8.3 Natural Gas		
A gas meter is located to the north of the mechanical room and is in good condition. No remediation recommended.		
3.2.8.4 Sanitary Sewer		
The sanitary waste system is routed off campus through a series of manholes and connector piping, is in good condition. No remediation recommended.		

Reference	Immediate	Long-term
3.2.8.5 Storm Sewer		
Storm drainage is through a gutter and downspout system that connects to an underground collection system. In some areas, the storm drainage is by downspouts to splash blocks and surface drainage. Repairs to damaged downspouts and connecting piping is required.	X	
<b>3.3 Structural Frame and Building Envelope</b>		
3.3.1 Foundation		
Foundation is assumed to be reinforced concrete spread footings supporting load bearing concrete masonry unit shear walls in good condition. Steel joists support floors. No remediation recommended.		
3.3.2 Building Frame		
Building frame is a reinforced concrete masonry unit shear wall system in good condition. Roof framing is reinforced gypsum deck on steel joists and trusses. No remediation recommended.		
3.3.3 Facades or Curtainwall		
3.3.3.1 Sidewall System		
Building exterior is face brick masonry veneer on concrete masonry unit walls, with adequate expansion joints and weep holes in good condition. No remediation recommended. There is some masonry veneer damage at kitchen loading dock. Masonry veneer repair at kitchen loading dock and overall cleaning is required immediately. Expansion joint replacement is recommended.	X	
3.3.3.2 Entrances/Exits		
Main entrance/exit is aluminum framing with single glazing. One door has automatic opening equipment for ADA accessibility. The entrance system is in good condition. No remediation recommended. Auxiliary exit/entrances are painted hollow metal doors with single glazing in painted hollow metal frames. Sidelights are single glazing in painted hollow metal frames. Auxiliary exit/entrances are in good condition. No remediation recommended.		

<b>Reference</b>	<b>Immediate</b>	<b>Long-term</b>
3.3.3.3 Fenestration System		
Window system is operable prefinished aluminum metal frame with single glazing in good condition. Framing sealant is in fair condition and replacement is recommended.		
3.3.3.4 Soffits		
Soffits at main entrance covered walkway and doors are wood and are in fair condition with some damage. Main entrance covered walkway has damaged skylights. Repair, refinishing wood soffits and skylight replacement is required.	X	
3.3.3.5 Parapets		
Parapets are in good condition. Metal copings, flashing, overflow scuppers and downspouts are in good condition. No remediation recommended. Replacement of damaged fascia and downspouts is required.	X	
3.3.4 Roofing		
The roofing system is an EPDM system, recently re-roofed, with metal copings and flashing in good condition. Roofing does not have proper slopes for drainage. Re-roofing, tapered insulation, including metal coping, flashings and accessories is recommended. Covered walkway roofing is pre-finished metal in good condition. No remediation recommended. Entrance canopy is built-up roofing, hold water and replacement is recommended. Metal fascia at back of building requires roofing asphalt removal and painting.		X
<b>3.4 Interior Elements</b>		
3.4.1 Common Areas		
Lobby and corridors have terrazzo flooring, glazed concrete masonry unit wainscot, painted concrete masonry unit walls, solid core wood veneer doors, hollow metal frames and suspended acoustic lay-in ceilings. All surfaces are in good condition.  Administrative, media center and classroom areas have carpet or vinyl composition tile flooring, glazed painted concrete masonry unit walls, solid core wood veneer doors, hollow metal frames and suspended acoustical lay-in ceilings. All surfaces are in good condition. No remediation recommended. Carpet replacement is required after asbestos abatement.		

Reference	Immediate	Long-term
<p>The cafeteria area has vinyl composition floor tile, glazed concrete masonry unit wainscot, painted concrete masonry unit walls, solid core wood veneers doors, hollow metal frames and suspended acoustical lay-in ceiling. All surfaces are in good condition.</p> <p>The gymnasium and stage areas have wood flooring, painted concrete masonry walls and exposed structure ceiling. Most surfaces are in good condition with the exception of exposed ceiling, which has major basketball damage to fibrous deck material and duct insulation. Stage front is ceramic tile in fair condition and repair is required.</p> <p>Kitchen areas have non-slip ceramic tile flooring, glazed concrete masonry unit wainscot, painted concrete masonry units walls, solid core wood veneer doors, hollow metal frames and suspended acoustical lay-in ceilings. All surfaces are in good condition. No remediation recommended. Kitchen equipment is in good condition.</p> <p>Public toilets have ceramic tile flooring, glazed ceramic tile on painted concrete masonry units and suspended acoustical lay-in ceilings. All surfaces are in good condition. No remediation recommended.</p>	X	
<b>3.5 ADA Tier I: Visual Accessibility Survey</b>		
3.5.1 Path of Travel		
<p>The path of travel from the parking area is not accessible. The main entry appears to be accessible. Curb cuts at the student drop off area are not accessible and a marked accessible route is required. Accessibility work is required.</p>	X	
3.5.2 Parking		
<p>Parking requires marked spaces designated with signage, one van accessible space and marked accessible route.</p>	X	
3.5.3 Entrances/Exits		
<p>The main entrance/exit approach and doors appear to be accessible. Auxiliary exit/entrance doors exit onto porches that do not provide exiting to accessible walkways. Interior doors appear to allow clearance and approach accessibility but require lever type opening devices. Achievement of exit accessibility is not</p>	X	X

<b>Reference</b>	<b>Immediate</b>	<b>Long-term</b>
required unless specific doors are altered, however, accessibility compliance is recommended.		
3.5.4 Signage		
Accessible signage is required at specified parking spaces and all doors designating permanent rooms.		X
3.5.5 Public Toilet Rooms		
Public toilets appear to be accessible. No remediation recommended.		
3.5.6 Drinking Fountains		
Drinking fountains are not accessible and require replacement with corridor protrusion protection.	X	
3.5.7 Telephones		
Not applicable.		
3.5.8 Elevators/Lifts		
There is one inaccessible elevator that is scheduled for replacement with an accessible unit within the next year. A chair lift is recommended for stage access.	X	X
3.5.9 Recreational Facilities		
Play fields are not accessible directly from the site and remediation may not be readily achievable without major ramp construction. Addition of accessible ramps is recommended.		X
<b>3.6 Mechanical and Electrical System</b>		
3.6.1 Overall General Description		
Approximately five years ago, the existing water source heat pump system that provided heating and cooling to the school was converted to a geothermal type heat pump system. The revised system has significant deficiencies that prevent all air conditioning units from operating during the warmest days. Public toilets were recently upgraded to comply with ADA, although some existing classroom sinks and smaller staff restrooms were not included in the upgrade. The electrical system is in generally good condition, although some deficiencies were identified.		

Reference	Immediate	Long-term
3.6.2 Plumbing		
3.6.2.1 Supply and Waste Piping		
Most piping is in good condition. Vent terminations at the roof are less than the required 6-inch height required by the <i>Plumbing Code</i> and extension of the length of the existing vent terminations is required.	X	
The kitchen is served by a single-compartment grease trap and is unsatisfactory. Replacement with a two- compartment type unit is required.	X	
3.6.2.2 Domestic Hot Water Production		
A single 300,000 BTU/Hr, gas fired hot water heater produces domestic hot water. Water heater appears to be in fair condition. No remediation recommended.		
3.6.2.3 Fixtures		
The existing plumbing system is approximately 50 years old. The public restroom fixtures are new. Staff restroom and classroom fixtures are in fair condition. Replacement of damaged fixtures is recommended.		X
3.6.2.6 Fuel Piping		
Natural gas piping is in good condition. No remediation recommended.		
3.6.3 Mechanical System		
3.6.3.1 Heat Generating Equipment		
Heating and cooling for the main portion of the school is provided by a geothermal heat pump system consisting of a series of 130 wells, 260 feet deep, buried beneath the playing fields. Circulating piping from wells terminates at an underground manifold vault and continues to a pump room under the stage. Piping is routed to water source heat pump units throughout the school. The underground manifold vault is prone to flooding and is not designed to drain excessive amounts of water . Improvements to the manifold vault drainage are required.	X	
The interior circulating system piping is Schedule 40 PVC pipe. Water temperatures exceeding 100 °F in the system is causing		

Reference	Immediate	Long-term
<p>swelling and weakening of the PVC piping. Observations of other DDESS schools indicate that water source heat pump systems utilizing PVC piping for heating and cooling water are prone to failure. Replacement of PVC piping with copper piping is required.</p> <p>There are insufficient isolation valves to isolate the interior piping from the exterior piping and are required.</p> <p>A vortex type air separator indicated in the construction documents was not installed. There are also no automatic air vents to remove air from the closed piping system. The addition of an air separator and automatic air vents to remove air from the circulating water system is required.</p> <p>Exterior circulating piping has suffered at least one significant break. During the construction of the playing fields, drilling for the foundation of one of the sports light poles for the baseball field ruptured a pipe causing debris in pipe strainers at individual cooling units. Thorough cleaning of the circulating water system is required.</p> <p>A combination filter and feeder unit is dormant and not in use. Repair of the filter and feeder unit is required.</p> <p>Maintenance personnel report that the existing geothermal well and piping system does not have the capacity to provide adequate cooling water during warm days. Circulating water temperature rises to the point that heat pump compressors trip themselves “off” on high head pressure safety devices. Also, elevated circulating water temperature is believed to be responsible for the premature failure of several compressors. The geothermal well system requires analysis to determine the capabilities of the existing wells and possibly add additional wells increase system capacity and is required. Replacement of the system with one that provides constant water temperature for water source heat pumps is recommended.</p> <p>There are electrical fans in some areas, such as the band room, served by the geothermal heat pump system. No remediation recommended.</p>		<p style="text-align: center;">X</p>



Reference	Immediate	Long-term
3.6.3.5 Control Systems		
A Siemens direct digital control system appears to be in satisfactory condition. No remediation recommended.		
3.6.4 Electrical		
3.6.4.1 Main Switchboard		
The main electrical distribution panel (MDP) is a 1,600 Amp, 120/208 Volt, 3 phase, 4-wire two-section panelboard located in the boiler room. The panel appears to be in good condition. No remediation recommended.		
3.6.4.2 Distribution and Panels		
Electrical distribution and panels appear to be in good condition. No remediation recommended		
3.6.4.3 Interior Lighting		
Typical classroom lighting is pendant-hung fluorescent light fixtures with T-8 lamps and electronic ballasts. The acrylic fins are yellowing. Replacement of the classroom light fixtures is recommended.  Corridor lighting is recessed parabolic fluorescent troffers with T-8 "U" tube lamps with electronic ballasts in good condition. No remediation recommended.		X
3.6.4.4 Exterior Lighting		
Exterior lighting is HID wall pack fixtures. Numerous fixtures are not operational and require repair.	X	
Lighting at entryways and covered walks is recessed incandescent fixtures in poor condition. Replacement of incandescent fixtures with compact fluorescent fixtures is required.	X	
There are no lights for the covered walks on the Middle School section or in the vicinity of the portable buildings. Addition of compact fluorescent light fixtures in these areas is required.	X	
Parking lot lighting utilizes pole-mounted high-pressure sodium light fixtures providing acceptable light levels. No remediation recommended.		

Reference	Immediate	Long-term
<b>3.7 Vertical Transportation</b>		
There is one existing elevator scheduled for replacement with an accessible elevator within the next year. Replacement Cost is included in this report.		
<b>3.8 Life Safety and Fire Protection</b>		
<b>3.8.1 Sprinklers and Standpipes</b>		
A partial fire sprinkler system and deluge water system is provided. The fire system control valve is located in the boiler room. A deluge fire extinguishing system is located at the stage. A sprinkler system serves the basement area beneath the stage, which is currently the varsity football locker room. A fire sprinkler system serving the entire facility is recommended but not required.		
<b>3.8.2 Alarm Systems</b>		
Visual alarm system is in noncompliance. Visual alarms are required in all common use spaces and rooms with more than one occupant. A new system with warnings complying with life safety codes and ADA guidelines is required.	X	
<b>3.8.2.1 Fire Evacuation Alarm System</b>		
The fire alarm and evacuation system is in good condition. No remediation recommended.		
<b>3.8.2.2 Kitchen Fire Protection System</b>		
A solenoid gas valve has been provided in conjunction with the dry chemical fire extinguishing system. However, there are no shunt trip type circuit breakers to disconnect power to equipment located under the exhaust hood in the event of a fire and are required.	X	
<b>3.8.3 Intercom Systems</b>		
There is a central public address system with intercoms in each classroom and appears to be in satisfactory condition. No remediation recommended.		

<b>Reference</b>	<b>Immediate</b>	<b>Long-term</b>
3.8.4 Educational Television		
The existing educational television system appears to be in satisfactory condition. No remediation recommended.		
3.8.5 Security Systems		
Not applicable.		
3.8.6 Computer Network		
The Local Area Network (LAN) has been recently upgraded. A minimum of 5 CAT-5 cable drops were installed in each classroom. The electrical system was upgraded to handle proposed computer density. No remediation recommended.  Quantico schools are interconnected with multi-mode fiber optic cable. This Campus Area Network (CAN) allows schools and the District Office communicate digitally. The multi-mode cable extends to the main server room where rack mounted fiber optic switches (hubs) distribute signals throughout the facility on a Local Area Network (LAN). Computers within approximately 300 feet of the main server room are each connected with individual CAT-5 cables. For longer runs, single mode fiber optic cable is extended to another HUB located remote from the server room. This HUB connects CAT-5 cables to individual computers in the remote area.		
3.8.7 Corridor and Separation Walls		
Exit corridor and separation walls require fireproofing sealing between wall and bottom of roofing system and around all wall penetrations.	X	
3.8.8 Doors		
Exit corridor doors require closing devices, panic devices (if required), smoke proof sealing systems and reduced glazed area with wired glass.	X	
3.8.9 Classroom Emergency Exiting		
Operable window units clearly marked as "Emergency Exit" provide classroom emergency exiting. No remediation recommended.		

<b>Reference</b>	<b>Immediate</b>	<b>Long-term</b>
3.8.10 Emergency Egress Lighting		
Required emergency lighting installed is not installed in egress corridors or toilets.  LED type exit sign have been properly installed in egress corridors and large rooms.	X	
3.9 Asbestos Abatement		
According to the AHERA Report, remaining asbestos -containing material (ACM) is non-friable and is primarily in floor tile, mastic and piping insulation at elbows. Some of the areas are covered with carpet.		X

#### 4.0 Opinions of Probable Costs to Remedy Physical Deficiencies (Quantico Middle/High School)

##### 4.1 General

Opinions of probable cost are provided to address physical deficiencies in the facility. Physical deficiencies are divided into three categories: Immediate, Intermediate and Long-term Remediation items as requested in the scope of work. The costs shown are based on visual observations from the walk-through survey. Quantities used in performing the estimate are approximate; no measurements were taken on site. Unit costs are parametric based on gross square footage for major building systems and components.

##### 4.2 Parametric Costs

The appendix of each report contains the parametric opinions of probable costs. Each major physical deficiency is listed with the report section number. The unit prices shown were derived from RS Means Building Construction Costs Data, 60<sup>th</sup> Edition, 2002 and from prior experience at the Military Base. Immediate, Intermediate, and Long-term Remediation Costs are based on Fiscal Year 2004 (FY04) values. Each item is marked up for general contractor overhead and profit and escalated for two years at 2.87% per year. It is assumed that these costs will be escalated beyond 2004 by the user. Each cost is also adjusted by a location adjustment factor based on the average nationwide statistical labor costs as established by the office of the Under Secretary of Defense, June 3, 2002. An estimate contingency is applied to all costs to cover costs for unforeseen conditions and unknown quantities. The contingency amount is contingent upon the level of scope and detail. Typically, budgetary opinions of probable costs provided at a “pre-concept” phase include a 15% contingency. Opinions of probable costs for “construction document” phase projects include 5 - 10% contingencies. A 15% contingency for the opinions of costs, based on the US Army Technical Manual TM 5-800-4 - Programming Cost Estimates for Military Construction, is included in this study due to the broad nature of the survey.

##### 4.3 Overall Cost Summary

The total cost summary for remediation of physical deficiencies follows in this section. The summary indicates the distribution of Immediate Remediation costs for the three primary standards used for evaluation: life safety, ADA, and major building system guidelines. Intermediate remediation items fall into categories of Title IX, force protection, play surfacing, and additional sitework for safe traffic flow. Long-term Remediation costs are indicated for additional ADA work and deferred maintenance items. Deferred maintenance is work that cannot be performed by routine maintenance and requires capital improvements. Examples of deferred maintenance include new roofing and asbestos abatement of non-friable materials.

#### 4.4 Detailed Cost Summary

A detailed cost summary is included at the end of this section for Immediate Remediation work recommended for completion within 1 year, and Long-term Remediation recommended for completion within 1 –10 years. Detailed distributions are not given for intermediate costs as they apply to individual line items, in general. Intermediate costs are a lower priority item than immediate costs. Cost distributions for each building system are indicated in tabular form for all items requiring remediation.

#### 4.5 Discussion of Results

Section 3.0 of the report lists the physical deficiencies and associated opinions of probable costs of remediation for each building system. Total costs for Immediate, Intermediate, and Long-term Remediation items are as follows:

Immediate	\$ 959,000
Intermediate	\$ 293,000
Long-term	<u>\$ 1,360,000</u>
Total Remediation Costs	\$ 2,612,000

A calculation of Plant Replacement Value (PRV) was also performed for this facility. Plant replacement value represents the cost of a new building and associated site work for FY04 pricing. The PRV for this school is approximately \$9,954,000. This cost was determined based on the following square foot cost escalated from TM 5 -800-4:

\$146.02/sf

These costs were then multiplied by the building square footage and applicable cost escalation and contingency factors. PRV is often used as a comparison to renovation and repair costs for economic feasibility studies.

Before a comparison of remediation costs and Plant Replacement Value (PRV) can be performed, it is important to consider the age of the building. According to the Department of Defense's "Facilities Recapitalization Front End Assessment, August 2002," the government's goal is a 67 year recapitalization rate. Sixty-seven years is the expected service life for a building in the DOD inventory and we have carried that assumption to this analysis. For the purpose of our study, we are utilizing relative useful life of a building, defined as the 67 year expected service life minus the age of the building. In facilities with additions, we have compiled a composite facility age using the areas and ages of each component making up the whole facility.

The above DOD reference calculates recapitalization rate as the plant replacement value divided by the planned annual sustainment costs to determine the number of years of expected life. A number greater than 67 is considered good because it exceeds the government goal. Sustainment in this model is the cost of annual maintenance and improvements. Because our study is based on a large, one-time investment and not

annual maintenance dollars, it does not transfer directly to our study. However, the logic of the method is easily transformed into a Modified Recapitalization Metric (MRM).

For the purpose of this study, the modified re capitalization metric (MRM) is computed considering the following factors:

- Expected Service Life (ESL): 67 years per DOD
- Relative Useful Life (RUL): Expected service life minus the age of the building. Because Quantico High School is a combination of additions and the original building, a composite relative useful life has been used.
- Target Sustainment: The annual investment required to keep the building in good working order to achieve an ESL of 67 years. It is calculated by dividing the plant replacement value by the ESL.
- Plant Replacement Value (PRV): The cost to replace the school building, sitework, furniture and associated assets. It is presented in FY 2004 dollars for this study.
- Remediation Costs: These are the total construction costs associated with correcting deficiencies noted in this study.
- Required Investment: The level of investment required to correct the current deficiencies spread out over the remaining useful life. It is calculated by dividing remediation costs by the RUL.

The MRM is the ratio of required investment to target sustainment (investment). A ratio less than one indicates it may be more cost effective to renovate a facility rather than replacing it. Conversely, an MRM greater than one indicates replacement may be the better option because the government could spend less sustaining a new facility rather than investing in an older, less modern facility.

The following table summarizes the MRM calculation for Quantico Middle/High School.

ESL (yrs)	AGE (yrs)	RUL (yrs)	PRV (\$)	TARGET SUSTAIN (Annual \$)	REMED. COSTS (\$)	REQ'D INVEST. (Annual \$)	MRM	RECOMMEND
67	*36.5	*27.8	9,954,000	148,600	2,612,000	94,000	.63	Renovate

\*Represents Composite Number.

Based on our analysis of the remediation costs, it is our opinion that this school should be renovated to bring it into compliance with applicable codes and repair problems with major building systems.

Refer Appendix for Total Cost Summary

Refer Appendix for Immediate Remediation Item Detail Table

Refer Appendix for Long-Term Remediation Item Detail Table

### 3.0 System Description and Observations

Reference	Immediate	Long-term
<b>3.1 Overall General Description</b>		
This facility is a 41,900 square foot, one-story masonry veneer building constructed in 1953. Additional classrooms and storage space were subsequent additions. This facility serves 300 students from pre-kindergarten to third grade.		
<b>3.2 Site</b>		
3.2.1 Topography		
Slopes away from building are gentle with minor water retaining problems. One play area across from the service drive retains water at edge of play curb. Courtyard drainage requires repair.	X	
3.2.2 Storm Water Drainage		
There is a storm water drainage system at the building perimeter and courtyard areas. Some storm sewer inlets are spaced around the building. However, grading is such that much of the water does not flow to them. The maintenance staff has installed additional drains and extended line to feed above ground into existing inlets. Very few downspouts extend to the storm sewer system. The Courtyard requires grading improvements to provide access to existing storm water drainage system. Replacement of damaged downspouts and missing splash blocks is required.	X	
3.2.3 Ingress and Egress		
The site is accessible by paved roadway. Concrete walkways provide access and egress from the parking area, the street and around the building perimeter. A concrete stairway at the street provides the main entry walkway access from the student drop -off area. No remediation recommended.		
3.2.4 Paving, Curbing and Parking		
Paving for road access and parking area is asphaltic concrete without curbs and is poor condition. Replacement of parking paving is recommended.		X

Reference	Immediate	Long-term
3.2.5 Flatwork		
Concrete walkways and ramps are in fair condition. Replacement and repair of damaged areas is recommended.		X
3.2.6 Landscaping and Appurtenances		
Perimeter landscaping is highly developed at main entrance. There are some trees on site. Lawn areas are well maintained. Planting areas between building and perimeter sidewalks are undeveloped and may require new plantings for aesthetics. Courtyard landscaping is overgrown and requires major redevelopment for aesthetics and maintenance and is may be included in courtyard drainage remediation.		
3.2.7 Recreational Facilities and Title IX Compliance		
There are numerous play areas with various types of equipment. Play surfaces include gravel, sand and bark and appear to comply with the U.S. Consumer Safety Commission “Handbook for Public Playground Safety requirements. There is one hard surfaced play area. All play equipment and surface areas are in good condition. The school does not sponsor specific team sport programs and is in compliance with Title IX regulations. No remediation recommended.		
3.2.8 Utilities		
3.2.8.1 Water		
Water service to the building is 3” and enters the boiler room on the west side of the building. A separate service does not feed the fire sprinkler system, which is tapped off the main water service in the boiler room. No meter or backflow preventer could be located. The service pipe in the boiler room appears to be in poor condition and may need to be replaced in the near future. The fire riser feeds sprinklers above and below the stage, and the janitors’ closets. The remainder of the building is not sprinkled. A backflow preventer and separate fire protection system water service is required.	X	
3.2.8.2 Electrical Service and Metering		
Overhead primary service is extended to an overhead transformer rack with 3-75 KVA transformers at the northwest corner of the facility and extends underground to the boiler room. Current transformers and an electric meter are located at the base of the		

Reference	Immediate	Long-term
<p>rack structure in an extremely corroded enclosure. Three 4” conduits extend to the building. 500 kcmil cables are run to the building through two conduits and the third remains for future use.</p> <p>A second service is located on the south side of the facility, apparently installed to serve temporary classrooms. This service has been abandoned.</p>		
3.2.8.3 Natural Gas		
<p>In approximately 1997 the school was converted from fuel oil to natural gas. An underground storage tank was removed and had been leaking so monitoring wells remain to take water samples. The natural gas feed has pressure regulators immediately outside the boiler room that supplies medium pressure gas to equipment installed as part of the conversion project. No natural gas meter could be located and maintenance personnel indicated that one had never been installed. The gas service is in good condition. A meter is required.</p>		
3.2.8.4 Sanitary Sewer		
<p>Major problems were not identified with the sanitary sewer system. However, it is anticipated that lines may need repair or replacement because of the length of time installed. The kitchen sewerage appears to flow to a manhole outside the building, which may be used as a grease trap. It is not a two-compartment unit and doesn’t meet code requirements. It also appears that all flow from the kitchen appears to flow to the grease trap instead of only grease producing equipment. A grease trap is required.</p>	X	
3.2.8.5 Storm Sewer		
Not applicable.		
3.2.8.6 Special Utility Systems		
Not applicable.		
<b>3.3 Structural Frame and Building Envelope</b>		
3.3.1 Foundation		
<p>Foundation is reinforced concrete spread footings. Some areas are settling causing face brick veneer to crack. There are utility tunnels for piping originating in a lowered mechanical area framed with reinforced cast-in-place concrete. Remediation of settling</p>	X	

Reference	Immediate	Long-term
foundation is required.		
3.3.2 Building Frame		
Building frame is a reinforced concrete masonry unit shearwall system in good condition. Roof framing is reinforced gypsum deck on steel joists and trusses. No remediation recommended.		
3.3.3 Facades or Curtainwall		
3.3.3.1 Sidewall System		
Building exterior is face brick masonry veneer on concrete masonry unit walls. There are no expansion joints or weep holes in the system except for the Storeroom addition. Some areas of face brick have cracked grout joints due to foundation settling and temperature changes (and appear to have moisture intrusion). Some areas have algae growth and efflorescence. Masonry is not in good condition and requires cracking repair, expansion joint construction and cleaning is required.	X	
3.3.3.2 Entrances/Exits		
Main entrance/exit is aluminum framing with single glazing. One door has automatic opening equipment for ADA accessibility. The entrance system is in good condition. No remediation recommended. Auxiliary exit/entrances are painted hollow metal doors in painted hollow metal frames. Sidelights are single glazing in painted hollow metal frames. Auxiliary exit/entrances are in good condition. No remediation recommended.		
3.3.3.3 Fenestration System		
Window system is operable painted metal frame with single glazing and is in poor condition. Steel lintels are rusting. Glazing sealant has been identified as ACM and is in poor condition. The entire window and sealant system is scheduled for complete abatement and replacement under separate contract within the next two years. No remediation recommended as part of this report.		
3.3.3.4 Soffits		
Soffit at the main entry is stucco and is in good condition. Soffits in remainder of building are stucco, are in poor condition and require repair or replacement.		X

Reference	Immediate	Long-term
3.3.3.5 Parapets		
Parapets are in good condition. Metal copings, flashing, overflow scuppers and downspouts are in poor condition and require replacement. Leak repair and replacement of damaged metal flashing is required. Costs are included in 3.3.4.		
3.3.4 Roofing		
Roofing over most of the facility is gravel surfaced built-up system with metal copings and flashing in poor condition. Roofing, metal component deterioration and some ponding is evident. Replacement of new roofing over tapered insulation, downspouts and skylight glazing and is recommended.	X	X
<b>3.4 Interior Elements</b>		
3.4.1 Common Areas		
<p>Lobby and corridors have terrazzo flooring, glazed tile wainscot on painted concrete masonry unit walls, solid core wood veneer doors, hollow metal frames and suspended acoustic lay-in ceilings. All surfaces are in good condition.</p> <p>Administrative, media center and classroom areas have carpet or vinyl composition tile flooring, painted concrete masonry unit walls, solid core wood veneer doors, hollow metal frames and suspended acoustical lay-in ceilings. All surfaces are in good condition. Carpet replacement is required after asbestos abatement.</p> <p>The gymnasium/cafeteria area has vinyl composition tile flooring, glazed tile wainscot on painted concrete masonry unit walls, solid core wood veneers doors, hollow metal frames and suspended acoustical lay-in ceiling. The stage area has wood flooring, painted concrete masonry walls and exposed structure ceiling. All surfaces are in good condition.</p> <p>Kitchen areas have nonslip ceramic tile flooring, glazed ceramic wainscot on painted concrete masonry units, solid core wood veneer doors, hollow metal frames and gypsum board ceilings. All surfaces are in good condition.</p> <p>Public toilets have terrazzo flooring, glazed ceramic tile on painted concrete masonry units and either suspended acoustical lay-in or painted gypsum board ceilings. All surfaces are in good condition.</p>		X

Reference	Immediate	Long-term
<b>3.5 ADA Tier I: Visual Accessibility Survey</b>		
3.5.1 Path of Travel		
The path of travel from the parking area appears to be accessible. The main entry/exit appears to be accessible. Curb cuts at the student drop off area and a ramp from the top of stairs at the street to the main entry sidewalk are required. A marked accessible route from the parking area is required. Accessibility compliance is required.	X	
3.5.2 Parking		
Parking requires marked spaces designated with signage, one van accessible space and marked accessible route and is required.	X	
3.5.3 Entrances/Exits		
The main entrance/exit approach and doors appear to be accessible, with one automatic operating door. Auxiliary exit/entrance doors exit onto porches that do not provide exiting to accessible walkways. Interior doors appear to allow clearance and approach accessibility but require lever type opening devices. Achievement of exit accessibility is not required unless specific doors are altered, however, accessibility compliance is recommended.	X	X
3.5.4 Signage		
Accessible signage is required at specified parking spaces and all doors designating permanent rooms.		X
3.5.5 Public Toilet Rooms		
Public toilets are not accessible but appear to have adequate space for required renovation.	X	
3.5.6 Drinking Fountains		
Drinking fountains are not accessible and require replacement with corridor protrusion protection.	X	
3.5.7 Telephones		
Not applicable.		

Reference		Immediate	Long-term
3.5.8	Elevators/Lifts		
Elevators are not required. A chair lift is recommended for stage access.			X
3.5.9	Recreational Facilities		
Accessible play areas and equipment are not available in each play area group. One accessible play area, with approved surfacing material, is required at each play area group.		X	
<b>3.6 Mechanical and Electrical System</b>			
3.6.1	Overall General Description		
HVAC systems include heating using fancoil units and unit heaters; residential window air conditioners for cooling and gas fired water heaters for domestic hot water. Electrical service is 120/208 VAC-3 phase-60 Hz. There is no form of standby generation or cogeneration. Exhaust fans to remove air from classrooms and bathrooms were installed throughout the facility, however, very few are operational. Repair and replacement of defective exhaust fans is required.		X	
3.6.2	Plumbing		
3.6.2.1	Supply and Waste Piping		
Water supply and waste piping is approximately 50 years old. Visible lines appear to be corroded and will need to be replaced in the future. Plumbing piping in the pipe tunnel underneath the edge of the building is rusted and corroded. The floor drains in the bathrooms and kitchen are very rusted, corroded, brittle and are in poor condition. A thorough evaluation of concealed water and waste piping could not be made without extensive testing and demolition. The average life of plumbing piping is approximately 40 years. Replacement of hot water, cold water and waste lines is recommended.			X
3.6.2.2	Domestic Hot Water Production		
Domestic hot water is produced by two 100 gallon, 75,000 Btuh A. O. Smith tank type water heaters. These units were installed in approximately 1997 and one shows significant signs of corrosion. The second unit appears to be in better condition and replacement is recommended. Hot water is stored in an extremely corroded large storage tank that requires replacement in the near future. A		X	

Reference	Immediate	Long-term
hot water circulator maintains hot water throughout the system.		
3.6.2.3 Fixtures		
The existing plumbing system is approximately 50 years old. Fixture connections in the bathrooms are rusted and very brittle. Most of the existing plumbing fixtures do not meet current code requirements and require replacement.		X
3.6.2.4 Fuel Piping		
Natural gas piping is fairly new and appears to be in good condition. Regulators inside the boiler room are vented to outside the building as codes require. No remediation recommended.		
3.6.3 Mechanical System		
3.6.3.1 Heat Generating Equipment		
<p>A 2-pipe system feeding water to fancoil units and some unit heaters provides heating. The system was installed when converting fuel oil to natural gas in approximately 1997. Two Patterson-Kelley Co. hermetic high efficiency boilers supply heating water. The system utilizes a primary loop from each boiler and secondary loop that supplies fancoil units in classrooms. Boilers, pumps and piping appear to be in good condition. No remediation recommended.</p> <p>Heating only make-up air units are not operational so adequate outside air is not being introduced into classrooms. Make-up air units do not have the capability of reducing ambient humidity levels. A system that will improve indoor air quality and fresh air requirements is recommended. Filtration to eliminate outside pollen and other air-borne contaminants is recommended.</p> <p>Remediation costs are included in 3.6.3.</p>	X	
3.6.3.2 Heating Distribution Equipment		
Heated water distribution piping appears to be in good condition. Fan coil units also appear to be functional for the time being, but are in poor condition. Remediation is recommended.		

Reference	Immediate	Long-term
<p data-bbox="201 233 618 264">3.6.3.3 Cooling Equipment</p> <p data-bbox="201 302 1062 516">Classrooms are cooled using residential window air conditioning units. These units have a dB level which is well above that required for classrooms, do a poor job of cooling, do not help produce good indoor air quality and are very high maintenance. Many are in poor condition and a great deal of corrosion is apparent on window frames where these units are installed.</p> <p data-bbox="201 558 1055 663">Replacement of these units with a system that provides reasonable comfort to students in the classroom and improves indoor air quality is recommended.</p> <p data-bbox="201 705 1065 846">The gymnasium/cafeteria has no air conditioning so temperatures are extreme during summer months. Exhaust fans unsuccessfully attempt to pull air in from other areas to reduce the temperature. A cooling system for this area is recommended.</p> <p data-bbox="201 888 711 919">Remediation costs are included in 3.6.3.</p>		
<p data-bbox="201 953 781 984">3.6.3.4 Cooling Distribution Equipment</p> <p data-bbox="201 1022 1062 1163">No cooling distribution system exists, and make-up air supply and exhaust ducts are routed throughout corridors in an effort to supply fresh air to classrooms. Make-up air units are not functional and fresh air is not being supplied to classrooms.</p> <p data-bbox="201 1205 1062 1419">Fiberboard duct is the primary air distribution and exhaust ducts. Fiberglass flexible duct is routed from the main duct to classrooms. Concrete masonry unit walls have been chipped out and sheet metal flanges form wall make-up and exhaust registers. No fire or fire/smoke dampers have been installed to meet life safety requirements.</p> <p data-bbox="201 1461 1062 1713">An improved HVAC system producing reduced humidity levels, tempered and clean air supplied to classrooms is required. This requires modification of the duct system, new make-up air units, registers and fire/smoke dampers between the hallway and classrooms. An evaluation should be made as to the feasibility of routing existing heating water supply lines to a combination unit which can provide heating, cooling and make-up air.</p> <p data-bbox="201 1755 716 1787">Remediation costs are included in 3.6.3.</p>		

Reference	Immediate	Long-term
3.6.3.4 Control Systems		
<p>Controls for each window air conditioner are on the face of the unit. However, heating boilers, pumps and unit heaters are controlled by a Siemens DDC system. This system has the flexibility to set back room temperatures at night while maintaining freeze protection, scheduling warm up cycles in the morning and generally minimizing excess use of heating equipment. The Siemens system is both expandable and can be upgraded to provide adequate control of existing and future equipment.</p> <p>Remediation costs are included in 3.6.3.</p>		
3.6.4 Electrical	X	
3.6.4.1 Main Switchboard		
<p>An 800-amp “Bull Dog Electric” switchboard provides primary power. The switchboard is undersized for the long -term needs of the school and is in poor condition. Based on a connected load of approximately 12 watts per square foot and 25% capacity for future growth, a 1600 amp switchboard is required. The switchboard needs to be sized to provide new air conditioning, make-up air and computer power requirements to meet current standards.</p> <p>Remediation costs are included in 3.6.4.</p>		
3.6.4.2 Distribution and Panels		
<p>Branch panels are primarily located in corridors throughout the facility. Most panels were upgraded in approximately 1984 and are in reasonable working condition. Replacement or supplementation of these panels to increase availability is recommended.</p> <p>Remediation costs are included in 3.6.4.</p>		
3.6.4.3 Interior Lighting		
<p>Classroom fixtures are pendent mounted and appear to have been manufactured in the 1970s. Lamps have been upgraded to high efficiency T-8 type with energy saving ballasts. Light levels were measured in four classrooms of which three had levels below 50 -foot candle (fc). The light level measured in one classroom was approximately 35 fc, which is low for the type of activities being</p>	X	

Reference	Immediate	Long-term
<p>conducted. The hallway was marginal at 14 fc and would have a higher fc level if fixtures that are not operating were repaired. Replacement of light fixtures is recommended.</p> <p>If the heating/cooling system is replaced, lowering the ceilings in classrooms will be required. Installation of new lay-in type fixtures, providing acceptable light levels are recommended.</p>		
<p>3.6.4.4 Exterior Lighting</p>		
<p>IESNA recommends that a minimum of .6 fc with a uniformity ratio of 4:1 for exterior security in public areas which are not subject to high levels of crime. Illumination levels around most exterior areas around this school were not detectable with the light meter utilized (well below .6 fc) and the uniformity ratio was well above 4:1. Several light fixtures were not functioning. Fixtures of various types and sizes have been added through the years in an attempt to increase exterior light levels.</p> <p>The design of exterior lighting system is required to provide adequate lighting for this facility. Depending on how the school is used at night, it may be best to have motion -sensing control of exterior lights. Some form of instant start would be required is HID fixtures were utilized.</p> <p>Parking lot lighting was not adequate and is required.</p>	X	
<p><b>3.7 Vertical Transportation</b></p>		
<p>Vertical transportation is not required in this facility.</p>		
<p><b>3.8 Life Safety and Fire Protection</b></p>		
<p>3.8.1 Sprinklers and Standpipes</p>		
<p>Sprinklers have been installed above and below the stage in the multipurpose room and in most janitor closets as required. Sprinklers are not installed in some janitor's closets and are required. The standpipe is not on a separate water service but is tapped off the domestic water service inside the mechanical room. There is no backflow preventer on the fire riser, which is an unsafe situation because bacteria can grow in fire sprinkler lines.</p>	X	



Reference	Immediate	Long-term
available system when the hood is replaced. It could not be determined if proper fire protection is provided around the exhaust duct. Replacement of the kitchen hood, including fire rate duct protection and fire suppression system is required.		
3.8.3 Intercom Systems		
The intercom system is in satisfactorily condition. No remediation recommended.		
3.8.4 Educational Television		
The educational television system is in satisfactory condition. No remediation recommended.		
3.8.5 Security Systems		
A Monitor Dynamics, Inc. model RTU-200A Safe Net system is used for security. This system appears to work properly and is tied into the base security. No remediation recommended.		
3.8.6 Computer Network		
<p>Quantico schools are interconnected with multi-mode fiber optic cable. This Campus Area Network (CAN) allows schools and the District Office communicate digitally. The multi-mode cable extends to the main server room where rack mounted fiber optic switches (hubs) distribute signals throughout the facility on a Local Area Network (LAN). Computers within approximately 300 feet of the main server room are each connected with individual CAT-5 cables. For longer runs, single mode fiber optic cable is extended to another HUB located remote from the server room. This HUB connects CAT-5 cables to individual computers in the remote area.</p> <p>A minimum of 5 CAT-5 cable drops to connect 5 computers to the LAN per classroom is desired. The number of drops in each classroom at this school varies but is limited. Increasing the size of the LAN at this school is not within the survey scope; it will likely be required eventually if the school is to remain. No remediation recommended.</p>		

Reference	Immediate	Long-term
3.8.7 Corridor and Separation Walls		
Exit corridor and separation walls require fireproofing sealing between wall and bottom of roofing system and around all wall penetrations.	X	
3.8.8 Doors		
Exit corridor doors require closing devices, panic devices (if required), smoke proof sealing systems and reduced glazed area with wired glass.	X	
3.8.9 Classroom Emergency Exiting		
Classroom emergency exiting is provided by either new doorways installed in existing exterior walls or by operable window units clearly marked as "Emergency Exit". No remediation recommended.		
3.8.10 Emergency Egress Lighting		
Emergency light fixtures are located throughout hallways except for the entry, which requires a unit. No emergency lighting is provided for the kitchen and is required.		
3.8.11 Asbestos Abatement		
According to the AHERA Report, remaining asbestos -containing material (ACM) is non-friable and is primarily vinyl floor tile and mastic. Some of these areas are covered with carpet. Long-term replacement of this material is required.		X

## 4.0 Opinions of Probable Costs to Remedy Physical Deficiencies (Russell Elementary)

### 4.1 General

Opinions of probable cost are provided to address physical deficiencies in the facility. Physical deficiencies are divided into three categories: Immediate Remediation, Intermediate Remediation, and Long-term Remediation items as requested in the scope of work. The costs shown are based on visual observations from the walk-through survey. Quantities used in performing the estimate are approximate; no measurements were taken on site. Unit costs are parametric based on gross square footage and major building systems and components.

### 4.2 Parametric Costs

Exhibit 7.4 contains the parametric opinions of probable costs. Each major physical deficiency is listed with the report section number. The unit prices shown were derived from RS Means Building Construction Costs Data, 60<sup>th</sup> Edition, 2002 and from prior experience at the Military Base. Immediate, Intermediate, and Long-term Remediation Costs are based on Fiscal Year 2004 (FY04) values. Each item is marked up for general contractor overhead and profit and escalated for two years at 2.87% per year. It is assumed that these costs will be escalated beyond 2004 by the user. Each cost is adjusted by a location adjustment factor based on the average nationwide statistical labor costs as established by the office of the Under Secretary of Defense, June 3, 2002. An estimate contingency is applied to all costs to cover costs for unforeseen conditions and unknown quantities. The contingency amount is contingent upon the level of scope and detail. Typically, budgetary opinions of probable costs provided at a “pre-concept” phase include a 15% contingency. Opinions of probable costs for “construction document” phase projects include 5 - 10% contingencies. A 15% contingency for the opinions of costs, based on the US Army Technical Manual TM 5-800-4 - Programming Cost Estimates for Military Construction, is included in this report due to the broad nature of the survey.

### 4.3 Overall Cost Summary

The total cost summary for remediation of physical deficiencies follows in this section. The summary indicates the distribution of Immediate Remediation costs for the three primary standards used for evaluation: life safety, ADA, and ASHRAE thermal and ventilation guidelines. Intermediate remediation items fall into categories of Title IX, force protection, play surfacing, and additional sitework for safe traffic flow. Long-term Remediation costs are indicated for additional ADA work and deferred maintenance items. Deferred maintenance is work that cannot be performed by routine maintenance and requires capital improvements. Examples of deferred maintenance include new roofing and asbestos abatement of non-friable materials.

#### 4.4 Detailed Cost Summary

A detailed cost summary is included at the end of this section for Immediate Remediation work for completion within 1 year ; and Long-term Remediation items recommended for completion within 1-10 years. Detailed distributions are not given for intermediate costs as they apply to individual line items, in general. Intermediate costs are a lower priority item than immediate costs. Cost distributions for each building system are indicated in tabular form for all major remediation items.

#### 4.5 Discussion of Results

Section 3.0 of the report lists the physical deficiencies and associated opinions of probable costs of remediation for each building system. Total costs for Immediate and Long-term Remediation items and are as follows:

Immediate	\$ 2,482,000
Long-term	<u>\$ 997,000</u>
Total Remediation Costs	\$ 3,479,000

A calculation of Plant Replacement Value (PRV) was also performed for this facility. Plant replacement value represents the cost of a new building and associated sitework for FY04 pricing. The PRV for this school is approximately \$5,342,000. This cost was determined based on the following square foot cost escalated from TM 5 -800-4:

\$140.38/sf

These costs were then multiplied by the building square footage and applicable cost escalation and contingency factors. PRV is often used as a comparison to renovation and repair costs for economic feasibility studies.

Before a comparison of remediation costs and Plant Replacement Value (PRV) can be performed, it is important to consider the age of the building. According to the Department of Defense's "Facilities Recapitalization Front End Assessment, August 2002," the government's goal is a 67 year recapitalization rate. Sixty-seven years is the expected service life for a building in the DOD inventory and we have carried that assumption to this analysis. For the purpose of our study, we are utilizing relative useful life of a building, defined as the 67 year expected service life minus the age of the building. In facilities with additions, we have compiled a composite facility age using the areas and ages of each component making up the whole facility.

The above DOD reference calculates recapitalization rate as the plant replacement value divided by the planned annual sustainment costs to determine the number of years of expected life. A number greater than 67 is considered good because it exceeds the government goal. Sustainment in this model is the cost of annual maintenance and improvements. Because our study is based on a large, one-time investment and not

annual maintenance dollars, it does not transfer directly to our study. However, the logic of the method is easily transformed into a Modified Recapitalization Metric (MRM).

For the purpose of this study, the modified recapitalization metric (MRM) is computed considering the following factors:

- Expected Service Life (ESL): 67 years per DOD
- Relative Useful Life (RUL): Expected service life minus the age of the building. Because Russell Elementary is a combination of additions and the original building, a composite relative useful life has been used.
- Target Sustainment: The annual investment required to keep the building in good working order to achieve an ESL of 67 years. It is calculated by dividing the plant replacement value by the ESL.
- Plant Replacement Value (PRV): The cost to replace the school building, sitework, furniture and associated assets. It is presented in FY 2004 dollars for this study.
- Remediation Costs: These are the total construction costs associated with correcting deficiencies noted in this study.
- Required Investment: The level of investment required to correct the current deficiencies spread out over the remaining useful life. It is calculated by dividing remediation costs by the RUL.

The MRM is the ratio of required investment to target sustainment (investment). A ratio less than one indicates it may be more cost effective to renovate a facility rather than replacing it. Conversely, an MRM greater than one indicates replacement may be the better option because the government could spend less sustaining a new facility rather than investing in an older, less modern facility.

The following table summarizes the MRM calculation for Russell Elementary School.

ESL (yrs)	AGE (yrs)	RUL (yrs)	PRV (\$)	TARGET SUSTAIN (Annual \$)	REMED. COSTS (\$)	REQ'D INVEST. (Annual \$)	MRM	RECOMMEND
67	*48.3	*18.8	5,342,000	79,700	3,479,000	185,100	2.32	Replace

\*Represents Composite Number.

The MRM ratio for Russell Elementary School exceeds 1 and replacement has been recommended. Almost all of the school was constructed before 1960. The school needs major renovation to comply with current ADA recommendations and life safety issues. In addition, several major building systems appear to be near failure and will need replacement or repair in the next ten years, particularly the mechanical, plumbing, and electrical systems. The current mechanical system utilizes fan coil units or unit heaters. Air conditioning is provided by residential style window units. This equipment is old and in poor condition overall. A large amount of underfloor heating water piping is expected to need replacement within ten years. Sewer piping and plumbing fixtures are also a concern. Maintenance was unplugging a sewer line at the time of our visit. Many fixture connections in the bathrooms were rusted and brittle. The electrical system is also in poor condition overall. The main switchboard is old and is undersized for the needs of a modern classroom. The branch panels are adequate. The lighting levels in the classroom are low. This school has problems with the exterior masonry and the foundations supporting it. Its roof also holds water in several places and will need replacement in the next ten years. We recommend replacement of this school within the next ten years because a new facility would be more cost effective to operate if fully sustained.

When replacement is recommended, a plant replacement value is useful for determining the cost of a new school. Using the Army Technical Manual resources, we have calculated a per square foot cost of plant replacement value for a middle school at Quantico Marine Base to be approximately \$138.34. Moveable furniture has been added to the PRV cost in this model as directed by DoDEA.

DoDEA has directed that the size building used for replacement costs should be adjusted to reflect the number of students attending school in the building plus 15% for possible enrollment shifts. Total student capacity at Russell Elementary School is 313. Total students enrolled is approximately 235. Considering the fifteen percent additional student potential with the 235 current students, a replacement school should be provided to serve 270 students. An approximate size school for this number of students is assumed at 38,000 square feet for the purpose of this study. Given a size of 38,000 square feet, the cost of replacement would be approximately \$5,257,000 plus the costs of kitchen equipment. For a school of this size, kitchen equipment would likely range from \$250,000 to \$300,000. Therefore, a total budgetary construction cost for the school would be approximately \$5,557,000, excluding design fees and SIOH. The adequacy of the current building square footage has not been evaluated. The State of Virginia may require larger classrooms and core spaces depending on the program needs. These considerations are important to consider, but are beyond the scope of this study. This replacement cost does not match the PRV from the previous page because the cost of kitchen equipment and moveable furnishings has been added.

Refer Appendix for Total Cost Summary

Refer Appendix for Immediate Remediation Item Detail Table

Refer Appendix for Long-Term Remediation Item Detail Table



**Photo 1 – Ashurst Exterior**



**Photo 2 – Damaged Paving and Walkways**



**Photo 3 – Exterior Elevation**



**Photo 4 – Play Area**



**Photo 5 – Exterior Showing Classroom  
Emergency Exiting**



**Photo 6 – Damaged Stucco Wall**



**Photo 7 – Fire Rated Wall Requiring  
Sealing Between Top of Wall and Roof  
Deck**



**Photo 8 – Damaged Deck due to Moisture  
Intrusion**



**Photo 9 – Classroom with Deteriorating Pendant Light Fixtures**



**Photo 10 – Kitchen Hood in NFPA Noncompliance**



**Photo 11 – Drinking Fountain in ADA Noncompliance**



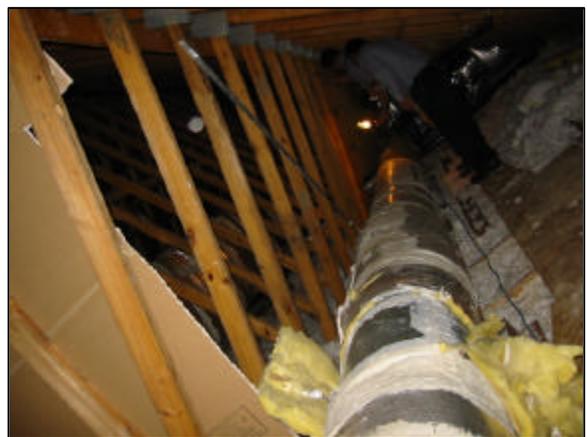
**Photo 1 – Exterior Main Entrance**



**Photo 2 – Damaged Soffit**



**Photo 3 – Damaged Roof**



**Photo 4 – Damaged Attic Fire Separation Wall**



**Photo 5 – Curb Cut in ADA Noncompliance**



**Photo 6 – Exit in ADA Noncompliance**



**Photo 7 – Exit in ADA Noncompliance**



**Photo 8 – Typical Play Area**



**Photo 9 – Toilet Fixtures in ADA Noncompliance**



**Photo 10 – Toilet Fixtures in ADA Noncompliance**



**Photo 11 – Drinking Fountains in ADA Noncompliance**



**Photo 12 – Kitchen Hood in Noncompliance**



**Photo 1 – Exterior Main Entrance**



**Photo 2 – Deteriorating Parking Paving**



**Photo 3 – Damaged Roadway Paving and Play Fields**



**Photo 4 – Damaged Walkway and Paving**



**Photo 5 – Loading Area with Deteriorating Paving and Unsafe Overhead Power Service**



**Photo 6 – Auxiliary Exit Requiring ADA Accessibility Compliance**



**Photo 7 – Roof Drainage Problems**



**Photo 8 – Football Locker Room**



**Photo 9 – Drinking Fountain in ADA Noncompliance**



**Photo 10 – Stairway to Play Fields in ADA Noncompliance**



**Photo 11 – Damaged Tennis Courts**



**Photo 12 – Kitchen Hood in Code Noncompliance**



**Photo 1 – Courtyard Drainage Problems**



**Photo 2 – Courtyard Exit with Deteriorated Concrete Porch**



**Photo 3 – Play Area Drainage Problems**



**Photo 4 – Deteriorated Courtyard Windows**



**Photo 5 – Damaged Masonry due to Foundation Settlement**



**Photo 6 – Damaged Downspout/Moisture Problem**



**Photo 7 – Stairway to Main Entrance Walkway in ADA Noncompliance**



**Photo 8 – Drinking Fountain in ADA Noncompliance**



**Photo 9 – Toilet in ADA Noncompliance**



**Photo 10 – Kitchen Hood, NFPA Noncompliance**



**Photo 11 – Exterior Window Air Conditioning Units, ASHRAE Noncompliance. Window Sealant is ACM.**