

MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION
SUMMARY REPORT
UNITED STATES VIRGIN ISLANDS
October 2015

Prepared by:
InSynergy Engineering, Inc.

I. BACKGROUND AND SUMMARY OF PREVIOUS PHASE II ASSESSEMENT

The initial physical assessment of all of the USVI schools was conducted in 2013 under Phase II of our OIA contract. Based on these surveys, physical condition assessment ratings were developed for the various MEP elements for each of the VIDE schools. Deficiencies identified during the Phase II assessments are summarized by school in the following table:

School	HVAC – Outside Air Provision	HVAC - Maintenance	HVAC - Equipment	Plumbing System/ Fixtures	Water Tank & Booster Pump	Electrical System	Electrical Hazard	Interior Lighting	Exterior Lighting	Telecommunications/Data	Fire Sprinkler system	Fire Pump System	Fire Alarm	Public Announcement (PA) System & Bell System	Total
Addelita Cancryn JH	X	X	X	X		X		X					X		7
Alexander Henderson ES	X	X	X	X	X	X	X	X			X		X		10
Alfredo Andrews ES	X	X	X	X	X	X	X	X			X		X		10
Arthur Richards JHS	X	X	X	X			X	X			X		X		8
Bertha C. Boschulte JH		X				X		X					X	X	5
Charles H. Emanuel ES	X	X						X			X		X		5
Charlotte Amalie HS	X	X	X	X		X	X	X					X		8
Claude O. Markoe ES	X	X				X	X	X			X		X		7
E. Benjamin Oliver ES	X	X	X	X				X					X		6
Edith L. Williams ES	X	X	X	X		X	X	X					X		8
Educational Complex HS	X	X	X		X	X	X	X			X	X	X		10
Elena Christian JHS		X				X	X	X					X	X	6
Eulalie Rivera ES	X	X	X	X				X			X		X		7
Evelyn M. Williams ES	X	X	X	X				X			X		X		7
Gladys A. Abraham ES	X	X	X	X		X		X					X		7
Guy H. Benjamin ES	X	X	X	X		X		X					X	X	8
Ivanna Eudora Kean HS	X	X	X	X		X		X	X				X	X	9
Jane E. Tuitt ES	X	X	X	X		X		X					X		7
John H. Woodson JHS	X	X	X					X			X		X		6
Joseph Gomez ES	X	X	X	X		X	X	X	X				X		9
Joseph Sibilly ES	X	X	X	X		X	X	X					X		8
Juanita Gardine ES		X				X	X	X					X	X	6
Julius E. Sprauve ES	X	X	X	X		X		X					X		7
Leonard Dober ES	X	X	X	X		X	X	X					X		8
Lew Muckle ES	X	X				X	X	X					X	X	7
Lockhart ES	X	X	X	X		X		X					X	X	8
Pearl B. Larsen ES		X				X	X	X					X	X	6
Positive Connections ALT	X				X	X	X	X		X			X	X	8
Ricardo Richards ES	X					X	X	X					X	X	6
St. Croix Central HS	X	X				X	X	X					X	X	7
Ulla F. Muller ES	X	X	X	X		X	X	X							7
Yvonne E. Milliner-Bowsky ES		X				X	X	X					X	X	6
Total	27	30	21	19	4	26	19	32	2	1	9	1	31	12	234

LEGEND =

X	has deficiency
O	satisfactory
N/A	not available

The phase II assessment also identified the high priority Health and Safety items which pose an immediate hazard to the health and safety of the building occupants which are summarized in the table below (as shown in the [Energy Audit](#), available at the project website):

System	Electrical										Plumbing & Sanitation								Mechanical				Fire Protection						
Hazard	Shock	Shock	Shock, Fire	Health	Shock	Shock	Fire	Falling	Shock, Fire	Evacuation	Injury	Injury	Fire	Sanitation	Sanitation	Health	Sanitation	Sanitation	Health	Fire	Health	Indoor air Quality	Indoor air Quality	Life safety	Life Safety	Fire	Fire Safety	Life safety	
Causes	Pad mounted switchgear is unsafe	No GFCI for receptacle at outdoor, wet areas, drinking fountain	Un-covered panel cover, exposed conductor	Overhead outdoor lamps without cover	Exposed uninsulated conductors	Un-grounded enclosure	Undersized & No over-current protection conductors	Un-covered & Un-secured manhole	Deteriorated & corroded enclosure	Lack emergency illumination	Inadequate support to piping and plumbing equipment	Un-piped relief valve at hot water heater, or wrong termination	Inadequate ventilation to LPG hot water heater	Crisen need service & repair	broken sewage line	No hand wash nearby Cafeteria	Inadequate/inoperable restroom fixtures and drains, leaking pipes	Inoperable septic system	Mildew due to condensate leak	Hot generator exhaust Gas too close the electrical cable	Poor Toilet ventilation	Inadequate outside air	Inoperable airconditioning system	Fire sprinkler system lack of services & maintenance	No fire suppression system at cooking hood	No ventilator for fuel storage	Deficient Fire alarm system	No Fire alarm and detection	
School																													Total
Addelita Cancryn JH																		X											X
Alexander Henderson ES		X	X									X									X	X			X		X		
Alfredo Andrews ES			X									X		X							X	X			X		X		
Arthur Richards JHS		X	X																			X			X		X		
Bertha C. Boschulte JH		X																				X					X		
Charles H. Emanuel ES		X													X												X		
Charlotte Amalie HS			X																						X		X		
Claude O. Markoe ES											X	X	X								X	X					X		
E. Benjamin Oliver ES			X																	X	X						X		
Edith L. Williams ES			X															X										X	
Educational Complex HS	X	X										X		X											X		X		
Elena Christian JHS			X						X												X	X					X		
Eulalie Rivera ES											X	X									X						X		
Evelyn M. Williams ES																													
Gladys A. Abraham ES																												X	
Guy H. Benjamin ES																												X	
Ivanna Eudora Kean HS																	X											X	
Jane E. Tuitt ES																												X	
John H. Woodson JHS												X													X		X		
Joseph Gomez ES			X															X									X		
Joseph Sibilly ES			X															X										X	
Juanita Gardine ES									X												X	X						X	
Julius E. Sprauve ES																												X	
Leonard Dober ES											X																	X	
Lew Muckle ES		X							X												X	X					X		
Lockhart ES																													
Pearl B. Larsen ES			X						X				X								X	X					X		
Positive Connections ALT									X			X									X	X						X	
Ricardo Richards ES			X									X		X				X											
St. Croix Central HS			X																								X		
Ulla F. Muller ES			X																								X		
Yvonne E. Milliner-Bowsky ES			X										X														X		
Total	1	6	14	0	0	0	0	0	5	0	3	8	1	5	1	0	7	1		1	9	8	0	1	7	1	16	14	93

II. PHASE III SCOPE OF WORK AND FOLLOW-UP MEETINGS AND SCHOOL VISITS

The Phase III scope included refining and confirming the high priority mechanical, electrical, and plumbing (MEP) concerns from the Phase II assessments, coordinating these MEP priorities with needs from other disciplines at a building level and developing conceptual multidisciplinary projects that would allow some of the repair or replacement work to be grouped for more efficient implementation.

As part of Phase III, additional field survey work was conducted from March 9 – 13, 2015. The purpose of the Phase III territory visits was to:

- Get input from VIDE and other stakeholders, including the VIEO, WAPA, and the Fire Marshall
- Confirm and review deferred maintenance (DM) work completed since the Phase II visits
- Discuss and review issues of particular concern to VIDE
- Update condition assessments of elements of concern
- Evaluate any new Health/Safety (H/S) issues
- Gather information on issues/elements of concern to develop project recommendations
- Review and update the energy audit

Based on concerns developed during our Phase II survey, as well as additional concerns expressed by the VIDE and stakeholders to the project team prior to the Phase III visit, the following schools were re-visited during the March 2015 visit:

St. Thomas

- Charlotte Amalie High School
- Joseph Gomez Elementary School
- Bertha C. Boschulte Middle School
- Addelita Cancryn Junior High School
- E. Benjamin Oliver Elementary School
- Lockhart Elementary School

St. Croix

- Elena Christian Junior High School
- John Woodson Junior High School
- St. Croix Educational Complex
- Evelyn Williams Elementary School
- Alexander Henderson ES

St. John

- Julius E. Sprauve School

III. OBSERVATIONS AND ADDITIONAL INFORMATION FROM PHASE III VISIT

The majority of the MEP DM work items identified in Phase II have not been completed, including most of the high priority MEP H/S items.

The primary concern raised during the survey work was that all of the fire alarm systems at the schools were inoperable due to numerous trouble and silenced fire alarm signals. The inoperable fire alarm systems and devices that were previously noted in Phase II have not been restored to full functionality due to the unavailability of parts for the older systems that were installed in 2003, and due to lack of service maintenance support from qualified fire alarm service providers. Based on these findings, and additional concerns raised by the fire department on this issue, the repair and replacement of the fire alarm systems has been elevated to a high priority MEP H/S item.

Additional concerns were also raised on the requirement to upgrade the electrical service to some of the schools due to low overhead lines, and to the lack of adequate fire separation for some of the electrical vaults. Some of these upgrades have been completed, while other service upgrades still need to be accomplished. The electrical service upgrade work in our MEP physical condition rating assessment has been updated accordingly.

Emergency power generators at the FEMA designated emergency shelters were provided by FEMA. These generators should be regularly maintained and serviced.

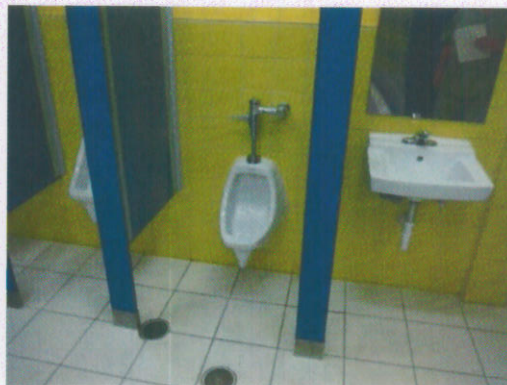
Additional Energy Conservation Measure (ECM) improvements were also completed as noted in the section covering the Energy Audit Assessment Update.

Following is a summary of the schools visited and the issues noted at each school.

A. Charlotte Amalie High School

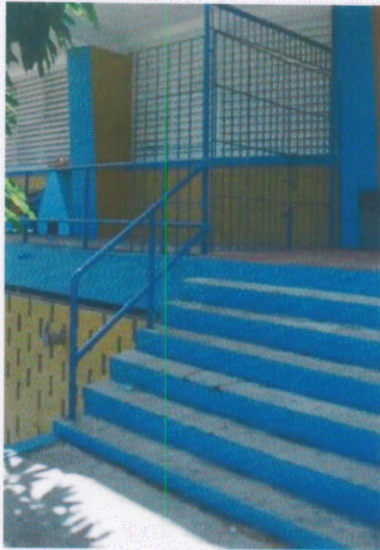
1. Building 14

Locker / restrooms were renovated. All plumbing fixtures, ventilation and lighting systems were satisfactory.



2. Building 05

FEMA emergency power generator engine exhausts were discharged adjacent to stair and walkway which posed health hazard to public. Fuel tank was not vented to outside the generator room. It was a fire safety due the accumulation of fuel vapor at the generator room.



3. Fire alarm system

OIA Phase II survey found the fire alarm system was inoperable and incomplete. The fire alarm system remained inoperable and incomplete throughout the campus in OIA Phase III survey. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus and be upgradable for future voice communication.



4. Electrical System

Transformers are inside a room at the lower level of the cafeteria building. An enclosed corridor has been added to the front of the transformer room. The electrical room is adjacent to the transformer room with unsealed openings.



B. Joseph Gomez Elementary School

1. Fire alarm system

OIA Phase II survey found no fire alarm system in the campus. Yet fire alarm system was installed in OIA Phase III survey. It was a safety hazard to the occupants. New fire alarm system should be provided throughout the campus and be upgradable for future voice communication.

2. Electrical system

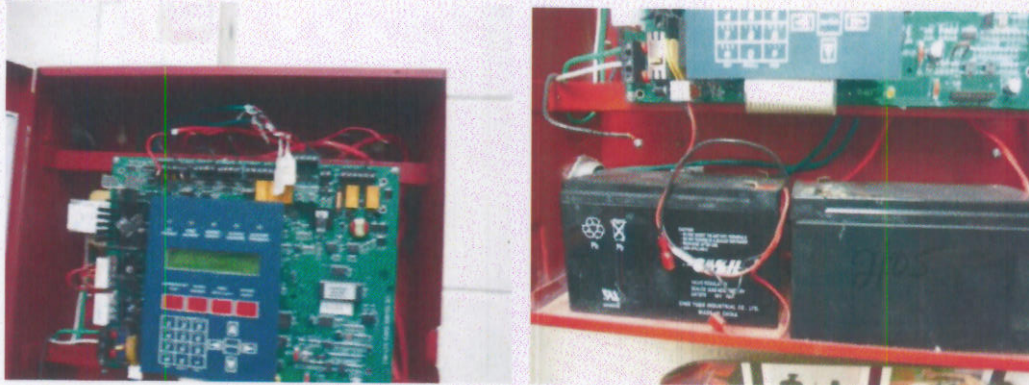
Two electrical services with pole mounted transformers and low lying weather heads. WAPA recommended to have these services relocated to provide ground pad mounted services.



C. Bertha C. Boschulte Middle School

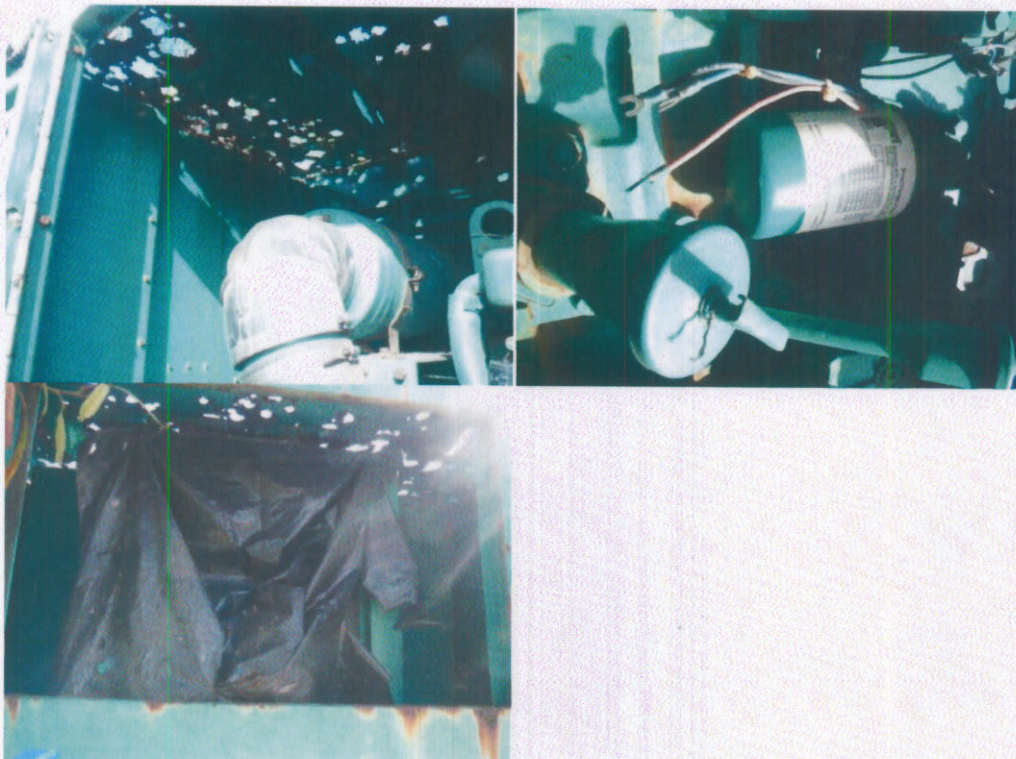
1. Fire alarm system

OIA Phase II survey found the fire alarm system was inoperable. During the OIA Phase III survey, the fire alarm panel power was off and batteries at the fire alarm panel were disconnected, posing a safety hazard to the occupants. The fire alarm system should be serviced and repaired to provide fire detection and notification throughout the campus and be upgradable for future voice communication.



2. Electrical system

250kW standby generator housing (not FEMA generator) is badly corroded. Sensor wires are removed. Control panel covered by plastic. Generator needs repair and service or replacement.



D. Addelita Cancryn Junior High School

1. 08 – Administration and Library

Roof leaks and damage to the air conditioning ducting insulation caused condensation, moisture and mildew issues at the library. These issues posed health hazards to the occupants.



2. Fire alarm system

OIA Phase II survey found the campus did not have fire alarm system. Yet fire alarm system was installed in OIA Phase III survey. It was a safety hazard to occupants. New fire alarm system should be provided throughout the campus and be upgradable for future voice communication.

3. Electrical system

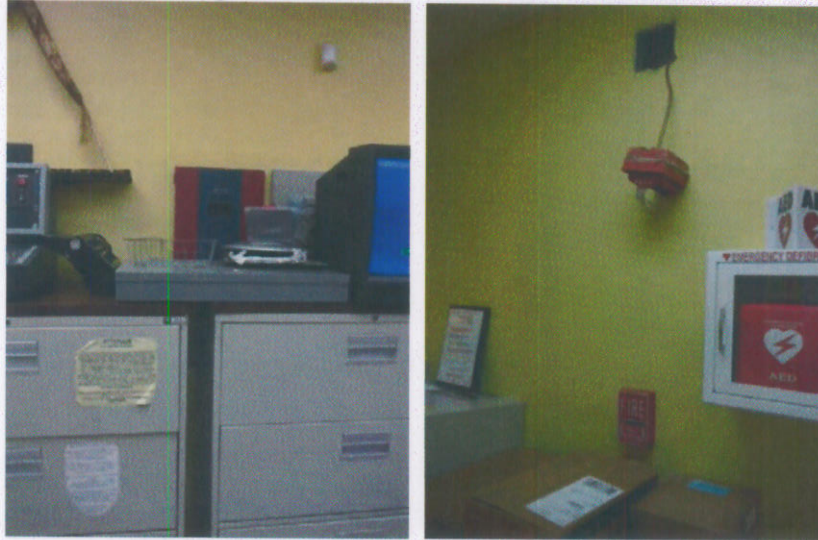
Main distribution panels are located at the main building (08 – Admin) basement. The electrical room in this building has an opening on perimeter wall causing flooding during heavy rain. Electrical panels have corroded covers and are vulnerable to flood damage. Main distribution panels and other electrical equipment are recommended to be relocated out of the basement.



E. E. Benjamin Oliver Elementary School

1. Fire alarm system

OIA Phase II survey found the fire alarm system required service and repair. During OIA Phase III, the fire alarm panel power was off. Fire alarm devices were not attached on the boxes. Both fire panel and manual pull station were obstructed. These are safety hazards. The fire alarm system should be serviced and repaired to provide fire detection and notification throughout the campus and be upgradable for future voice communication.

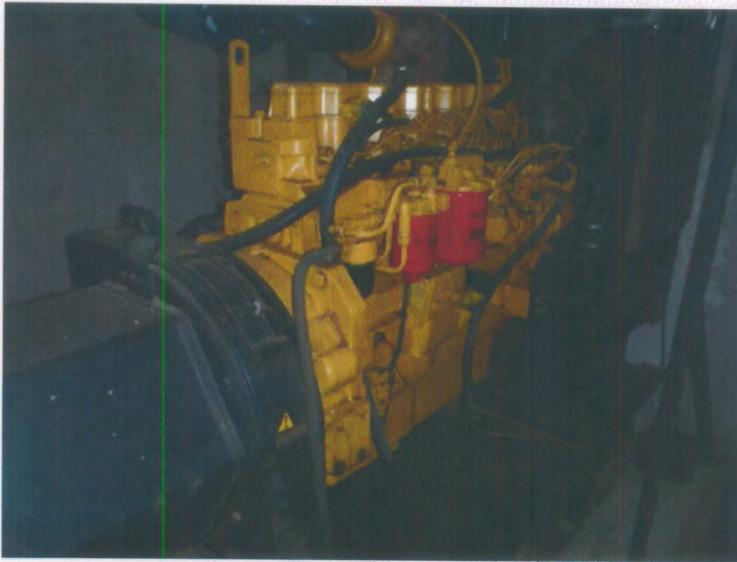


2. Electrical system

Transformers are located inside a room which has openings in the wall directly adjacent to the main electrical room. Main distribution panel has burn marks.

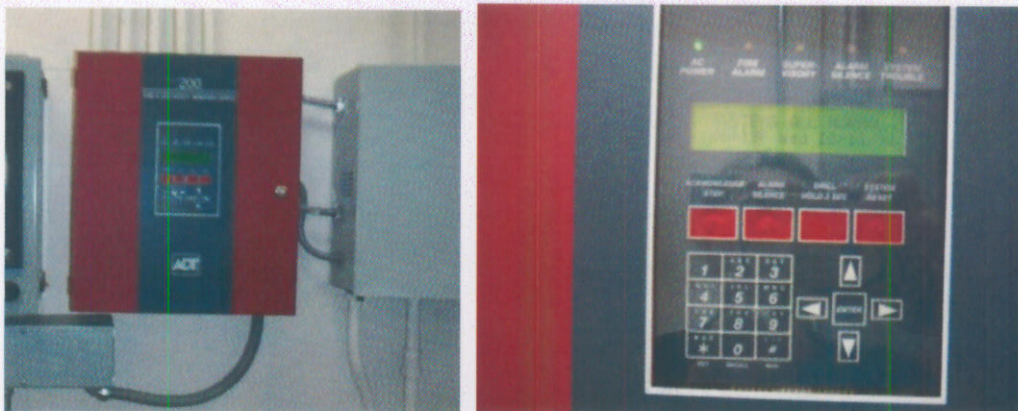


Standby generator (not FEMA generator) is located indoors in a room adjacent to the kitchen. Generator is in fair condition.



F. Lockhart Elementary School
1. Fire alarm system

OIA Phase II survey found the fire alarm devices were inadequate. Since the Phase II assessments, the fire alarm was upgraded and now is in good operable condition.. The time and date of the fire alarm panel was inaccurate and should be corrected and be upgradable for future voice communication.



2. Electrical system

Standby Generator (not FEMA generator) is in fair condition, but battery is missing

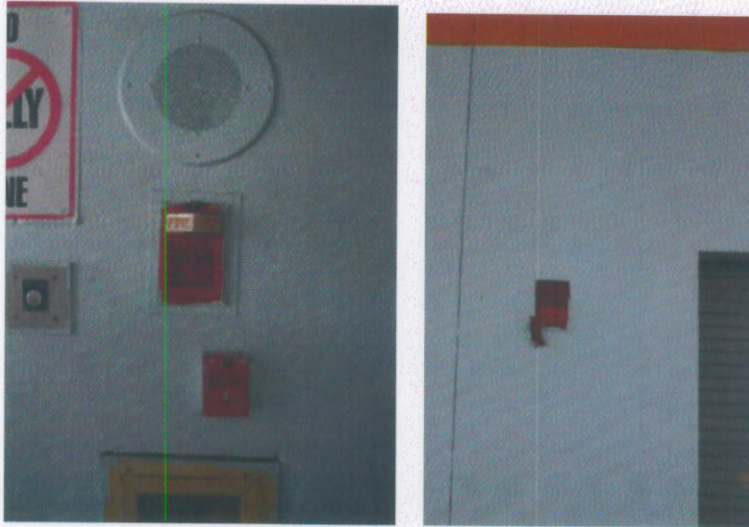


G. Elena Christian Junior High School

1. Fire alarm system

OIA Phase II survey found the fire alarm system was inoperable. The fire alarm was still inoperable at the start of Phase III. Fire alarm panel was silenced and had numerous trouble and alarm signals. Defected manual pull stations and fire alarm devices need to be repaired or replaced. These pose safety hazards to occupants. Fire alarm system should be serviced and repaired and be upgradable for future voice communication.





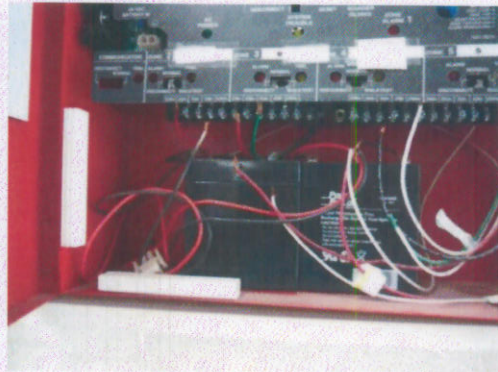
2. Low flow plumbing fixtures

Low flow fixtures were installed in portion of the school. At Building 01, push button faucets with aerators and 1.28 gallon per flush (gpf) water closets were installed. However, urinals were 1.0 gpf.



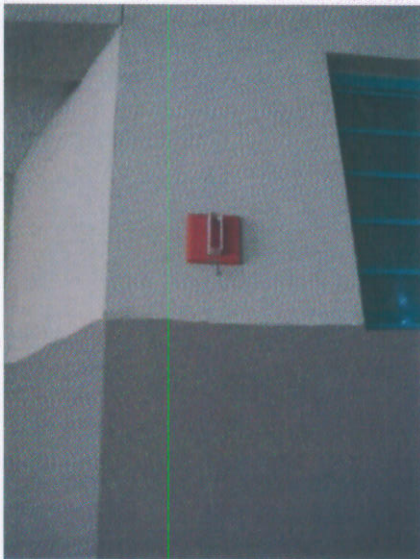
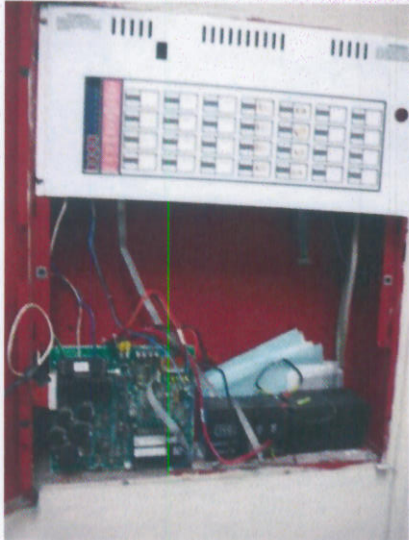
H. John Woodson Junior High School
1. Fire alarm system

OIA Phase II found the fire alarm system was inoperable. At the start of Phase III, the fire alarm system remained inoperable. Fire alarm panel power was off, wires were removed from the fire alarm panel terminals, and batteries were disconnected. Defected manual pull stations were not repaired or replaced. These are safety hazards to the occupants. Fire alarm system should be serviced and repaired and be upgradable for future voice communication.



I. St. Croix Education Complex
1. Fire alarm system

OIA Phase II found the fire alarm systems were inoperable. At the start of Phase III, fire alarm systems were still inoperable. Power to the fire alarm panels were off, batteries were disconnected, and defected fire alarm devices were not repaired. These are safety hazards to the occupants. The fire alarm system should be serviced and repaired and be upgradable for future voice communication.



2. Fire pump, fire sprinkler and standpipe system

OIA Phase II found the fire pump, fire sprinkler and standpipe systems required service and repair. At the start of Phase III, no service and repair work had been completed for fire sprinkler and standpipe systems. These pose safety hazards to the occupants. Fire pump, fire sprinkler and standpipe systems should be serviced and repaired.



3. Electrical system

Main distribution equipment located outdoors in outdoor enclosures are in satisfactory condition. However, equipment enclosures were not locked exposing live electrical parts if opened.



J. Evelyn Williams Elementary School

1. Fire alarm system

OIA Phase II found the fire alarm system was inoperable. At the start of Phase III, fire alarm system remained inoperable. Fire alarm panel had numerous trouble and alarm signals. Defected manual pull stations were not repaired or replaced. These pose safety hazards to the occupants. Fire alarm system should be serviced and repaired and be upgradable for future voice communication.



2. Building 01

At the time of the initial Phase III site visit, the encased down spout was leaking and needed repair.



3. Air conditioners' condensate drain

Air conditioners' condensate drains discharged or dripped to the walkway. These are creating slipping hazards as well as damaging the walkway surface. Condensate drain should be piped and discharged to proper location, such as waste line or dry well.



4. Electrical system

WAPA transformer installed in poor location and should be relocated for better access and safety.



K. Alexander Henderson Elementary School

1. Kitchen

OIA Phase II found that the kitchen hood lacks a fire suppression system. At the start of Phase III, kitchen was being upgraded with new appliances under VIEO's Energy Saving Performance Contract (ESPC). Kitchen hood fire suppression system was not included in the ESPC scope. Lack of fire suppression to the kitchen hood is a fire safety hazard. We recommend including the kitchen hood fire suppression system in the upcoming ESPC.



2. Electrical system

New WAPA pad mounted transformer installed above roadway and old transformer removed within fenced area.



L. Julius Sprauve Elementary School

1. Fire alarm system

OIA Phase II survey found no fire alarm system at the campus. A fire alarm system was installed prior to the initial Phase III survey, alleviating the safety hazard to the occupants. It is recommended that new fire alarms be upgradable for future voice communication.

2. Electrical system

A 100kW FEMA generator is located at main campus. A 72kW FEMA generator is located at the annex building. Both generators are in fair condition but the 72kW generator doesn't start and requires servicing.



IV. ADJUSTMENTS TO PRIORITIZATION

While none of the MEP H/S issues noted in Phase II were known to have been repaired, the site visits at the start of Phase III identified additional MEP H/S issues. The facility database was updated accordingly so that these issues would be addressed in the DM Reduction Program work plan. Database updates include:

1. DM cost estimates for the electrical service upgrades for transformer relocation work at C. Amalie, J. Gomez, E.B. Oliver and E. Williams
2. DM cost estimate for the emergency shelter standby electrical power systems for C. Amalie.
3. Changed most of the fire alarm repair work from level 2 and 3 DM items to high priority H/S items

V. ENERGY AUDIT ASSESSMENT UPDATE FOR PHASE III

1. Recap and Update of Phase II Energy Audit Findings

The chart below (adapted from the chart shown on p. 20 of the Phase II report) provides an overview of the ECMs that were recommended for the USVI per the 2013 assessment and the revised analysis. At the time of the 2013 assessment, the total annual savings was estimated at \$4.4 M (2013 dollars) at a total investment cost of \$34.8 M for the Primary ECMs that were recommended.

Based on the follow-up survey, several ECM's were implemented, primarily for replacing T-12 with T-8 lighting and selective replacement of plumbing fixtures with low flow fixtures in the schools in the USVI. Our updated analysis, which has been revised to reflect the implementation of T-8 lighting retrofits, and selective replacement with low flow plumbing fixtures in USVI, is summarized in the table below:

Energy Audit ECM Recommendations	2013 Energy Audit Findings	2015 Revised Energy Audit Findings
ECMs - Electric		
New Solar Hot Water or Heat Recovery System		
Replace T12 Fixtures with T8 LED		Already completed
Replace T8 Fluorescent Lamps with T8 LED		
Programmable Thermostats for AC		
Roofmount 30-200 KW PV system		
Fix Supply Air Discharge Duct Leaks		
New Lighting Controls		
New VFDs/High Efficiency Booster Pump Motors		
New Heat Recovery/ Desuperheater System		
Insulate Non-insulated Roofs		
Replace AC Systems with High Efficiency Units		
Retrofit with Ultra Low Flow Plumbing Fixtures		
Total Investment (\$M) - Primary ECMs	\$34.8	\$35.0
Simple Payback (years) - Primary ECMs	8	8
Investment Capitalization (years) - Primary ECMs	8	8
Dollar Savings (millions per year) - Primary ECMs	\$4.4	\$4.2
Percent Reduction in Utility Costs - Primary ECMs	56%	54%
Total Investment (\$M) - All Feasible ECMs	\$53.7	\$53.4
Simple Payback (years) - All Feasible ECMs	10	11
Investment Capitalization (years) - All ECMs		11
Dollar Savings (millions per year) - All ECMs	\$5.2	\$5.0
Percent Reduction in Utility Costs - All ECMs		64%
ECM Recommended – Primary Recommendation		
ECM Recommended– Other, feasible if funding permits		
Not proposed		

The updated analysis, which includes the retrofit of the recently installed T-8 with LED linear lamps for an additional 30% improvement in energy efficiency for lighting, suggests that the implementation of the Primary ECM's will still be cost effective, with the total annual savings for all Primary ECM's totaling \$4.2 Million at a total investment cost of \$35.0 Million. The total annual savings with all additional feasible ECM's, including replacement of all of the air conditioning equipment with high efficiency units and the replacement of all remaining plumbing fixtures with low flow plumbing fixtures, would increase to \$5.0 Million at a total investment cost of \$53.4 Million. The implementation of these additional feasible ECM's would also have a significant positive impact on addressing the DM for the replacement and maintenance of these items.

VI. PROJECT RECOMMENDATIONS

Following are descriptions of Mechanical/ Plumbing/ Electrical Health and Safety Issues of prominent concern, as well as some other common repair issues, along with recommended repair solutions. These are provided to assist in scoping these types of projects.

1) HVAC Systems

a) Air conditioning equipment:

Most schools at UVSI use unitary air conditioning systems including ducted split and packaged air conditioners. When air conditioners are replaced, the following recommendations should be considered:

- EPA approved refrigerant, high efficiency system and corrosion protective coating air conditioning equipment should be used.
- Implement energy conservation programs such as temperature set back or turn off air conditioning based on school activity schedules. Programmable thermostats or centralized controls should be used.
- Placement of condensing units should consider maintenance accessibility, required operation clearance, acoustical impact to classrooms; minimize penetrations to building envelopes and hurricane protection.
- Remove old air conditioning equipment and seal all unused penetrations.

b) Indoor air quality:

Ventilation should conform to ASHRAE 62.1. Space comfort level should conform to ASHRAE 55.1. HVAC system deficiencies will cause poor indoor air quality, health hazards and damage to building elements and contents.

Location: A. Cancryn JH Building 08, Office & Library

Roof leaks damaged insulation of air ducts. Subsequently, condensation occurred on air ducts and aggravated ceiling damage and high indoor humidity issues.



Location: E. Christian JH Building 02, Classrooms & Library

Air conditioners were broken at Library. Library was closed due to high room temperature and humidity.



Recommendations:

- Repair air conditioning deficiencies in timely manner. Repair water leaks and condensation as soon as possible.
- Maintain inadequate outside air and space comfort levels to the occupied spaces per ASHARE standards.

c) Condensate drain:

Location: E. Williams ES.

Condensate drains discharged to sidewalks and overhung eaves. They caused slipping hazards and promote vegetation growth at the eaves, which impact roofing.



Recommendations:

- Provide proper sized and sloped condensate drain lines to collect and convey the condensate drain. Minimum 1" (25 mm) diameter pipe and 2% slope are preferred. Provide clean out not more than 180 degree change in direction and 50 ft apart.
- Condensate drain should discharge to dry well or indirect drain with P-trap to waste line.

2) Generator ventilation and exhaust

Standby power generator installation should have proper ventilation and exhaust in accordance with manufacturer requirements, Internal Mechanical Code (IMC) and International Fire Code (IFC).

Location: Charlotte Amalie HS Building 5, Auditorium

Normal vent and emergency vents of aboveground fuel tank were not piped to outside per IFC requirements. Generator engine exhausts terminated by the sidewalk did not comply with IMC and IFC, and posted safety and health hazard to occupants.



Location: Claude O. Markoe ES Building 2, Storage

Engine exhaust discharged underneath of the utilities cables. Hot engine exhaust fume could damage the cable insulation causing hazards.



Location: St. Croix Education Complex Building 4, Agriculture / Green House.
Radiator exhausts were not connected to exhaust louvers. Hot air could not leave the room and recirculate to radiator causing generator overheating and operation problem.



Recommendations:

- Require qualified engineer and technician to install and commission the standby generator system.
- Install and commission system in accordance with applicable codes and standards, and manufacturer requirement and recommendations.
- Consult with fire department for generator and fuel system installation requirements.

3) Hot water heaters

Installation of hot water heater should be in accordance with IMC and National Electrical Code (NEC). Hot water heater should be secured. Temperature and pressure relief should be piped to above floor. Hot water heater should not be installed inside the electrical room.

Location: A. Henderson Building 2, Cafetorium; A. Andrews Building 2, Cafetorium;

Recommendations:

- Install hot water heater in accordance with applicable codes and standards. Provide seismic restraints, relief valve piping and service clearance.
- Relocate hot water heater from electrical room equipment room, or provide separation between hot water heater and electrical equipment.



4) Pipe supports

Piping, and ducting and equipment should be proper to support and secure against gravity, vibration, thrust, expansion and seismic loads.

Location: Charles Emanuel ES Building 01, Library & Cafeteria.

Waste piping was separated due to snapped pipe stripe supports causing waste spilled inside the crawl space.



Recommendations:

- Use proper anchor, hanger and pipe support system, such as steel rod, ring hanger, clevis hanger, and trapeze hanger.
- Use corrosion resistant material and coating for pipes and supports at humid and corrosive environment.

5) Booster pumps and cisterns

Provide reliable water supply to schools for sanitation purposes.

Location: A. Henderson ES Building 01, Classroom

One booster pump was installed without spare pump. School water supply would be affected if booster pump broke.

Location: A. Andrews ES Building 01, Classroom

Sewage pipe runs inside the cistern. Cistern was abandoned due to sewage contamination.



Recommendations:

- Install spare pump as redundancy, or provide a spare pump on site.
- Coordinate with EPA and Health department to maintain water quality assurance program.

6) Kitchen hood fire suppression systems

UVSI schools have kitchens to cook meals at the campuses. Cooking hood should be installed and maintained in accordance with IMC and IFC, including ventilation system, fire suppression system and interlocks to associated systems such as fuel supply and fire alarm system. IFC requires automatic fire suppression system for Type I commercial cooking hood, which generates grease and smoke. Most of the Type I hoods had no automatic fire suppression systems.

Recommendations:

- Install automatic fire suppression systems to Type I cooking hoods in accordance with IMC, IFC, fire department requirements and applicable codes and standards. Systems should be designed, installed and commissioned by qualified engineer and technician.
- If possible, incorporate into the ESPC kitchen renovation projects to complete the project at the same time.

7) Fire sprinkler / standpipe / fire pump systems

Location: St. Croix Educational Complex

Wet based fire protection systems including fire sprinkler, standpipe and fire pump were not maintained and tested in accordance with NFPA standards. Fire hoses were missing at fire hose cabinets. Sprinkler risers were obstructed by combustible materials. Flow test header and fire pump were not maintained and tested. Fire protection systems are fire and life safety systems to protect the occupants and the properties. They should be maintained and serviced regularly to ensure their functions and performance. They should be repaired as soon as impairment is required.



Recommendations:

- Provide regular maintenance to the water based fire protection systems in accordance with NFPA 25.
- Conduct regular tests and fire drills; invite and coordinate fire department participation.
- Establish fire safety awareness program to promote fire safety awareness to the staff and occupants.

8) Fire Alarm Systems
Location: All schools

USVI Fire Department enforces International Fire Code 2012 (IFC). Fire alarm systems should have manual pull stations and emergency voice alarm communication systems (EVAC) throughout the campus, except the previously approved system. Only Lockhart ES fire alarm system was operational during the Phase III survey. Other schools have no fire alarm system, obsolete systems, or systems that are turned off due to unresolved trouble alarms. Fire alarm systems were not maintained and serviced. These are critical safety systems and should be maintained and serviced by qualified technician to ensure reliability and functionality.

Recommendations:

- Install and upgrade fire alarm system in accordance with IFC 2012 and fire department requirement.
- Provide regular maintenance to the fire alarm system in accordance with NFPA 72.
- Fire alarm works should be designed and installed by qualified engineer and technician. Systems should have local support for parts and technical support.
- Create a fire alarm technical team within VIDE to perform the trouble shooting, repair, maintenance and routine testing and certification.
- Conduct regular test and fire drill. Coordinate and invite fire department to participate fire test and fire drill.
- Establish fire safety awareness program to promote fire safety awareness to the staffs and occupants.

9) Electrical Systems
a) Transformer Location

Location: Charlotte Amalie High School and E. Benjamin Oliver Elementary School



Existing transformers are located in a room that is not rated for use as a transformer vault.

Recommendations:

- Install new pad mounted exterior transformer and remove existing transformers from interior room.
- Installation of new pad mounted transformer will require shutdown of electrical services
- Site of new pad mounted transformer will need to be coordinated with WAPA

- Installation requirements per WAPA Standards

Location: Evelyn Williams Elementary School

Existing exterior transformer is not installed in suitable location due to access and safety concerns.

Recommendations:

- Install new pad mounted exterior transformer and remove existing transformer
- Installation of new pad mounted transformer will require shutdown of electrical services
- Site of new pad mounted transformer will need to be coordinated with WAPA
- Installation requirements per WAPA Standards



b) Main Distribution Equipment

Location: Addelita Cancryn Junior High School

Main electrical distribution equipment located in basement of the administration building (Building 8) which is prone to flooding

Recommendations:

- Provide new electrical distribution equipment in new location above grade level and not in flood prone area. Possible location would be a new room adjacent to the existing structure.
- New equipment should be sized for existing power demand plus an additional twenty five percent
- Existing site conditions and building service locations will determine the route to reconnect electrical services.
- Remove electrical equipment from basement area.



c) Service Entrance

Location: Addelita Cancryn Junior High School

WAPA overhead service to electrical service equipment appears to be too low and routed through trees.

Recommendations:

- Convert service from overhead to underground distribution.



- Existing site conditions and coordination with WAPA will determine the route of the new service.
- Installation requirements per WAPA Standards
- New service equipment shall be sized for existing power demand plus an additional twenty five percent

d) Receptacles

Location: Various Schools

Additional or insufficient classroom receptacles.

Recommendation:

- Determine amount of additional receptacles required based on the number of classrooms.
- Upgrade electrical service equipment to accommodate the additional power demand of adding the receptacles plus an additional twenty five percent.
- Upsizing existing equipment will result in power outages for installation.
- Provide new branch circuiting for new receptacles. Routing will be determined by existing site conditions.
- Installation per current code requirements

e) Equipment

Location: Various Schools

Replace damaged or dilapidated electrical equipment.

Recommendations:

- Provide new electrical distribution equipment. If extended outages are acceptable, the existing equipment can be removed and the new equipment can be installed in the same location. If not, the equipment will need to be installed at a new location to minimize the outage time.
- All New equipment shall be sized for existing power demand plus an additional twenty five percent
- Existing site conditions and building service locations will determine the route to reconnect electrical services.
- Installation per current code requirements

PRINCIPAL	MR. FELIX DURANT
ENROLLMENT	285 STUDENTS
SCHOOL OPENED	UNKNOWN
SITE VISIT DATE	FEB., 2015
APPROX. SITE ACREAGE	1.6 ACRES



ZONE X

LEGEND:

GENERAL FLOW DIRECTION

ZONE X: AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN

EXISTING FLOODING

SITE IMP. LEGEND:

(A) ADD DIVERSION DITCH TO REDIRECT RUNOFF RAISE EXIST. RETAINING WALL AS NEEDED

(B) ADD DIVERSION DITCH WITH GRATED COVER AND HW'S, SLOPE TO DRAIN.

(C) ADD CUTOFF DITCH WITH GRATED COVER SLOPE TO DRAIN.

GENERAL ABBREVIATIONS:

BB: BASKETBALL

CMU: CONCRETE MASONRY UNIT

GPR: GROUND PENETRATING RADAR



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HHF PLANNERS
places for people

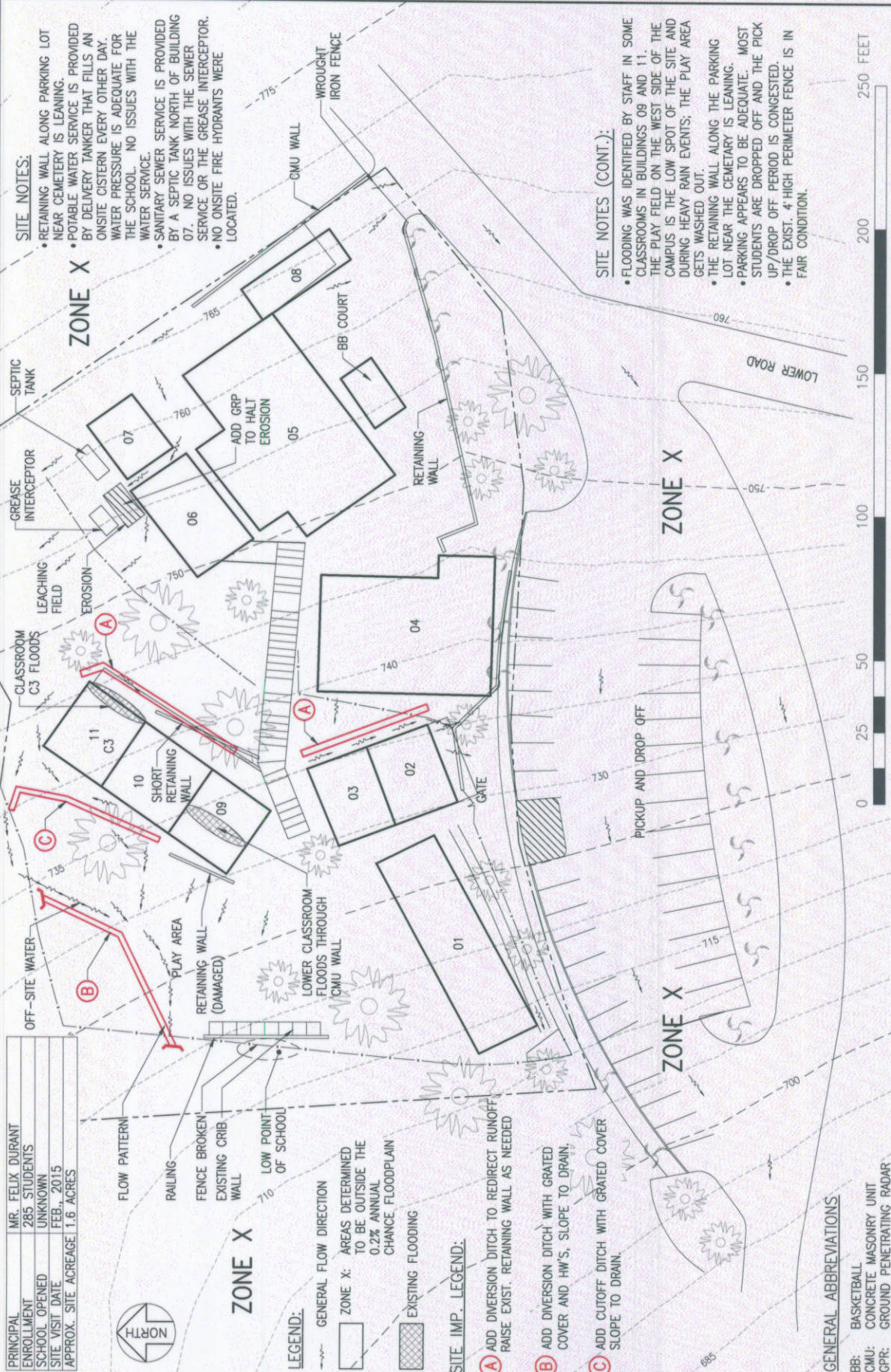
Austin Tsutsumi & Associates, Inc.
Engineers & Surveyors

FIGURE

11

JOSEPH SIBILLY ELEMENTARY SCHOOL

DISCLAIMER: SITE PLAN FEATURES ARE CONCEPTUAL AND NOT INTENDED FOR DESIGN PURPOSES
ELEVATION CONTOURS ARE PROVIDED BY GOOGLE EARTH



SITE NOTES:

- RETAINING WALL ALONG PARKING LOT NEAR CEMETERY IS LEANING.
- POTABLE WATER SERVICE IS PROVIDED BY DELIVERY TANKER THAT FILLS AN ONSITE CISTERN EVERY OTHER DAY.
- WATER PRESSURE IS ADEQUATE FOR THE SCHOOL. NO ISSUES WITH THE WATER SERVICE.
- SANITARY SEWER SERVICE IS PROVIDED BY A SEPTIC TANK NORTH OF BUILDING 07. NO ISSUES WITH THE SEWER SERVICE OR THE GREASE INTERCEPTOR.
- NO ONSITE FIRE HYDRANTS WERE LOCATED.

SITE NOTES (CONT.):

- FLOODING WAS IDENTIFIED BY STAFF IN SOME CLASSROOMS IN BUILDINGS 09 AND 11. THE PLAY FIELD ON THE WEST SIDE OF THE CAMPUS IS THE LOW SPOT OF THE SITE AND DURING HEAVY RAIN EVENTS, THE PLAY AREA GETS WASHED OUT.
- THE RETAINING WALL ALONG THE PARKING LOT NEAR THE CEMETERY IS LEANING.
- PARKING APPEARS TO BE ADEQUATE. MOST STUDENTS ARE DROPPED OFF AND THE PICK UP/DROP OFF PERIOD IS CONGESTED.
- THE EXIST. 4' HIGH PERIMETER FENCE IS IN FAIR CONDITION.

PRINCIPAL	MS. CLAXTON
ENROLLMENT	300 STUDENTS
SCHOOL OPENED	UNKNOWN
SITE VISIT DATE	FEB. 2015
APPROX. SITE ACREAGE	12.7 ACRES

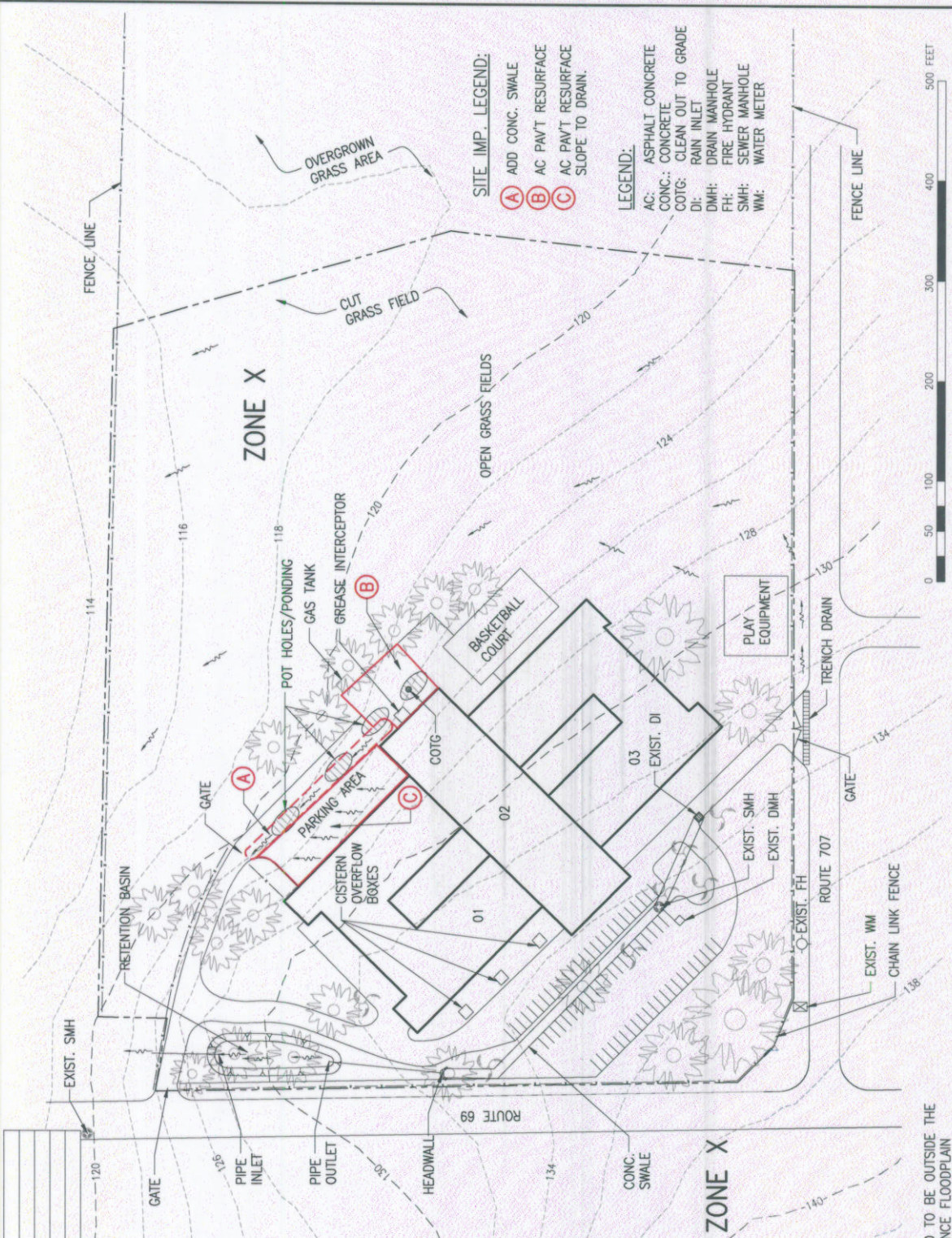


SITE NOTES:

- WATER SERVICE IS PROVIDED BY THE DPW WATER SYSTEM. THE SCHOOL ALSO HAS TWO BACKUP CISTERN AND PUMP SYSTEMS THAT ARE FILLED BY THE DPW SYSTEM. THE SOUTH CISTERN IS NOT IN USE AND EMPTY, BUT THE NORTH CISTERN IS FILLED FROM THE DPW WATER CONNECTION AND PROVIDES WATER WHEN THE DPW SYSTEM GOES DOWN. THE CISTERN WATER IS TESTED WEEKLY. WATER PRESSURE IS ADEQUATE FOR THE SCHOOL.
- SANITARY SEWER SERVICE IS PROVIDED BY THE DPW SEWER SYSTEM. NO ISSUES WITH THE SEWER SERVICE OR THE GREASE INTERCEPTOR. REGULAR MAINTENANCE OF GREASE INTERCEPTOR IS REQUIRED.
- NO ONSITE FIRE HYDRANTS WERE LOCATED. ONE OFFSITE FIRE HYDRANT WAS LOCATED ALONG ROUTE 707.
- SIDEWALKS ARE IN FAIR CONDITION.
- PARKING APPEARS TO BE ADEQUATE.
- A MAJORITY OF THE STUDENTS GET PICKED UP/DROPPED OFF AND THE MOVEMENT IS CONGESTED. PARENTS ARE NOT ALLOWED TO ENTER THE CAMPUS DURING THESE PERIODS.
- THERE IS NO FENCE ALONG THE NORTH AND EAST BOUNDARIES.

LEGEND:

- GENERAL FLOW DIRECTION
- ▨ EXISTING PONDING
- ZONE X: AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN



- SITE IMP. LEGEND:**
- (A) ADD CONC. SWALE
 - (B) AC PAV'T RESURFACE
 - (C) AC PAV'T RESURFACE SLOPE TO DRAIN.

- LEGEND:**
- AC: ASPHALT CONCRETE
 - CONC.: CONCRETE
 - COTG: CLEAN OUT TO GRADE
 - DI: RAIN INLET
 - DMH: DRAIN MANHOLE
 - FH: FIRE HYDRANT
 - SMH: SEWER MANHOLE
 - WM: WATER METER



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ST. CROIX



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ASSOCIATES, INC.
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FIGURE

18

ALFREDO ANDREWS ELEMENTARY SCHOOL

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ELEVATION CONTOURS ARE PROVIDED BY GOOGLE EARTH

PRINCIPAL	MR. MOREHEAD
ENROLLMENT	1982
SCHOOL OPENED	FEB., 2015
SITE VISIT DATE	APPROX. SITE ACREAGE 17.1 ACRES

SITE NOTES:

- POTABLE WATER SERVICE IS PROVIDED BY THE WAPA WATER SYSTEM. THE SCHOOL ALSO HAS A BACKUP CISTERN AND PUMP SYSTEM BUT IT IS UNCLEAR IF THE SYSTEM IS IN USE. WATER PRESSURE IS ADEQUATE FOR THE SCHOOL. NO ISSUES WITH THE WATER SERVICE.
- SANITARY SEWER SERVICE IS PROVIDED BY THE DPW SEWER SYSTEM. NO ISSUES WITH THE SEWER SERVICE OR THE GREASE INTERCEPTOR, BUT REGULAR MAINTENANCE OF THE GREASE INTERCEPTOR IS REQUIRED.
- THREE ONSITE FIRE HYDRANTS WERE LOCATED BUT IT IS UNCLEAR IF THE FIRE HYDRANTS ARE OPERATIONAL.
- FLOODING WAS IDENTIFIED BY STAFF IN CERTAIN ROOMS IN BUILDINGS 03, 04 AND 05. FLOODING APPEARS TO BE FROM THE BUILDING JOINTS FOR CLASSROOMS IN BUILDINGS 03 AND 04 AND FROM A LEAKING ROOF GUTTER FOR BUILDING 05. THE PARKING AREA APPEARS BE BUILT OVER A NATURAL DRAINAGE WAY AND ROUTINE CLEARING OF THE DRAINAGE WAY IS REQUIRED.
- PARKING IS ADEQUATE FOR STAFF AND VISITORS. THE PARKING AREA WAS RE-DONE 4 TO 5 YEARS AGO (2010). MOST STUDENTS ARE BUSSED TO SCHOOL (65%). PICKUP/DROP OFF TRAFFIC MOVEMENT IS FAIR.
- THE PLAYING FIELD HAS HOLES AND IS IN POOR CONDITION.
- EXIST. SIDEWALK IS IN GOOD CONDITION AND RAMPS ARE IN EXCELLENT CONDITION.
- THE EXIST. FENCE IS IN FAIR CONDITION BUT SOME AREAS ARE DAMAGED.

ZONE X

LEGEND:

- GENERAL FLOW DIRECTION
- ZONE X: AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN
- EXISTING PONDING



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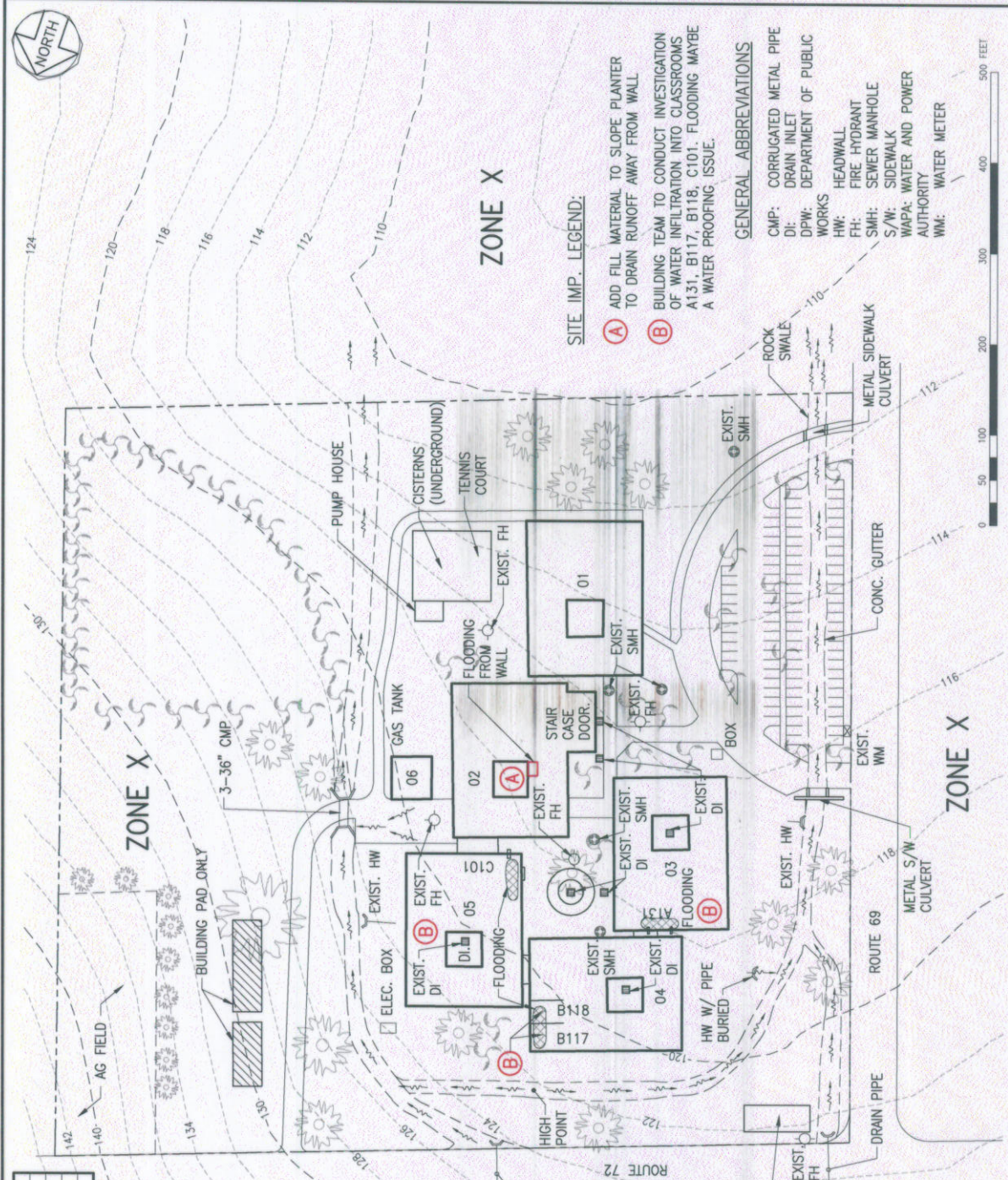
ATA AustinTsumi
ASSOCIATES, INC.
Engineers & Surveyors

FIGURE

JOHN WOODSON JUNIOR HIGH SCHOOL

25

DISCLAIMER: SITE PLAN FEATURES ARE CONCEPTUAL AND NOT INTENDED FOR DESIGN PURPOSES
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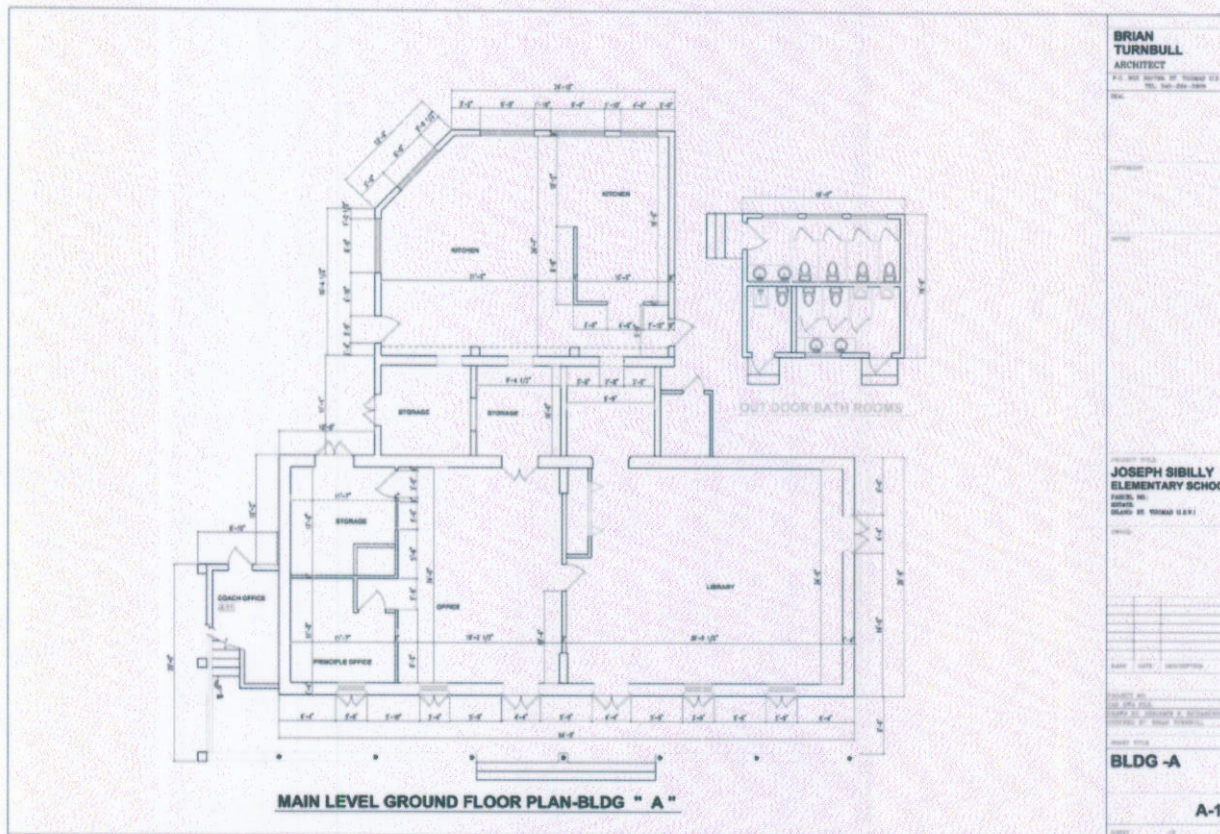


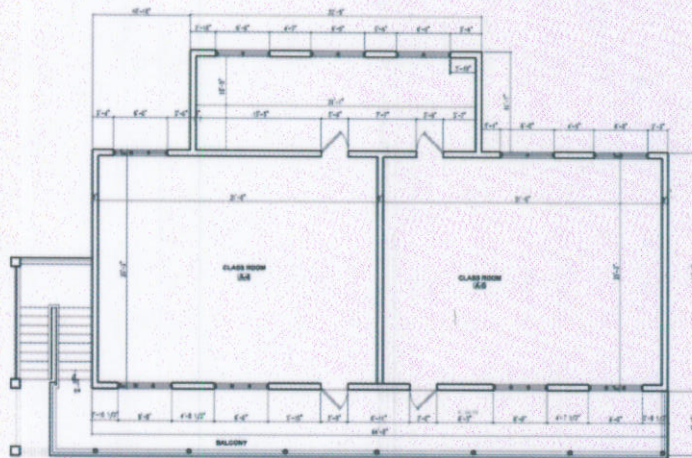
SITE IMP. LEGEND:

- (A) ADD FILL MATERIAL TO SLOPE PLANTER TO DRAIN RUNOFF AWAY FROM WALL
- (B) BUILDING TEAM TO CONDUCT INVESTIGATION OF WATER INFILTRATION INTO CLASSROOMS A131, B117, B118, C101. FLOODING MAYBE A WATER PROOFING ISSUE.

GENERAL ABBREVIATIONS

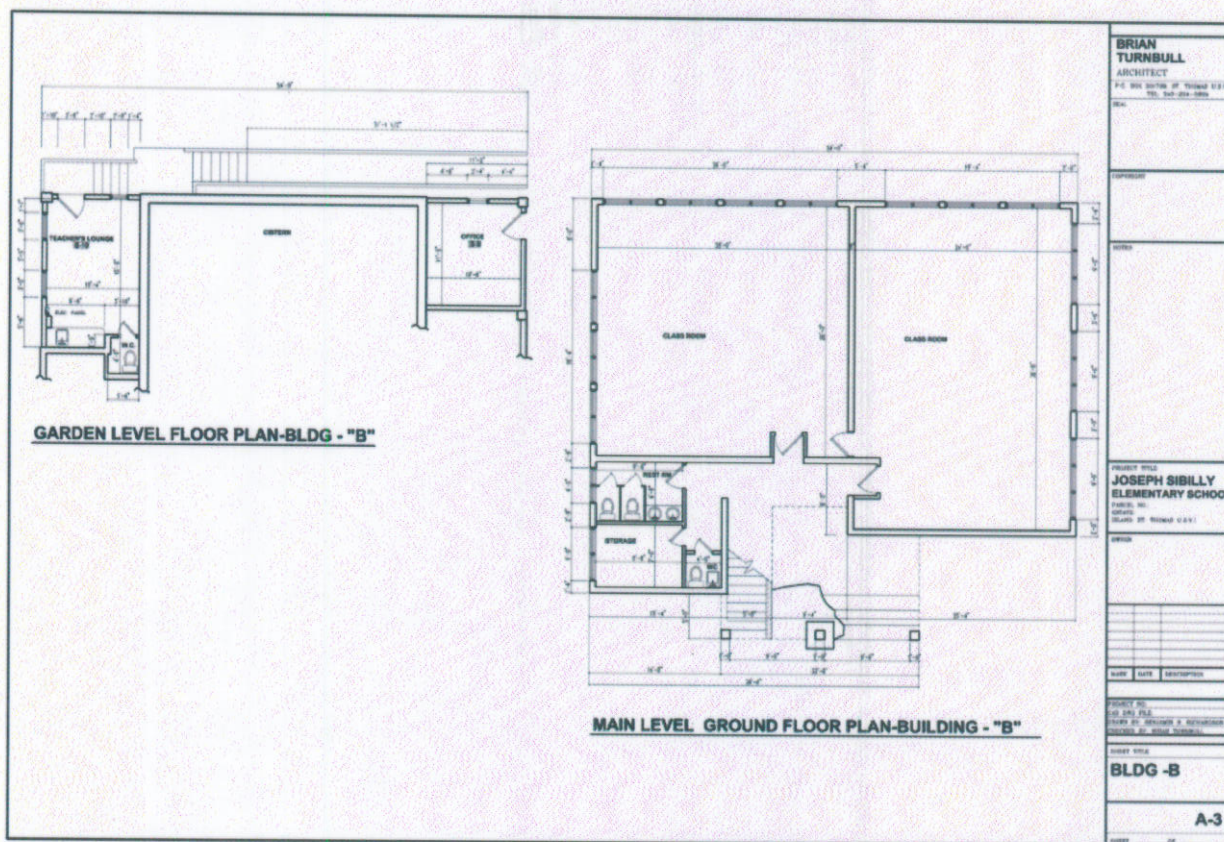
- CMP: CORRUGATED METAL PIPE
- DI: DRAIN INLET
- DPW: DEPARTMENT OF PUBLIC WORKS
- HW: HEADWALL
- FH: FIRE HYDRANT
- SMH: SEWER MANHOLE
- S/W: SIDEWALK
- WAPA: WATER AND POWER AUTHORITY
- WM: WATER METER





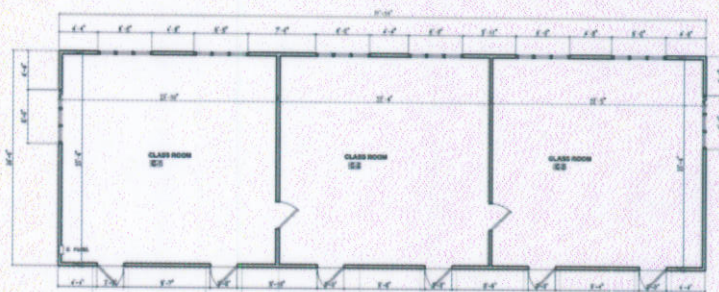
UPPER LEVEL FLOOR PLAN-BLDG - " A "

BRIAN TURNBULL ARCHITECT P.E. AND LICENSED BY THE STATE OF TEXAS 1001 SAN ANTONIO DRIVE SAN ANTONIO, TEXAS 78204 TEL: 214-344-0000		
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PROJECT:		
NOTES:		
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OWNER:		
ARCHITECT:		
DATE:		
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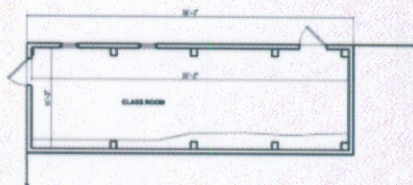




BRIAN TURNBULL ARCHITECT P.O. BOX 50746, ST. LOUIS, MO 63151 TEL. 347-254-1055		
DATE: _____		
(continued)		
NOTES: _____		
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NAME	DATE	DESCRIPTION
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SHEET TITLE BLDG-B		
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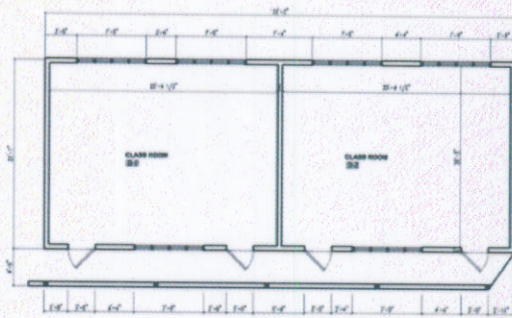


MAIN LEVEL FLOOR PLAN - BUILDING "C"



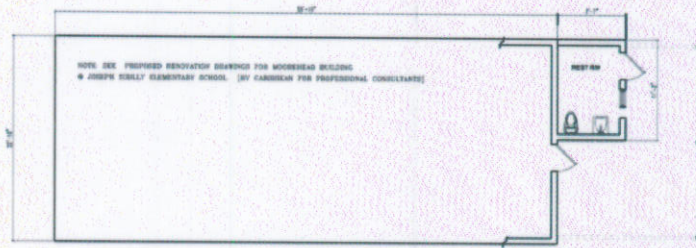
LOWER LEVEL FLOOR PLAN - BUILDING "C"

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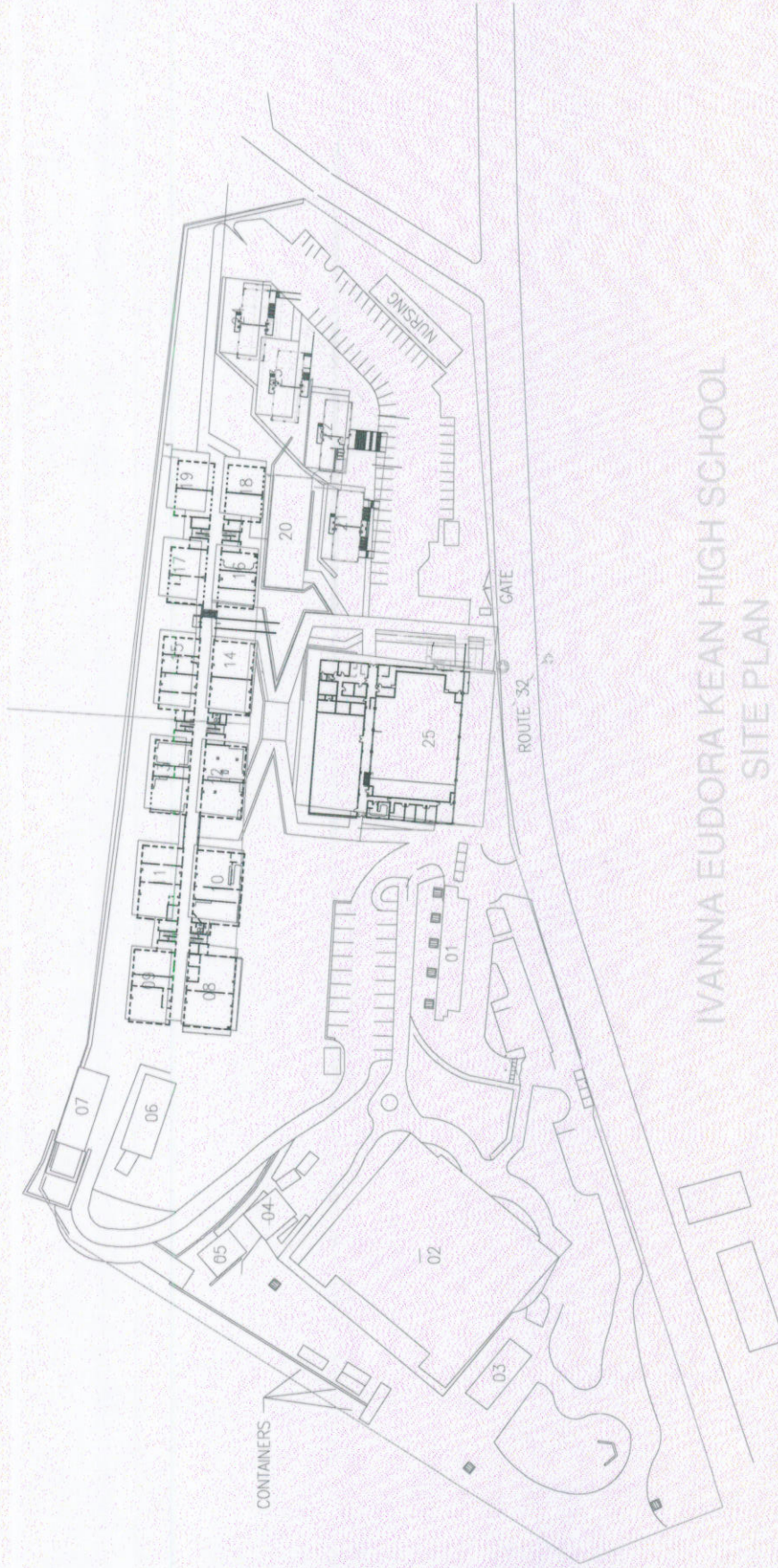
FLOOR PLAN - BUILDING "D"

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FLOOR PLAN - BUILDING "E"

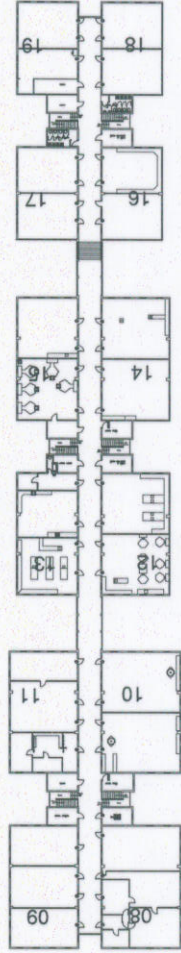
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IVANNA EUDORA KEAN HIGH SCHOOL

SITE PLAN

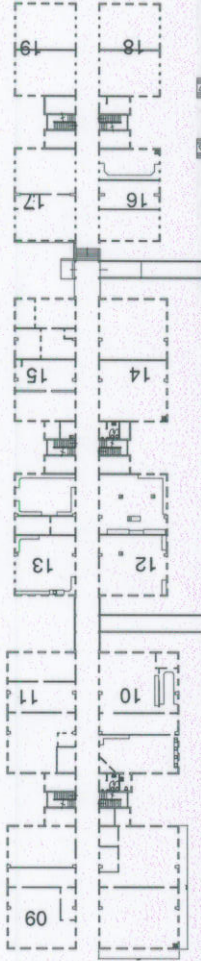
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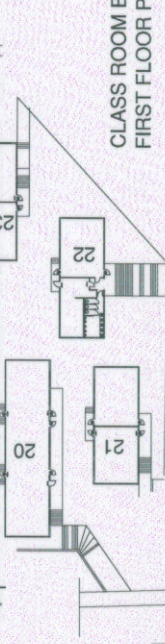
CLASS ROOM BUILDING
SECOND FLOOR PLAN



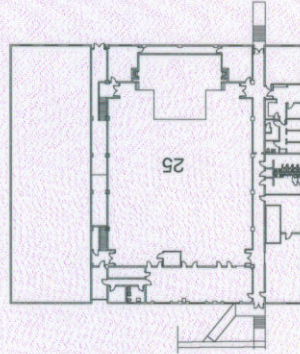
JROTC BUILDINGS
FLOOR PLAN



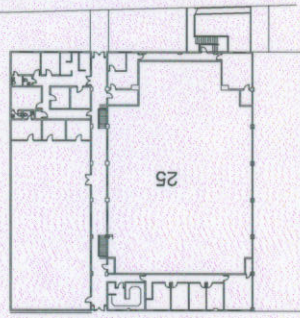
CLASS ROOM BUILDING
FIRST FLOOR PLAN



CLASS ROOM BUILDING
FIRST FLOOR PLAN



ADMINISTRATION BUILDING
SECOND FLOOR PLAN



ADMINISTRATION BUILDING
THIRD FLOOR PLAN

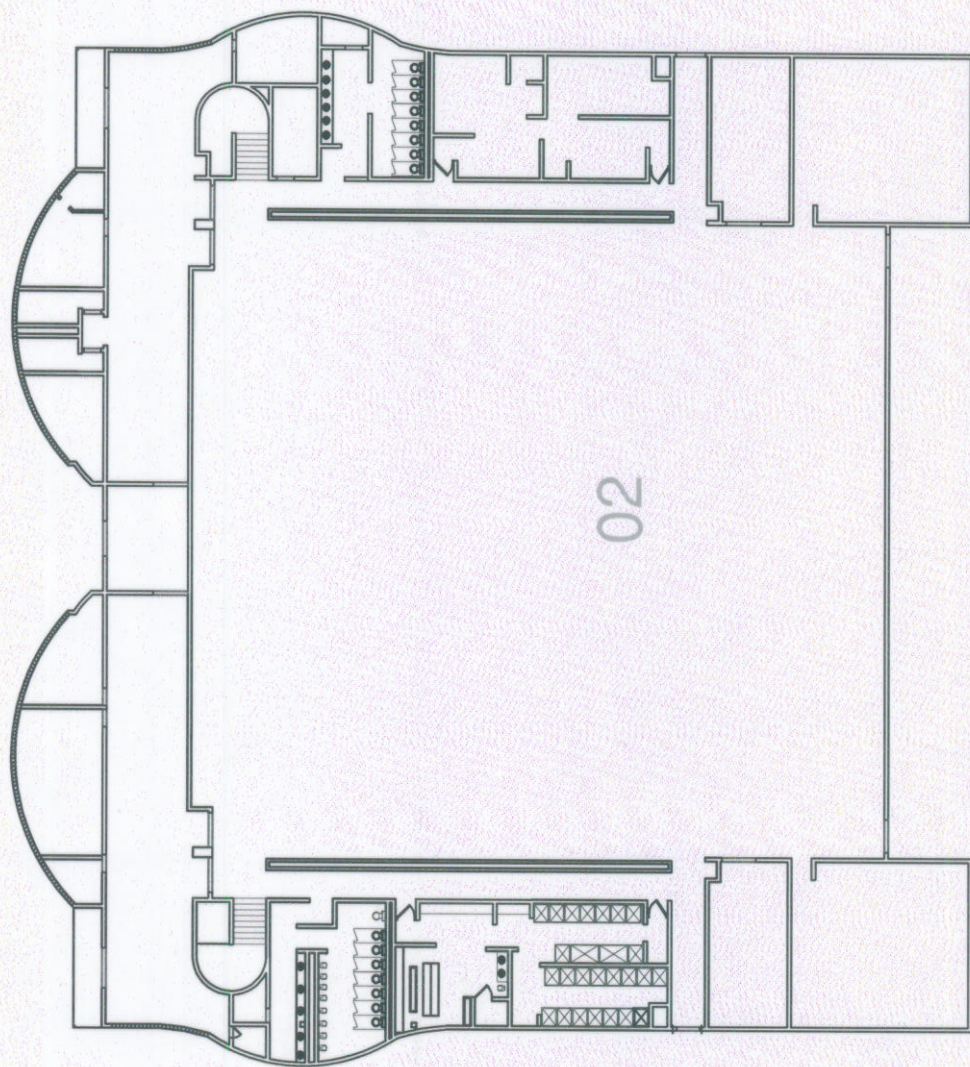


ADMINISTRATION BUILDING
FIRST FLOOR PLAN

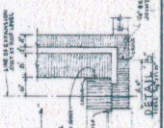
IVANNA EUDORA KEAN HIGH SCHOOL

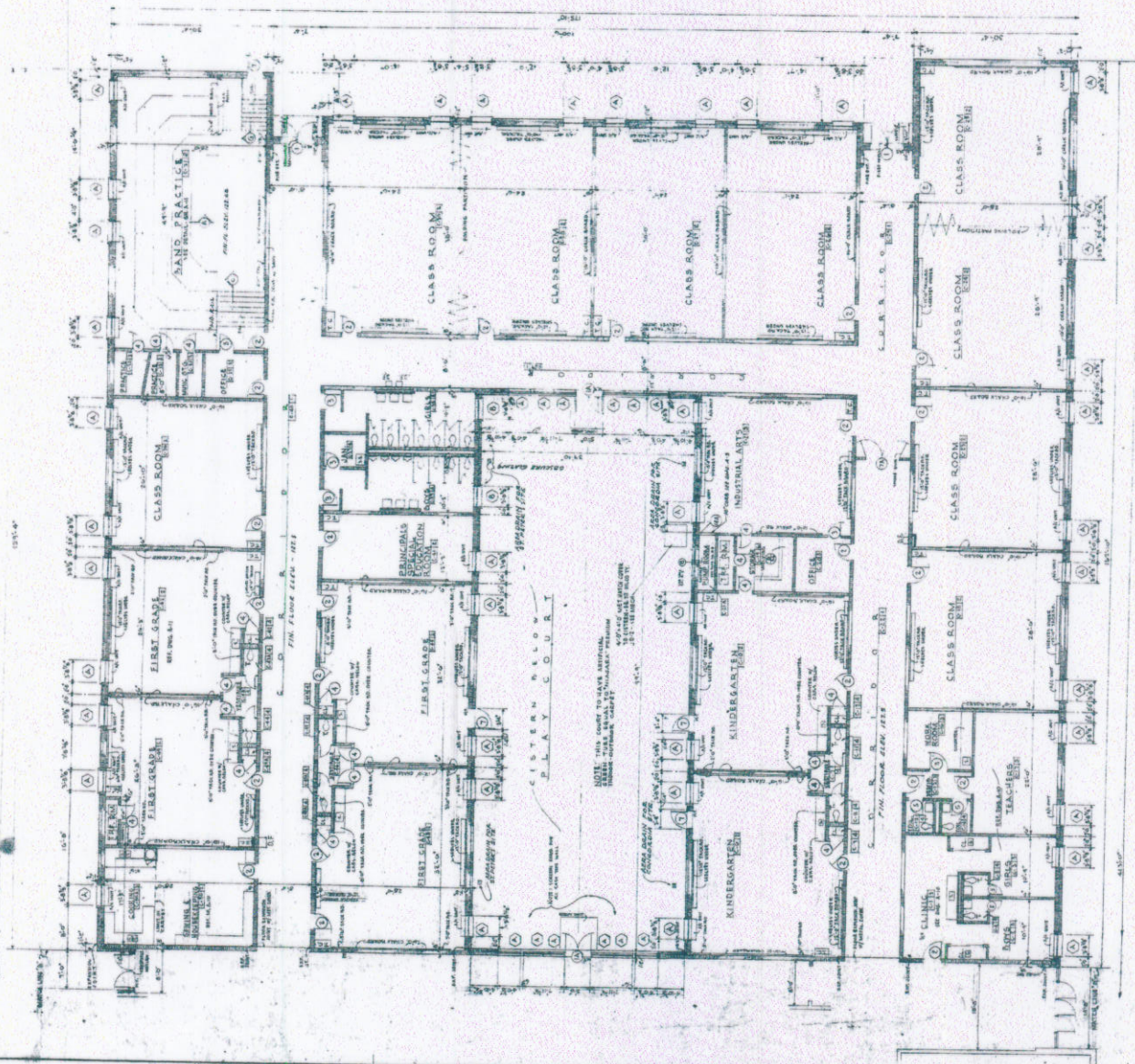
FLOOR PLANS

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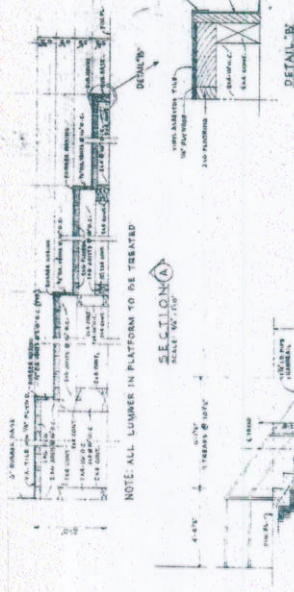


GYMNASIUM BUILDING FLOOR PLAN

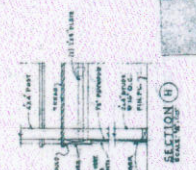
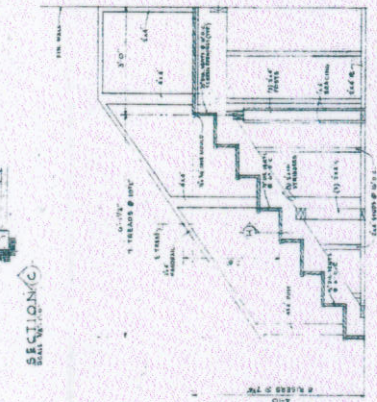




FLOOR PLAN UNIT "C"



NOTE: ALL LUMBER IN PLATFORM TO BE TREATED.



FLOOR PLAN - UNIT 'C'

GREGGSON & ASSOCIATES

SCHOOL BUILDING

ST. FRANK

U.S. MARINE ISLAND

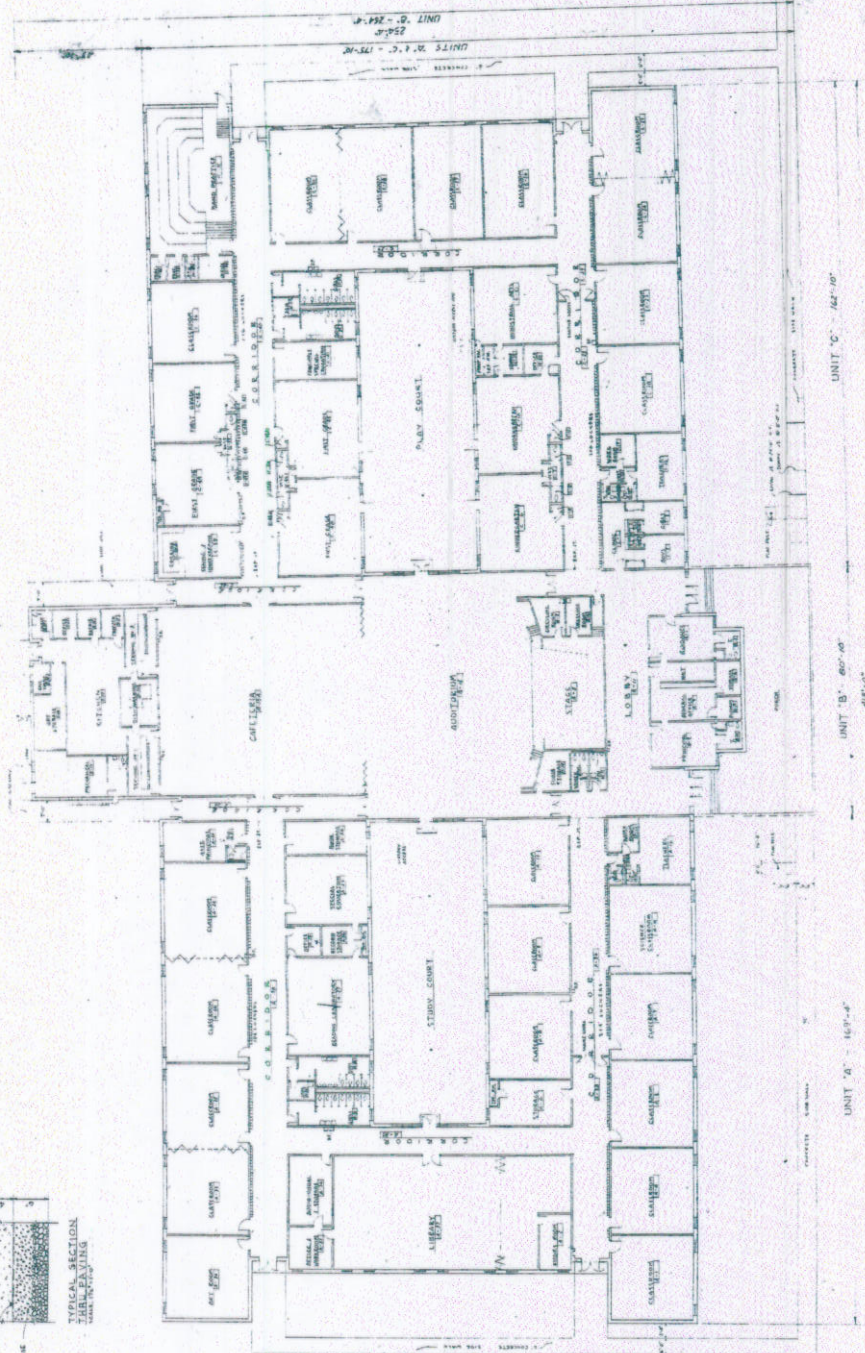
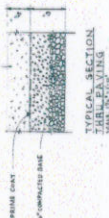
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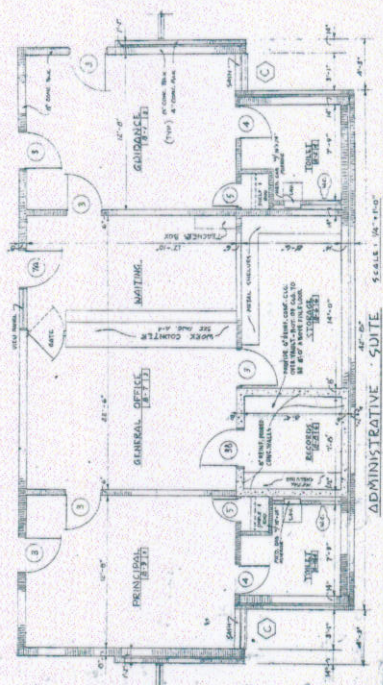
AS BUILT DRAWINGS

CONTRACT SET

SECTION THROUGH WALL



FLOOR PLAN
SCALE 1/8" = 1'-0"

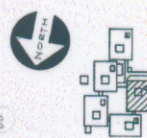


ADMINISTRATIVE SUITE
SCALE 1/8" = 1'-0"



FLOOR PLAN	
GREGSON & ASSOCIATES	
SCHOOL BUILDING	
ST. GEORGE, VIRGINIA	
U.S. VIRGINIA ISLANDS	
DATE	1961
BY	1041
SCALE	1/8" = 1'-0"
CONTRACT SET	

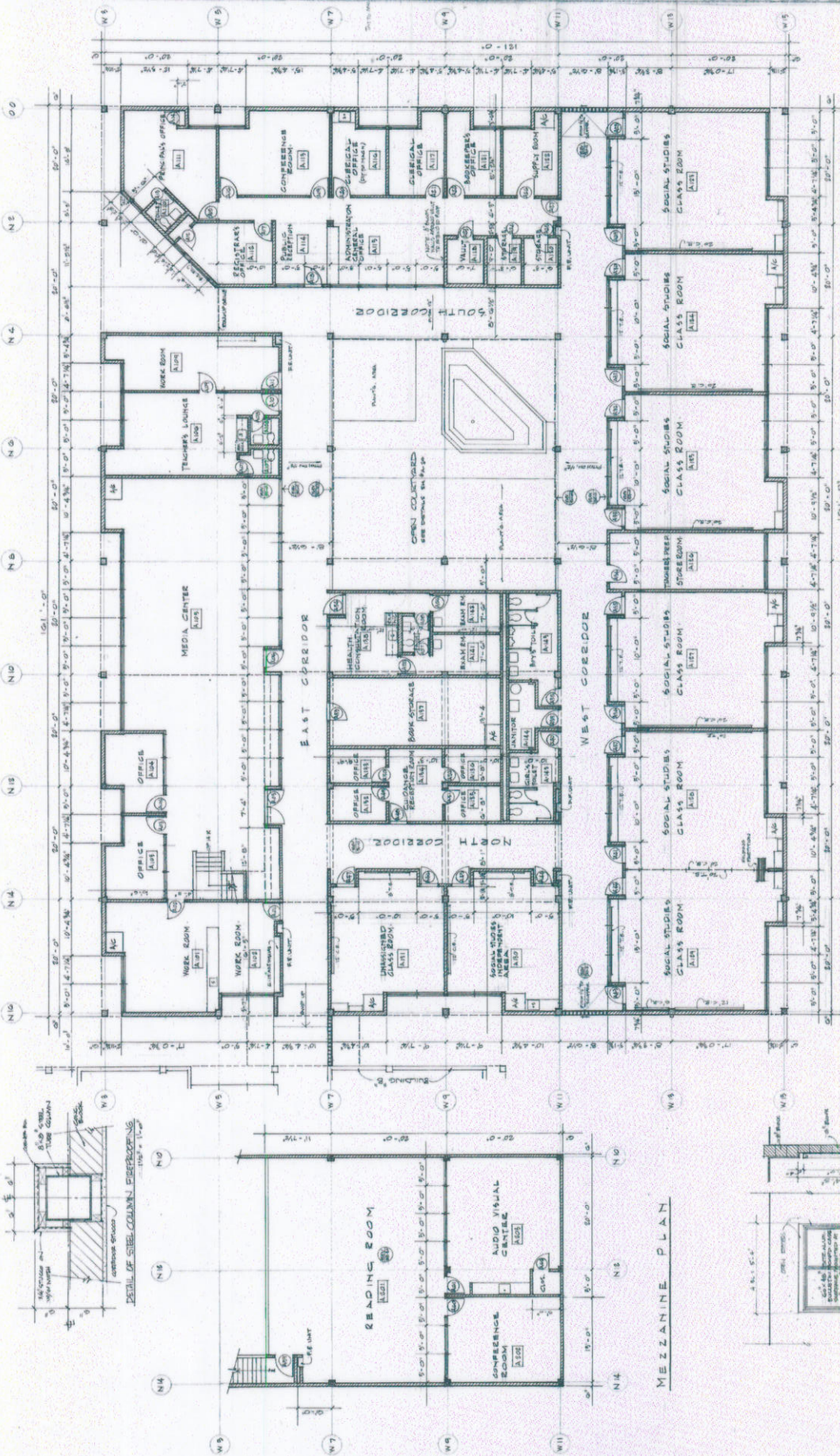
AS BUILT DRAWING



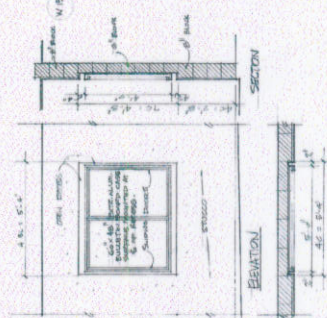
NOTE
 UNLESS NOTED DIMENSIONS ARE TO
 FACE OF WALLS OR CENTERLINE
 OF WALLS ON GLASS SURFACES

BLDG. A

SECTION PHASE
 1/4" = 1'-0"

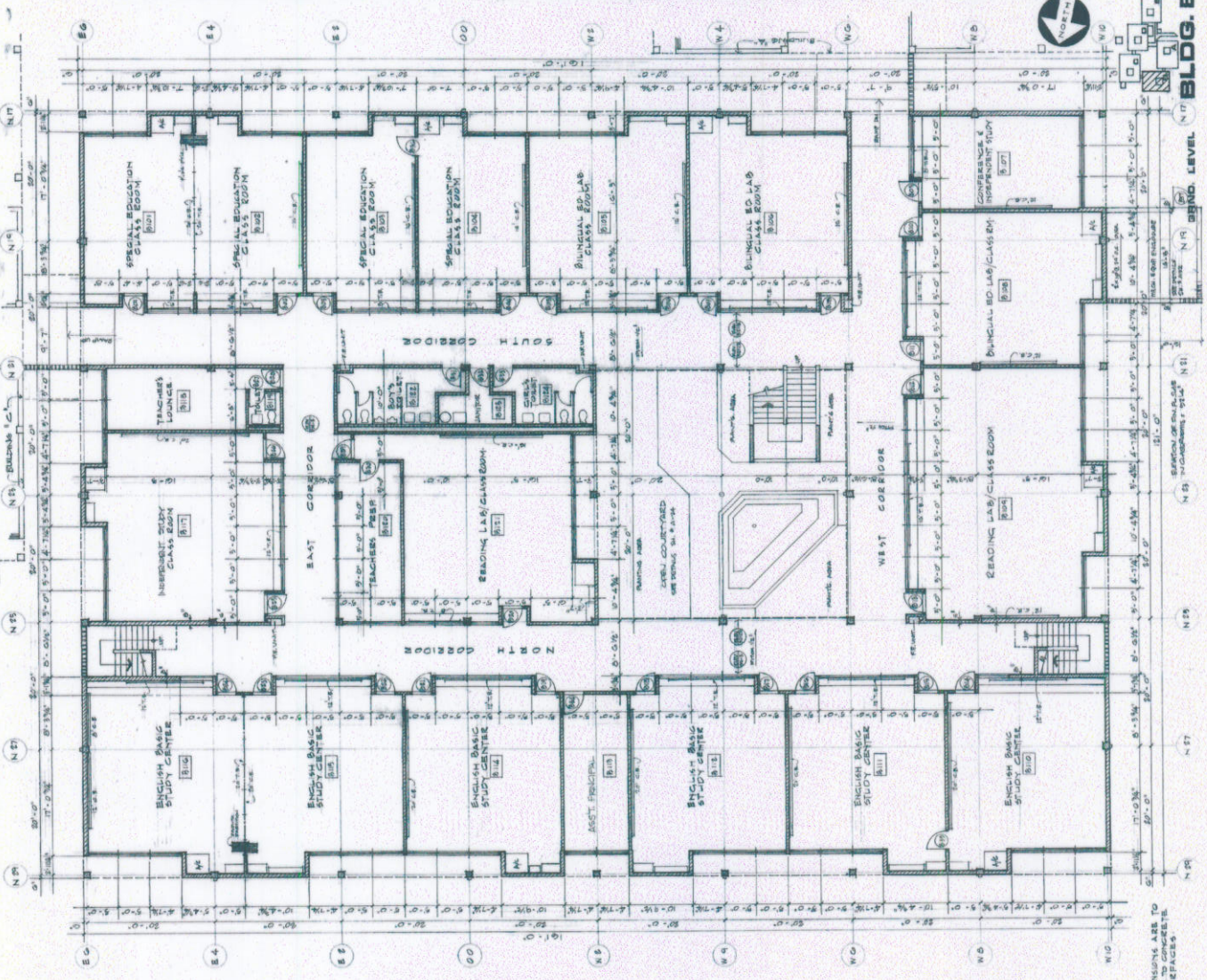


MEZZANINE PLAN

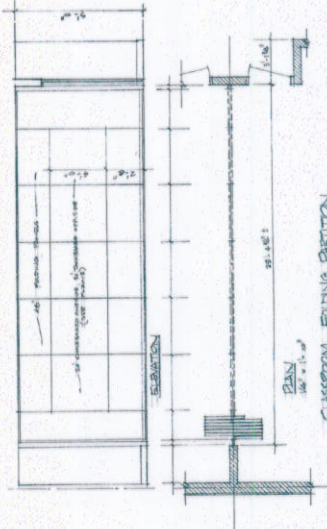


DETAIL OF STEEL COLUMN EMBEDDING
 1/4" = 1'-0"

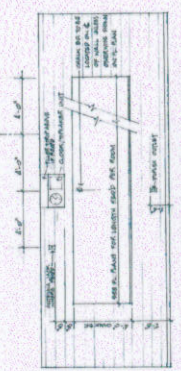
ILLUSTRATIVE PLAN - TYPICAL DIMENSIONING



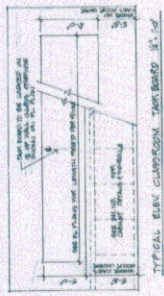
NOTE:
 UNLESS NOTED DIMENSIONS ARE TO
 MODULE GRID LINES OR TO CONCRETE
 SURFACES ON SLAB SURFACES



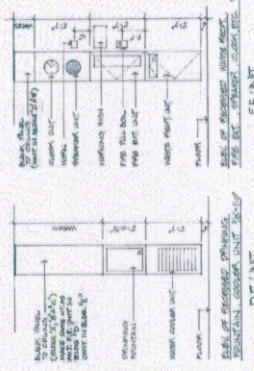
CLASSROOM ELEVATION SECTION



TYPICAL CLASSROOM ELEVATION SECTION



TYPICAL CLASSROOM ELEVATION SECTION



TYPICAL CLASSROOM ELEVATION SECTION

FEET
 1/8" = 1'-0"

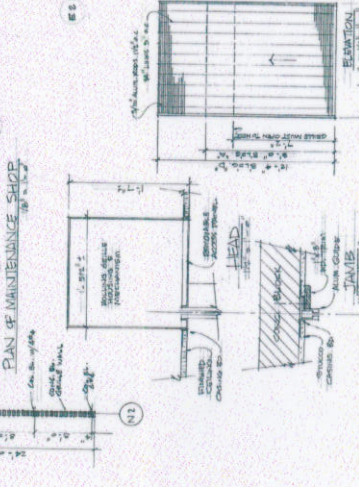
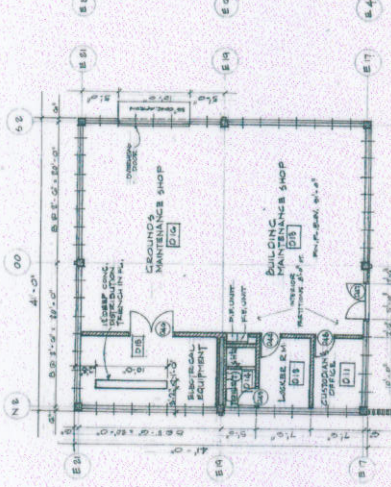
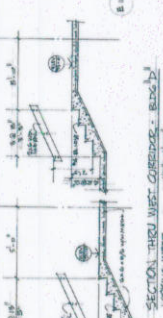
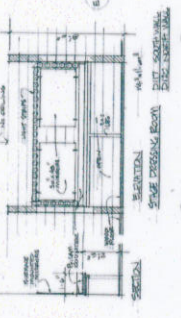
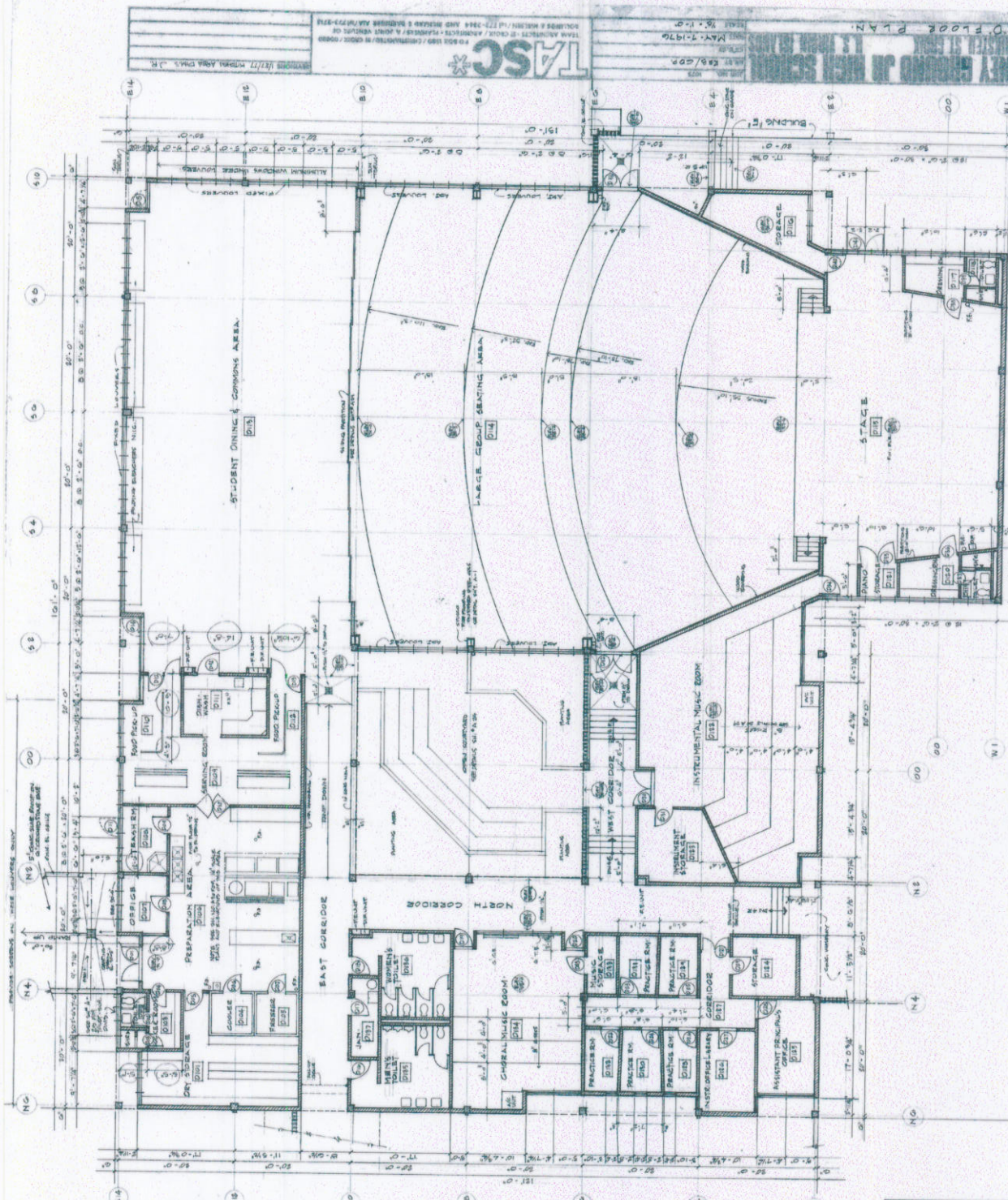
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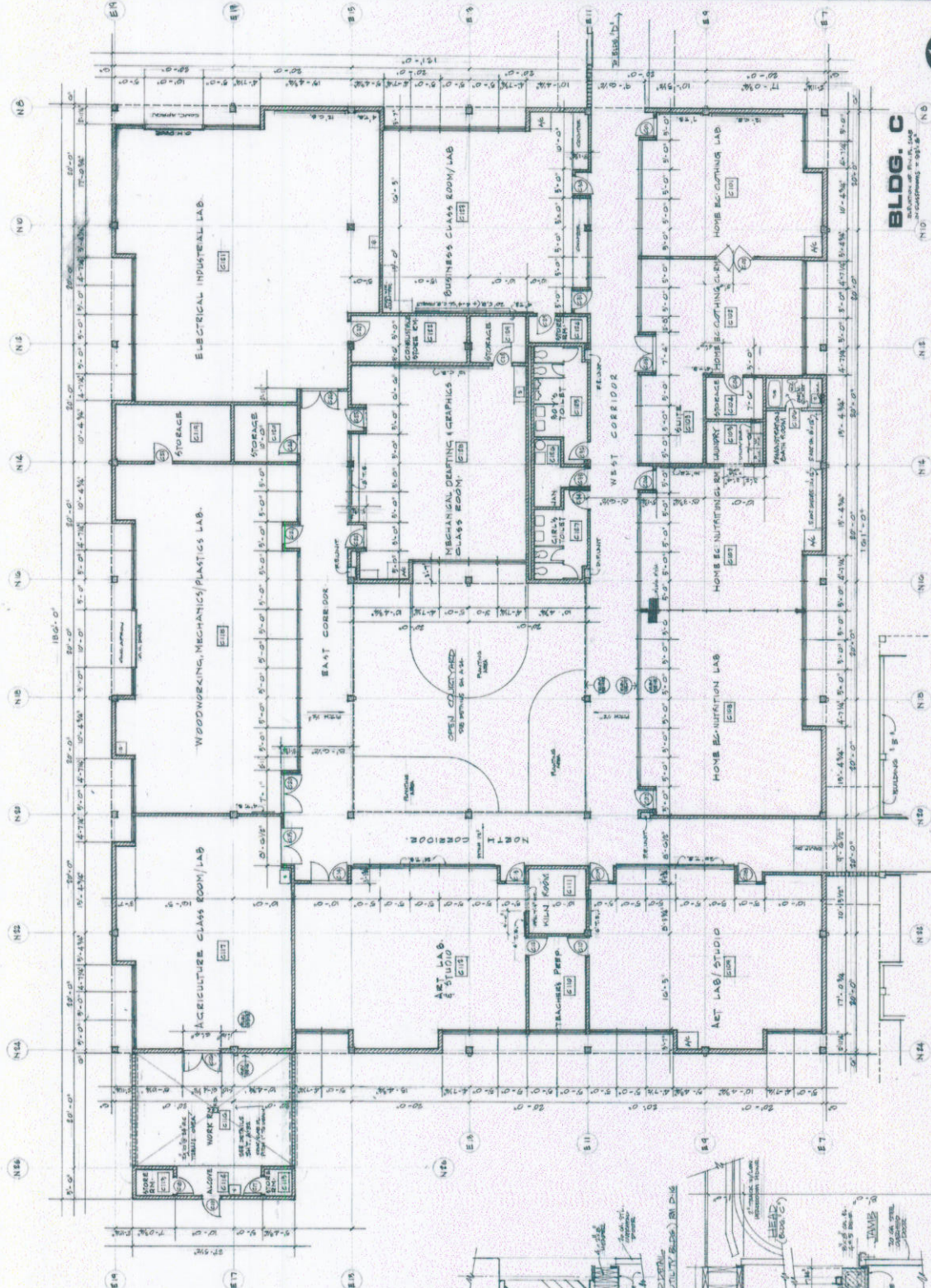




FLOOR PLAN

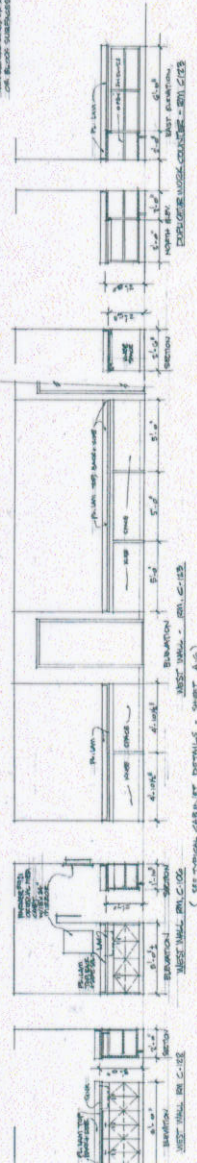
NOTE:
 UNLESS NOTED DIMENSIONS ARE TO
 FACE OF WALLS OR CENTER
 COLUMN OR RAILING ELEVATION





BLDG. C

SCALE: 1/8" = 1'-0"
 NORTH ARROW
 SEE TYPICAL CASHIER DETAIL - SHEET A-6
 SEE TYPICAL CASHIER DETAIL - SHEET A-6



DETAILS OF OVERHEAD DOORS