
Wayne School District

Facilities Assessment

Wayne District Office
Wayne Middle School
Wayne High School
Loa Elementary

13 May 2015

NAYLOR
WENTWORTH
LUND
ARCHITECTS



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Purpose

As directed by the Wayne School District Board of Education an assessment of four of the district's buildings was undertaken. The purpose of this assessment was to gather information regarding the current state of the four buildings. The information obtained as a result of the assessment will be used to aid the school board in making decisions about future facility development and maintenance procedures. The four facilities which have been assessed are the School District Office Building, Wayne Middle School, Wayne High School and Loa Elementary.

Procedure

The facility assessment team included staff from Naylor Wentworth Lund Architects, BHB Consulting Engineers (structural), Van Boerum & Frank Associates, Inc. Consulting Engineers (Mechanical) and BNA Consulting Engineers (Electrical). Electronic copies of drawings of three of the four facilities were made available to the assessment team by school district staff. Drawings were not available for the District Office Building. Although the drawings did not represent a complete set of documents for the respective buildings, they were sufficient enough in detail that they could be used for a preliminary review of the facilities. The drawings were briefly reviewed by respective team members prior to an on-site visit to each of the buildings. On March 25 & 26, 2015 the assessment team visited each of the four buildings to gather information first hand. The on-site visits lasted an average of 2 hours per building. Preliminary reports were sent to Naylor Wentworth Lund Architects afterward. On April 9, 2015 Terance White from Naylor Wentworth Lund Architects met with the school board and staff during the regular board meeting to present the initial findings and to obtain input from the board. Following that board meeting the initial reports were updated. This final report is the result of the foregoing procedures. Please note that the assessment associated with this report was limited in scope and time. All deficiencies may not have been adequately defined and additional deficiencies may exist that could be revealed upon a more thorough investigation.

General Observations

As a result of the assessment several items were observed that are consistent across the four subject buildings. These items are categorized here by the respective disciplines that conducted the assessment. For specifics at each of the buildings the reports included in the appendices may be referenced.

Architectural

- The prominent feature of these buildings is that they have had multiple additions made to them. It is easy to distinguish the additions as there is a lack of consistency in building materials from one addition to another. The exception to this is the district office building that appears not to have had an addition made to it. The additions by themselves do not necessarily indicate problems. What it does suggest is that the facility renewal philosophy of the district has been one of “patch and repair” in order to keep the buildings functioning. However, upon closer examination, this approach to the facilities appears to be putting stress on building systems which were never designed to support the added building area.
- Each of the four buildings exhibit problems relating to compliance with accessibility. These issues range from insufficient railings to inadequate paths of travel to entrances to non-compliant door hardware.
- Fire sprinklings systems are incomplete or non-existent
- At each of the three schools the main office is located such that it is not in a prominent place to allow for visual control of the front entrance. A prominent front entry is desirable for an extra layer of student safety and protection.
- The roofs at each of the buildings are in need of, or very close to the time for replacement.
- Many of the interior finishes at each of the four buildings are well worn and in need of replacement. Such finishes include floor coverings, ceilings and wall finishes.

Structural

- The main concern structurally is with the oldest portions of each of the existing buildings. These portions of the buildings were not constructed to account for the level of seismic protection required by current code standards.

Mechanical

- The mechanical systems in each of the four buildings are very old and have exceeded their life expectancy. The exception to this is the high school where a portion of the system is newer and not yet past the life expectancy. However, even those systems at that building will be arriving at that time period in the next few years.

- There is a lack of outside air provided in the mechanical systems at each of the buildings. Low levels of fresh air results in higher levels of carbon dioxide inside as the day progresses.

Electrical

- The main concern with the electrical systems in each of the buildings is that they are not adequate to support new mechanical systems. If the recommendation to replace mechanical systems is followed, and the new mechanical systems are dependent on electricity, the current electrical infrastructure would need to be upgraded.
- Low levels of lighting exist to some degree in each of the four buildings. This includes inadequate, or non-existent, exit and emergency lighting.
- Fire alarm systems are not adequate in each of the four buildings. This ranges from the need to add devices all the way to the need to replacement the entirety of the existing fire alarm system.
- Intercom systems in each of the three school buildings are either past their life expectancy or approaching it.
- There is a general lack of power outlets in each of the four buildings.

Recommendations

Based on the observations made, and the discussion with the board, the following recommendations are being suggested as viable options for continuing to provide facilities for the students in the Wayne School District. You should also note that not all deficiencies listed in the observation reports have been included in the scope of work for remodeling. Only those items that affect life safety, and are most feasible to undertake, have been included. However, for the purposes of the recommendations the accompanying estimates of probable cost provide a good basis to aid the board in making decisions. Also, keep in mind that the estimates of probable cost are in today's dollar value. Although five options have been suggested in this study, it is likely that the board will discover additional options after review of this information.

Recommendations – Option #1

Remodel – \$13,800,000.00

This first option is to simply keep the existing facilities and remedy the deficiencies that currently exist by remodeling each of the facilities.

Scope & Estimated Probable Costs per building:

Wayne District Office Building - \$1,200,000.00

- Replace roof
- Replace exterior wall finishes
- Repair/replace damaged concrete walks and stairs
- Address non-compliant ADA issues both inside and out
- Replace floor and ceiling finishes
- Replace damaged roof structure
- Cut down chimney
- Install new mechanical system
- Upgrade electrical system if required by new mechanical system
- Upgrade lighting including exit and emergency lighting systems
- Upgrade fire alarm system
- Add power outlets

Wayne Middle School - \$4,000,000.00

- Repair/replace damaged exterior trim
- Address non-compliant ADA issues both inside and out
- Provide insulation on interior side of exterior walls
- Replace some floor and ceiling finishes
- Replace roof where needed
- Upgrade roof structure at oldest portion of building
- Install new mechanical system
- Install fire sprinkling system
- Upgrade electrical system if required by new mechanical system
- Upgrade lighting including exit and emergency lighting systems
- Upgrade fire alarm system
- Replace intercom system
- Add power outlets

Wayne High School - \$5,000,000.00

- Provide insulation on interior side of exterior walls
- Address non-compliant ADA issues both inside and out
- Replace roof
- Upgrade roof structure at oldest portion of building
- Install new mechanical system where needed
- Install fire sprinkling system where needed
- Upgrade electrical system if required by new mechanical system
- Upgrade lighting including exit and emergency lighting systems
- Upgrade fire alarm system

- Replace intercom system

Loa Elementary School - \$3,600,000.000

- Replace gym roof
- Repair damaged concrete stairs and walks
- Address non-compliant ADA issues both inside and out
- Upgrade roof structure at oldest portion of building
- Install new mechanical system where needed
- Install fire sprinkling system where needed
- Upgrade electrical system if required by new mechanical system
- Upgrade lighting including exit and emergency lighting systems
- Upgrade fire alarm system
- Upgrade data system
- Add power outlets

Recommendations – Option #2

Rebuild – \$25,200,000.00

This option is given if it is determined that the school district would like to rebuild each of the four buildings. For this scenario it is assumed that the buildings would be rebuilt on the current sites. The cost of demolition is included in the estimate of probable cost. For this option the current area of the buildings was used as the basis for the estimate. The exception to this is with the high school where the shop and arts building were not included as it is assumed these would remain intact as they are. If the facilities are rebuilt it may be that the area could be larger or smaller depending on the programmatic requirements.

Scope & Estimated Probable Costs per building:

Wayne District Office Building - \$1,700,000.00

- 8300 Square Feet

Wayne Middle School - \$6,800,000.00

- 32,700 Square Feet

Wayne High School - \$11,200,000.00

- 53812 Square Feet

Loa Elementary School - \$5,500,000.00

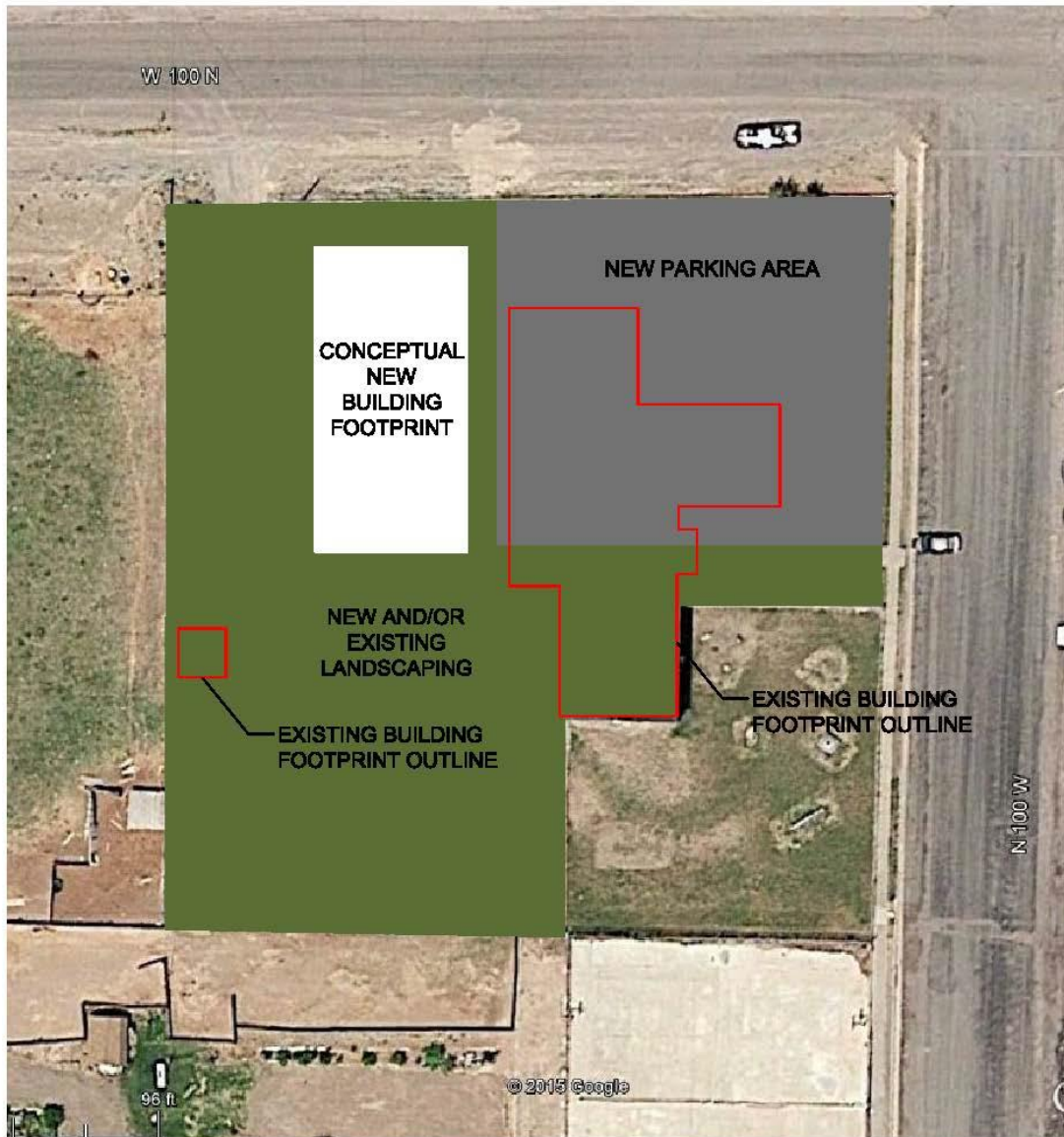
- 27,018 Square Feet

Refer to the drawings that follow which pertain to Option #2. The drawings show a proposed new footprint for each site and how they might possibly be positioned on the site.

Recommendations – Option #2

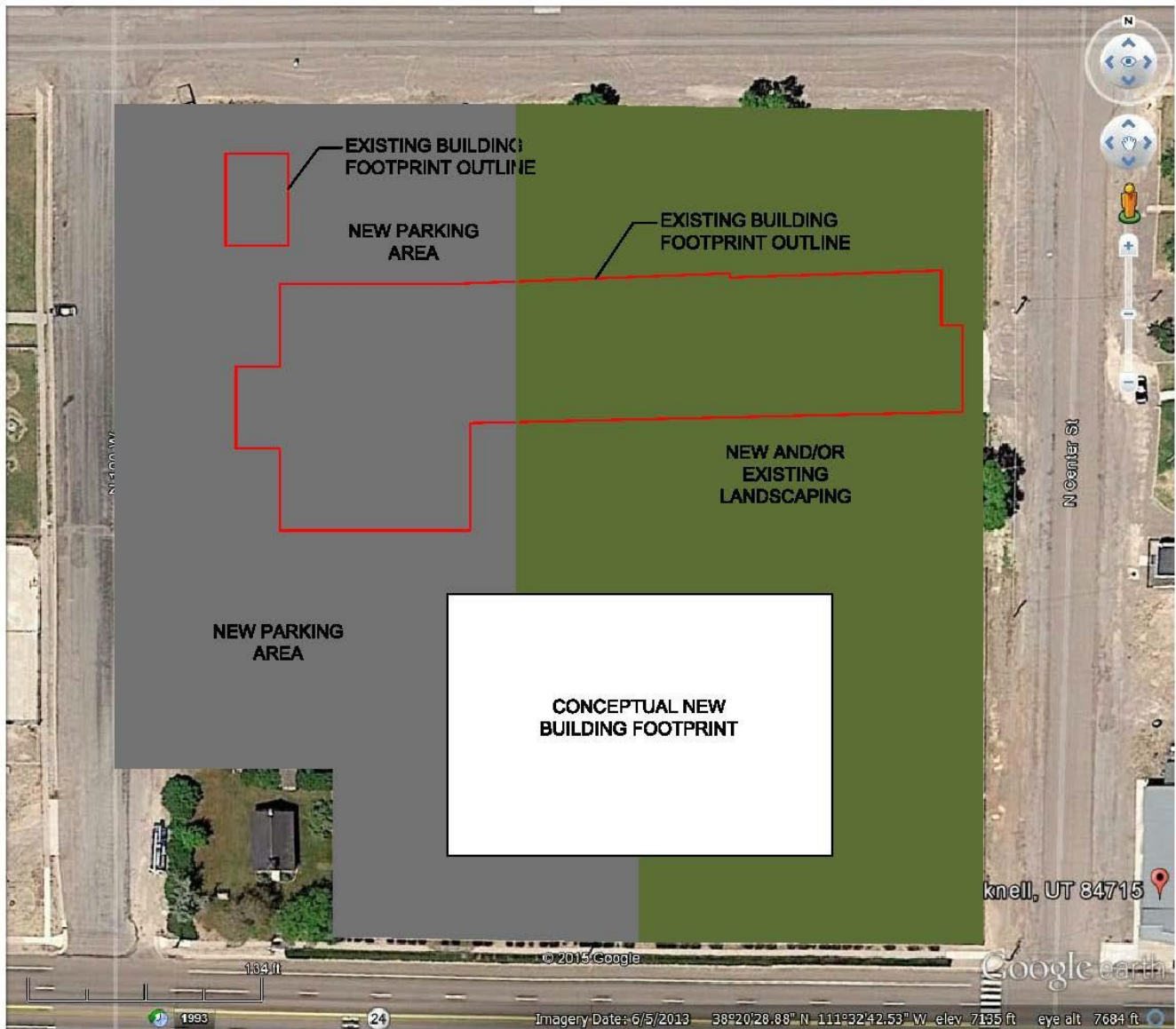
Recommendations – Option #2

Wayne District Office Building – Site Layout Schematic



Recommendations – Option #2

Wayne Middle School – Site Layout Schematic



Recommendations – Option #2

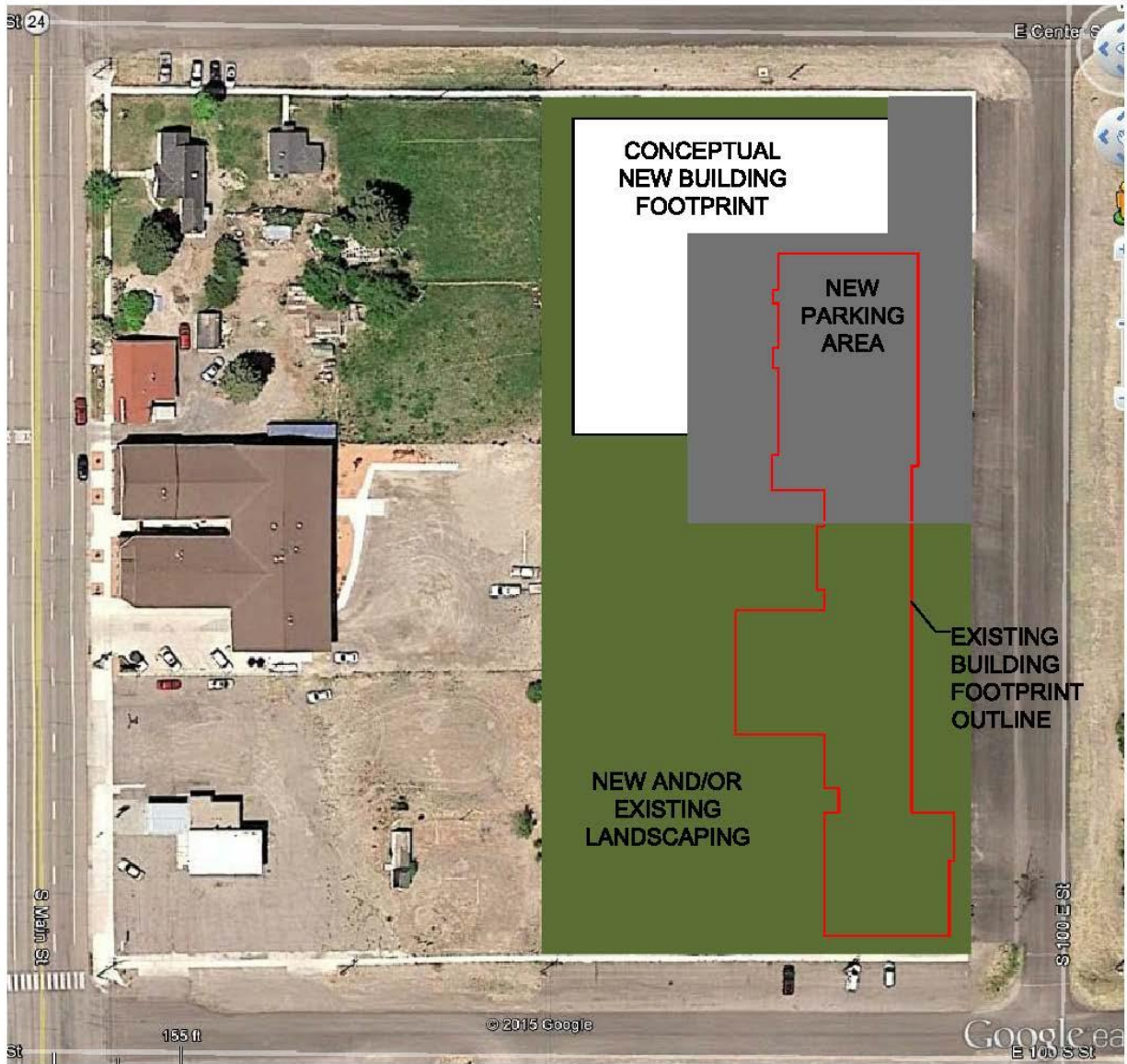
Wayne High School – Site Layout Schematic

For this option to work a portion of the new building would be built as two stories.



Recommendations – Option #2

Loa Elementary School – Site Layout Schematic



Recommendations – Option #3

Consolidate – \$24,360,000.00

There appears to be some advantages to combining the three schools together on one site and moving the district office operations to one of the buildings being vacated by the school functions. For this option it is assumed that the high school site would remain intact and the middle and elementary school facilities would be constructed new at that location. For the purposes of this exercise it is assumed that the older portions of the high school would be torn down and replaced with new facilities. The existing gymnasium and auditorium would remain. New administrative suites, classrooms and a new main gym would be constructed. The new elementary function would be in standalone building adjacent to the new middle/high school building. The existing gym would be turned into an auxiliary gym to be used by the middle and high school students. This probable cost estimate plans for a separate gym for the elementary students, but there is the possibility of cost savings if the existing gym could be used for elementary, middle and high school functions. The district office would then move to the middle school building. The oldest portion of that building would be torn down while the middle classroom area would be remodeled into office space. The existing gymnasium would remain and be remodeled as recommended in the first option. Drawings representing these recommendations have been included for review.

Scope & Estimated Probable Costs per building:

Wayne District Office Building - \$60,000.00

- Demolition of existing structure

Wayne Middle School (New District Office Building) - \$2,400,000.00

- Demolition of oldest portion of existing structure
- Architectural upgrades
- Mechanical Upgrades
- Electrical Upgrades
- Fire Alarm System Upgrades

Wayne High School (New HS/MS with Elementary) - \$21,700,000.00

- Demolition of portions of existing high school structure
- 89,700 Square Feet new for HS/MS
- 27,000 Square new for Elementary

Loa Elementary School - \$200,000.00

- Demolition of existing structure

Refer to the following drawings pertaining to Option #3.

Recommendations – Option #3

Wayne Middle School (New District Office Building) – Site Layout Schematic



Recommendations – Option #3

Wayne High School with Middle School and Elementary School – Site Layout Schematic



Recommendations – Option #4

Relocate – \$23,660,000.00

This option would include the relocation of the elementary school to Bicknell where a new building would be constructed at the site of the middle school. All of the current middle school building would be demolished except for the gymnasium which would remain to be used as part of the new elementary. The district office would be moved to Loa where it would occupy the current Loa Elementary School Building. The older portion of the Loa Elementary building would be torn down and the newer part, along with the gymnasium, would be kept and updated as necessary to accommodate the district office functions. The existing district office building would be demolished. The high school building would be remodeled and added to so that the middle school could move to that site.

Scope & Estimated Probable Costs per building:

Wayne District Office Building - \$60,000.00

- Demolition of existing structure

Wayne Middle School (New Elementary) - \$6,000,000.00

- Demolition of all except gymnasium
- Architectural upgrades
- Mechanical Upgrades
- Electrical Upgrades
- Fire Alarm System Upgrades
- Install fire sprinkling system
- 20,000 Square Feet new for elementary

Wayne High School (New HS/MS with Elementary) - \$16,300,000.00

- Demolition of portions of existing high school structure
- 89,700 Square Feet new for HS/MS

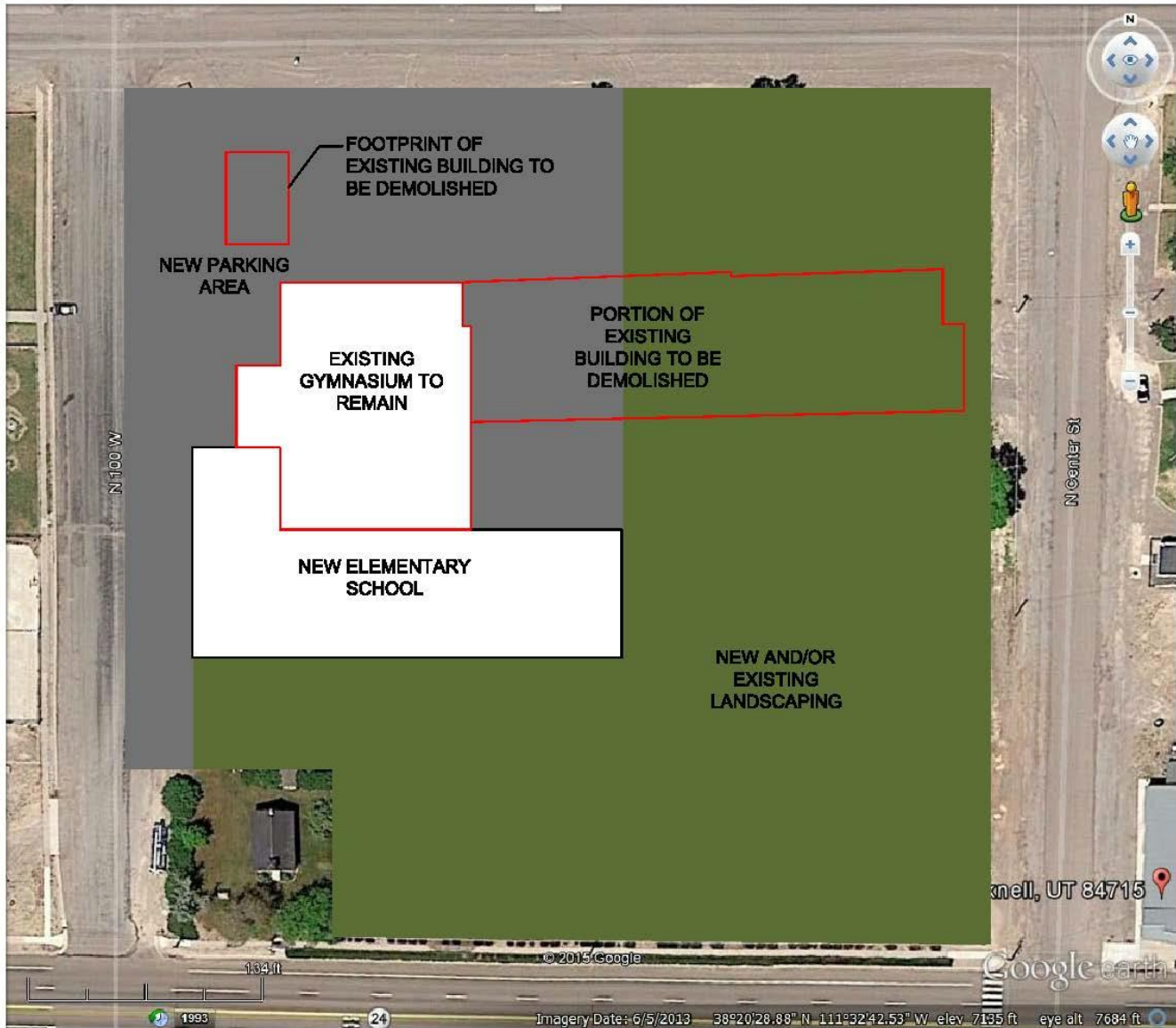
Loa Elementary School (New District Office - \$1,300,000.00

- Demolition of oldest portion of existing structure
- Architectural upgrades
- Mechanical Upgrades
- Electrical Upgrades
- Fire Alarm System Upgrades

Refer to the following drawings pertaining to Option #3.

Recommendations – Option #4

Wayne Middle School (New Elementary School) – Site Layout Schematic



Recommendations – Option #4

Wayne High School with Middle School – Site Layout Schematic



Recommendations – Option #5

Relocate & Remodel – \$22,360,000.00

In this scenario the district office would be relocated to the current middle school building as described in Option #3. The current district office would be demolished. Loa Elementary would remain and be remodeled as suggested by the assessment team. The middle school functions would be moved to the high school site as described in Options #3 & #4.

Scope & Estimated Probable Costs per building:

Wayne District Office Building - \$60,000.00

- Demolition of existing structure

Wayne Middle School (New District Office Building) - \$2,400,000.00

- Demolition of oldest portion of existing structure
- Architectural upgrades
- Mechanical Upgrades
- Electrical Upgrades
- Fire Alarm System Upgrades

Wayne High School (New HS/MS with Elementary) - \$16,300,000.00

- Demolition of portions of existing high school structure
- 89,700 Square Feet new for HS/MS

Loa Elementary School - \$3,600,000.000

- Replace gym roof
- Repair damaged concrete stairs and walks
- Address non-compliant ADA issues both inside and out
- Upgrade roof structure at oldest portion of building
- Install new mechanical system where needed
- Install fire sprinkling system where needed
- Upgrade electrical system if required by new mechanical system
- Upgrade lighting including exit and emergency lighting systems
- Upgrade fire alarm system
- Upgrade data system
- Add power outlets

Appendix A

Architectural Field Notes

Naylor Wentworth Lund Architects
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Wayne School District Facilities Assessment

Wayne School District Office Building

Exterior

- Roof should be replaced
- Many wall shingles cracked/damaged
- Concrete at porches is failing or failed
- Non-compliant ADA ramps & walks

Interior

- Lack of ADA compliance throughout building
- Floor and ceiling finishes are in need of replacement throughout
- Water damage visible on walls

Wayne Middle School

Exterior

- Wood trim at roof should be covered
- Dirt parking on north should be paved
- North Entry
 - Non-descript
 - North Facing entry not desirable
 - Could use a canopy
- Walkway at north side of gym should be replace
 - Could use canopy for weather protection
- ADA non-compliance
 - Exterior classroom doors
 - West Gym entry
- Kitchen delivery and east entry too close together
- Three different architectural styles
 - Mismatched brick
 - Mismatched fascia
 - CMU
 - Modular brick (2 colors)
 - Stucco (some is failing)
- Building is below street on north side lending to potential drainage issues
- Single pane glass
- No insulation on exterior walls

Interior

- Main office not in optimal location
 - Should be moved to afford better views of exterior
- 1955 classrooms
 - Hallway ceiling due for replacement
 - ADA non-compliance in restrooms
 - Toilet partitions
 - Narrow doorways
- Not enough railing on interior ramps
- Inadequate space for shop (safety issue)
- Dust control problem in shop
- Science lab needs (safety issues)
 - More sinks
 - More storage
 - More counter work space
- Door hardware throughout is not ADA compliant
- Roof Replacement
 - 1955 Classrooms & gym

Wayne High School

Exterior

- Inconsistent architecture from addition to addition
- No insulation at exterior walls
- Approach to front entry from roadway is not desirable
- Roof nearing time for replacement

Interior

- Auditorium
 - Carpet ready for replacement
 - No fire curtain at stage
 - Should be fire sprinkled
- Science Classroom acid and flammable storage cabinets not vented
- Restrooms in locker rooms not ADA Compliant
- Ceilings throughout are due for upgrading
- Foods lab
 - Borderline insufficient space
 - Should have demonstration station for the teacher
 - Ceilings should be replaced
- Instrument cages in band room are well-worn
- Aesthetic throughout building is not unified and lacks consistency
 - Multiple flooring types
 - Multiple casework materials
 - Multiple ceiling types
 - Multiple wall finishes
- Main office is located away from the main point of entry
- Insufficient space for wrestling & weights
- Gym mezzanine access is not compliant with ADA

Loa Elementary School

Exterior

- Concrete stairs to boiler room should be replaced (safety issue)
- Concrete failing at stairs to gym and kitchen
- Exterior classroom door access is not ADA compliant
- Exterior windows are non-insulated
- Gym roof should be replaced
- Inconsistent architecture from one addition to the next

Interior

- Low lighting levels throughout
- Office location could be improved for better visibility
- Door hardware is not ADA compliant
- Building is not fire sprinkled
- Wood trim and wood doors are well worn
- Ceilings in the middle section of the school should be replaced
-

Appendix B

Structural Engineer Report

BHB Consulting Engineers
Don W. Barker, S.E.
Structural Engineers
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T: 801.355.5656



April 21, 2015

Report

Building Assessments Wayne School District Buildings Bicknell, Utah

I. PURPOSE AND SCOPE

The purpose and scope of this structural investigation was to:

1. Perform an on-site observation (limited to one visit) to observe the structural condition of the facility.
2. Review any architectural and structural drawings provided to us by Terance White with Naylor Wentworth Lund Architects.
3. Make an assessment based upon the on-site observation and the review of the existing drawings.
4. Write a brief report.

This evaluation is limited in scope and is based on visual observation from our one site visit and the review of existing drawings. No physical tests were made. Also, no demolition was done to any of the architectural systems, such as ceilings, walls, etc.

II. BUILDING DESCRIPTION

The building assessments consisted of four buildings owned by the Wayne County School District. The buildings are: the Wayne County District Office Building, the Wayne County Middle School, the Wayne High School building, and the Loa Elementary School building.

Wayne District Office Building

Based upon the information provided to us by the district, the building was built in 1948, and was donated to the district in 1992. The building has two levels, with the bottom

level being a basement that retains soil the full story height on two sides of the structure, and only a few feet on the other two sides.

The basement has concrete exterior foundation walls all the way around, which are exposed on the exterior of the building where less soil is retained. The interior basement walls are wood framed, and the main floor is wood framed as well. The walls above the basement are all wood framed, and the roof appears to have been constructed with site-built wood trusses, which were overlain with 1x members and asphalt shingles. There is a chimney on the west side of the building that is constructed of unreinforced brick.

Wayne Middle School

From the information provided to us by the district, the middle school building was originally constructed in 1957, and received additions in 1972 and 1991. The building is one story and has masonry walls throughout all phases of construction. The roof members are open web trusses of varying spans and depths with steel web members and wood chord members in all locations. The foundation is composed of standard spread footings with concrete foundation walls at exterior walls.

Wayne High School

The high school building was originally constructed in 1955, and received additions in 1985, 1996, and 2000, and a remodel of a portion of the building in 2008. The building has masonry walls throughout all phases of construction. The original portion of the building has arched glu-lam girders, with sawn lumber beams and 1x tongue-and-groove decking for the roof system. The gym area and classrooms that were part of one of the additions have open web joists with wood chord members and steel web members. The auditorium has open web steel joists with metal roof deck for the roof system.

Loa Elementary School

From the information that we have received, Loa Elementary School was originally constructed in 1953, and received additions in 1978 and 2000. The entire building has masonry walls. The original construction has 3x8 members spanning between bearing walls and 1x tongue-and-groove decking for the roof system. The auditorium and stage area, as well as the classrooms that were part of one of the additions have wood I-joists and plywood decking.

III. OBSERVATIONS

On March 25, 2015, at the request of Terance White with Naylor Wentworth Lund Architects, Dane Hirst with BHB Consulting Engineers, P.C. made a site visit to view the

actual conditions of the structure. The following items were observed for each of the structures.

Wayne District Office Building

The 1x decking and asphalt shingles that are used to roof the building do not provide a suitable roof diaphragm for the transfer of lateral forces. The roofing also has not provided an adequate weather barrier, and water damage of wood members was observed throughout the roof space.

There does not appear to be any truss blocking between any of the roof trusses, and none of the connections of the trusses to the walls below appear to be designed to transfer shear forces.

Several of the truss members and 1x deck members have begun to deteriorate and have split.

The chimney on the west side is taller than twice its least horizontal dimension, which is taller than is allowed for unreinforced masonry by ASCE 31-03. This could be a falling hazard in a seismic event.

The concrete foundation walls that are exposed are deteriorating in many locations. Cracking and spalling was observed in several locations.

The library contains several tall bookcases full of books that are not braced to the floor or walls.

Wayne Middle School

The original construction was not designed for seismic forces, and lacks seismic connections to and a proper load path to transfer these forces from the roof diaphragm to the masonry walls below.

The 1x tongue-and-groove decking that is in place in the original area is likely not nailed into the roof trusses in any regular fashion, and does not provide an adequate roof diaphragm for transferring lateral forces.

The additions appear to have been designed for seismic forces and have what appear to be adequate connections to transfer lateral forces from the roof diaphragm to the walls below.

Wayne High School

The original construction was not designed for seismic forces, and lacks seismic connections to and a proper load path to transfer these forces from the roof diaphragm to the masonry walls below.

The 1x tongue-and-groove decking that is in place in the original area is likely not nailed into the roof trusses in any regular fashion, and does not provide an adequate roof diaphragm for transferring lateral forces.

The additions appear to have been designed for seismic forces and have what appear to be adequate connections to transfer lateral forces from the roof diaphragm to the walls below.

Loa Elementary School

The original construction was not designed for seismic forces, and lacks seismic connections to and a proper load path to transfer these forces from the roof diaphragm to the masonry walls below.

The 1x tongue-and-groove decking that is in place in the original area is likely not nailed into the roof trusses in any regular fashion, and does not provide an adequate roof diaphragm for transferring lateral forces.

The additions appear to have been designed for seismic forces and have what appear to be adequate connections to transfer lateral forces from the roof diaphragm to the walls below.

IV. RECOMMENDATIONS

Wayne District Office Building

In a seismic event of low magnitude, this building would likely perform fair. In a seismic event of moderate to high magnitude, this building would likely pose a high risk to life safety.

We recommend that an adequate roof diaphragm be provided that can adequately transfer lateral forces, and also a roofing system be installed that will eliminate the leaking of water into the building. A proper roof diaphragm could possibly be provided by overlaying the existing 1x decking with plywood sheathing and nailing the sheathing to the roof trusses. Wood members that have experienced enough water damage to reduce their structural integrity should be replaced or strengthened with new wood members.

Truss blocking should be provided between trusses at the wall connections, and adequate seismic connections of the trusses are recommended to be provided at exterior shear walls.

We recommend that the chimney be cut down to meet the requirements of ASCE 31-03 in order to eliminate the falling hazard.

Truss members and other wood structural members that have split should either be replaced or strengthened with new members.

We recommend that any damaged concrete be removed and repaired with concrete patch material. It is recommended that the exposed concrete foundation walls be sealed to prevent further deterioration.

We recommend anchoring the bookcases in the library to the floor or walls behind them.

Wayne Middle School

For the original building, we recommend that a load path be provided for lateral forces, and that adequate connections be provided between the roof diaphragm and the masonry walls below.

A proper roof diaphragm needs to be provided in the original area of construction that is designed to transfer lateral forces. This could possibly be accomplished by overlaying the existing tongue and groove decking and nailing this into the roof trusses.

The additions were designed for seismic forces. The design forces that are required by code today are higher than was required when the additions were designed and constructed, but these areas are not deemed in need of any structural upgrade.

Wayne High School

For the original building, we recommend that a load path be provided for lateral forces, and that adequate connections be provided between the roof diaphragm and the masonry walls below.

A proper roof diaphragm needs to be provided in the original area of construction that is designed to transfer lateral forces. This could possibly be accomplished by overlaying the existing tongue and groove decking and nailing this into the roof trusses.

The additions were designed for seismic forces. The design forces that are required by code today are higher than was required when the additions were designed and constructed, but these areas are not deemed in need of any structural upgrade.

Loa Elementary School

For the original building, we recommend that a load path be provided for lateral forces, and that adequate connections be provided between the roof diaphragm and the masonry walls below.

A proper roof diaphragm needs to be provided in the original area of construction that is designed to transfer lateral forces. This could possibly be accomplished by overlaying the existing tongue and groove decking and nailing this into the 3x8 members below.

The additions were designed for seismic forces. The design forces that are required by code today are higher than was required when the additions were designed and constructed, but these areas are not deemed in need of any structural upgrade.

V. LIMITATIONS

It must be cautioned that the recommendations presented in this report are limited by the extent and accuracy of information available to us during the course of this investigation. Conditions detrimental to the structure may exist which were not visible or were not otherwise discovered during the field observation portion of this investigation. This report is intended for planning purposes and not for construction.

Respectfully Submitted,

BHB Consulting Engineers, PC



Don W. Barker, SE

Appendix C

Mechanical Engineer Report

Van Boerum & Frank Associates, Inc.

Ladd M. Birch, P.E.

Mechanical Engineers

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April 23, 2014

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Re: Wayne School District - Evaluation and Mechanical Review of:
District Office Building
Wayne High School
Wayne Middle School
Loa Elementary

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Dear Terance,

The St. George Office of Van Boerum and Frank Associates visited the (4) Wayne School District properties listed above on March 25 & 26, 2014 to review and note the condition of the mechanical systems. This report is based on information gathered during that field observation day as well as from discussions with different people that occupy and maintain these buildings.

DISTRICT OFFICE BUILDING

The district office building was originally constructed in 1948 by the LDS church and was used by the LDS church until they donated the property to the WCSD in 1992. This 67 year old building is in rough condition as is the mechanical systems. The heating system uses a coal fired steam boiler that feeds convectors through-out the building. The boiler appears to have been upgraded or replaced in the 1960s and is connected to original steam piping installed through the crawl space to the convectors. The pipe insulation has been mostly deteriorated over time or has been replaced and the remaining insulation will probably contain asbestos which was common in pipe insulation from that era. The boiler and piping have far exceeded the American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc. estimation of life expectancy for equipment of this type. The age of this equipment is a real concern in terms of maintenance, efficiency and associated operational costs. Another major problem besides the age of the mechanical system is the lack of outside air. This building does not meet current minimum outside air requirements in order to maintain adequate indoor air quality. Life safety is a concern for occupants when buildings do not meet indoor air standards and this building does not have any outside air currently introduced in the building through the mechanical system. The office area on the upper floor and the data room have been retrofitted with modern air conditioning equipment that appears in good condition. The data room unit is a standard ductless split system with a wall mounted fan coil unit with outdoor condensing unit. The office area is another split system but ducted with supply and return duct. However, the outside air has not been incorporated into the system and should be. The plumbing piping system is most likely all original but there were no negative comments regarding it.

PRINCIPALS

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WAYNE HIGH SCHOOL

Wayne High School was originally constructed in 1955 and has been added onto in 1985 and 1996. The original heating plant has been upgraded from the most likely original coal fired boilers to propane fired boilers. The boilers were manufactured in 2006 and are considered quality boilers by modern standards. Most of the building has roof top units with a propane fired section and a blower section connected to supply and return duct serving it. These units do not have a cooling section but they most likely use an economizer to introduce 100% outside air into the building when cooling is needed. These units are not in a bad condition and could be easily replaced when needed with modern roof top equipment with gas fired heat and direct expansion mechanical cooling for better more comfortable space cooling. The efficiency of roof top unit's gas fired heating sections have not improved much over time so to replace these units with modern gas fired units would not make sense. And the use of the economizers to cool when needed is the most efficient since it doesn't use any electrical energy so the only reason to replace these units is if the cooling isn't very good and/or when the life expectancy of the units has been reached. ASHRAE lists 12.5 as the average life expectancy of RTUs and will meet that in another 4 years. The WCSD should have several years of used past that if these units are properly maintained.

The gym, kitchen, some classrooms, and auditorium were added in 1985 and 1996. The mechanical system in these areas are in good condition and consist of fan coil units and cabinet unit heaters fed by the hot water heaters. The equipment installed in 1985 has exceeded ASHRAE's life expectancy most likely due to a good maintenance program but should be considered for replacement when possible. The plumbing systems and domestic water heaters appear to be in good condition.

WAYNE MIDDLE SCHOOL

The Wayne Middle School was built in 1957 and has a coal fired steam boiler in the heating plant. The boiler is stamped 1971 so the original boiler has been replaced with this one. The boiler feeds a hot water storage tank with heat exchanger for domestic hot water generation when the boiler is firing. In the off season an 80 gallon electric tank water heater feeds the hot water storage tank and the building. The small electric water heater appears in good condition and is roughly 5 years old. The steam boiler is 44 years old now while the hot water storage tank and most likely the piping are original or 58 years old, well past ASHARE life expectancy of 50 years for equipment and piping of this type. The boilers feed convectors and radiators and radiators through the building and with this type of system outside air is neglected and the same concerns as expressed for the District Office are included for this building.

The gym was added in 1972 and the mechanical system installed at that time were (4) suspended outside air units with steam coil section. The steam coil section with the blower section provide heat to the gym while cooling utilizes 100% outside air through the units. This system works and provides adequate cooling and enough heating that only (2) units are needed in the heating months. This system is approaching 43 years old and should be considered for replacement. They are past ASHRAE guidelines for equipment life expectancy. The plumbing system with exception of the 80 gallon electric water heater and another 50 gallon electric water heater serving the Home Education Classroom is all original. The domestic hot and cold water piping was installed using galvanized pipe. The galvanized piping has far exceeded its life expectancy and is most likely a maintenance issue. Galvanized piping has also been proven to rust from the inside out so potable drinking water quality is a concern.

LOA ELEMENTARY

Loa Elementary School was originally constructed in 1953 making it 62 years old, the 2nd oldest building we visited after the District Office Building. Loa Elementary also uses a coal fired steam boiler feeding radiant heaters and convectors and (2) built up multi-zone units. One concern mentioned on site was the furthest classrooms from the multi-zone unit do not heat while rooms closest over-heat. This equipment appears to be original and overdue for replacement. The coal fired steam boiler feeds a steam to hot water heat exchanger that feeds hot water to fan coil units in additions built in 1985 and 2000. The additions included several classrooms, offices and an auditorium. The

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equipment serving this area is original to the addition making it 30 and 15 years old, respectively. The 30 years old units have past their life expectancy and the 15 year old units will in another 7-10 years. A small electric water heater was installed in the attic for the classroom additions and they appear in good condition. The same concern we have for the District Office Building and Wayne Middle School are present in this building too. There is not outside air implemented into the mechanical system not even in the multi-zone units that have some duct. Indoor air quality is most likely an issue here whether known or not. The amount of carbon dioxide increases dramatically from early morning unoccupied hours to mid-morning occupancy when kids start school for the day. This issue should be addressed.

SUMMARY

The condition of the mechanical system in these (4) buildings are typical for their age. It is evident that they have been fairly well maintained. It was also evident that the (3) buildings with the coal fired boilers are in dire need to have them replaced by the amount of soot through-out the building. The cleaning and maintenance to keep this to a minimum needs to be addressed because there appears to be an excessive amount. The age of these buildings ranges from 56 to 67 years old. They have been good buildings in the past but they are less than adequate by modern standards. If investigated using DOE2 energy modeling software, which is beyond the scope of this study, the amount of energy and money spent in operating and maintenance costs compared to a modern building would probably be significant. Replacement of all (4) buildings with mechanical systems is recommended based on the age of the equipment, the type of the equipment, the inefficiency of the equipment, the inefficiency of the building, the cost to maintain, and the lack of adequate indoor air quality.

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Appendix D

Electrical Engineer Report

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WAYNE COUNTY DISTRICT OFFICE ELECTRICAL ASSESSMENT

MARCH 2015

Service Equipment

Electrical service is 120/240V fed from a pole mounted transformer. The main distribution panel is 200A 120/240V. It is located in the basement with the boiler. There is no power factor correction or TVSS. There are three electrical panels fed from main distribution panel. Due to the age of the electrical equipment, maintenance of the electrical equipment (finding new or replacement breakers) will become more challenging as only retrofit or after-market products are available.

Electrical service to the building seems to be adequate for existing electrical needs. However, if any substantial mechanical upgrades occurred, and depending on whether the mechanical upgrades involved electrical or gas equipment, the electrical service would need to be evaluated to determine if it would be adequate.

Lighting

The exterior lighting consists of a few wall mounted incandescent fixtures. Since parking is along the street, the only lighting available for parking is from adjacent city street lights.

The interior lighting is typically acrylic lensed surface mounted wraparound fluorescent fixtures with T-12 lamps and magnetic ballasts. The school district has started to retrofit all T-12 fixtures throughout the district to T-8. At the time of this report, it is estimated that the school district is about 20-25% complete district-wide. There is a lot of good daylight available for lighting during the day. Overall interior lighting seems to be adequate. However, the kitchen and boiler room light levels are "low" considering the types of activities and tasks that are performed in these areas.

There are no automatic lighting controls in the building. All lighting is controlled manually with wall switches.

There are a few exit signs which all appear to be incandescent. However, exit signage, directing egress, is inadequate. More exit signs are required.

There appeared to be no emergency egress lighting throughout the building. This includes the large assembly hall and county library. Calculations should be performed to determine the necessary amount of egress lighting to provide the code minimum of an average of 1 footcandle along the egress path.

Fire Alarm/Smoke Detectors

There is no fire alarm control panel. The fire alarm system consists of (3) battery operated smoke detectors (one located in downstairs corridor and two located in upstairs corridor). There is not a fire sprinkler system. With no fire sprinkling system, the building is required to be completely detected. The (3) smoke detectors do not provide complete detection required.

Intercom

N/A

Data/Internet/Telephone

The main data room is located in a storage room downstairs. The room has an air conditioning system and was sufficiently cool during my visit. The equipment is located on a 2-post equipment rack. Equipment rack is "fitted" with a rack mounted UPS battery back-up. The cables are Cat 6. The system appears to be meeting the district's needs and has room for expansion.

Outlets

The availability of receptacles throughout the office building is insufficient. There is demand for more receptacles. It was observed in several spaces that surface raceway and plugstrips have been installed to provide more outlets.

Security

N/A

WAYNE COUNTY DISTRICT OFFICE ELECTRICAL ASSESSMENT

MARCH 2015

Access Control

N/A

Audio and Video Systems

N/A

Emergency Generator (Emergency Electrical System)

N/A

WAYNE MIDDLE SCHOOL ELECTRICAL ASSESSMENT

MARCH 2015

Service Equipment

Electrical service is 120/208V fed from a pad mounted transformer located just outside of boiler room entrance. The main distribution panel is 350A 120/208V. It is located in basement with the boiler. There is no power factor correction or TVSS.

Electrical service is inadequate for this size of building and will not meet future electrical needs and any anticipated mechanical upgrades.

In 1991, a few classrooms were added. A new panel was installed (Panel 'A' fed from main distribution panel) to feed the new classroom areas. It was noted during my visit that the Shop teacher (who occupies one of the classrooms) regularly experiences "tripped" breakers.

Lighting

There is no parking lot lighting. The only lighting available to the parking lot is adjacent city street lights. There are a few wall mounted metal halide fixtures on the exterior of the building.

In the original portion of the school and in gymnasium locker/classroom areas, the interior lighting is typically acrylic lensed surface mounted wraparound fluorescent fixtures with T-12 lamps and magnetic ballasts. The interior lighting for the 1991 addition is recessed 2X4 fluorescent fixtures with T-12 lamps and energy saving ballasts. The school district has started to retrofit all T-12 fixtures throughout the district to T-8. At the time of this report, it is estimated that the school district is about 20-25% complete district-wide. The gymnasium lighting was recently retrofitted from metal halide to T5HO lamps. Overall interior lighting seems to be adequate for the schools needs.

There are no automatic lighting controls in the building. All interior lighting is controlled manually with wall switches. Exterior lights are controlled with a mechanical time clock.

There are a few exit signs. Signage in the original portion of the school building is inadequate. More exit signs are required in this area of the building.

As for emergency egress lighting, the original portion of the building and gymnasium areas have none. Emergency lighting was provided in the 1991 classroom addition using emergency ballasts in the fluorescent fixtures. However, the locations of the emergency fixtures indicate that the egress lighting is insufficient. Calculations should be performed to determine the necessary amount of egress lighting to provide the code minimum of an average of 1 footcandle along the egress path. In addition, it appeared that some classrooms had been "enlarged" (two classrooms combined into one classroom by removing wall). In these "enlarged" classrooms emergency lighting and exit signs are required if the occupancy is >50 people.

Fire Alarm/Smoke Detectors

The original fire alarm system was old addressable Simplex panel. It appears that the existing cabinet housing has since been retrofitted into a Peak Alarm fire alarm control panel. It is located in the administrative front office. There is not adequate smoke detection or notification throughout the school. The only place with smokes and notification is in the 1991 addition. However, the 1991 addition lacks notification in the restroom areas. There is not a fire sprinkler system in the original section of the school which requires the building to be completely detected. The coverage of horn/strobes and the location of smokes/heat detectors does not meet NFPA standards.

Intercom

The intercom system head end equipment is located in the administrative front office. It is a Rauland system and sits on the counter. There are call-in switches on the wall in the classrooms. The devices are clock/speaker combos. The system operates with the building telephone system. The system appears to meet the needs of the school. However, the system is coming to the end of its life and no longer supported. Maintenance will become more challenging to find replacement electronic components that become defective.

WAYNE MIDDLE SCHOOL ELECTRICAL ASSESSMENT

MARCH 2015

Data/Internet/Telephone

There are (2) data equipment locations in the building. Both locations are in classrooms. The equipment is located on shelving and cabinets. The cables are Cat 6. In the original portion of the school, cabling is not installed in any raceway. Due to the ceiling type in the original portion of the school, cabling is "strung" below the ceiling along the corridor wall. The system is mostly accessed via wireless access points (WAP) throughout the school. The system appears to be meeting the schools needs.

Outlets

The availability of receptacles throughout the school and particularly in classrooms is insufficient. Even in the 1991 classroom addition, there is demand for more receptacles. However, due to the size of the 350A main distribution panel, more receptacles would increase the load on the electrical service which may lead to more "tripped" breakers.

Security

There is a CCTV system. The system is IP based that the administrators can view from a web browser. Doors are secured with manual locks.

Access Control

N/A

Audio and Video Systems

For video systems, each classroom has either a projector or a wall mounted TV. These are all stand-alone as there is no central video distribution system. There is no audio enhancement system in any of the classrooms.

The gymnasium does have a sound system, but it is not operational and hasn't worked for quite some time. It was noted that a "boom box" is wheeled in to play music when necessary.

Emergency Generator (Emergency Electrical System)

N/A

WAYNE HIGH SCHOOL ELECTRICAL ASSESSMENT

MARCH 2015

Service Equipment

Electrical service is 120/208V, fed from a pad mounted transformer. During the 1996 Auditorium addition, the service was "upsized" to a 2000A 120/208V main distribution panel and is located outside next to the service transformer. There is no power factor correction or TVSS.

Electrical service to the building seems to be adequate for existing electrical needs. Even with a mechanical upgrade, the existing service should be adequate. However, depending on whether the mechanical upgrades involved electrical or gas equipment, the electrical service may still need to be evaluated to validate that it would be adequate.

Lighting

There are a few metal halide parking lot lights in front of the main school entrance. There are also wall mounted light fixtures (a mix of metal halide and incandescent) on the exterior of the building.

In the original portion of the school, the interior lighting is typically fluorescent fixtures with T-12 lamps and magnetic ballasts. The interior lighting for the 1996 addition is fluorescent fixtures with T-8 lamps and electronic ballasts. The school district has started to retrofit all T-12 fixtures throughout the district to T-8. At the time of this report, it is estimated that the school district is about 20-25% complete district-wide. There were just a couple areas where the light levels seemed "low" (namely in hallway by auditorium where parabolic light fixtures are being used). Otherwise, light levels seem sufficient throughout the school.

There are no automatic lighting controls in the building. All interior lighting is controlled manually with wall switches. Exterior lights are controlled by photocells.

There are a few exit signs. More exit signs are required in areas of the building. An egress path study needs to be conducted to determine exact egress path directions and then evaluate where exit signs are required.

As for emergency egress lighting, the original portion of the building and gymnasium areas have very little and is not adequate. Emergency lighting in these areas is accomplished using emergency bug-eye units. The emergency lighting provided in the 1996 addition uses emergency ballasts in the fluorescent fixtures. It was also observed that there were a few spaces (Music, Home Ec, Shop, etc.) that should be evaluated to determine if emergency lights and exit signs may be required based on occupancy. Calculations should be performed in the original portion of the building to determine the necessary amount of egress lighting to provide the code minimum of an average of 1 footcandle along the egress path.

Fire Alarm/Smoke Detectors

It was noted that the fire alarm panel had recently been replaced. The new fire alarm panel is an addressable Fire-lite system. It is located in the administrative front office. An assessment of the fire alarm system found a few locations that lacked notification. There are also some restroom areas that lacked smoke detection. There is not a fire sprinkler system in the school which requires the building to be completely detected. The coverage of horn/strobes and the location of smokes/heat detectors does not meet NFPA standards.

Intercom

The intercom system head end equipment is located in the administrative front office. It is a Rauland system and is in a self-contained rack. There are call-in switches on the wall in the classrooms. The devices are clock/speaker combos. The system operates with the building telephone system. The system appears to meet the needs of the school. However, the system is coming to the end of its life and no longer supported. Maintenance will become more challenging to find replacement electronic components that become defective.

Data/Internet/Telephone

There appear to be (4) data equipment locations located throughout the school. While some equipment is located in a rack, others are on cabinets. This equipment is also located in a rack shared with the central video distribution system. The cables are Cat 6.

WAYNE HIGH SCHOOL ELECTRICAL ASSESSMENT

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The system is also accessed via wireless access points (WAP) throughout the school. The system appears to be meeting the schools needs.

Outlets

The availability of receptacles throughout the school and particularly in classrooms appears sufficient.

Security

There is a CCTV system. The system is IP based that the administrators can view from a web browser. Doors are secured with manual locks.

Access Control

N/A

Audio and Video Systems

For video systems, each classroom has either a projector or a wall mounted TV. There is no audio enhancement system in any of the classrooms.

There are sound systems in the gymnasium, music room, and auditorium. The music room sound system does not appear to be functioning as the music teacher seldom uses the equipment. The gymnasium sound system appears to be functioning but could use some upgrading. The auditorium sound system is functioning properly and appears to be meeting the needs of the school.

Emergency Generator (Emergency Electrical System)

N/A

LOA ELEMENTARY SCHOOL ELECTRICAL ASSESSMENT

MARCH 2015

Service Equipment

Electrical service is 120/208V, fed from a pole mounted transformer. The main distribution panel is 600A 120/208V and is located in multi-purpose storage room adjacent to gym. There is no power factor correction, but does have a level 2 TVSS.

Electrical service to the building seems to be adequate for existing electrical needs. However, if any substantial mechanical upgrades occurred, and depending on whether the mechanical upgrades involved electrical or gas equipment, the electrical service would need to be evaluated to determine if it would be adequate.

Lighting

There is no parking lot lighting. The only lighting available to the parking lot is adjacent city street lights. There are a few wall mounted metal halide fixtures on the exterior of the building.

In the original portion of the school and in gymnasium locker/classroom areas, the interior lighting is typically fluorescent fixtures with T-12 lamps and magnetic ballasts. The interior lighting for the 2000 addition is recessed 2X4 fluorescent fixtures with T-8 lamps and electronic ballasts. The school district has started to retrofit all T-12 fixtures throughout the district to T-8. At the time of this report, it is estimated that the school district is about 20-25% complete district-wide.

There are no automatic lighting controls in the building. All interior lighting is controlled manually with wall switches. Exterior lights are controlled with a mechanical time clock.

There are a few exit signs. Signage in the original portion of the school building is inadequate. More exit signs are required in this area of the building.

As for emergency egress lighting, the original portion of the building and gymnasium areas have none. Emergency lighting was provided in the 2000 classroom addition using emergency ballasts in the fluorescent fixtures. Calculations should be performed in the original portion of the building to determine the necessary amount of egress lighting to provide the code minimum of an average of 1 footcandle along the egress path.

Fire Alarm/Smoke Detectors

During the 2000 classroom addition, a new addressable EST fire alarm control panel was installed. It is located in the administrative front office. There is not adequate smoke detection or notification throughout the school. The only place with smokes and notification is in the 2000 addition. The only notification in the original portion of the school consists of a couple "bull" horns located in the central corridor. There is not a fire sprinkler system in the school which requires the building to be completely detected. The coverage of horn/strobes, the location of smokes/heat detectors and the location of pull stations does not meet NFPA standards.

Intercom

The intercom system head end equipment is located in the administrative front office. It is a Bogen system and is in a self-contained rack. There are call-in switches on the wall in the classrooms of the 2000 addition only. The system operates with the building telephone system. The system appears to meet the needs of the school.

Data/Internet/Telephone

There appeared to be only (2) data equipment locations. One is located in the computer lab classroom that was part of the 2000 addition. This equipment is located in a rack. The other location is a small patch panel in the media center. This equipment is also located in a rack shared with the central video distribution system. The cables are Cat 6. There is also a telephone terminal board located in the basement with the boiler. The cabling in the basement was in a state of dis-array. The equipment needs to be upgraded and relocated to a "cleaner" environment.

The system is mostly accessed via wireless access points (WAP) throughout the school. The system appears to be meeting the schools needs.

LOA ELEMENTARY SCHOOL ELECTRICAL ASSESSMENT

MARCH 2015

Outlets

The availability of receptacles throughout the school and particularly in classrooms is insufficient in the original portion of the building. It was observed in several spaces that surface raceway and plugstrips have been installed to provide more outlets. The 2000 addition appears to have adequate outlets.

Security

N/A

Access Control

N/A

Audio and Video Systems

For video systems, each classroom has either a projector or a wall mounted TV. The 2000 addition added a central video distribution system which is located in the media center. There is no audio enhancement system in any of the classrooms.

The gymnasium does have a sound system. It appears to be used only for microphone input and appears to be functioning but could use upgrading.

Emergency Generator (Emergency Electrical System)

N/A