Wiss, Janney, Elstner Associates, Inc.
30700 Telegraph Road, Suite 3580
Bingham Farms, Michigan 48025
248.593.0900 tel
www.wje.com

VACANT HISTORIC SCHOOL BUILDINGS DISPOSITION PLAN

City of Detroit RFP# 19BW2717

Building Envelope and Structural Assessment Report

Carstens Elementary School

Basic Property Information: COD 4-Carstens-2550 Coplin

Short Name:	Carstens
Address:	2550 Coplin Street Detroit, Michigan 48215
Year Built:	1916
Additions Built:	1919, 1921
Outbuildings:	None
Year Vacated:	2011
Building Footprint:	160 feet x 290 feet
Square Footage:	83,084 sq. ft.
Number of Stories:	3
Building Height:	43 ft.

Current Ownership:	City of Detroit
City Council District:	4
SNF District:	JC

Structural Framing System:
- Cast-in-Place Concrete
- Brick Masonry
- Structural Steel
- Wood

Exterior Wall System:
- Brick
- Terra Cotta
- Cast Stone
- Limestone
- Stucco

Window System(s):
- Wood
- Aluminum

Roofing System(s):
- Built-Up Roof
- Asphalt Shingles
- Gutters
- Internal Roof Drains
- Stone Ballast

Assessment Summary

Assessment Date:	May 28, 2020
WJE Inspector(s):	Sarah Rush; Andrew Lobbestael
Report Date:	November 12, 2020
Building Risk Index:	**103.25**

Cost Estimate

Base Rehabilitation Cost Estimate:	$1,692,750
Preparation for Rehabilitation Work:	$900,000
Mechanical, Electrical, Plumbing, Fire Protection ($80/sq ft):	$6,646,720
Sub-Total	$9,239,470
Contingency (25%):	$2,309,867
Sub-Total	$11,549,337
Overhead and Profit (15-18%):	$1,154,933
Sub-Total	$12,704,271
Escalation (6% for 2 years)	$762,256
Sub-Total	$2,693,305
Architectural and Engineering Design Services (20%):	$16,159,833

ASSESSMENT METHODS

Visual Survey

As requested, Wiss, Janney, Elstner Associates, Inc. (WJE) performed a visual review of the building envelope and structure to assess the viability of the building for reuse. WJE was joined by Mr. Andrew Wald of Interboro Partners and Ms. Jennifer Ross and Mr. Garrick Landsberg of City of Detroit Planning and Development Department. During the time on site, Mr. Wald gathered information pertinent to the general building site and layout of the building, and Ms. Ross and Mr. Landsberg assessed the condition of the historic fabric of the building.

WJE performed a visual review of the building facades from grade, using binoculars as needed. Roof levels were accessed above the main low-slope roof level and above the mechanical spaces within the east courtyard. An unmanned aerial vehicle (drone) was also used to take detailed aerial photographs. On the interior, WJE performed a walkthrough of accessible areas of each floor of the building. The interior finishes are in a state of deterioration, exposing the structural framing systems in multiple locations. Up-close examination of building elements and destructive inspection openings involving the removal of building finishes to review underlying conditions were generally not performed.

WJE's observations were documented with tablets and digital photography. WJE has shared our field data with Interboro Partners; City of Detroit Planning and Development representatives; and A.M. Higley Company, the cost estimator for this project. Each observed condition is documented in the field data and assessed as discussed under "Risk Characterization" below. A summary of the conditions observed is provided in the "Building Overview" section below.

Limitations of Assessment

Limited to four hours on site, WJE visually assessed the exposed portions of the building envelope and structure. Recognizing the limitations on visually detecting distress from afar and the limitations on detecting concealed internal distress, the assessment may not include all current conditions. As such, completion of this assessment is not an indication, certification, or representation that all deterioration or hazards have been observed or recorded, including underlying deterioration not evident from the building exterior or interior. Additionally, the conditions of the building elements discussed herein are exposed to further damage and deterioration due to the existing condition and unoccupied status of the property, and as such, WJE cannot state the conditions discussed herein will remain unaltered and as observed during the visual survey. However, we have performed these assessments in accordance with the requirements of applicable regulations and the applicable standard of care for architects or structural engineers performing such services.

WJE identified structural or building envelope issues that have significant impact on the viability of future reuse of the property. Items posing little risk such as regular maintenance items are not included in the assessment. The assessment was limited to within the walls of the building; on-grade walkways, access roads, parking lots, landscaping, play structures, or other site features were excluded from this assessment. The assessment, remediation, and identification of hazardous materials (e.g., asbestos, lead, etc.) or other environmental issues were also excluded. Based on WJE's past experience with building rehabilitation projects, WJE has assumed existing mechanical, electrical, plumbing, interior finishes, and other building

systems are anticipated be removed and replaced with future reuse of the building, and as such, were not included in WJE's assessment.

Document Review

WJE performed a cursory review of documentation provided by Interboro Partners to gain familiarity of the property. The documentation provided included:

- Site Plan (included with this report)
- Floor Plans (included with this report)
- Environmental Reports
- National Register of Historic Places Registration Form

Other documents, such as original construction drawings, specifications, or maintenance records, were not made available for our review.

Risk Characterization

WJE has categorized each significant area of distress, damage, or deterioration observed with a systematic methodology to provide an objective, quantitative characterization of its relative condition and associated risk, or its Condition Risk Index (CRI). The CRI is based on the primary building system affected by the condition and the condition's severity, prevalence, and the associated consequence of failure. A higher CRI score indicates that observed conditions embody relatively higher risk than conditions with a lower CRI. The CRI is the product of each of the rankings below multiplied and normalized to meet a maximum score of 100 per condition.

Specifically, the CRI assigns a numerical value to the following:

- System (Structural, Roofing, Facade, Other)
  Conditions affecting the structure are assigned a higher rating than those affecting the facade or roofing systems. Other includes items such as non-load bearing partition walls and exterior steps, and are assigned a lower rating.
- Building Performance Impact (Minor, Moderate, Advanced, Critical, Imminently Hazardous)

  This parameter addresses the severity of the impact of the observed condition on the performance of the affected building system. Imminently Hazardous is assigned the highest rating. For example, a crack in a concrete slab may be a minor distress, but a damaged prominent skylight is considered advanced distress. Imminently hazardous conditions are discussed immediately with Interboro Partners and the City of Detroit representatives.
- Size/Distribution (Isolated/Infrequent/Frequent/Widespread/Pervasive)

  In short, this parameter rates how large and/or frequent a condition is with respect to the entire affected building system/component. Pervasive is assigned the highest rating. Examples include: an isolated step crack in a masonry wall versus pervasive corrosion of metal floor decking throughout a building.

- Consequence of Failure (Low, Moderate, High)

  This parameter allows inspectors to exercise judgment regarding general risk to the public, considering the unoccupied status of the buildings. High is assigned a higher priority, and, for example, might be assigned to a condition whose failure would result in potential harm within the public right of way. Conditions rated with a high consequence of failure are discussed immediately with Interboro Partners and the City of Detroit representatives.

The CRI for each observed condition is summed to calculate a total Building Risk Index (BRI), as provided in this report. The reported BRI is therefore a numerical expression of the relative risk present at one property, as compared to other properties in the scope of this assessment.

Both the CRI and the BRI are expressions of WJE's professional opinion of the relative significance of an observed condition to other building conditions, and the collective relative risk of the structural and building enclosure elements of this property. Neither the CRI nor the BRI are an expression of actual risk or probability of occurrence of any event. The CRI for each condition is tabulated in WJE's electronic field notes. The BRI provides a numerical tool for the project team and the property owners to compare and make decisions about this property and the other properties included in this overall effort, in context with the cost estimate, market analysis and community input. Both the CRI and BRI are intended only for this assessment project. The numerical values do not have substantive meaning beyond the context of the Vacant Historic School Buildings Disposition Plan project.

Recommendations

Recommendations developed in the assessment are conceptual and are intended for budgetary and planning considerations. Recommendations are provided within the narrative below, and in the field data provided. It is not the intent or purpose of this report or the field data to direct a contractor to bid, or otherwise implement, the recommendations. Significant additional investigation by various professional disciplines is necessary to develop appropriate scopes of repair and rehabilitation efforts to enable the re-use of any facility included in this assessment.

Cost Estimating

The rehabilitation costs are opinions of probable construction cost and have been developed with the assistance of A.M. Higley Company, a contractor familiar with rehabilitation of historic buildings. The costs have been developed for evaluating the relative cost of repair of distressed conditions as well as establishment of order-of-magnitude repair budgets. They are based on national construction cost data, adjusted based on the local construction market, and our experience with similar past projects.

Understanding the rehabilitation cost may vary depending on type of future occupancy, this assessment assumes the building will be rehabilitated to a weathertight and "grey box" condition with unfinished walls, flooring and ceilings; no mechanical, electrical, plumbing or other building systems installed. The costs assume the rehabilitation work would occur in 2022 and are not inflated should the work occur in future years.

In addition to this "grey box" base rehabilitation cost, an allowance, based on percentage of costs and square footage of the building, is delineated for:

- Preparation for Rehabilitation Work
- Mechanical, Electrical, Plumbing, Fire Protection ($80/sq ft)
- Contingency (25%)
- Overhead and Profit (15-18%)
- Escalation (6% for 2 years)
- Architectural and Engineering Design Services (20%)

The preparation for rehabilitation work item includes mobilization, hazardous material abatement as well as salvaging for potential later duplication or re-installation pertinent historic interior finishes identified by the City. For the purposes of the cost estimating effort, all roofing replacement or repair work is recommended to be performed with like-kind materials; all windows are assumed to be replaced with new commercial window assemblies in lieu of restoration of existing elements, and any exterior doors are to be repaired or replaced in like-kind. Where like-kind materials may no longer be available, WJE will offer alternative materials for the cost estimating purpose. For rehabilitation design and construction efforts, further evaluation of each of these elements is recommended. All work is recommended to be performed as per the Secretary of Interior's Standards for The Treatment of Historic Properties.

The condition-based subdivision of repair recommendations used to develop the base cost estimate is not representative of how a repair program could be implemented to remediate building conditions. Moreover, the costs assume that all repairs would be remediated in the same rehabilitation project. Execution of separate repair projects, or phasing of the rehabilitation project, could result in increases in the total repair cost. Furthermore, the final scope of repair work and the actual repair costs may vary depending on underlying or concealed conditions that were not apparent during our limited assessment.

BUILDING OVERVIEW

Overall

The original, two-story building was constructed in 1916 with two-story additions completed in 1919 and 1921. The 1919 addition included two wings which extend from the east side of the original building and frame the mechanical spaces (i.e. coal, fan, and boiler rooms) at the basement level. The 1921 addition extends from the south end of the original building. Windows are present at the basement, first, and second levels; classrooms within the basement level are finished and include stairwells to access egress windows.

The original facades consist of multi-wythe clay brick masonry laid in a running bond without header courses in the exterior wythe. Ornamental terra cotta bands extend over the second story windows and are present at continuous sills at the first-floor level and horizontal belt courses. A limestone belt course is located near grade. Spandrels between the first and second floor windows have an ornate, diamond-patterned brick design with stucco infill. Stucco-faced panels are also located within horizontal bands above the basement and second floor windows. Ornate stone carvings, which appear to be carved from dolomite stone, are present on either side of the main west entrance; stone pillars and ornate brickwork are present above the entrance doors. Windows are wood framed with aluminum caps on the exterior; the window sashes are currently missing but likely consisted of aluminum replacements set within the original window openings. The building entrances generally consist of conventional steel doors.

The facades of the 1919 and 1921 building additions are similar to that of the original construction with a few material variations. The two east 1919 additions have red-colored cast stone materials in lieu of terra cotta at the lower horizontal bands and sills, as well as coated limestone units at the horizontal belt course in lieu of stucco-faced brick masonry. The south 1921 addition contains variations from both previous construction eras depending on the facade.

The hip roof has asphalt shingles along the building perimeter and a low-slope, internally drained roof at the interior of the building footprint. The low-slope roof consists of a smooth-surfaced bituminous built-up roof (BUR) with an aluminum coating. The hipped roofs overhang the exterior walls creating ornate wood soffits with decorative rafter tails. The hipped roofs are drained with external gutters and downspouts. The roofs of the southeast 1919 addition and above the mechanical spaces within the east courtyard are low-sloped with perimeter masonry parapets and clay tile copings. These roof areas consist of internally drained, bituminous built-up roof (BUR) assemblies with slag surfacing and granulated cap sheet base flashing. The BUR assemblies may be coal tar or asphaltic based. An elevated structural slab is located at grade over the fuel room within the east courtyard, which has an exposed concrete surface and several manhole covers. Bituminous material is visible from the underside of the manholes, but the type and extent of a waterproofing system, if present, is unknown at this time.

The roof structure in the original building is composed of wood decking supported by wood joists and rafters supported by wood framed trusses. The roof framing in the additions typically consist of wood decking supported by wood joists and rafters supported by steel trusses. The roof framing over the gymnasium and auditorium consists of cast-in-place concrete over gypsum planks supported by steel channels that span between built-up steel trusses. The trusses are typically supported by load bearing brick masonry walls at the exterior and interior. The floor framing for the building typically consists of

concrete tee joist-slab construction with stay-in-place clay tile masonry forms. The floor framing is generally supported by load bearing masonry walls although concrete columns were present in isolated locations.

In general, the building is in serviceable condition with localized areas of distress. Various components of the roofing assemblies are severely damaged or deteriorated, resulting in masonry distress, wood decay, and concrete deterioration within the wall assemblies and structural systems below, as well as damage to the interior finishes. The structure is generally in serviceable condition with a few areas with more advanced deterioration that warrant repair including decayed roof framing, the deteriorated concrete roof slab over the fuel room, and a partial collapse of the parapet, roof and exterior wall at the northwest end of the southeast addition (near the auditorium). The majority of observed facade deterioration is attributed to water infiltration, as well as subsequent corrosion of the embedded steel support elements and reinforcing. Window assemblies exhibit significant distress due to damage from vandalism and deterioration, requiring replacement. Further detail of the observed distress is provided below.

Facade

The masonry is generally in fair, serviceable condition. Where downspouts are missing or gutters are actively leaking, deterioration within the facade includes decay of the wood soffit and framing within the roof overhangs, significant mortar deterioration of the brick and stone masonry, cracking and spalling of the stucco, peeled and missing paint on the limestone horizontal bands, and localized efflorescence and water staining. On one area on the west facade, a missing downspout has resulted in a large soil washout, approximately three feet deep. The exposed waterproofing and common brick units are deteriorated in this area and should be repaired in conjunction with replacement and repair of the downspouts and gutters. The brick masonry beyond the failed downspouts is generally in good, serviceable condition.

A surface-applied parge coat over common brick is present at the base of the facades. In some regions, particularly at the failed downspouts, the parge coat material is unsound or missing. The exposed masonry contains localized areas of mortar deterioration and spalled brick units. Water infiltration was evident within the basement rooms at these regions, as exhibited by moisture on the wall surfaces and failed and peeling paint. Rehabilitation of the building should include removal of the unsound patch and membrane materials, repointing of unsound mortar, replacement of spalled brick units and installation of an appropriate surface-applied repair material and/or waterproofing detailing to mitigate water penetration into the wall assembly and further masonry distress.

Localized cast stone units are spalled, cracked, or displaced, with corroded reinforcement visible at some spalled surfaces. The observed distress is attributed to water infiltration in the wall assembly and vandalism. Displaced units may be reset, while other distressed units should be repaired or replaced. The terra cotta units exhibit similar localized distress. Several units are missing above the main west entrance, which may be replaced in-kind or by using alternative materials to restore the original aesthetic. Some regions of terra cotta within the upper band are displaced and should be further investigated to verify the cause of distress and develop appropriate repairs. Localized, cracked, or spalled terra cotta units may be repaired in-place.

On the north facade, displacement is visible across the joint between the original building and the east addition, possibly due to differential settlement or lack of an expansion joint. We recommend this

condition be repaired with an appropriate expansion joint detail to accommodate future movement. Should the distress reoccur, further investigation into potential settlement of the building foundation will be warranted.

Corrosion of the steel lintels was observed, with some areas containing masonry distress and lintel displacement due to the development of pack rust. Locations containing significant masonry distress should be rebuilt to include installation of flashing with a durable repair detail at the corroded lintels. Lintels with only minor corrosion and limited masonry distress may require only maintenance repairs to extend the life of the associated elements, such as cleaning and painting the exposed steel elements and repointing deteriorated mortar joints.

At least two previous masonry repair projects have been completed at the building based on the observed brick unit replacement types and variations in the repair detailing. These past projects have included localized steel lintel repairs; replacement of localized brick masonry, cast stone sills, and masonry spandrels; patch repairs to the terra cotta and stucco; installation of metal panels to cover or replace apparent deterioration within the masonry spandrels; and localized repointing of distressed mortar. The repairs largely remain in good, serviceable condition, though some areas show indications of continued deterioration and likely require repair with improved, durable repair detailing and maintenance.

Within the northern east wing addition, some regions of mortar contain lines or cracks at the surface of the mortar. The mortar is eroded, as expected for this building age, and does not exhibit other indications of distress. We believe the surface imperfections are ice crystal imprints from the building's construction where water used in the mortar mix had frozen before the mortar set. These regions are not related to freeze-thaw damage and do not require repair.

The majority of the windows are missing or damaged, including missing sashes, missing and decayed frames, missing and displaced aluminum covers, and broken glass. The exterior steel doors are typically corroded near the base, dented, or missing. Rehabilitation of the building should include replacement of the window and exterior door assemblies. Temporary systems should be installed to secure the interior of the building from trespassers.

The upper four feet of the brick masonry chimney is significantly deteriorated and displaced. A large vertical crack extends down the east and west faces of the chimney. At the base of the chimney, significant water-related deterioration is present including deteriorated mortar and spalled and collapsed brick units. This distress is attributed to a failed gutter above and subsequent freeze-thaw damage. Cracked, displaced, and missing brick units should be rebuilt and the distressed mortar joints should be repointed.

Roofing

Deterioration within roofing assemblies is leading to significant damage to the wall assemblies, structural systems, and interior finishes, though the extent of roofing distress varies by region.

At the asphalt shingled hipped roofs, localized areas of the asphalt shingles are missing, exposing the underlayment and roof deck. The wood decking is also exposed in several of these regions, which has either decayed or collapsed due weather exposure. Flashing elements at the transition between the low-sloped roof and the steep sloped roofs are missing or displaced, often correlated with areas of missing shingles. The dormer is missing above the main west entrance. Areas of missing shingles require

replacement in conjunction with repairs to the roof structure and replacement of the missing dormer. Temporary measures are recommended in the near term to stabilize the observed deterioration and mitigate additional distress to the wood-framed structural system. Flashing elements and downspouts are missing, which has been attributed to vandalism. These elements should be replaced or repaired as needed to mitigate further distress to the wall assembly and wood soffit elements.

At the main low-slope roof level that extends between the hipped roofs, the drain conductors and rooftop mechanical units are missing. However, based on a lack of water intrusion or evidence of wood decay below the field of the low-slope roofing, the roof itself appears to be performing well in this region. Maintenance repairs within the field of the roof should be performed to extend the service life of the existing roof assembly in conjunction with the more significant repair work to the drainage system and rooftop units.

The low-slope roof over the southeast addition is damaged from the collapsed roof structure and should be replaced in conjunction to the structural repairs, discussed in further detail below.

The roofing of the multiple low-slope roof levels located over mechanical spaces in the east courtyard is significantly deteriorated, warranting removal and replacement. Several clay tile copings are cracked or missing. Several of the sheet metal flashings at the roof material have been removed, and the base flashings are pulled away from the masonry substrates, resulting in water infiltration into the wall assembly and building interior. Significant concrete deterioration is present near failed drains and conductors, and organic growth and vegetation are present on the roof surface. The elevated concrete structure over the fuel room is deteriorated due to an insufficient and/or deteriorated waterproofing system. Concrete repairs of the roof structure, discussed below, should be coordinated with the waterproofing and roofing repairs.

Structure

Overall, the structure is in good condition with localized areas of significant distress throughout. The plaster finishes are distressed in these same areas, exposing portions of the structural framing systems.

The wood roof framing has localized areas of decay and collapsed wood decking due to roof leaks primarily at the transition from the steep-sloped hip roofs to the low-sloped roofs. The largest area occurs at the west side of the 1920 addition where the water leaks are also causing extensive damage to the ceiling finishes below. Decayed wood roof framing is also present at the east end of the south wing of the original building and the south slope of the north 1919 addition. We recommend replacing the decayed wood framing and repairing the wood decking and roofing.

The concrete structure above the fuel room, boiler room, and fan rooms are deteriorated. The most severe deterioration occurs above the fuel room where the bottom reinforcing steel in the slab is corroded and exposed due to spalls. Some of the reinforcing bars exhibit significant section loss. At least one beam above the fuel room also has corroded steel exposed and cracking occurring near a concrete column. The concrete slabs in the boiler room and fan rooms are in better condition, but also exhibit isolated cracks, peeling paint, moisture stains, corrosion stains and deteriorated concrete at a floor drain. The concrete distress is most likely caused by long term exposure to moisture. We recommend that the concrete be repaired. Further investigation would be required to determine the most appropriate repair approaches for the slabs which could vary from underside shotcrete repairs to full-depth replacement depending on

the thickness and overall condition of the slab. We recommend form-and-pour repairs for the beam repairs. The concrete repairs should be coordinated with the replacement of the waterproofing system above.

There is bulging and cracked brick masonry at the west exterior wall above the main entrance. The brick is bulging inward. The cause and severity of the bulging is not well understood at this time. We recommend further investigation to determine if this is a structurally significant condition. In the meantime, we recommend this condition be monitored.

The partial roof collapse adjacent to the auditorium should be repaired. The roof appears to be in a stable condition at this time since the steel channels supporting the roof deck are resting on sound masonry. Repair of this area will require replacement of about 200 square feet of the roof structure in coordination with the re-roofing and masonry wall repairs.

A few of the steel lintels at openings in the load bearing interior masonry walls exhibit corrosion with associated areas of adjacent masonry distress. The steel lintel at the passageway between fuel rooms has undergone significant section loss and the brick masonry above and adjacent to steel is loose, displaced, and appears friable (soft/powdery). Where the steel corrosion is minor, we recommend cleaning the exposed steel surfaces, assessing the extent and severity of the corrosion, and repairing as appropriate. At this time, we anticipate recoating the steel will be adequate for most cases. However, we recommend replacing the lintels in the passageway between fuel rooms; this effort will require temporary shoring.

The steel trusses in the additions exhibit localized areas of corrosion. We recommend cleaning and coating the corroded areas of the steel framing.

Miscellaneous

Many of the interior CMU walls are cracked. We recommend further investigation to determine the cause of the distress, but it is suspected to be related to the water infiltration occurring and thermal or volumetric changes in the wall materials. Cracking within select walls, such as interior classroom walls, may be related to the relative stiffness of the walls within the structural building frame system. Repointing of the cracked mortar joints and replacement of cracked units is recommended. These cracks may recur after rehabilitation and remain an ongoing maintenance item unless the underlying cause of the cracking is further assessed and mitigated.

The stone steps at the main west entrance are displaced. We recommend that the stones be reset to prevent tripping hazards. This should be coordinated with any accessibility improvement that may be part of a rehabilitation project.

PLOT PLAN.
HATTIE CARSTENS SCHOOL.
BOARD of EDUCATION.
DETROIT.
Dept of Building & Grounds
Drawn by SHH. 2.6-28.

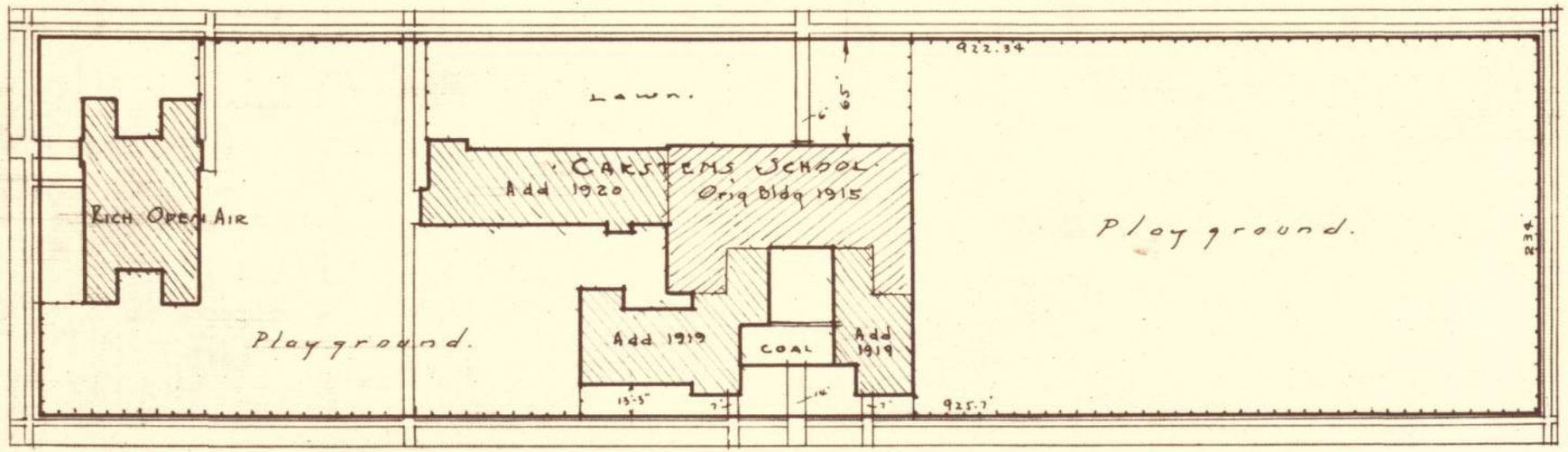
4.96 ACRES.

COPLIN AVE. 60'

WATERLOO AVE 60'

CHARLEVOIX AVE 60'

LAKEVIEW AVE 60'



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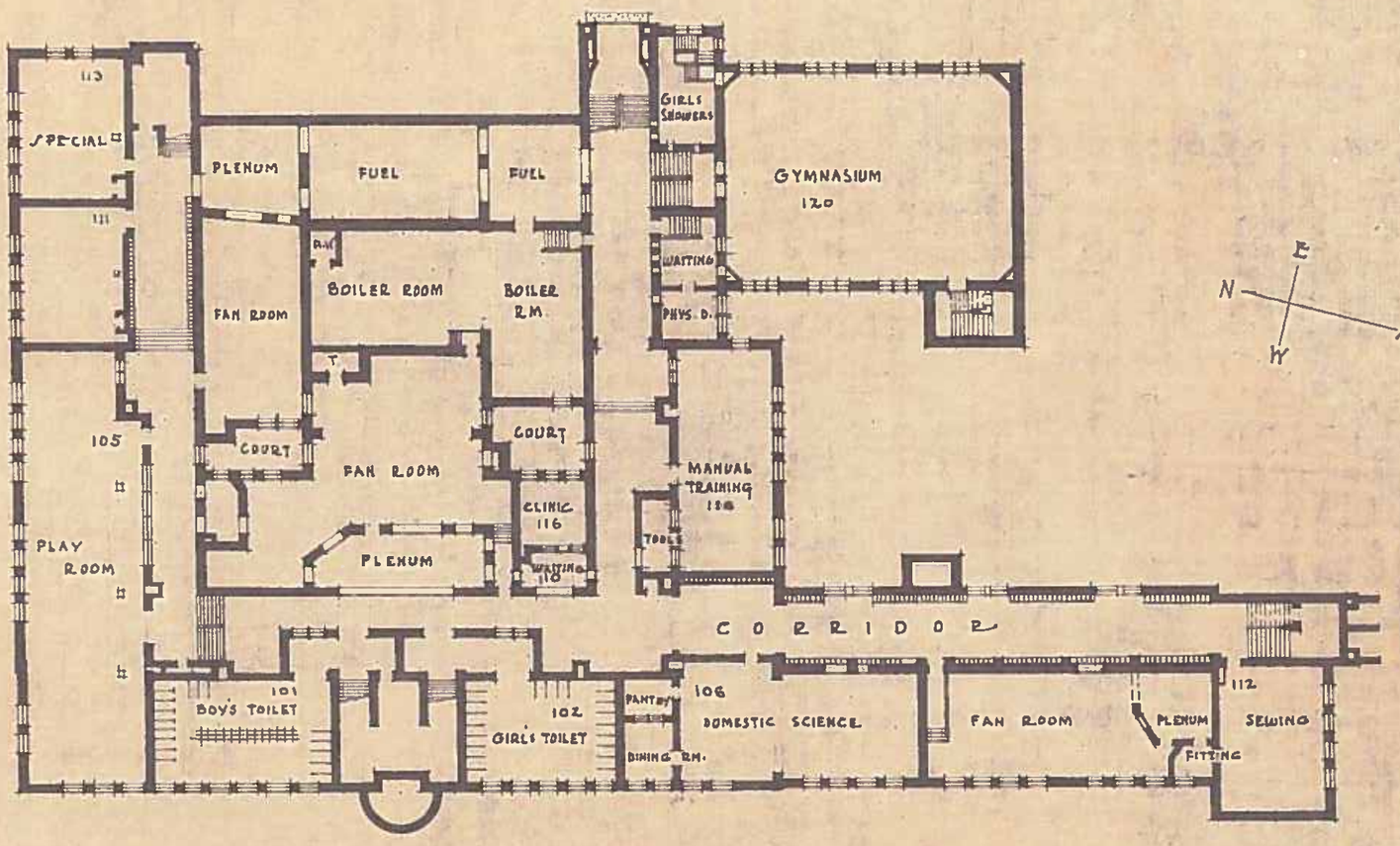
Scale 1" = 100'

HATTIE CARSTENS SCHOOL
BASEMENT PLAN
SCALE 1/32 = 1'-0"

DEPT. OF ARCHITECTURAL ENGINEERING
BOARD OF EDUCATION
DETROIT MICH.

DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
W.H.M.	1-14-21				



BASEMENT PLAN
SCALE 1/32 = 1'-0"

HATTIE CARSTENS SCHOOL
FIRST FLOOR PLAN
SCALE 1/32" = 1'-0"

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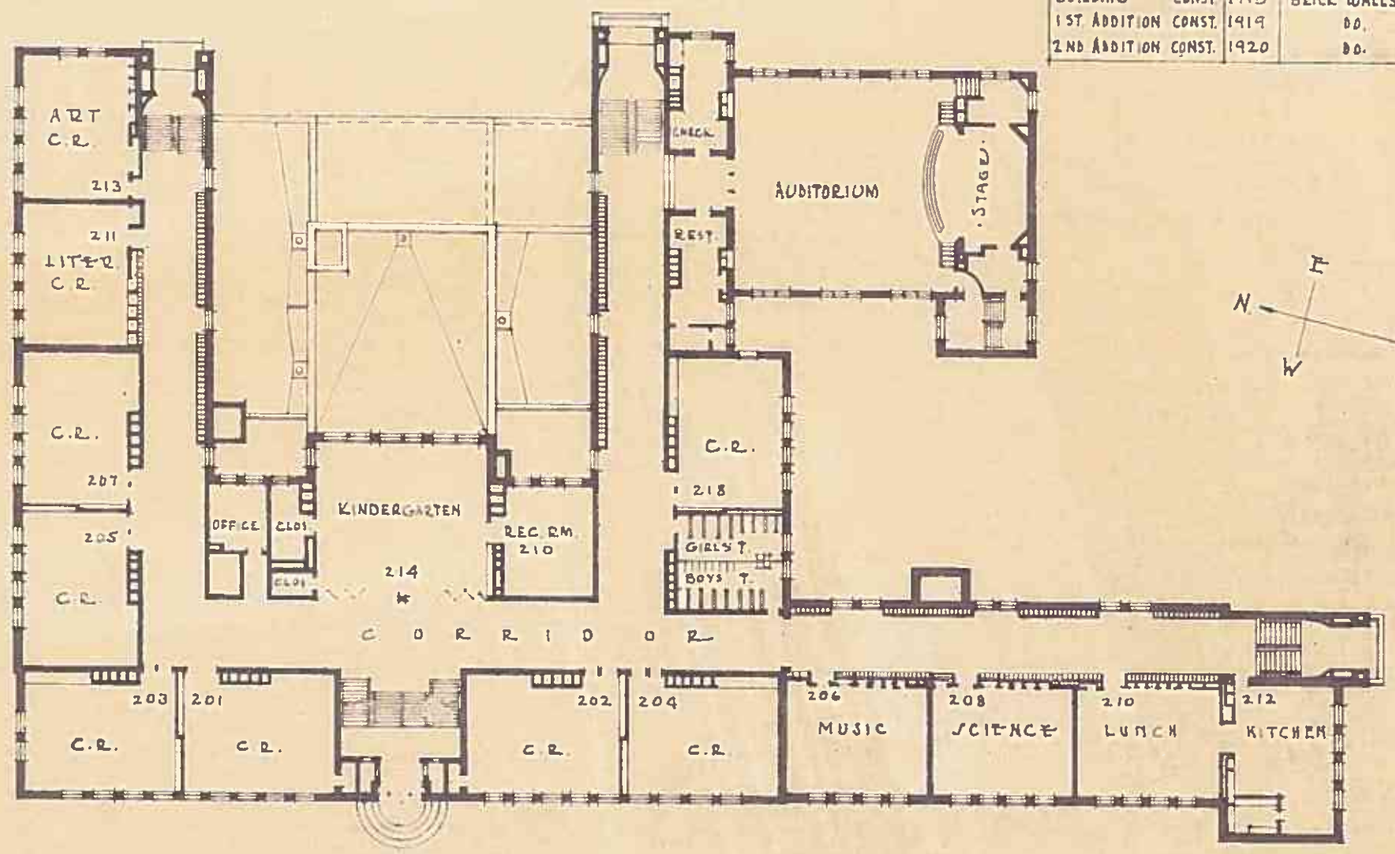
DETROIT MICH.

DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
W. H. M.	1-14-21	C			

BUILDING CONST.	1915	BRICK WALLS	CONCRETE FLOORS
1ST ADDITION CONST.	1919	DO.	DO.
2ND ADDITION CONST.	1920	DO.	DO.



FIRST FLOOR PLAN
SCALE 1/32" = 1'-0"

HATTIE CARSTENS SCHOOL
SECOND FLOOR PLAN
SCALE 1/32" = 1'-0"

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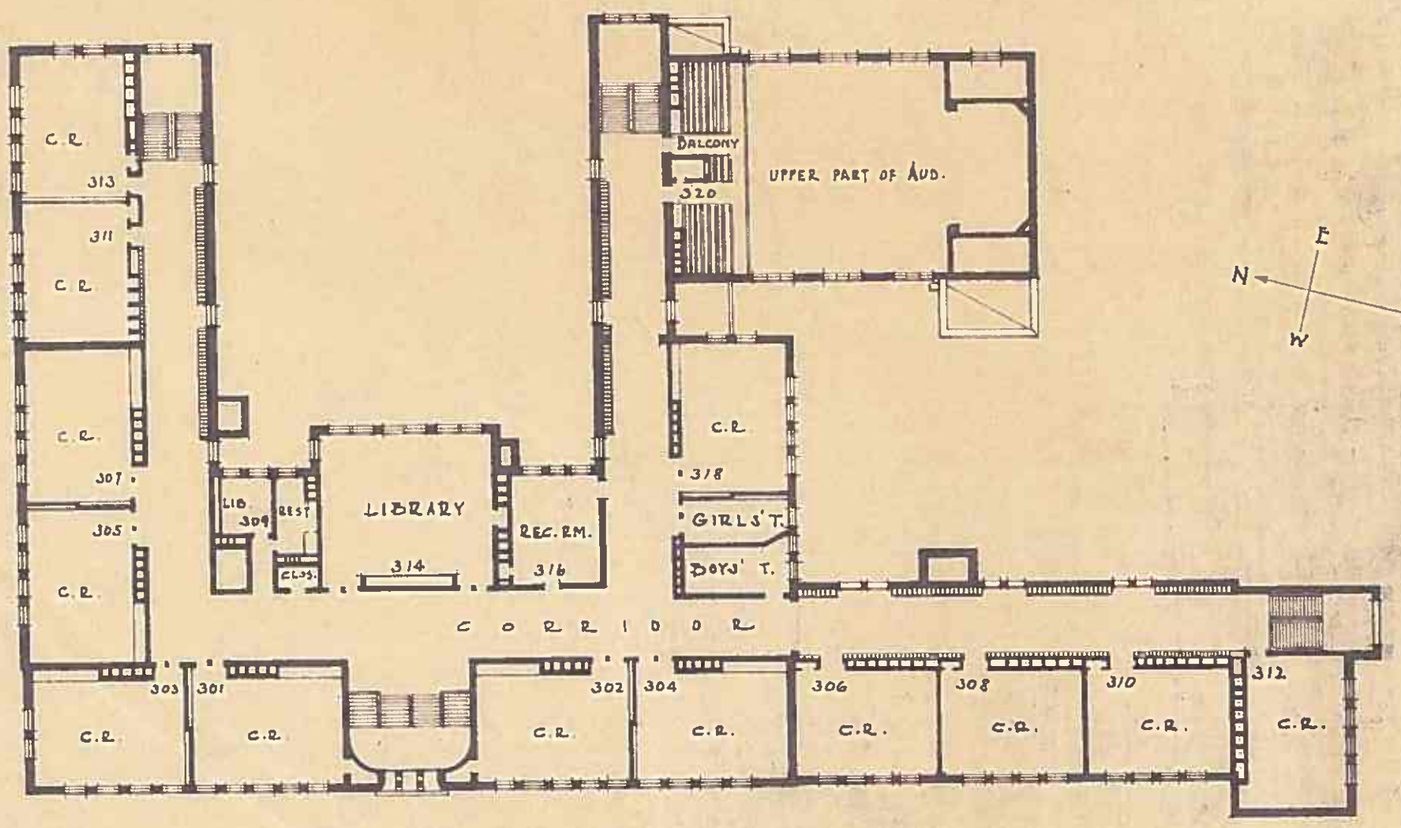
DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
W.H.M.	1-14-21				



SECOND FLOOR PLAN
SCALE 1/32" = 1'-0"