HISTORIC STRUCTURE ASSESSMENT

EDGAR KESNER MEMORIAL BUILDING

E. 9th Street and D Street
Salida, Chaffee County, Colorado 81201

Figure 1. Kesner Building, 1922.

Funded by Colorado Historical Society State Historical Fund Project No. 2002-HA-041 and Chaffee County School District RE32J

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1.0 INTRODUCTION

1.1 RESEARCH BACKGROUND / PARTICIPANTS

The purpose of this project is to provide a comprehensive understanding of the condition and preservation needs of the Edgar Kesner Memorial Building to allow Chaffee County School District RE-32-J to make informed decisions about its continued use.

This report was prepared by Central Colorado Preservation Partners, Inc., with Gary W. Higgins as preservation architect and Jackie W. Powell as preservation planner. Structural engineering was provided by Monroe and Newell Engineers. Historical information was provided by Front Range Research Associates, in conjunction with their 2003 nomination of the property to the State Register of Historic Places.

Cash match for State Historical Fund grant 2002-HA-041 was provided by the School District.

1.2 BUILDING LOCATION

LOCATION

Kesner Memorial Building, also known as Kesner Junior High School, is located at East 9th Street and C Street in Salida, Chaffee County, Colorado. Geographically, it is in Township 49N, Range 9E, Section 5 of the Salida East, Colorado quad map. The UTM reference is Zone 13, Easting 413259, and Northing 4264595.

The nominated area consists only of the building footprint.

VICINITY MAP

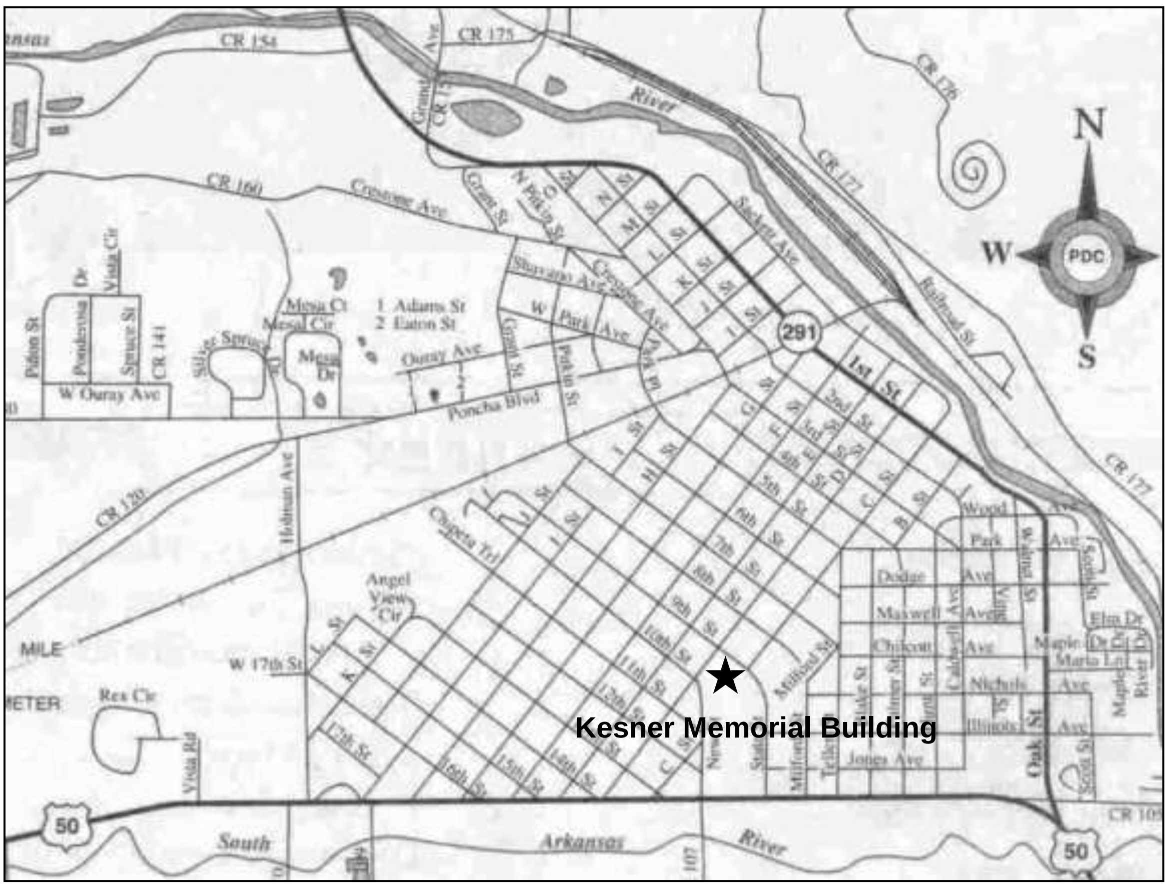

Figure 2. Vicinity Map. Not to scale.

SITE PLANS

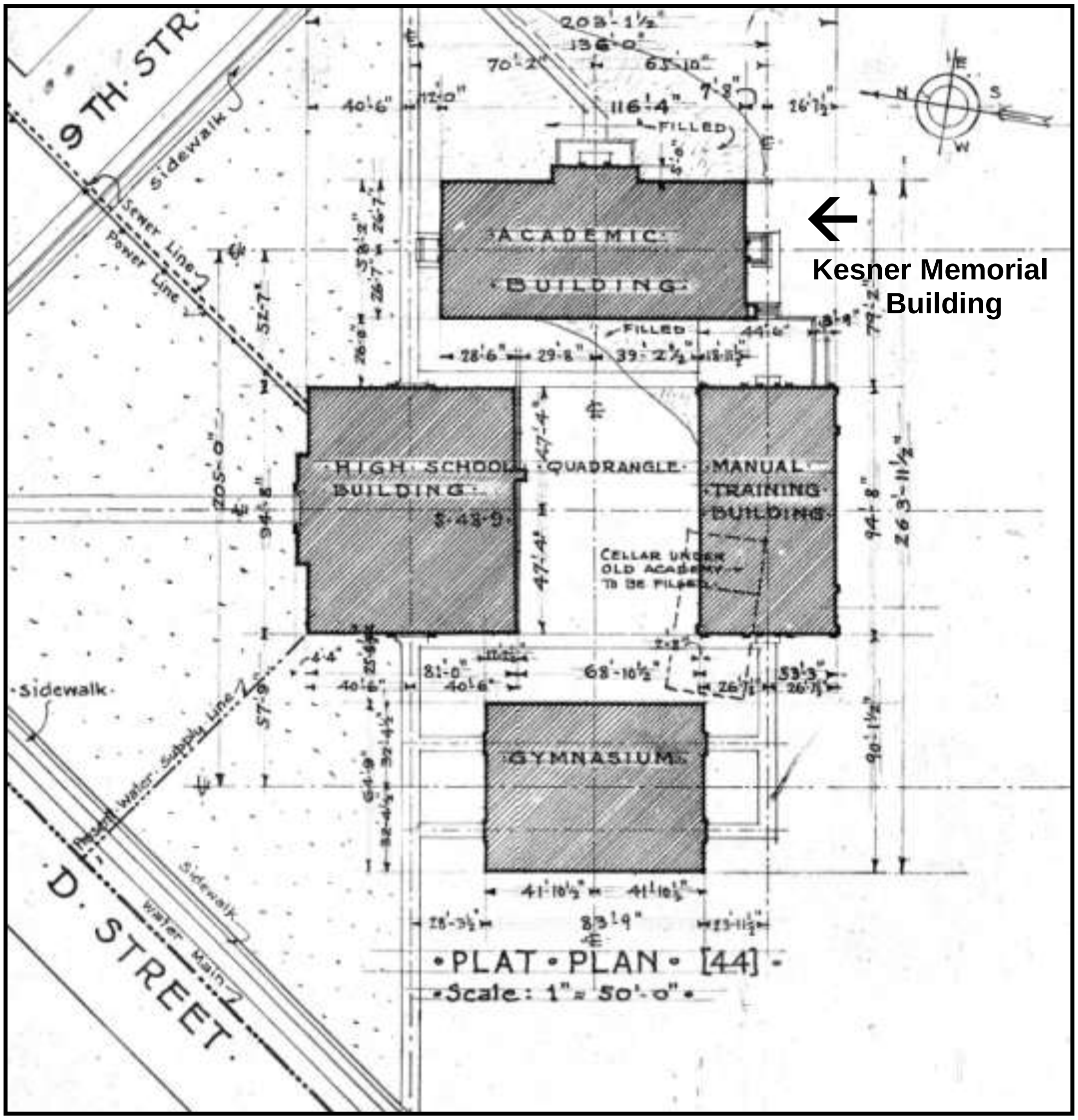

Figure 3. Architects Cooper and Desjardins prepared this plat plan for the school grounds showing the relationship of the various buildings. The Kesner Memorial Building is at the top, labeled "Academic Building." SOURCE: Cooper & Desjardins Architects, "Academic Building, Salida High School," Sheet No. AC-8, job number 281921, 1 March 1922, Pueblo, Colorado.

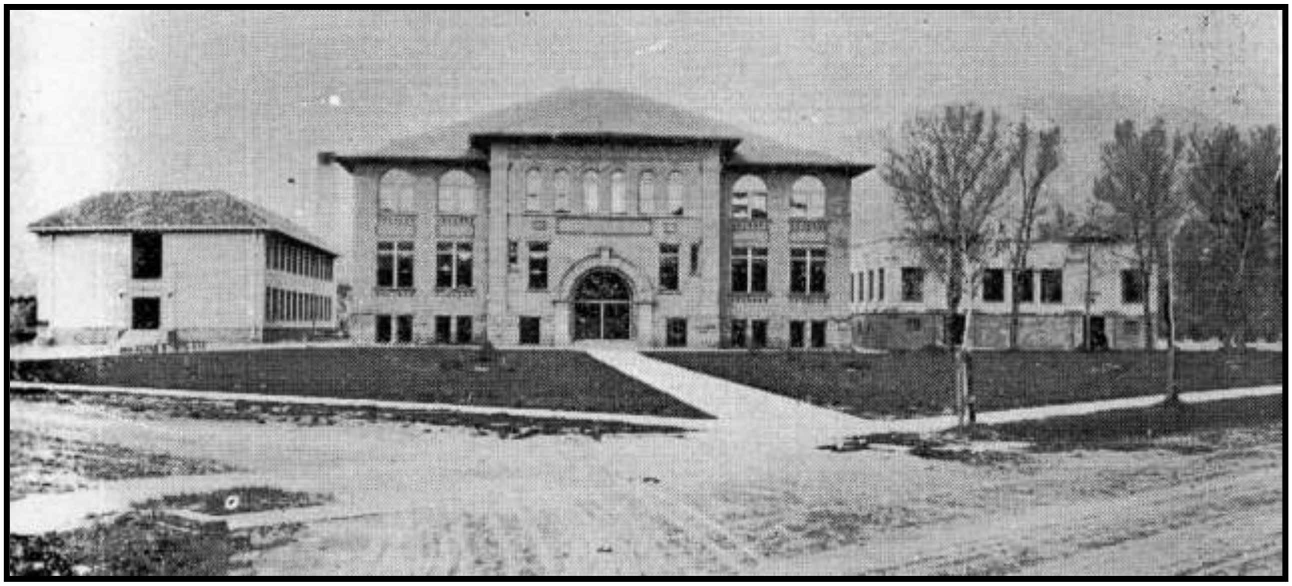

Figure 4. This 1937 view of the school grounds shows the 1910 high school building (no longer standing) flanked by the Kesner Memorial Building (left, showing north and west walls) and the gymnasium (right). SOURCE: Le Résumé (high school yearbook), 1937.[1]

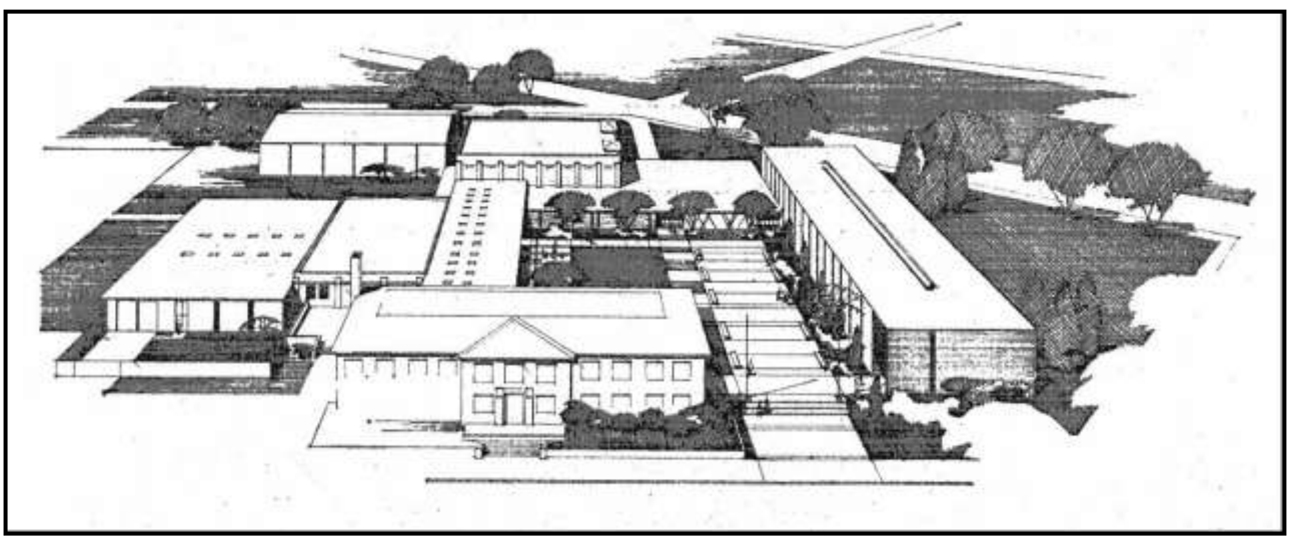

Figure 5. After the old high school burned in 1962, architects Ditzen, Rowland, Mueller & Associates of Boulder prepared this perspective drawing (view west) showing the new high school campus. The Kesner Building is in the center foreground. Melien Hall, erected in 1978, now occupies the northeast corner of the site. SOURCE: Mountain Mail, 25 October 1963.[1]

[1] FRRA 2003

Figure 6. Kesner Memorial Building in 2003. Looking west.

2.0 HISTORY AND USE

2.1 ARCHITECTURAL SIGNIFICANCE AND CONSTRUCTION HISTORY[2]

DESCRIPTION

The Edgar Kesner Memorial Building is a two-story rectangular brick building crowned by a tile roof and featuring a projecting central pavilion. The school is located in a residential neighborhood in southern Salida, the county seat of Chaffee County. The building is part of a complex of Salida High School facilities bordering a quadrangle and including historic buildings erected at the same time as the Kesner Building and modern buildings erected after the original high school building burned in 1962.[3] Connecting passageways between two modern buildings of the complex are attached to the north and west (rear) walls of the Kesner Building…. South of the complex are a brick field house and open athletic fields, while a small school district office is located across Ninth Street one block northeast. Landscaping in the immediate vicinity of the building includes a terrace extending from the front wall to a concrete retaining wall with pebble dash finish, as well as small bushes planted near the foundation.

The low-pitched hipped roof of the Kesner Building has overhanging eaves with exposed rafters and is clad with regularly laid clay tiles in shades of red (the predominant color), blue, black, gray, and beige. The buff brick building includes a sandstone water table with tooled top and a raised concrete foundation with pebble dash finish. All original windows have been replaced with two-part metal frame windows and horizontal colored panels.

The symmetrical façade (east wall) has a central projecting pavilion with pyramidal hipped roof. The first and second stories of the pavilion feature three large window openings. There is a rock-faced stone lintel course at the top of the wall and the sills are brick. The first story windows have two projecting bricks at each corner that support the sills. Spandrels are ornamented with panels of stacked header brick enframed with projecting header and rowlock bricks, with square stone accents at the corners. On the first story of the pavilion, a central window (formerly the location of the main entrance) is flanked by paneled brick pilasters with stone bases and capitals featuring stone trim and diamond-shaped insets…. Above the window is a large stone plaque inscribed “1922.” At the northeast corner of the pavilion is a black granite cornerstone reading “Edgar Kesner Memorial, Erected A.D. 1922.” The foundation has two louvered vents. The north and south walls of the pavilion have a single-light window on each story

The wings on either side of the projecting bay feature four windows on each story, a rock-faced lintel course, spandrels with panels of brick, a rock-faced stone water table, and a raised concrete foundation with pebble dash finish. There are small vents along the foundation.

[2] Extracted verbatim from FRRA 2003, including all other footnotes in this section of the document.

[3] Assimilated into the complex are two other historic buildings that are more altered than the Kesner Building: a gymnasium now used as an auditorium and a manual training building.

The south wall of the building has a central bay with double door entrance. The entrance includes metal flush panel doors and a single-light transom. A rock-faced stone surround that extends from the water table elaborates the entrance. Flanking the entrance are slightly projecting pilasters rising from the foundation and extending halfway up the second story. The pilasters are concrete and brick and are divided by the stone water table. Above the entrance is a large four-part window on the second story. The spandrel between the window and entrance has stacked header brick with a diamond-shaped stone ornament at the center. Flanking the central bay are expanses of blank brick. The foundation of the building has greater exposure on the south, including garden level windows on each side of the entrance. At the west end of the south wall is a full-height brick chimney that projects outward and has a concrete cap at the top. The stone water table extends along the chimney.

The rear (west) wall of the building has a stone lintel course, stone water table, and raised foundation with pebble dash finish. The fenestration includes twelve bays of windows on both stories. The windows have brick sills and the first story windows have projecting bricks at the corners that support the sills. There are stacked panels of header brick enframed with projecting bricks in the spandrels. The third bay from the southwest corner is intersected by a one-story connecting passageway with flat roof, yellow brick walls, bands of plate glass windows, colored panels, and a flush panel door facing metal steps toward the south. The passageway leads to a modern one-story building sited on the southern edge of the courtyard behind the Kesner Memorial Building.

A two-story connecting bay intersects the north wall of the Kesner Memorial Building on the west half (toward the rear). The visible portion of the original north wall has a stone lintel course, stone water table, pebble dash foundation, and one pilaster with a stone capital. There are no windows on the north wall. The two-story corridor has a flat roof and features a column of dark-tinted glass adjacent the north wall of the Kesner Building. The corridor attaches to the 1978 Melein Hall, a modern yellow brick building located north of the Kesner Memorial Building.

ALTERATIONS

The principal alterations to the building have been the enclosing of the main entrance on the front and replacement of all the original windows. The entrance was blocked up, entrance stairs were removed, and offices were created in the lobby in 1963. The original multi-light windows were replaced in 1976. Connecting passageways (described above) were attached on the north (1978) and west (1963) leading to modern buildings added to the complex.[4]

SIGNIFICANCE STATEMENT

The Edgar Kesner Memorial Building is significant under Criterion A, in the area of education, for its association with the history of public education in Salida. The Kesner Building is the most intact historic educational building still standing in the city, serving as a reminder of the community's longstanding commitment to public instruction. During the eighty years since its construction, the building has served as an academic facility for generations of Salida students. For many years, the building housed the school district administration office and classes for

[4] *Salida Mountain Mail*, 25 October 1963, 5; Charles Melien, *100 Years of Spartan Spirit* (Salida: Charles Melien, 1980), 8.

both high school and junior high students. The building was operated as Salida's first separate junior high beginning in 1936 and continued to serve students in grades seven and eight until 1999. Although the building has undergone some alterations allowing it to function as an integral part of Salida High School today, it retains the essential physical features conveying its historic character. They may be described as:

- low pitched flat topped hip roof with multi-colored clay tiles;
- widely overhanging eaves with exposed rafter tails;
- symmetrical facade with projecting pavilion;
- centered entry accentuated on each side with decorative projected brick columns;
- decorative brick work with sandstone accents; and
- symmetrical fenestration pattern with large window openings. Unfortunately the existing 1970s windows detract from the richness of the facades formerly provided by the missing multi-paned windows.

HISTORY

Salida's school district organized in 1879, one year before the Denver & Rio Grande Railroad platted the town of Salida, and hired Miss Jennie Smith for a three-month term teaching twenty-five students in a rented room. In 1882 the district erected its first building, a two-room stone facility, which quickly became inadequate.[5] Nine years later, the district constructed the H Street School (later known as Longfellow School) housing high school and grade school classes. By 1904, continued growth of the student population resulted in the purchase of ten acres of grounds and associated buildings of the Presbyterian Academy, a private institution that had operated at the corner of 9th and D streets in the southern section of the city during 1884-1904. A high school building, described as "one of the largest and best equipped high schools in this part of the State" was erected on the site in 1910.[6]

During and immediately after World War I, Salida Public School Superintendent Edgar Kesner reported overcrowding in the city's schools. Loss of teachers due to the war effort prevented the district from adding classes to relieve the situation. Elementary schools included grades one through eight, and all fed into one high school, resulting in crowded conditions for all levels of students. The city's status as a major railroad center resulted in a diverse student population, which included students of Italian, Mexican, Austrian, and German heritage. The district frequently held night schools in its buildings, offering "Americanization" classes for adults. There were also a number of small school districts in the surrounding agricultural region whose students were moving into Salida to finish their undergraduate educations.[7]

At the same time, a movement to create schools with courses specifically designed for intermediate students had achieved great popularity throughout the country. In addition to providing such junior high classes, Salida also needed facilities for manual training instruction. Concurrently, local citizens were actively calling for the construction of a gymnasium for high school athletic activities. Modern, well-ventilated and well-illuminated and fireproof facilities were desired.[8]

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[5] The school was first known as the Third Street School and later as Central School.

[6] Longfellow School was torn down in the mid-1960s. The 1910 high school building was destroyed by fire in 1962. Melien, *100 Years of Spartan Spirit* , 2-5.

[7] Salida Public Schools, "School Board Minutes," 1917-29, 10, 14, 32, 37, 43; and 86 Melien, *100 Years of Spartan Spirit*, 7.

[8] Melien, 100 Years of Spartan Spirit, 6; Salida Mail, 24 November 1921, 1.

In February 1921 Superintendent Kesner again raised the issue of the district's need for additional facilities and equipment, but the School Board deferred definite action to relieve the situation. In June, the district directed that basement rooms in two schools be prepared for classes for the following year. When school started in September, overcrowding was an immediate dilemma that even threatened the high school's accreditation by the North Central Association of Colleges. Faced with these problems, the School Board[9] responded decisively, requesting proposals from several architectural firms for new academic, manual training, and gymnasium buildings on the high school grounds. Among the architects submitting proposals for the new complex were Mountjoy and Frewen and William N. Bowman, of Denver, and Cooper and Desjardins, of Pueblo.[10]

Cooper and Desjardins presented drawings and ideas "that appealed favorably to the directors," who selected the firm for the project. Leo A. Desjardins was born in Fort Collins in 1885 and studied architecture at Cornell University. He spent the first half of his career in Denver, where he became the first architect in Colorado to qualify for licensing by examination. As Professor of Architecture at the Denver School of Technology, he trained others in his field. Among the buildings designed by Desjardins are the Woodruff Memorial Library in La Junta, the First National Bank of Florence, the Pagosa Springs Middle School, Denver's Oriental Theater, Skate Land in Trinidad, and the Holy Cross Abbey in Canon City. Desjardins retired in 1935 and died in Trinidad in 1967. His partner, Francis W. Cooper, was born in New York, and also graduated from Cornell University. He worked in Ohio and Wyoming before moving to Pueblo in 1881, establishing an architectural practice that lasted half a century until his death in 1934. Cooper served as president of the State Board of Examiners for Architects and was a Fellow of the American Institute of Architects. He is credited with the design of a number of commercial buildings and residences in Pueblo, including the Mechanics Building and the Henkel-Duke Building, as well as Taylor Hall on the campus of Western State College.[11]

In a special election on 27 December 1921, Salida voters approved by a margin of 121 votes a $110,000 bond issue to finance erection of the new educational facilities. This was the last new construction funded by the school district for more than thirty years. Tragically, Superintendent Edgar Kesner died at the beginning of the building project after catching influenza. The superintendent was described as "a man of strong faith, of high ideals, and noble character." Born in Canada in 1857, he had moved to Colorado in 1886 to recover his health. He worked first in Park County, serving as principal of the Fairplay School for two years. Subsequently, he was hired as principal of Highland School in Boulder and received a degree from the University of Colorado. In 1897, Salida selected him as superintendent, a position he filled with distinction for twenty-five years. Upon his untimely death, the city's Parent-Teachers' Association requested that the new academic building be designated in his honor as the "Kesner Memorial Building."[12]

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[9] Members of the School Board at the time of construction of the building were: Walter T. Everett, president; Franklin C. Woody, secretary; William E. Crutcher; Dr. Guy W. Larimer; and R. Leander Hampson.

[10] Salida Public Schools, "School Board Minutes," 1917-29, 44, 51, 55, 59, 63.

[11] Salida Public Schools, "School Board Minutes," 1917-29, 59; Colorado Historical Society, Office of Archaeology and Historic Preservation, Colorado Architects' Biographical Sketches, Francis W. Cooper; Richard Cherry, National Park Service Historic Preservation Certification Application, Part 1, Amherst Building, Pueblo, Colo., 13 May 1996.

[12] Salida Public Schools, "School Board Minutes," 1917-29, 65 and 69; Melien, 100 Years of Spartan Spirit, 6; *Salida Record*, 17 March 1922, 1.

On 3 June 1922, contracts for construction were awarded: Raymond G. Whitlock of Pueblo received the general contract. Johnson & Davis of Denver was awarded the heating and plumbing work, and Clarence T. Gibbon of Salida received the contract for wiring. Excavation work on the building site began immediately. The Salida Granite Corporation donated a granite cornerstone for the Kesner Building, which was laid on 19 September 1922. The P.T.A. led the cornerstone ceremonies and was credited with working for the passage of the bond issue and creating "a desire for Salida children to have the best there is in an educational way." The program included a tribute to Superintendent Kesner, who "gave the best years of his life to the upbuilding of Salida's school system." Nine hundred students offered flowers in memory of the Superintendent.[13]

The $70,000 Kesner Memorial Building's design reflected a restrained Italian Renaissance influence in its low-pitched hipped roof with ceramic tile roofing, symmetrical façade with projecting central entrance pavilion, and elaborated doorway. The School Board requested that the architects submit suggestions for "relieving the plainness of the north end" of the building. L.A. Desjardins also volunteered to prepare plans and specifications for the future erection of enclosed corridors leading to other buildings in the complex.[14]

The building was completed by the opening day of school, 4 September 1923. The junior high operated originally as a component of the high school, sharing the Kesner Building, the gymnasium, and other facilities. Junior high teachers and subjects during the 1923-24 school year included Hettie M. Rogers (English), Frances Brush (history), Orphie Dickinson (science and penmanship), and Rose Ridgway (math). In addition to housing class rooms, the building also included the offices of the superintendent and other school district administrators for many years.

In 1936, the second floor of the building was remodeled and became the official location of the junior high, which included two seventh and two eighth grade sections. In subsequent years additional sections and teachers were added. Mary Mitchell, a graduate of the University of Denver who had taught at Salida High, became the first principal of the junior high, serving until 1941. She was succeeded by George Eichman, who held the position until 1969, becoming the longest serving principal in any Salida School. When kindergartens were added to Salida's elementary schools in the fall of 1952, sixth grade classes were moved to the junior high, where they remained until 1960. The number of students in the junior high varied from a low of 128 to more than 300, reaching a peak of 310 in 1973.[15]

In addition to pursuing a course of studies designed for intermediate students, junior high pupils assisted the school staff by serving as office workers, hall monitors, and librarians. Musical groups were an important part of school activities, as were athletic endeavors. A Boy Scout room was created in the basement to serve members of that organization. When the junior high became a separate department, a Kesner P.T.A. organized to provide support and assistance to the school.[16]

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[13] Salida Public Schools, "School Board Minutes," 1917-29, 73 and 81; *Salida Mail*, 9 June 1922 and 22 September 1922, 1; *Salida Record*, 22 September 1922, 1.

[14] Salida Public Schools, "School Board Minutes," 1917-29, 90 and 109.

[15] *Salida Mail*, 31 May 1939 and 24 August 1923; Melien, *100 Years of Spartan Spirit*, 95 and 97.

[16] *Salida Mail*, 31 May 1939.

In 1962 fire destroyed the 1910 high school building. Until a new building could be completed the following year, high school classes were conducted in the Kesner Memorial Building on a split-session schedule. Junior high students studied in the building until 1999, when a new school was erected. Today, the Kesner Memorial Building serves as an integral component of the Salida High School campus. The Salida School District plans to preserve the historic building and hopes to restore the main entrance and windows in future years.

CONSTRUCTION EVOLUTION OF SCHOOL SITE

1910 Old High School

1922 Manual Training Building

1922 Gymnasium

1922 Academic Building – Salida Junior High School – Kesner Memorial Building

1962 Ditzen, Rowland, Mueller & Associates, Architects, Boulder, was hired to undertake a remodeling. A partial set of drawings exist entitled "Salida Senior and Junior High School Buildings." It appears the base contract was for the new High School, and work on Kesner was done as an additive alternate. Work included removal of main entry doors and blocking up the openings, associated partition revisions, new doors in north entry in existing openings, new connecting structure to the new music wing to the west, adding partitions to convert the northeast main floor room into 3 rooms, for the Superintendent, Secretary, and a Work and Storage space, removal of a partition from the second floor center room, east side (now Room 212), new cabinetry, chalkboards, and interior finishes. The heating system was changed from steam to hot water with significant remodeling of the boiler room. The ventilation system was revised and new fire-dampered ductwork installed in the old plenum spaces.

1976 The original multi-light windows were replaced.

1977 Nixon, Brown, Brokaw, and Bowen, Architects, Boulder were hired to design a wing to the north that connected Kesner to the new high school. This connection included a science room and laboratories, home economics room, and an accessible ramp that served both buildings. This new connection was built tight to the center west end of the Kesner Building's north wall. Kesner Building again got new entry doors in the north end and its north stair was demolished to make way for the ramp. The downspout on the Kesner north wall was removed and redesigned to discharge "on a splash block on the new roof."

2.2 SKETCH PLAN

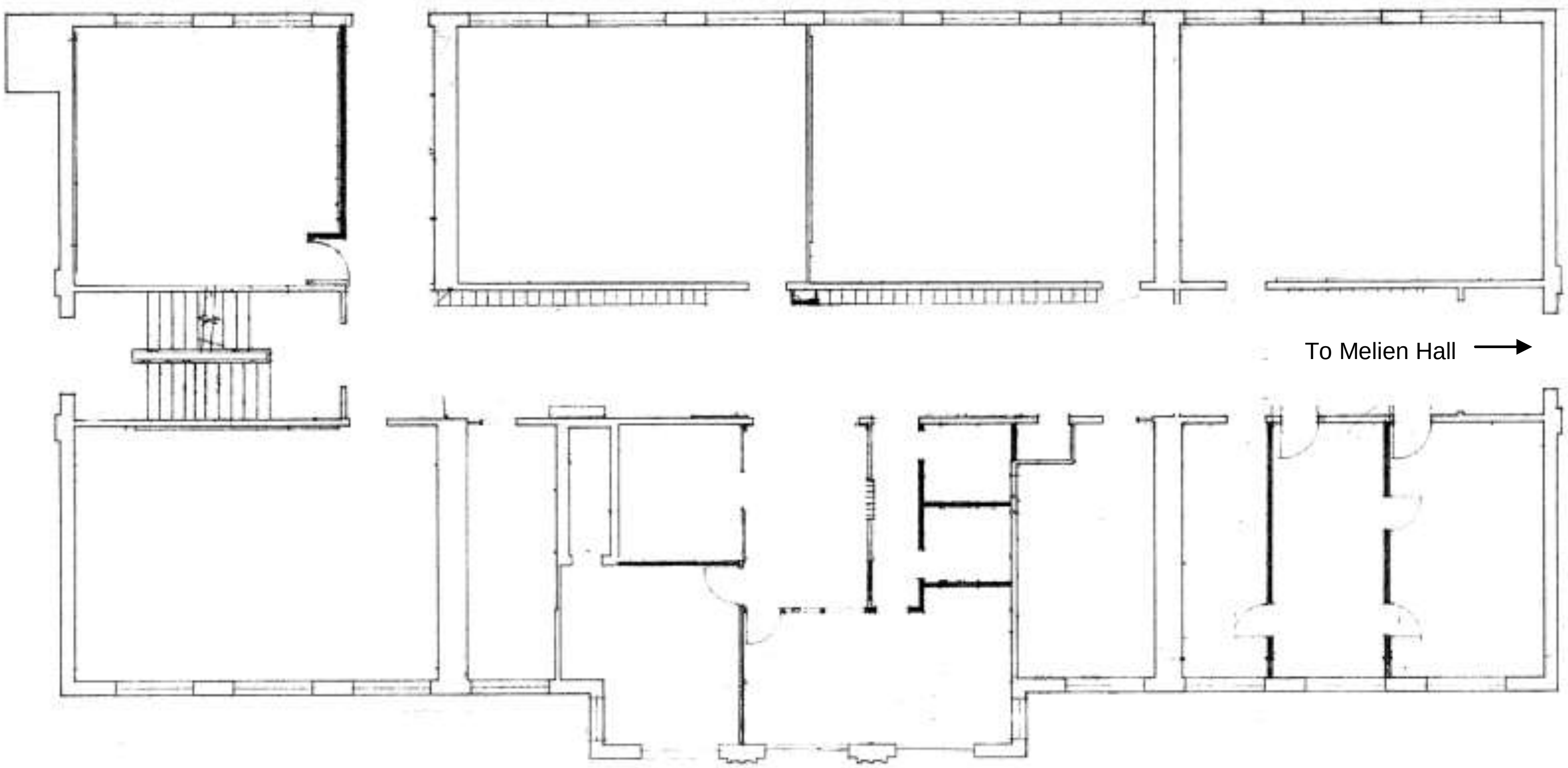
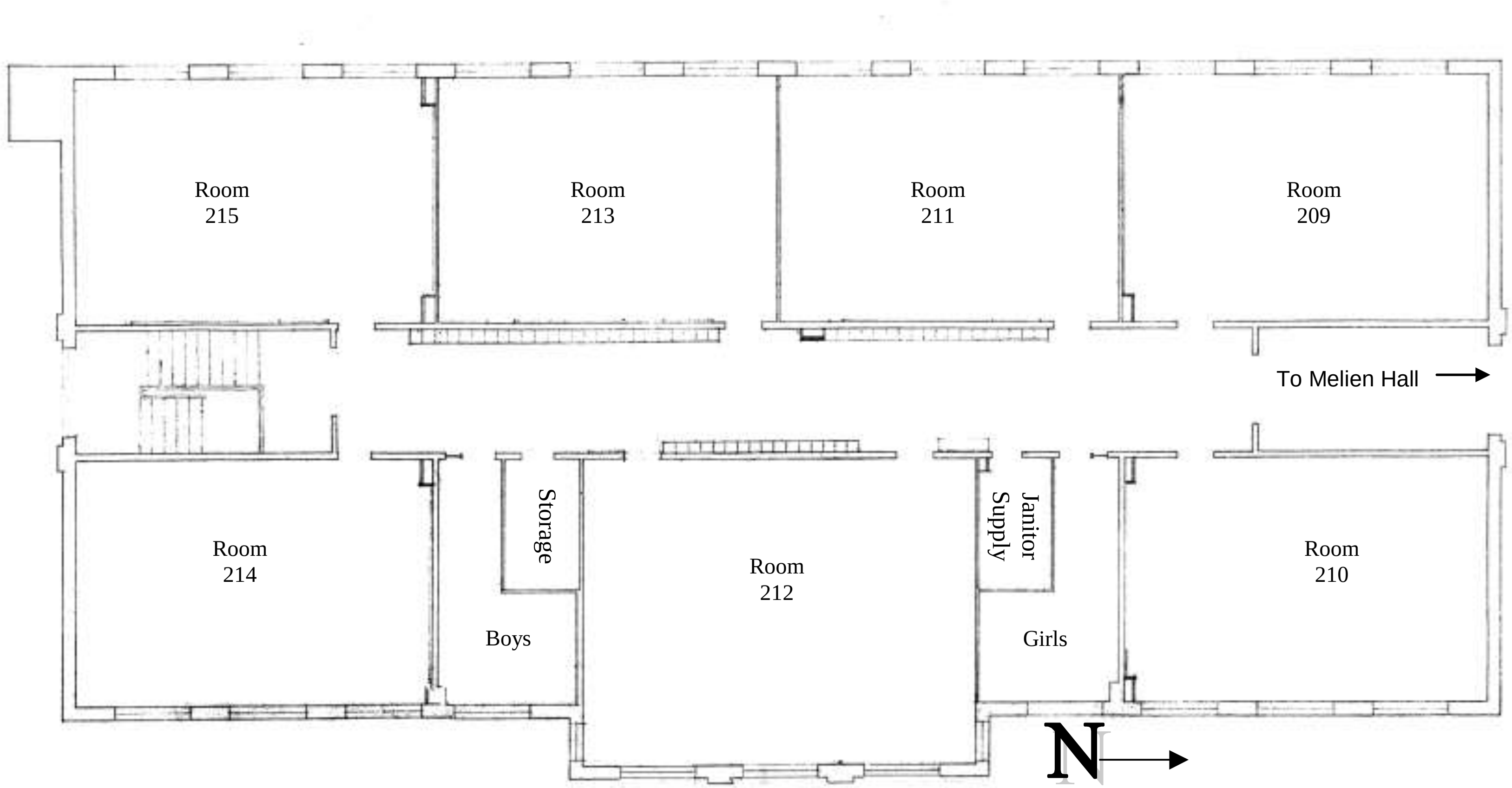


Figure 7. *Sketch Plan, First Floor*
Kesner Building

Figure 8. Sketch Plan, Second Floor
Kesner Building



2.3 PROPOSED USE(S)

At present Kesner Building is used for high school classes, counseling, offices, and a copy center. The Salida School District intends to continue to use Kesner Building in a similar fashion for the foreseeable future.

The project goals are to:

- Through the process of rehabilitation, enhance the building's capability to perform as a twenty-first century learning environment while retaining its historic character-defining features.

- Restore the exterior as nearly as possible to its historic appearance, including reopening the front (east) door for use and replacing the windows with windows of similar sizes and configurations as the originals.

- The district wishes to explore the possibilities of restoring a classroom to its former appearance prior to the 1962 remodel work. This action would enhance the "sense of the historic" to the building interior for the benefit of the users. It is felt this aspect of the rehabilitation would round out the rich experience of enjoying and understanding the building. It would involve changes in interior finishes, including going back to wood flooring, blackboards, and reinstallation of historic interior lighting--four incandescent light fixtures. While not recommending this action, the HSA will provide descriptions of required changes and associated costs for the district's consideration.

- Remedy the roof deficiencies to stop the leak tendencies and retain the appearance.

- Upgrade HVAC and electrical system to provide for today's needs.

- The district wishes to apply for a SHF grant in October, 2003, everything else being equal, *i.e.*, other funding being available for match, and barring any further cutbacks in state assistance to education.

3.0 STRUCTURE CONDITION ASSESSMENT

3.1 SITE

ASSOCIATED LANDSCAPE FEATURES AND PARKING

DESCRIPTION

As can be seen in the site plan shown on page 3, Kesner completed the fourth side of an academic quadrangle campus plan. Although the high school that fronted the quadrangle burned in 1962, the replacement buildings retained the quadrangle arrangement and an open courtyard continues to exist today within the connected complex of buildings shown on page 4.

The main entrance on the east side of the building was blocked up and the entrance stairs were removed in 1963. At the same time, another set of stairs at the parking lot (seven risers), the retaining wall returns flanking the stairs on the north and south, and the sidewalk between the top of these stairs and the foot of the entry stairs were removed. The resulting gap in the retaining wall was filled in with new concrete-capped retaining wall to match the existing. This left a relatively level grassy area on the east side of the building, with a concrete retaining wall abutting a concrete sidewalk. To the east of the sidewalk is a parking area, accommodating approximately 30 to 35 cars. A few shrubs are planted along the foundations of the building.

Figure 9. Concrete retaining wall curved corner with concrete cap and pebbledash stucco finish below. Note horizontal line in concrete showing two concrete pours.

CONDITION

The landscaping is in **good** condition but some changes are needed to facilitate drainage away from the building and to prevent damage from watering plant materials.

The retaining wall is in **fair** condition with much of the pebbledash pargeting coat loose or missing (approximately 30%).

The features mentioned above will have to be replaced to accommodate reopening the main entry.

Figure 10. Retaining wall close-up.

RECOMMENDATIONS

- Remove retaining wall section that was installed in 1963.
- Reconstruct the retaining wall returns.
- Reconstruct the seven-riser concrete stair.
- Reconstruct the sidewalk between stairs.
- Remove loose pargeting from existing retaining wall to sound surface.
- Apply new pebbledash parge coat where missing from existing sections of the retaining wall and to the new sections of retaining wall. Parge coat to match existing.
- Please see **additional** recommendations for landscaping changes associated with foundations and drainage below.

Figure 11. Concrete retaining wall infill at location of steps removed in1962. The steps led from the parking lot up to the former main entrance level.

ARCHAEOLOGY

DESCRIPTION

No archaeological assessment has been done of this site. Ground disturbance will be required if the original entrance is reestablished, and if work is needed on the south entrance and the foundations.

CONDITION

Unknown.

RECOMMENDATIONS

- Archaeological monitoring should be provided during ground disturbance associated with landscaping and construction.

Figure 12. East Façade, Kesner Memorial Building, 2002. The original main entrance and steps were in the center of the protruding bay.

Figure 13. Central pavilion, east façade.

Figure 14. West façade, looking south-southeast. Note short connector between Kesner Building and newer building to right.

Figure 15. West façade, looking northeast. Stair is to connector to new building to left.

Figure 16. Northeast corner of Kesner Building. Note connector between Kesner Building and Melien Hall (to the right.)

Figure 17. South façade, with Manual Training Building visible to left of chimney.

3.2 FOUNDATION

FOUNDATION SYSTEMS

DESCRIPTION

The foundations are stepped concrete spread footings with stem walls above. The footings are lower and deeper at the south end where original grade was lower and where there is a basement under the building. The footings step up to the north where original natural grade was approximately 4'-6" below first floor level. On the east and west walls the top of stem walls are 24" to 30" above grade.

Figure 18. Foundation and stepped footing, west wall, basement. Note efflorescence.

A couple of notes on the plans are encouraging. One calls for three ½" rods at the basement window heads and the other calls for two ¾" rods in a stair foundation. They also put steel reinforcing in slabs on grade. While the concrete footings, foundation walls, and column piers appear to be well sized there is no indication of steel reinforcing in any of them. Two other encouraging notes state, "all footings must reach solid bearing" and "bring all footings to substantial bearing."

CONDITION

The foundation appears to be in **fair** to **good** condition. There is spotty efflorescence on the foundation stem wall in the basement. It seems to lie on and penetrate the wall at places where the concrete pours break horizontally. It probably results from a combination of things including lawn maintenance watering, poor drainage away from the building, and inadequate drainage away from downspout discharge. There are some vertical cracks in the stem wall, which can be seen in the basement. Due to stored goods and storage area partitions and shelving, it is not possible to see all the foundation.

RECOMMENDATIONS

- Monitor and record severely cracked areas with a crack monitor system. Monitoring should be done over the course of a full year and coordinated with brick masonry monitoring activity recommended under "Exterior Masonry." A source of crack monitors is PRG Inc., which can be accessed at www.PRGinc.com.
- If additional movement is not evident during the monitoring period, cracks should be grouted and pargeted over on the exterior.
- If additional movement is evident during the monitoring period, the foundation should be excavated in selected areas and the foundations and subsoils should be inspected by a structural engineer.
- For water control around the building, please see recommendations under "Building Backfill" and "Gutters and Downspouts" below.

PERIMETER FOUNDATION DRAINAGE

DESCRIPTION

No perimeter foundation drainage is known to exist and none is shown on 1922 plans nor on 1962 plans and none is known to present staff.

CONDITION

Not applicable.

RECOMMENDATION

- If the crack movement continues and the foundation excavation noted above under "Foundations" shows it would be beneficial, a perimeter drain should be installed at the bottom of the spread footing. For the north half of the building where the stepped foundations are higher, the system could daylight into the south or east parking lot. The south end of the building would require a lift pump to raise the water to a discharge area in a parking lot.

BUILDING BACKFILL

DESCRIPTION

Grade around the perimeter varies from place to place. The east facade and the majority of the length of the west facade are bordered by grass; grass wraps around the northeast corner from the east facade. The south end of the west side is abutted by the connection to the old manual arts building and the roof of the boiler room which is topped by a walking surface; this roof is a couple of feet lower than the grass north of the connection. The south end of the building is bordered by the steps of the south entry and a sidewalk which is several feet below the boiler room roof and the grass on the east facade. A retaining wall extends eastward from the southeast corner, separating the east facade grass from the sidewalk.

Current lawn watering practice includes physically moving a hose system with ganged sprinklers.

Figure 19. Note stained area from watering grass. West wall, looking southeast.

CONDITION

Drainage around the perimeter of the building is **poor**. The grade adjacent to the building in many areas is flat or has a negative slope against the foundation wall. Lawn and shrubbery watering causes additional water at the wall/grade interface as the water runs down the side of the masonry wall.

RECOMMENDATIONS

- Regrade around the building to bring the grade up and create positive slope away from the building of 1/2" per foot for a distance of at least 10 feet.
- Install a dry zone for four feet around the perimeter. This can be accomplished with 6" of porous gravel on filter fabric. Areas where concrete walks abut the building may remain and should be checked periodically to assure positive drainage away from the building. Caulk the joints between the walks and the building wall.
- Replace bluegrass turf with a low water grass and water it with a zoned underground automatic sprinkler system on timers.
- Shrubs may remain on east side of the building, if desired: if they remain, they should be watered sparingly, and with a drip watering system.
- Revise current watering system to eliminate any water hitting the building wall. This can be done immediately as a management decision. (Please see additional recommendations under "Gutters and Downspouts.")

3.3 STRUCTURAL SYSTEM

GENERAL STRUCTURAL SYSTEM

Kesner is a two-story load bearing brick walled building with a full height basement in the south half and a generous crawl space in the north half. The roof is framed in wood and the floors are steel-framed concrete. There are two levels of concrete slab on grade in the basement in the south end of the building. Off the southwest corner of the main building is an attached boiler room whose east wall is common with the main building west foundation wall. This room is partially below grade, a few steps below the lower basement slab; its roof is a walking deck. Please see Appendix A – Structural Engineer's Report.)

FIRST AND SECOND FLOOR STRUCTURAL SYSTEM

Both floor systems are concrete on rib lath on 6" steel channels spanning east west at various spacings. The spacing varies depending on location in the structure and whether the rooms below allow intermediate beams. The second floor channels are supported at the east and west walls in pockets in the load bearing brick and at the first floor in concrete foundation wall pockets. According to the 1922 drawing, every fourth channel joist is anchored in the brick with a 5/8" round x 8" long steel bar. There are major steel beams running longitudinally along each side of the ten foot wide central corridor that support the other end of the floor channels. These beams are supported on steel H columns that bear on concrete piers at foundation level and continue up to pick up the second floor ceiling. Secondary longitudinal steel beams support the floor loads at mid span between the corridor beams and the exterior bearing walls. There are variants and interruptions in the system at the stairs, the vault, and the projection at the east wall where the original main entry was located.

There originally were two stairs, one each at the north and south ends of the main corridors. The 1960s ramp at the north end obliterated the north stair, but the south stair remains. From the main floor down to the basement, the stair is concrete on grade and from the main floor up to the second floor it is concrete treads on a steel support system. The landing between the first and second floors is concrete—the drawing note says," 5"- 4.1# steel I joist for landing."[17]

CONDITION

The floor systems are performing well and are in **good** condition. There is one area in the northeast room, second floor (Room 210) that has a feeling of sponginess when walked over, approximately 4 feet long east-west and 2 to 3 feet wide north-south, located about 10 feet from the south wall of the room and centered in the east-west direction. In this room as in many others, a wood floor on sleepers was installed over the concrete floor slab. Some science lab

[17] The preparers were fortunate to have a set of the original drawings at hand to compare with what is actually in the building. Today we refer to dimension lumber by nominal size and don't use inch marks on the drawing notes. Inch marks on lumber call-out notes are used only when we want to denote an actual size and that particular size deviates from standard lumber size designations. This set of drawings uses inch marks on most call-outs seemingly regardless of whether nominal or actual. Also some of the structural lumber is rough sawn and some is surfaced 4 sides. For instance the rafters are rough sawn while most other structural lumber is surfaced.

A research paper by Jim Joy, SHF Preservation Specialist while a research assistant at CSU architectural preservation program found that the first national lumber standard was established in 1924, two years after construction of this building.

equipment was removed from this room after the 1977 addition. It is believed this small floor area may have been affected by a leak in the lab equipment and may not have been repaired properly. The entire floor in this room squeaks when walked on, but the floor system exhibits very little bounce even when jumped upon.

Figure 20. Underside of first floor showing concrete oozing through diamond mesh rib lath supported on double 6" steel channels on I beam (background).

Figure 21. Interior concrete column (pier) with footings. Note lack of efflorescence. Ventilation trunk duct overhead.

Figure 22. Double steel channel joists bearing on exterior foundation wall. Note brick infill between joists. Brick is the water table backing

RECOMMENDATIONS

- The carpet in this room is in **poor** condition and it should be high on the list for carpet replacement in the near future. At that time this particular area should be inspected and repaired as necessary.

ROOF FRAMING SYSTEM

The roof is framed entirely of wood. The lower hipped portion of the roof—around the perimeter of the building—is framed at a 6 ¾ in 12 slope. Above this incomplete hip roof is a basically flat roof that is minimally sloped to shed water onto the hip roof planes. This flat roof is 33 feet wide x 92 feet long.

Figure 23. Attic space, looking north.
Cluster of posts, struts, and braces.

Above the second floor ceiling, the steel H columns support vertical 4 x 4 columns that continue up to support the middle third of the upper flat roof. Also at the top of the H columns are various angled struts and braces giving the column top a clustered appearance. The 3 x 8 (actual 2 ½" x 7 ¼") sloped roof rafters at 24" on center bear on a 2" x 10 ½" wood plate anchor-bolted to the top of the brick bearing wall at the eave and on longitudinal beams composed of doubled 2 x 8s at the corridor lines. There is another set of longitudinal 2-2x8 beams at the intersection of the hip and flat roofs. These beams are supported on angled 4" x 6" posts that emanate from the cluster atop the steel H columns. [18]

[18] A note associated with "Structural/Metal/Lumber Details" on Dwg. No. AC-6, says, "Details of framing not shown shall conform generally with those shown in the "Berloy" Handbook, 1921, Berger Mfg. Co., Canton, Ohio."

Figure 25. Blown-in insulation in attic with steel wall framing channels protruding through ceiling.

Roof sheathing boards are 1" x 7 1/4” to 7 3/4", except where concrete form boards of various widths were reused as roof sheathing. The roof boards were installed tight to one another without gaps, but small gaps have opened in some places. At the eaves, approximately 4" wide V-groove boards (probably tongue and groove) replace the typical sheathing boards providing a finished appearance.

Figure 26

The second floor ceiling rafters are 1 1/2" x 4 1/2" at 16" on center running east west supported at the outside wall and on the corridor walls. A longitudinal 2" x 10" board above the ceiling joists supports the ceiling at mid span. It is suspended from the roof rafters by 1" x 8" boards at 4'-0" on center.

CONDITION

The roof framing overall is in **good** condition.

Approximately one half of the exposed rafter tails (see Figure 35) exhibit severely water stained ends for 2 to 4 inches into the rafter and may be deteriorated. At these locations the condition is **fair** to **poor**.

RECOMMENDATIONS

- Inspect each rafter tail end for deterioration individually during reroofing project.
- Replace as needed using a dutchman technique replacing only as many as necessary (assume 25%).

3.4 ENVELOPE - EXTERIOR WALLS

EXTERIOR WALL CONSTRUCTION

The portions of the exterior walls above the concrete stem walls are 13" thick load bearing brick. The body of the walls are red brick faced with a buff brick. The face brick is 81/2" x 2 3/8" x 4", while the red structural brick found on the inside of the walls in the attic 8 ½" wide x 2 ½ " high x 4" deep. Face brick joints are ½" to 5/8" rodded concave. The top of concrete at the first floor line is at the same level as the top of the concrete stem wall. At the exterior face of the wall a 9 1/2" high x 15" to 44" long sandstone water table is laid atop the stem wall. The top of the stone projects approximately 2 inches from the face of the brick above, and is tooled flat as are the ends of each stone block. The drawings show the water table to be approximately 7" thick (scaled). (Please see Exterior Masonry below for recommendations.)

EXTERIOR FINISHES

DESCRIPTION

The rather austere facades are made up of a hard buff face brick trimmed at the top of the walls with a simple 1x trim board. The exposed rafter tails are partially let into and through this board. There is not, nor was there originally, any other exterior wood trim.

The concrete foundation wall below the stone water table has a fairly coarse pargeting coat that has the appearance of pebbledash stucco. The drawings call for "Concrete rubbed with carborundum brick." Apparently Cooper and DesJardins did not intend the pargeting, but there is no information available on when it was installed. The parge coat was also applied to the concrete retaining wall on the east side of the building.

CONDITION

The wood trim appears to be in **good** condition.

The foundation wall pargeting is in **poor** condition as is the pargeting on the concrete retaining wall. Much of it is loose or missing. Where it has come off, the rough concrete is revealed. In many cases, the marks left between one day's pour and another are visible. The original retaining wall appears to be relatively plumb, but the infill area where the original steps from the parking lot to the front of the building were is tipping outward slightly.

RECOMMENDATIONS

- Prep and paint wood trim at eave including the rafter tails and underside of roof deck.
- Remove loose pargeting to sound surface.
- Remove the infill portion of the retaining wall and reconstruct the return wall to flank the concrete steps.
- Apply a parge coat to the foundation wall and retaining wall.

EXTERIOR MASONRY

DESCRIPTION

The buff face brick comprises the field of the exterior walls. While relatively simple as an overall composition, there is some understated decorative brickwork. Starting at the top of the water table is a rowlock course followed by 34 courses where there is another rowlock. The top of this rowlock is at the first floor window head. Above it is another 19 courses to the top of the second floor windowsill. Above this are another 24 courses to a rowlock, the top of which is at the window head. Above this is a band of rusticated sandstone, much like the water table, which encircles the building. Topping out the wall are 7 or 8 additional courses of buff brick. The face brick field has no regular bond courses.

The rowlock courses may be full bricks embedded into the structural wall and thus tie the face brick to the structure structural brick. And the decorative panel surrounds are rowlock courses which may also act as bond courses.

The windowsills are sloped rowlock special sized bricks, nearly as high as they are thick, i.e., almost 4" square at the ends. At the first floor each end of the sill is supported visually by two projected bricks corbelled out below the sill to make a sort of bracket. The second floor sloped rowlock sills are plain without this feature.

At the spandrels below the second floor windows there is a pattern of projected rowlock brick that forms a rectangle the full width of the window. At the corners of each rectangle is a square rusticated sandstone boss.

The primary building entry was located in the middle of the 5'-0" pavilion projection at the east facade. Here is found additional masonry decoration, brick with strategically integrated sandstone as an emphasis. A less ornate element was also found at the two secondary end entrances and still exists at the south entrance.

This feature is composed of two flanking engaged columns of projected brick. Each bears on 2 courses of sandstone that bear on a concrete foundation projection. The column "capitals," at the level of the window spandrels, is made up of more sandstone and brick. At the center of the capitals is a piece of sandstone set diagonally. Over the main entrance between the capitals is a large piece of sandstone that in large numbers simply announces the year of construction, "1922. "

Today the main entry doors have been removed and replaced with a modern window in the opening. The masonry has been filled in below the new window and the brick detailing with the rowlock sill and sill-end brackets has been emulated. The new brick closely matches the original, but the difference is apparent even on casual observation.

The north entry was modified in the 1962 with a new pair on doors and removal of the concrete stoop, and in 1977 the Melien Hall addition with its long interior accessible ramp caused additional changes. Currently on the first floor is a new steel double door with panic hardware and a locking system that is keyed to the rest of the school. The second floor in this area is now occupied by the accessible ramp. The Melien Hall architects worked within the space between the engaged pilasters flanking the entry doors and window above, leaving the brickwork on the east side of the entry intact. The brickwork on the west side of the entry was covered over by

Figure 27. Sandstone water table (inside corner) showing pebbledash stucco below, brick above, door jamb at right.

Figure 28. Decorative brick spandrel panel with sandstone bosses at corners.

Figure 29. Decorative brick at pavilion projection (east façade).

Figure 30. Brick decoration adjacent to original east building entry. Looking west.

the two story Melien Hall addition. The entry at the south end of the building continues to be used and all the surrounding brickwork is in place as is concrete stoop that is much like the original.

Steel lintels carry the brickwork above the door and window fenestrations. A drawing note calls for "Suitable steel lintels over all flathead openings in masonry work."

CONDITION

The overall condition of the exterior masonry is **fair**. In some places it must be classified as **poor** because there are areas where water can enter quite freely. There is diagonal cracking at the corners of several windowsills and stair-step cracks in several locations, some quite long. One of these, on the east wall, has broken several bricks in a nominally vertical line between windows. This crack has opened a gap up to approximately 3/8"at some points. The surface of the brick on the north side of the crack is standing out slightly from the surface on the south side. There is a crack at the intersection of the main wall and the south wall of the pavilion projection; this crack penetrates the wall and can be seen at the interior wall. None of the building walls has been spared the indignation of cracking, though the north end of the building seems to less affected. The chimney has cracks on all three exposed surfaces and is slightly separated from the building wall. The chimney also has two corner straps, but they appear to have been installed for some purpose other than structural.

Figure 31. Brick chimney showing metal corner straps and poorly repointed stairstep cracking. Looking east.

The masonry joints on approximately 5-10% of the exterior wall surface have eroded and/or some mortar is missing. Where cracking has occurred and the wall has been repointed, the prevailing mortar used is gray in color which probably indicates a relatively high portland cement content. The original mortar in the field brick appears to be harder than that used in setting the sandstone water table.

The broken brick phenomenon indicates that the mortar is as strong or stronger than the brick. The wall came under stress of some sort, a stress that found a release in the brick. The interior side of the wall at this crack is inside a plenum and cannot be observed. There is some foundation cracking below this part of the wall. These cracks could have been caused by wetting of the bearing soils resulting in minor settlement as stated in the structural engineer's report or for some other reason. Since there is other similar, but less dramatic, cracking in other areas of the building, and school board minutes report a need for "pointing up cracks" in the first year, it seems there may be an inherent design flaw. Causes for this cracking damage have not been definitely identified, but all indications are that there is no reason for concern from the life safety point of view.[19] [20]

There are open joints on the tops of windowsills. These joints are between sloped rowlock brick and a concrete material used to install the windows.

Figure 33. East wall, second window from south. Diagonal cracking under window. Note pegbbledash stucco coat on foundation wall beneath sandstone water table to grade

Figure 32. East wall, third window from south. Diagonal cracking under window.

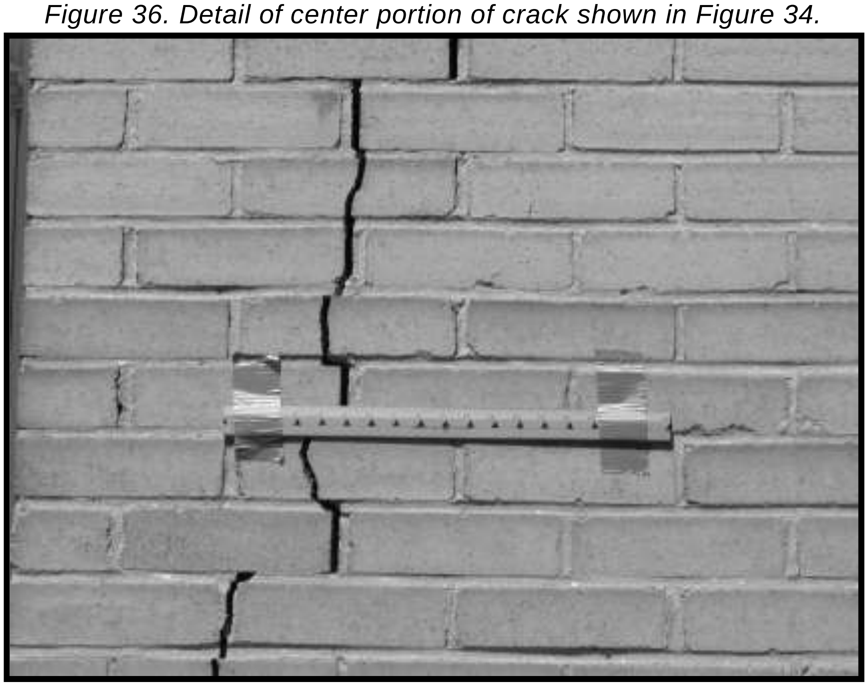
[19] Front Range Research Associates found two references to brick issues in the school board minutes, 1. In the volume "covering 1917-1929, page 90, dated 3-23-1923: "R.C. Whitlock [General contractor from Pueblo] agreed to remedy crack in the cement roof of the boiler room, point up cracks in the academic building (Kesner Memorial), and remedy heaving of the maple floor in the Gymnasium building." 2. page 105, 7-27-1923: Minutes note that William Kasling was hired to do cement work on the high school grounds and the "wall at the northeast corner of the Kesner Building."

[20] The only earthquake of record in this area since the building was constructed in 1922 was a 3.3 magnitude quake on March 16, 1985, centered about 15 miles northeast of Salida. Apparently damage was light and scattered. Bill Webb was in charge of school district maintenance at the time and said in a telephone conversation, June 12, 2003, that there was "absolutely no damage to the school buildings from that earthquake." U.S.G.S. "Earthquake History of Colorado", website information, updated April 5, 2001.

Figure 35. East wall, between third and fourth windows from south. Large continuous crack. Note broken bricks.

Figure 34. Detail of upper portion of crack shown in Figure 34.

Figure 36. Detail of center portion of crack shown in Figure 34.



Repeated wetting stains brick on the west wall to a height of six to nine feet above grade from lawn watering activity. There also are stains below a room air conditioner mounted in a window on this side of the building.

It is plausible that in some areas the face brick has moved differentially from the structural brick and that the structural brick is totally intact. Diagonal cracking is common at window corners in older masonry buildings. However, there is some plaster cracking observable in interior spaces opposite diagonal cracking below windowsills, which could indicate minor foundation settlement.

The stone water table is in **fair** to **good** condition. Several of the individual stones are partially eroded, but by and large are still sound for most of their mass. There is one cracked stone in the east wall where the brick above and the foundation below are also cracked. One stone where the front entry was blocked up in 1962 is severely eroded, but it will have to be removed to reinstate the entry.

RECOMMENDATIONS

- Install crack monitors at major points of cracking, especially on the crack with the broken brick.
- If it is determined that the building wall is not moving, replace broken bricks to match existing and repoint the open joints.
- If it is determined that the wall is moving appropriate steps must be taken to stop the movement prior to repairing the face brick (Please see recommendations under "Foundations.")
- Replace missing and broken brick in all areas of walls.
- Repoint all brick and stone wall surfaces to sound condition, with mortar to match original in composition and appearance.
- Clean mineral residues from west wall, using the gentlest means possible.
- Caulk open joints between windowsill brick and new windows.
- Revise lawn watering methods as recommended under "Building Backfill" above.
- The sandstone water table should be inspected regularly for additional erosion. As they erode to the point of losing integrity and no longer performing their job as a weather barrier, they should be removed and replaced. The sound stones at the entry should be removed and stored under cover for later reuse where necessary.

EXTERIOR APPENDAGES—PORCH, STOOP, PORTICO, ETC.

DESCRIPTION

There were concrete stoops at all three entries. The main entry had three risers and concrete platforms of decreasing size from bottom to top. The base was about 28 feet by 9 feet and the top step was 12 feet by four feet. At the north wall there was a four riser stoop 8'-3" wide with the bottom riser 9'-0" away from the building. There was a low concrete wall, 2'-4" wide on each side of the stair which extended north to about the middle of the second tread where ended in a vertical face. The top of these flanking walls was only a few inches above the top of the stoop. The south entry stoop had (and still has) four risers with three treads, ziggurat style on three sides; the lower was 13 feet wide and projected 8 feet from the building wall. Today this stoop has 3 risers and 4 treads with partial steel nosings.

There is a set of concrete steps (8 risers) from the parking lot level to the top of the Boiler Room roof and on to steel steps leading to doors into the connecting corridor from Kesner and the shop corridor. This set of concrete steps has a flanking concrete wall with handrail. The treads have steel nosings. The flanking concrete wall has a sloping top and apparently was capped with a stone coping that is now missing. This flanking wall led continuously up to a low concrete guardrail wall that keeps people from falling off the east and south edges of the boiler room roof. This wall has concrete to about 18" off the top of the deck, and is capped with a soldier course of brick surmounted by a sandstone coping of the same material as used for the building water table.

CONDITION

The stoop to the south entry door is in **poor** condition. The concrete is spalling from the edges and the body of the treads are exfoliating in horizontal layers.

The stair and handrail/guardrail to the top of the Boiler Room roof deck is in **poor** condition. The risers and treads are experiencing the same fate as the south entry stoop. The handrail has lost its coping as has parts of the guardrail, however it appears that this element had only a stone coping rather than brick and stone. The brick/stone coping of the guardrail, where it is extant is in **poor** condition in great need of repointing with some of it needing resetting.

RECOMMENDATIONS

South Entry Stoop

- Remove concrete from the stoop and treads to a level 2" minimum from the top of existing concrete. Remove and salvage for re-use the steel nosings.
- Set anchors in existing concrete and form edges to receive new concrete.
- Place new concrete in these forms setting nosings in former locations.

Stair, Handrail and Guardrail at Boiler Room roof

- Treat stair concrete same as Stoop above.
- Where guardrail is extant on roof, repoint and reset stone and brick. Where guardrail is missing, replace to match extant portion.
- Rehabilitate concrete handrail as in other concrete above.
- Set new sandstone coping on handrail.

Figure 37. Concrete stoop at south entry doors. Note cracking and crazing, especially at top risers.

Figure 38. Concrete stair to boiler room roof. Note poor condition and handrail to left with no coping.

Figure 39. Concrete guardrail with stone Coping supported on soldier brick course. Note coping stone on roof deck.

3.5 ENVELOPE - ROOFING AND WATERPROOFING

ROOFING SYSTEMS

DESCRIPTION

The original drawings call for "Tile or Shingle Roof—Alternate Figures", but provide no elaboration about type of tiles or shingles, nor information about installation methods except another note that says "Tile roof & bld. paper or shingle..." The elevations are drawn showing tiles, perhaps indicating the architects' preference of tile over shingles.

The main roof is clay pantiles with an integral flat pan and barrel tile as one unit measuring 10" wide x 13 1/2" long. They are set with 11 3/4" exposed to the weather. While the predominant color is red, there are yellow, aquamarine blue, true green and black tiles randomly interspersed. Some of the colored tiles are glazed and some are not. The hip ridge covers are tapered barrel tiles; the hip starter has an integral rounded bullnose closed end. All the hip ridge tile are of one color, red. There is one nail hole at the top of each field tile; the nails found in broken tile removed from the roof are typical 2 inch galvanized steel roofing nails. The tiles were manufactured by the “HEINZ ROOFING TILE CO DENVER COLO.” This data is embossed on the underside of each tile.

Figure 40. Tile roof, showing variegated color.

The top "flat" roof (*Figure 22*) is built-up, the original drawings calling for "composition roofing on deck" and has been reroofed one or more time. The current roof was coated last year with white roof coating. This roof drains onto the pitched tile roof below. The hip of the projected wing on the east side of the main building projects vertically in a point above the upper flat roof.

Figure 42. Frank Orzechowski on newly coated semi-flat upper roof.

Figure 41. Stair from boiler room deck to connector. Looking northeast

The attic space is insulated with approximately 6" of blown in cellulose insulation. There is no ventilation in the attic space, and while the building paper used under the roofing tiles is undoubtedly vapor permeable, it does little to provide ventilation except where deteriorated and torn.

The boiler room flat roof (*Figure 23*) off the west side of the southwest corner of Kesner is a built up composition roof and is flashed into the west wall of the Kesner building, the east wall of the manual arts wing and the south wall of the connector. The top of this roof is about three feet below the first floor level. Two 4-riser steel ladders from the connector access it and the manual arts wing as well as up from a set of concrete steps from grade in the parking lot. Plastic runners are glued down on top of the roofing along the two most used path directions, i.e., from both steel ladders to the stair down to the parking lot.

MAIN ROOF – CONDITION

The main tile roof is in **fair** condition. It is an on going battle to keep water out of the attic where it can usually be arrested before wetting the second floor ceilings. Occasionally water from leaks finds its way to the first floor ceiling. A relatively small percentage (of the whole) is cracked or broken. A larger percentage is loose from being uplifted during heavy winds. The largest percentage of broken tiles is at the eaves and a few rows above the eaves, but there are broken tiles in all areas of the roof.

The tile at the point of the east projection roof is mopped into the new upper roof coating as a means of compensating for inadequate flashing. It is known that some of the sheathing in this point is rotted and won't hold nails. The hip ridges also are punky. A makeshift metal flashing surmounts the top of the point.

The building paper under the tiles is brittle, cracked and torn from age, water and wind damage.

Figure 43. Roof framing at tile roof valley. Note water staining on both sheathing and valley rafter.

Figure 44. Examples of roof tiles.

Figure 46. Interface of tile roof and semi-flat roof. Note roof coating mopped up over tiles and sheet metal cap also seen in Figure XX

Figure 45. Makeshift metal flashing at top of point of the east pavilion projection roof.

MAIN ROOF -- RECOMMENDATIONS

This roof has performed well for the last 81 years. But because the flashings and building paper is so deteriorated and many tiles are cracked and broken, it must be rehabilitated. Therefore, the goal is to remove the tiles from the roof, salvage the sound tiles for reuse, replace deteriorated sheathing boards, replace the underlayment, and reinstall the **good** tile.

A discussion with a reputable retired roofing contractor familiar with the building led to development of a viable sequence of re-roofing the building.[21] This scenario would salvage as many tile as possible from the whole roof, reinstall them on the east (primary), west and south roof planes. The north roof plane can be seen (viewed) from almost nowhere on the ground. On this plane use an available tile that as closely as possible matches (but doesn't necessarily duplicate) the existing tile. This method also would, as will be seen below, obviate the need for extensive scaffolding. A lift would be required on the north roof plane to remove rejected tile and hoist up the small amount (nine to ten squares) of new tile needed.

- Mr. McCormick's suggested process would go like this:
    - Remove all the tile from the north and east roof planes of the hipped roof, stockpile on the roof, being especially careful to salvage field tile cut for valleys and hip ridges.

    - Stockpile and sort tile on the north roof plane and semi-flat roof above using a crew of 4 or 5 workers. Tile could be carefully removed, and passed bucket brigade style to the sorting and storage area on the semi-flat roof. The tile should be removed from along a hip ridge first because the workers could, after the first one or two rows were removed, walk on the wood sheathing instead of on the tile all the way across the roof.

[21] .[21] Jim McCormick, owner of United Roofing Contractors, Salida.

- Repair or replace any deteriorated sheathing boards (do not use plywood), roll out and nail down new felts, salvage good tiles, take good tiles from the next side in line and install good tiles on the newly laid felts, and simply work around the roof in that manner.

- Start replacing tile at the hip ridge on the north end of the east roof plane, as the tiles have to go down from right to left. Establish a triangle of tile with the apex at the top and the base at the eave. The left side of the triangle should be parallel to the hip ridge on the south end of the roof plane. Work across the roof to the south carrying this angled edge as work progresses. Install the hip ridge caps as they are encountered. In this way the tile roof is spared anyone walking on it.

- Continuing around the roof in this manner would make it possible for one crew to be removing good tile from the next roof plane in line while another is installing salvaged tile on the former roof plane. Each day's work should stop at a hip ridge if possible. Put closely matching tile on the north roof plane last.

- Use 90# felt or other underlayment determined during construction documents phase, well lapped, at least 12" to 14". Perhaps use ice and water shield on the first and second rows only, but this roof is steep enough that neither snow nor water stands on it long and ice damming has not been a problem. Use cement grout at all tiles on the hip ridges and on eave starter courses, and atop the tile point.

- Upon completion of all but part of the north roof plane, reroof the upper semi-flat roof with a light colored single ply membrane mechanically fastened or fully adhered roofing system incorporating proper edge flashing, flashing between the tile point and flat roof and around waste vents and other penetrations.

Figure 47. Boiler room concrete slab ceiling. Note flaking paint on ceiling above steel beam.

- Install low profile ventilators near the center of the upper roof and held back from each end by one half of the width of the semi-flat roof. This (these) could be installed on a low curb similar to a ridge vent or monitor. The top of any of these new vents should be kept to no more than two feet total above the roof surface. Objects of this height would not be seen from the ground.

BOILER ROOM ROOF--CONDITION

This flat mopped-on composition roof is in **fair** condition with recent leaks visible in the boiler room below. The walk mats, which are simple glued down plastic floor runners are partially missing and those parts that remain are in **poor** condition.

RECOMMENDATIONS

- Replace boiler room roof with new single membrane roof with walk surface. Flash this roof properly into all adjacent wall surfaces.

SHEET METAL FLASHING

DESCRIPTION

There are no flashings called for in the original drawings. Since they didn't even pin down the type of roofing to be used it would have been difficult to do any flashing details during the design phase. The drawings show saddles at the pointed intersection of the sloped tile roof and flat roofs and between the chimney and the sloped tile roof, but even though flashings are not shown, the chimney today has stepped flashing into the brick joints at both the west and south roof planes. The tile is set with an open valley and there is valley flashing at the valley intersection of the main roof and east projection roof as well as between the north wall and the
On the drawings there appears to be a drip edge flashing at the "eave" edges of the upper flat roof. This drip edge is buried beneath new flashings installed in the recent past when the upper

Figure 48. Southeast roof valley flashing. Note waste vent through the flashing.

Figure 49. Stepped flashing and saddle flashing at chimney-roof interface.

flat roof was reroofed or the flashing was removed and replaced at that time**.** The new flashing is light sheet metal in the form of a drip, the bottom leg of which is about 3 inches and is bent outward over the top of the topmost row of tile.

The boiler room roof may have sheet metal flashing to Kesner's west concrete foundation wall, but there is so much roofing mastic at this intersection that any metal flashing is well covered.

CONDITION

Flashings in most areas of the building are in **fair to poor** condition. The roof valley flashing is very **poor** resulting in the need for makeshift trough and bucket arrangements in the attic to catch leaking water beneath the valleys. The waste vent pipe in the south valley protrudes through the flashing.

The stepped flashing at the chimney is uneven and rusted in spots and the flashing that covers the saddle is badly rusted

RECOMMENDATIONS

- Replace all flashings during reroofing work. In general flashings should be galvanized steel with weights, gauges and details in accordance with the Architectural Sheet Metal Manual of the Sheet Metal and Air Conditioning Contractor's National Association (SMACNA).
- Relocate sewer vent that pierces the valley flashing.

DRAINAGE SYSTEM, GUTTERS AND DOWNSPOUTS

DESCRIPTION

The upper flat roof drains on to the tile roof which carries water to gutters at all eaves. The gutters are attached to a flat vertical surface let into the 3" x 8" rafter tails. The notes call for Galv. Iron "Crown Mold Gutter", but the gutter installed is not molded but rather is a simple box gutter Another detail shows the gutter as a double box gutter, the 27 gauge outside one is approximately 4 ½" high U shaped and of constant height along the eave. Inside is "soldered and riveted in place" another piece of U-shaped galv. iron, 28 gauge, that is pitched at 1 inch in 10 feet. High point and downspout locations are shown on the drawings.

There originally were 6 total, 4" x 6", 27 gauge galvanized iron downspouts, of which all but one remain with some new pieces integrated into the system. A leader drops vertically out of the bottom of the gutter, turns back to the building wall at approximately 30 degrees, then drops vertically a few inches into a mildly decorative conductor head. The downspouts are anchored to the brick walls with decorative leader straps. The one exception to a complete downspout is on the west end of the north wall that is now covered by Melien Hall. Here the conductor head is still in place but the downspout below it has been shortened and discharges onto the Melien Hall flat roof. The other 5 typical 27 gauge galvanized iron downspouts drop out of the bottom of the conductor head straight to the ground. A few inches above grade the downspout shoes angle outward from the wall where they discharge. The original plans show all downspouts discharging to a 10" x 18" concrete "scupper."

Today three of the six downspouts daylight a few inches above the ground, one onto the Melien Hall roof and the remaining two drain into buried metal pipes. One of these is toward the south end of the west wall and the other is on the east end of the north wall. There is no evidence of these pipes daylighting anywhere to the south of the building which is the only possible place low enough. Staff indicates there is a sump pump toward the southeast end of the basement, which operates occasionally but its operation has not been correlated with rainstorms or snowmelt. Conjectures are that the downspouts may discharge into the sanitary sewer system, a drain in the west courtyard, or even into a dry well. The three that daylight just above grade discharge onto long sheet metal pans on the ground. Two of these have a negative slope against the building and are filled with detritus.

Figure 50. Downspout at east end of north wall. Discharge is into metal pipe in ground.

Figure 51. Downspout at south end of east wall. Discharge is into sheet metal trough that is sloped backward against building.

Figure 52. Downspout, south end of pavilion projection, east wall. Note bullet holes in leader and conductor head, and water stained rafter tail ends.

Figure 53. Broken downspout wall anchor bracket.

CONDITION

The gutters as viewed from the ground and the upper roof appear to be in **fair** condition. There is some rusting evident, but it appears to effectively carry water to the downspouts. The sloping inner gutter is undoubtedly responsible for its longevity.

The downspouts are in **fair** condition. Several of the hangers are broken and one conductor head and its associated leader have numerous tightly spaced small holes through the sheet metal. It appears to have been shot at with a firearm, caliber undetermined. Some parts of the downspouts have been replaced with varying degrees of skill with similar, but not identical, box shaped sheet metal.

While still performing the requisite function, parts of the system need repair or replacement.

RECOMMENDATIONS

- During roof repair, thoroughly inspect the gutter for areas of excessive rusting and deterioration.
- Repair areas that can effectively be soldered.
- Replace totally deteriorated areas with galvanized sheet steel of the gauges cited above.
- Remove the downspout shoes, cut a short section of downspout, and reinstall the shoes at least 6 inches above new grade at the building wall. Install new splash blocks to drain water away.
- Repair broken downspout wall anchor brackets. Replace in kind brackets that are beyond repair.
- Repair or replace deteriorated leaders, conductor heads and downspout sections, in kind.

3.6 WINDOWS AND DOORS

DOORS, TRIM, HARDWARE, AND FINISHES

DESCRIPTION

Exterior

Historic Doors

The main (east) entry was a double door, each leaf having four vertical lights and a square panel in the bottom half. Paneled brick pilasters with stone bases and capitals featuring stone trim and diamond-shaped insets flanked it. Above the doors was a 10-light fixed transom.

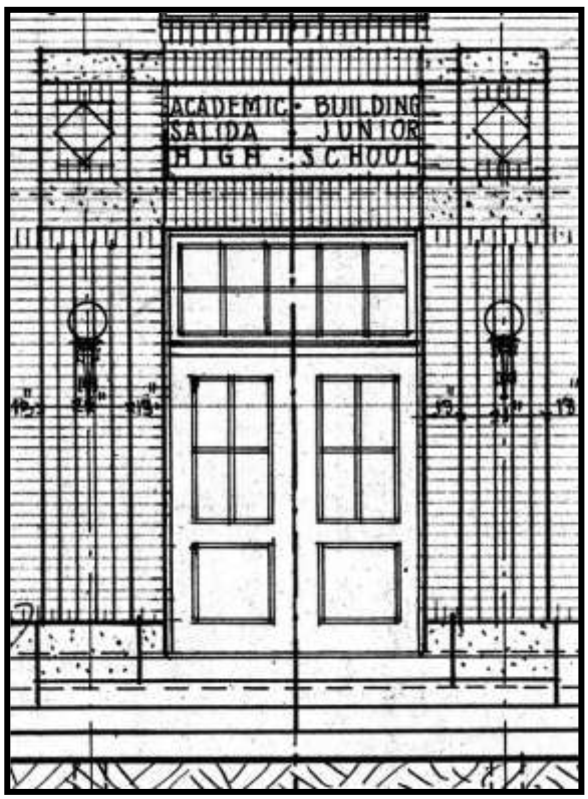


Figure 54. Main (east) entrance to Kesner Building, 1922 drawings.

The south entry was also a double door, but with six lights in each leaf, and a 12-panel fixed transom above. The surround to this entrance is less ornate than the main entrance. A rusticated stone surround that extends from the water table elaborates the entrance. Flanking the entrance are slightly projecting pilasters rising from the foundation and extending halfway up the second story. The pilasters are concrete and brick and are divided by the stone water table.

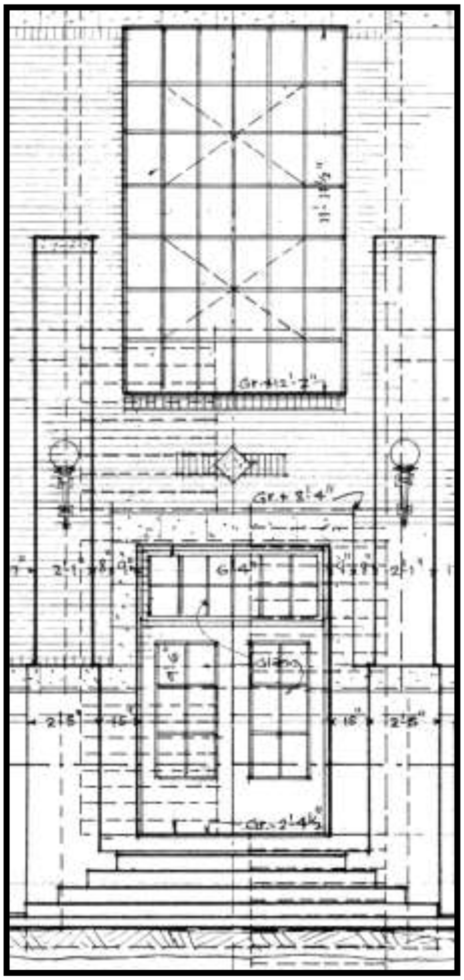
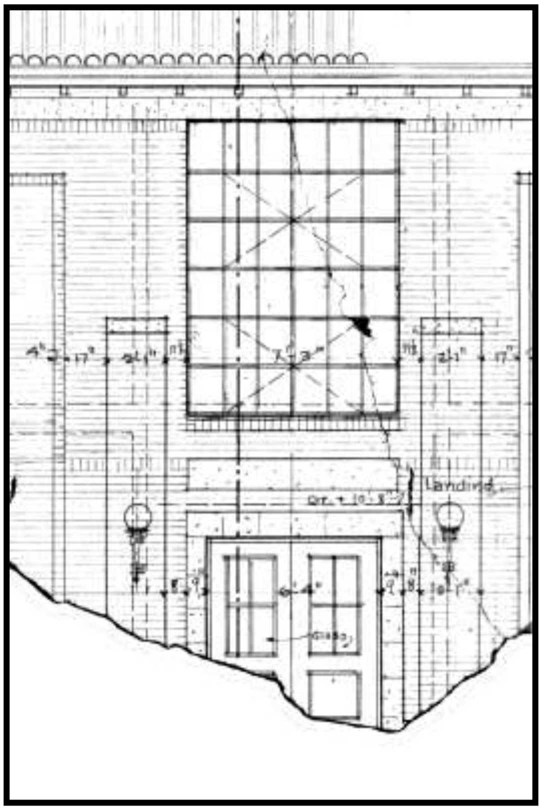


Figure 56. South entrance, 1922 drawings (left).

Figure 55. South entrance, 2002

The north entrance doors were similar to those on the front (east), with four lights in each leaf and a square panel below those lights. This end of the building is, like the south end, more austere than the main entrance.



Existing Entry Doors

The main (east) doors were removed and replaced with windows in the 1962 remodel. The north doors were removed when Melien Hall was added in 1977, and the existing exterior doors are now in Melien Hall rather than in Kesner Building. The south doors were replaced with metal doors that have tall, narrow glass lights on the operating side of each leaf. The transom above was replaced with painted wood. The doors are painted purple, purple and white being the school colors.

Figure 57. North entrance doors, 1922 drawings.

Figure 58. Looking through the opening on the north end of the Kesner first floor hall where the north entrance was originally. The doors visible in this picture are part of Melien Hall.

Interior

Historic Doors

The historic interior doors that appear on the 1922 drawings show six types:

- A class room door with nine lights;
- Two-leaf toilet doors with five panels on each leaf;
- Five-panel doors to the storage rooms;
- A pair of narrow six-light doors for the stairs inside the north entry.
- Six-light doors from the main entrance hallway into the Men Teachers and Women Teachers toilets, and
- A pair of doors between the main entrance vestibule and the hallway.

The latter are shown in section only so it is not possible to say much about their appearance. However, it shows three lights vertically that time out in height with the Teachers' toilet doors shown in elevation on the same drawing.

A single six-light historic door, relocated from the entry stairs, is found on the first floor, at the entrance to the workroom just off the lobby for the Athletic Director/Chief of Maintenance and his Secretary. Three five-panel historic doors, also relocated from elsewhere, are in place in the basement. All appear to have original hardware.

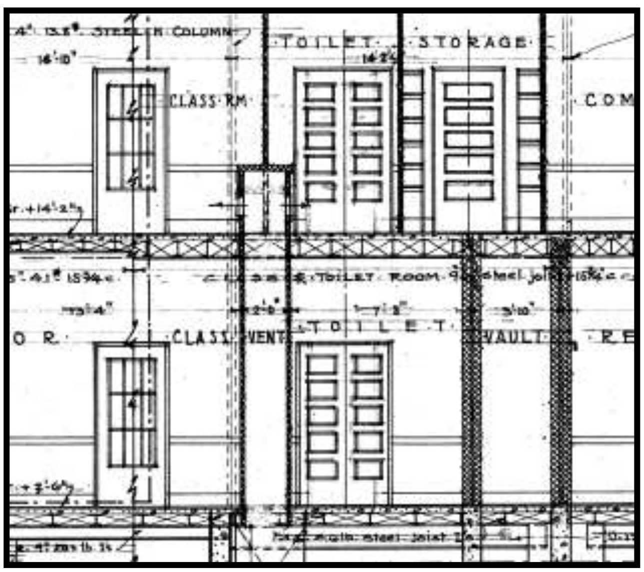


Figure 60. Part of a cross-section of the building from the 1922 drawings, showing

Figure 61. Six-light door with original hardware in Work Room

Figure 62. One of three historic five-panel doors in the basement. Bottomrail has been cut down to fit new opening.

Existing Class Room Doors

Existing doors are 3'-0" x 7'-0" x 1-3/4" thick, swinging into the corridor. Each door has a 6" wide x 3'-6" high light located 5 5/8" in from the outside edge of the door and 5 7/8" down from the top. It is held in place by ½" wide x ¾" deep molding. The doors are stained a medium reddish brown.

Figure 63. Typical class room door today, this one with accessible lever.

Frames are cased and stained.

The door hardware is dull chrome. The lockset has a square rose. There are three hinges on each door. There are no closers. The corridor wall has a white metal knob bumper.

On the top center of the door is a small dark simulated wood Formica square with the room number routed into it. There is also a brass-colored channel for a name plate. Each door has a metal clip attached to it, to hang messages.

There have been various numbering systems for the rooms over the years. What was designated as Class Room 2 on the 1922 plans was changed to Special Class E-113 and Corridor E-112 in 1962, when the remodeling was done. The current number plate on the door is 116, below it is a sliding melamine plate in a metal holder saying it is where the Copy Aide works, and her name is given below. In some cases, the name of the class room is in a name plate on the wall next to the door.

The 1962 specification book states:

<u>MILLWORK</u>

Wood Doors: Doors shall be 1-3/4 inches solid core in accordance with Type “A” Brochure No. 5 of A.W.I. and shall be Roddis, U.S. Plywood Weldwood, Paine or Curtis American. Veneer qualify shall be **good** grade in accordance with CS-171-58 and veneer species shall be Rotary Natural Birch. Edging shall be ¾-inch before sanding and shall match face veneer.

Furnish and install glazing in wood door as shown on the drawings. Glass shall be ¼-inch polished wire Nuweld as manufactured by American-Saint Gobain Corporation or Misco as manufactured by Mississippi Glass Company.

Wood Frames and Trim: Door frames and trim shall be of thickness and shape shown on the drawings and shall be Oak to match the existing work or unselect natural Birch.

Hardware Schedule

a. All doors shall receive 1-1/2 pair of hinges – Stanley BB241 – 4-1/2 x 4
b. Class room doors marked “C” shall receive Russwin lockset 440-4/8 Cosmic x Rose 3943 Enfield….

Finish for hinges shall be CMD; for locksets and pulls US26D; and for closers SBL.

The Painting section calls for painting or varnishing “new door and new door frames, “and “existing door frames which are to receive new doors.” It is not clear that all the doors were replaced in 1962, but the existing ones and their hardware appear to match the above specifications.

Figure 65. Today’s typical room interior door knob.

Figure 64. Exterior (hall side) door knob. Note scratched condition of door.

Figure 66. Restroom exit handle .

Other Interior Doors

In 1962, the southwest downstairs class room was divided into a smaller room (now the copy center), and a corridor. The end of the corridor was framed into a door opening, which leads to the connector with the new addition. The doors at the end of this connector are double leafed, solid core wood with a glass panel similar to those on the class room doors. This pair of doors has panic hardware.

New restroom doors were placed inside the door opening where the double-leaf panel doors had been. Since the new doors were not as wide as the opening, the side of each restroom door opening was filled with a wood panel.

Figure 68. Restroom door. Note width of original opening filled by wood panel at left.

Figure 67. Expanding gate between hall and reception area.

Other doors in the building – on workrooms, janitor supply closet, storage room, and interior divisions – are, like the restroom doors, solid core flat wood doors without lights.

The reception area just outside the athletic director's office can be closed off from the hall by an expanding gate.

CONDITION

Exterior

The south entry doors are in **fair** condition. While serving their intended purpose reasonably well, they will have to be replaced in order to return the building exterior to its former appearance.

Interior

The interior door finishes are becoming shabby and some of the knobs are loose. There is a need to re-key all the locks because of the large number of keys that have been issued over the years and the lack of a coordinated keying system. Some hinges may need rehabilitation. However, the interior doors and hardware must be evaluated as being in **good** condition.

RECOMMENDATIONS

Exterior

- Replace the pair of south entry doors with a pair of replicated wood or steel doors with six lights in the upper half. These lights should replicate the doors shown in Figure 35.
- Reinstate the east main entry. This will entail the following:
  - Remove existing window and brick infill below to restore the original opening.
  - Install a pair of doors and transom window to match originals. It is believed the originals were wood, but the replacement doors may be steel or steel clad wood with true divided lights in the original configuration.
  - Replace entry stoop.
  - Replace concrete stair at parking lot and retaining wall returns per photographs.
  - Redesign interior spaces to accommodate this entry.

Interior

- Lightly sand and refinish doors.
- "Tune" (reset and lubricate) hinges.
- Where original hardware remains on original doors, it should be retained and retrofitted for accessibility.
- Replace door knobs with lever handles for universal access.
- When any doors and hardware other than knobs must be replaced, replacement should be in-kind.

WINDOWS, TRIM, HARDWARE, AND FINISH

DESCRIPTION

This basically rectangular building with the 34'-0" wide by 5'-0" deep projection in the center of the east facade has regularly spaced window fenestrations. The original double door was centered in the projection, set in a 6'-1" masonry opening. Two windows flanked it and to both the north and south along the main wall plane are four more evenly spaced window openings, 6'-1" x 6'-8". The other long facade, the west, originally had 12 evenly spaced windows of the same size. Today the third window from the south on this facade has been opened into a door that connects to the manual arts building. The end facades had only one window each at the end of the central corridor at the stair landing above the double entry doors.

The typical windows originally were steel divided light, six wide by four high. In the center three wide by two high was an operating sash that pivoted horizontally along the center mullion. The window in the south elevation at the stair landing was six wide by seven high and had two pivoted operating sash. The north window was six wide by six high and also had two pivoted operating sash.

In addition there were similar steel windows on the first and second floors in the 5'-0" projection wall. These were three wide by four high. A drawing note indicates the lights were 12" x 18" glass; they apparently had no operating sash.

All of the typical windows were replaced in 1976 with aluminum sash in the same masonry openings. The new windows are double glazed sliders in the lower two thirds with a single piece of fixed glass above. The window opening above the south entry has been replaced with a pair of fixed glass windows approximately three feet wide by the height of the original opening.

CONDITION

The windows are in **fair** to **poor** condition. Many of the operating rollers are broken out or inoperable. Many windows open only a short distance and some not at all.

RECOMMENDATIONS

- Replace all windows with steel projected pivoted windows. These should be thermally broken (if possible), energy efficient, double glazed, low E windows, ideally with center pivot operation as in the originals.

Selection of replacement windows and doors must be carefully considered. The new units should be exact replacements of the originals if the actual original window and door type, pane division sizes, and frame color can be determined and if not exorbitantly cost prohibitive. For windows, if single glazed pivoted steel sash exactly duplicating the originals are installed, they should be thermally assisted with storm sash as recommended in various National Park Service Preservation Briefs and Tech Notes. Some of these documents advocate interior storm sash since it preserves the exterior appearance of the building.

Compatible substitute windows and doors may be considered if use of the same kind of material as existed historically is not technically or economically feasible and if the new material conveys the same visual appearance as the historic material. Some energy saving elements of replacement windows can affect the appearance of the new windows, causing them to look dramatically different than the originals. All characteristics of replacement windows and doors must be carefully evaluated prior to final selection.

Figure 69. Example, window exterior. Note original size of window opening, filled in to accept new sliders.

Figure 70. Example, window interior. Venetian blinds are pulled up to lower edge of filled-in area.

3.7 INTERIOR FINISHES

OVERVIEW

A room finish schedule from the 1962 remodel drawings shows that there have been few changes made to the finishes since that time. The class rooms in particular have changed little. For the purposes of this report, a typical class room, (Room 117, at the southeast corner of the first floor), was used as a baseline room against which others were compared.

DESCRIPTION

WALL FINISH MATERIALS

Class Rooms

Exterior walls originally were, and primarily continue to be, plaster over masonry. Interior walls are plaster over metal lath on metal studs and channels. Remodeling in 1962 introduced some gypsum board interior walls.

The 1962 Room Finish Schedule on Sheet CM-9 of 25 specifies that the wall materials in these class rooms will remain “exist. plas.” except in the Study Hall E-201 and in Corridor E-112. The area where the partition separating “Typing” from the rest of “Commercial” is to be removed will be “new patch plaster.” Corridor E-112 specifies “Exist. Plaster & Gyp. Bd.”

All 1962 wall finishes in these rooms are listed as “paint.” However, the specifications booklet calls out painting only those areas where new work is to be done – e.g., new door and door frames, existing door frames which are to receive new doors, etc. It states that “painting shall include spackling of cracks and holes on existing plaster surfaces,” and that a sealer coat on existing plaster is to be omitted. General class room painting must have been accomplished outside of this contract.

The Room Finish Schedule specifies the base as 4” cove.

Room 117

A number of patches exist on the walls at various points around the room where items have been attached and removed over the years. For example, the ghost of a 4” wide chair rail or bump rail, the top of which is 36” above finished floor, can been seen around the entire room where the wall is exposed at that height. The chair rail is drawn in the 1922 drawings.

Toward the south end of the west wall there is a rather large patch located in the area where the south end of the original blackboard would have been. On the north wall is the ghost of what might have been a shelf or the top of some sort of semi-attached closet or cabinet. This extends approximately 6’-8” west from the northwest corner, and the top is at almost 8’0” AFF.

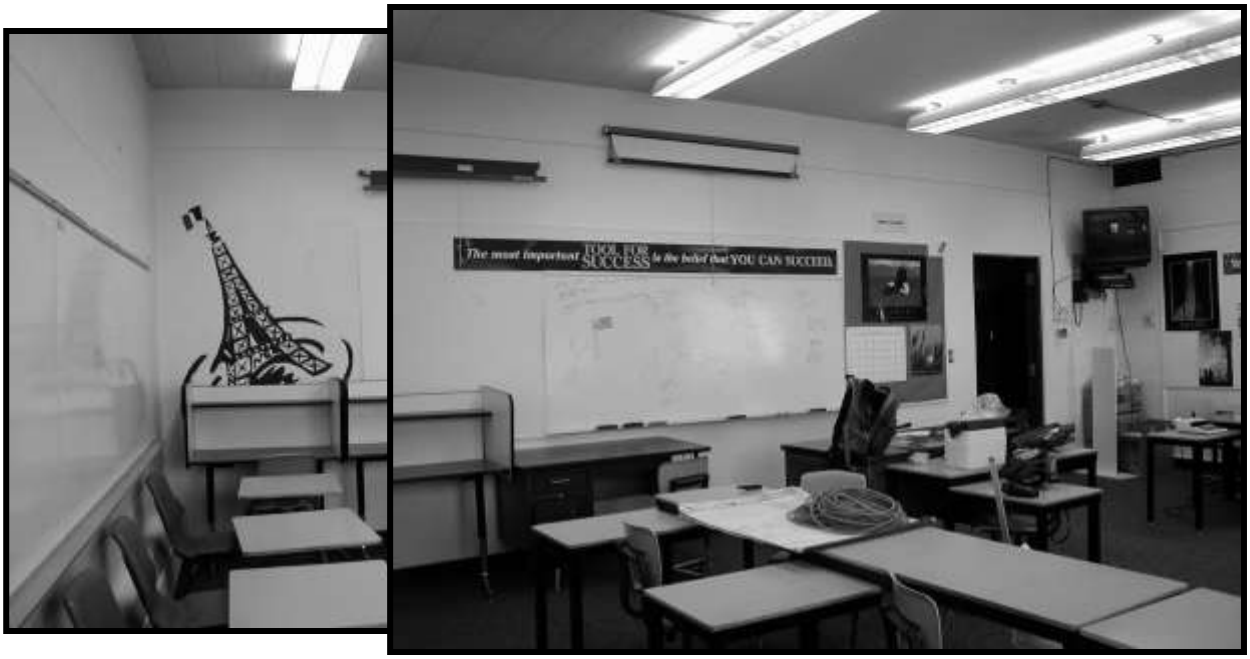


Figure 71. West wall of Class Room 117. Note whiteboard across much of the wall. Note indented line from left to right high on the wall. Note heat vent above television, upper right.

Figure 72. Room 117 looking north. Clock and speaker above the blackboard are standard for each room.

Figure 73. Room 117, looking northeast at east wall. Note sliding windows, with area in original window opening closed with a painted wood panel.

Figure 74. Room 117, looking at south wall.

Figure 75. Ceiling at northeast corner of Room 117. Note missing tile, and stains on those at the edge of the ceiling. Also note exposed wires and wire mold running around the top of the wall.

Figure 76. Detail, Room 117. Carpet at bottom half of picture, with black base over original wood base. Quarter-round at top of base is original painted wood. Toward top is ubiquitous wire mold

All walls are painted off-white or cream.

Base is 4” high black rubber or vinyl, curved at the bottom. It is applied over an earlier base, probably wood, that is topped with 1” quarter round. This is painted the room color. There is no trim at the top of the wall where it meets the ceiling.

At 8’-11½ “ AFF, there is a narrow groove that runs entirely around the room. This could have been a decorative feature, above which the walls were painted the same color as the ceiling, or it could have been a picture hanging element.

Other Class Rooms

The other class rooms are similar to Room 117. Almost all have the same number and arrangement of whiteboards and tackboards. Some have differing paint schemes.

In the word processor room (Room 114) there is a ceiling fan and additional wiring. The computer room (Room 113) also has a ceiling fan and additional wiring, but the center window has been replaced entirely with wood to accommodate a window air conditioner.

The copy center (Room 116) is smaller than the other rooms because the corridor to the new building to the west was created out of its north end, and it has a small entry vestibule off that corridor. It and Room 215 above it are unusual in that in the west wall between the two south windows there is a 21” x 11” trash chute for the janitor that empties in the basement. In Room

115, earlier known as the Library, room darkening roller shades have been added at the top of the windows.

The history room (Room 212) extends the width of the center projection of the building, making it more than twice as large as the other class rooms. It originally was the Commercial and Typing room, with the north one-third designed as “Typewriting” and the south two-thirds “Commercial.” There was one door into the Commercial room, but now there are two doors toward each end of the large space. Between its time as Commercial and Typing and now, it was also a Study Hall.

Chalk- and Tackboards

The 1962 project drawings show chalk and tackboards in elevation as “backed-prefab units w/ aluminum trim – See specifications.” These items were not found in the specifications booklet. Chalkboard Type “A” is 16’-0” wide x 4’-0¼” high, the bottom at 3’-1” AFF. Chalk & Tackboard Type “B” is 16’-0” wide x 4’-0¼” wide, also 3’-1” AFF, with an 8’-0” chalkboard centered between two 4’-0” cork panels. Type “C” is all cork, 4’0” high x 6’-7½” wide, the bottom at 6” AFF.

The existing typical Chalk & Tackboards differ from the three types described above in that the tackboard is 4’-6” high, and instead of chalkboards there are 3’-6” high whiteboard panels with metal chalk rail. The bottoms are 2’-6” AFF. See Figures XX

It is not known if the original specifications were followed in 1962 and these are a more recent replacement, or if these are the as-builts from 1962. However, for convenience, these will be classified using the original typology, taking into account existing differences from the original specifications.

In Room 117, there is a chalkboard similar to *Type “A”* on the south wall. On the north and west walls is a chalk and tackboard similar to *Type “B”.* The north unit has black Masonite on it instead of whiteboard and there is no chalk rail. There is no stand-alone tackboard like *Type “C”* in this room. The tackboards and trim are painted room color.

The existing tackboards are dense cork surrounded on all sides by a ¾” wide x 3/8” deep lightweight metal frame. This frame is anchored with screws. The frame covers the whiteboard edges where they coincide with the tackboard edge, and also runs along the edge of the whiteboard to the top of the tackboard, where the whiteboard is smaller than the tackboard. The whiteboard is typically attached at the bottom edge of the tackboard, so only 1’-0” of tackboard and frame are exposed above the whiteboard.

Each whiteboard is 4’-0” wide at the chalk rail, and 3’-6” to the top of a 1” cork strip that runs across the entire top. The cork is inserted into a square-U shaped metal channel that is shaped like a square U in profile. The closed end of the U attached to the wall so the cork is exposed to the room. The chalk rail is also metal, shaped like a T with its top attached to the whiteboard. The leg of the T is the chalk rail. It is 2¾” deep, and the top surface has channels to keep objects from rolling around. The edge of the rail is curved up slightly.

Halls and Stairwell

Halls and the stairwell retain the original walls. The chair rail ghost noticed in the class rooms is also present where the walls are visible here.

Restrooms

The restroom walls are tiled with 4" square tiles to 6'8" AFF. Above that, they are the original walls painted white. Metal toilet and screening partitions stand to about 6' AFF.

Offices and Workrooms

During the 1962 remodel, class room 4 at the northeast corner of the first floor of the building, became the offices for the superintendent and his or her secretary and a workroom connecting to the secretary's office. It is now offices and workroom for the counselor and his or her secretary. Two gypsum board partitions were inserted into class room 4T, creating a long secretary's office between the superintendent and the work room. The work room uses the original door opening, but new doors from the hall were inserted into the new offices. These two rooms connect with two doors, and the work room connects to the secretary's office through a single door.

The counselor's office has vertically grooved mahogany panels on the walls. The secretary's office has painted walls. Inside the work room is case work and shelves as specified in the 1962 remodel. The walls there are painted light green.

The athletic director's office, in the northern two-thirds of the front 34 feet of the projecting central bay, has the original walls, painted, on the north, east, and south walls. The west wall is a gypsum board partition penetrated by a large obscure-glass window and two solid doors. The south wall is a gypsum board partition.

The north, east, and south walls in the secretary's office are original. The original west wall, which contained a door and two (presumably obscure) glass windows was removed and replaced by a gypsum board wall. All walls in these rooms are painted white. The reception area, which is now used as a copy and mail room, has three original walls, the fourth being the gypsum board wall that replaced the original in the 1962 remodel.

In the southwest corner of the secretary's office is the vault. Entered through a heavy metal door with combination lock, it appears not to have been painted for some time. The 1962 remodel plans indicate it was to be painted "all white," but this has become a blotchy tannish-brown.

The janitor's stock room on the second floor east of the girls' restroom remains the same as indicated on the original plans, even down to the casework. Its walls, too, are becoming rather muddy in color. It retains a plain 1"x4" chair rail at the same height as the ghosts are seen in other parts of the building.

A storage closet west of the second floor boys' restroom also is unchanged. It retains the original shelves, which have bowed somewhat over the years. No chair rail is seen here.

Other

Two clear-finished wood and glass trophy cases hang on either side of the north end of the downstairs hall. Poster hangers and bulletin boards are found at various locations around the building. Most of the hall walls are lined with double-high lockers, some gunmetal grey, some the school purple.

CEILING FINISH MATERIALS

Class Rooms

Ceiling material in the 1962 Room Finish Schedule for these rooms lists “Acous. Tile – Glue to Ceil.” with no finish specified.

The ceilings in 2003 are covered with 12” square acoustical tile, installed with the texture pattern alternating directions checkerboard-style.

Figure 77. ***12” x 12” ceiling tile with random pattern, typical of all classrooms****.*

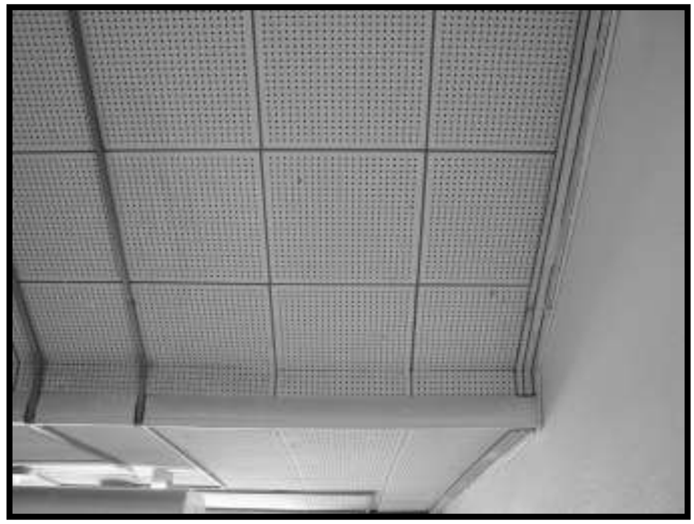


Figure 78. ***12” x 12” regular pattern ceiling tile in south stair****.*

Figure 79. T-grid lay-in ceiling panels in main floor corridor.

Halls and Stairwell

The downstairs hall has a suspended acoustical tile ceiling at approximately 9'-3" AFF, with a metal grid supporting large acoustical panels. Fluorescent light fixtures are above translucent panels inserted in this grid. Lockers line the walls wherever there is space. Ghosts of a chair rail at the same height as those in the class rooms can be seen at various undisturbed portions of the walls. Upstairs, the hall ceiling is acoustical tiles glued to the original ceiling.

Figure 80. Second flight, south stair. Looking north.

The stairwell ceiling and under the stair have acoustical tile glued to them, with a quarter-round clear finish molding surrounding the edges.

Restrooms

Restroom ceilings are the original painted plaster.

Offices and Workrooms

All office ceilings are acoustical tile glued to the ceiling, as is the workroom adjacent to the counselor's secretary and the copy-mail room. The reception area outside the athletic director's office has a suspended acoustical tile ceiling with inserted translucent panels for fluorescent light fixtures. The remaining miscellaneous rooms – janitor's supply closet, storage, and vault – have original ceilings.

FLOOR FINISH MATERIALS

Class Rooms

The original floors were wood on concrete. In 1962, the floors in these rooms were to be covered with vinyl sheet **good**s. In 2002, carpet was glued down to what has been described as square vinyl tiles. It would not be surprising if several floor coverings have been installed between the vinyl sheet **good**s 40 years ago and the 2002 carpet.

In Room 117, there is a slight sloping rise from the corridor floor to the room floor.

Halls and Stairwell

The downstairs hall is carpeted. Upstairs it is floored with vinyl tile. Treads and nosing on the stairs are covered with red rubber marbled with white (called out as Melflex Red on the 1962 drawings) tread mats that are cross-hatched to improve traction. Risers and skirts are painted black.

Restrooms

Three of the restrooms are one-inch ceramic tile. The fourth, the upstairs boy's restroom, is liquid-applied seamless flooring.

Offices and Workrooms

All offices are carpeted, and presumably have been through the same evolution in floor coverings, as have the class rooms. The janitor supplies closet and storage closet have the original cement floors.

CONDITION

ALL INTERIOR FINISHES

Class Rooms

The class rooms are typical of many found around the country. They are "messily organized" or cluttered-appearing with the detritus of teaching and learning. In the case of the Kesner Building, the class rooms also appear somewhat used or shabby. Although they have been painted regularly and apparently well-maintained over the years, there is an accretion of wire mold, stained acoustical tile, places where walls have been changed or patched, and other small flaws that erode away the appearance of cleanliness. This is especially true in the rooms where the carpet has not been recently changed.

In this case, however, it must be said that the class rooms are generally in **good** condition. Some specific problems are discussed in sections dealing with other elements, such as windows.

Halls and Stairwell

The halls and stairwell are likewise are in **good** condition.

Restrooms

The restrooms are in **good** condition, except where there has been water damage in a few places.

Offices and Workrooms

These rooms are all in **good** condition. The janitor's supply room and the storage room on the second floor, and the vault could use new paint. The shelving in the storage room is seriously overloaded and the original shelves have taken on a permanent set.

RECOMMENDATIONS

Class Rooms

- Although it is not a historic preservation necessity, carpets should continue to be replaced according to the current schedule.

- Redecorating the class rooms would provide a cleaner, more organized appearance. The value of doing this, however, must be weighed against the inevitable messiness of an educational setting. There is little point in smoothing a few wall flaws if those flaws will be covered with posters or class work. The whiteboards and tackboards appear to function as intended, and newer, more stylish ones would be nice but not necessary.

- Many of the acoustical ceiling tiles are stained. Painting them would decrease their effectiveness. They should be removed and replaced with a new acoustical material. This would potentially add to the light levels in the room, since the old tiles are rather dingy. This could be done on a room-by-room basis, depending on the amount of staining in each room; the expense of removing and replacing all the tiles in all rooms may not be merited by the difference it would make.

Halls and Stairwell

No recommendations.

Restrooms

- The restrooms need to be made wheelchair accessible. All entry doors were set into the original door openings, and then narrowed with a wood panel. These could be returned to their original width, and the interior partitions rearranged to provide wheelchair access. This recommendation is included with others related to Accessibility Compliance, below.

Offices and Workrooms

- Prop up shelves in the second floor storage room, or replace the shelves in the same configuration with brackets providing support from the wall side.

RESTORE HISTORIC CLASSROOM

The school district has expressed a desire to restore one of the classrooms as a historic classroom if a reasonable cost/benefit can be demonstrated. This document will outline below the actions necessary to restore one of the classrooms and provide the cost estimate for undertaking this restoration.

Note that restoring/reconstructing a classroom to appear as a historic room carries the risk that it may create a false sense of how any of the individual historic classrooms actually looked. Utmost care must be taken to 1) use available documentation and physical evidence, and 2) provide a statement in or near the room that the re-creation of the room is in fact a restoration/reconstruction and is at least partly conjectural, although based on good evidence and documentation.

A limited amount of documentary evidence exists in the form of the original 1922 construction drawings and the 1962 "remodel" project that brought many of the rooms to their current state.
Undertaking to restore a classroom is not recommended unless additional physical or documentary evidence can be found. The physical evidence might include paint ghosts under the existing wall paint or wood floor type and paint color under the carpet. Documentary evidence might include interior photographs, first person accounts describing a classroom, or invoices for materials used.

The early rooms had plaster walls and ceilings, wood floors, and wood framed slate blackboards with profiled chalk rail on 2x2 brackets as shown in detail at top of sheet AC-2 of the original drawings; there also is a detail for bulletin boards. The building sections show a four inch wide chair rail, with top at 2'-10" above finished floor and a six inch high base. Sheet AC-7 the Transverse Section shows, in elevation, the north wall of Classroom 2 on the first floor and Classroom 6 above it on the second floor; these are the southeast corner classrooms. In both rooms there is a 5'-6" set of bookshelves on the west end of the wall, an 8'-0" chalkboard in the center and a 5'-6" bulletin board at the east end. The bottoms of these elements are at the top of the chair rail. A note on the first floor plan says, "wood floors all classrooms". The classroom doors were 3'-0" x 7'-0" x 1 3/4" wood with six divided lights in the upper portion as shown on sheet AC-5. The replicated door should be detailed similar to the existing historic door in the Work Room.

The lighting consisted of four electric light fixtures, located as shown on the drawings. They were lamped with 100 watt bulbs, but their appearance is not known. Each room was equipped with a steam radiator and was ventilated as described under Mechanical Systems. There were no electrical outlets shown on the drawings, and if there were any originally, they don't survive.

Classroom 2 was modified with a new north partition wall to establish a corridor to the connector to the new west wing in 1962. Classroom 6 above is relatively unchanged and could be restored. However the original Library on the first floor, now room #115, would be most visible from the main entry and more easily accessed than a second floor room.

RECOMMENDATIONS

Restore a classroom as nearly to its historic appearance as possible and still be useable as a classroom.

- Remove carpet, vinyl asbestos tile (v.a.t.) and wood floor beneath. The v.a.t. was installed in 1962 apparently over the wood floors in the classrooms. The v.a.t. is considered a hazardous material and is likely that the mastic used in its installation also contains asbestos. Licensed technicians will be required to remove it. Consideration was given to removing the tile and refinishing the wood floors beneath, but sanding the floors would put the asbestos into a friable state, thereby increasing the danger. Also, it is likely the wood floors were in poor condition when they installed the tile so trying to save them appears inadvisable.

- Install new wood floor on new subfloor on sleepers anchored to concrete floor beneath. New wood floor to match the floor being removed
- Install new replica door to corridor. This may present a code problem in that one hour doors are required in this situation and the historic doors won't qualify for a one hour rating.
- Install 1x4 chair rail on all walls; stain dark to match existing stain on extant door frames.
- Install bookshelves, blackboard and bulletin board on the end wall nearest the door per the details on Sheet AC-7.
- Remove resilient base and install wood baseboard and shoe.
- Install a 16' black board on the hallway wall, centered between the door frame and the end wall of the room as shown on original drawing plan sheets.
- Determine original wall and ceiling colors and paint walls and ceiling in historic colors.
- Replace hot water baseboard heating units with a single radiator converted to hot water located under the center window. Optionally, remove enough of the baseboard heating units to set a radiator against the wall and route the piping connecting the two remaining lengths of baseboard tight to the wall behind the radiator. In rooms 2 and 6, the drawings show a 128 sq. ft. radiator with a length of approximately 6'-8".
- Install ganged recessed two tube fluorescent lighting in the ceiling between original metal joists so the lenses are flush with the ceiling. This will provide the necessary lighting levels for productive teaching and learning while not detracting materially from the historic appearance.
- Install four ceiling mounted (or suspended on chains) globe type fixtures similar to the historic fixtures at similar locations. At present is not known what the classroom fixtures at Kesner looked like. The fixture shown right is from the 1921 Tarryall school that was electrified in 1946. Similar fixtures are found in the Alma Community Church which was built in 1931 and may have had electricity at the time of construction.

Figure 81. Schoolroom Globe from Tarryall School, Park County.

3.8 MECHANICAL SYSTEMS

A contract is in force with Johnson Controls, Inc., Littleton, Colorado to provide retrofit services to a number of heating, ventilating, and electrical elements over a span of 15 years. This contract guarantees a minimum energy savings. The system improvements are to be paid for on an incremental basis from the energy savings provided by the retrofits. To date two obsolete boilers have been replaced, heating and ventilating controls have been upgraded, all fluorescent light fixtures have been relamped and reballasted, computer and communication systems have been networked among buildings, a video security system has been installed, and a key card secure entry system is being installed.

Heating

The original heating system was steam boilers supplying steam radiators in the rooms. Heating today is by hydronic baseboards that extend the full length of the window walls in most rooms. The main heat source is two hot water boilers installed in 1998 replacing earlier equipment. They are fueled by natural gas and provide heat to the entire campus. The room baseboard units are quite old, probably installed in 1962, but appear to be functioning adequately.

Figure 82. One of two new boilers

Ventilation

The interior demising walls between each end class room and the next class room in from the end of the building is a plenum that was designed originally to contain both supply and return air functions. The supply air was ducted from a 17" x 13" grill in the foundation wall below these plenums. In the crawl space the ducts turned up into the plenum and served each first and second floor room through a register. Air movement was effected by a 1/2 hp motor at each plenum switched to the basement cafeteria. It appears the "exhaust air was collected from the interior these interior spaces, dumped into the crawl space and exhausted through a grill out the west side of the building foundation. The drawings show a 1/2 hp motor fixed to the inside of the foundation wall at this single grill. The restrooms were not part of this system and appear to have been vented through a 4" x 12" vent built into the foundation concrete wall and the brick wall above. There is no ductwork shown connected to these vents leading to the conjecture that they may have opened into the crawl space and exhausted through the west wall along with the room exhaust air.

The supply grills are extant, but the exhaust grill has been removed from the west foundation wall and the wall sealed up.

The ventilation system was revamped during the 1962 project and included installation of new ductwork, some of which is above the suspended ceiling above the corridors and some in the four original wall plenums. None of the new ductwork is exposed to view in finished areas but duct work can be obscured in both the basement and the attic. A return air grill was removed in the course of this investigation confirming that it is now ducted as shown in the 1962 drawings. This new system utilizes two 16" x 62" aluminum grilles through the foundation wall on the east side of the building. These are the only elements of the new system that change the character of any of the facades.

A room air conditioner was installed in the computer room (Room 113) in 1996. This window unit can be seen on the first floor west facade.

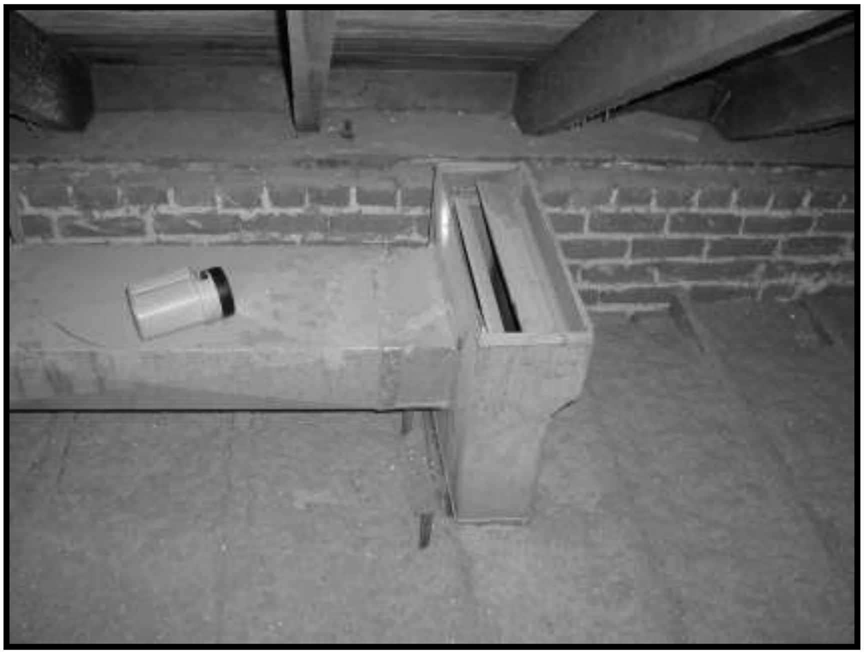


Figure 83. Ventilation duct in attic with damper.

Both the original steel windows and the current aluminum windows incorporated operating sash, which were and are today, relied upon to supplement ventilation. There are venetian blinds at each window intended to provide some respite from solar gain.

Figure 84. One of two large air intake vents on east wall.

While the heating and ventilation systems are adequate to meet basic human needs a large percentage of the time, they fall short of providing a comfort level conducive to learning and growing in an educational environment. The most serious shortfall is the lack of air conditioning. In the morning the long east facing side of the building overheats and in the afternoon the same happens on the west side. This situation is exacerbated during summer school which has now become a permanent part of the school operation.

CONDITION

There is no building wide integrated air conditioning system. While contract with Johnson Controls, Inc., has gone some distance to improve Kesner's usability, it does not include air conditioning.

The Venetian blinds are in **poor** condition

RECOMMENDATION

- Replace venetian blinds in classrooms and offices. Install new blinds at door transoms and large windows at the end of corridors. Other types of blinds that supply both ventilation and thermal insulation may be used. Cost estimates are for standard steel blinds. If thermal blinds are recommended as a result of the HVAC study, the costs should be adjusted accordingly.
- Conduct a comprehensive study of HVAC alternatives for this building, considering the existing systems and optimum ways of integrating elements into them. The study should consider how Kesner relates to and integrates with the other buildings in this complex, but should focus on Kesner and be especially sensitive to those characteristics that make Kesner significant.

There are a number of factors involved in the selection of a system to improve the interior environment. They include the following options or combinations thereof. A decision on which of these to implement should be made on the basis of the recommendations of the comprehensive study.

- The number of days the interior heat and humidity are such that additional tempering of the air is required.
- Heat loss and gain calculations.
- Effect of wall insulation
- Effect of additional insulation in the attic.
- Effect of new glazing characteristics, such as low-E glass.

Ken Berndt[22] supplied a wealth of possibilities for improving the interior environment in a telephone conversation:

- Install a new air conditioning system integrated with the ventilation ductwork. Compressors would have to be located within 50 feet of existing ventilation ductwork.
  This system would cost $10,000 to $15,000.

- Install a new full-blown air conditioning system, with totally integrated controls and zoning, which would provide individually adjustable controls for each room.
  This system would cost $50,000 to $75,000.

- Install a system with a compressor for each room. This would allow individual controls in each room, but would require camouflaging all the small compressors that would necessarily be in the east and west yards.

- Install an evaporative cooling system and perhaps be able to use existing ductwork. This system would require fairly large air intake grills, and there is no place in the present building configuration that would accommodate them. This would be a very good system in our climate, if the intake problem could be solved.

- There are ways to introduce cooled water into the baseboard units, but would require additional controls that would have to be integrated with the current system.

[22] Telephone conversation with Ken Berndt, of Johnny Berndt and Sons, Inc., HVAC Contractor, Salida.

- Currently, outside air is tempered (warmed) as it enters the system. This works well in cold but in the interest of saving money, the operators don't like to use it in very cold weather, so they override it and the air gets stale.

- Another possibility would be to program the controls so outside air would be brought in during the night to cool the interiors. It would moderate the room temperature so they wouldn't heat up so fast during the daytime.

- A full study by qualified persons would have to be done in order to determine the optimum combination of actions to be undertaken so as to provide a coordinated integrated system.

WATER SERVICE, PLUMBING, AND SEWER UTILITIES

DESCRIPTION

Water and sewer service is provided from the City of Salida system. On site they have had some problems with buried metal pipe deterioration (both supply and waste) due to electrolysis.

CONDITION

As far as currently is known, all deteriorated steel pipe has been replaced.

RECOMMENDATIONS

None.

FIRE SUPPRESSION—SPRINKLERS

None exist.

3.9 ELECTRICAL SYSTEMS

ELECTRICAL SERVICE AND PANELS

Electricity is served from a main panel located in the gymnasium building to a 225 amp panel (see right) and smaller sub-panel located on the first floor on the north wall of the corridor in the middle of the building. This was the original location of a recessed panel shown on the original drawings. There is a smaller panel above the building main panel. The current panels, while in the same general location as the original are in a furred out floor to ceiling chase approximately as deep as the adjacent lockers and about two feet wide. The main building panels (two) were located under the up run of the north stair.

Figure 85. Sub-panel in first floor hall, Kesner Building.

ELECTRICAL DISTRIBUTION SYSTEM

Most of the class rooms have few outlets. Room 117, the room used as a baseline in this assessment has only two duplex outlets. Additional electrical capacity has been installed in the computer class room and word processing class room. This wiring is in wire mold run along the bottom of the chalkboards and windowsills.

Wiring for the recently installed communications system is hung loosely bundled, at the top of the exterior wall above the windows.

Wiring for the exterior video cameras on the southeast corner of the building is routed through the interior on the wall surfaces and exits through the upper "sash" of a window in Room 117.

CONDITION

Most of the electrical service components have been replaced in recent times. However, the building suffers from insufficient quantity and quality of service elements. The class rooms are under-electrified, as are the offices, with too few outlets. The main panel has a continuous hum, sounding like a loud transformer.

RECOMMENDATIONS

- Identify and correct the loud hum in the main electrical panel. It is disturbing to be near and doubly disturbing when trying to hold a conversation.

- It is recognized that the school needs the retrofit electrical and communications wiring, however much of the wiring in the building has been installed in a haphazard manner resulting in an unsightly situation. In the future, care should be taken to preserve the visual characteristics of the room interiors.

- In the future, where electrical or communications wiring must pass horizontally through a room, a box soffit should be constructed above the windows at the ceiling or at the ceiling on the opposite wall and painted out the wall color.

- Every attempt should be made to avoid hanging any additional devices of any kind on the exterior walls or roofs of the building.

- Paint the flex conduit at the video camera wiring same color as the brick.

- Increase electrical outlets in all rooms, except restrooms. New wiring can be routed through the plenum spaces from the basement level through the first floor to the second floor. The attic is also available to route wiring which could be dropped into partitions from above. If accessed vertically through the plenum toward the corridor wall, wiring could be distributed horizontally along the wall in rectangular "wire mold" boxes (higher than deep) below the window stools and chalk boards. This solution has the appearance of a large plug strip and can be painted out in the wall color. Wire mold can also be run on top of the base to diminish its impact on original features, materials, and spaces.

- Remove and relocate the bundle of wires in the computer room and reroute per above.

LIGHTING

DESCRIPTION

Original lighting was by ceiling mounted incandescent fixtures with glass globes. There were four in each class room, five along the entire length of the main corridors, and one in each small room and other small corridors and spaces. The drawings call for most of these to be lamped with 100 watt bulbs. The smaller non-public rooms such as the storage rooms and the vault simply indicate the letter "S" with no wattage shown. A few of these “S’ fixtures are extant in obscure places in the building. It is unlikely that the "100w" fixtures in the public areas were the same as the "S" fixtures.

Figure 86. Original light fixture in the janitor’s supply closet.

There were wall mounted entry fixtures on the pilasters that flank the entry doors. In the elevations, these fixtures are drawn as a simple globe atop a cylindrical shaft on stand off brackets. All these fixtures are missing, but at the former main entry, the junction boxes are still extant 7'-9" above the floor line. These also were lamped with 100 watt bulbs.

Today the interior lighting is ceiling mounted fluorescent fixtures, most of which are on short brackets so they stand off the ceiling a few inches. They are fed by wiring in ceiling mounted wire mold from junction boxes that appear to be in the same locations as the original light fixtures. These fixtures are old and have baffles that direct light downward, but no lenses. In the class rooms they are four feet long in four-lamp gangs, mounted in a continuous row along the length of the corridors.

CONDITION

Although old, the fluorescent fixtures appear to be serving adequately. In 1998 the ballasts were replaced and the fixtures relamped with lamps having a Color Rendering Index of 85 which much improves the light quality. These lamps have a Neutral color temperature that can be classified as "Friendly, Inviting, Non-threatening", obviously positive lighting for a school.[23]

RECOMMENDATIONS

- Lighting could be improved by replacing the existing with new fixtures. Location and orientation could also improve the experiential quality. For instance it is usually more pleasant in passing through a corridor to encounter fluorescent fixtures that are perpendicular to the path of travel than along its length. Fixtures with state of the art lenses would also be an improvement. However, because the lighting has been found to be adequate by specialists in the field, this assessment recommends that the status quo be maintained.

- The model historic class room should incorporate incandescent fixtures of the original type.

- New reproduction or similar lamps should be installed at the main entry and south entry.

FIRE DETECTION SYSTEM

None. There is a fire alarm system activated by pull boxes at both ends of the corridors on both floors.

SECURITY ALARM SYSTEM

The building is wired for a security system utilizing magnetic contacts at the doors, but the system has not yet been completed. Additionally there is a video camera system employing 3 outdoor and 13 indoor cameras that operates 24 hours a day, 7 days a week. There are additional cameras on the other buildings in the complex. Monitors in the basement custodian's kitchen are on at all times. These computers have a memory capacity of 30 days so the events recorded by any camera within the past 30 days can be reviewed. Real time events can also be called up on remote computers using a programmed set of inputs.

[23] Information in letter from Johnson Controls, Inc., to Rob Wikoff, Salida Schools, 5/11/98.

4.0 ANALYSIS AND COMPLIANCE

4.1 HAZARDOUS MATERIALS

No radon has been found in the Kesner Building.

Air quality is considered to be good. Chemical cleaning compounds have been inspected, and they are appropriate and are used correctly. At present, no science classes are held in the Kesner Building and chemical storage and handling for class room use is therefore not a problem.

In 1998, all asbestos elbows and joints were removed from the boiler room in the Kesner Building basement. The gasket material containing asbestos on the #2 boiler remains. It is assumed that the floor tile in the Kesner Building contains asbestos. However, periodic surveillance reports by Don Ogden Consulting indicate that the floor tiles are well sealed and maintained.

No mention was made of the acoustical tiles in the class room ceilings.

No other hazardous materials or conditions have been noted.

Testing for lead based paints should be undertaken before construction begins.

4.2 MATERIALS ANALYSIS

Names of manufacturers of various building products have been included in the text and footnotes. Formal analyses of mortar, paint or other materials was not undertaken during preparation of this HSA. Paint and mortar analysis should be undertaken before construction begins.

4.3 ZONING CODE COMPLIANCE[24]

Kesner Building is located on the west edge of a residential area, zoned R-2. To the south are playing fields and other buildings that are part of the educational complex. Beyond that is commercial development along Highway 50.

Schools are a conditional use within R-2, meaning that it is a use that typically fits into the neighborhood but may need some site specific review if a major change is proposed, such as an expansion.

[24] Phelan, Jennifer, Salida City Planner, Personal Communication, 2003.

4.4 BUILDING CODE COMPLIANCE

The Colorado Historical Society has included a code compliance review in their Historic Structure Assessment Outline to assure that the subject structure can be used for the purpose it is intended without excessive rehabilitation. This is particularly important when a historic building is to be converted to a new use and rehabilitation for the new use could require significant modification or even destruction of the character defining elements of the building. This is not the case with Kesner, which is continuing in its historic use.

An exhaustive code analysis is beyond the scope of the historic structure assessment. Materials and systems have been examined visually with no destructive investigation and no laboratory analysis, and no glaring code problems are apparent. For example, most areas of the school are plaster on steel studs which has a better fire-rating than standard 5/8" Type X drywall on wood studs which constitutes a one hour wall. The remainder of the construction is masonry, steel and concrete, all inflammable materials. The corridors and stairs are wide and there are no dead ends. And while the classroom doors do not bear the required one hour labels, they are 1 3/4" solid core doors with small wire glass lights. They don't meet the letter of the code exactly, but they come very close. Additionally the Salida Fire Marshall conducts periodic inspections of all the district buildings and fire drills are required.

Chapter 34, *Existing Buildings,* and Appendix Chapter 34 of the UBC contain provisions that allow alterations and modifications to existing buildings so long as the modifications conform to code and the result is no less safe than the original building was to begin with. These chapters allow the building official significant latitude to interpret the code. Chapter 34 also refers the reader to the Uniform Code for Building Conservation (UCBC), which is a "building conservation guideline presented in code format." The stated purpose of the UCBC is to "provide a community with the means to preserve its existing buildings while achieving appropriate levels of safety." The provisions of the UCBC allow, among other things, estimation of fire safety capabilities of archaic materials and systems in existing and historic buildings. The recommendations of this assessment take into consideration those things that can be interpreted by a building official under Chapter 34 and the UCBC to save character defining features of this historic building.

The project architects of any future project(s) should consult with the building official early in the design process for interpretations allowed by the UCBC and work with the building official to develop solutions that provide a high level of life safety and that are in keeping with the historic character of the building. Mr. Horn, State Division of Labor building official, said in a telephone conversation that he will work with the school districts as long as the building in question is a "bona fide" historic building.

Code Authority:	Colorado Division of Labor Public Safety Section 1515 Arapahoe St. Tower 2E, Suite 775 Denver, CO. 80202
Chief Building official:	Wayne Horn 303 572-2919

Building Code:	Uniform Building Code, 1997 Edition adopted by the state, effective May 1, 1999. The Uniform Code for Building Conservation (1997) may be used as a guideline by the building official. The state has not formally adopted the UCBC but does recognize its application as a guideline for the protection of historic buildings.
Occupancy Group:	Group E, Division 1: “Any building used for educational purposes through the 12th grade by 50 or more persons for more than 12 hours per week or four hours in any one day.”

4.5 ACCESSIBILITY COMPLIANCE

Melien Hall to the north end of the Kesner Building provides wheelchair access to the Kesner Building. The fire alarms provide both visual and audible access. However, there are other items that should be addressed to facilitate universal access to all functions of the building. This is a short and non-comprehensive list of suggestions for improvements to the building itself. Additional provisions, such as text telephone and suitable furniture and furniture arrangement, should also be considered.

- Visible signs are needed to indicate the location of accessible parking and a wheelchair accessibly entry.
- All room door knobs should be changed to lever handles.
- Doors should be adjusted to open easily.
- Door signs should be mounted on the wall adjacent to the latch side of the door, at 60" from the floor, with raised, high-contrast characters.
- Fire pull boxes cannot be operated with a fist. They also may be too high above the floor for someone in a wheelchair to use.
- Restroom partitions need to be reorganized to provide access to wheelchair users. At least one toilet in each restroom should be accessible to a wheelchair user.
- The mirrors should be mounted with the bottom edge of the reflecting surface 40 inches high or lower.
- The gang lavatories should be replaced or augmented with a type that is not foot operated and that allows wheelchair access.
- Water fountains should be cane detectible.

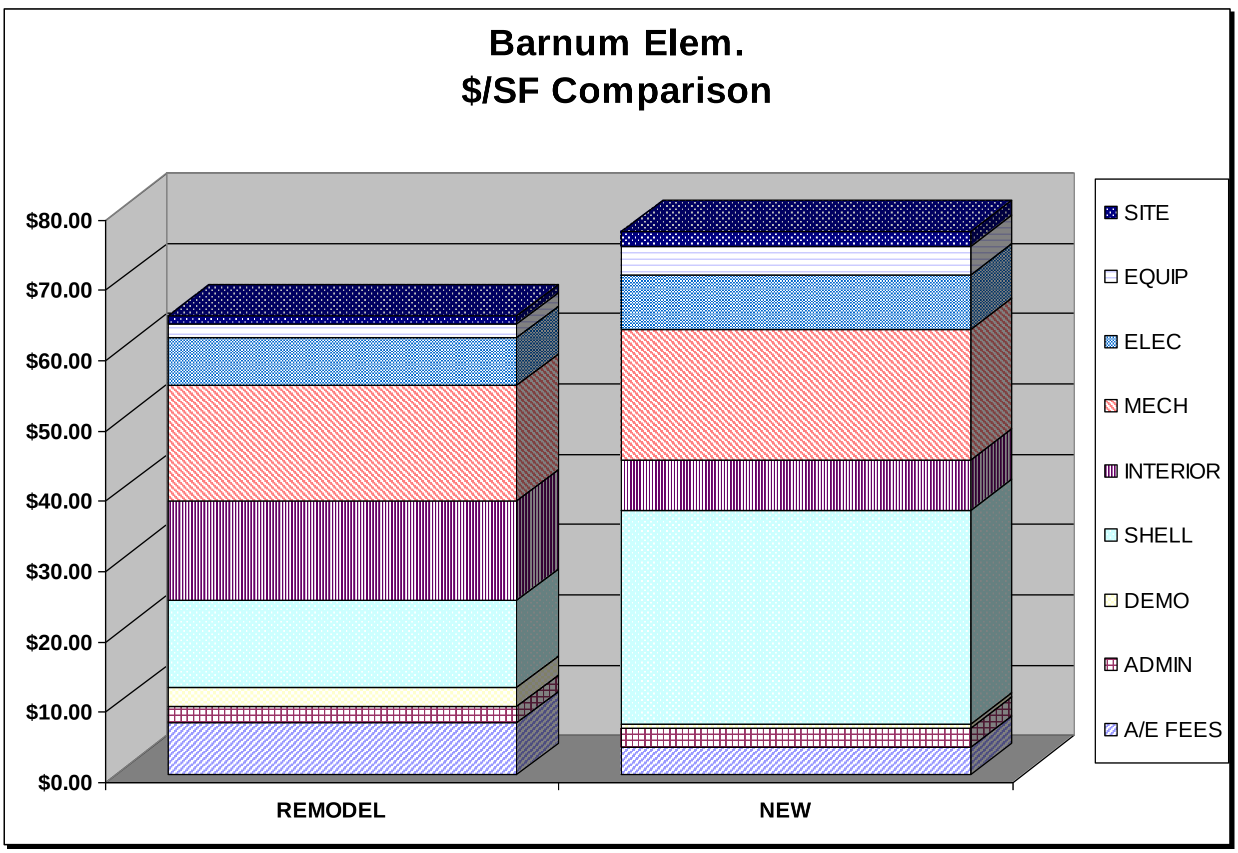
5.0 PRESERVATION PLAN

5.1 PRIORITIZED WORK

Overall, Kesner Building is a sound building with many of the problems of aging that are common to buildings of this vintage. None of the conditions found in this study leads to a conclusion that the building should be replaced. The greatest unknowns are the questions of foundation and wall movement. Prudence requires that a monitoring program be undertaken, to determine whether the building is continuing to move.

The wall cracking appears to have been an early event. It appears that soils wetting is very likely to be the major cause of this phenomenon. If so, treating this problem should be high on the priority list.

However, this study concludes that, overall, the building is sound and has the prospect of many years of life if certain remedies are undertaken. The chart below was developed by Denver Public Schools to show the cost of building a new school versus the cost of remodeling an existing one. Not only is it less expensive per square foot monetarily to remodel the old school,



but the energy embodied in the original structure is retained, and fewer newly manufactured materials are required.

The preservation plan has been developed on the assumption that the district wishes to continue the building in its present use and that the crack monitoring plan will find little or no continuing movement. The estimated cost is the item includes materials, labor and contractor's probable overhead and profit. The right column includes an additional 10% for general conditions, 15% contingency, and A/E fees of 16%.

Priority	Discussion	Estimated Cost	With Gen'l Conditions, Contingency & AE Fees
1	***Remedy water problems.*** • Watering regime • Gutters and downspouts • Grade at building • Establish dry zone • Lawn change-out and sprinkler system	***Costs are removed due to rapid change in prices from when the document was done.***	
2	***Monitor wall and foundation cracking.***		
3	***Address and resolve accessibility needs.***		
4	***Rehabilitate roof.*** This will stop the minimal water damage that is currently occurring. Also, there is some small potential of broken tile falling from the roof and causing injury, contributing to the high priority of this action.		
5	***Repair walls and foundations.***		
6	***Replace windows and window coverings..*** This action will improve energy savings and comfort level at the same time as contributing to the exterior restoration of the building.		
7	***Improve electrical system.***		
8	***Study HVAC.*** Improved HVAC will improve the comfort level which in turn will contribute to extending the usability of the building.		
9	***Restore exterior,*** including site work and work on the south and southwest sides of the building. This action will go far in soliciting support. Window replacement will already have provided an appearance of nearly total restoration.		

10	***Restore Class Room.*** This action will increase support and, on the part of students and teachers, should be an exciting place to teach and learn.	21,085	30,940
11	***Complete Interior Work.***	25,585	37,543

5.3 ESTIMATED COSTS OF CONSTRUCTION

Costs are removed from the document due to changes in prices.

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7.0 APPENDICES

APPENDIX A – STRUCTURAL ENGINEER'S REPORT

June 30, 2003

Central Colorado Preservation Partners
532 Poncha Boulevard
Salida, CO 81201

Attn: Mr. Gary Higgins

Re: Kesner Junior High School, Salida, Colorado (M&N #5795)

Gentlemen:

As requested, Monroe & Newell Engineers, Inc. conducted a site observation and has completed a review of the existing drawings provided for the Junior High School. The purpose of our observation and review was to provide our opinion of the current structural condition of the building.

The original building is a two level classroom building primarily rectangular in shape with classrooms on either side of a center corridor. A rectangular entry area steps out from the main area at the center of the east side. The building has connections on both the north and west sides to additional buildings. There is a partial basement/mechanical room area below the south end of the building, a partial height basement/storage area below the center section of the building, and a crawlspace below the north end.

The roof shape of the building is a standard hip with the center portion being a flatter pitch. On the southwest corner of the building is a rectangular chimney element that extends above the hip roof. The original building drawings are dated 1922.

The exterior of the building includes a clay (or) concrete tile roof. The roof eave has exposed wood rafters. The exterior walls above the first floor level are brick. Below the first level there are some exposed concrete foundation walls.

Based on our observation, the building overall appears to be in good condition at this time. The wood roof framing appears to be in good condition.

There are only small areas of the main floor framing exposed in the lower level and that framing appears in good condition. The floors are concrete slabs supported on steel channel shaped joists spaced at 1'-0" to approximately 2'-0" on centers. This is an unusual structural framing system considering the building age and type. The system appears to have performed very well.

The exterior walls of the building are load bearing brick approximately 13 inches thick. Except for the south portion of the east wall, the brick appears in good condition.

There has been movement in the south portion of the east wall that has resulted in brick cracking. The most visible crack occurs between the third and fourth windows from the south end of the wall. It is approximately 1/2 inch wide and both stair steps in brick joints and has cracked through the brick. The crack could not be seen inside the building but may have been inside a non-accessible le shaft.

In addition, there are vertical cracks in the foundation walls at the junction of the east entry to the building on the south side and at the southeast corner of the entry. These cracks are visible inside the storage area and crawlspace.

These cracks appear to be the result of minor foundation settlement. There is a roof downspout in the area and possibly the bearing soils have been wetted. The cracking observed does not appear recent, however, additional investigation is
warranted.

If the age of the crack cannot be verified, if it is relatively recent, or if it has recently changed; it would be prudent to start a simple monitoring program on the building. This should be done by:

1. Photographing the crack with dated photos.

2. Putting crack monitors across the crack to record horizontal and vertical movement of the crack.

3. Surveying this portion of the building exterior to monitor both vertical and horizontal movement. Points could be established on the stone sill, window frames, etc. for this purpose.

If it can be determined that the crack is stable, the existing wall can be repaired to eliminate the crack and take out broken bricks.

It is unusual to have a complete set of drawings available for a building of this age. It is even more unusual to see drawings from this time period that indicate such a high degree of structural engineering design. A complete review of the structural framing is beyond the scope of this report. However, based on our limited review, it appears both the roof framing and the floor framing are capable of supporting the loads currently required by the building code.

In conclusion, the building appears to be generally in good structural condition and appears to be capable of supporting current required design loads.

If you have any questions or comments, please call.

Very truly yours,

MONROE & NEWELL ENGINEERS, INC.

Peter Monroe, P.E.
Principal

APPENDIX B– PRESERVATION AND REPAIR OF HISTORIC CLAY TILE ROOFS

30 Preservation Briefs

Technical Preservation Services

National Park Service
U.S. Department of the Interior

THE PRESERVATION AND REPAIR OF HISTORIC CLAY TILE ROOFS

Anne E. Grimmer and Paul K. Williams

A NOTE TO OUR USERS: The web versions of the **Preservation Briefs** differ somewhat from the printed versions. Many illustrations are new, captions are simplified, illustrations are typically in color rather than black and white, and some complex charts have been omitted.

Clay tiles are one of the most distinctive and decorative historic roofing materials because of their great variety of shapes, colors, profiles, patterns, and textures. Traditionally, clay tiles were formed by hand, and later by machine extrusion of natural clay, textured or glazed with color, and fired in high-temperature kilns. The unique visual qualities of a clay tile roof often make it a prominent feature in defining the overall character of a historic building. The significance and inherently fragile nature of historic tile roofs dictate that special care and precaution be taken to preserve and repair them.

Clay tile was a popular roofing material for residential structures during the Romanesque Revival period. Photo: NPS files.

Clay tile has one of the longest life expectancies among historic roofing materials-generally about 100 years, and often several hundred. Yet, a regularly scheduled maintenance program is necessary to prolong the life of any roofing system. A complete internal and external inspection of the roof structure and the roof covering is recommended to determine condition, potential causes of failure, or source of leaks, and will help in developing a program for the preservation and repair of the tile roof. Before initiating any repair work on historic clay tile roofs, it is important to identify those qualities important in contributing to the historic significance and character of the building.

This Brief will review the history of clay roofing tiles and will include a description of the many types and shapes of historic tiles, as well as their different methods of attachment. It will conclude with general guidance for the historic property owner or building manager on how to plan and carry out a project involving the repair and selected replacement of historic clay roofing tiles.

Repair of historic clay tile roofs is not a job for amateurs; it should be undertaken only by professional roofers experienced in working with clay tile roofs.

HISTORICAL BACKGROUND

The origin of clay roofing tile can be traced independently to two different parts of the world: China, during the Neolithic Age, beginning around 10,000 B.C.; and the Middle East, a short time later. From these regions, the use of clay tile spread throughout Asia and Europe. Not only the ancient Egyptians and Babylonians, but also the Greeks and Romans roofed their buildings with clay tiles, and adaptations of their practice continue in Europe to the present. European settlers brought this roofing tradition to America where it was established in many places by the 17th century.

Tapered barrel clay roof tiles were custom made for the restoration of the 1820s Indian barracks at Mission Santa Cruz in California. Photo: NPS files.

Archeologists have recovered specimens of clay roofing tiles from the 1585 settlement of Roanoke Island in North Carolina. Clay tile was also used in the early English settlements in Jamestown, Virginia, and nearby St. Mary's in Maryland. Clay roofing tiles were also used in the Spanish settlement of St. Augustine in Florida, and by both the French and Spanish in New Orleans.

Dutch settlers on the east coast first imported clay tiles from Holland. By 1650, they had established their own full-scale production of clay tiles in the upper Hudson River Valley, shipping tiles south to New Amsterdam. Several tile manufacturing operations were in business around the time of the American Revolution, offering both colored and glazed tile and unglazed natural terra-cotta tile in the New York City area, and in neighboring New Jersey. A 1774 New York newspaper advertised the availability of locally produced, glazed and unglazed pantiles for sale that were guaranteed to "stand any weather." On the west coast clay tile was first manufactured in wooden molds in 1780 at Mission San Antonio de Padua in California by Indian neophytes under the direction of Spanish missionaries.

By far the most significant factor in popularizing clay roofing tiles during the Colonial period in America was the concern with fire. Devastating fires in London, 1666, and Boston in 1679, prompted the establishment of building and fire codes in New York and Boston. These fire codes, which remained in effect for almost two centuries, encouraged the use of tile for roofs, especially in urban areas, because of its fireproof qualities. Clay roofing tile was also preferred because of its durability, ease of maintenance, and lack of thermal conductivity.

Although more efficient production methods had lowered the cost of clay tile, its use began to decline in much of the northeastern United States during the second quarter of the 19th century. In most areas outside city-designated fire districts, wood shingles were used widely; they were more affordable and much lighter, and required less heavy and less expensive roof framing. In addition, new fire-resistant materials were becoming available that could be used for roofing, including slate, and metals such as copper, iron, tin-plate, zinc, and galvanized iron. Many of the metal roofing materials could be installed at a fraction of the cost and weight of clay tile. Even the appearance of clay tile was no longer fashionable, and by the 1830s clay roofing tiles had slipped temporarily out of popularity in many parts of the country.

REVIVAL STYLES RENEW INTEREST IN CLAY ROOFING TILES

By the mid-19th century, the introduction of the Italianate Villa style of architecture in the United States prompted a new interest in clay tiles for roofing. This had the effect of revitalizing the clay tile manufacturing industry, and by the 1870s, new factories were in business, including large operations in Akron, Ohio, and Baltimore, Maryland.

The clay tile roof is important in defining the character of the c. 1917 Mission-style Grove Park Inn, Asheville, North Carolina. Photo: NPS files.

Clay tiles were promoted by the Centennial Exhibition in Philadelphia in 1876, which featured several prominent buildings with tile roofs, including a pavilion for the state of New Jersey roofed with clay tiles of local manufacture. Tile-making machines were first patented in the 1870s, and although much roofing tile continued to be made by hand, by the 1880s more and more factories were beginning to use machines. The development of the Romanesque Revival style of architecture in the 1890s further strengthened the role of clay roofing tiles as an American building material.

Alternative substitutes for clay tiles were also needed to meet this new demand. By about 1855, sheet metal roofs designed to replicate the patterns of clay tile were being produced. Usually painted a natural terra cotta color to emulate real clay tile, these sheet metal roofs became popular because they were cheaper and lighter, and easier to install than clay tile roofs.

Clay roofing tiles fell out of fashion again for a short time at the end of the 19th century, but once more gained acceptance in the 20th century, due primarily to the popularity of the Romantic Revival architectural styles, including Mission, Spanish, Mediterranean, Georgian and Renaissance Revival in which clay tile roofs featured prominently. With the availability of machines capable of extruding clay in a variety of forms in large quantities, clay tiles became more readily available across the nation. More regional manufacturing plants were established in areas with large natural deposits of clay, including Alfred, New York; New Lexington, Ohio; Lincoln, California; and Atlanta, Georgia; as well as Indiana, Illinois and Kansas.

Clay tiles emphasize the prominence of the peaked roofs of these late 19th century rowhouses. Photo: NPS files.

The popularity of clay tile roofing, and look-alike substitute roofing materials, continues in the 20th century, especially in areas of the South and West-most notably Florida and California--where Mediterranean and Spanish--influenced styles of architecture still predominate.

EARLY TILES

During the 17th and 18th centuries the most common type of clay roofing tiles used in America were flat and rectangular. They measured approximately 10" x 6" x ½" (25cm x 15cm x 1.25cm), and had two nail or peg holes at one end through which they were anchored to the roofing laths. Sometimes a strip of mortar was placed between the overlapping rows of tile to prevent the tiles from lifting in high winds. In addition to flat tiles, interlocking S-shaped pantiles were also used in the 18th century. These were formed by molding clay over tapered sections of logs, and were generally quite large. Alternately termed pan, crooked, or Flemish tiles, and measuring approximately 14 ½" x 9 ½" (37cm x 24cm), these interlocking tiles were hung on roofing lath by means of a ridge or lug located on the upper part of the underside of each tile. Both plain (flat) tile and pantile (S-shaped or curved) roofs were capped at the ridge with semicircular ridge tiles. Clay roofing tiles on buildings in mid-18th century Moravian settlements in Pennsylvania closely resembled those used in Germany at the time. These tiles were about 14"-15" long x 6"-7" wide (36cm-38cm x 15cm-18cm) with a curved butt, and with vertical grooves to help drainage. They were also designed with a lug or nib on the back so that the tiles could hang on lath without nails or pegs.

The accurate dating of early roofing tiles is difficult and often impossible. Fragments of tile found at archeological sites may indicate the existence of clay tile roofs, but the same type of tile was also sometimes used for other purposes such as paving, and in bake ovens. To further complicate dating, since clay tile frequently outlasted many of the earliest, less permanent structures, it was often reused on later buildings.

CLAY TILE SUBSTITUTES

In addition to sheet metal "tile" roofs introduced in the middle of the 19th century, concrete roofing tile was developed as another substitute for clay tile in the latter part of the 19th century. It became quite popular by the beginning of the 20th century. Concrete tile is composed of a dense mixture of portland cement blended with aggregates, including sand, and pigment, and extruded from high-pressure machines.

Asphalt shingles are an incompatible replacement substitute for the original Spanish clay tiles. Photo: NPS files.

Although it tends to lack the color permanence and the subtle color variations inherent in natural clay tile, concrete tile continues to be a popular roofing material today because it reproduces the general look of clay tile, if not always the exact profile or proportions of historic clay tile, at a somewhat lower cost and weight. Another modern, slightly cheaper and lighter substitute for clay tile more recently developed consists of a mixture of mineral fiber and cement with pigments added to supply color. While these aggregate tiles also replicate the shape and appearance of clay roofing tiles, they have many of the same dissimilarities to clay tiles that are found in concrete tiles. Thus, like concrete tiles, they are seldom appropriate substitutes for clay tiles.

TRADITIONAL TILE SHAPES AND COLORS

There are two types of clay roofing tiles: interlocking and overlapping. *Interlocking* tiles are designed in pairs so that an extrusion or "lip" on one of the tiles "hooks" over the other tile thereby "locking" or securing the two together; they are also usually nailed to the roof structure. *Overlapping* tiles, which can also function in pairs, generally do not have any sort of "lip" and must be nailed in place. There is a wide range of shapes of historic clay roofing tiles, and many, sometimes with slight variations, are still produced today. There are many variations, and the country of origin of some of them may be revealed in their names, but there are essentially only two kinds of shapes: pantiles and flat tiles. Both pantiles and flat tiles may be either interlocking or overlapping.

Pantiles. The shape most commonly associated with historic clay roofing tiles is probably that of convex or rounded tiles, often grouped together generically as "pan tiles" or "pantiles." These include Spanish tiles-sometimes called "S" tiles, or the similarly shaped Mission tiles, also known as Barrel or Barrel Mission tiles, straight or tapered, as well as Roman tiles, and their Greek variation.

Flat Tiles. Flat, shingle tiles are another type of historic clay roofing tiles. Flat tiles can be completely plain and flat, and, like roofing slates, overlap one another, attached with nails to the roof sheathing. Or they may interlock at the top and on one side. Although the "interlock" holds them together, most interlocking shingle tiles also have one or more holes, usually near the top, for nailing to the roof sheathing. Flat tiles are mostly variations of English or Shingle tiles, and include English Shingle, Closed Shingle, Flat, Shingle or Slab Shingle, as well as French tiles which have a slightly higher and more contoured profile.

Any of the standard tile shapes may be known by a different name in another region of the country, or in different parts of the world. For example, what are known as Spanish or "S" tiles in the United States, may be called Single Roman tiles in England. Sometimes Spanish and Mission tiles are equated despite the fact that the former are usually 1-piece interlocking tiles and the latter are single ½ cylinders that overlap. Since missions and the Mission style are associated with the Americas, Mission tiles in the United States are more commonly referred to as Spanish tiles in England and Europe. In a similar vein, Spanish or "S" tiles, or Barrel tiles, might seem to be more typical of some tiles used in France than what are marketed as French tiles by American manufacturers.

Today some tile manufacturers have given their own trademark name to historic tile shapes. Other companies market uniquely shaped "S" tiles that are more in the shape of a true, but rather low profile "s" without the customary flat portion of traditional American "S" tiles.

An eave closure or *birdstop* to keep out birds is notably absent from the replacement tile in the center of the bottom row. Photo: NPS files.

Field and Specialty Tile. The tiles that cover the majority of the flat surface of the roof are called field tile. Some roof shapes, particularly conical towers or turrets, require tiles of graduated sizes, and some shapes or patterns of field tile also require specially shaped finish tiles to complete the roof covering package. Other uniquely-shaped tiles were made to fit odd-shaped spaces and places including dormers and valleys, roof hips, rakes, ridges and corners. There are also finish tiles that fulfill certain needs, such as eave closures or clay plugs called "birdstops." These are intended to keep out snow and rain, and birds from nesting in the voids under the bottom row of curved tiles. Different patterns and designs can also be created by combining, or mixing and matching flat tiles with dimensional tiles.

Tile Colors. A terra cotta red is the color most commonly associated with historic clay roofing tiles. The reddish color comes from clay with a large percentage of iron oxide, and there are many variations of this natural color to be found in tiles ranging from deep reddish browns to softer and paler oranges and pinks. Lighter buff and beige colors, as well as black, also appear on traditional tile-roofed buildings. Buff-colored tiles were made from nearly pure fire clay, and pouring manganese dissolved in water over the tile before firing resulted in smoke brown or black glazed tiles. Toward the end of the 19th century the popularity of colored glazes for roofing tiles increased, and their use and the range of colors continues to expand today.

Most historic glazed roofing tiles are in fairly natural hues that range from reds and browns and buffs, to blacks and purples, blues (often created with smalt, or powdered blue glass), and a wide variety of greens (usually created with copper slag). There could be a considerable range in the colors of tiles that were baked over a wood fire because the temperature within the kiln was so uneven; tiles closest to the fire cooked all the way through and turned a darker red, while tiles farthest from the flames were likely to be smoke-stained, and lighter orange in color.

HOW TILES ARE ATTACHED

The method used to attach clay roofing tiles varies according to the shape, size and style of the particular tile. For the most part, traditional and modern methods of installing clay roofing tiles are very similar, except that modern practice always includes the use of wood sheathing and roofing felt. But most of the earliest clay roofing tiles were laid without benefit of wood sheathing and hung directly on roofing laths and battens that were nailed to the roof rafters; this practice continued up into the mid-19th century in some regions. While this method of attachment allowed for plenty of ventilation, and made it easy to find leaks and make repairs, it also meant that the overall water-tightness of the roof depended entirely on the tiles themselves.

Gradually, the practice evolved of nailing roofing tiles directly onto continuous wood sheathing, or hanging them from "nibs" on horizontal lath that was attached to roof rafters or sheathing. Some kinds of tile, especially the later Mission or Barrel tiles were laid over vertical strips or battens nailed to the sheathing, or the tiles were fastened to wood purlins with copper wire.


Projections on the underside of these replacement Spanish clay tiles help them adhere to the cement mortar on the roof sheathing. Photo: NPS files.

Partly because they do not always fit together very closely, some tile shapes, including Spanish, Barrel or Mission as well as other types of interlocking tiles, are not themselves completely water-repellent when used on very low-pitched roofs. These have always required some form of sub-roofing, or an additional waterproof underlayer, such as felting, a bituminous or a cementitious coating. In some traditional English applications, a treatment called "torching," involved using a simple kind of mortar most commonly consisting of straw, mud, and moss. The tapered Mission tiles of the old Spanish missions in California were also laid in a bed of mud mortar mixed with grass or straw which was their only means of attachment to the very low-pitched reed or twig sheathing (*latia*) that supported the tiles.

More recent and contemporary roofing practices require that the tiles be laid on solid l" (2.5cm) wood sheathing felted with coated base sheets of at least 30 lbs., or built-up membranes or single-ply roof membranes. This substantially increases the water-tightness of the roof by adding a second layer of waterproofing. Horizontal and vertical chalk lines are drawn to serve as a guide in laying the tile and to indicate its patterning. Most tiles are designed with one or two holes so they can be attached by copper nails or hangers, and/or with projecting nibs, to interlock or hang on battens or lath attached to the base sheathing.

Before laying the tiles, the copper or lead gutters, flashings and valleys must be installed, preferably using at least #26 gauge (20-24 ounce) corrosion-resistant metal extending a minimum of 12" (30.5cm) under the tile from the edge, or in accordance with the manufacturer's specifications. The long life and expected durability of clay tiles require that, as with the roofing nails, only the best quality metal be selected for the flashing and guttering.

These tapered barrel clay tiles were accurately reproduced from archeological materials found on site. Photo: NPS files.

"Field tile" is usually ordered by the number of "squares"-that is, a flat section 10' x 10' (25cm x 25cm)--needed to cover a roof section. The tile company or roofing contractor should calculate the number of tiles needed according to the type of roof, and based on architect's drawings to ensure accuracy. This should include specialty ridge and eave tiles, decorative trim, partial "squares" approximately 10-20 per cent allowance for breakage, and extra tiles to store for repairing incidental damage later on. Once at the site, the tile is evenly distributed in piles on the roof, within easy reach for the roofers.

The tiles are laid beginning with the first course at the lower edge of the roof at the eaves. The method by which roofing tiles are laid and attached varies, depending on the type and design of the tiles and roof shape, as well as on regional practice and local weather conditions. A raised fascia, a cant strip, a double or triple layer of tiles, or special "birdstop" tiles for under the eaves, may be used to raise the first row of tiles to the requisite height and angle necessary for the best functioning of the roof. The tile is positioned to overhang the previously installed gutter system by at least 1-1/2" (4cm) to ensure that rainwater discharges into the central portion of the gutter. Once this first course is carefully fitted and examined from the ground level for straightness and color nuances, and adjusted accordingly, successive courses are lapped over the ones below as the roofer works diagonally up the roof toward the ridge. Positioning and laying tiles in a 10" x 10" (25cm x 25cm) square may take on the average of 16-1/2 man hours.

FLAT TILES

Most flat clay tiles have one or two holes located at the top, or on a "nib" or "lug" that projects vertically either from the face or the underside of the tiles, for nailing the tile to the sheathing, battens, or furring strips beneath. As successive rows of tile are installed these holes will be covered by the next course of tiles above. Traditionally, clay tiles on the oldest tile roofs were hung on roofing laths with oak wooden pegs. As these wood pegs rotted, they were commonly replaced with nails. Today, copper nails, 1-3/4" (4.5cm) slaters' nails, are preferred for attaching the tiles because they are the longest lasting, although other corrosion-resistant nails can also be used. Less durable nails reduce the longevity of a clay tile roof which depends on the fastening agents and the other roofing components, as much as on the tiles themselves. Clay roofing tiles, like roofing slates, are intended to hang on the nails, and nailheads should always be left to protrude slightly above the surface of the tile: Nails should not be driven too deeply into the furring strips because too much pressure on the tile can cause it to break during freeze/thaw cycles, or when someone walks on the roof.

Plain flat tiles, like roofing slates, are attached to the roof sheathing only with nails. They are laid in a pattern overlapping one another in order to provide the degree of impermeability necessary for the roof covering. Because plain flat tiles overlap in most cases almost as much of one half of the tile, this type of tile roof covering results in a considerably heavier roof than does an interlocking tile roof which does not require that the tiles overlap to such an extent. Interlocking flat tiles form a single layer, and an unbroken roof covering. Although most interlocking tiles on all but the steepest roofs can technically be expected to remain in place because they hang on protruding nibs from the roofing laths or battens, in contemporary roofing practices they are often likely to be nailed for added security. In most cases it is usually a good idea to nail at least every other tile.

PANTILES

With Mission or Barrel tiles, where one half-cylinder overlaps another inverted half-cylinder to form a cover and pan (cap and trough) arrangement, the fastening is more complicated. While the pantiles that rest directly on the sheathing are simply nailed in place, there are two ways of attaching the cover tiles that rest on the pantiles. They can be secured by a copper wire nailed to the sheathing or tied to vertical copper strips running behind the tiles. Another method requires the installation of vertical battens or nailing strips on the roof to which the cover tiles are nailed, or the use of tile nails or hooks, which are hooked to the pantile below and secured with twisted copper wire.

Sometimes cement mortar, or another underlayer such as grass, moss or straw, or hair-reinforced mortar was added under the tiles. Before the use of felting this was a particularly common practice on some of the plain flat tile or Spanish tile roofs with low rises that were themselves not especially waterproof. Mortar also helped to keep driving rain from getting under the pantiles, and it is still customary in contemporary roofing to add a dab of cement mortar to help secure them.

RIDGE OR HIP TILES

At the roof ridge or hip, clay tile is usually attached to a raised stringer with nails and a small amount of mortar, elastic cement or mastic. The joint is sealed with a flexible flashing such as copper or lead. Ridge tiles are often somewhat larger and more decorative than the field tile utilized on the broad sections of the roof.

ROOF PITCH AND WEATHER ARE FACTORS IN TILE ATTACHMENT

The means by which clay tile is attached to the sheathing is also partly determined by the roof pitch. *Generally the fastening requirements increase with an increase of roof pitch*. For low-pitched rises of 4"-6" (10cm-15cm) in a 12" (30.5cm) run the weight of the tiles is usually sufficient to hold them in place on the lath by the ridge or "lug" on the underside of the tile, with only the perimeter tiles requiring metal clips to secure them to the sheathing. But the tiles on even these low-pitched roofs are usually nailed for added security, and additional fastening measures are necessary on roofs with a higher pitch, or in areas subject to high winds or earthquakes. For steeper pitched roofs, such as towers, 7"-11" (18cm-28cm), or 12"-15" (30.5cm-38cm) in a 12" (30.5cm) run the tiles are nailed and a band of perimeter tiles three to four tiles thick is secured with clips. For roof rises over 16" (41cm) in a 12" (30.5cm) run, and in areas prone to earthquakes or hurricanes, every tile may be secured with both a nail and a copper or noncorrosive metal clip, and often also with a dab of roofing mastic or mortar.

The installation of clay roofing tiles in areas with significant amounts of snowfall-over 24" (61cm) per year-also varies somewhat from the normal guidelines. Larger battens may be necessary, as well as additional clipping or tying of the tile to securely attach it to the sheathing. The roof structure itself may also need added bracing, as well as the insertion of small snow clips or snow birds that protrude above the surface of the tile to prevent snow and ice from sliding off the roof and damaging the tile.

PRESERVATION AND REPAIR

Identifying Common Problems and Failures

While clay roofing tiles themselves are most likely to deteriorate because of frost damage, a clay tile roof system most commonly fails due to the breakdown of the fastening system. As the wooden pegs that fastened the early tiles to hand-riven battens rotted, they were often replaced with iron nails which are themselves easily corroded by tannic acid from oak battens or sheathing. The deterioration of metal flashing, valleys, and gutters can also lead to the failure of a clay tile roof.

Another area of potential failure of a historic clay tile roof is the support system. Clay tiles are heavy and it is important that the roof structure be sound. If gutters and downspouts are allowed to fill with debris, water can back up and seep under roofing tiles, causing the eventual deterioration of roofing battens, the sheathing and fastening system, or even the roof's structural members. During freezing weather, ice can build up under tiles and cause breakage during the freeze/thaw cycle. Thus, as with any type of roof, water and improperly maintained rainwater removal and drainage systems are also chief causes for the failure of historic clay tile roofs.

Clay tiles may be either handcrafted or machine-made; in general, roofs installed before the end of the 19th century consist of hand formed tiles, with machine-made tiles becoming more dominant as technology improved during the 20th century. Clay tile itself, whether made by hand or made by machine, can vary in quality from tile to tile. Efflorescence of soluble salts on the surface may indicate that a tile has excessive porosity which results from under-burning during its manufacture. Poor quality porous tiles are particularly susceptible to breaking and exterior surface spalling during freeze-thaw cycles. By letting in moisture, porous tiles can permit the roof battens and roof structure to rot. The problem may be compounded by waterproof building paper or building felt laid underneath which can, in some instances, prevent adequate ventilation.

Clay roofing tiles can also be damaged by roofers walking carelessly on an unprotected roof while making repairs, or by overhanging tree branches, falling tree limbs, or heavy hail. Broken tiles may no longer provide a continuous waterproof surface, thereby allowing water to penetrate the roofing structure, and may eventually result in its deterioration if the broken tiles are not replaced in a timely manner.

Although modern, machine-made clay tiles are more uniform in appearance than their handmade counterparts, they also have the potential for failure. Occasionally, entire batches of mass-produced tile can be defective.

Regular Inspection and Maintenance

Broken or missing tiles, or leaks on the interior of the building, are obvious clues that a historic clay tile roof needs repair. Even though it may be clear that the roof is leaking, finding the source of the leak may not be so easy. It may require thorough investigation in the attic, as well as going up on the roof and removing tiles selectively in the approximate area of the roof leak. The source of the leak may not actually be located where it appears to be. Water may come in one place and travel along a roofing member some distance from the actual leak before revealing itself by a water stain, plaster damage, or rotted wooden structural members.

A special system consisting of brass or copper wires is used to attach these tapered barrel roof tiles. Photo: NPS files.

Temporary Protection during Repair

In some instances temporary protection and stabilization may be necessary to prevent further damage or deterioration of a historic clay tile roof. Plywood sheets, plastic, roll roofing, or roofing felt can provide short-term protection until repair or replacement materials can be purchased. Another option may be to erect a temporary scaffold that is encased or covered with clear or semitransparent polyethylene sheeting over the entire roof. This will not only protect the exposed roofing members during repair or until repairs can be made, but also lets in enough natural light to enable the reroofing work to take place while sheltering workmen from cold or wet weather.

General Repair Guidance

Once the source and cause of a leak has been identified, appropriate repairs must be made to structural roofing members, wood sheathing, felt or roofing paper if it is part of the roofing membrane, or possibly to vertical roof battens to which the tiles may be attached. If the problem appears limited to gutters and flashing in disrepair, repair or replacement will probably require temporary removal of some of the adjacent tiles to gain access to them. If the roofing tiles are extremely fragile and cannot be walked on even with adequate protection (see below), it may also be necessary to remove several rows or a larger area of tiles and store them for later reinstallation in order to create a "path" to reach the area of repair without damaging existing tiles. Even if most of the tiles themselves appear to be intact but no longer securely attached to the roof substrate due to deterioration of the fastening system or roofing members, all the tiles should be labeled and removed for storage. Regardless of whether the repair project involves removal of only a few damaged tiles, or if all the tiles must be removed and relaid, historic clay roofing tiles are inherently fragile and should be pulled up carefully with the use of a slate ripper. The tiles can be reattached one-by-one with new corrosion-resistant copper nails, copper straps or tabs, "tingles', or another means after the necessary repairs have been made to the roof.

Replacing Individual Tiles

The most difficult aspect of replacing a single broken clay roof tile is doing so without breaking neighboring tiles. While flat shingle tiles can generally be walked on by a careful roofer without likelihood of much damage, high profile pantiles are very fragile and easily broken. By using sheets of plywood, planks, or burlap bags filled with sand to distribute weight, the professional roofer can move about the roof to fix broken tiles or flashing without causing additional damage. Another method involves hooking a ladder on the ridge to support and evenly distribute the weight of the roofer.

A broken tile should be carefully removed with a slate ripper or hacksaw blade inserted under the tile to cut the nail or nails holding it in place. If successive layers of tile are already in place covering the nailholes, it will not be possible to attach the replacement tile with nails through the holes, so an alternative method of attachment will be necessary. By nailing a tab of double thickness copper stripping on the sheathing below the tile, the new replacement tile can be slipped into position and secured in place by bending the copper strip up with a double thickness of the copper over the tile. A slate hook or "tingle" can be used in the same way. This fastening system functions in place of nails.

When replacing hard-to-match historic tile, and if matching clay tile cannot be obtained, it may be possible to relocate some of the original tiles to the more prominent locations on the roof where the tile is damaged, and insert the new replacement tile in secondary or rear locations, or other areas where it will not show, such as behind chimney stacks, parapets, and dormer windows. Even though replacement tile may initially match the original historic tile when first installed, it is likely to weather or age to a somewhat different color or hue which will become more obvious with time. Thus, care should be taken to insert new replacement tile in as inconspicuous a location as possible. New, machine-made clay tile or concrete tiles should generally not be used to patch roofs of old, handmade tile because of obvious differences in appearance.

Sources for Replacement Tiles

When restoring or repairing a clay tile roof it is always recommended that as many of the original tiles be retained and reused as possible. Sometimes, particularly when working with "pan and cover" type tile roofs, while many of the "cover" tiles may be broken and require replacement, it may be possible to reuse all or most of the "pan" tiles which are less susceptible to damage than the "cover" tiles. But, in most cases, unless matching replacements can be obtained, if more than about 30 per cent of the roofing tiles are lost, broken, or irreparably damaged, it may be necessary to replace all of the historic tiles with new matching tiles. When counting the number or percentage of missing or broken tiles that need to be replaced, it is important to order extra tiles to allow for breakage and damage during shipping and on the job site. The size of the tiles must be noted, whether they are all the same size, the same size but laid with different amounts of exposure to compensate for changes in perspective, or of graduated sizes according to horizontal rows-typical, for example, on conical or tower roofs.

Many late-19th and early-20th century tiles are marked on the back with the name of the company that made them, along with the size and the name of that particular tile shape. Some companies that were in business in the United States at the turn of the century are still producing many of the traditional tile shapes, and may be able to supply the necessary replacements. But it is important to be aware that in some cases, although the name of a particular tile pattern may have remained the same, the actual shape, size, thickness and profile may have changed slightly so that the new tile does not match the historic tile closely enough to permit it to serve as a compatible replacement for missing or broken tiles. While such tiles may be acceptable to use on a secondary or less prominent elevation, or to use when an entire tile roof needs replacement, they would not be suitable to use on an area of the roof that is highly visible.

Even if the particular tile is no longer manufactured by a company, the original molds may still exist which can be used to make new tiles to match the historic tiles if the quantity needed is sufficiently large to warrant a custom order. Other companies stock and sell salvaged tile, and keep a variety of old tiles available which can be identified and matched by the number and company imprint on the back of the tiles. Still other companies specialize entirely in custom-made reproduction of historic clay tiles for a specific preservation project.

Modern clay tiles are even more varied than historic tiles. Many shapes and styles are offered in a wide variety of colors and glazes. Several manufacturers produce special color-blended tiles, as well as tiles of different hues that are intended to be carefully mixed when installed. Yet, it is important to remember that many of these modern tiles may not be appropriate for use on historic clay tile roofs. The place of manufacture must also be taken into consideration. For instance, tiles made for use in a hot, dry climate may not be able to withstand wet weather, drastic temperature changes or freeze-thaw cycles. Some of the tile shapes, and many of the colors-especially those that are very bright and highly glazed-are completely contemporary in design, and do not represent traditional American styles, and thus, are not suitable for use on historic buildings.

Repairing a Failed Fastening System

Clay roofing tiles, as noted before, frequently outlast their fastening systems. Wood pegs rot, nails rust, and even copper nails that are not adequately driven in can pull out of the roof's structural members. Although it is unusual that all of the clay tiles on a roof need to be replaced unless matching replacements cannot be obtained, it is not uncommon for old tile roofs to be stripped of all their tiles in order to relay the tiles with new fastenings and battens. When the fastening system has failed, all the roof tiles must be removed and reattached with new corrosion-resistant fasteners. If possible, all the tiles should be numbered and a diagram should be drawn showing the location of each tile to aid in replicating the original pattern and color variations when the tiles are relaid. Ideally, each tile should be numbered to ensure that it is reinstalled in its original location. But this may not always be feasible or practical, and it may be enough simply to group the tiles as they are removed by type and size or function-such as field tiles, custom tiles for hips, dormers and ridges, and specially cut pieces. This will help facilitate reinstallation of the tiles. If all of the tiles have to be removed, it is probably a good idea to consider installing a layer of modern roofing felt over the wood sheathing. This will add another layer of waterproofing, while providing temporary protection during reroofing.

Even if the tiles were originally attached with wooden pegs, it is generally recommended that they be rehung with corrosion-resistant, preferably heavy copper, or aluminum alloy nails or hooks. Today there are numerous nontraditional fastening systems for clay tile roofs, and many of them are patented. Roofing contractors and architects may have individual preferences, and some systems may be better suited than others to fit a particular roof shape or to meet a specific climatic or seismic requirement. Original battens or other roof members that may have deteriorated should be replaced to match the original using pressure-treated wood. Additional support may be necessary, particularly if the original roof was inadequate or poorly designed.

Replacing Flashing

Deteriorated flashing, gutters and downspouts should generally be replaced in kind to match the historic material. Copper or lead-coated copper, if appropriate to the building, or terne-coated stainless steel, is often preferred for use on historic clay tile roofs because of their durability and long lasting qualities. However, copper staining from downspouts can sometimes be a problem on light-colored masonry walls which should be taken into consideration when planning replacements to rainwater removal systems. Clay tile roofs usually have an open valley system where the tiles are separated by metal flashing at intersections of roof sections with different angles. This makes the insertion of new flashing quite easy, as only a few surrounding tiles must be removed in the process. New copper flashing that is too "bright" can be made to blend in and "mellowed" by brush-coating it with boiled linseed oil or proprietary solutions.

Inappropriate Repairs

The most important repair to avoid is replacing broken or missing roof tiles on a historic building with materials other than matching natural clay tiles. Concrete, metal or plastic tiles are generally not appropriate substitutes for clay roofing tiles. They lack the natural color variations of clay tile, and they do not have the same texture, shape, thickness or surface irregularities.

Although much concrete tile and composition tile is produced to resemble the general shape, if not the exact profile, of clay roofing tiles, concrete tile is generally too thick and also lacks the range of colors inherent in natural clay tile. Concrete tile is not a compatible substitute material to repair or replace individual historic clay tiles.

Patching a historic clay tile roof with roofing tar, caulk, asphalt, pieces of metal, or non-matching clay tiles is also inappropriate. Such treatments are visually incompatible.

They also have the potential for causing physical damage. Water can collect behind these patches, thus accelerating deterioration of roof sheathing and fastening systems, and during the expansion and contraction of a freeze-thaw cycle ice buildup at patches can break surrounding tiles.

SUMMARY

Clay roofing tile itself, when correctly installed, requires little or no maintenance. Often, it is the fastening system used to secure the tiles to the sheathing that fails and needs to be replaced rather than the tiles themselves. In fact, because clay tiles frequently outlasted the building structure, it was not unusual for them to be reused on another building. When the fastening system has deteriorated, or the roofing support structure has failed, clay tiles can be removed relatively easily, necessary repairs can be made, and the historic tiles can be relaid with new corrosion-resistant nails or hooks. Broken or damaged tiles should be replaced promptly to prevent further damage to neighboring tiles or to the roof structure itself.

As with any kind of historic roofing material, regular maintenance, such as cleaning gutters and downspouts, can add to the life of a tile roof. Additional preventive measures may include placing wire mesh over downspout openings or over the entire gutter to prevent debris from collecting and water from backing up. Periodic inspection of the underside of the roof from the attic after a heavy rain or ice storm for water stains may reveal leaks in their early stages which can be eliminated before they escalate into larger, more serious repair problems.

If replacement tile is required for the project, it should match the original tile as closely as possible, since a historic clay tile roof is likely to be one of the building's most significant features. Natural clay tiles have the inherent color variations, texture and color that is so important in defining the character of a historic tile roof. Thus, only traditionally shaped, clay tiles are appropriate for repairing a historic clay tile roof.

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SELECTED SOURCES OF CLAY ROOFING TILES

Boston Valley Terra Cotta
6860 South Abbott Road
Orchard Park, NY 14127

Custom-made architectural terra cotta and clay roofing tiles

C.C.N. Clay Roof Tiles (Canteras Cerro Negro S.A.)
8280 College Parkway, Suite 204
Ft. Myers, FL 33919

Distributors of C.C.N. clay roofing tiles from Argentina

Earth/Forms of Alfred
5704 East Valley Road
Alfred Station, NY 14803

Made-to-order reproduction clay roofing tiles

Gladding, McBean & Co.
P.O. Box 97
Lincoln, CA 95648

Manufacturer since 1875 of terra cotta and clay roofing tiles, and custom reproductions

Hans Sumpf Company, Inc.
40101 Avenue 10
Madera, CA 93638

MADE-TO-ORDER Mission-style clay roofing tiles

International Roofing Products, Inc.
4929 Wilshire Blvd., Suite 750
Los Angeles, CA 90010

New clay roofing tiles, some suitable for historic buildings

London Tile Co.
65 Walnut Street
New London, OH 44851

MADE-TO-ORDER reproduction clay roofing tiles

LudowiciCeladon, Inc.
4757 Tile Plant Road
New Lexington, OH 43764

Manufacturer since 1880s of clay roofing tiles, and custom reproductions

M.C.A. (Maruhachi Ceramics of America, Inc.)
1985 Sampson Avenue
Corona, CA 91719

New clay roofing tiles, some suitable for historic buildings

The Northern Roof Tile Sales Company
P.O. Box 275
Millgrove, Ontario LOR 1VO, Canada

Traditional clay roofing tiles imported from England and South America

Raleigh, Inc.
6506 Business U.S. Route 20
P.O. Box 448
Belvidere, IL 61008-0448

Inventory of new and salvage clay roofing tiles

Supradur Manufacturing Corp.
P.O. Box 908
Rye, NY 1~580

Imports Spanish ("S") clay roofing tiles from France

TileSearch
P.O. Box 580
Roanoke, TX 76262

Computerized network for new and salvage clay roofing tiles

United States Tile Company
P.O. Box 1509
909 West Railroad Street
Corona, CA 91718

New clay roofing tiles, some suitable for historic buildings

Note: Measurements in this publication are given in both the U.S. Customary System and International (Metric) System for comparative purposes. Metric conversions are, in some cases, approximate and should not be relied upon for preparing technical specifications.

ACKNOWLEDGEMENTS

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Washington, D.C. September, 1992

Home page logo: Historic clay tile roof. Photo: NPS files.

This publication has been prepared pursuant to the National Historic Preservation Act of 1966, as amended, which directs the Secretary of the Interior to develop and make available information concerning historic properties. Technical Preservation Services (TPS), Heritage Preservation Services Division, National Park Service prepares standards, guidelines, and other educational materials on responsible historic preservation treatments for a broad public.

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APPENDIX C – AVONGARD CRACK MONITORS

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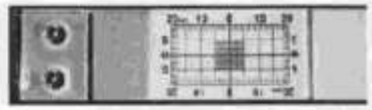
AVONGARD CRACK MONITORS (USA)



This calibrated tell-tale is easy to install with screws, nails or epoxy (see Quicl Epoxy). It is waterproof and weather resistant so it can be used inside or outsic monitor is direct reading to an accuracy of one millimeter for horizontal or ver movement. The Avongard Crack Monitor consists of two overlapping acrylic j One plate is white with a black millimeter grid, while the other is transparent v crosshairs centered over the grid. Once the Crack Monitor is in position across crack, the crosshairs shift vertically or horizontally on the grid if movement oc Included is a crack progress chart for marking the position of the crossed cursc site, and for engineering evaluation later.

SPECIFICATIONS

Material:	Plexiglass(r) acrylic
Dimensions (each plate):	1.25 x 4 x 0.25 in.
Dimensions (overall):	1.25 x 5.75 x 0.25 in.
Dimensions (grid):	1.5 x 0.75 in / 40 x 20mm
Discrimination:	0.5 mm
Max. width movement:	0.750 in / 20mm
Max. upward movement:	0.375 in / 10mm
°F Coeff. Thermal Expansion:	3.80 x 10-5 in/in
°C Coeff. Thermal Expansion:	6.84 x 10-5 mm/mm

Crack Monitors

Check price list

PRICE LIST | MASONRY | HOW TO ORDER

PRG Preservation Resource Group, Inc.

P. O. Box 1768 Rockville, MD 20849-1768 U.S.A

Order Desk (800) 774-7891

WWW.PRGINC.COM

Tech. Support Phone (301) 309-2222 Fax (301) 279-7885

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item	price	item#
Avongard **Crack Monitors**		
1 - 9 units	$16.00 ea	DEACM
10 - 99 units	$14.00 ea	DEACM10
100 or more units	$12.80 ea	DEACM100
PRG **Flat Crack Monitors**		
1 - 9 units	$ 12.50 ea	SYC100
10 - 99 units	$ 11.75 ea	SYC100-10
PRG **Corner Crack Monitors**		
1 - 9 units	$ 13.50 ea	SYC200
10 - 99 units	$ 12.50 ea	SYC200-10
PRG **Standing Crack Monitors**		
1 - 9 units	$ 17.25 ea	SYC300
10 - 99 units	$ 16.00 ea	SYC300-10
Quick-set Epoxy (for crack monitors)	$1.00 ea	RE2940
Crack Points	$ 37.50 ea	SYC1030
Light Scale Loupe	$ 105.00 ea	SYC2028
Chip & Fill Kit for masonry repairs	$145.00 ea	SAE001
Rilem		
Rilem Tubes (vertical only)		
1 - 9 units	$13.00 ea	PS229V
10 - 99 units	$11.70 ea	PS229V1099
100 or more units	$10.40 ea	PS229V100
Rilem Putty (1/2 lb)		
1 - 9 units	$12.60 ea	PS1335
10 - 99 units	$11.30 ea	PS1335-10
100 or more units	$10.00 ea	PS1335-100
Sand Shaker - Sieve Analysis Field Kit	$ 100.00 ea	KESS81

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8.0 ORIGINAL DRAWINGS

Please see Images/Original Drawings. These files are too large to include in the document. They are also outsize drawings that would require tipping in.