ROOF:

Historic photographs reveal that the roof was originally embellished with Chateauesque features and covered with red-clay field, hip and ridge tiles. Fragments of the original 3/8" flat-slab unglazed red 3/8" flat clay tile fragments were found in the attic along with mint-condition unglazed red ridge tiles stored in the boiler room that were presumably never installed. The original roof tiles were a slightly deeper/cooler red than the warm-red tiles that are more frequently found on historic Midwest roofs after circa 1910. These tiles may have been produced by the United States Tile Roofing Company in Chicago Heights, Illinois, a likely source for Burnham & Root and the CB&Q. U.S Tile was acquired by the Ludowici Roof Tile Company in 1893 and grew to become one of the largest plants making clay roof tile in America until it was destroyed by fire in 1909.[36] Ludowici later acquired the Celadon Roofing Tile Company of New York in 1906 to become Ludowici-Celadon, Inc., the leading American supplier of clay roof tile. In 1989, the company was renamed Ludowici Roof Tile (Ludowici) and remains in business today.

The steep Depot roof sweeps down into flared eaves. The main pitch varies from the 9:12 pitch of the freight room gable and waiting room hip to an 18:12 pitch or greater in the upper hip roof, boiler room gable, turrets, and near vertical gable heads. The entire roof is approximately 110 "squares" in its truncated condition today which will increase to approximately 140 squares once the upper roof, turrets and dormers are restored.

The Library of Congress (LC) has an original 1907 panoramic print of Keokuk's riverfront taken from the bluff by Frederick J. Bandholtz of Des Moines; a high-resolution TIFF file is posted on line which contains a wealth of information on the original Depot roof **[Fig 14.]** (see back cover for entire panorama). The photo reveals sharp details of the ridge terminals and the hip tiles, as well as the copper ridge and finals on the upper hip roof, corner turrets and dormers. The ball finials on the dormers are similar to finials found on a round house stable in Chicago designed by Burnham and Root in 1880 (now part of the DuSable Museum). However, Root likely recalled this detail from his days wandering among London's Victorian buildings. The image also reveals the original marble troughs that were employed in select locations to drain the roof runoff across the sidewalk.

The Bandholtz panorama also shows nearly 80 missing or broken field tiles and one missing hip tile. More than half of these are missing from the waiting room roof, concentrated at the flared eaves. This is puzzling since clay tile is usually a century-plus roof and it was only sixteen years old in this image. Although the damage may be attributed to a recent storm and not yet repaired, it may also provide some insight on the original roof's performance with the 3/8" flat slab tile. Several installation factors could account for the missing tiles. Some nails may have been "driven-home" (nailed too deep) which cracked various tiles and caused them to slip. Moreover, the same nails may have been employed everywhere even though longer nails are required at the transition into the flared eaves. With poor "purchase," short nails would have pulled loose from high winds, train vibrations, etc. It is also possible that iron nails were used in lieu of copper nails and began to corrode and fail in 1907. However, these are merely speculations and the concentration of missing tiles at the eaves may simply point to the weathering performance of the original tiles and their resistance to: a) hail damage (which would tend to increase as the roof pitch diminishes at the eaves, or b) ice damming in the gutters that dislodged tiles at the eaves (or a combination of both).

[36] http://www.ludowici.com/documents/historical_perspective.pdf

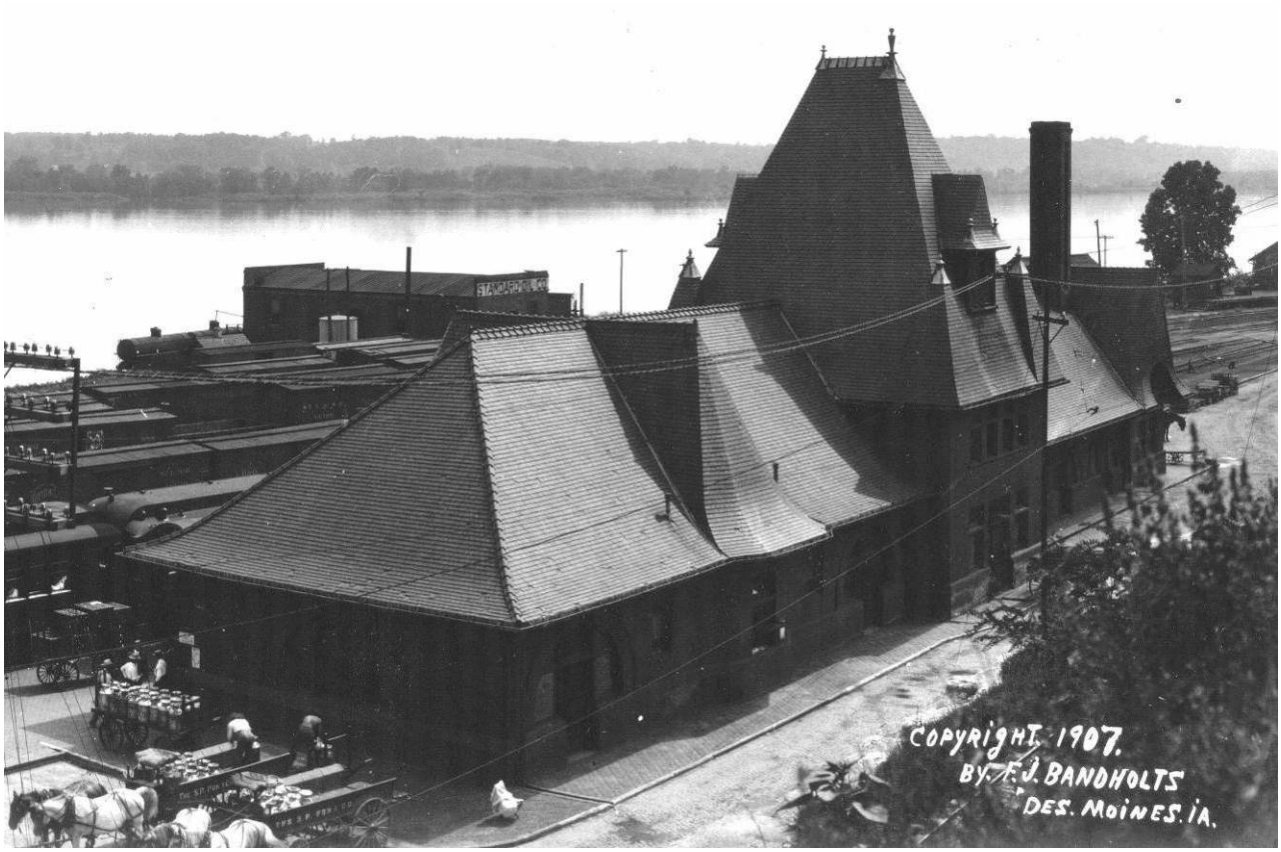


Fig 14. The Depot's original roofline and all of its decorative accessories.

The dormers should be detailed and finished in an appropriate manner other than flat panels that were intended to have clock faces. Small windows would be typical of the period and would facilitate access for emergency repairs and maintenance of the dormers which would be difficult to access otherwise. As a focal point of the restored roof, the dormers should at least be trimmed with moldings to add relief to the broad, flat surface that was merely left as an unfinished detail.

The asphalt shingles found on the roof today were an unfortunate change in materials that significantly compromised the building's architectural integrity. They flattened the roof texture and softened the dramatic sweeping roof planes once accentuated by the bulbous tops of the hip and ridge tiles. The color harmony of the Depot's architectural form was also lost in the shift to green roofing—visually separating the marriage of the roof to the walls. The only known color image of the clay tile shows the roof in the background behind the CB&Q's sleek stainless-steel Mark Twin Zephyr in 1947 **[Fig 9.]**.

Burnham and Root designed a dramatic roofline since the Depot was so prominent on Keokuk's riverfront and had to compete with the limestone bluff and short approach by trains rounding the bend. **Today, the original roof line and clay tile roofing are the most significant and crucial features to restore the elegant aesthetic massing of the Depot designed by John Wellborn Root.**

There are three separate roof systems: 1) the waiting room half-hip with a cathedral ceiling; 2) the full hip roof over the two-story core of the building, and; 3) the intersecting gables of the downriver freight rooms and boiler room. The cathedral ceiling and roof over the waiting room is supported by arch-braced hammer-beam trusses reinforced with steel tie-rods and connection plates **[Fig 15.]**. The trusses are pine/fir laminated with oak veneer construction. Though beautiful in their own right, these trusses are structural as well as decorative.

Fig 15. Truss cluster supporting the waiting room cathedral ceiling.

The upper hip roof is framed with 2" x 12" rafters spaced 24" on-center and decked solid with original ¾" x 6" tongue & groove (T&G) decking. The rafters are sound despite roof leaks and surface charring in the west corner from a lighting strike on July 8, 1937 that caused a fire. An article at the time noted *"officials at the Union station say that when the lightning struck the building they could hear several tile rip from the roof and fall to the pavement below."*[37] The first architectural accents to be lost on the Depot roof were the copper ridge and finials at the top of the upper hip roof but contemporary descriptions of the lightning strike indicate the bolt entered lower on the hip through a phone line. The ridge and finials do appear to be missing in a poor quality snapshot of the MTZ calling at Keokuk between 1935 and 1945. Until very recently, many believed the upper hip roof was removed as a result of the lightning strike and fire. This assumption was made in both of the National Register nominations in 1994 and again in 2012. However, a 1947 photo recently rediscovered reveals the 1937 date was erroneous since the soaring clay tile roof is still there **[Fig 9.]**. The Depot is classified as a moderate-to-severe risk for lightning strikes according to National Fire Protection Agency standards and properly grounded lightning protection should be included in the reconstruction of the upper hip roof.

[37] The Keokuk Daily Gate City, "Union Station Also Struck During Storm," July 9, 1937.

The precise date when the upper hip roof was lowered has yet to be determined, however, a snapshot of the Depot showing a 1956 Ford reveals the corner turrets on the roof and clay tiles were removed by that time. Curiously, a photocopy of a CB&Q drawing dated December 27, 1928 from the State of Iowa Historical Society's files shows proposed alterations to the roof—the upper hip is truncated eliminating the clock dormers and corner turrets. Since the original tracings have not been found, it is difficult to know if this was actually considered in 1928, or it is a later undated revision to the 1928 drawing.

In speculation, the roof may have been replaced during the most significant interior remodeling in 1948-1949 (based on CB&Q remodeling drawings); this would fall into line with the photographic record. Future research may eventually determine the actual date the roof was altered and the clay tiles were removed—they probably occurred simultaneously. The resulting low-slope roof that replaced the upper hip peak is heavily framed with 2" x 14"' and larger rafters salvaged from the upper roof portion that was removed **[Fig 16.]**.

Bundles of asphalt shingle were left in the attic from circa 1950 **[Fig 17.]**. These shingles, along with other debris in the attics, create unnecessary point-loads on the ceiling structure and provide fuel for a fire. Any and all loose debris in the attics should be removed.

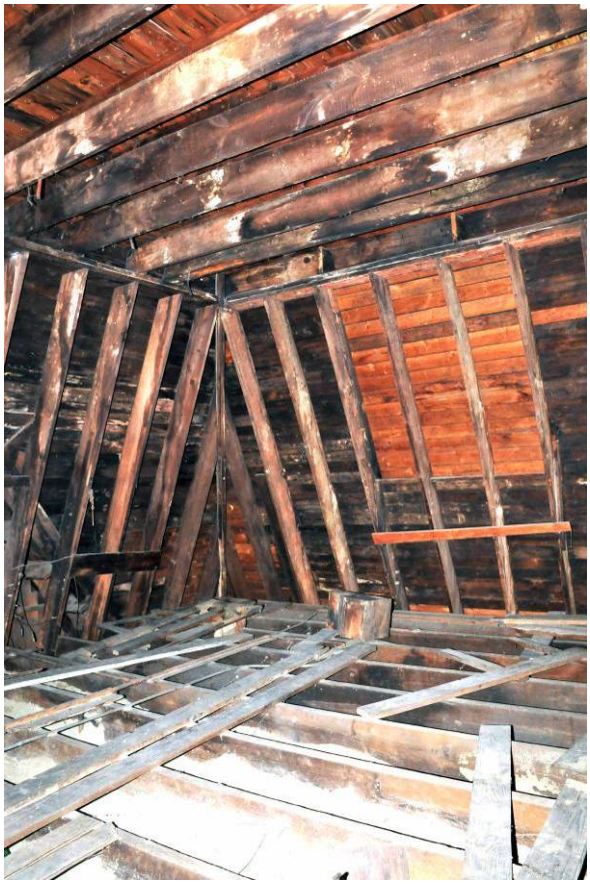


Fig 16. Roof framing in upper hip roof.

Fig 17. Stockpile of asphalt shingles.

The roof over the downriver gable that covers the freight room will require the most extensive repairs and reinforcement. This roof section was missing shingles for many years resulting in rotted decking, rafters and purlins **[Fig 18 & 19.]**. This even caused the tongue and groove ceiling below to pull loose from the ceiling joists in the far south freight room.

Fig 18. Aerial view of the holes in the roof observed in January 2011.

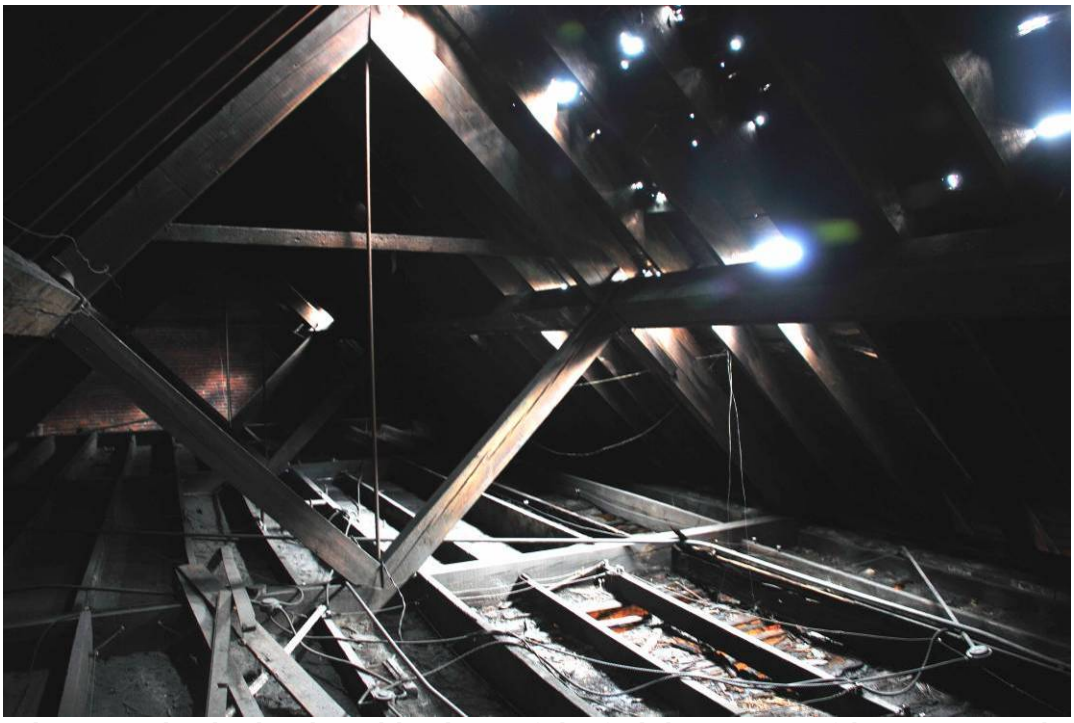


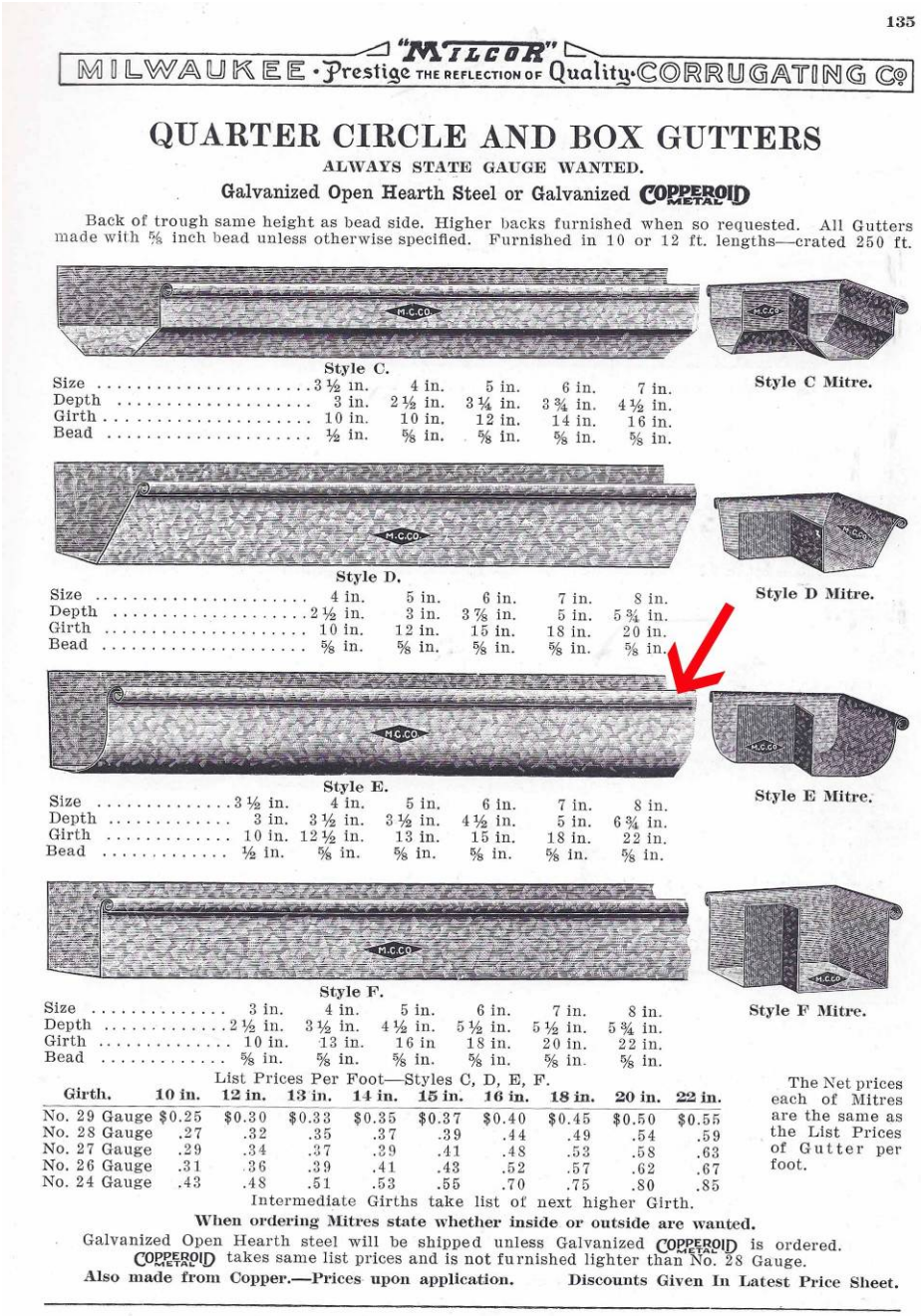
Fig 19. Holes in the riverside slope of the freight room roof (January 2011).

The roof rafters must be inspected more closely around the former gaping holes on the riverside slope, especially at their bearing point on the top plate, to determine the full extent of repairs and reinforcement required. The primary structural members of the trusses and purlins were found to be sound during the engineer's survey with the exception of isolated damage observed in a single purlin on the north slope of the downriver roof attributable to flashing concerns that caused water to wick into the end grain (above conductor's equipment room) **[Figs 20. & 21.]**.

Fig 20. View upriver of riverside slope roof framing over the freight rooms.

Fig 21. A rotted purlin on the north slope of the downriver roof at the two-story wall.

Historic articles from the time of construction note that the gutters and "spouting" were copper but all traces of the original copper flashing, drainage and ornaments have been missing since circa 1950. The original copper gutter profile was similar to the galvanized steel example "Style E" from a turn-of-the-century sheet metal trade catalog shown below **[Fig 22.]**. Although it is more difficult to fabricate than other period profiles, it should be replicated in the restoration of the original roof. The original downspouts (leaders) were probably smooth "rounds" and their original locations can be determined from historic photos and ground receivers that still remain around the Depot. Some drained into marble base gutters or rain troughs that cut across the sidewalks.



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QUARTER CIRCLE AND BOX GUTTERS

ALWAYS STATE GAUGE WANTED.

Galvanized Open Hearth Steel or Galvanized COPPEROID METAL

Back of trough same height as bead side. Higher backs furnished when so requested. All Gutters made with ⅝ inch bead unless otherwise specified. Furnished in 10 or 12 ft. lengths—crated 250 ft.

Style C.

Size	3½ in.	4 in.	5 in.	6 in.	7 in.
Depth	3 in.	2½ in.	3¼ in.	3¾ in.	4½ in.
Girth	10 in.	10 in.	12 in.	14 in.	16 in.
Bead	½ in.	⅝ in.	⅝ in.	⅝ in.	⅝ in.

Style C Mitre.

Style D.

Size	4 in.	5 in.	6 in.	7 in.	8 in.
Depth	2½ in.	3 in.	3⅞ in.	5 in.	5¾ in.
Girth	10 in.	12 in.	15 in.	18 in.	20 in.
Bead	⅝ in.	⅝ in.	⅝ in.	⅝ in.	⅝ in.

Style D Mitre.

Style E.

Size	3½ in.	4 in.	5 in.	6 in.	7 in.	8 in.
Depth	3 in.	3½ in.	3½ in.	4½ in.	5 in.	6¾ in.
Girth	10 in.	12½ in.	13 in.	15 in.	18 in.	22 in.
Bead	½ in.	⅝ in.	⅝ in.	⅝ in.	⅝ in.	⅝ in.

Style E Mitre.

Style F.

Size	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.
Depth	2½ in.	3½ in.	4½ in.	5½ in.	5½ in.	5¾ in.
Girth	10 in.	13 in.	16 in	18 in.	20 in.	22 in.
Bead	⅝ in.	⅝ in.	⅝ in.	⅝ in.	⅝ in.	⅝ in.

Style F Mitre.

List Prices Per Foot—Styles C, D, E, F.

Girth.	10 in.	12 in.	13 in.	14 in.	15 in.	16 in.	18 in.	20 in.	22 in.
No. 29 Gauge	$0.25	$0.30	$0.33	$0.35	$0.37	$0.40	$0.45	$0.50	$0.55
No. 28 Gauge	.27	.32	.35	.37	.39	.44	.49	.54	.59
No. 27 Gauge	.29	.34	.37	.39	.41	.48	.53	.58	.63
No. 26 Gauge	.31	.36	.39	.41	.43	.52	.57	.62	.67
No. 24 Gauge	.43	.48	.51	.53	.55	.70	.75	.80	.85

The Net prices each of Mitres are the same as the List Prices of Gutter per foot.

Intermediate Girths take list of next higher Girth.

When ordering Mitres state whether inside or outside are wanted.

Galvanized Open Hearth steel will be shipped unless Galvanized COPPEROID METAL is ordered. COPPEROID METAL takes same list prices and is not furnished lighter than No. 28 Gauge.

Also made from Copper.—Prices upon application. Discounts Given In Latest Price Sheet.

Fig 22. A steel gutter profile similar to the original copper profile found on the Keokuk Depot.

Roof Assessment & Recommendations:

The original clay tile roof endured for nearly 60 years but may have been replaced prematurely—before the typical century-plus life expectancy for such roofs. No documentation has been found as to why the roof was lowered or why the clay tiles were replaced with asphalt shingles. Although a few samples of the ridge tiles survive for matching, it is very unfortunate that the ridge/hip tiles and terminals were not salvaged and stored in the Depot after removal. Replacement units will account for nearly a third of the roof replacement material costs. In theory, the original flat tiles were on the thinner side and may have not performed well in hailstorms. The hip/ridge tiles were very heavy and would have performed well in all weather conditions.

New clues regarding the removal of the clay tile roof may be revealed during the tear-off of the asphalt shingles; particularly if evidence is found that iron nails were used in lieu of copper, or the nails were too short. Material testing on the surviving clay tile pieces may also yield more answers. The CB&Q may have simply been cutting costs after World War II at a time when passenger rail traffic was waning and their stewardship of the Keokuk station did not warrant the long term preservation of a clay tile roof. Regardless of why it was removed, when the clay tile roof is restored, it will be crucial to address the potential for ice damming by adding roof insulation, ice and water shield at the eaves, and/or commercial-grade heat cables in the gutters. Proper fasteners must also be specified; stainless steel screws and wind clips are warranted on the upper hip roof and other select areas of high exposure and/or difficult access.

The roof drainage was clogged causing ice dams and deterioration of the wide eaves and soffits when the City of Keokuk acquired the building in 2011. The gutters were cleared and temporary roof repairs were completed in early spring of 2011 but the deteriorated roof continues to rot the perimeter eaves and chronically leaks into the freight rooms. The downspout receivers, drain tiles, and troughs were abandoned over the years and the roof simply surface-drains around the building foundation and hardscape. Unfortunately, this has contributed to “rising damp” and masonry deterioration below the water-table (see Masonry). It will be important to eventually restore these aspects of roof-to-ground drainage when the masonry is addressed in Phase II.

The upper hip roof was the most prominent, character defining-element of the building and could be viewed from many vantage points on the bridge, bluff and river. Restoring the clay tile roof will expose the chasm between an award-winning restoration and the compromised standards for something much less. Asphalt/metal shingles represent something much less. Given the advanced deterioration of the roof, this work must be undertaken as Phase 1 of the Depot’s restoration.

TGRWA verified that the roof structure is more than adequate to support up to a ½” flat slab tile (18 lbs./psf) dead load. The recommended structural reinforcement is actually intended to increase resistance to wind-uplift from storms, microbursts, tornadoes, etc. The new rafter connections help secure the roof structure to the top plate and walls. The downriver roof repairs call for replacement of the decking with ¾” marine-grade plywood. New decking will furthermore act as a structural ‘diaphragm” to tie the roof system together and infuse structural redundancy. In order to add insulation over the waiting room, new decking must be installed over the insulation board and a taller fascia board will be required at the eave. Here too, the plywood will reinforce the roof. Finally, the upper hip roof will be constructed of all new select-structural lumber and marine grade plywood with lateral support of engineered lumber where required to prevent sway in the tall slender hip in high winds.

Detailed plans and specifications must still be developed for final, firm bids for the proper installation of the clay tiles, copper drainage and roof details and accents. These can be developed from Restoric's roof drawings produced in concert with TGRWA—which show the new upper hip roof framing, cross-tie rafters, turret framing and clock-dormer framing. The drawings currently illustrate the restoration of the missing architectural elements lost between 1947 and 1956, the structural reinforcement of the roof, the reconstruction of the eaves, the general placement of clay tile, and waterproofing and insulation details (see **Appendix D**).

After extensive research of clay tile materials, and qualified installers who compete for clay tile roof projects of this scale in the Midwest, Restoric has identified several key players who could complete the KUD roof project, the advantages they have to offer, as well as their drawbacks. These groups essentially split into three options: A) Ludowici Roof Tile (Ludowici) of New Lexington, Ohio; Tile Roofs, Inc. (TRI) of Frankfort, Illinois; and the Independents.

A) Ludowici (as discussed earlier) has fabricated tile since 1888 in various company iterations and has grown to absorb essentially all of their American counterparts; they are by far the largest clay tile roofing company in the U.S. Ludowici has an envious portfolio of historic projects that includes most of the biggest and best roof restoration projects in the country including federal buildings, state capitols, Ivy League schools, and scads of historic railroad stations, counting Union Station in St. Louis, a National Historic Landmark. They have great historical resources, fabulous literature (including a new brochure dedicated to railroad stations) and knowledgeable sales representatives and technical staff. Perhaps most importantly, they already make a matching field tile (Summer Rose flat slab tile) for the Keokuk Depot and they have the proven capability to match the original hip, ridge tiles and terminals. For over a century, Ludowici has set the standard for clay tile roofs which no other American company can match.

However, Ludowici which merged with Terreal, a French terra cotta company in 2003, is a virtual monopoly, setting standards above and beyond ASTM (American Society for Testing Materials) and developing a certified training program that is eliminating the competition by selecting very few "Crown" certified roofers who can install roofs that meet their "watertight" commercial warranty. Some aspects of this program are marketing hyperbole but the bottom line is the current qualified "Crown" bidder list is thin and the contractors Ludowici furnished must travel a significant distance: Glandt Roofing in St. Louis (who provided budget pricing), Weathercraft Company (Lincoln, Nebraska), and Baker Roofing (North Carolina). In sum, they have unsurpassable material-supply capabilities, but limited fully qualified installers. Moreover, their very high quality standards, 75-year warranty, and strong customer support comes with equally high material costs. Their anticipated lead time for material with custom tiles is three to four months.

B) TRI sells salvage tiles to numerous roofers in the Midwest including the major players in northern Illinois and Chicago. They also own Mortenson Roofing which has been among the most prolific installers of clay tile roofs in the Midwest for decades (they were reportedly Ludowici's largest customer until there was a falling out over the certification program, practice of installing salvaged tiles, etc.). As a result of this conflict, TRI developed a relationship with Fabryka Ceramiki Budowlanej (FCB) in Poland as their American distributor to furnish new tile. They also utilize a supplier from Trinidad, specifically for flat tiles. Their preliminary estimate submitted for the field tile alone would reduce the roof budget by $85,000 and they contend they could save another $15,000 on the hip/ridge tiles and terminals.

Presumably, further savings could be achieved by the more competitive pricing from multiple bidders using their materials. The ability for TRI to achieve a consistent color match and meet ASTM standards remains unknown at this time. They indicated they can provide new matching field tile samples, a competitive warranty and can deliver material nearly as fast as Ludowici. Unfortunately, they do not have Ludowici's proven track record, or depth of resources (in sales, manufacturing or technical support). Their anticipated lead time for coordinating International sources is up to six months.

C) The Independents option represents clay tile roofers Restoric has encountered at preservation conferences and tradeshows or crossed on various projects in the Midwest over the past 25 years. The Independents option includes names provide by the Tile Roofing Institute (Institute), a national trade association located in the Pacific Northwest. These companies would simply install the tile ordered and furnished by the owner, and/or utilize their own salvaged tiles they have accumulated over the years. The majority of these roofers contacted pushed for utilizing salvaged tiles. Although they will install new tile, the lower pricing they can offer with salvaged tiles gives them the competitive edge they need to compete against Ludowici's Crown installers and others who have the luxury of securing high profile projects. The Independents option may shave another 10% or more off of the TRI option but may involve further aesthetic and durability compromises in the final installation.

Salvaged tiles in and of themselves support the preservation ethic and sustainability goals of the "green movement." However, they raise multiple concerns in this instance that must be resolved between the submittal of this HSR and the lead time required to order new and/or salvaged materials when the Foundation is prepared to contract the new roof. These roofers are perhaps more accustomed to competing for narrower margins and will urge simplified (but readily available) hip and ridge profiles that will reduce the architectural integrity of the roof. Every roofer and supplier agreed that the original hip/ridge tiles and terminals on the Keokuk Union Depot cannot be matched with salvage. Therefore, the accessory tiles must be new and matching old weathered flat tiles to brand new accessory tiles may require accepting a varied patina from the onset. The trade off of course is that simpler, salvage tiles will be less expensive and essentially any clay tile will still be more aesthetically pleasing than asphalt. Renaissance Roofing (Rockford, Illinois) indicated they could secure enough matching field tile to the original flat-slab tile. Although since this tile is thinner than many other types of tile, there is a greater inherent risk of hairline cracks in salvaged tiles that have been handled a lot.

The final decision regarding which option to pursue requires the Foundation's careful review and measured thought. For the purpose of this HSR and budget, Restoric has considered all new Ludowici clay tile roof with custom molds for pieces but increasing the flat tile to ½" in Summer Rose which will create a slightly higher butt and shadow line. The KUD roof details are too unique for compromise unless absolutely necessary. Working with Ludowici will help ensure the best color match, highest quality standards, and best technical support. Moreover, they are the most likely to back their warranty over the years if any issues arise. The additional 1/8" will add a little more texture and slightly stronger shadow lines across the roof. This decision would be best determined by comparing two 10' x 10' mock-ups installed on the roof side by side. If alternative roofers from TRI or the Independents options provide significantly better final installation pricing for the Ludowici products, the Foundation must weigh this savings against the true value of any warranties that may be voided. The savings realized could be invested in a maintenance budget for the stewardship of the roof over the years to offset more frequent repairs.

EAVES, SOFFIT & BRACKETS:

There are three slightly different eaves constructions to go with the three different roof constructions for the: 1) waiting room roof, 2) upper hip roof, and 3) downriver freight rooms and boiler room roofs **[Fig 23., 24. & 25.**].

The eaves were originally constructed from the top down, before the roof was decked and covered with clay tile. The eaves were partially reconstructed with a bead-board soffit in lieu of the original 3½" V-groove T&G soffit on the upper hip roof and along the bluffside of the downriver wing. This likely occurred in circa 1950 when the clay tile roof was removed. Recent eave repairs on the riverside were completed with T&G smooth stock and treated lumber. Specifications must be developed for higher standards to ensure that future eave repairs and restoration will incorporate V-groove T&G boards for the soffits and replicate the original wood species in every detail.

Today, the soffits, fascias and rakes are in various states of decay and many sections will require complete reconstruction. Ideally, they are reconstructed in the same manner from the top-down so this work must occur in concert with the roof restoration project. It will be important to select a rot-resistant species that will perform well even though new roof details and insulation will substantially reduce the risk of ice damming, leaks and wood rot from the topside.

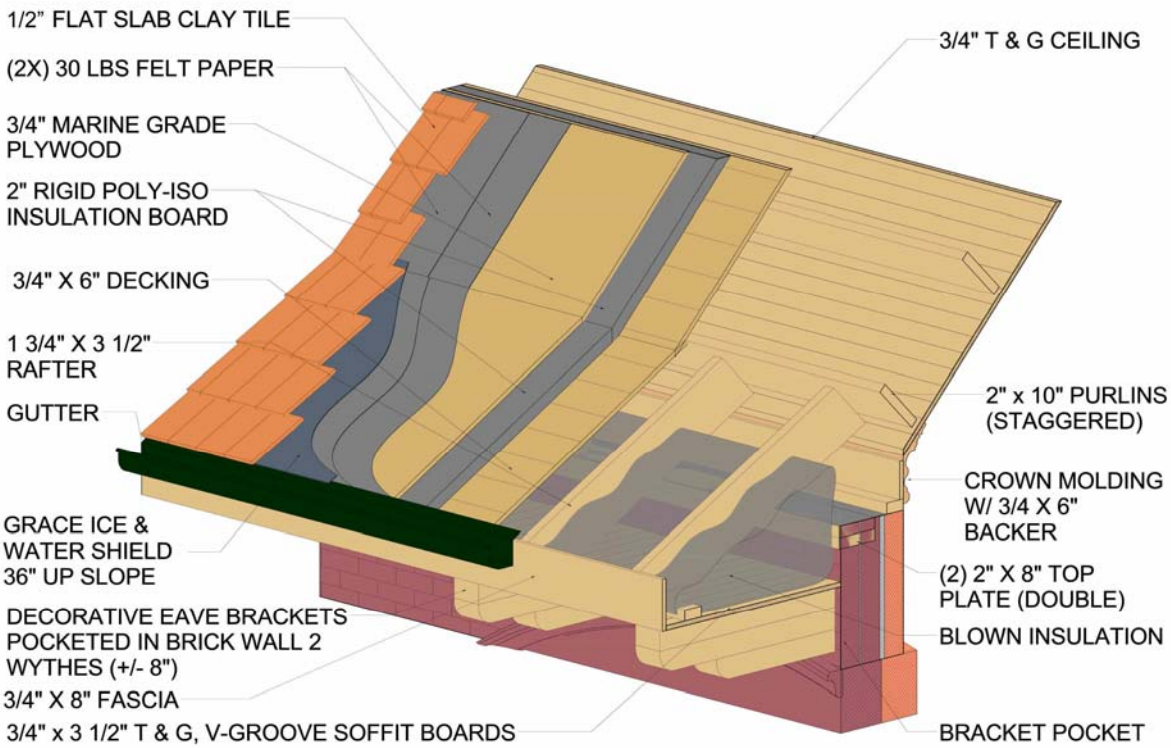

Fig 23. Reconstruction details for restoring the waiting room roof eaves.

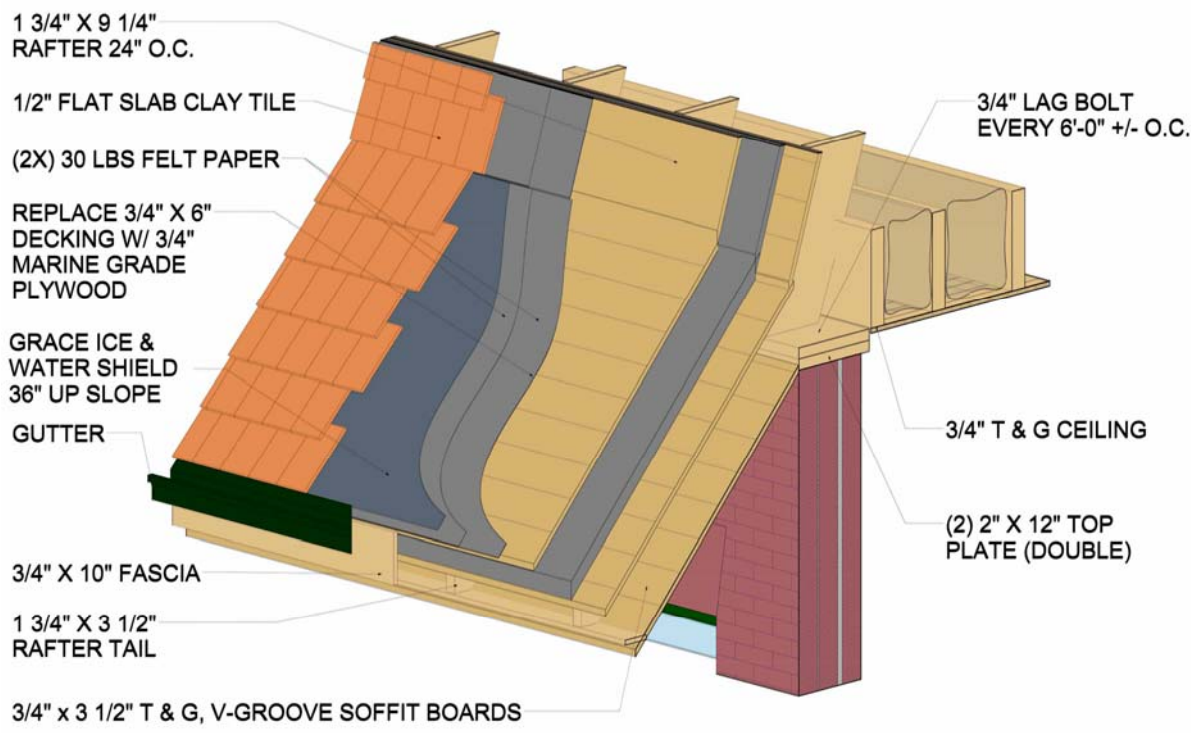

Fig 24. Reconstruction details for restoring the upper hip roof eaves.

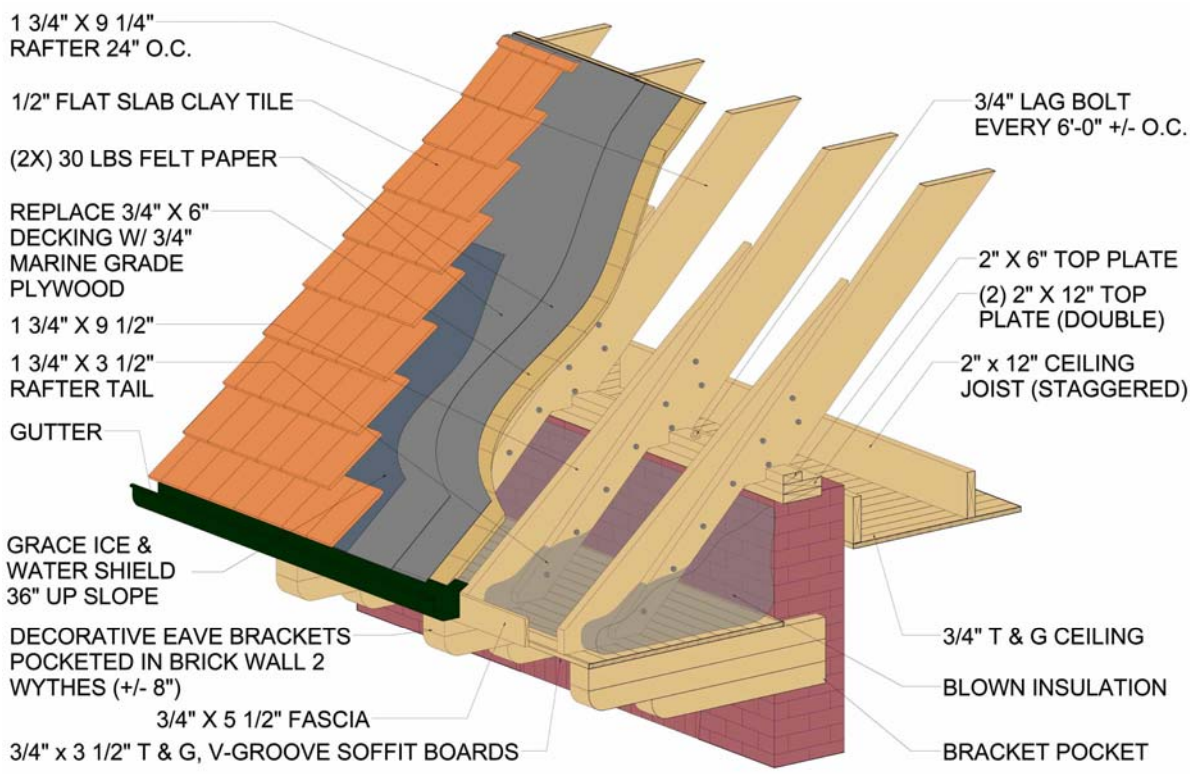

Fig 25. Reconstruction details for restoring the freight & boiler room roof eaves.

Reconstruction of the eaves will provide an opportunity to conceal electrical runs for exterior lighting and will also hide conventional HVAC gas/condensing lines until the Foundation can upgrade to new geothermal or other more energy efficient systems. The eaves should also be insulated to reduce or eliminate ice damming. Particularly around the upriver roof section over the waiting room which will be inaccessible after the new roof has been restored and the eaves reconstructed. Grace Ice & Water Shield, or similar product, should be installed at the eaves and up the roof slope to prevent water damage in the future (see details in **Appendix D)**.

A curious construction detail is found inside the eaves around the waiting room. Here, one wythe of bricks set in lime mortar is stacked atop the wooden top plate of the wall **[Fig 26.]**. Additional clues for their role may be revealed when the roof is torn off and the eaves are reconstructed. However, they are not load-bearing and the only possible rationale determined at this time is that they were left as a makeshift fire-stop between the rafters. They are a variation of a Chicago masonry wall construction called "corbelling" that was (more effectively) employed as a fire-stop.[38] The KUD top-plate bricks are not contiguous and provide virtually no protection and do not occur at the upper hip roof eave or downriver roof eave. If during reconstruction, these bricks are deemed non-essential, any matching face brick should be removed and stockpiled for the exposed masonry wall repairs required below the eaves. If an essential role is determined for these bricks upon further investigation, any historic face brick can still be salvaged and replaced with new common brick since all masonry repairs above the eaves will remain concealed.

Fig 26. Face bricks atop the wood top-plate can be salvaged for visible repairs below the eaves.

[38] International Correspondence School. "Common Brickwork". Scranton International Textbook Company, 1898. Chapter 39, page 37.

The two-story upper hip eaves are pitched to follow the roof slope and never had the heavy timber brackets found under the lower roof eaves. The soffit here is almost completely bead-board and was presumably replaced in circa 1950 when the roof was altered. It is possible that the bead board is original; the soffit boards for the upper hip roof may have been a different profile than the lower eave soffit since the construction is otherwise different.

The upper hip roof eave must be investigated more closely during the roof tear-off when it can be accessed from the topside to determine whether it is original from the nails, paint coatings, saw marks, etc. If original, it can likely be salvaged, stripped and restored since it is generally in better condition than the lower roof soffit. If the evidence reveals that it was entirely reconstructed during a later period, then V-groove boards to match the lower eaves should be used for the reconstruction of the upper eaves as well.

The investigation of the wood finishes for the trim color on the eaves, fascia, soffit and brackets remains inconclusive. Additional sampling will be required when the eaves are deconstructed to determine the final authentic finish. Initial samples taken in 2011 from the trackside near the waiting room revealed a natural stain and varnish; the most common wood finish applied elsewhere around the Depot. Natural finishes on the exterior trim were not uncommon for architecturally significant buildings and even private mansions of the era. A natural stain and varnish was discovered during a partial restoration of the Charles Gates Dawes mansion in Evanston, Illinois by Restoric (built just one year after the Union Depot within a few blocks from Daniel Burnham's home) **[Fig 27.]**. Here too, subsequent owners choose to paint the eaves over time covering the natural finishes and diminishing the historic character of the building.

Fig 27. Further investigation of the Depot may reveal the eaves had a natural finish as shown in this restored bay on the Dawes House (1892) a few blocks from Burnham's home in Evanston, IL.

Subsequent sampling from the bluffside in 2013 however, indicated that a reddish-brown paint color was employed. The soffit boards from the underside of the boiler room roof arched eaves that were tested appeared original to the building but further investigation may reveal that they were in fact replaced.

If more extensive paint analysis verifies that select eaves, or all of the eaves, were a natural finish, it will be important to choose a repair and replacement wood species that stains and varnishes similar to the original wood species employed (old growth pine/fir yet to be reviewed microscopically and confirmed). Virtually all of the brackets appear to be original and can be restored with epoxy and Dutchman repairs and reinstalled.

The reconstruction will entail new (concealed) details recommended by the structural engineer and master carpenters to strengthen the eave construction (see **Appendix D**).

TRACKSIDE CANOPY (Train Shed)

The initial rendering of the Keokuk Union Depot published in May 1890 shows a glimpse of an arched masonry train shed with a clay tile roof attached to the building. The published construction budget reached as high as $80,000 at one point but was ultimately reported to be $75,000 as-built. The iron truss and corrugated iron roof train shed may have been one of the changes that helped reduce the final budget. The freestanding iron trackside eyebrow canopy that was built instead is an alluring architectural element and it is fortunate that this elegant industrial feature has survived and continues to complement the Depot today.

The canopy is 146 feet long, over 11 feet tall, and remains in good condition overall. As long as protective coatings are maintained, it will stand indefinitely. The gutters are deteriorated and two of the concrete bases supporting the trusses on the ends are damaged. These both appear to be damaged from impact and were presumably hit by heavy carts or vehicles at some time. The corrugated iron roof remains in remarkably good condition, attributable to the heavy-gauge iron employed and the roof form which readily sheds and drains melting snow, ice and rain.

A thorough microscopic paint analysis must be performed during stripping to determine the original colors prior to restoration. Articles of the grand opening merely indicate the canopy was painted in “attractive shades.” Historic photos, peeling paint and exposures appear to show that up to three colors were employed. The concrete bases appear to be a darker color in historic photos but this depends on the actual color and color-sensitivity of the black & white film. The underside of the canopy was presumably white/off-white to reflect the indirect lighting down and illuminate the platform and promenade. The iron trusses were probably a light color for visibility at night. The roof color is not yet known but was presumably painted reddish-brown to harmonize with the clay tile roof, or bluish-green to coordinate with the copper drainage and ornament on the Depot roof. Repainted historic elements are frequently painted the same color over and over (although rarely matched exactly) to minimize the amount of paint required for coverage. The roof is painted green today, but this may have occurred in circa 1950 to coordinate with the green asphalt shingles that replaced the clay tile. The gutters and spouts are relatively beaten up but the only patch in the entire corrugated iron roof canopy is a one-foot square patch where the original semaphore pole used for train signals penetrated the roof.

As funds allow, the entire canopy and trusses should be stripped (blasted) to bare metal to remove multiple layers of paint and surface corrosion and painted with high-performance industrial epoxy coatings. Testing with various blasting media may be necessary to determine the most effective treatment that does not damage the metal (compressed air, ice, sponge media, iron slag, etc.). The canopy undoubtedly has multiple layers of lead paint and should be tented off when blasted so the waste can be captured and disposed properly. The roof has likely weathered bare several times over the years but the underside and trusses should be contained.

Historic articles seem to indicate the canopy was once fitted with "marquee" strip-style lighting; notches in the steel channels may have supported these early strip fixtures. LED lamps (bulbs) are manufactured today that mimic the warm glow of carbon filament lamps from the late 19th century. These lamps are very energy efficient and will be inexpensive to operate for extended hours. Alternate wire guards can be installed for the lamps, if vandalism proves to be an issue. A rendering was developed for the HSR to illustrate the effect this will have on the canopy and building at night **[Fig 28.]**. Restoring the canopy and installing new lighting may further increase public sentiment to restore the Depot.

Fig 28. A 2014 rendering of the trackside canopy with restored "marquee" style strip lighting.