SHENANDOAH COUNTY

FEASIBILITY ANALYSIS OF
RENOVATION AND EXPANSION OF SHENANDOAH COUNTY COURTHOUSE
AS PROPOSED BY CITIZENS FOR DOWNTOWN COURTS

June 18, 2007

MOSELEY ARCHITECTS
A PROFESSIONAL CORPORATION

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Introduction

At the request of the Shenandoah County Board of Supervisors, Moseley Architects has performed a preliminary analysis of the feasibility of renovating and expanding the historic Shenandoah County Courthouse as described in a proposal entitled "Shenandoah County's 1795 Courthouse: An Architectural Plan for Its Continuous Use By the Courts", dated February 21, 2007. The proposal was submitted to the County by Citizens for Downtown Courts ("CDC"), an ad hoc group advocating that the historic Courthouse remain in use by the County's courts. Craddock Cunningham Architectural Partners of Lynchburg participated in the preparation of the proposal. The proposal was revised and supplemented in a letter, dated May 18, 2007, from Hal C. Cradock, AIA, of Craddock Cunningham to Shenandoah County Administrator Vince Poling.

The purpose of this feasibility analysis is to provide an opinion of the structural and architectural feasibility of the proposed building alterations to assist the Board of Supervisors in determining whether to proceed with more detailed study of the CDC proposal. This analysis does not address the functionality of the CDC plan and does not include a cost estimate. Should the Board decide to investigate the CDC proposal in more depth, Moseley Architects is prepared to provide additional analysis consisting of review of the proposed concept for compliance with the space and functional requirements of the courts; refinement of the conceptual plan and site plan; and a preliminary estimate of cost for the project.

Summary of the CDC Proposal

The CDC proposal calls for expanding the Courthouse to make significantly more space available for the courts by:

1. Connecting the Courthouse to the adjacent former Shenandoah Bank and Trust Building, thus incorporating that building into the Courthouse;
2. Constructing a new second floor within the existing volume of the 1871 and 1880 wings of the Courthouse;
3. Constructing additions on both the north and south sides of the Courthouse and on the north side of the Bank; and
4. Constructing a semi-detached building north of the Bank or renovating Lawyer's Row to house the Commonwealth's Attorney.

In order to create enough headroom for the new second floor in the Courthouse, CDC proposes "lifting the lower chord of the tie beams" that support the attic floor. Due to height limitations in the Courthouse, the new second floor cannot be constructed at the same elevation as the existing second floor of the Bank even if the tie beams are lifted. To address this situation, CDC calls for the existing second floor of the Bank to be "restructured to align with the new upper levels [second floor] of the Courthouse". In other words, the existing second floor of the Bank would be removed and a new, lower one would be constructed.

Precedents for the CDC Proposal

Constructing a new second floor within the volume of an existing Courthouse is not without precedent in Virginia. The City of Fredericksburg Courthouse was originally constructed in 1852 with a very high-ceilinged courtroom. In 1947, a second floor was constructed within the courtroom volume to create more space in the building; however, it was not necessary to alter the roof structure of that building in order to add the new floor. There are also other examples of constructing new floors within existing building volumes. These include the Albemarle County Office Building in Charlottesville, where a second floor was added within the volume of what had been the gymnasium of the former school building. As in Fredericksburg, no changes to the roof structure were required.

On-Site Building Observation

Two architects and a structural engineer from Moseley Architects' staff conducted a site visit to the Courthouse and Bank on June 1, 2007 to observe existing conditions. The purpose of the visit was to supplement on-site observations previously conducted by Moseley staff and to review specific conditions relevant to the CDC proposal. Various measurements and photographs were taken to assist with the feasibility analysis. Moseley's staff was accompanied by Duane Williams, Shenandoah County Facilities Supervisor.

The information and opinions presented in this report are based on the non-destructive, visual observation of the existing buildings conducted during the June 1 visit and previous visits. Not all portions of the buildings were accessible for observation, e.g., the crawl space of the 1880 wing of the Courthouse. No testing of any kind was conducted, and below-ground conditions such as the presence or type of wall footings, if any, could not be determined.

At Moseley Architects' request, the County engaged a surveyor, Walsh Land Surveys Incorporated of Woodstock, to determine the elevations of all floors of the Courthouse and the Bank, including their attic floors, and the elevation of the Court Street sidewalk where it meets the two buildings. This information was used to evaluate the issues involved in connecting and aligning the first and second floors of the two buildings, and in determining the headroom available below the existing Courthouse roof structure.

Architectural Considerations

The primary architectural factors to be considered in evaluating the feasibility of the CDC proposal are the relative elevations of the various building floors and the availability of adequate headroom to provide for appropriate ceiling heights and above-ceiling building systems. Diagram A illustrates the relationship of the various floor and attic levels, and their relationship to Court Street, all as determined by Walsh Land Surveys, Incorporated.

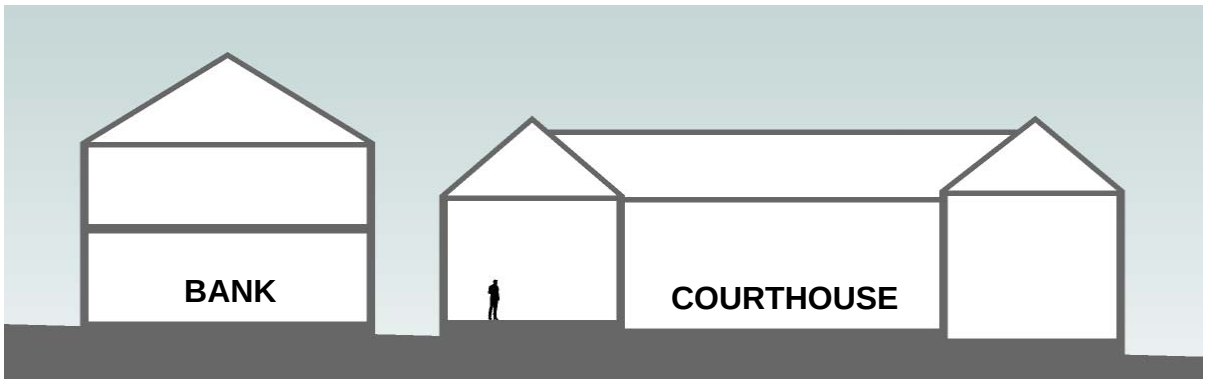

Diagram A

The original Courthouse fronting on Main Street (at right in diagram) was constructed in the 1790's. The middle portion (current courtroom) was added in 1871, and the rear portion (current clerk's office) in 1880. As the diagram indicates, the Courthouse first floor actually consists of three different floor levels. Apparently this results from the fact that the Courthouse property slopes gently upward from Main Street toward the Bank, so each of the two additions to the original Courthouse has a correspondingly higher floor. The difference in elevation between adjacent floors is less than two feet in both cases.

The first floor of the Bank building is between two and three inches lower than the first floor of the adjacent 1880 courthouse wing. Since the two floors are at nearly the same level, connecting them together would be relatively simple assuming that the level of the adjacent Courthouse floor is not altered.

Diagram B illustrates the proposed construction of a new second floor in the Courthouse. Proposed new construction is indicated in red. The dashed line indicates the elevation of the existing second floor in the Bank. Height limitations in the Courthouse will prevent its new second floor from being constructed to align with the existing second floor of the Bank. CDC thus proposes removal of the existing second floor of the Bank and construction of a new one at a lower elevation. This new floor is also shown in red. The diagram does not indicate alterations to the roof structure of the Courthouse that would be necessary to achieve adequate headroom for the new second floor. That issue is addressed below.

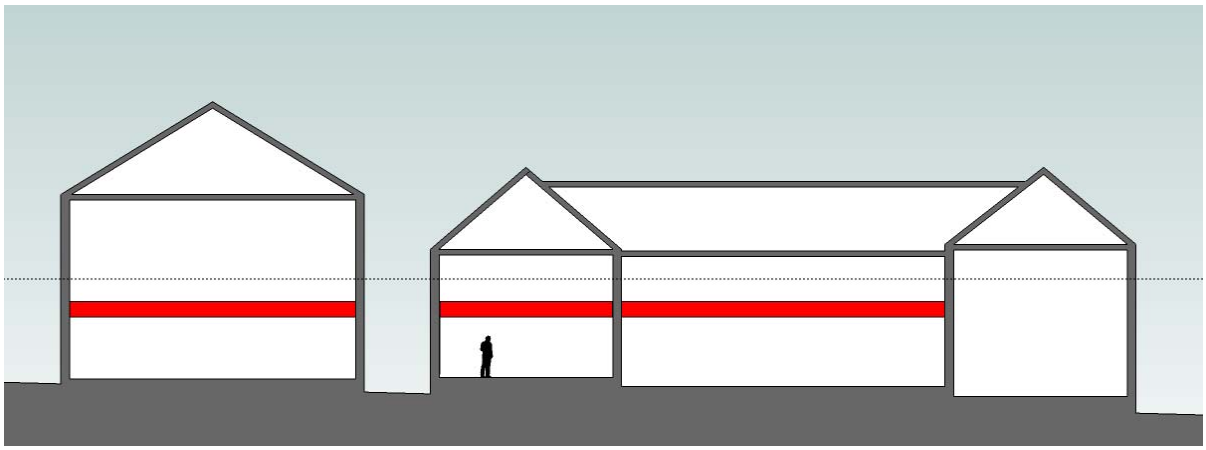

Diagram B

Diagram C shows a cross-section of the 1871 center portion of the existing Courthouse at the courtroom.

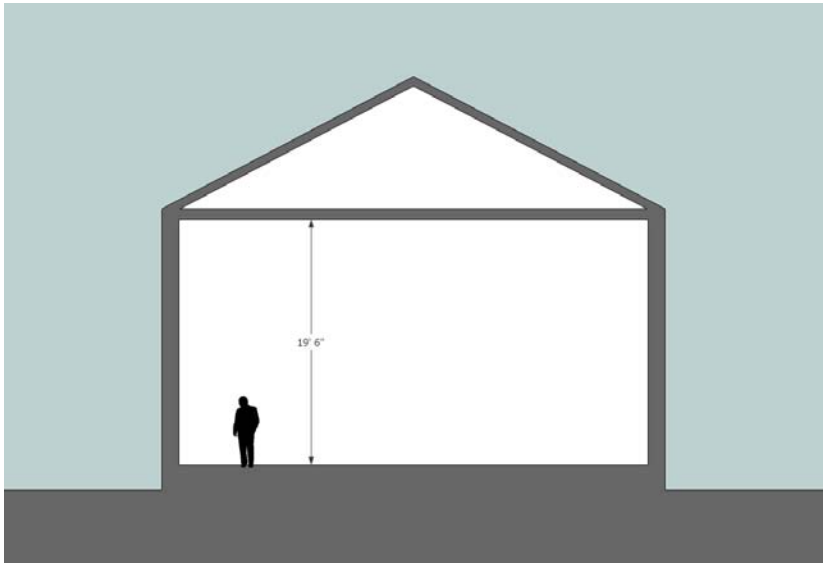

Diagram C

The height from the existing courtroom floor to the bottom of the lower tie beam of the roof truss is about 19'-6". (The ceiling height is actually lower, but the ceiling is suspended from the roof structure and can be removed with no impact on the structure.) Hal Craddock's letter of May 18, 2007, to Vince Poling proposes constructing the new second floor of the Courthouse at a height of eleven feet above the first floor of the rear wing of the building. This would place it about 12'-4" above the first floor of the center portion of the building since the first floor in that part of the building is about 1'-4" lower than the first floor of the rear wing (see Diagram B).

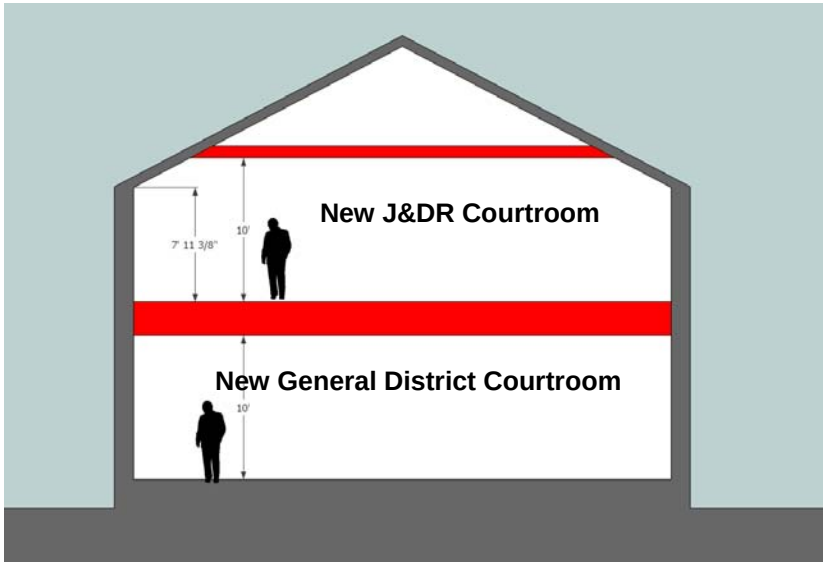

Diagram D

A minimum ceiling height of 10'-0" is recommended by Moseley Architects for any courtroom because of the size and nature of the room. Higher ceilings are often preferred depending on the size of the room. Ceilings of less than ten feet in height are visually uncomfortable and do not provide an appropriate environment and setting for judicial proceedings. Diagram D illustrates a cross section through the central portion of the Courthouse showing the proposed new second floor in red. It also shows the roof tie beams raised as required to provide a minimum ceiling height of ten feet in the second floor J&DR courtroom.

As Diagram D indicates, a ceiling height of ten feet can be achieved in the new second floor courtroom over part of the room, but the slope of the roof will reduce the height of the ceiling

to less than ten feet over about twenty percent of the room, and to less than eight feet at the exterior walls. Nevertheless, the symmetrical configuration of the sloped ceilings along the sides of the room may be compatible with the proposed courtroom use even though a minimum height of ten feet would not be maintained throughout the entire space.

Placing the new second floor at the proposed height above the existing courtroom floor while maintaining a minimum ceiling height of ten feet in the new first floor courtroom will provide for a space 2'-4" deep between the first and second floors. As in most buildings, this space between the floors would be occupied by structural framing and by building systems such as ductwork, light fixtures, piping, electrical conduit, and data cabling. Typically a depth greater than 2'-4" is required to adequately provide for these systems in a building such as a courthouse. A minimum requirement of three feet is a reasonable assumption in this case. Providing that amount of space would require that the floor be eight inches higher than proposed by CDC. The lower tie beams of the roof structure could probably be placed higher than shown in Diagram D in order to compensate, but the ceiling heights around the perimeter of the second floor J&DR courtroom would be further reduced and the overall area of the sloped ceiling within the room would be increased, adversely affecting the viability of the proposed design.

Similar headroom issues would be encountered in constructing the proposed second floor within the 1880 rear portion of the Courthouse. The headroom above the new second floor there would be only about 7'-6" unless the roof tie beams are raised. The proposed use of the second floor in this portion of the building is office space. Typical office ceiling heights are nine feet or more, but a height of eight feet is not unreasonable if necessary. Achieving a minimum height of eight feet for the new second floor would require that the tie beams be raised at least six inches over this portion of the building.

Structural Considerations - Courthouse

The existing structure of all three parts of the Courthouse is a combination of wood framing and load bearing masonry walls. There is a basement with cast-in-place concrete walls below the central portion and part of the original 1795 Courthouse. There are inaccessible crawl spaces below the rear wing and part of the original Courthouse.

The exterior bearing walls of the original Courthouse are cut stone, painted on the exterior. The exterior bearing walls of the central portion and the rear wing are solid brick, painted on the exterior and with an interior plaster finish. The presence of wall footings could not be verified for any portion of the building.

The first floors of the original Courthouse building and the central portion are wood framed. Although inaccessible and therefore not observed, County staff reports that the first floor of the rear wing is also wood framed.

The roof structure of the central portion consists of wood beam trusses with wood purlins and rafters. The wood beam trusses are spaced approximately 12'-6" apart and bear on the exterior walls of the building. The roofs over the original Courthouse and the rear wing are supported by wood rafters. There is a wood framed bell tower on the roof of the original Courthouse building. The roofing for the entire building is metal standing seam.

The majority of the existing first floor wood framing in the central portion of the Courthouse appears to be original. At the center of the building, wood columns supporting a wood beam have rotted where they meet the basement floor, making them ineffective in supporting floor loads. As a result, four temporary steel columns have been placed below the beam to support it. Along the rear of the building, steel tubes and beams have been used to support a portion of the floor framing. Several wood joists in the area have been cut to route piping.

Several concrete masonry walls built inboard of the basement walls were observed in this area. County staff indicated that the concrete masonry walls, steel columns, and beams had been installed to prevent further movement and cracking of the original basement walls and to reduce floor deflection in the courtroom. Cracks in the concrete masonry walls are apparent, and County staff indicated gauges were installed on these walls three to four years ago to monitor deflection.

The majority of the wood floor framing of the original Courthouse building appears to be replacement material and is not original. However, due to floor deflection, approximately ten temporary steel columns with tube steel beams have been placed to provide additional support for the floor framing. Several cracks in the existing concrete basement walls were observed under this part of the building.

The existing roof structure at the central portion and the rear wing appear to be original and are generally in good condition. No visible signs of significant damage or deterioration were observed in the wood beam trusses of the central portion or the wood rafters of the rear wing. However, many wood ceiling rafters in the central portion are damaged and displaced from their connections at the wood truss tie beam.

As part of any renovation, the first floor framing of the entire building should be analyzed, modified, reinforced, and/or replaced as required to support anticipated floor loads. The temporary steel columns and beams should be replaced by permanent structure designed to carry the required floor loads. Cracked basement walls should be repaired appropriately. Floor joists cut to provide for piping should be replaced and piping rerouted as necessary. Existing foundation wall movement should be analyzed and remedied with appropriate permanent techniques. The existing roof structure of the entire building should be analyzed for current roof live load requirements. These measures should be taken regardless of how and for what purpose the building is renovated, and are not specific to the CDC proposal.

CDC proposes adding a second floor in the central portion and the rear wing of the Courthouse. It is not recommended that additional structural loading (i.e., the weight of the new floor and everything it supports) be applied to the original, existing bearing walls by pocketing new floor joists into those walls. Accordingly, a new steel-framed floor structure independent of the existing building structure would be required. This structural framing would be “inserted” within the existing building volume. The new steel columns would need to extend through the first floor structure to new footings inset from the existing exterior foundation walls. In order to avoid adverse impact on the structural integrity of the existing walls that could result in damage to the existing structure, construction of the new footings would require careful investigation and analysis of the existing footings (if any) and foundation walls to determine their condition and configuration.

In order to have adequate headroom (ceiling height) for the new second floor, CDC proposes “lifting the lower chord of the tie beams” in the central portion of the Courthouse. The lower tie beams are not simply a means for supporting the attic floor. They are an integral part of the existing roof trusses and are therefore essential to support the roof and to laterally brace the existing exterior walls. In order to maintain the structural integrity of the existing wood roof framing it would be necessary to raise each truss in its entirety, including the lower tie beam. This would require removing the entire roof and extending the height of the existing exterior bearing walls - an extremely difficult and expensive construction process that is not recommended. Even if affordable, it would significantly change the proportions and appearance of the historic building. CDC’s proposal to raise only the lower tie beams is undoubtedly in response to these problems.

Raising only the lower tie beam while leaving the other wood roof truss members and the exterior walls in place would require cutting the tie beams. This would destroy the structural

integrity of the existing roof trusses and effectively remove any bracing at the top of the exterior walls. In order to achieve the necessary headroom for the new second floor, it would therefore be necessary to extend the new steel columns supporting the new second floor up to the roof, and to install new steel beams at the building perimeter to brace the exterior walls. New steel framing would also be required to support the roof structure in lieu of the existing wood trusses. Installing the new steel roof framing would likely require removing sections of the existing roof structure, thus destroying original portions of the historic building fabric. A similar approach would be necessary to raise the tie beams over the rear of the building, and similar issues would be encountered.

Structural Considerations - Shenandoah Bank and Trust Building

The Bank structure is a combination of wood and steel framing and load bearing masonry walls. The building has a basement with a combination of cast-in-place concrete and cut stone walls. The exterior bearing walls above the basement are solid brick, painted on the exterior with an interior plaster finish. The presence of wall footings could not be verified.

The first and second floors are wood framed; however, the second floor structure could not be observed due to visual obstructions. Steel girders support the framing of the second floor and attic floor. The roof is supported by wood rafters and load bearing wood-framed knee walls. Roofing is standing seam metal.

The majority of the first floor wood framing appears to be original. Several floor joists at the first floor have been damaged by fire. The steel floor girders are encased in what appear to be plaster bulkheads and are not visible. Some repair of the floor structure may be necessary as part of any renovation of the building. The existing roof structure appears to be in good condition and shows no visible signs of significant damage.

As part of any planned renovation, the first and second floor framing should be analyzed, modified, reinforced, and/or replaced as required to support anticipated floor loads. The first floor wood joists damaged by fire should be replaced. The existing roof structure should be analyzed for current roof live load requirements. These measures should be taken regardless of how and for what purpose the building is renovated, and are not specific to the CDC proposal.

CDC proposes to lower the existing second floor of the Bank building to align with the proposed new second floor of the Courthouse (see Diagram B). As with the Courthouse, it is not recommended that additional structural loading be applied to the original, existing bearing walls by pocketing new floor joists into those walls. The “insertion” of an independent structure like that proposed above for the Courthouse would therefore be required. This new steel framing would support only the new floor, as no modifications to the existing roof structure would be required. So as to avoid the need to temporarily brace the exterior walls during construction, the existing second floor should be demolished only after the new second floor framing has been secured to the exterior walls. The same care in construction of new footings would be required as described above for the Courthouse.

Conclusions

The modifications to both the Courthouse and Bank that would be required to implement the CDC proposal appear to be feasible. There is no doubt, however, that these modifications are substantial and could even be characterized as extreme in terms of the necessary structural alterations, their cost, and their impact on the historic buildings. An entirely new structural frame would have to be constructed within each building, and the roof structure over most of the Courthouse would have to be replaced from within in order to provide appropriate headroom for the new second floor. The logistics of erecting new structural steel

within the envelopes of the existing buildings would be challenging, complex, and extremely expensive compared to conventional construction. Needless to say, both buildings would need to be vacated entirely during construction, with appropriate interim facilities provided for the courts.

As stated earlier in this report, this feasibility analysis does not include a cost estimate. However, it is the opinion of Moseley Architects that the proposed CDC plan would be substantially more expensive to implement than other court facility options considered to date. Ultimately, however, the decision to implement such a plan may hinge on other considerations. For example, the limited available headroom in the Courthouse raises concerns about the comfort and aesthetic appropriateness of the interior space, especially the courtrooms. On a more practical level, these headroom issues will also limit the depth of the above-ceiling space below the new second floor. This will make installation of the necessary above-ceiling building systems more difficult and therefore more expensive than would otherwise be the case. Construction of low ceiling bulkheads will no doubt be necessary in some areas to accommodate ductwork and other building components. Lack of headroom may also limit choices as to the types of systems that can be installed.

Whenever substantial structural changes are made to a building, particularly an older one, potential accidental damage to the building during construction is a possibility that must be considered. In 2006, construction operations for the substantial modification and expansion of a century-old court building in Charlottesville caused the unintended partial collapse of that structure.

The potential useful life of the renovated and expanded Courthouse must be considered. Current projections do not indicate the need for more than one courtroom each for General District and J&DR Court over the next twenty years; however, the potential long-term future need for more space for these courts must be anticipated. One way to accommodate that need would be to move one of the district courts out of the building in the future, leaving the other to expand into the space thus vacated. This possibility raises the question of whether the County wishes to have three separate court buildings eventually, with the associated operational impacts on the courts, the Sheriff's department, and the County's citizens.

Any thoughtful consideration of the CDC's proposed plan should include the impact of the proposed changes on the historic character of the Courthouse and the degree to which existing historic fabric would be lost. The evolution of a historic building to accommodate changing needs over time does not necessarily devalue the building if modifications are designed and constructed with sensitivity and skill. Indeed, the Courthouse has already evolved and changed significantly since it was first built. The determination of whether the changes required by the CDC proposal are either appropriate or too extreme is a subjective decision that must be made by the community, not by architects and engineers. CDC's proposal to construct substantial two-story additions on both the north and south sides of the Courthouse should be taken into account when considering this issue.

Alternatives to renovation and expansion of the Courthouse for continued court use include renovating it for another public use, possibly including restoration of the nineteenth century wings as was done with the original 1795 Courthouse building. The value of maintaining and experiencing the building and its setting in a condition more like its historic origins must be weighed against the value of extending its life as a court facility, for which substantial change is required.