

Highway Facility Study

Jefferson County Highway Department

Jefferson County, Wisconsin

SEH No. A-JEFFC0801.00

July 2008



July 30, 2008

RE: Jefferson County Highway Department
Highway Facility Study
Jefferson County, Wisconsin
SEH No. A-JEFFC0801.00

Mr. Bill Kern, P.E., Highway Commissioner
Jefferson County Highway Department
141 W Woolcock Street
Jefferson WI 53549

Dear Mr. Kern:

Short Elliott Hendrickson Inc. (SEH[®]) wants to thank you for the opportunity in providing our services for this project study. Your project was interesting, in a number of ways, when compared to other county highway facilities. The current location of the Highway Department is probably the most picturesque we've seen. Also, it is obvious the Highway Department has made efforts in identifying what its services will be and the equipment fleet it will maintain. This is an important step in moving forward as this information will have a direct effort on the size of a Highway Facility project. We know you will find the information in this report informative.

Please contact me should you have any questions or comments.

Sincerely,



Bob Sworski, AIA
Project Manager

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Highway Facility Study

Jefferson County Highway Department
Jefferson County, Wisconsin

Prepared for:
Jefferson County Highway Department
Jefferson County, Wisconsin

Prepared by:
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Project Manager

AIA Number: 8200-005

Date

July 18, 2008

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Highway Facility Study

Jefferson County Highway Department

Prepared for Jefferson County Highway Department

1.0 Introduction and Background

Jefferson County is situated between the cities of Madison and Milwaukee, Wisconsin. The County has experienced moderate growth because of its location between two of Wisconsin's largest metropolitan areas. The County Highway Department is headquartered in the City of Jefferson, on the eastern bank of the Rock River and west of Highway 26. This main facility occupies approximately 15 acres. Satellite highway facilities are located at Palmyra, Ixonia, and Waterloo. One of the services the County provides includes maintaining the State and County Highway systems within its jurisdiction. The County Highway Department also serves a number of Townships, offering road maintenance services and truck set-up and repair.

SEH was charged with the task of providing a study that completed the overall review process necessary for the Highway Department and County to move forward with packaging a building design and assisting financial cost for such a project - whatever shape that project might take. To do that, SEH tasked itself with the following items:

- Touring the existing main facility and site
- Interviewing the Highway Commissioner
- Intermittently questioning employees
- Develop an understanding of the current operations
- Review a "Building Evaluation & Feasibility Study" that was authored in June of 2000 by OMNI Associates.

The intent of the 2000 OMNI study was to "explore alternates for the remedy of cramped and poor working conditions" at the main Highway Department Facility. The study by OMNI reviewed Architectural, Structural, HVAC, Plumbing, and Electrical systems. Similar to that study, the SEH study does not address the outlying sites, listed above. Like before, those sites do not impact the primary building systems – Architectural, Structural, HVAC, Plumbing, and Electrical - at the main facility.

2.0 Existing Highway Site Assessment

The site is approximately 15 acres in size. As stated earlier, it is situated in an urban setting. Most of the site drains toward the Rock River. SEH was not hired to complete any environmental review of this site or its facilities. The Highway Department has taken care to mitigate any runoff from its modern day highway operations.

Over the last decade, and particularly since the 2000 study, the County Highway Department has fluctuated in size. This fluctuation has occurred in staff, equipment and operational aspects. Currently, the Highway Department has 61 full-time employees (FTE's) and 4 seasonal employees. Four of the employees are in Administration, four are Superintendents, four are mechanics and one serves as the custodian. It is now believed by department management, staff, and the highway committee that the current level of staff and equipment is the functional and cost effective baseline level of service that best suits Jefferson County.

SEH toured the existing site and main facility in the fall of 2007. The site is composed of seven (7) main buildings that would be considered occupied by staff, vehicles, or both. These buildings include:

- Administration Building/Commissioners Office (built 1957)
- Vehicle Repair/Vehicle Storage Building (built 1923, additions 1962 and 1978)
- Vehicle Storage Building (built 1962)
- Three different Cold Storage Buildings (acquired in 1969)

Other major items on site include:

- Three Salt & Salt Sand Storage facilities
- A large Propane Tank (for fueling Sheriffs patrol cars)
- Culvert Storage area
- Scale area
- Employee/Visitor Parking
- Small Stock Pile Storage area
- Fuel Tanks and Pumps



Because the intent of this study is to identify the cost/benefit aspects associated with the past study and the current conditions, SEH will refer in general terms to the condition of the “building systems” – the Architectural, Structural, HVAC, Plumbing, and Electrical packages. We will also provide commentary on Security – a sixth system now prevalent in Highway and Public Works facilities. During our first visit of the facilities we found the compound to be neat and appeared to be well-maintained. At-a-glance, it would appear that as neat and clean as the facilities are, there would be no need for a major project improvement; that any changes required would be mostly cosmetic in nature. This however, is not the case. Evidence of this can be found in the two photos below. Photo A is that of a 2003 Caterpillar 140H. Photo “B” is that of a 1958 Galion Motor Grader. Both photos were taken 30’ - 0” away from the respective piece of equipment. This is a case in point why the Highway Department needs an upgrade. Modern day equipment is larger, requires dozens of gallons of hydraulic fluids and oils, is loaded with electronics and can have (9) on board computers. Having a neat facility may help with safety and have some small functional efficiency, but it doesn’t mean much if the hydraulics are frozen and can’t be worked on inside in a timely manner.



3.0 Existing Administration/Office and Vehicle Repair/Vehicle Storage Assessment

In our visits, SEH found that the Architectural and HVAC issues have gotten worse since the 2000 Study. Architecturally, roof leaks have become common place in the existing Repair/Vehicle Storage Building. The single pane windows and the uninsulated wall systems (as applicable) in the heated buildings continue to emit energy inefficiencies, almost exponentially as energy fuel costs continue to climb.



One additional item that is typically not thought of as an Architectural element is the functional aspect of how the Highway Department operates internally and on-site. For example, the existing Vehicle Repair/Vehicle Storage Building really contains three (3) different repair and maintenance areas. This is very inefficient in providing HVAC, plumbing (lube systems and floor drains, etc.), and electrical systems. Work spaces that are spread out tend to cost more money to repair, construct, and maintain over the life of the facility. More important, but harder to cost account, is the inefficiency in employee hours for maintaining and repairing equipment in different locations. Preparing a vehicle for repair, or having a vehicle in a bay waiting for repair parts, can clog the work day when a mechanic is gone or out in the field.

Finally, all restrooms are non-compliant in some way, shape or form. In the Administration/Commissioners Office the restrooms have been modified with the intent of being ADA compliant, but the door(s) into the room(s) remain too narrow to comply. Fixture heights, fixture types, and grab bars all are items of concern. Given the area in each of the buildings containing restroom and locker facilities, it is unlikely that additional area could be carved out of the existing buildings if the number of fixtures must be adjusted. ADA compliant restroom and locker rooms require more area than what is currently available on a per fixture basis. The upper floor areas in the original portion of the building should be served by an elevator as the County is a public entity. The Commercial Building Code, however, makes a distinction in WHEN an elevator must be installed. Should this site and facility be upgraded, it will be required that an elevator be installed, or the offices moved and created at grade. Often times, it is less expensive to create the new space than it is to install an elevator. It should also be pointed out that the electrical systems would require additional modification if an elevator is installed.

3.1 Mechanical Systems

HVAC issues have become, in our professional opinion, a specific risk management concern. The HVAC equipment that is present in the buildings, have reached the end of their normal life cycle. Better “source point” exhaust systems are used today in the Vehicle Repair areas. Similarly, the Vehicle Storage areas SEH designs include both the minimum air exchanges required coupled with a “purge” type exhaust system that is intended to be used at peak times to supplement the baseline exhaust equipment. These systems can be designed in existing or new facilities and can be controlled automatically or overridden manually, depending on the season of the year. The

existing HVAC equipment, even if replaced, would need to be “added to”, as the existing equipment does not meet the current building codes. The 2000 study made reference to “purge” type exhaust systems. In SEH Highway Facility designs, these types of systems are installed as a matter of standard practice. These types of systems are even more critical in repair and vehicle storage facilities with lower ceiling heights. Exhaust is considered a carcinogen and should be treated with the utmost and immediate attention.

Structural, Plumbing and Electrical systems have remained mostly “as is” since the 2000 study. It is unlikely that any major, life threatening structural damage has occurred from the roof leaks and water infiltration. Additionally, new, compliant ADA and low-flow fixtures will need to be installed should remodeling commence.

The older heated Vehicle Storage Facility has witnessed seven years of additional wear. Architecturally, further degradation of the metal wall panels will continue, however, the uninsulated concrete push walls pose the larger problem of a thermal “nose bleed” in this era of hiked energy costs. With the lapped-seam metal roof, expansion and contraction of the metal panels will continue to shield from water infiltration. It should be noted that this building, when replaced is quite possibly more valuable today than what it was purchased. Recycled metals, including steel, are bringing record prices. This particular building has paid the County back repeatedly in the course of its life.



The HVAC system has witnessed its normal period of useful life. The radiant heating system is common, relatively efficient, easy to maintain, and easily replaced, should that choice be made. Of more concern is the plumbing system, particularly the underground systems. The 2000 study makes reference to not being able to determine where the underground sanitary leaves the building. This should be considered important priority. At some point, it should be determined and corrective actions taken if necessary.

3.2 Unheated Vehicle Storage

The three (3) Cold (unheated) Storage Buildings provide storage for the common dry goods associated with Highway Department operations. These items include:

- Traffic signage
- Forms and items used in concrete construction
- Seasonal equipment



These buildings are of two different vintages – one a “late” model agricultural pole building and two more standard wood frame buildings near 50 years old. While the post/frame building has served its purpose, it by no means, currently meets the Commercial Building Code. The structure is designed as an agricultural building only. It should be used in a private setting and not in commercial applications, particularly in an urban setting. The other two buildings have had the metal skin painted over the years. All doors and windows are in need of upgrade if the building will continue to be used by the Highway Department in the long-term future. This would be specifically addressed as a security issue.

4.0 Cost/Benefit and Life Cycle Costing

Based on the types and amounts of area the Highway Department occupies (heated and unheated, office and shop/vehicle storage space) and the changes/upgrades required, SEH can estimate remodeling and repair costs (identified as COST). That cost is then compared with proposed solutions: remodel/upgrade vs. building a new facility (identified as BENEFIT in LIFE CYCLE). The idea of “cost/benefit” is the only real way to know the best solution to choose. As important, if the best decision is not chosen, then at least all stakeholders are able to determine why a certain solution was selected.

Further, soft costs such as Highway Department inefficiencies during remodeling, can unknowingly affect the real cost of the project. Where do the displaced functions of the Department go when the space is occupied by contractors? How much does a contractor allow in his bid for working around an owner’s operations? How much is the actual “deconstruction costs”? These are all valid questions to consider in a remodeling project. The true answer is no one knows until the project is bid....but we do know that it adds to a project’s cost.

The next logical questions become: “How do we add and modify the space we have to make the facility compliant?”, “Can we increase worker efficiency if all the repair bays were together?”, “Will our energy bills go down if we make these modifications?”, “What can we do to mitigate long term operation and maintenance costs?”, and “What will be the solution in providing the best in highway safety and maintenance for the traveling public?”

In making existing restrooms and locker rooms compliant with ADA guidelines, the County would have to create more space. The obvious choice is to construct an addition adjacent to the existing locker room to the east. However, that area is already limiting vehicular circulation, making this location a poor choice for an addition. Creating new space on some other side of the building only serves to increase the construction cost; cutting into concrete floors to install required plumbing. Further, worker efficiency is achieved through removing redundancy, or “multi-tasking” specific spaces.

Energy (electricity and fuel costs) will most likely continue to rise. The Polk County Highway Department is a case in point. SEH recently completed working with the Polk County Highway Department on an identical study. Their facilities are very similar in size to that of Jefferson County. In cost comparing their existing facility with the new precast concrete highway shop in neighboring Washburn County, it was determined that Polk County’s energy bills were nearly 3x that of Washburn County, but they only had about 67% of the total area of the Washburn County Facility. This is an example of how a root question is answered.

Additionally, and probably most important, is that the City of Jefferson sponsored a Tax Increment – Territory and Project Plan Amendment for TIF District No. 5. This document was developed by Ehlers & Associates – municipal financial planners. This report was intended to highlight the redevelopment of the current urban Highway Department site. This should be looked at in a very favorable light for a number of reasons. The first is that it presents an opportunity to prepare and actually sell the site. Often times, this is never a real option, and is definitely not always planned. Second, these are the kinds of projects that are examples of how effective government entities can work together to achieve win-win situations. More importantly, these projects are indications that comprehensive thought is being used in planning, then spending tax payer monies.

5.0 Options

In meeting with the Highway Commissioner and the Committee, review of the accumulative data and changes in the operating staff size and operations, SEH highlights (4) four options for consideration by the County. Option 1 and Option 2 are scenarios that allow for remodeling and renovation at the existing site. These options also require a phased approach – remodeling, renovating, or constructing a portion of the final project, prior to proceeding with the next phase. Option 3 and 4 depict new facility designs on a new 30 acre site.

SEH reviewed the estimates of probable cost in the 2000 OMNI Study. While we concur with the overall proposed construction cost estimates at that time for the building systems highlighted, we find that square foot cost estimates with a 5% average (compounded) inflationary factor provide accurate information for each year that an owner chooses NOT to build. Estimates of probable costs for remodeling and new building options are listed below:

In **Option 1**, the existing office facility would be scheduled to be demolished first. Temporary office facilities would be housed in a large construction-type trailer. Then, a new heated vehicle storage area would be constructed to allow for the temporary storage and maintenance of equipment while the third phase – the renovation of the existing heated storage area – takes shape. This area would be modified into the new vehicle repair area and shop facility. Other accessory spaces would also be moved into this area, including the sign shop and wash bay. Finally, the original portion of the highway shop facility would be demolished, and simultaneously, a new Highway Office would be built. Site improvements which include removal of the existing scale, installation of a new scale, upgrade of the fueling systems, and new site paving, would be constructed and modified throughout the process.

Option 1: Remodel Existing Highway Facility

Demolition

Existing Highway Office		\$28,000
Original Vehicle Repair Shop & Storage Bldg.		\$85,000
New Construction (Office Area)	4,000 s.f. @ \$150/s.f.	600,000
New Construction (Heated Vehicle Storage)	56,000 s.f. @ \$110/s.f.	\$5,600,000
Architectural/Structural		
HVAC		
Plumbing		
Electrical		
Fire Protection		
Communications/Security		
New Construction (Office and Locker Rooms)		
Renovate Existing Vehicle Storage into Vehicle Repair, Wash Bay & Sign Shop	28,800 @ \$90/s.f.	\$2,592,000
Architectural/Structural		
Partition Walls		
Doors and Hardware		
Windows		
Roof System Repairs		
Wash Bay		
Cutting and Patching		
Equipment (Vehicle Lift, Crane and Lube System)		
New Floors		
Interior Finishes		
HVAC		
Plumbing		
Electrical		

Subtotal Estimated Building Costs	\$8,905,000
A/E Fees, Bonding Costs, Attorney Fees, Reprographics, Contingencies, and Permits	\$1,336,200
Total Estimated Project Costs	\$10,241,200

Option 2 is much like that phased process described in Option 1. Again, the existing office area would be demolished in the first phase. A new heated storage facility, along with a new sign shop and wash bay would be constructed on the south side of the existing heated storage facility. In this case however, the original Highway Shop facility would remain standing -used for tempered storage only. The remaining portion of the heated storage required would then be connected to the existing building on the south side. As in Option 1, construction of a new office area would be the last major construction phase. Site improvements, again, similar to Option 1, could be renovated and constructed throughout the major construction process. Removal of the existing scale, installation of a new scale, and upgrades to the fuel system can be accomplished while the facility remains in operation.

Option 2: Remodel Existing Highway Facility

Renovate and Remove Existing Northernmost Shop Areas into Heated (Tempered)

Vehicle Storage Space	22,100 s.f. @ 40/s.f.	884,000
Selective Demolition		
New Ventilating and Heating System		
New Lighting System		
EIFS Wrap on Masonry Exterior		
Re-Roof		
New Doors and Windows		
Sitework		
New Construction (Office Area)	4,000 s.f. @ \$150/s.f.	600,000
New Construction (Heated Vehicle Storage)	37,100 s.f. @ \$110/s.f.	\$4,081,000
Architectural/Structural		
HVAC		
Plumbing		
Electrical		
Fire Protection		
Communications/Security		
New Construction (Office and Locker Rooms)		
Renovate Existing Vehicle Storage into Vehicle Repair, Wash Bay & Sign Shop	28,800 @ \$90/s.f.	\$2,592,000
Architectural/Structural		
Partition Walls		
Doors and Hardware		
Windows		
Roof System Repairs		
Wash Bay		
Cutting and Patching		
Equipment (Vehicle Lift, Crane and Lube System)		
New Floors		
Interior Finishes		
HVAC		
Plumbing		
Electrical		

Subtotal Estimated Building Costs	\$8,157,000
A/E Fees, Bonding Costs, Attorney Fees, Reprographics, Contingencies, and Permits	\$1,224,000
Total Estimated Project Costs	\$9,381,000

Option 3 and 4 are options that depict layouts of new facilities and new sites. The two are similar in layout, but differ slightly in the overall size. Option 2, the larger of the two options, has slightly more area allocated to a vehicle wash bay and vehicle storage area. Both options are laid out to minimize the typical unassignable area, such as corridors and hallways between spaces. It is also intended to serve to enhance the efficiency between staff and be as compact in nature as possible to better control operational and maintenance costs in minimizing the building envelope. New County Highway facilities with operations the size of Jefferson County, typically require siting on a 30+ acre site. Site improvements such as outdoor storage areas, salt storage barns, scales, and fueling systems would complete the facility.

Option 3: New Precast Concrete Building System on New (assumed) County Owned Site

Offices, Locker Rooms, Etc.	4,180 s.f. @ \$150/s.f.	\$627,000
Welding Repair Areas, etc.	24,420 s.f. @ \$110/s.f.	\$2,686,200
Heated vehicle storage	55,700 s.f. @ \$100/s.f.	\$5,570,000
Site work allowance		\$300,000
Cold Storage	20,500 s.f. @ \$45/s.f.	\$922,500
Fuel system and scale		\$180,000
Salt Shed (5,000 Ton)		\$470,000
Subtotal Estimated Construction Costs		\$10,755,700

A/E Fees, Bonding Costs, Attorney Fees, Reprographics, Contingencies, and Permits	\$1,613,355
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Total Estimated Project Costs	\$12, 369,000
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Option 4: New Precast Concrete Building System on New (assumed) County Owned Site

Offices, Locker Rooms, Etc.	4,180 s.f. @ \$150/s.f.	\$627,000
Welding Repair Areas, etc.	21,720 s.f. @ \$110/s.f.	\$2,389,200
Heated vehicle storage	53,800 s.f. @ \$100/s.f.	\$5,380,000
Cold Storage	20,500 s.f. @ \$45/s.f.	\$922,500
Site work allowance		\$300,000
Fuel system and scale		\$180,000
Salt Shed (5,000 Ton)		\$470,000
Subtotal Estimated Construction		\$10,088,700

A/E Fees, Bonding Costs, Attorney Fees, Reprographics, Contingencies, and Permits	\$1,513,305
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Total Estimated Project Costs	\$11,602,000
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An allowance of \$300,000 for site work was added to the costs in Options 3 & 4 listed above. The actual cost may vary depending on location, utility access, soil conditions, and amount of grading and paving completed.

The primary difference between Options 3 and 4 is that Option 4 contains slightly less area designated to occupant and vehicular circulation.

6.0 Timelines

Options 1 & 2

Design: 9 to 11 months (depending on frequency of design meetings (how often the Board/Committee wants to meet), chain of command (who approves what in the design), and verification of field/site conditions.

Construction: approximately 12 to 15 months: due to contractor working in an "occupied" environment/site/facility and availability of what construction takes place during the winter season.

Options 3 & 4

Design: 8 to 9 months (how often the Board/Committee wants to meet) and chain of command (who approves what in the design).

Construction: 10 to 12 months: this depends mostly on time of year project is bid - enclosing the structure to allow for ongoing winter construction is best, as well as reducing the temporary heating costs associated with constructing a project over winter.

Timetables listed above may be affected by third party negotiations, county financial priorities, or some unforeseen circumstance.

7.0 Recommendations

Our recommendation is somewhat different than the offerings in the 2000 OMNI study. Those recommendations included pre-engineered metal building structures and single wythe masonry structures. Due to the high re-sale price of (recycled) steel (\$269+/-prepared ton) and oil costs (\$130+/-barrel), pre-engineered metal building systems cost nearly as much as a precast structure due to the high cost of recycled steel. And from a life/cycle, cost benefit approach, they tend to last only about 45% as long as precast structures. Both precast and metal building systems are considered “green”, or environmentally conscious.

SEH recommends that Jefferson County construct a new, approximate 80,000 to 85,000 square foot Highway Facility Option 4 on a 30 acre site. For the Facilities, SEH recommends that the project be constructed of precast concrete wall panels, which has a typical 80-year life-cycle. Besides being the most durable construction material, precast concrete is also the most flexible, allowing for year round construction. With proper planning it is even possible to stay ahead of some increased construction costs.

7.1 Summary of Positive and Negative Features for the Existing Facility:

Positive Features:

1. Facility has provided useful service life.

Negative Aspects:

1. The heating systems have reached and, in some cases, exceeded their useful life cycle
2. Most of the ventilating systems do not meet current building codes
3. The electrical system has reached capacity and in some areas actually generate large amounts of heat
4. Plumbing systems (water heaters, toilets, lavatories, faucets, etc.) that do not meet current building code
5. More expensive, and continued, maintenance has become an issue
6. The facility no longer provides functional, efficient service for maintaining the County’s fleet due to increase in size and complexity of equipment in the roster
7. Cramped heated vehicle storage areas (Most drive isles are blocked at night)
8. Cramped accessory work areas such as sign shops and work bays
9. None of the existing buildings are energy efficient, though some are more energy efficient than others
 - a The doors and windows are energy inefficient
 - b The masonry building wall systems have virtually no insulating value
 - c The original heated metal building contains virtually no insulation, and the insulation that is present in the building is probably wet and therefore actually wicks heat from the building to the exterior air
 - d There is no opportunity to take advantage of natural light – this increases the need and reliance on the need for artificial lighting and increased electricity costs

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10. The buildings have varying degrees of architectural building code violations, including compliance with ADA (American with Disabilities Act) issues. These include:
 - a Doors into rooms that are too narrow
 - b Toilets (and toilet compartments), lavatories, and showers that are inaccessible
 - c Upper floors that are not accessible via elevator
 - d Upper floors that are not served by code compliant stairs
 11. Roofs that leak
 12. Current site that is occupying developable land
 13. Current physical facility that is situated in an area not conducive to “industrial type” use
 14. Current access from site is cumbersome and could be improved
 15. Scale has failed, new system is needed
 16. Fuel system is failing, no automation for security and control
 17. No proper facilities on site for break areas and employee training.
 18. Multiple buildings and building additions built over 70 years do not work together and are very inefficient compared to modern facilities.
 19. No facility for washing vehicles
 20. Fire alarm system is failing and causing multiple false alarms

7.2 Summary of Positive and Negative Features for a New Facility:

Positive Features:

1. Opportunity to correct all current code deficiencies via new construction
2. Omit all contractor contingencies and redundancies associated with renovating and remodeling an existing facility
3. Omit inefficiencies, inconveniences, and interference with contractor in highway department operations during construction period
4. Development of a more efficient and safe highway department operation as facility is designed for current sized equipment
5. Design a more open, flexible facility with clear span joist systems
6. Virtually eliminate any long-term building envelope maintenance costs
7. Mitigate County and employee risk exposure
8. Develop a facility on a more appropriate (non-residential) site, away from sensitive natural areas such as the Rock River
9. Regain control of benefit/cost issues per square foot of facility in O&M costs
10. Ability to better plan for future technologies such as solar power, etc.

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11. Develop on a more secure site
 12. Opportunity to develop on a site that may be shared with other County Departments creating secondary efficiencies
 13. Develop on a new site that allows for easier, better, and quicker access to plow / work routes

Negative Aspects:

1. New site has yet to be determined
2. Higher construction cost than remodeling options at the current site within the City of Jefferson

Similarly, single wythe CMU (concrete block) would NOT be a recommended wall system, due to concrete masonry being extremely porous and resultant high maintenance cost. Other building materials such as wood are not acceptable building materials because of its fire rating and structural limitations. Its long term durability for such a facility is extremely poor. This kind of wall is extremely hard to insulate, and often an exterior insulation finish system (EIFS) is put over the face as an insulation method. If a wall of this type was not covered with EIFS, the amount of wall exposure for such a notoriously porous building product, would commit the County to long term maintenance cost.