

Cost Estimate Validation

Final – revised 02

**Nicholas County
Board of Education
Nicholas County, WV**

Report prepared for
FEMA REGION III

Report prepared by

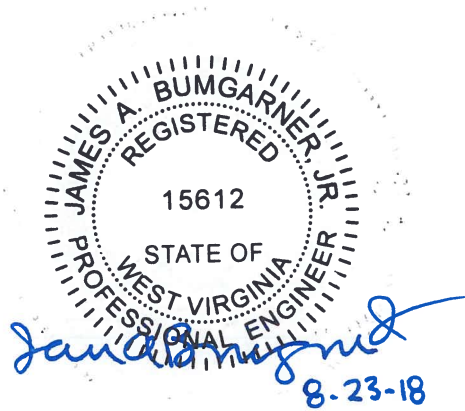


August 23, 2018

COST ESTIMATE VALIDATION REPORT

NICHOLAS COUNTY BOARD OF EDUCATION
NICHOLAS COUNTY, WEST VIRGINIA

PREPARED FOR FEMA REGION III



Prepared by:

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1. Executive Summary

At the request of the Federal Emergency Management Agency – Region III (FEMA Region III) Mead & Hunt, Inc. (Mead & Hunt) has prepared a cost estimate validation for the additional costs for the Nicholas County Board of Education (NCBOE). Nicholas County, West Virginia. The objective of the cost estimate validation study is to evaluate the costs associated with the additional scope of work to be included in the FEMA 428 Agreement with NCBOE. The aim of this report is to review and verify the reasonableness of the current cost estimate, given the West Virginia construction environment. The review needs to consider market place, land acquisitions, flood mitigation measures, and compliance with codes and standards.

This report presents a review of the costs for:

- Codes and standards to meet floodplain ordinance
- Career Technical Center Facilities
- 406 Mitigation measures for Summersville Middle School.

All categories of costs in the project estimate were reviewed by team members with specific expertise in specific disciplines. Based on the details of each project element, Mead & Hunt assessed if the estimated costs adequately reflected the current scope and market conditions. At the end of this component review, Mead & Hunt arrived at recommended adjustments to the current estimate.

The Total Costs for Additions of \$36,243,136 is low by \$5,667 million based on Mead & Hunt's team review.

2. Introduction

FEMA Region III contracted with Mead & Hunt to complete a cost analysis review of additional scope of work developed beyond the base cost estimate for the construction of three additional components for the replacement of the schools damaged in the flood of 2016. The project site is at the Summersville Middle School in Summersville, Nicholas County, West Virginia. The site is located along the bank of Brushy Fork Creek.

The estimate review is necessary to ensure that the base cost estimate is an accurate reflection of the project's scope and site conditions and that the assumptions and basis are appropriate.

A. Evaluation Team Members

The names of the members who are part of Mead & Hunt's evaluation team appear below along with their areas of expertise. The intent of the team was to have individuals with a strong background in this type of work and expertise in specific disciplines of the project.

James Bumgarner, PE	Flood Mitigation, Engineer of Record
Karen Wieneri	Project Manager, Civil Site, Flood Mitigation
Bernie Krusel	Architecture, Structure

Joe Rutledge	Plumbing, Fire Protection
Brian DeBaker	Mechanical
Mark Mladenoff	Electrical
Mark Stifter	Technology
Laurie Whitney	Technical Lead and Architecture

B. Information Received

- Report, “Additional Cost Considerations for the Nicholas County Board of Education”, August 2, 2018.
- Worksheet, “NCBOE Replacement Schools Estimate Comparisons (Amended 8/10/18)”
- Worksheet, “Nicholas County Comprehensive High School, Summerville, West Virginia, High Level Conceptual Budget, 10August 2018, Skanska
- “Conceptual CTE Floor Plan”
- Worksheet, “CTE Program Construction Description:
- Email from Steven Ward dated August 20, 2018. Additional CTE information.

3. Cost Estimate Assumptions

- The estimate is in present day July 2018 dollars.
- Escalation has been calculated to mid-point of construction. The project timeline used includes 24 months for design, permits, bidding and contract award. The construction phase of the project includes an additional 24 months. If the design were to begin in earnest within the next month, the assumed project completion would be July 2022 which Mead & Hunt used for validation of the cost estimate.
 - Escalation has been calculated to mid-point of construction which is assumed to be August 2021.
- All work to be performed first shift with no provisions for scheduled overtime.
- No restricted access to work zones.
- Construction work to be performed on a continuous bases with no stoppages.
- Existing utility connections are near the project site and capped from the middle school’s demolition Mead & Hunt assumes all services to the project site are in good repair and adequately sized for the proposed Career Technology Center (CTE) adjoining Safe Rooms and site improvements. Assumed utilities include but not limited to the following:
 - Domestic water service for the proposed CTE’s wet-pipe fire protection system, plumbing system, and classroom/shop needs
 - Natural gas service for the for the proposed CTE’s heating system and classroom/shop needs
 - Sanitary waste piping for the proposed CTE with connection to the municipal sewer system that has enough slope without need for pumps or lifts
 - Electrical service for the proposed CTE, site lighting, parking lot lighting, street lighting
 - Technology and fiber service for the proposed CTE that meet current/future technology requirements

- General Contractor Mark-ups included in the estimate shall be based on schematic level values of 10 percent overhead and 10 percent profit.
- Mead & Hunt will not develop an independent cost estimate. The team will note which values provided to Mead & Hunt from FEMA appear too low or too high including recommended values with explanation in the validation report. The team will note items that appear to be missing with recommended values and items that appear to have been provided in more than one area of the cost estimate.

NAVFAC Building Cost Index (BCI)

The escalation factor computed from the NAVAC Cost Index, 23May 2018, (attachment) is:

Escalation from date:	August 2018	5636
Escalation to midpoint in construction date:	August 2021	5979
Escalation Factor = 1.609		

4. Methodology

Mead & Hunt initially reviewed the project cost estimate at a summary level and developed a list of items that required further clarifications during the review of the more detailed breakdown of the current cost estimate. Mead & Hunt reviewed the various project components in more detail. All categories of costs in the project estimate were reviewed. Based on the details of each project element, Mead & Hunt assessed if the estimated costs adequately reflected the current scope and market conditions. At the end of this component review, Mead & Hunt arrived at recommended adjustments to the current estimate.

5. Work Item Cost Analysis

The summary of the total costs associated with the Project as identified by ZMM Architects & Engineers:

Project	Total Cost
Codes and Standards to Meet Floodplain Ordinance	\$4,772,089
Cost of Career Technical Center Facilities	\$26,981,289
406 Mitigation Measures for Summersville Middle	\$4,489,758
Total Project	\$36,243,136

6. Codes and Standards to meet floodplain ordinance

Mead & Hunt has reviewed Table 1 – Codes and Standards – Floodplain Management and assumed that the cost is based on raising 370,729 SQ FT of building 4.0 feet so the final building footprint will be two feet above the base flood elevation. This would require 54,900 cubic feet (compacted volume) of structural fill. Using the unit price for “Soil borrow, compact in place” found in Table 6 – Safe Rooms of \$41.00 per cubic yard, the Earthwork cost found in Table 1, Part A Base Construction Cost should be:

= 54,900 cubic yard X \$41.00

= \$2,250,900 - \$2,130,833
= \$120,000 additional base construction cost

Also, the cost estimate included an item for Cost Escalation Factor of 0.291% per month for 24 months. If using the assumed Escalation Factor of 1.0609, Table 1 Part E would decrease from \$3,770,723 to \$3,739,213. With the addition of the \$120,000 additional base construction cost and the decrease in the escalation factor the total cost for codes and standards would be \$4,613,625 or an increase of \$159,788.

A. Career Technical Center Facilities

The SKANSKA Conceptual Budget was reviewed for the Career Technical Center Facilities.

Architectural/Structural

The building's core and shell in SKANSKA's estimate includes the following sections; (1) Structure, (2) Exterior Wall, (3) Roofing, Waterproofing, Fireproofing, (4) Partitions/Doors/Stairs, (5) Interior Finishes/Specialties, (6) Equipment, and (7) Furnishings. The subtotal for these combined sections is \$257.31/square foot or \$13.26 million. This estimate is for direct work cost as noted in SKANSKA's summary are reasonable for conceptual design of a vocational education center in this region.

Equipment

Allowances for equipment to be used in the labs and shop areas are included in the estimate. The allowances are reasonable for the size of room areas provided in the scope of work.

Site Improvements

After review of the site improvements it is determined that the construction cost subtotal estimate for the site improvements for this type of facility are reasonable for conceptual design.

Fire Protection

After review of the building plans it is determined that the estimate for the fire protection sprinklers for this type of facility are reasonable for conceptual design.

Plumbing

After review of the building plans it is determined that the estimate for the plumbing portion of work for this type of facility are reasonable for conceptual design.

Mechanical

Upon review of the project scope documents, it has been determined that the project construction cost estimate for the mechanical portion of the work for this type of facility is in line with industry standards. As the project is early in the design phase and little information is available on the size or type of the proposed HVAC system, the mechanical cost of the project can vary greatly.

Electrical

Upon review of the project scope documents, it has been determined that the project construction cost estimate for the Electrical portion of the work for this type of facility are reasonable for conceptual design.

Technology

Upon review of the project scope documents, it has been determined that the project construction cost estimate for the TELE/Data/AV/Security portion of the work for this type of facility are missing costs and definitions for the various systems typically encountered for today's vocational middle school i.e. Distributed antenna systems (DAS) including EMERGENCY RESPONDER RADIO COVERAGE to comply with IFC 510), Cellular frequencies, Wi-Fi frequencies, On-site Emergency broadcast system, wired network(s) including LAN, WAN, or SAN, Wireless voice or data systems, Active learning and A/V systems, Telecommunications carrier services (POTS, DSL, T1, fiber-optic based services, CATV, DSS), including coordination of services\, Network architecture and active network electronics (routers, switches, servers, desktop PCs and laptops, etc.) and Sound masking systems. Therefore, TELE/Data/AV/Security portion of project may be low.

CTE Codes and Standards – State Board of Education

The CTE will incur additional indirect costs that need to be included in the total cost for the facility. At conceptual design these costs are commonly determined as percentages of the construction cost. The working estimated cost of the facility is \$26,981,690. The project includes an additional escalation cost of 3% per annum for 2 months which increases the estimate by \$1,009,166.15. Adding these 2 numbers together provides a working cost estimate of \$17,580,038.94. The working cost estimate was used to determine the additional indirect costs as provided in the following table which includes Mead & Hunt review comments.

CTE Project Costs	Total Cost	Mead & Hunt Review
Contractor's Working Cost Estimate	\$21,541,690	
Escalation cost of 3.5%/annum for 2 years	\$1,311,888	
Plan Review and Permit Fees	\$105,480.23	
Reserve for Change Orders (3%)	\$685,607.37	+ \$457,071 ¹
Project Management Design Phase (1%)	\$228,535.79	
A/E Design Contract (7.6%)	\$1,736,872.00	
Basic Construction Inspection Services (3%)	\$685,607.37	
Project Management Construction Phase (3%)	\$685,607.37	
Original CTE Project Cost	\$26,296,366.37	
Design Contingency (15%)		+ \$3,944,455 ²
Validation Revision		+ \$4,401,526
Revised CTE Project Cost with Validation	\$30,697,892	

Mead & Hunt Review:

- ¹ Change Orders: A project with complete and coordinated construction documents and well-organized contractors typically have change orders at 5% or a little more on an average. The 3% allowance provided is low and a minimum of an additional 2% (\$) needs to be added (\$457,071).
- ² Design Contingency: At the conceptual design phase of a project there are many unknown variables in the project design. With each design phase the design contingency is reduced. For projects similar to the CTE a conceptual design contingency of at least 15% (3,516,008) is an industry standard for establishing a maximum project cost.

The soft costs for the CTE need to be increased from \$3,285,638.97 to \$7,153,246.97.

B. 406 Mitigation Measures for Summersville Middle

The summary of the total costs associated with the 406 Mitigation Measures efforts:

406 Mitigation Measure	Total Cost
Access Road Elevation	\$2,337,425
Bank Stabilization of Brushy Fork Creek	\$485,838
Stream Gauges and Monitors	\$50,868
Safe Rooms	\$1,343,204
<i>Project</i>	<i>\$4,217,335</i>
Escalation	\$272,423
Total Project	\$4,489,758

(1) Access Road Elevation

The total cost for the Access Road Elevation listed in Table 3 – Access Road Elevation is \$2,337,425.

The cost estimate does not appear to include unit prices for clearing and grubbing, existing road removal, storm sewer piping, street and parking lot lighting, existing private utility relocation, pavement marking and landscaping. To account for these Mead & Hunt estimates an additional \$27.00 per square yard in addition to the \$92.45 per square yard should be included in the Part A cost estimate, or:

$$= 12,450 \text{ SY} \times \$27.00/\text{SY}$$

$$= \$336,150 \text{ additional base construction cost}$$

Also, the cost estimate included an item for Cost Escalation Factor of 0.291% per month for 12 months. If using the assumed Escalation Factor of 1.0609, Table 1 Part E would increase from \$66,732 to \$116,380. With the addition of the \$336,150 additional base construction cost and the increase in the cost escalation factor the total cost for access road would be \$3,077,684 or an increase of \$740,259.

(2) Bank Stabilization

The Bank Stabilization of Brushy Fork Creek total cost listed in Table 4 – Bank Stabilization of Brushy Fork Creek is \$458,838.

The estimate for the mitigation measure does not appear to include unit prices for excavation for flood benches along the stream, storm sewer piping, erosion control, live willow stakes for the LPSTP, and site restoration. Therefore, for this portion of the project the bank stabilization construction cost is low by \$167,500. Also, the cost estimate included an item for Cost Escalation Factor of 0.291% per month for 12 months. If using the assumed Escalation Factor of 1.0609, Table 1 Part E would increase from \$13,032 to \$22,727. With the addition of the \$167,500 additional base construction cost and the increase in the cost escalation factor the total cost for bank stabilization would be \$812,038. Therefore, the total for bank stabilization would increase by \$353,200.

(3) Stream Gauges and Monitors

The Stream Gauges and Monitors total cost listed in Table 5 – Stream Gauges and Monitors is \$50,868. The cost estimate included an item for Cost Escalation Factor of 0.291% per month for 24 months. If using the assumed Escalation Factor of 1.0609, Table 5 Part E would decrease from \$2,715 to \$2,368. With the decrease in the cost escalation factor the total cost for stream gauges and monitors would be \$50,457 or a decrease of \$411.

(4) Emergency Safe Rooms

The total cost for Emergency Safe Rooms listed in Table 6 – Safe Rooms is \$1,343,204.

Site Improvements

If the soil borrow, compact in place total cost is \$37,000 the unit price for 600 CY would be \$61.67/ CY. If the unit price is to be \$41.00 then the soil borrow would be \$24,600. There is a discrepancy of \$12,400.

Architectural/Structural

The core and shell line item cost estimates were provided in Table 6 – Safe Rooms. The following items were extracted for review of the architectural and structural work.

Safe Rooms (Core and Shell Costs Only)	Total Cost
Reinforced Concrete Floor	\$84,166
Reinforced Concrete Roof	\$91,200
Foundation	\$7,800
Concrete support columns	\$31,000
Access Ramps	\$18,500
Reinforced concrete masonry infill walls	\$80,200

Safe Rooms (Core and Shell Costs Only)	Total Cost
Bullet Resistant doors	\$45,000
Acoustical Ceiling	\$14,150
Floor Finishes	\$19,300
Wall finish (paint)	\$6,840
Fire Escape Ladder	\$11,000
Roof hatch	\$2,000
Misc. (lockers, cabinets)	\$31,000
Attached Bathrooms	\$90,000
Total Project	\$532,156

The scope of work requires the construction of 3 separate safe rooms at 1,600/net square feet (nsf) each for a combined 5,000/gross square feet (gsf). The total bare construction cost of \$532,156 equates to square foot estimate of \$106/sf. This value is for the core and shell construction only of all 3 safe rooms.

- Cost estimates for site work including fill below the elevated floor slabs, fire protection, plumbing, mechanical, electrical, and technology are listed separately in Table 6.

The estimate provided for the direct work cost as noted in Table 6 and broken out above for core and shell construction only is reasonable for the 3 separate safe rooms that are to be concrete vault type construction.

Fire Protection

After review of the description of the safe rooms it is determined that the estimate for the fire protection sprinklers for this type of facility are in line with industry standards.

Plumbing

After review of the description of the safe rooms it is determined the overall number for the safe rooms is adequate. However, in reviewing the breakdown of the overall estimate, it appears the dollars allotted for plumbing are not in line with the overall number. The plumbing line item indicates (3) water closets. The estimate for plumbing should include a lavatory at each water closet, (1) drinking fountain at each safe room, and (2) water closet at each safe room as well as a reasonable determined length for utility rough-in.

Mechanical

Upon review of the project scope documents, it has been determined that the project construction cost estimate for the mechanical portion of the work for this type of facility may be inadequate for these spaces based on the total number of occupants for each room to provide appropriate ventilation and cooling capacity. As the project is early in the design phase and little information is available on the size or type of the proposed HVAC system, the mechanical cost of the project can vary greatly.

Electrical

Upon review of the project scope documents, it is determined that the estimate for the Electrical portion of work for this type of facility are in line with industry standards at this conceptual portion of design.

Technology

Upon review of the project scope documents, it is determined that the estimate for the Technology portion of work for this type of facility are in line with industry standards at this conceptual portion of design.

7. Conclusion

The combined assessment of the Mead & Hunt Team added approximately \$1,933,080 to the project cost estimate, increasing it from \$30,127,524 to \$32,060,604, which is an increase of approximately 6%.

Summary of Costs

Project	Project Estimate	Review Results
Codes and Standards to Meet Floodplain Ordinance	\$4,772,089	+ \$159,788
Cost of Career Technical Center Facilities	\$26,981,289	+ \$4,401,526
406 Mitigation Measures for Summersville Middle	\$4,489,758	
<i>Access Road Elevation</i>		+ \$740,259
<i>Bank Stabilization</i>		+ \$353,200
<i>Stream Gauges and Monitors</i>		- (\$411)
<i>Emergency Safe Rooms</i>		+ \$12,400
CTE		
Total Project	\$36,243,136	+ \$5,666,762

The above table demonstrates that the Mead & Hunt team considered an additional \$5.667 million should be added to the project estimate. The additional amount is made up of base costs for items not included in the original project estimate.

The findings of the review are summarized as follows:

- It was confirmed that the project estimate is consistent with the current stage of project development.
- Some specific items were not accounted for in the base estimate
- Estimate did not account for inflation to the project's estimated mid-point of expenditure