OLO REPORT 97-2 **FEBRUARY 25, 1997**

BUDGET INQUIRY INTO SCHOOL CONSTRUCTION COSTS

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EXECUTIVE SUMMARY

Montgomery County Public Schools' square foot construction costs increased 40 percent between 1991 and 1996. The Office of Legislative Oversight (OLO) found that these increases result from market conditions, new construction and regulatory standards, and changed educational requirements. While direct comparisons are difficult, MCPS' construction cost increases are generally in line with those of other school systems in the area.

The school construction industry's recovery from the recession in the early 1990's led to a market situation where there are fewer contractors bidding on a greater number of projects. More recently, higher prices for certain materials and labor also reflect competing demands from other large construction projects in the region. In addition, changing construction standards and educational requirements during the past five years have contributed to increased square foot costs of school construction.

Between July and December 1996, the Board of Education requested the Council approve emergency appropriations totaling $12.6 million related to the new construction of three high schools and one middle school. The Board's emergency funding requests were based on construction bids that ranged from 14-30 percent above approved funding levels.

OLO found that the gap between approved funding and actual construction costs for recent school projects results from deficiencies in the budget process. Perhaps most importantly, the current process lacks a clear decision point early enough in the design and approval process that requires the reconciliation of project cost, scope, and timing with budget affordability. In addition, the current process fails to differentiate between cost estimates with large vs. small margins of error, lacks a consistent method for adjusting prices due to market conditions, and may reflect the mistaken view that low budgets will decrease construction bids. The process also reflects pressures to maintain lower budget amounts to accommodate more projects.

OLO offers a series of recommendations to reduce or eliminate the gap between budgeted amounts and contract awards and identifies some opportunities to reduce the cost of future school construction.

To improve the budget process, OLO recommends that the County Council, Board of Education and County Executive work together to:

- Strengthen the process of estimating school construction costs;
- Develop and use a school construction cost escalator instead of a general inflation adjustment to project future costs of school construction; and
- Adopt a consistent decision point early enough in the process (after facility planning but before design) that allows the Council, in consultation with the Board and Executive, to reconcile the cost and timing of projects with budget affordability.

To reduce the future costs of school construction, OLO recommends the Council ask the Board to:

- Include a fiscal and comparative analysis in MCPS' upcoming review of the educational specifications;
- Explore the use of alternate construction delivery methods to contain project costs and reduce project delivery time; and
- Maximize the use of value analysis throughout the design and construction process, to include the use of financial incentives.

I. INTRODUCTION

A. AUTHORITY

Council Resolution No. 13-747, Amendment to the Office of Legislative Oversight FY 1997 Work Program, adopted December 19, 1996.

B. BACKGROUND AND PROJECT SCOPE

Between July and December 1996, the Board of Education (Board) requested that the Council approve emergency appropriations totaling $12.6 million related to the new construction of three high schools and one middle school. The Board's emergency appropriation requests were based on contractor responses to MCPS' request for construction bids that ranged from 14-30 percent above approved funding levels.

The Council's request to the Office of Legislative Oversight (OLO) was to conduct a budget inquiry for the purpose of providing greater understanding of the construction cost increases currently being experienced by the Montgomery County Public Schools' new construction and modernization projects. Specifically the scope of the project was to:

- track and analyze the history of construction costs in the MCPS capital budget for a sample of school projects currently underway;
- review MCPS' process of procuring school construction and explore the feasibility and advantages of alternative approaches;
- gather data on relevant experience of comparable school systems; and
- summarize findings.

C. METHODOLOGY

This project was conducted by Karen Orlansky, Director of the Office of Legislative Oversight, with assistance from Joan Planell, Senior Legislative Analyst for the County Council, and Jennifer Kimball and Tim Ammon, OLO Research Assistants.

The inquiry included a review of Council packets, budget documents and related memorandum prepared by Council, Executive, and Montgomery County Public Schools (MCPS) staff. General construction market data were obtained from industry publications and Internet searches.

Written information was supplemented through interviews with public and private sector individuals, many but not all of who have played a role in the planning, design, or construction of County schools or other County-funded projects. Private sector representatives interviewed included architects, engineers, general contractors, construction managers, project managers, attorneys, and construction cost consultants.

Public sector staff interviewed included representatives from MCPS' Departments of Facilities Management, Division of Construction, Department of Facilities Planning and Capital Programming, Department of Management Budget and Planning, and Department of Educational Accountability; and the County Government's Office of Management and Budget, Office of Procurement, Department of Finance, Department of Permitting Services, and Department of Public Works and Transportation. Representatives from the Washington Suburban Sanitary Commission (WSSC), Maryland-National Capital Park and Planning Commission (M-NCPPC), and Montgomery College were also consulted.

Also interviewed were representatives from the federal General Services Administration, the State Interagency Committee on School Construction (IAC) office, the Maryland Department of General Services, and staff from Fairfax County Public Schools, Howard County Public Schools, Baltimore County Public Schools, Frederick County Public schools, and Loudoun County.

D. ACKNOWLEDGMENTS

Throughout this inquiry, OLO received full cooperation from all parties. OLO extends special thanks to the many people who took time out of their demanding schedules to share their views and expertise. In particular, OLO wants to acknowledge Richard Hawes, MCPS' Director of Construction, and Joseph Lavorgna, MCPS Director of Educational Facilities Planning and Capital Programming, for their assistance with gathering data and understanding of our project deadlines.

E. ORGANIZATION OF REPORT

Chapter II provides an overview of the school construction design, procurement and budget process, and presents information on traditional vs. alternate methods of construction delivery methods.

Chapter III includes general information on the school construction market and specific information on the recent history of Montgomery County Public Schools' square foot construction costs.

Chapter IV includes data and analysis on the four new school construction and two school modernization projects selected as case studies for this OLO project.

Chapter V provides information about how MCPS' recent school construction cost experience compares with that of other school systems in the area.

Chapter VI presents OLO's findings and recommendations.

Definitions of the following terms used in the report are in Appendix B:

1. Capital Improvements Program (CIP)
2. Project Description Form (PDF)
3. Capital budget
4. Construction costs
5. Education specifications or "ed specs"
6. The Modernization Assessment Process
7. Value analysis/value engineering

Unless otherwise indicated, the use of "Board" in the report refers to the Montgomery County Board of Education.

II. OVERVIEW OF SCHOOL CONSTRUCTION DESIGN, PROCUREMENT AND BUDGET PROCESS

This chapter describes the key steps in the MCPS school construction design, procurement, and budget process. The process described begins after MCPS has identified the need to build or modernize a school. The final section in the chapter provides information on traditional vs. alternate construction delivery methods.

Part A: describes the key activities in each phase of school construction design and procurement. It identifies the points in the process when project cost estimates are typically obtained. The process outlined is for the traditional delivery method known as "Design-Bid-Build," which MCPS uses for almost all school construction in the County.

Part B: provides an overview of the annual planning and budget calendar for school construction. It identifies the timing, activities, and products associated with the annual cycle of preparation, review, and approval of the Capital Improvements Program (CIP) and capital budget. It sets forth the respective roles of the Superintendent of Schools, Board of Education, County Executive, and County Council.

Part C: provides additional information about the planning, design, and procurement process, including the organization of MCPS staff involved; the State role in school construction, and a description of how MCPS selects architects.

Part D: explains the traditional construction delivery method of Design-Bid-Build and offers an introduction to the alternate delivery methods of Construction Manager (Agency and At-Risk) and Design-Build.

A. THE FIVE PHASES OF SCHOOL DESIGN AND PROCUREMENT

Before FY 96, MCPS' design process started with the development of the educational specifications and schematic planning. The process was modified in FY 96, so that projects initiated since the FY 96-01 Capital Improvements Program (CIP) now begin with an earlier planning phase called "facility planning". **The six projects examined as case studies in this OLO report (see Chapter IV) were designed before MCPS projects formally went through a facility planning phase.**

MCPS obtains at least three independent construction cost estimates for a facility during the design process. The further along in the design process, the lower the margin of error between the cost estimate and what can be expected as the eventual project bids. This is logical because as the project proceeds through the design process, there are fewer and fewer unknown conditions and requirements. MCPS' cost estimates include relatively small contingency funds for each project: 2-3 percent for new construction projects and up to 5 percent for modernization projects.

The chart at Appendix C outlines MCPS' standard capital project schedule. It shows the general time needed for each the five phases described below. The time periods vary according to type of school, (elementary, middle, or high) and according to whether the project is new construction or modernization.

Phase 1. Facility Planning

As indicated above, MCPS initiated facility planning for projects beginning in the FY 96-01 CIP. The facility or pre-architectural planning phase begins one year before the fiscal year when MCPS plans to request architectural planning funds for the project. The key activities to accomplish during the facility planning phase are to:

- Develop guideline educational specifications;
- Select site (if new school);
- Select prototype design (if new elementary or middle with standard capacity);
- Identify special conditions or project constraints;
- Develop feasibility and preliminary project plan and cost report;
- Conduct conceptual reviews with the State and County regulatory agencies; and
- Develop initial CIP budget estimate

A facility advisory committee for the school is appointed. The committee includes a mix of MCPS staff and community representatives, and the State Interagency Committee on School Construction (IAC) is invited to send a representative. Staff from MCPS' Department of Educational Facilities Planning and Capital Programming work with the facility advisory committee to develop the guideline educational specifications (ed specs) for the school. The guideline ed specs set forth the expected number of classrooms, offices and core areas required, size of each space and relationships between spaces. (See the definitions in Appendix B for further explanation of educational specifications.)

An outside architect is hired to work with the facility advisory committee to develop a proposed preliminary plan for the project based on the guideline educational specifications. This architect may or may not be the project architect selected in the next phase.

For new elementary and middle schools that have a standard enrollment capacity, the committee is asked to select from one of MCPS' prototype (also known as repeat) school designs. MCPS does not use prototype designs for new high schools or modernizations. MCPS has four prototype designs for elementary schools and three prototype designs for middle schools. Since 1988, MCPS has built 13 out of 16 new elementary and middle schools based on prototype designs. As the design process moves along, the prototype designs are modified to meet the educational program needs of individual schools.

During facility planning, conceptual reviews of the project may be held about the project with the Montgomery County Department of Public Works and Transportation and the Department of Permitting Services, the State Highway Administration, the Maryland Department of the Environment, and the Maryland-National Capital Park and Planning Commission staff.

The preliminary plan includes an estimated construction cost, that then becomes the basis for the initial CIP budget request for the project. At the end of facility planning, according to building professionals, it is reasonable to expect that a construction cost estimate for the project should have a margin of error of plus or minus 10-15 percent for new construction projects. The expected margin of error is somewhat higher for modernizations.

This means that at the end of facility planning, the construction cost estimate could be 10 -15 percent higher or lower than the eventual low contract bid for the project. Sometimes, cost estimates generated at this point in the process contain what is known as a 10-15 percent "design contingency" to cover this margin of error.

Phase 2. Final Educational Specifications and Schematic Design

As indicated above, for new construction and modernization projects started before FY 96, this phase was the first formal step in the design process.

During this phase, the Department of Educational Facilities Planning and Capital Programming works with the facility advisory committee to finalize the educational specifications (ed specs) for the project. According to MCPS staff, when finalizing ed specs, the goal is to maintain equity across schools while recognizing the special needs of individual educational programs at specific schools.

Once the ed specs are done, the project architect is selected to work with the facilities advisory committee to develop preliminary architectural plans for the facility. The first phase of architectural planning is known as schematic design. This phase establishes the floor plan of the building, including size and location of rooms, halls, doorways, and size improvements. As mentioned above, with new construction of elementary and middle schools, the architect works from one of MCPS' prototype designs.

The schematic plans are submitted to the Board of Education for approval. After the schematic plans are approved, additional discussions take place about the project with the County and State regulatory agencies. The schematic plans are also submitted to the State Interagency Committee on School Construction for review and approval for projects eligible for state funding.

At the end of the schematic design phase, the facility is typically considered to be 15 percent of the way through the architectural design process. An independent cost estimate is developed based on the schematic plans and preliminary discussions with the regulatory agencies. It is generally accepted by building professionals that the construction cost estimate at the end of schematic should have a margin of error of plus or minus 10 percent for new construction projects and 15 percent for modernizations.

If the cost estimate is higher than the earlier estimate, a request for a budget adjustment is submitted as a part of the next budget review. (This process is being revised as a result of the decision to have a biennial Capital Improvements Program.) In sum, the key activities to accomplish during this phase are to:

- Finalize the educational specifications;
- Select the project architect;
- Develop the preliminary architectural plans or schematics;
- Meet with State and County regulatory agencies;
- Update project cost estimate and request a budget adjustment in next CIP review, if necessary; and
- Submit plans to the State Interagency Committee on School Construction (IAC) for review and approval.

Phase 3: Design Development

During design development, the architect selects the major building systems (structural, mechanical, and electrical) to be used for the final drawings and specifications that will be used to bid and construct the facility. Typically, MCPS hires an outside consultant or assigns in-house staff to conduct a value analysis study to ensure that the use of materials and equipment are optimized from a cost perspective. (See definition of value analysis in Appendix B for further explanation.)

During design development, the project architect and MCPS staff begin to develop and analyze a preliminary list of equipment or materials to bid as "alternates." During the late 1980's, the County Council adopted a policy that required MCPS to identify items worth 10 percent of each school construction project that can be separated from a base bid and bid as add-alternates. The objective of this policy was to provide some flexibility in the contract process. The idea was to identify some "optional" or "extra" items, which could then be eliminated if bids come in above an approved budget amount. For each item identified as a bid alternate, the contractors are asked to submit fixed price bids separate from the base construction bid for the project.

As part of design development, the project formally moves through the mandatory referral process, which is review of the project by Planning Commission staff and the Planning Board. The architect and MCPS staff also meet with code and regulatory officials to determine specific project code requirements. Internal to MCPS, review comments are coordinated from curriculum staff concerning the layout and equipment plans for the school. The design development documents are also sent to the State IAC for review and comment.

At the end of the design development phase, the design documents are approximately 30 percent completed and MCPS obtains an updated independent cost estimate. It is generally accepted by building industry professionals that the construction cost estimate produced at the end of design development should have a margin of error of plus or minus 5-10 percent. This applies to both new construction and modernization projects.

In sum, the key activities to accomplish during design development are to:

- Monitor the architect's work to ensure that the project design complies with the program requirements and MCPS building standards;
- Develop and analyze a preliminary list of alternates;
- Meet with regulatory and code officials;
- Finalize value engineering studies;
- Produce updated cost estimate;
- Coordinate review comments from MCPS curriculum staff concerning the plan layout and equipment plans for the facility; and
- Submit design development documents to State IAC for review and comment.

Phase 4: Preparation of Construction Documents

The construction documents phase is the last step in the preparation of bid documents. During this time, the architect completes the detailed drawings and specifications for the facility. An outside consultant and/or MCPS staff continues to monitor the architect's work to ensure the facility design is properly coordinated and complies with MCPS building standards.

Value analysis (either by in-house staff or by consultants) continues throughout this phase and building permits are applied for. In addition, an outside consultant or in-house staff conducts what is known as a constructibility review to ensure that the detailed drawings are properly coordinated for bidding. The State IAC also reviews the final drawings for eligibility of state funding and bid approval.

At the end of this phase, an updated construction cost estimate is produced to reflect the final bid documents. This estimate is referred to as the "probable cost of construction." It is generally accepted by building professionals that the construction cost estimate at this point should be within a margin of error of plus or minus 1-3 percent. This applies to both new construction and modernization projects.

The key activities to accomplish during the construction documents phase are to:

- Review bid documents to ensure they are completed properly and comply with MCPS building standards;
- Apply for building permits;
- Coordinate final drawing review comments from MCPS staff concerning the architectural, structural, mechanical, and electrical systems and equipment;
- Ensure architect completes bid documents in accordance with the project's bidding schedule;
- Submit final construction documents to State IAC;
- Complete constructability review; and
- Update cost estimate to reflect final bid documents.

Phase 5: Bidding and Contract Award

When the construction documents are completed, MCPS advertises for competitive lump sum bids to construct the facility. MCPS advertises publicly in local newspapers and local trade publications. Consistent with industry practice, MCPS also deposits sets of plans with the trade organizations (e.g., F.W. Dodge, Association of Builders and Contractors) that make the plans available free of charge to potential contractors and subcontractors.

The bidding period is typically 3-4 weeks, although the time may be extended if MCPS staff has reason to believe there will be an insufficient number of bidders. Approximately one week after the construction documents are issued, MCPS holds a pre-bid meeting. As questions come up about the bid documents, MCPS prepares and distributes clarifying addenda to the potential bidders.

At the designated hour, the bids are received and posted publicly. Base bids are due 30 minutes before the bids on the project alternates. Usually within two weeks after the public bid opening, the Superintendent makes a recommendation to the Board for a contract award to the lowest responsive and responsible bidder for the base bid plus whatever alternates are recommended for selection.

For new construction projects, if the Superintendent recommends and Board approves awarding the contract for a bid that exceeds the appropriated amount for construction costs, the Board requests an emergency or supplemental appropriation from the County Council The contract is not awarded until the necessary funding appropriation is approved.

When a contract award is going to exceed an expected amount for a modernization project, the scenario is somewhat different due to how funds for modernizations are budgeted. Construction funds for modernizations in the later stages of design are approved for multiple projects in one aggregate Project Description Form (PDF), titled Current Modernizations/Renovations. As long as there are enough funds within this PDF to cover the contract award, the Board can approve it and the contract can be awarded. A supplemental request to fund construction costs in a modernization project will typically only occur if the project is ready for contract award near the end of the fiscal year and the remaining funds within the Current Modernizations PDF are insufficient.

The key activities in the bidding and contract award phase are:

- Public advertising;
- Pre-bid meeting and issuance of addenda to clarify or modify the contract documents;
- Public opening and review of bids;
- Contract award to the lowest responsive and responsible bidder; and
- Request emergency or supplemental appropriation, if needed.

B. ANNUAL SCHOOL CONSTRUCTION PLANNING AND BUDGET CALENDAR

The annual process of preparing, reviewing, and approving MCPS' Capital Improvements Program (CIP) and capital budget is year round. For readers not familiar with the budgeting terminology:

- The **capital budget** is the amount of spending authority appropriated each year for specific projects.

- The **Capital Improvements Program** (CIP) outlines the six year expenditure plan for accomplishing all capital projects which involve County funding.

  Before voter approval of a Charter amendment last November, the Council approved a six-year CIP every year. With voter approval of a Charter amendment, the Council will review and approve a six-year CIP only in even numbered years. In odd numbered years, the Council will approve a capital budget for those projects already approved in the six-year CIP. In odd-numbered years, the Council will also review amendments to the current CIP that constitute a change in scope which could have an impact in the following year.

The following chart (Exhibit A) summarizes the annual capital planning and budgeting calendar. In even-numbered years, the calendar is for the development and approval of the biennial CIP. In odd-numbered years, the calendar is for the development and approval of amendments to the CIP.

EXHIBIT 1

ANNUAL CAPITAL PLANNING AND BUDGET CALENDAR FOR SCHOOL CONSTRUCTION

Month	Who	Activity	Product/Output
July - September	MCPS staff	Staff prepares CIP/capital budget beginning with next fiscal year	MCPS working papers
October	Board of Education/MCPS staff	MCPS staff presents Board with data on enrollment trends and facility planning issues	MCPS working papers
November 1	Superintendent	Superintendent publishes recommended CIP/capital budget	Superintendent's Recommended CIP/capital budget
November	Board of Education and community	Board holds public hearings on Superintendent's request	Board adopts a CIP/Capital Budget request.
December 1	Board of Education	Board submits CIP request to County Executive and Council	Board Requested CIP, (produced as amendments to Superintendent's recommended CIP)
December 7	Board of Education; County Executive; & County Council	Board submits request to State Interagency Committee of School Construction for reimbursement on capital budget	County's request to IAC written as joint letter from Board, Exec., and Council, accompanied by Council Resolution
January 15	County Executive	CE publishes recommended 6-year CIP or capital budget and amendments to the CIP	County Executive's Recommended CIP/Capital Budget
February	County Council and community	Council holds public hearings on CIP/capital budget request	Public testimony
February/March	County Council and Council staff	Council holds Committee and full Council worksessions on CE's CIP/capital budget request	Preliminary Council decisions on CIP/capital budget
May 30	County Council	Council takes final action on CIP/ capital budget	Approved CIP and capital budget
mid-June	Superintendent	Superintendent publishes summary of all CIP/budget actions to date affecting school facilities	Comprehensive Facilities Master Plan

C. ADDITIONAL INFORMATION

This section provides some additional information that relates to how MCPS County designs, procures, and budgets for school construction.

1. MCPS Staffing

Two offices within MCPS share the responsibilities for the planning, design, procurement, budgeting, and building of schools: the Department of Educational Facilities Planning and Capital Programming and the Department of Facilities Management, Division of Construction.

The Department of Educational Facilities Planning and Capital Programming reports to the Chief Financial Officer. The Department's major responsibilities for school construction are to:

- Identify the need for MCPS' capital facilities;
- Develop planning and budget documents including the CIP and Facilities Master Plan; and
- Work with community members and other MCPS staff to develop educational specifications for individual projects.

The Division of Construction is organizationally located in the Department of Facilities Management, which reports to the Associate Superintendent for Supporting Services. The Division of Construction's major responsibilities are to:

- Conduct facility planning, which includes the preparation of feasibility plans for individual capital projects;
- Manage the architectural design, procurement, bidding, and construction process, which includes the selection of professional consulting services needed throughout the process, e.g., architects, engineers, and construction management services; and
- Administer the contracts awarded to build the facilities.

2. List of Project Development Forms in the CIP Related to New Construction and School Modernization Projects

The requested and approved CIP documents consist of Project Description Forms (PDF), which provide the detailed description of the scope, funding source(s), appropriation level, and expenditure schedule for individual capital projects. The forms also include information on operating budget impact expected from the completed project. The CIP includes a number of different PDFs associated with the new construction and modernization of schools.

- Funds for MCPS' facility planning (new construction and modernization) activities are budgeted in a separate PDF titled Facility Planning.

- Each new construction project has its own individual PDF. Since MCPS began facility planning, a new construction project is presented as a separate PDF only after it completes the facility planning process.

- Funds for modernization and renovation projects are shown in two aggregate PDFs. The Current Modernization/Renovations PDF includes funds for modernization/renovation projects that have received funds for planning and design. Most projects funded in this PDF will move into the construction phase within the next several years. The Future Modernization/Renovations PDF includes funds for projects planned for beyond the next two years.

- The Rehabilitation/Renovation of Closed Schools (RROCS) PDF includes funds for school facility re-use projects.

3. How MCPS Selects Architects and the Architect's Responsibility to Re-Design

MCPS selects architects using procedures that are consistent with those outlined by the Maryland Board of Public Works. MCPS' procedures were most recently revised in 1986. MCPS' five-step process for selecting architectural/engineering services expected to exceed $25,000 is summarized below:

Public Notice: MCPS advertises its need for services in local newspapers and trade publications.

Application: Interested architectural and engineering firms submit information that describes their experience and qualifications. MCPS uses standard US Government forms 254 and 255 for this purpose.

Initial Selection: For a specific project, a selection committee composed of MCPS staff and community representatives evaluates the applications based on qualifications based criteria including:

- General competence
- Geographic location
- Past performance
- Indications of firm's understanding of the project
- Originality and quality of design of previous work
- Firm's financial responsibility

The committee members discuss the selection criteria and votes by secret ballot. The firm that receives the most votes becomes a candidate for appointment.

Negotiation: The Director of the Division of Construction attempts to negotiate a lump sum fee for delivery of all services for the project that the Director determines to be fair, competitive, and reasonable.. The basis for negotiation is a fee schedule developed by the Division of Construction. If a fair, competitive, and reasonable fee cannot be negotiation with the first-place firm, the Director can proceed to negotiate with the second-place firm.

Appointment: When a satisfactory agreement is negotiated, the proposed agreement is forwarded to the Superintendent and then the Board for approval. If the Board concurs with the Superintendent's recommendation, the Board authorizes a contract with the candidate firm.

The Board's contracts for architectural services, consistent with standard industry practice, commit the project architect to design a facility that, when competitively bid, will receive a bid that comes within a specified budgeted amount. This amount is expressed in current dollars at the time the architect is hired. If the lowest bid exceeds the budget as adjusted for inflation from the time the architect is hired, (and assuming the owner does not add additional program or design requirements along the way), then the architect is committed to re-designing the project, at no extra cost, so that the project can be re-bid to meet the budget.

4. State Role in MCPS School Construction

State law provides that Montgomery County can be reimbursed for up to 50 percent of "eligible" costs of school construction from the State. Every year, the Interagency Committee on School Construction recommends the allocation of dollars throughout the State. The final decisions are made by the Board of Public Works, which oversees all State-funded construction.

For projects to be eligible for State reimbursement, the County must adhere to the State laws, regulations, and procedures relevant to school construction. According to State law (Maryland Code, Education Article, Section 5-112), all contracts for school construction must be awarded to the lowest responsible bidder. In practice, this means that the State will not reimburse localities for professional services, such as architectural or construction management services, that are not selected solely on the basis of low bid. In addition, State law does not allow for more flexible award arrangements, such as competitive negotiation or negotiation with the lowest bidder.

Each year, the IAC determines the dollar amount per square foot that will be used to calculate State allocations to local school construction projects. The IAC sets one amount for new construction and another for modernizations. The IAC calculates this figure based on contracts awarded for construction throughout the State during the first six months of each year. The schools used in the calculation include whatever mix of elementary, middle, and high schools went to contract award during that period of time. There is no adjustment for project scope and no adjustment for regional market conditions throughout the state.

D. TRADITIONAL AND ALTERNATE DELIVERY METHODS FOR SCHOOL CONSTRUCTION

With few exceptions, MCPS builds and modernizes schools using the traditional delivery method known as "Design-Bid-Build". This section reviews the traditional model and briefly describes several alternate delivery methods.

In recent years, more educational and public agencies have turned to alternate structures with the hopes of reducing costs and/or project delivery time. The state, federal government, and even some area school systems are using alternate approaches in selected projects. For example, Howard County Public Schools relies almost exclusively on the Construction Manager-Agency method, and Baltimore County Public Schools is building 11 elementary school additions using the Design-Build method.

The alternate methods differ from the traditional method with respect to the contract structures, and responsibilities of the owner, the architect, the contractor, and in some cases, a construction manager. Exhibits 2-5 (beginning at page 19a) show the different relationships among the major participants in the construction delivery process.

The literature on traditional vs. alternate delivery methods consistently points out that there is no "best" method of project delivery for all public construction projects. However, advocates of the non-traditional methods argue that having alternatives to the traditional Design-Bid-Build model available provide an opportunity to produce cost savings. The major reasons cited for potentially reducing costs with alternate structures are the opportunities to:

- Reduce project completion time;
- Make greater use of financial incentives; and
- Create a team atmosphere among the owner, architect, and contractor.

1. The Traditional Approach: Design-Bid-Build

For many years, the traditional method of procurement for delivering public construction projects has been the Design-Bid-Build approach. The public sector has traditionally favored this method, because it insures a firm commitment from a general contractor under a competitive bid arrangement for the lowest cost. In the traditional model, the project architect (typically hired on contract) is given lead responsibility for planning and design. The architect is also often relied upon for his/her expertise in construction administration.

Exhibit 2 (page 19a) depicts the relationships between the owner (MCPS), architect, general contractor, and subcontractors in the traditional model; and Exhibit 6 (page 19c) shows the sequence of activities. In a traditional model, the three major activities occur sequentially:

- First, the facility is fully designed
- Then the construction of the facility is bid and awarded to a general contractor, and
- Then the facility is built.

The State law governing school construction (reviewed earlier in this chapter) encourages the traditional model by requiring that all contracts for school construction must be awarded to the lowest responsible bidder. In practice, this means that the State will not reimburse localities for services that are not selected solely on the basis of low bid.

In a traditional Design-Bid-Build model, the owner provides program guidelines that form the basis for the architect to design the facility (for schools, these are the educational specifications). The architect's responsibility is to prepare complete and accurate design and contract documents. The architect also serves as the owner's representative during construction to see that work is being performed consistent with contract documents. With MCPS projects, the architect works directly with the in-house project managers assigned by the Division of Construction to work on the design and construction of specific schools.

The General Contractor (GC) is responsible for the means and methods of construction, based on the scope of work defined in the contract documents developed by the architect. The GC's responsibilities include supervising and coordinating all services necessary for completion of the work, including the award, scheduling, and coordination of subcontractors.

The compensation method used by MCPS, like most other public entities, is called a "stipulated sum," which means the General Contractor provides a lump-sum bid for delivering the entire project. It is possible to use an alternative compensation method, such as a target price with an incentive, or a cost plus fee with a guaranteed maximum price (GMP).

Advocates of the traditional method argue that it is successful for the owner because it:

- Requires the scope of work to be clearly defined upfront;
- Limits the financial risk to the owner; and
- Lends itself to a straightforward procurement process of sealed bids with award to the lowest bidder.

The most often cited disadvantages to the traditional Design-Bid-Build method are that it:

- Lacks a team approach to protect the owner's interests;
- The selection method emphasizes the initial price at bid time, and not the quality or reliability of the GC firm; and
- The sequence of the traditional model also does not generally provide for involvement of the contracting community early on in the design of the project.

2. An Introduction to Alternative Methods

Over the years, changes in the construction industry have taken place that enable alternatives to the traditional Design-Bid-Build method. This section reviews three of the most often cited alternatives:

- Design-Build;
- Construction Manager - Agency; and
- Construction Manager - At Risk.

In most cases, an owner procures the services associated with these alternate methods using a qualifications based selection process and successful negotiations with the awarded firm. While there are significant differences among alternate structures, the reasons cited as potential advantages are often similar.

The most commonly cited advantage of alternate models is that they can reduce project delivery time because the activities are not necessarily sequential (See Exhibit 6 at page 19c) In addition, advocates of alternate models argue that they:

- Create a more efficient and flexible delivery team;
- Provide improved and more consistent management of the construction process;
- Provide accountability on both a performance and cost basis; and
- Reduce construction-related claims and litigation.

The Design-Build Method

The American Institutes of Architects describes the Design-Build delivery method as when " . . . responsibility for both design and construction is vested in a single entity....the owner writes one contract assigning 'single point' responsibility for the project."

In Design/Build, the owner begins by developing a detailed scope and criteria, or program, for the project. The owner then selects a contractor who is experienced with building the type of project desired. The contractor either uses his/her in-house design staff or subcontracts with an architect/engineer. Jointly, the contractor and architect/engineer produce a facility that balances the owner's functional and aesthetic needs, budget, and time requirements.

Exhibit 3 (page 19a) depicts the typical relationships in a Design/Build model. Different compensation methods can be used with Design/Build, although lump-sum fee and a cost plus fee with a guaranteed maximum price (GMP) are the most common.

Even the strongest advocates of Design/Build acknowledge it is not suitable for every project. However, the most consistently cited advantages from the owners point of view are that it:

- Reduces the extent of construction documentation;
- Reduces total project delivery time;
- Reduces the owner's financial risk; and
- Vests responsibility for the project in a single source.

The most often cited disadvantages to the owner of Design/Build are that the:

- Owner loses a design professional as an independent advisor; and
- Owner has less control over the project once the program requirements are handed over to the Design/Build firm.

Construction Manager - Agency and At-Risk

Construction Manager as a general approach is described as a team approach to the planning, design, and construction of a project in order to control time and cost for the project owner. The team members are the owner, the architect/engineer, and the Construction Manager (CM). In most situations, the CM is hired at about the same time as the architect. The CM's job is to serve as the owner's agent through all phases of the design and construction of the project.

In the CM-Agency model, the CM is paid a professional services fee that does not depend on the ultimate cost of the project. In what is called the CM-At Risk model, the CM provides the owner a Guaranteed Maximum Price (GMP) for the project and is accountable to the owner for completing the project within the amount agreed to.

Exhibits 4 and 5 (page 19b) depict the two CM methods. In both models, the role of the CM is the same; the major difference is the other contractual relationships. In a CM-Agency model, the owner holds the contracts with the prime contractor or multiple-prime contractors; and in the CM-At Risk model, the CM holds these contracts.

Advocates of CM argue that the team approach:

- Facilitates phased construction, which can reduce overall delivery time;
- Provides for early coordination and interaction with the architect to produce a buildable design before bidding;
- Allows construction planning to take place during pre-construction; and
- Provides for greater control of subcontractors.

The most often cited disadvantages of CM are that:

- There can be confusion of roles if the team concept is not fully accepted;
- The CM becomes a third party to the architect/engineer's relationship with the owner (which some design team members may not like); and
- It can increase the financial risk of the owner once construction begins;
- In the CM-Agency model, the owner must hold a greater number of contracts and there is time involved with coordinating and managing subcontractors.

In sum, the purpose of this section was to provide an introduction to alternate construction delivery methods and indicate the major differences between the alternate and traditional models. Substantial additional work is required to think through the pros, cons, and logistics required to make greater use of alternate approaches for school construction in Montgomery County.

Exhibit 2

TRADITIONAL METHOD: DESIGN-BID-BUILD

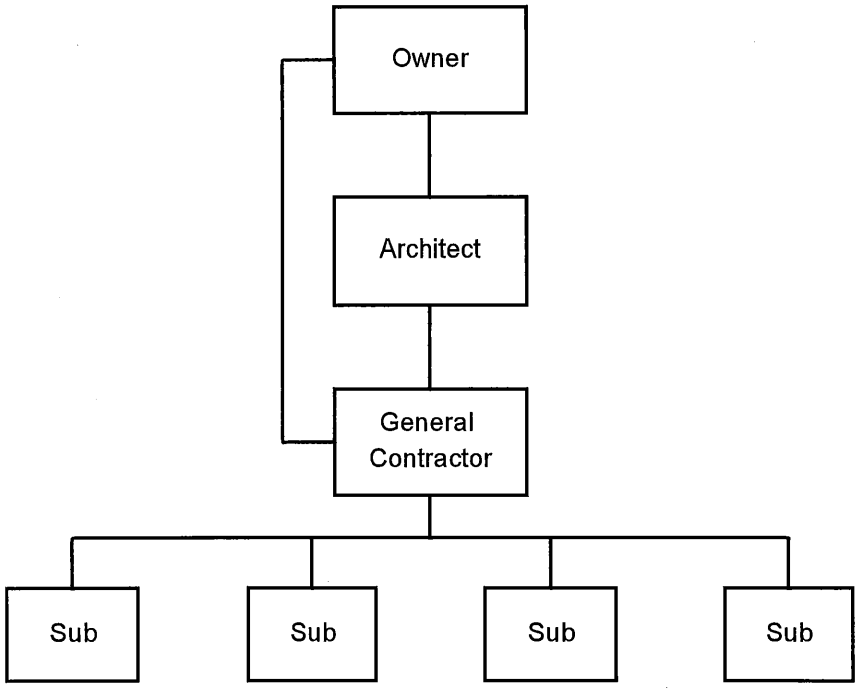


Exhibit 3

DESIGN/BUILD METHOD

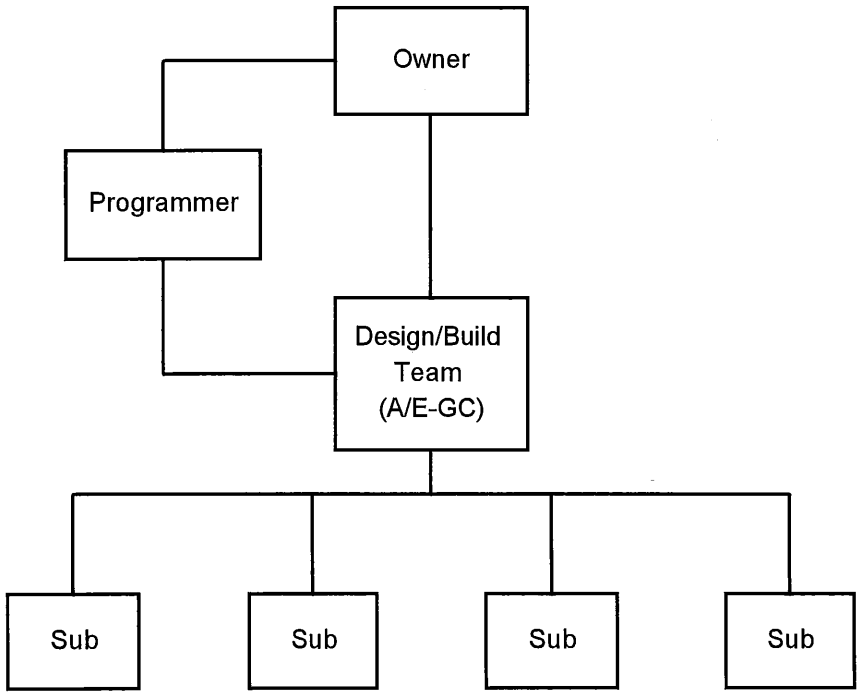


Exhibit 4

CONSTRUCTION MANAGER "AGENCY" METHOD

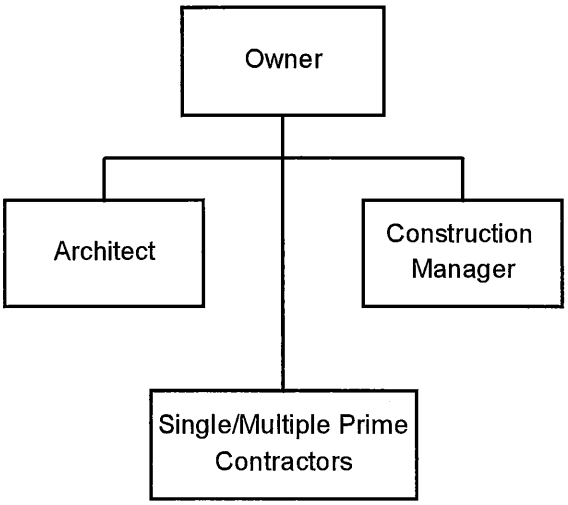


Exhibit 5

CONSTRUCTION MANAGER "AT RISK" METHOD

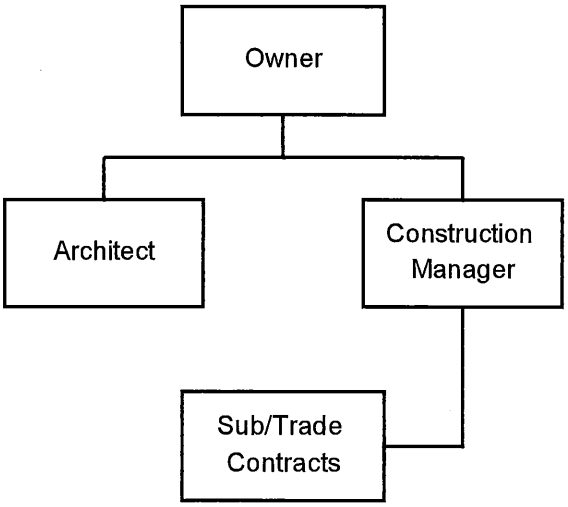
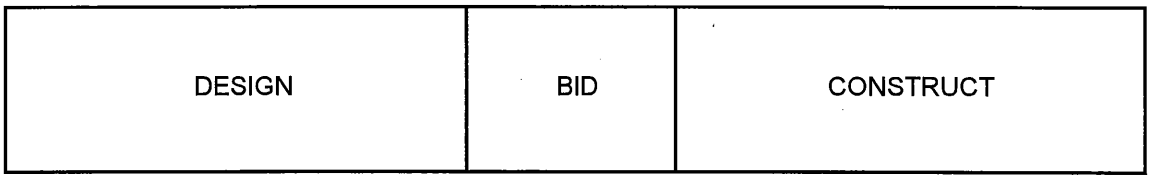


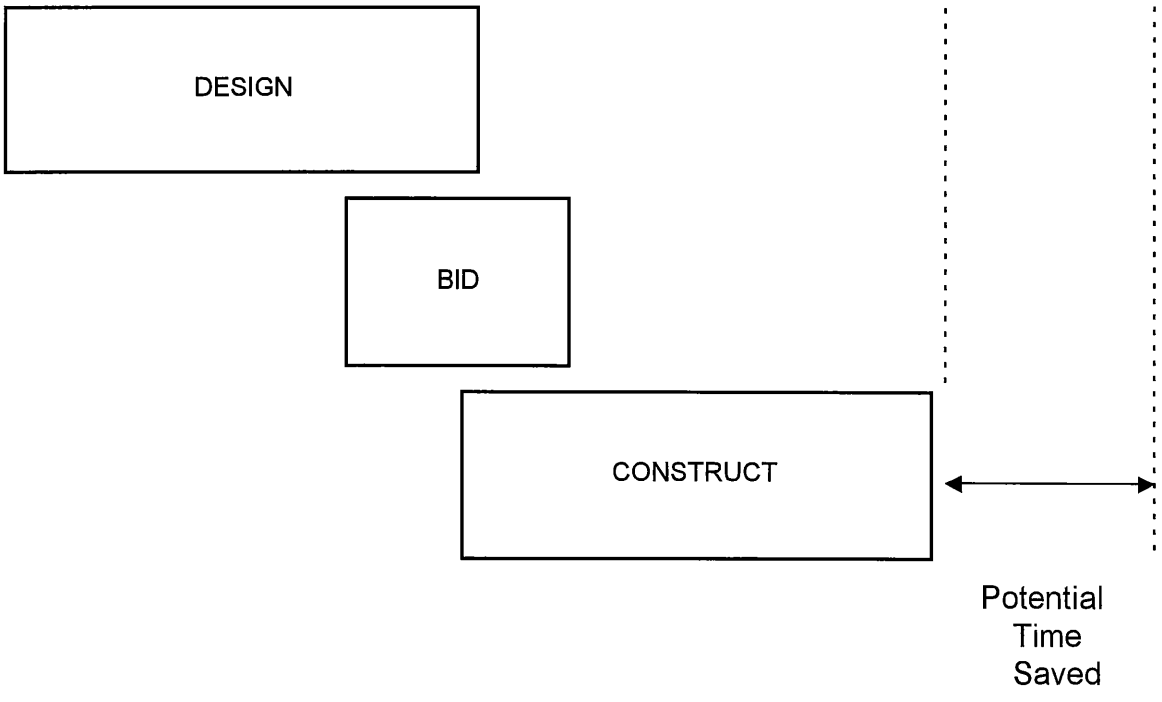
Exhibit 6

TRADITIONAL VS. ALTERNATE METHODS
SEQUENCE OF ACTIVITIES

Traditional



Alternate



III. THE SCHOOL CONSTRUCTION MARKET

A. THE SCHOOL CONSTRUCTION MARKET IN GENERAL

The construction industry considers educational building a sector of the nonresidential construction market. Many industry publications discuss school construction as part of the institutional building market, which also includes healthcare facilities, amusement-related construction such as convention centers and sports arenas, detention facilities, post offices, court houses, police/fire stations, and other public buildings.

The school construction market, like other institutional building, generally follows broad demographic and social developments. For example, increasing school enrollment from the baby boom generation increased demand for new school construction during the 1960's, and declining student enrollment during the 1970's reduced demand for new school construction.

The school-age population declined steadily during the 1980's, but since 1989 has increased and is expected to continue to grow for the next 15 years. Growing school enrollment nationwide has translated directly into higher demand for educational facilitates.

Exhibit 7 (page 20a) shows the trend in school construction spending since 1980, with projections out to 2010. The data show that annual education construction spending:

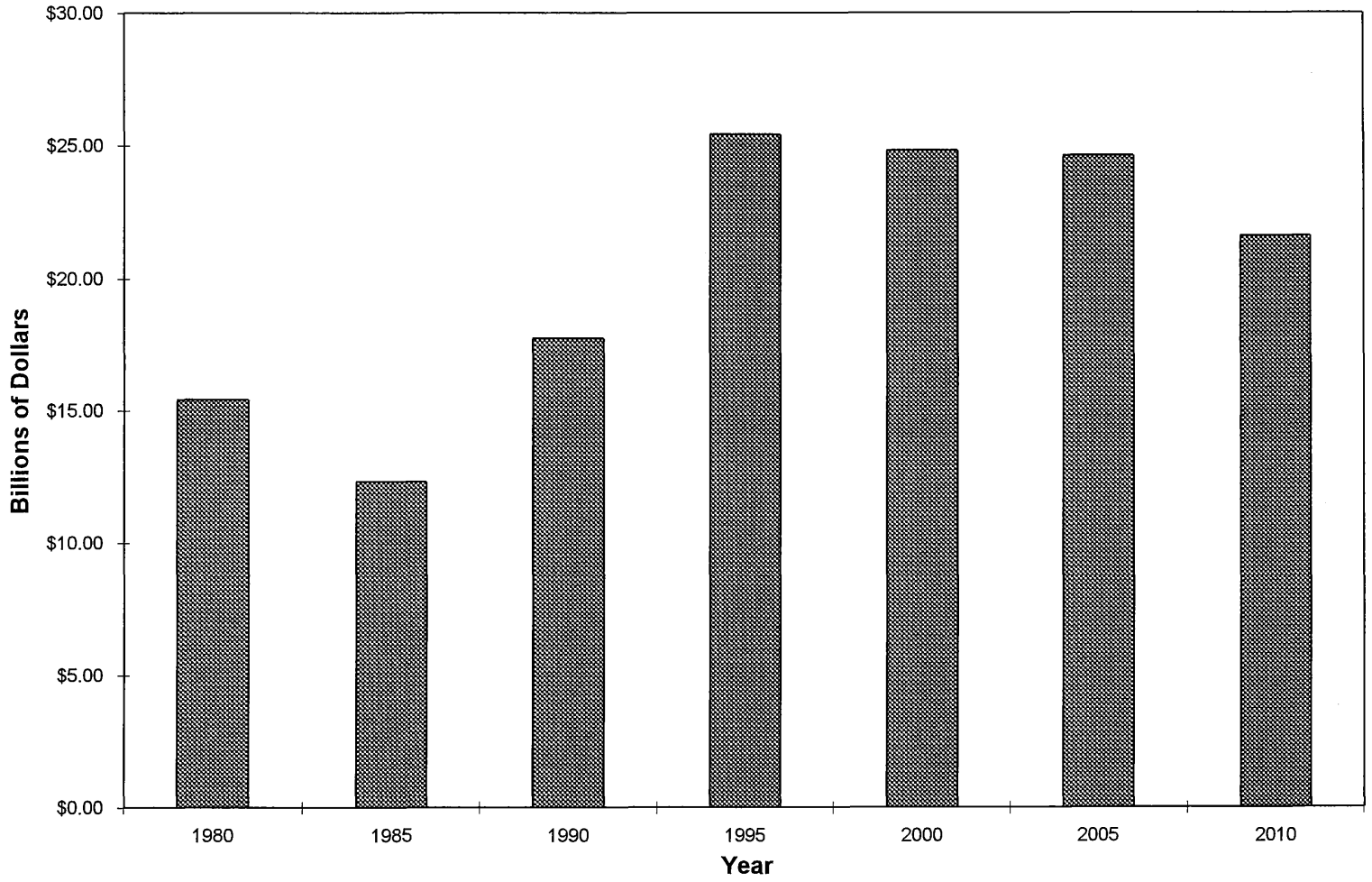
- More than doubled between 1985 and 1995;
- Will continue to remain strong for the next decade; and
- Will begin to slow in 2010, but still remain 40- 50 percent higher than it was during the 1980's.

The sustained demand for school construction is explained in part by a significant and growing level of replacement demand. A 1995 report by the General Accounting Office examined the condition of the nation's schools and concluded that at least $112 billion in repairs and replacements was needed to bring the stock of existing schools up to good condition. This parallels data from the American Association of School Administrators that reports almost one third of the nation's schools were built before 1950 and 43 percent were built in the 1950's and 1960's.

School Planning and Management magazine reports that in recent years about half of all school construction spending was to upgrade or add to existing facilities, while the other half was to construct new buildings. The extent to which the need for added school facilities can be met through modifying existing structures varies around the country, with improvements and additions accounting for a higher portion of total construction expenses in slower growing regions, such as the Northeast and Mid-West.

Exhibit 7

Estimated School Construction Spending in the U.S.
1980 - 2010



Source: U.S. Dept. of Commerce and the AIA; Data Calculated in 1992 Dollars

The McGraw-Hill Construction Outlook is a well known publication that provides a detailed analysis each year of the industry's economic environment and market trends. Construction Outlook '97 reported the following major points about the current school construction market:

- The so-called "baby boom echo" continues to provide for a surge in school construction across the country. According to the National Center for Education Statistics, all levels of schooling will experience continued enrollment growth over the next five years. Although elementary school enrollment will begin to recede after 2001, the decline will be more than made up by continued increases in the secondary school and higher education enrollments.

- In 1995, school construction was one of the "hot construction markets", rising 9 percent nationwide to 177 million square feet. In 1996, school construction declined slightly in the first quarter, but rebounded during the rest of the year to finish at approximately 166 million square feet, the second highest amount this decade.

- In the early 1990's, much of the school construction came from elementary and junior high schools, but the mid-1990's has seen increased activity shift to high schools, which constituted almost 30 percent of the 1996 square footage. (This is up from 20 percent during the 1980's.)

- An August 1996 report by the US Department of Education reported that school age (primary and secondary) enrollment for the 1996-97 school year will total 51.7 million students. This exceeds the previous 1971 record of 51.3 million students. The report estimates that 5,100 more schools will be needed by 2001.

- Rising enrollments are expected in 33 states, with particularly large increases projected for the South Atlantic and the West. States identified with steep enrollment gains include: Virginia, New Jersey, North Carolina, Georgia, Florida, and California.

In sum, Construction Outlook '97 concludes that, "With such sustained demand for classroom space, an increase in next year's amount of educational building is virtually certain, with a 7 percent rise to 178 million square feet expected."

B. MONTGOMERY COUNTY SCHOOL CONSTRUCTION COSTS: 1986-96

Exhibit 8A (page 22a) shows MCPS' average per square foot cost of new school construction between 1986 and 1996. The data demonstrate the cyclical nature of school construction costs. In nominal dollars, the per square foot cost of new school construction:

- Increased 9 percent between 1986 and 1989;
- Decreased 23 percent between 1989 and 1991; and
- Increased 40 percent between 1991 and 1996.

During this past five year period, MCPS' school construction costs increased at a rate that exceeded general inflation due to a combination of:

- Changes in market conditions;
- New construction standards; and
- Changes to educational requirements.

Changes in Market Conditions. As discussed earlier, the school construction market is a sector of the nonresidential/institutional construction market. School construction costs are influenced by factors that are not captured by a general inflation index. Examples of important cost factors are: the number of other institutional (especially school) construction projects being bid in the region; the cost of specific materials used in school construction (e.g., bricks, steel door frames, asphalt); and prevailing wages in the region for certain trades (e.g., masons, steel erectors, drywall subcontractors).

When asked to explain the marked increase in square foot costs during the past five years, the consistent response from public and private sector officials was the following sequence of events:

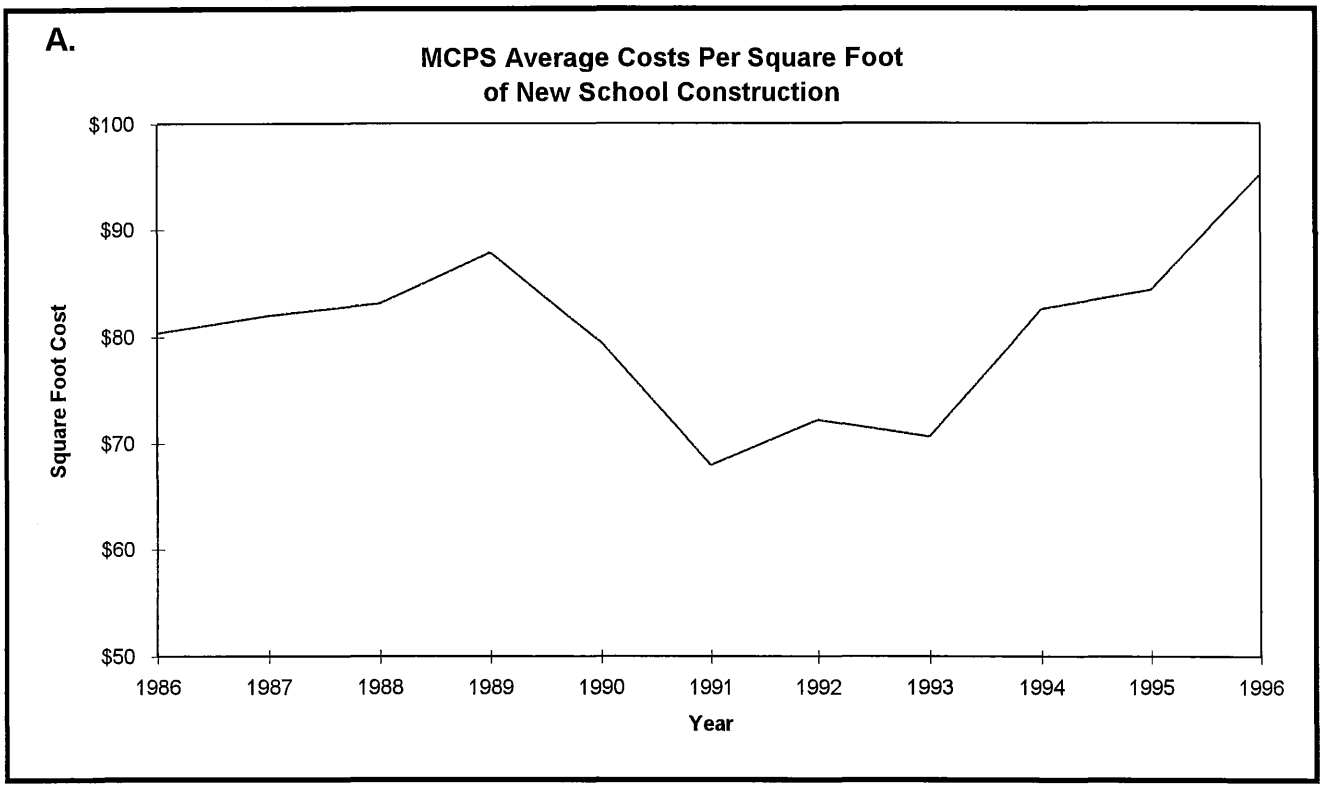
1. A recession hit the construction market in the Washington DC region (residential and nonresidential) in the late 1980's and lasted through the early 1990's.

2. The bids for school construction during and immediately after the recession reflected very low profit margins, as general contractors and subcontractors sought jobs just to stay in business. During the recession, firms that had been doing commercial work also competed for school construction work, which increased competition and further depressed profit margins.

3. As a result of the recession, numerous firms (general contractors and subcontractors) either relocated or went out of business.

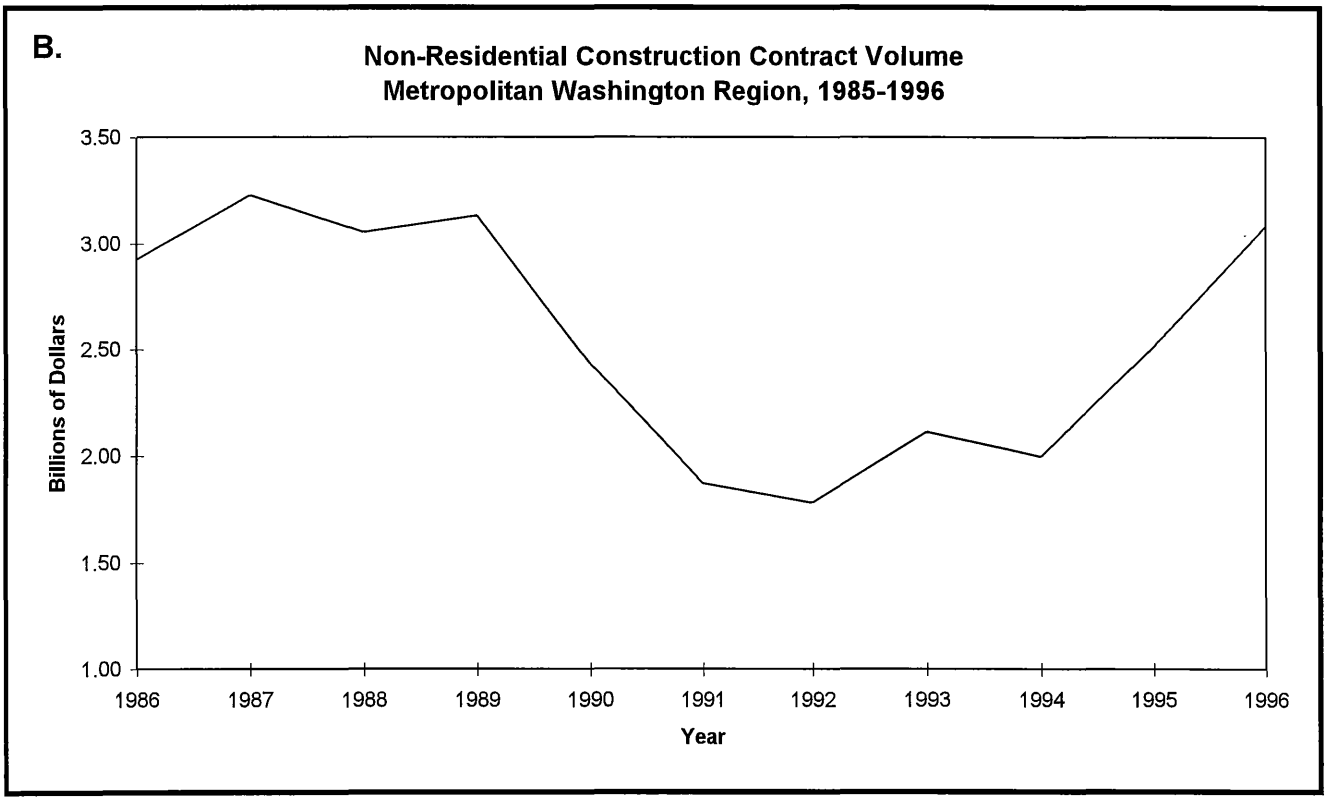
Exhibit 8

A.



Source: MCPS Records

B.



Source: Reports from FW Dodge Division of McGraw Hill

4. As the construction market in the region recovered during the mid-1990's, there was more work available but no longer the same number of contractors available.

5. Over the past several years, the construction market in general and the school construction sector in particular has cycled upward in the region with construction costs rising at a rate higher than general inflation. With greater opportunities for work, the school construction market is supporting higher profit margins and fewer builders are competing for a larger number of jobs.

According to contractors, recent price increases in the costs of school construction are due also to higher prices in the region for specific materials and labor, including masonry, drywall, asphalt, lumber, and steel. The prices of these inputs react quickly to market forces of supply and demand. Recent price increases in the area reflect competition, especially for subcontractors, from a number of large construction projects in the institutional sector of the non-residential market, e.g., the stadiums and sports arena projects, federal building projects, and other school building.

Exhibit 8B (page 22a) shows the non-residential construction contract volume (i.e., dollar value of contracts awarded) in the Metropolitan-Washington region between 1986 and 1996. The similar shape of this curve to MCPS' square foot cost experience (Exhibit 8A) evidences the parallel between the cyclical costs of school construction and the general level of non-residential construction activity in the region.

Changes in Project Scope. Separate and apart from market conditions, the scope of a school construction project can change between the time it is decided to plan the construction to the time a construction contract is awarded. A scope change can be:

- Program related, for example, the number or size of classrooms;
- Design related, for example, the shape of the roof, the type of flooring; or
- The result of a regulatory requirement, for example, the fire code or building code.

A scope change can also result from what is known as "unforeseen conditions", such as the discovery of rock under the building site.

The costs of building schools in the County has increased since the early 1990's due to changes in construction standards and educational requirements. It is estimated that the following requirements have added between $7 to $13 a square foot to school construction for specific projects:

- Stricter fire code regulations for fire suppression systems: $1 per square foot;
- American for Disabilities Act requirements: $1 per square foot;
- Stricter building code requirements for mechanical ventilation equipment (to reduce the possibility of "sick building syndrome"): $1-$2 per square foot;
- Stormwater management requirements: $2-$4 per square foot.
- Technology infrastructure: $2 to $5 per square feet.

Separate and apart from market conditions, on a base of $68 per square foot in 1991, these scope changes explain cost increases between 10-20 percent during the past five years.

C. CONSUMER PRICE AND CONSTRUCTION COST CHANGE INDEXES

Exhibit 9 (page 24a) compares MCPS' square foot costs of new construction (Exhibit 9A) and three regional indices (Exhibit 9B) between 1986 and 1996.

- The Consumer Price Index-Urban Customers (CPI-U) for the Washington-Metropolitan region measures the average change over time in the prices paid by urban consumers in the area for a fixed market basket of consumer goods and services. The market basket includes expenditures on items such as housing, apparel, food, transportation, medical care, and entertainment.

- The RS Means index of construction costs combines nine different types of buildings to create a composite model of construction costs. The model includes prices of 66 commonly used construction materials, labor hours for 21 building construction trades, and equipment rental rates for six types of construction equipment. The data presented is for the Washington DC region.

- The Engineering News Record (ENR) index of construction costs provides a weighted index of the prices of constant quantities of structural steel, portland cement, lumber, and labor. The labor component is the average union wage rate, plus fringes for carpenters, bricklayers, and structural ironworkers. The data presented are for Baltimore, MD. (For the time period examined, Washington DC data were not readily available.)

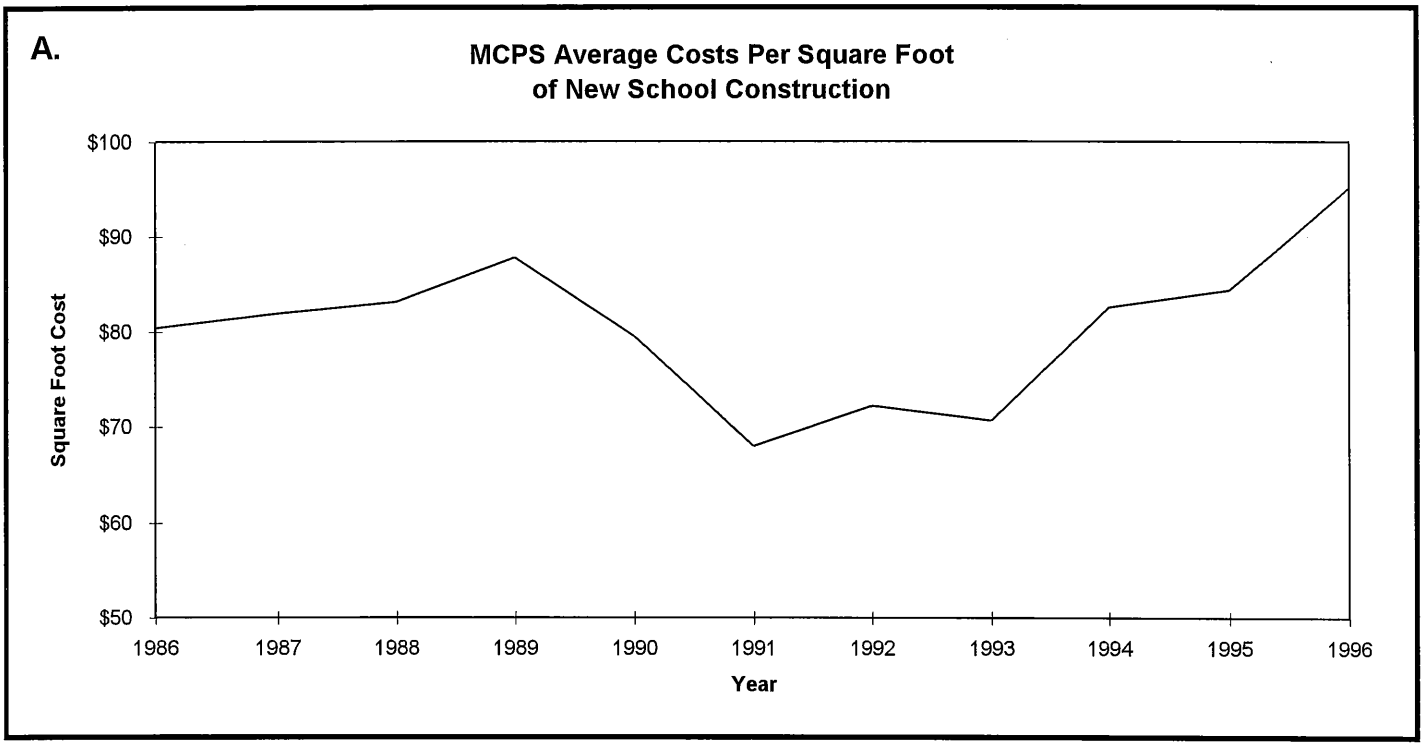
The ENR index comes the closest to capturing the cyclical nature of school construction costs experienced by MCPS during the past 10 years. The CPI-U and RS Means indexes both evidence a gradual incline during the ten year period, but do not demonstrate the roller coaster of school construction costs experienced by MCPS.

The CPI-U does not correlate well with school construction costs. This is because it is a basket of consumer expenditures that does not capture the conditions of supply and demand in the construction market. While the RS Means is a construction cost index, it is a model that considers a wide range of construction materials and labor conditions. Because it includes such a large basket of construction costs, large cost increases experienced by specific materials or labor trades will be "smoothed" out.

Of the three indexes examined, the ENR index is probably the best match because, compared to RS Means, it is a smaller basket of construction materials and labor and more likely to reflect fluctuation in the costs of specific commodities.

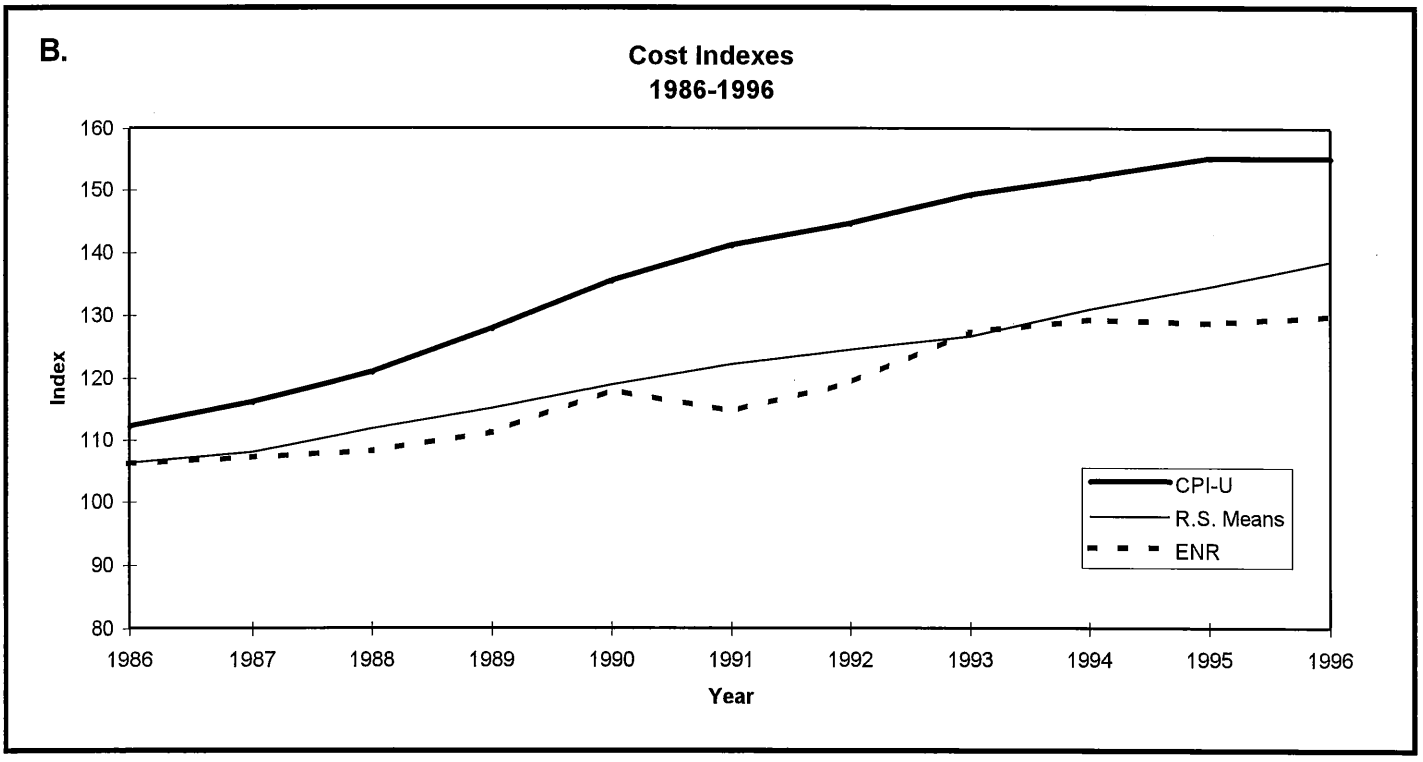
Exhibit 9

A.



Source: MCPS Records

B.



Source: U.S. Government Dept. of Labor, R.S. Means Construction Cost Indexes Report, and Engineering New Record Quarterly Cost Report

IV. THE BUDGET HISTORY OF SIX CASE STUDY SCHOOLS FROM INITIAL REQUEST TO CONTRACT AWARD

Between July and December 1996, the Board of Education requested emergency appropriations for school construction costs totaling $12.6 million for the new construction of three high schools and one middle school. The Board's emergency appropriation requests were based on contractor responses to MCPS' request for construction bids that ranged from 14-30 percent above approved funding levels.

In order to understand how such a gap developed between the approved funding levels and actual contract bids, OLO researched the budget history of the four new construction projects associated with this year's supplemental appropriations:

- Poolesville Middle School
- Northeast Area High School
- Northwest Area High School and
- Montgomery Blair High School

OLO also researched the budget history of two recent school modernization projects for which the final contract award also exceeded the budgeted funding level. OLO selected the Einstein High School modernization project as an example where the gap was relatively large and the Wyngate Elementary School modernization as an example where the gap was relatively small.

This chapter is divided into two sections:

⇒ Part A presents OLO's general observations on the six case studies.
⇒ Part B presents the detailed budget history of each project.

A. GENERAL OBSERVATIONS ON THE SIX CASE STUDY SCHOOLS

1. Construction Costs from Initial Estimate to Contract Award

For the six case study schools, Exhibit 10 (page 25a) compares the initial project square foot cost estimates to the final square foot costs of construction based on the actual contract award. It is important to remember that all six of these schools were designed before MCPS initiated facility planning. This means that construction cost estimates were published before a feasibility plan and guideline ed specs for the project had been completed. (See Chapter II for more information about the phases in the design process.)

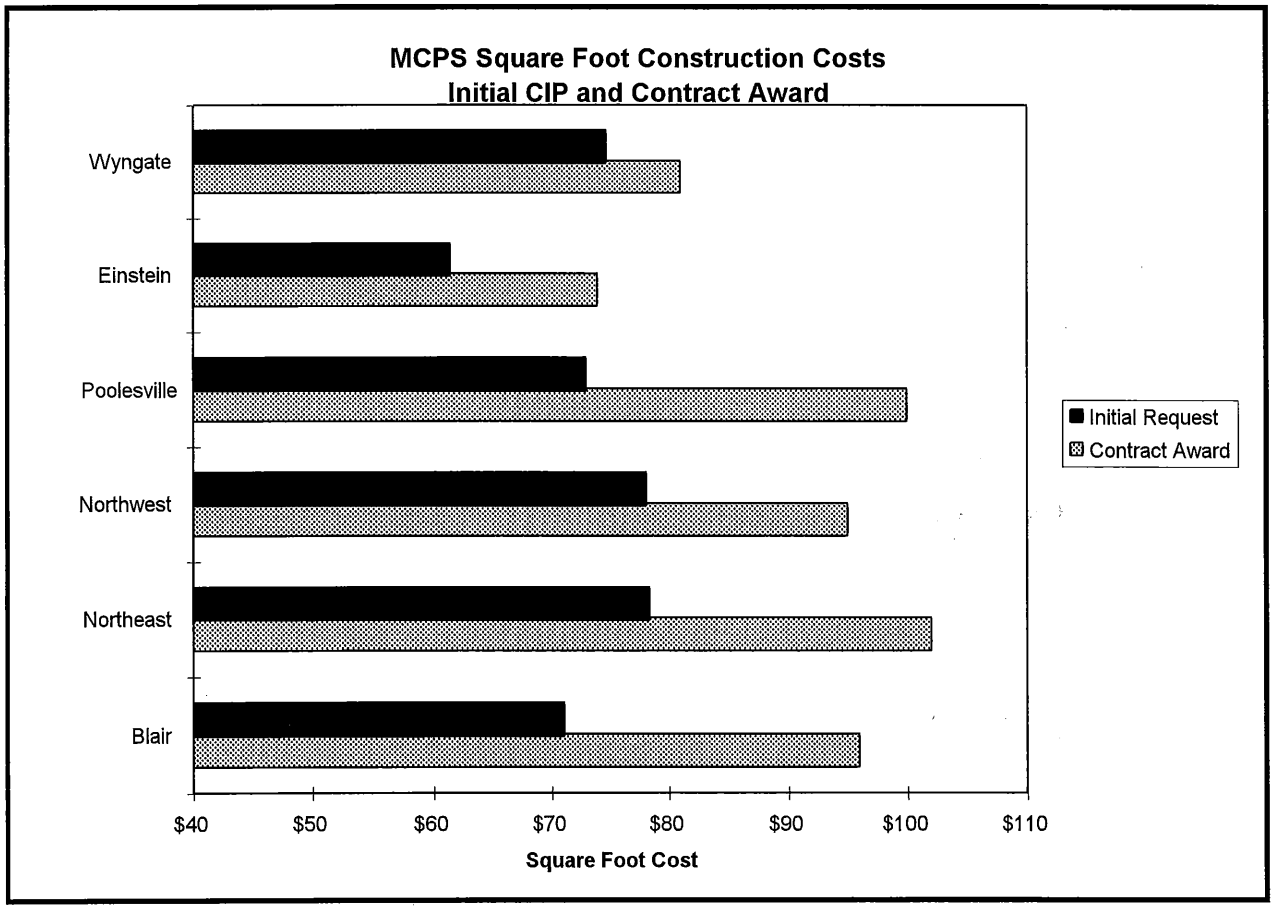
For four of the projects (Blair, Northeast, Northwest, Einstein), the time period between the initial construction cost estimate and contract award was four budget cycles; for the other two projects (Poolesville, Wyngate), the time period was three budget cycles.

Exhibit 10

MCPS Square Foot Construction Costs - Board's Initial CIP Request and Final Contract Award

	Square Foot Cost Based on BOE's Initial CIP Request		Square Foot Cost Based on Final Contract Award		
	CIP	SqFt Cost	CIP	SqFt Cost	% Change
New					
Blair High School	FY 94-99	$71	FY 97-02	$96	35%
Northeast High School	FY 94-99	$78	FY 97-02	$105	35%
Northwest High School	FY 94-99	$78	FY 97-02	$97	24%
Poolesville Middle School *	FY 95-00	$73	FY 97-02	$99	36%
Modernized					
Einstein High School	FY 94-99	$61	FY 97-02	$74	21%
Wyngate Elementary School	FY 95-00	$75	FY 97-02	$81	8%

* The initial Board request for Poolesville was not available. The initial square foot cost is based on the first Council approved CIP.



Source: MCPS Staff

The data in Exhibit 10 show that:

- For the new construction of Poolesville, Blair, Northeast, and Northwest, the square foot costs based on contract award were 24-36 percent higher than the initial estimates;
- For the modernization of Einstein, the square foot costs based on contract award were 21 percent higher than the initial estimate; and
- For the modernization of Wyngate Elementary School, the square foot costs based on contract award were only 8 percent higher than the initial estimate.

For the six schools examined, the reasons and justification for adjusting a project's construction budget from the time of initial Board request to final contract award were not clearly documented from year to year. The annual budget history of the modernization projects were even more difficult to track because of the practice of appropriating funds for modernization projects in an aggregate PDF titled Current Modernizations/Renovations."

However, based on the Project Description Forms (PDFs) and discussions with MCPS and OMB staff, OLO was able to reconstruct most of the construction costs adjustments from year to year. Based on this review, it appears that changes to the estimated construction costs each year came from:

- A decision to change the scope of the project; and/or
- A judgment that general inflation and/or market conditions changed the cost of building the proposed facility.

The reasons behind these changes are further explored below.

Types of Scope Changes

There are different types of scope changes. A scope change can be:

- Program related, such as a change in the number of classrooms, or a decision to build (or not build) a gymnasium. A program related change directly affects the educational program planned for the school.
- Design related, such as a change in the shape of the roof line, the number of classrooms with windows, or the type of tile in the bathroom. A design related change may or may not affect the educational program planned for the school.
- A regulatory process change, such as a requirement to build a stormwater management pond on the premises or a requirement to revise the original fire suppression system.
- A result of "unforeseen conditions", such as the discovery of rock under the building site.

Budgeted vs. Requested Amounts

The extent to which the approved CIP funding level differed from the Board's request for construction costs varied from year to year and from project to project. The extent to which the approved CIP funding level differed from the Board's request for construction costs varied from year to year and from project to project. In some cases, the budgeted amounts approved in the CIP were below the Board's requests. In other cases, the Council approved the amounts requested. The Council's action sometimes agreed and other times disagreed with the County Executive's recommendations.

The County Executive recommended and the County Council more often than not reduced MCPS' requested budget amounts or denied requested increases for several reasons:

- Decisionmakers believed that the proposed scope of MCPS' projects included some non-essential items that could be eliminated to reduce costs;
- Decisionmakers were concerned that increasing the budgeted amounts might have an inflationary effect on bids; and
- There were substantial pressures on decisionmakers to maintain lower budgeted amounts in order to accommodate a greater number of projects in the CIP within fixed resource limits.

Inflation Adjustment due to Market Conditions

The history of these six schools indicates the absence of a consistent method used in the budget process to adjust construction cost estimates for "market conditions." The projects examined were subject almost every year to different views among the Board, the Executive, and the Council as to what an appropriate across-the-board inflation adjustment should be.

For the six projects examined, there is evidence that MCPS' initial budget requests were ballpark estimates based on outdated square foot costs from projects that had been built during the economic recession in the early 1990's. As these projects progressed through the design process, MCPS revised its construction budget requests, based on updated cost estimates. MCPS' cost estimates include relatively small contingency funds for each project: 2-3 percent for new construction projects and up to 5 percent for modernization projects.

The most marked difference of opinion on the appropriate "market adjustment" occurred in the FY 96-01 CIP. That year, the Board asked for an inflation adjustment that averaged 20 percent across all new construction and modernization projects. The Executive recommended reducing the inflation adjustment to 10 percent, and the Council eventually approved an inflation adjustment of approximately 14 percent. This pattern of construction cost adjustments appeared in all of the projects reviewed.

For the FY 97-02 CIP, the Office of Management and Budget (OMB) issued an inflation adjustment guideline of three percent for all CIP projects. In some cases, the Board limited increases in its construction cost requests in the FY 97-02 CIP to OMB's three percent guideline, even though this amount was not sufficient to cover MCPS' staff latest estimates of project costs.

For the six projects examined, MCPS' construction cost estimates varied in terms of who prepared them and the rigor in which they were prepared. Initial construction costs were generally estimated in-house, by making rough calculations based on estimated square foot costs of the new facility and recent construction cost experience. From the point of schematic planning on, most cost estimates for the projects were prepared by independent cost estimators, on contract either to MCPS directly or to the project architect.

For the six project examined, MCPS' independent cost estimates were not routinely shared with Executive or Council staff. Furthermore, the timing of updated cost estimates for these six projects did not always coincide with the budget preparation schedule. This disconnect meant that while MCPS staff had more up-to-date cost information, it was not necessarily incorporated into the current budget discussions.

The Timing of Budget Decisions

The contract bids for five of the six schools (Poolesville, Northeast, Northwest, Blair, and Einstein) came in substantially above the approved funding levels. This appears to have happened because the projects were allowed to proceed without making adjustments to more closely align budgeted amounts to updated cost estimates.

By the time the size of the budget gap became clear, these five projects were already through the design development stage with construction documents well underway. While MCPS staff took steps in each of these projects to contain costs, the projects were too far along in the design process to make the significant scope adjustments that would have been needed to keep the projects within the budgeted amount.

MCPS re-bid only one of the projects, Poolesville MS. When the bids on Poolesville all exceeded the budgeted amount, MCPS reduced the scope of the project (primarily design-related scope adjustments) and re-bid the project. The end result was still bids that exceeded the budgeted amount.

The timing of budget decisions in the Wyngate Elementary school modernization was different than for the other schools examined. Wyngate was only at the schematic planning phase when it became clear that the budgeted amount for construction costs was lower than the Board's request. MCPS staff worked with the facilities planning committee at Wyngate to reduce the scope of the project, primarily through design-related changes, before proceeding through design development and preparation of bidding documents. The final result at Wyngate evidences the success of this process. The lowest bid exceeded the budget by only $25,000, which MCPS was able to cover through the project's contingency fund.

The Relationship Between Budgeted Amounts and Contract Bids

MCPS is using the traditional delivery method (Design-Bid-Build) for construction of five of the six schools reviewed. MCPS is using an alternate delivery method called Construction Manager-Agency for the construction of Blair High School.

Using the traditional method, MCPS fully designed the facilities, then held a competition for the construction of the facility, and then awarded construction of the facility to the general contractor who submitted the lowest bid. With Blair, similar to the other projects, MCPS fully designed the facility first. However, instead of awarding one contract to a general contractor, MCPS then hired a Construction Management firm that has helped MCPS award and manage contracts directly with multiple subcontractors. (Additional information about traditional vs. alternate methods was reviewed in the final section of Chapter II.)

For the four schools that held a single competition for a General Contractor, the number of bidders ranged as follows:

- The Northeast and Einstein projects each had 5 bidders; and
- The Northwest and Wyngate projects each had 6 bidders.

Of the schools examined, only new construction of the Poolesville MS was re-bid. For the initial Poolesville bid, there were eight bidders, and in the re-bid, there were only four bidders.

Exhibits 11, 12, and 13 (beginning at page 29a) compare the budgeted amounts for Poolesville, Northeast, and Northwest to the bids received. The data show that the bids (especially base bids) clustered very close together, with greater connection to each other than to the budgeted amount. When interviewed about the meaning of this, the consistent answer from architects, contractors, and staff were that close bids evidence well prepared bid documents.

While the projects examined all experienced bids exceeding the budgeted amount, MCPS staff also shared examples of other projects where the bids received were all lower than the budgeted amount. This occurred in projects that went to contract bid in the early 1990's, when school construction costs were declining as a result of the recession in the construction market.

Contractors interviewed stated unequivocally that the published budgeted amount has a negligible affect on preparation of the bids on bid day. Potential bidders use the published construction cost appropriation to determine the general cost range of the project; for example, to see if the project is a $5 million, $10 million, or $20 million job. It is the cost of labor and materials and the contractor's judgment on his/her competition for the job that determine the contractors' bids, not the budget allocated for the project.

Exhibit 11

Northeast High School - New Construction

Comparison of Approved Construction Funding to Contract Bids (Bid Date: November 1996)

Approved Construction Funding*	Contractor	Base Bids	Difference From Budget	Base + All Alternatives	Difference From Budget	Base + Chosen Alternatives	Difference From Budget
$ 22,681	A	$ 24,980	$ 2,299	$ 26,872	$ 4,191	$ 26,097	$ 3,416
	B	$ 24,995	$ 2,314	$ 26,762	$ 4,081	$ 26,115	$ 3,434
	C	$ 24,889	$ 2,208	$ 26,882	$ 4,201	$ 26,226	$ 3,545
	D	$ 25,761	$ 3,080	$ 27,714	$ 5,033	$ 27,001	$ 4,320
	E	$ 26,394	$ 3,713	$ 28,052	$ 5,371	$ 27,462	$ 4,781

* This number reflects the approved construction funding in the FY97-02 CIP, approved just before the bidding process.

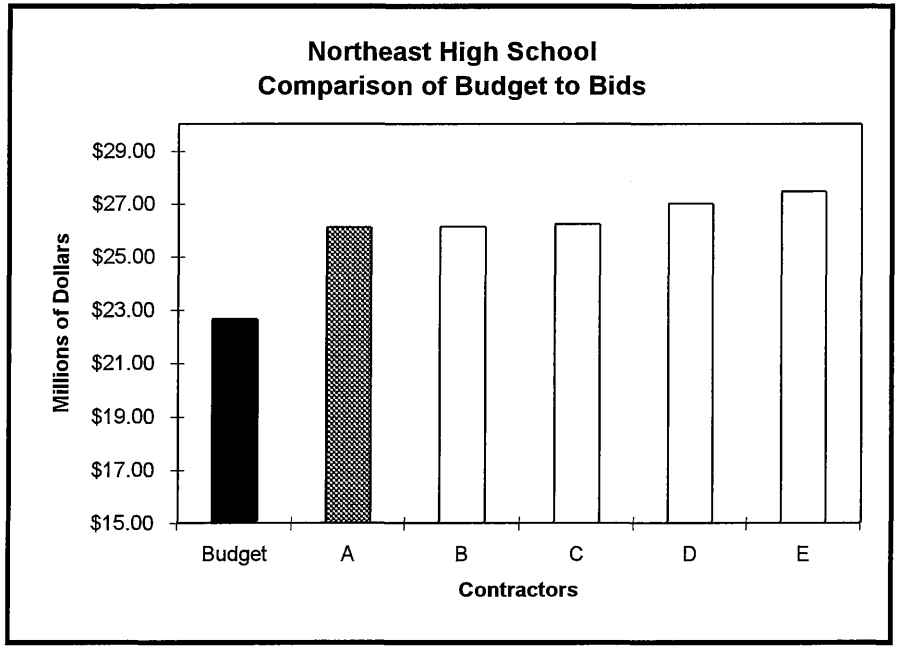


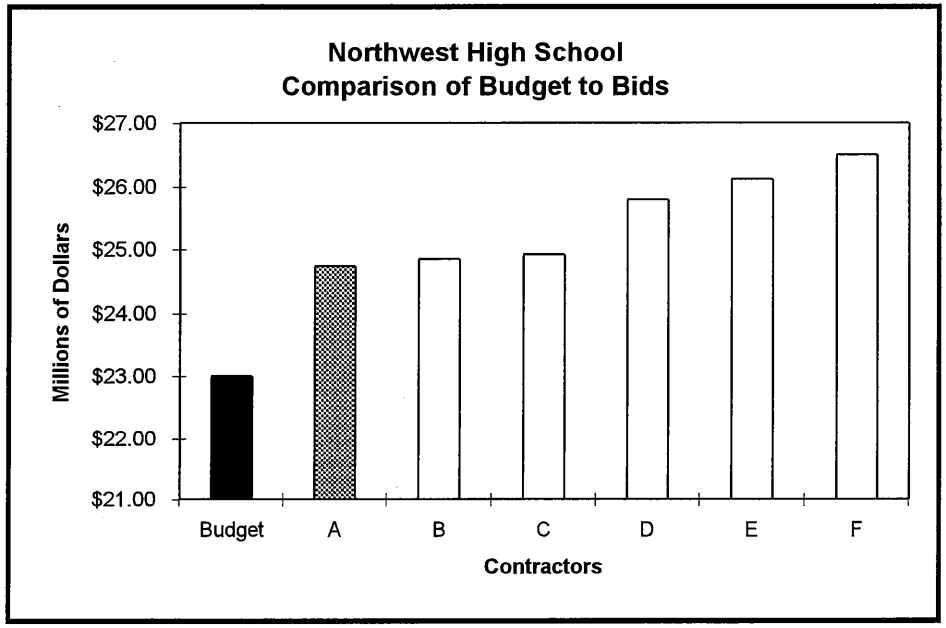
Exhibit 12

Northwest High School - New Construction

Comparison of Approved Construction Funding to Contract Bids (Bid Date: August 1996)

Approved Construction Funding*	Contractor	Base Bids	Difference From Budget	Base + All Alternatives	Difference From Budget	Base + Chosen Alternatives	Difference From Budget
$ 22,999	A	$ 23,380	$ 381	$ 25,024	$ 2,025	$ 24,735	$ 1,736
	B	$ 22,618	$ (381)	$ 25,099	$ 2,100	$ 24,849	$ 1,850
	C	$ 23,494	$ 495	$ 25,170	$ 2,171	$ 24,920	$ 1,921
	D	$ 23,837	$ 838	$ 26,027	$ 3,028	$ 25,794	$ 2,795
	E	$ 24,499	$ 1,500	$ 26,350	$ 3,351	$ 26,118	$ 3,119
	F	$ 24,639	$ 1,640	$ 26,799	$ 3,800	$ 26,498	$ 3,499

* This number reflects the approved construction funding in the FY97-02 CIP, approved just before the bidding process.



Source: MCPS Records

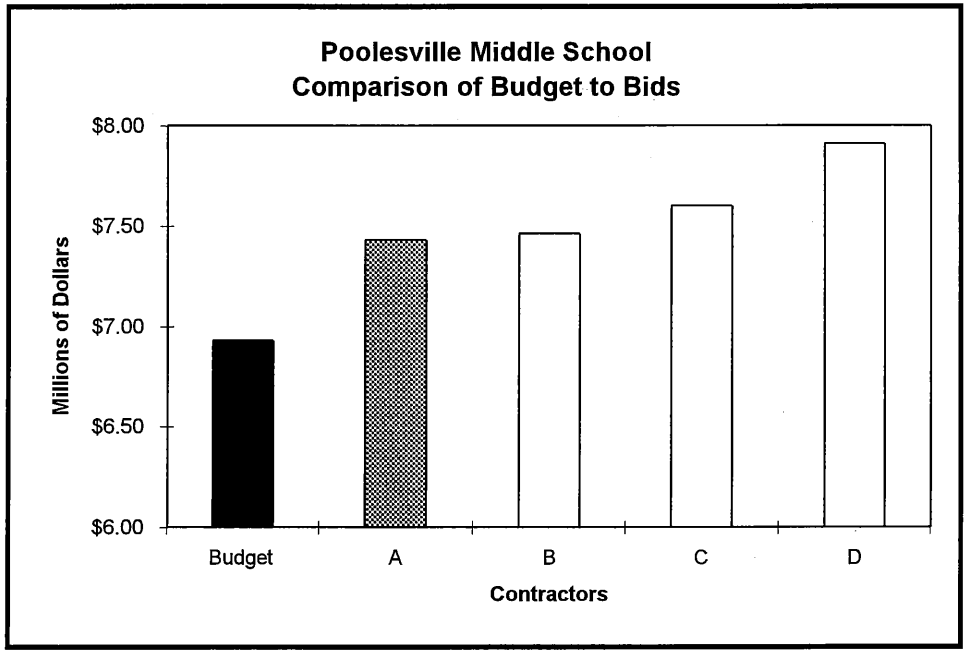
Exhibit 13

Poolesville Middle School - New Construction

Comparison of Approved Construction Funding to Contract Bids (Bid Date: May 1996)

Approved Construction Funding*	Contractor	Base Bids	Difference From Budget	Base + All Alternatives	Difference From Budget	Base + Chosen Alternatives	Difference From Budget
$ 6,932	A	$ 7,369	$ 437	$ 7,794	$ 862	$ 7,429	$ 497
	B	$ 7,398	$ 466	$ 7,807	$ 875	$ 7,464	$ 532
	C	$ 7,533	$ 601	$ 7,980	$ 1,048	$ 7,595	$ 663
	D	$ 7,838	$ 906	$ 8,248	$ 1,316	$ 7,905	$ 973

* This number reflects the approved construction funding in the FY97-02 CIP, approved just before the bidding process.



Source: MCPS Records

Feedback from contractors also indicates that carrying an unrealistically low budget number may actually deter contractors from submitting bids. Preparing a bid is an investment of time and resources for a contractor. Potential bidders are wary of projects with unrealistically low budgets because they may lead to re-bid or supplemental funding situations, which add cost, time, and uncertainty to the process.

Identifying and Selecting Alternates

As described in Chapter II, during the late 1980's, the Council adopted a policy that requested MCPS to identify items worth 10 percent of every school construction project that can be separated from a base bid and bid as add-alternates. The objective of this policy was to provide some flexibility in the contract process. The idea was to identify upfront some "optional" or "extra" items, which could be eliminated if the bids came in above an approved budget amount. For each item identified as a bid alternate, the contractors are asked to submit fixed price bids separate from the base construction bid for the project.

According to MCPS staff, it has become more and more difficult in recent years to identify 10 percent of project's costs as alternate items. Furthermore, even when bids have exceeded the budgeted amount for projects, the Board continues to select some of the items identified as alternates.

With Poolesville MS and Wyngate ES, the alternates selected by the Board represented less than one percent of the total contract award. However, if bid alternates truly were optional items, then the total contract awards for the Northeast HS, Northwest HS, and Einstein HS projects could have been reduced by 4.5-9.6 percent, by not selecting any alternates. The bid history of these schools shows that:

- The Northwest Area HS was bid with 11 alternates. In the final contract award, the Board selected five of these alternates. If none had been selected, the contract would have been awarded on the basis of the lowest base bid, which would have reduced project costs by $2.4 million, or 9.6 percent.

- The Northeast Area HS was bid with 13 alternates. In the final contract award, the Board selected 4 of these alternates. If none had been selected, the contract would have been awarded on the basis of the lowest base bid, which would have reduced project costs by $1.2 million, or 4.6 percent.

- The Einstein HS modernization was bid with 28 alternates. In the final contract award, the Board selected 10 of these alternates. If none had been selected, the contract would have been awarded on the basis of the lowest base bid, which would have reduced project costs by $925,000, or 4.5 percent.

Feedback from contractors indicates that MCPS tends to list a larger number of alternates than surrounding jurisdictions. According to the private sector, identifying and bidding alternates that are not unequivocally optional items adds unnecessary confusion to the bidding process and increases the chances of contractor errors.

B. THE BUDGET HISTORY OF THE CASE STUDY SCHOOLS

The budget history of each case study school is presented in detail beginning at page 33a. For each school, there are two tables, one graph, and a list of observations:

Project	Exhibit Number	Begins at page
Montgomery Blair High School - New Construction	14	33a
Northeast Area High School - New Construction	15	33c
Northwest Area High School - New Construction	16	33e
Poolesville Middle School - New Construction	17	33g
Einstein High School - Modernization	18	33i
Wyngate Elementary School - Modernization	19	33k

Construction Cost Funding from Initial Request to Contract Award

Table A for each school shows the annual history of construction cost funding from the time that the project is initially requested by the Board to the year a contract award is made for the project. Construction cost funding is defined to include amounts for construction and site improvement.

Things to know when reviewing Table A are:

- The Superintendent's and Board's request are shown as a single amount. For the projects examined, the Board consistently endorsed the Superintendent's recommendations.

- For the new construction projects, the dollars tracked are the amounts allocated in the construction and site improvement categories on the project's Project Development Form (PDF). For these projects, the table shows the Superintendent/Board's request, the County Executive's recommendation, and the amount approved by the Council.

- The amounts shown for the County Executive's recommendations were estimated based on information provided by OMB and MCPS staff. It was necessary to estimate the amount because the Executive's published Recommended CIP only includes total project funding and does not break down the recommended amounts allocated to the different PDF categories. In years where the CE recommended a reduced inflation adjustment, the number shown assumes the total reduction was in construction funding; some minor portion may have been attributed to other PDF categories.

- The Board does not request and the Council does not separately appropriate construction funds for modernization projects. The numbers shown for Einstein and Wyngate represent the amounts associated with the modernization projects, as identified by internal MCPS documents. Due to time constraints, OLO was not able to reconstruct the Executive's recommendations on the two modernization projects.

Reasons for CIP Adjustments

Based on information available in published PDFs supplemented with input from MCPS, OMB, and Council staff, Table B for each school summarizes why adjustments were made to the construction cost funding throughout the process .

An attempt was made to classify the reasons for changes into three categories:

- An "X" under "Scope Change" indicates the construction cost was adjusted as the result of a decision to alter the scope of the project; the scope change could be either program related or design related.
- An "X" under "Regulatory Requirements" indicates the construction cost was adjusted in order for the project to comply with a regulatory requirement.
- An "X" under "Market Conditions" indicates the construction cost was adjusted as the result of a judgment that the cost of building the facility had changed due to price increases or inflation.

Things to know when reviewing Table B are:

- The information available was not complete. The PDFs for the new construction projects did not consistently report exactly why adjustments were made, or identify how much of a dollar adjustment was made as result of a scope change vs. a different inflation assumption. Tracking the reasons behind adjustments for modernizations projects was even more difficult, given how funds for modernizations are appropriated in aggregate PDFs.

- The percent change for both the CE and the Council's action is calculated from the base of the Board's request for that year. The Board's action is calculated from the most recently approved CIP.

- The percent change calculation is a net number of the changes made that year. For example, if an inflation adjustment increased the project cost 10 percent but a scope reduction decreased the cost 4 percent, then the net change shown would be 6 percent.

Project Graph and Observations

Following the tables for each school is a graph that compares the Board's annual request for construction funding and the amount approved by the Council in the CIP. Beneath each graph are some observations about the funding history for each school.

Things to know when reviewing the graph and observations for each school are:

- The Board's request is depicted with a broken line and the amount in the Council-approved CIP with a solid line.

- The Poolesville MS graph looks different at the beginning because the initial construction cost estimate for the school was added by the Council. (The Board's budget request that year had included an addition to an existing facility.)

The Board and Council lines always come very close together at the end. For all projects except Wyngate ES, this reflects the Council's approval of the Board's request, (either 100 percent or close to 100 percent) for an emergency or supplemental appropriation. For Wyngate ES, a supplemental appropriation was not needed because the difference between the budgeted amount and contract award was covered out of the project's contingency fund.

Exhibit 14

Montgomery Blair High School - New Construction

Table A. Construction Cost Funding from Request in FY94-99 CIP to Contract Award in FY97-02 CIP ($000)

	FY94-99 CIP			FY95-00 CIP			FY96-01 CIP			FY97-02 CIP			With FY97-02 EA**	
	Nov-92	Jan-93	May-93	Nov-93	Jan-94	May-94	Nov-94	Jan-95	May-95	Nov-95	Jan-96	May-96	Nov-96	Dec-96
Supt/BOE Request	$ 26,420			$ 23,863			$ 35,010			$34,490			$ 38,380	
Executive Rec. *		$ 22,420			$ 21,264			$ 31,578			$ 34,490		$ 38,380	
Council Approved			$ 20,430			$ 25,575			$ 33,039			$34,490		$ 37,240

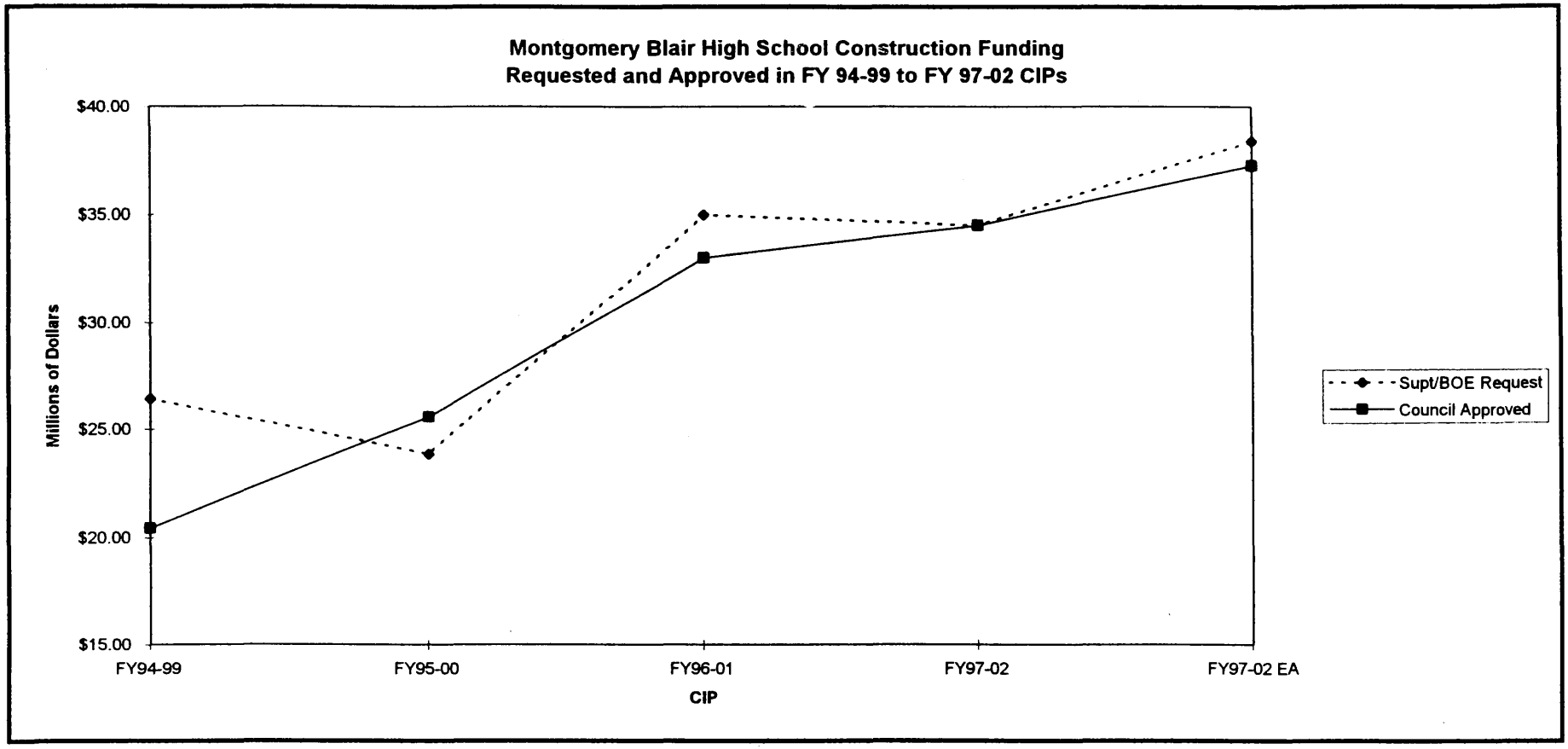
* Based on information provided by MCPS and County OMB staff.

** EA- Emergency Appropriation

Table B. Explanation of Net CIP Adjustments by Board of Education (BOE), County Executive (CE), and County Council (CC) Based on Information Available in Published Project Development Forms

CIP	Who	% Net Change *	Rationale for Cost Adjustment: Scope Change	Reg. Require.	Market Condition	Summary Description
FY94-99	BOE	NA				BOE requests construction funding for project.
	CE	-15%	X			Reduced amount for project pending final decision on scope and location.
	CC	-23%	X			CC reduced budget to reflect cost of a replacement school on the Wayne Ave. site instead of a new HS on Kay Tract.
FY95-00	BOE	+17%	X	X		Added systems development charge and funds for design related scope changes including funds to provide windows in 80% of the classrooms.
	CE	-11%	X			Reduced budget associated with design-related scope changes requested by BOE for school at Wayne Ave site.
	CC	+7%	X			Added dollars to build new school on the Kay Tract.
FY96-01	BOE	+37%			X	Added inflation adjustment of 20% to reflect current construction costs.
	CE	-10%			X	Reduced inflation adjustment to 10%.
	CC	-6%			X	Reduced inflation adjustment to 14%.
FY97-02	BOE	+4%		X	X	Added 3% inflation adjustment (consistent with OMB guidelines) & added final design costs of the sound wall and wetlands protection.
	CE	0%		X	X	Recommended approval of BOE request.
	CC	0%		X	X	Approved budget request.
EA FY97-02	BOE	+11%			X	Requested $3.8 million emergency appropriation for construction costs because low bids exceeded budget.
	CE	0%			X	Recommended approval of BOE request for emergency appropriation.
	CC	-3%		X	X	Approved emergency appropriation of $3.7 million with decision on final SDC charge deferred.

* For Council and Executive, the net change is calculated as the difference from the Board request.



Observations:

1. The construction cost funding for Montgomery Blair High School increased $10.8 million or 41%, between the Board of Education's request in the FY 94-99 CIP and the final amount appropriated for construction in FY 97. The final site decision was made in the FY 95-00 CIP.

2. The approved funding level for construction costs in the FY 94-99 and FY 96-01 CIPs were lower than the Board of Education's request. The differences were: $6 million (23%) in FY 94-99 and $2 million (6%) in FY 96-01. The approved funding in the FY 95-00 CIP was $1.7 million (7%) higher than the Board of Education request.

3. For the FY 97-02 CIP, the Council approved the Board of Education's initial request for construction funding. The approved amount was $3.7 million less than the amount needed for project construction. This led to a $3.7 million emergency appropriation request from the Board of Education, which was approved by the Council, except for $950,000 associated with the payment of the systems development charge. (There is not a single contract award amount for Blair because MCPS is using a construction management delivery method, which includes multiple prime contracts).

Exhibit 15

Northeast High School - New Construction

Table A. Construction Cost Funding from Initial Request in FY94-99 CIP to Contract Award in FY97-02 CIP ($000)

	FY94-99 CIP		FY95-00 CIP				FY96-01 CIP			FY97-02 CIP			With FY97-02 EA **	
	Nov-92	Jan-93	May-93	Nov-93	Jan-94	May-94	Nov-94	Jan-95	May-95	Nov-95	Jan-96	May-96	Nov-96	Dec-96
Supt/BOE Request	$ 19,300			$ 20,096			$ 23,659			$ 22,681			$ 27,916	
Executive Rec. *		$ 9,440			$ 19,572			$ 21,531			$ 22,681		$ 27,916	
Council Approved			$ 18,440			$ 19,572			$ 21,309			$ 22,681		$ 27,666

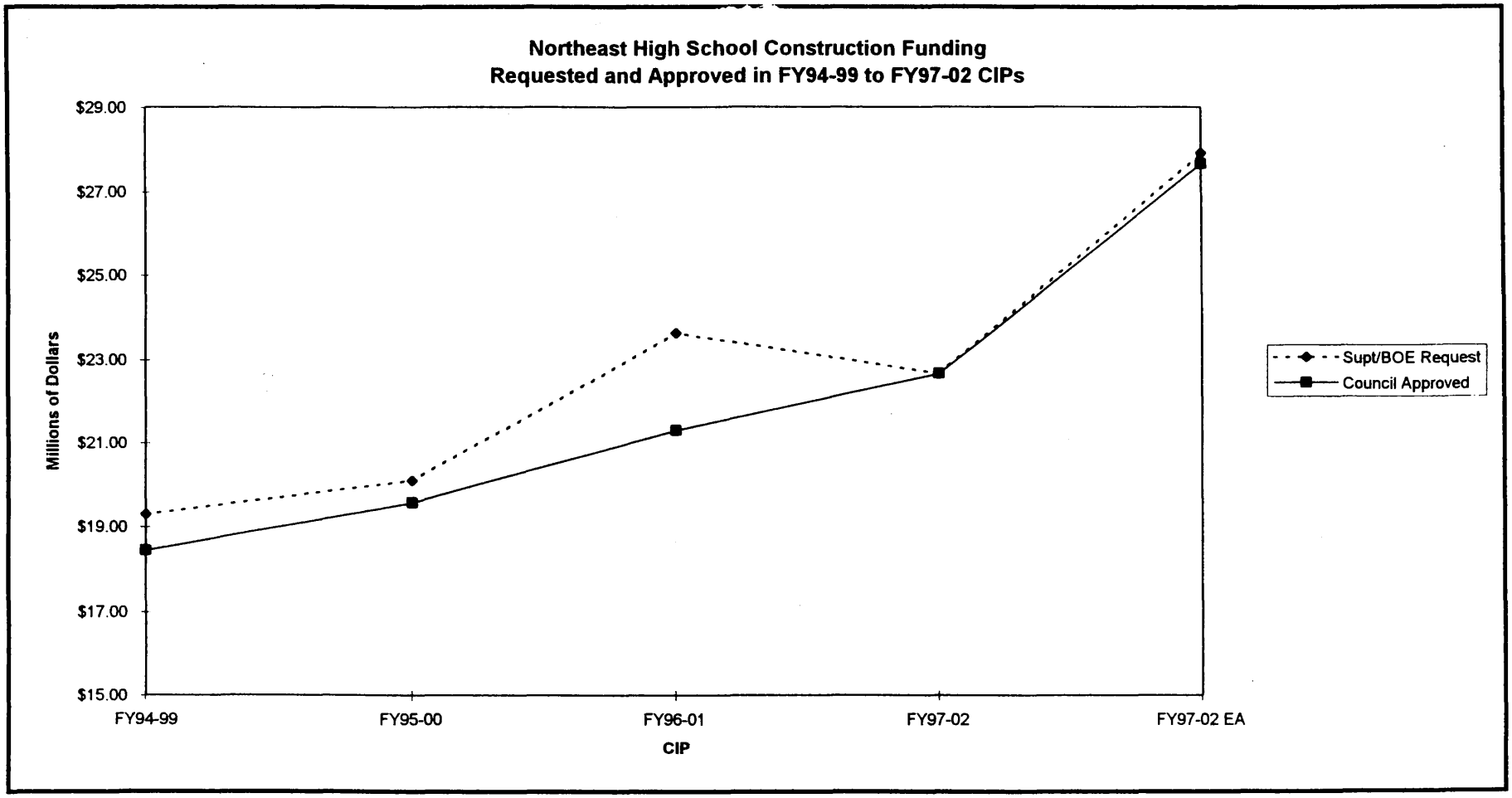
* Based on information provided by MCPS and County OMB staff.

** EA- Emergency Appropriation

Table B. Explanation of Net CIP Adjustments by Board of Education (BOE), County Executive (CE), and County Council (CC) Based on Information Available in Published Project Development Forms

CIP	Who	% Net Change *	Rationale for Cost Adjustment: Scope Change	Reg. Require.	Market Condition	Summary Description
FY94-99	BOE	NA				BOE requests construction funding for project.
	CE	-51%	X			Reduced funding pending final decision on how to meet Blair/Eastern area high school capacity needs.
	CC	-5%			X	Reduced inflation adjustment by 5%.
FY95-00	BOE	+9%		X	X	Added inflation adjustment and funds for environmental mitigation plan.
	CE	-3%		X	X	Reduced inflation adjustment, reduced estimate for environmental mitigation, and added $20,000 for SDC for net reduction of 3%.
	CC	-3%		X	X	Agreed with CE recommendations.
FY96-01	BOE	+21%	X		X	Added inflation adjustment and cost of additional site development.
	CE	-9%			X	Reduced inflation adjustment to 10%.
	CC	-10%	X		X	Reduced inflation adjustment to 14%, reduced number of teaching stations, and deferred construction start date by one year.
FY97-02	BOE	+6%			X	Added inflation adjustment to reflect current construction costs and accelerated construction by one year.
	CE	0%			X	Recommended approval of BOE request.
	CC	0%			X	Approved budget request.
EA FY97-02	BOE	+23%			X	Requested $4.985 million supplemental because low bid exceeded budget, and transferred $260,000 from surplus funds in the MCPS West Farm Transportation depot project.
	CE	0%			X	Recommended approval of BOE request for emergency appropriation.
	CC	-.9%			X	Approved emergency appropriation except for $250,000 associated with SDC.

* For Council and Executive, the net change is calculated as the difference from the Board request.



Observations:

1. The construction cost funding for Northeast High School increased $8.4 million or 43%, between the original Board of Education's request in the FY 94-99 CIP and the final amount appropriated for construction in FY 97.

2. The approved funding level for construction costs in the FY 94-99 through FY 96-01 CIPs were lower than the Board of Education's request. The differences were: $860,000 in FY 94 (4%), $524,000 (3%) in FY 95-00 and $2.4 million (10%) in FY 96-01.

3. In the FY 97-02 CIP, the Council approved the Board of Education's initial request for construction funding. The approved amount turned out to be $5.2 million less than the lowest bid received for construction of the base project plus selected alternates. This led to a $4.985 million emergency appropriation request and $260,000 transfer of funds. The Council approved the Board of Education's request except for $250,000 associated with the systems development charge.

Exhibit 16

Northwest High School - New Construction

Table A. Construction Cost Funding from Initial Request in FY94-99 CIP to Contract Award in FY97-02 CIP ($000)

	FY94-99 CIP			FY95-00 CIP			FY96-01 CIP			FY97-02 CIP			With FY97-02 EA**	
	Nov-92	Jan-93	May-93	Nov-93	Jan-94	May-94	Nov-94	Jan-95	May-95	Nov-95	Jan-96	May-96	Sep-96	Oct-96
Supt/BOE Request	$19,300			$ 19,968			$ 22,575			$ 22,999			$ 25,799	
Executive Rec. *		$ 18,329			$ 18,655			$ 21,002			$ 22,999			$ 25,799
Council Approved			$ 18,329			$ 18,655			$ 21,727			$ 22,999		$ 25,799

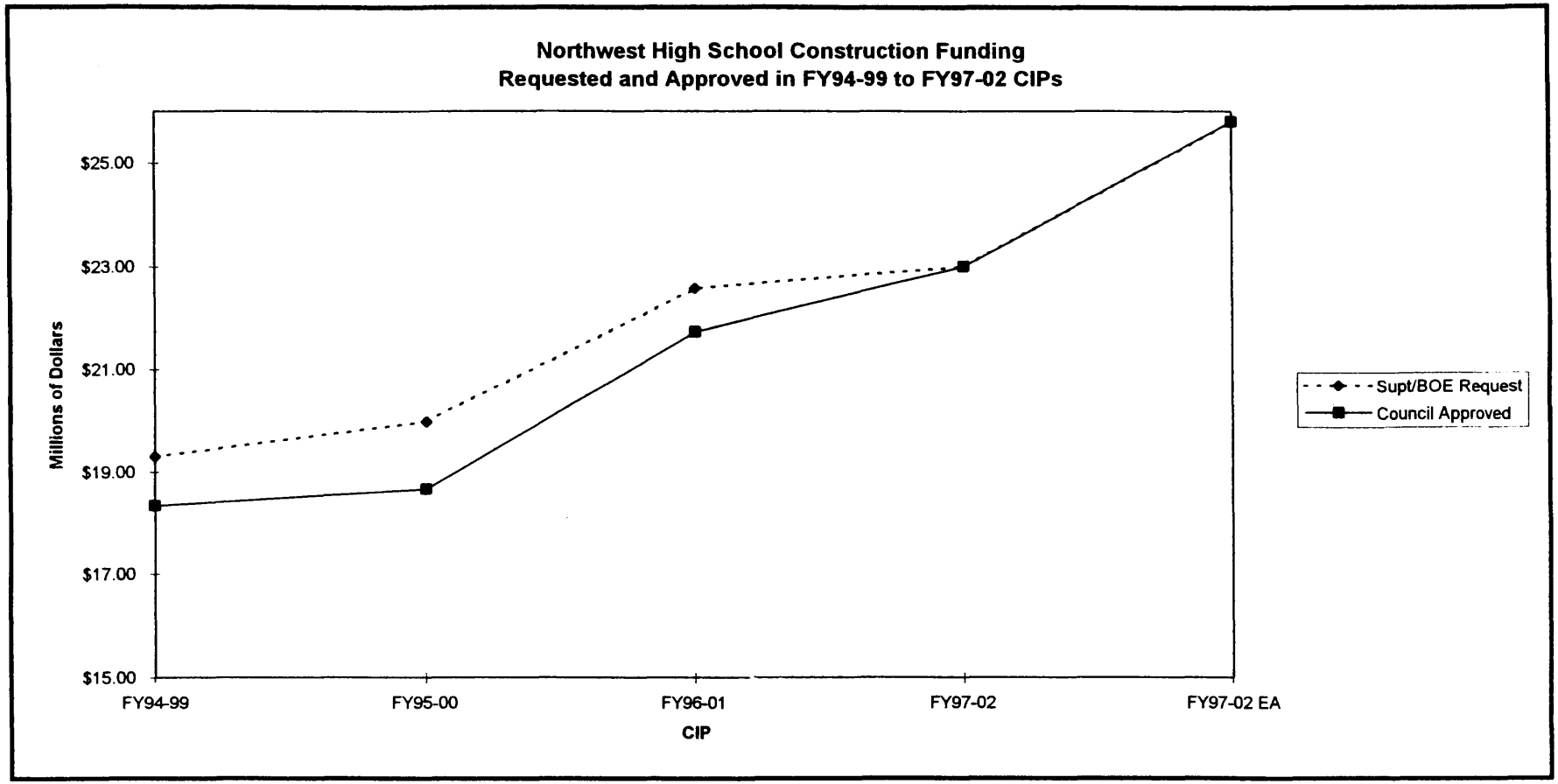
* Based on information provided by MCPS and County OMB staff.

** EA- Emergency Appropriation

Table B. Explanation of Net CIP Adjustments by Board of Education (BOE), County Executive (CE), and County Council (CC) Based on Information Available in Published Project Development Forms

CIP	Who	% Net Change *	Rationale for Cost Adjustment: Scope Change	Reg. Require.	Market Condition	Summary Description
FY94-99	BOE	NA				BOE requests construction funding for project.
	CE	-5%	X		X	Reduced inflation adjustment by 5%, deferred 10 classrooms and adjusted expenditure schedule.
	CC	-5%	X		X	Agreed with CE's recommendation.
FY95-00	BOE	+9%		X	X	Added system development charge and reduced inflation adjustment for a net increase of 9%.
	CE	-7%	X	X	X	Reduced inflation adjustment, reduced funds for classrooms, and reduced amount for SDC.
	CC	-7%	X	X	X	Agreed with CE's recommendation and deferred construction start date one year.
FY96-01	BOE	+21%			X	Added inflation adjustment of 20% to reflect current construction costs.
	CE	-7%			X	Reduced inflation adjustment to 10%.
	CC	-4%			X	Reduced inflation adjustment to 14% and deferred construction start date one year.
FY97-02	BOE	+6%			X	Added inflation adjustment to reflect current construction costs and accelerated construction by one year.
	CE	0%			X	Recommended approval of BOE request.
	CC	0%			X	Approved budget request.
EA FY97-02	BOE	+12%			X	Requested $2.8 million emergency appropriation for construction costs because low bid exceeded budget.
	CE	0%			X	Recommended approval of BOE request for emergency appropriation.
	CC	0%			X	Approved emergency appropriation request.

* For Council and Executive, the net change is calculated as the difference from the Board request.



Observations:

1. The construction cost funding for Northwest High School increased $6.5 million or 34%, between the original Board of Education's request in the FY 94-99 CIP and the amount needed for actual contract award in FY 97.

2. The approved funding level for construction costs in the FY 94-99, FY 95-00, and FY 96-01 CIPs were lower than the Board of Education's request. The differences were: $971,000 (5%) in FY 94-99, $1.3 million (7%) in FY 95-00, and $848,000 (4%) in FY 96-01.

3. For the FY 97-02 CIP, the Council approved the Board of Education's initial request for construction funding. The approved amount turned out to be $2.8 million less than the lowest bid received for construction of the base project plus selected alternates. This led to a $2.8 million emergency appropriation request from the Board of Education, which was approved by the Council.

Exhibit 17

Poolesville Middle School - New Construction

Table A. Construction Cost Funding from Initial Request in FY95-00 CIP to Contract Award in FY97-02 CIP ($000)

	FY95-00 CIP	FY96-01 CIP			FY97-02 CIP			With FY97-02 EA***	
	May-94	Nov-94	Jan-95	May-95	Nov-95	Jan-96	May-96	Jun-96	Jul-96
Supt/BOE Request	**	$ 7,210			$ 6,932			$ 7,892	
Executive Rec. *			$ 6,490			$ 6,742		$ 7,892	
Council Approved	$ 5,490			$ 6,730			$ 6,742		$ 7,892

* Based on information provided by MCPS and County OMB staff.

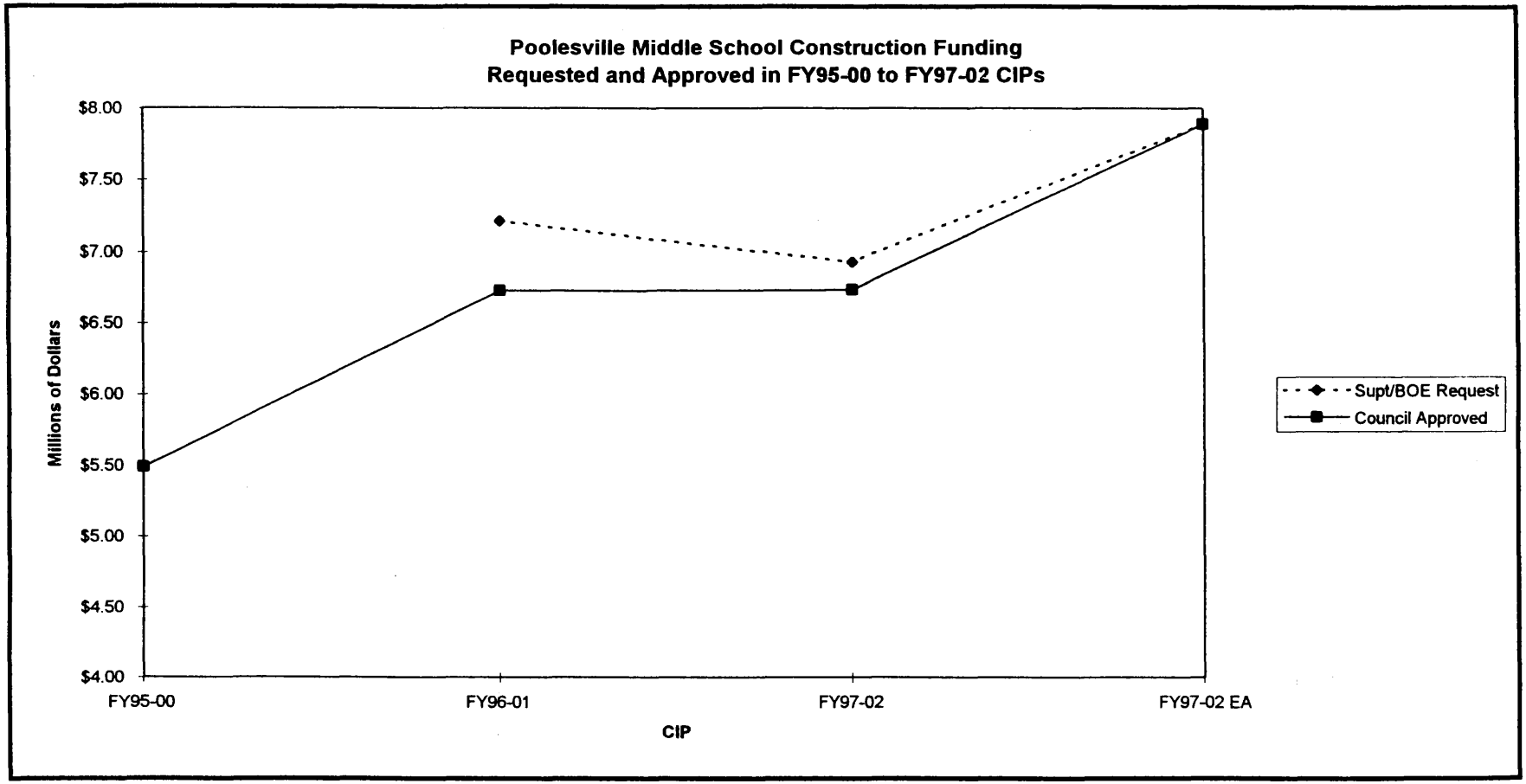
* * The BOE's FY 95-00 CIP request included a project to construct a relocatable addition at the existing Poolesville HS/MS facility, with the long-range goal to provide a separate middle school facility. The approved CIP included estimated funding for construction of a separate middle school.

*** EA- Emergency Appropriation

Table B. Explanation of Net CIP Adjustments by Board of Education (BOE), County Executive (CE), and County Council (CC) Based on Information Available in Published Project Development Forms

CIP	Who	% Net Change *	Rationale for Cost Adjustment: Scope Change	Reg. Require.	Market Condition	Summary Description
FY95-00	CC	N/A	X			Approved CIP was based on CC request for BOE to explore building a separate middle school in lieu of expanding the existing HS/MS facility.
FY96-01	BOE	+31%	X		X	Added inflation adjustment of 22% and added cost of rock removal.
	CE	-10%			X	Reduced inflation adjustment to 10%.
	CC	-7%			X	Reduced inflation adjustment to 14%.
FY97-02	BOE	+3%			X	Added 3% inflation adjustment (consistent with OMB guidelines).
	CE	-3%			X	Eliminated 3% inflation adjustment (based on fact that project construction funds were appropriated in FY 96-01 CIP) and adjusted expenditure schedule to accomodate accelerated schedule in Blair HS project.
	CC	-3%			X	Agreed with CE's recommendation.
EA FY97-02	BOE	+17%			X	Added $1.15 million emergency appropriation for construction costs because low bid exceeded budget.
	CE	0%			X	Recommended approval of BOE request for emergency appropriation.
	CC	0%			X	Approved emergency appropriation request.

* For Council and Executive, the net change is calculated as the difference from the Board request.



Observations:

1. The construction cost funding for the separate Poolesville Middle School increased $2.4 million or 44%, between the first Council approved amount in the FY 95-00 CIP and the amount needed for actual contract award in FY 97.

2. The approved funding level for construction costs in the FY 96-01 and FY 97-02 CIP was lower than the Board of Education's request. The differences were $480,000 (7%) in FY 96-01 and $190,000 (3%) in FY 97-02.

3. When MCPS bid the construction for the new Poolesville Middle School the first time (April 1996), the contract bids all exceeded the construction budget, as approved in the FY 97-02 CIP. The Board of Education authorized the re-bidding of the project.

4. MCPS staff reduced the scope of the project and new bids were received in late May 1996. Scope changes were primarily design changes within the facility. All contract bids on the re-bid continued to exceed the construction budget. This led to a $1.15 million emergency appropriation request from the Board of Education, which was approved by the Council.

Exhibit 18

Einstein High School - Modernization

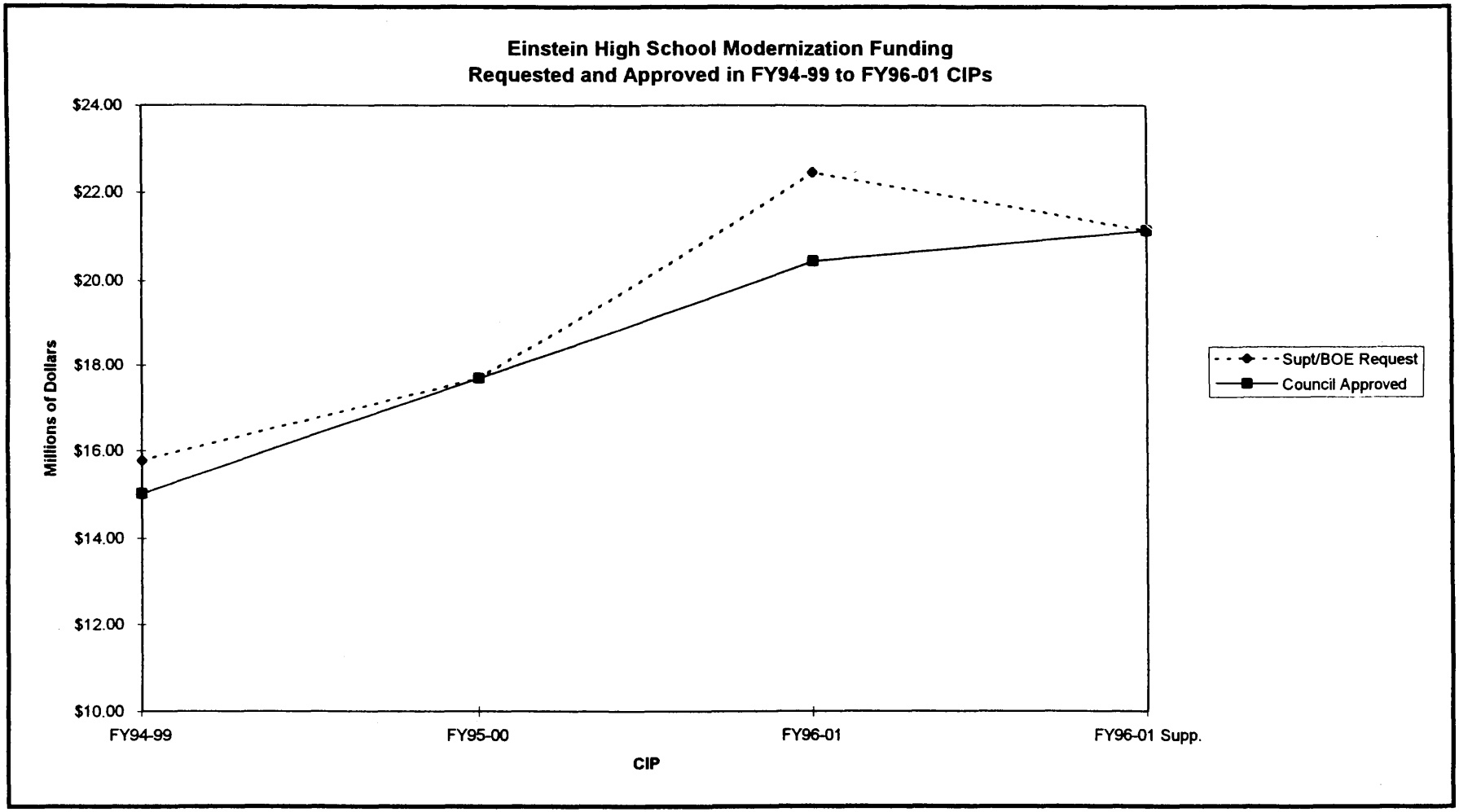
Table A. Construction Cost Funding from Initial Request in FY94-99 CIP to Contract Award in FY96-01 CIP ($000)

	FY94-99 CIP		FY95-00 CIP		FY96-01 CIP		With FY96-01 Supp.	
	Nov-92	May-93	Nov-93	May-94	Nov-94	May-95	Nov.-95	Feb-96
Supt/BOE Request	$ 15,775		$ 17,692		$ 22,450		$ 21,147	
Council Approved*		$ 15,024		$ 17,692		$ 20,457		$ 21,147

* The Council does not separately appropriate construction funds for modernization projects. The number shown here represents the amount associated with the Einstein modernization project, as identified by MCPS staff.

Table B. Explanation of Net CIP Adjustments by Board of Education (BOE) and County Council (CC) Based on Information Available in Published Project Development Forms

CIP	Who	% Net Change	Rationale for Cost Adjustment: Scope Change	Reg. Require.	Market Condition	Summary Description
FY94-99	BOE	N/A				BOE requests construction funding for project.
	CC	-5%			X	Reduced inflation adjustment by 5% and deferred construction start date by one year.
FY95-00	BOE	+18%	X	X	X	Added system development charge, added a 5% inflation adjustment and added 6 classrooms. Requested that project be deferred one year based on availability of holding school (Northwood).
	CC	0%				Approved budget request and accelerated construction start date by two years (compared to FY95-00 request).
FY96-01	BOE	+27%		X	X	Added 20% inflation adjustment to reflect current costs and increased costs for stormwater management.
	CC	-9%	X		X	Reduced inflation adjustment and deleted two classrooms.
Supp. FY96-01	BOE	+3%	X		X	Deleted two classrooms and requested $690,000 supplemental because low bid exceeded budget.
	CC	0%	X		X	Approved supplemental request.



Observations:

1. The construction funding associated with Einstein High School's modernization increased $5.4 million or 34%, between the original Board of Education's request in the FY 94-99 CIP and the amount needed for actual contract award in FY 96.

2. The approved funding level for modernizations in the FY 94-99 and FY 96-01 CIPs were lower than the Board of Education's request. For the Einstein modernization, the differences were: $751,000 (5%) in FY 94-99, and $1.993 million (9%) in FY 96-01.

3. For the Einstein modernization, the approved amount in the FY 96-01 CIP turned out to be $690,000 less than the lowest bid received for construction of the base project plus selected alternates. The Board of Education requested a $1.5 million supplemental appropriation for modernizations, of which $690,000 was for Einstein. The Council approved the supplemental request.

Exhibit 19

Wyngate Elementary School - Modernization

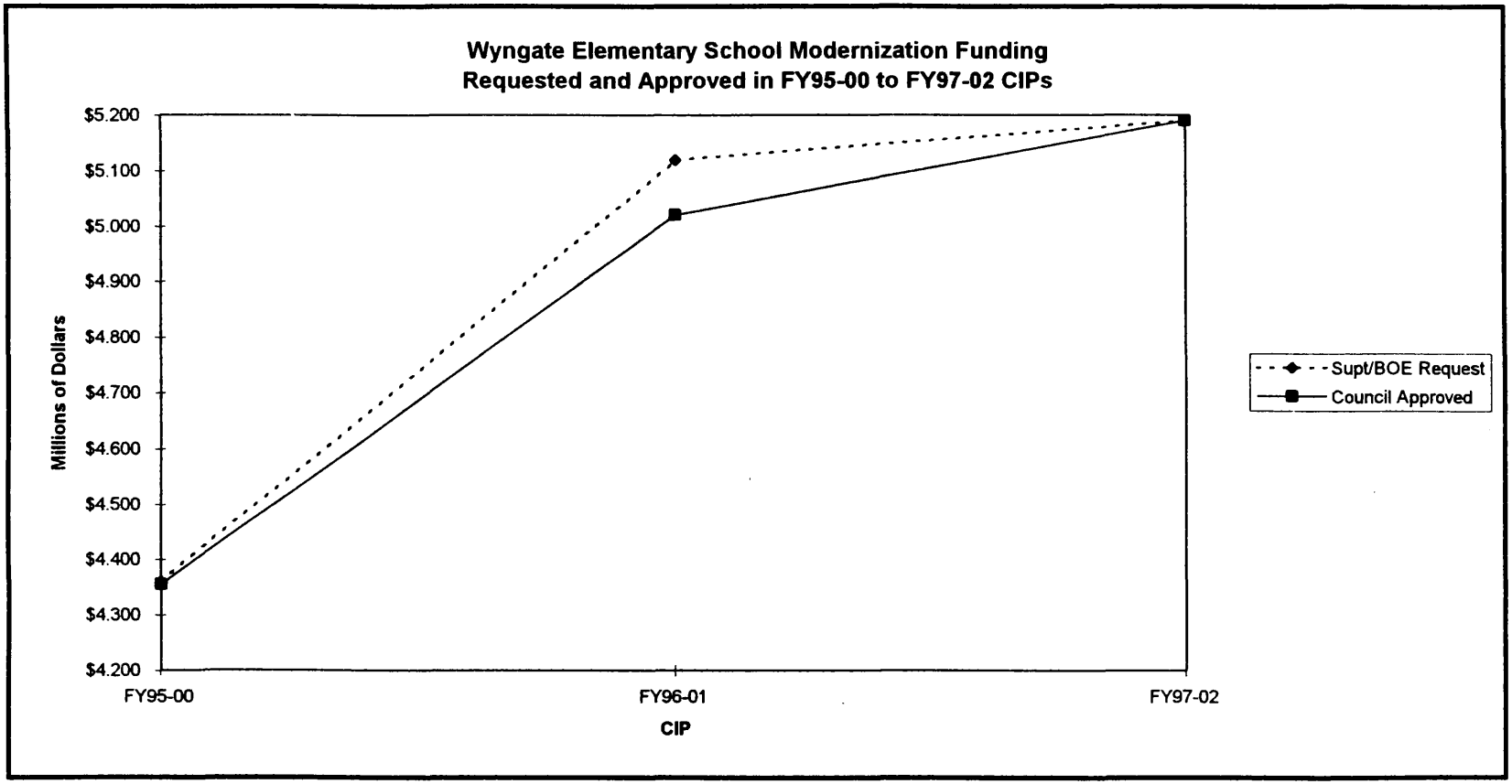
Table A. Construction Cost Funding from Initial Request in FY95-00 CIP to Contract Award in FY97-02 CIP ($000)

	FY95-00 CIP		FY96-01 CIP		FY97-02 CIP	
	Nov-93	May-94	Nov-94	May-95	Nov-95	May-96
Supt/BOE Request	$ 4,361		$ 5,120		$5,185	
Council Approved*		$ 4,356		$ 5,022		$5,185

* The Council does not separately appropriate construction funds for modernization projects. The number shown here represents the amount associated with the Einstein modernization project, as identified by MCPS staff.

Table B. Explanation of Net CIP Adjustments by Board of Education (BOE) and County Council (CC) Based on Information Available in Published Project Development Forms

CIP	Who	% Net Change	Rationale for Cost Adjustment: Scope Change	Reg. Require.	Market Condition	Summary Description
FY95-00	BOE	NA				BOE requests construction funding for project.
	CC	-.1%				No reason indicated.
FY96-01	BOE	+18%			X	Added inflation adjustment of 20% to reflect current construction costs.
	CC	-2%			X	Reduced inflation adjustment and accelerated project one year.
FY97-02	BOE	+3%			X	Added inflation adjustment to reflect current construction costs.
	CC	0%			X	Approved budget request.



Observations:

1. The construction funding associated with Wyngate Elementary School's modernization increased $824,000 or 19%, between the original Board of Education's request in the FY 95-00 CIP and the amount needed for actual contract award in FY 97.

2. The approved funding level for modernizations in the FY 95-00 and FY 96-01 CIPs were lower than the Board of Education's request. For the Wyngate modernization, the differences were: $5,000 (.1%) in FY 95-00 and $98,000 (2%) in FY 96-01.

3. The amount approved in the FY 96-01 CIP associated with the Wyngate modernization was less than the lowest bid received for construction of the base project and alternates selected. However, the difference was relatively small (less than $25,000) and was paid for out of the project's contingency budget.

4. In the FY 97-02 CIP, the Council approved the additional amount in the Modernizations project development form associated with the Wyngate modernization.

V. COMPARATIVE INFORMATION

In the time available for this report, OLO was able to compile comparative data based primarily on interviews with representatives from four other school systems in the region (Fairfax, Baltimore County, Howard, Frederick), the State Interagency Committee for School Construction (IAC), the State Department of General Services (check name), and the federal General Services Administration. Square foot cost data on schools in the region were obtained through interviews and document reviews. A report on school construction costs produced by Loudoun County also provided some comparative information.

This chapter summarizes OLO's observations on how MCPS' recent school construction experience compares with that of other school systems in the area.

1. The dollar amount of school construction (new and modernizations) in Montgomery County exceeds that of other Maryland counties. This year, it is close to the dollar amount undertaken by Fairfax County Public Schools.

Appendix D contains a chart from the Interagency Committee on School Construction (IAC) that summarizes the Capital Improvements Program (CIP) funding requests for school construction projects in Maryland, as approved by the IAC and submitted to the Board of Public Works in January 1997. While the data evidence investment in school construction throughout the state, the annual projected construction activity in Montgomery County is substantially higher than in other counties.

This fiscal year, MCPS awarded $95.5 million in construction contracts. This compares to $100 million awarded this year by Fairfax County Public Schools. For the foreseeable future, similar to Montgomery County, most of Fairfax County's construction activity will be for the repair and upgrades to existing schools as opposed to new construction.

2 Readily available square foot cost data suggest that MCPS' cost experience is not out of line with other school systems in the area. The validity of this comparison, however, is limited because of the inconsistent methods used to compile and report construction cost information.

Exhibits 20 and 21 list the school construction square foot cost data that are readily available for schools either newly constructed or modernized since 1995.
Exhibit 20 (page 34a) includes data on elementary schools and Exhibit 21 (page 34b) includes data on middle and high schools. Most of the schools listed are located in the Washington-Baltimore metropolitan areas. Because of the significantly fewer middle and high school built during the past several years, Exhibit 21 includes cost data for some high schools in other parts of the state.

Exhibit 20

Reported Square Foot Construction Costs*
Elementary Schools, 1995-1997

County	School Name	Constr. Type	Bid Date	Sq. Ft. Cost
Anne Arundel County, MD	South Shores	New	7/96	$124
Baltimore County, MD	Edgemere	New	6/96	$119
Anne Arundel County, MD	Park	New	5/95	$116
Baltimore County, MD	Southwest	New	9/96	$114
Anne Arundel County, MD	Meade Heights	New	1/96	$112
Carroll County, MD	Elmer Wolfe	New	3/96	$112
Anne Arundel County, MD	Jacobsville	New	1/97	$109
Howard County, MD	N/A	New	7/96	$93
Anne Arundel County, MD	Ridgeway	New	1/97	$92
Fairfax County, VA	Fort Hunt	New	10/95	$91
Montgomery County, MD	**Kemp Mill**	**Mod**	**4/95**	**$88**
Fairfax County, VA	Hunt Valley	New	9/95	$87
Fairfax County, VA	Belvedere	New	8/95	$87
Loudoun County, VA	Lowes Island	New	4/96	$86
Fairfax County, VA	Fort Belvoir	New	6/96	$86
Fairfax County, VA	Sleepy Hollow	New	8/95	$86
Loudoun County, VA	Ashburn Village	New	4/96	$85
Fairfax County, VA	Saratoga	New	10/96	$85
Montgomery County, MD	**Wyngate**	**Mod**	**6/96**	**$81**
Montgomery County, MD	**Jackson Road**	**Mod**	**7/94**	**$82**
Fairfax County, VA	Gunston	New	7/95	$80
Fairfax County, VA	Kings Park	New	6/95	$80
Montgomery County, MD	**Rosemont**	**Mod**	**7/94**	**$80**
Montgomery County, MD	**Georgian Forest**	**Mod**	**7/94**	**$78**
Montgomery County, MD	**Flower Valley**	**Mod**	**4/95**	**$77**
Fairfax County, VA	Kings Park	Renewal	6/95	$61

* The data come from a variety of sources, including surveys conducted by local school systems, architecture/engineering firms, and construction management firms. Without further analysis of the calculation methods used, the validity of comparing these square foot costs is unclear.

Exhibit 21

Reported Square Foot Construction Costs*
Middle and High Schools, 1995-1997

County	School Level	School Name	Constr. Type	Bid Date	Sq. Ft. Cost
Worcester County, MD	Middle	Stephen Decatur	New	3/96	$113
Queen Anne County, MD	High	Kent Island	New	11/96	$112
Montgomery County, MD	**High**	**Northeast**	**New**	**6/96**	**$105**
Loudoun County, VA	High	Eastern Loudoun Co.	New	1995	$102
Loudoun County, VA	High	Potomac Falls	New	1995	$100
Frederick County, MD	High	Urbana	New	1996	$100
Montgomery County, MD	**Middle**	**Poolesville**	**New**	**6/96**	**$99**
Montgomery County, MD	**High**	**Northwest**	**New**	**7/96**	**$97**
Montgomery County, MD	**High**	**Montgomery Blair**	**New**	**1/96**	**$96**
Howard County, MD	High	N/A	New	7/95	$92
Harford County, MD	High	CM Wright	Add.	10/95	$91
Montgomery County, MD	**Middle**	**Northwest Area**	**New**	**3/96**	**$97**
Howard County, MD	Middle	N/A	New	7/96	$90
Fairfax County, VA	Middle	Whitman	New	8/95	$90
Baltimore County, MD	High	Towson	Renov.	9/95	$81
Montgomery County, MD	**High**	**Einstein**	**Renov/ Add.**	**10/95**	**$74**
Fairfax County, VA	Middle	Whitman	Renewal	8/95	$54

* The data come from a variety of sources, including surveys conducted by local school systems, architecture/engineering firms, and construction management firms. Without further analysis of the calculation methods used, the validity of comparing these square foot costs is unclear.

In the process of compiling square foot data, it became apparent that different school systems use different methodologies to compile and report construction cost data. Examples of inconsistencies include: whether to include the costs of athletic facilities; the definitions of "normal" site development; and whether to use the amount of the contract award, the final approved budget, or the final costs (including change orders) for the project.

Without additional work to ensure more consistent calculations, the validity of the comparative square foot cost data is limited. However, the data that are available suggest that MCPS' cost experience has not been out of line with that of other school systems in the area.

3. Between 1986 and 1995, MCPS' average square foot costs of new school construction was lower than the square foot cost allocation established by the State Interagency Committee on School Construction (IAC).

Exhibit 22 (page 35a) graphs MCPS average square foot costs of school construction vs. the annual square foot cost calculated by the IAC for determining new construction cost reimbursement throughout the State. The data show that between 1986 and 1995, MCPS' costs of new construction were consistently lower than IAC's amount, in amounts that ranged from $3 to more than $30. In 1996, MCPS' square foot costs were about $3 higher than IAC's.

Further analysis of IAC's calculation method is required before reaching any conclusions as to why this pattern exists. At least part of the explanation, however, may be that IAC's calculation is a statewide average based on the schools for which contracts were awarded during a specific time period. This means that the IAC's calculation does not adjust for the types of schools built (e.g., elementary, middle, high) or correct for regional variations in market conditions.

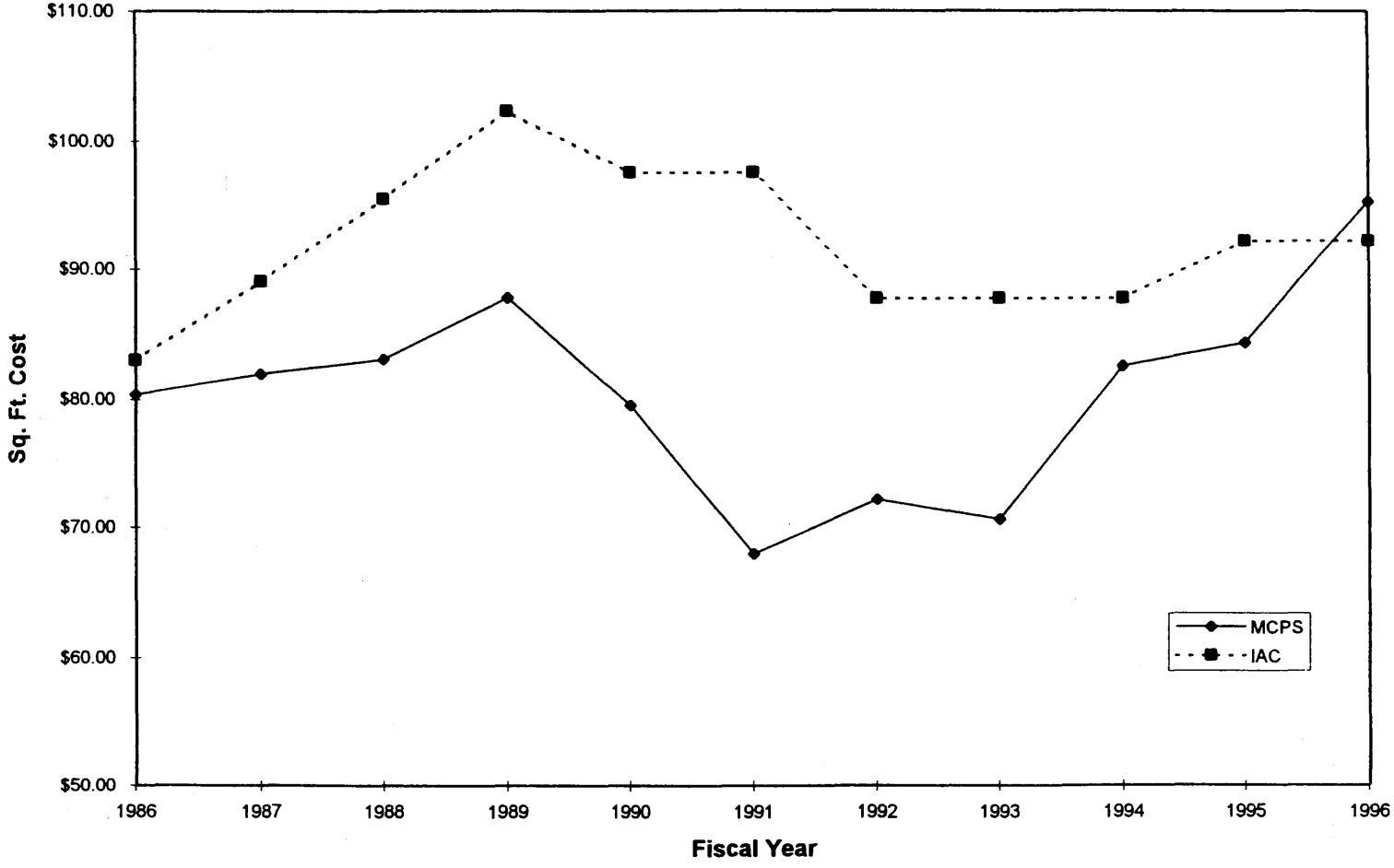
When OLO asked why Montgomery County's square foot costs might be lower than other parts of the state, contractors consistently cited the following reasons:

- MCPS pays well. MCPS has a 7-day pay policy which means that contractors are guaranteed a check within one week after submitting their requests for payment. This prompt service is worth a lot to contractors.
- MCPS staff, especially those in the Division of Construction, have a reputation for being professional and reasonable. Having confidence that you will be able to establish good working relationships with the project managers is worth something to contractors when they are putting together their bids.
- Montgomery County is in relatively close geographic proximity to many of the contractors and subcontractors, and reduced time getting to a job site also affects the cost of construction.

While these reasons are not easily quantifiable, they are likely factors that affect the costs of school construction in Montgomery County.

Exhibit 22

Square Foot New Construction Costs from 1986 to 1996
MCPS vs. Interagency Committee on School Construction



MCPS data represent the average (mean) square foot costs of new construction during each fiscal year. Interagency Committee on School Construction (IAC) data represent the dollar amount the IAC develops and uses each year to determine State contributions to local school construction projects. By law, Montgomery County can be reimbursed for up to 50% of "eligible" school construction costs, as determined by the IAC.

4. The school system representatives interviewed all report significant increases in construction costs since the economic recession in the early 1990's. The different school systems are using different strategies to deal with these cost increases.

MCPS reported average square foot cost of new school construction increased 40 percent between 1991 and 1996, from $68 to $95. While recognizing the limits of square foot cost comparisons, the average square foot costs reported by Fairfax County Public Schools also increased 40 percent between 1991 and 1996, from $61 to $86.

Different school systems use different strategies to deal with the increased costs of school construction. For example, Frederick County and Howard County both report making significant scope reductions to their projects in order to meet budgeted amounts.

Howard County staff reported reducing the scope of several projects before going out to bid; in one project the changes included a 10 percent reduction in the number of square feet. Frederick County staff reported reducing the scope of a new high school only after the original bid resulted in all bids exceeding the project budget. After reducing the project scope (including elimination of an auxiliary gym), Frederick County re-bid the project which meant a six month delayed opening of the new school. Even after re-bidding the project, the project still required a supplemental appropriation.

Fairfax County Public Schools' reported the ability to provide projects with supplemental funds, using a reserve account that was built up in the early 1990's when contract bids were lower than budgeted amounts. Fairfax County funds school construction projects through bond referendums and is authorized to maintain surplus funds in this reserve account.

The federal GSA reports a similar ability to access supplemental funds without seeking an additional appropriation, when bids for a specific project exceed a budgeted amount. Specifically, GSA has some limited authority to re-program funds which are earned as rent and placed in a revolving fund for capital facilities work.

5. A number of school systems use delivery methods other than the traditional design-bid-build method.

Since the late 1980's, Howard County Public Schools has used the Construction Manager-Agency method for school construction. Howard County hires a Construction Manager (CM) at the same time as the project architect. The CM serves as a professional construction consultant, who works on behalf of the school system throughout the course of the project. During the construction period, the CM manages multiple prime contracts, which continue to be held by the school system. (This is similar to the model MCPS is using for construction of Blair High School.)

Howard County officials believe using the CM model is a cost-effective way to build schools. All projects used with the CM method have been completed on time and within budget. Howard County staff believe the professional fee paid to the CM is less than what would be paid to a general contractor in the form of overhead and profit. Finally, the CM approach has enabled the school system to maintain a relatively small in-house staff to manage the construction program.

Baltimore County Public Schools is using a Design-Build method for the design and construction of 11 elementary school additions. Baltimore County also reports using the CM-Agency method on selected projects.

Fairfax County tried a low-bid total Design-Build project more than 20 years ago. The County was not pleased with the results and does not plan to try it again. Loudoun County, however, is experimenting currently with a variation on a Design-Build scenario for a new school. The idea being tried is to take the design of the school through the schematic phase, and then award a contract for completion of the design and construction of the facility.

The State is using the Design-Build method for selected projects, including some facility construction on the University of Maryland campuses. At the federal level, a number of agencies, including the General Services Administration, Federal Bureau of Prisons, and Postal Services, is using both CM and Design/Build methods. For more about the potential benefits of alternate methods, see Chapter II, Section D of this report.

VI. FINDINGS AND RECOMMENDATIONS

The Council requested the Office of Legislative Oversight to conduct this budget inquiry because of $12.6 million in emergency appropriation requests from the Board of Education since last July related to the new construction of three high schools and one middle school. The Board's emergency funding requests were based on construction bids that ranged from 14-30 percent above approved funding levels.

The Office of Legislative Oversight's findings and recommendations respond to the following questions:

- What explains the gap between approved budgets and contract awards for school construction projects that leads to emergency or supplemental funding requests, and what can be done to eliminate this gap?

- Why have school construction costs increased over the past five years, how does Montgomery County's experience compare to that in other jurisdictions, and what opportunities exist for reducing future costs?

A. FINDINGS

1. MCPS' Costs of School Construction

a) Between 1989 and 1991, MCPS' average square foot costs for school construction decreased 23 percent while general inflation increased by 9.5 percent. Between 1991 and 1996, MCPS' square foot costs increased 40 percent while general inflation increased approximately 15 percent.

b) The school construction market is a sector of the nonresidential/institutional construction market. In addition to educational building, the institutional market includes healthcare facilities, amusement-related construction such as convention centers and sports arenas, and other public sector projects such as jails, police stations, and post offices.

c) School construction costs are influenced by factors that are not captured by a general inflation index. Examples of factors that influence school construction costs are: the number of other institutional construction (especially school) projects being bid in the region; the market price of specific materials used in school construction (e.g., concrete, masonry and steel); and prevailing wages in the region for certain trades (e.g., masons, steel erectors, drywall subcontractors).

d) During the early 1990's, the economic recession resulted in lower costs of school construction. The bids for school construction during and immediately after the recession reflected very low profit margins, as general contractors and subcontractors sought jobs just to stay in business.

e) During the past five years, school construction costs increased at a rate that exceeded general inflation due to a combination of market conditions, new construction standards, and changes in educational requirements.

f) The non-residential construction market, and in particular the institutional sector, has cycled upward with construction costs rising at a rate higher than general inflation. Because there are greater opportunities for work, the school construction market is supporting higher profit margins and fewer builders are competing for a larger number of jobs.

g) Separate and apart from market conditions, the scope of a school construction project can change between the time it is decided to plan the construction to the time a construction contract is awarded. A scope change can be:

- Program related, e.g., the number or size of classrooms,
- Design related, e.g., the shape of the roof, the type of flooring; and
- The result of a regulatory requirement, e.g., fire or building code.

A scope change can also result from what is known as "unforeseen conditions", such as the discovery of rock under the building site.

h) The costs of building schools in the County has increased since the early 1990's in part due to changes in construction standards and educational requirements. It is estimated that the following requirements have added between $7-$13 a square foot to school construction:

- Stricter fire code regulations for fire suppression systems: $1 per square foot;
- American for Disabilities Act requirements: $1 per square foot;
- Stricter building code requirements for mechanical ventilation equipment (to reduce the possibility of "sick building syndrome"): $1-$2 per square foot;
- Stormwater management requirements: $2-$4 per square foot; and
- Technology infrastructure: $2 to $5 per square feet;

Separate and apart from market conditions, on a base of $68 per square foot in 1991, these scope changes explain cost increases between 10-20 percent during the past five years.

2. Other Factors that Impact School Construction Costs

a) The educational specifications have a profound influence on the costs of school construction. At present, there are differing views as to whether and how the ed specs should be changed, and whether changes could eventually produce construction cost savings. MCPS is launching an effort to review the educational specifications for elementary, middle, and high schools.

b) The cost of building a school also has something to do with the number of bidders, especially in a market where contractors have plenty of job opportunities. Up to a point, a larger number of bidders means more competition and the potential for lower prices. In order to ensure a healthy bid environment, MCPS needs at least 4-5 responsive and responsible bidders on new construction and modernization projects.

c) MCPS staff already employs value analysis during the design process, but does not presently use financial incentives to encourage value analysis after a contract is awarded. Value analysis or value engineering is an interdisciplinary analysis of the design and function of a building or system for the purpose of identifying the maximum use of materials or construction techniques to produce the lowest cost possible without sacrificing quality, performance, or desired aesthetics. It can mean either getting the best possible product for a given cost, or getting the same quality of product for a lower cost.

d) The Council's policy of bidding 10 percent of every school construction project as add-alternates makes sense when the add-alternates are optional items. The recent Board record of selecting project alternates, even when contract bids exceed the approved budget for the project, evidence that items being bid as alternates are not truly "optional" items. While it is unclear whether bidding non-optional project components as alternates adds to the cost of projects, the use of numerous alternates is a nuisance factor that increases the chances of contractor errors and may even deter potential contractors from bidding on MCPS projects.

3. Comparative Findings

a) At present, the validity of using square foot cost data to compare MCPS' construction cost experience to that of neighboring jurisdictions is questionable because of inconsistent methods used to calculate square foot costs. This is especially true for comparing square foot costs of modernization projects.

b) With the above caveat, other school systems in the region report increases in square foot costs during the past five years that generally parallel MCPS' experience. For example, between 1991 and 1996, both MCPS and Fairfax County Schools report 40 percent increases in square foot costs for new construction.

c) Different school systems use different strategies to deal with construction cost increases. For example, Howard County and Frederick County Public Schools report reducing the scope and re-bidding projects. Fairfax County Public Schools has tapped into a reserve fund that was built up in the early 1990's when contract bids were lower than budgeted amounts.

d) Some school systems are also using alternate construction delivery methods. For example, Howard County uses the Construction Manager-Agency method; and Baltimore County is building 11 elementary school additions using the Design/Build method.

e) Between 1985 and 1986, MCPS' average square foot costs of new school construction were lower that the square foot cost allocation established each year by the Interagency Committee on School Construction (IAC). Further analysis of IAC's calculation method is required before reaching any conclusions as to why this pattern exists. At least part of the explanation, however, is that IAC's calculation is a statewide average based on the schools for which contracts were awarded during a specific time period; the IAC's calculation does not adjust for the types of schools built (elementary, middle, high) or correct for regional variations in market conditions.

f) When asked why Montgomery County's square foot costs might be lower than in some other parts of the state, contractors consistently cited the following reasons:

- MCPS' seven-day pay policy means that contractors are guaranteed a check within one week after submitting their requests for payment;
- MCPS staff, especially those in the Division of Construction, have a reputation for being professional and reasonable; and
- Montgomery County is in relatively close geographic proximity to many of the contractors and subcontractors, and reduced time getting to a job site affects bid prices.

4. Traditional vs. Alternative Delivery Systems for School Construction

a) With few exceptions, MCPS builds and modernizes schools using the traditional delivery system known as Design-Bid-Build. The major activities occur sequentially: a project architect designs the facility, MCPS selects a General Contractor through a competitive low-bid process, and then construction begins. MCPS is using an alternate model (Construction Manager-Agency) for the construction of Blair High School.

b) The State law governing school construction encourages the traditional delivery method because the State will only reimburse jurisdictions for school construction contracts awarded to the lowest responsible bidder. For example, the State will not reimburse localities for professional services, such as architectural or construction management services, that are not selected on the basis of low bid. In addition, State law does not allow for more flexible award arrangements, such as competitive negotiation or negotiation with the lowest bidder.

c) In recent years, more educational and public agencies have turned to alternate delivery structures with the hopes of reducing costs and/or project delivery time. The state, federal government, and even some area school systems are using construction management and design/build in selected projects. (See earlier comparative findings.)

d) Alternate delivery methods differ from the traditional method with respect to the contract structures, and responsibilities of the owner, the architect, the contractor, and in some cases, a construction manager. The literature on traditional vs. alternate delivery methods consistently points out that there is no "best" method of project delivery for all public construction projects. However, advocates of the non-traditional methods argue that having alternatives to the traditional design-bid-build model available provide an opportunity to produce cost savings.

e) The major reasons cited for potentially reducing costs with alternate structures are the opportunities to:

- Reduce project completion time;
- Make greater use of financial incentives; and
- Create a team atmosphere among the owner, architect, and contractor.

5. The Budget Process and Emergency/Supplemental Appropriations for the Case Study Schools

For the four new construction and two modernizations projects selected as case studies:

a) There is evidence that MCPS initial budget requests were ballpark estimates based on outdated square foot costs from projects that had been built during the economic recession in the early 1990's. (The six case study projects were started before MCPS initiated facility planning. This means that construction cost estimates were published before a feasibility plan and guidelines educational specifications were completed.)

b) As these projects progressed through the design process, MCPS revised its construction budget requests, based on updated cost estimates. The rigor of MCPS cost estimates varied and the timing of MCPS' updated cost estimates did not always coincide with the budget preparation schedule.

c) The extent to which the approved CIP funding level differed from the Board's request for construction costs varied from year to year and from project to project. In some cases, the budgeted amounts approved in the CIP were below the Board's requests. In other cases, the Council approved the amounts requested. The Council's action sometimes agreed and other times disagreed with the County Executive's recommendations.

d) The County Executive recommended and the County Council more often than not reduced MCPS' requested budget amounts or denied requested increases for several reasons:

- decisionmakers believed that the proposed scope of MCPS' projects included some non-essential items that could be eliminated to reduce costs;
- decisionmakers were concerned that increasing the budgeted amounts might have an inflationary effect on bids; and
- there are substantial pressures on decisionmakers to maintain lower budgeted amounts in order to accommodate a greater number of projects in the CIP within fixed resource limits.

e) The contract bids for five of the six case study schools (Northeast, Northwest, Blair, Poolesville, and Einstein) came in substantially above the budgeted amounts because the projects proceeded through the design and bidding process without making adjustments to more closely align budgeted amounts to cost estimates.

f) In these five school, while MCPS staff took steps to contain costs, by the time the gap was identified, the projects were too far along to make the scope adjustments that would have been needed to keep the projects within the budgeted amount. The gap between contract bids and the budgeted amount was too large in these projects to be covered by the project's contingency fund.

g) With the Wyngate ES modernization project, the gap between the budget and the project cost estimate came at an earlier time in the design process. It was possible to make adjustments to the scope of the project to more closely align the budgeted amount with the cost estimate for the project. Although contract bids still exceeded the budgeted amount, the difference was small enough to be covered by the project's contingency fund.

6. Process Lessons from the Case Study Schools

a) The school construction budget process suffers from a failure to differentiate between placeholder or ballpark cost estimates that have large margins of error, and rigorous cost estimates that have much smaller margins of error. This is particularly true for projects (like all six case study schools) that were started before MCPS initiated facility planning.

b) There is no agreed-on and consistent decision point early enough in the design and approval process that requires the Council or Board of Education to reconcile the cost, scope, and timing of projects with budget affordability. The absence of this decision point enables projects to proceed through the later phases of architectural design and even the bidding process, despite gaps between the budgeted amount and estimated project cost.

c) The further along a project is in the design process, the greater is the pressure for the budget gap to be solved by an emergency or supplemental appropriation. By the time a project completes the design development phase, it is expensive and often impractical to reduce a project's scope, which is necessary to reduce construction costs by any significant amount.

d) With current practice, the reasons and justification for adjusting a project's construction cost estimate are not consistently or clearly documented. It is difficult to track whether revisions are made because of actual changes in the scope of the project and/or because of judgments concerning how general inflation or market conditions will change the cost of construction.

e) There is not a consistent method used in the budgeting process for deciding how to adjust school construction cost estimates for "market conditions." As indicated above, the school construction market is a sector of the nonresidential/institutional construction market, and school construction costs are influenced by factors that are not captured by a general inflation index.

7. The Discipline of Estimating Construction Costs

a) MCPS' construction cost estimates vary in terms of who prepares them and the rigor with which they are prepared. Before MCPS started facility planning in the FY 96-01 CIP, initial project construction costs were estimated in-house, by making rough calculations based on estimated square foot costs of the new facility and recent construction cost experience. With the advent of facility planning, MCPS may also use outside estimators to develop initial project construct cost estimates

From the point of schematic planning on, most cost estimates for school projects are prepared by independent cost estimators, on contract either to MCPS directly or to the project architect. In the past, MCPS' independent cost estimates have not been routinely shared with Executive or Council staff.

b) The discipline exists to develop construction cost estimates for specific projects that come within an expected margin of error. The margin of error between the estimate and the eventual contract bids will vary according to how far along the project is toward the completion of design and bidding documents, and how long it is before the contract documents are issued for bidding. **The further into the architectural design process, the more accurate become the cost estimates and the more costly and difficult it becomes to make changes that could reduce project costs.**

c) It is generally accepted by building professionals that by the end of MCPS' facility planning process (instituted for projects started since FY 96), it is realistic to expect a construction cost estimate to be within a margin of error of plus or minus 10-15 percent for new construction projects, and plus or minus 15-20 percent for modernization projects.

When the contract documents are fully prepared, it should be possible to estimate construction costs for both types of projects within a 1-3 percent margin of error. Modernization projects will have a higher margin of error until design development is completed because there is greater uncertainty as to what will be required.

d) There will always be some margin of error between budgeted amount and contract bids. The margin of error, however, should be expected in both directions, meaning that sometimes budgeted amounts will be higher than actual bids and sometimes budgeted amounts will be lower.

At the completion of this planning/design phase:	Percent of Facility Design Completed	Expected Margin of Error of Construction Cost Estimate: New Construction Projects:	Expected Margin of Error for Construction Cost Estimate: Modernization Projects:
Preliminary estimate	0%	25-40%	25-40%
Facility planning*	under 10%	10-15%	15-20%
Schematic Design	15%	less than 10%	less than 15%
Design development	25-30%	5 - 10%	5 - 10%
Construction documents	100%	1 - 3%	1 - 3%

*MCPS introduced the facility planning phase for projects initiated since FY 96. It is assumed that by the end of facility planning, guideline educational specifications and a feasibility plan have been completed for the project.

Clarification of Current Practice: For new construction projects started before FY 96, MCPS' ballpark estimates served as the basis for the Superintendent's initial request for construction costs published in the CIP. For new construction projects started since FY 96, construction cost estimates for specific projects will not be published in the CIP until a project completes the facility planning process. At the end of facility planning, there will be an updated cost estimate which will form the basis for the initial construction cost request for the project.

Funds for modernization and renovation projects are appropriated in two aggregate PDFs. The Current Modernization/Renovations PDF includes funds for modernization/renovation projects that have received funds for design. Most projects funded in this PDF will move into the construction phase within the next several years. The Future Modernization/Renovations PDF includes funds for projects planned for construction beyond the next two years. MCPS internally carries construction cost estimates for individual projects; these are shared with OMB and Council staff during the budget review process, but are not published in the CIP.

8. The Relationship Between Budgeted Amounts and Contract Bids

a) There is no evidence that budgeting higher amounts has an inflationary effect on bids. Contractors interviewed stated unequivocally that published budgeted amounts have a negligible affect on the bids received.

b) Potential bidders use the published construction cost appropriation for a specific project to determine the general cost range of the project. For example, to see if the project is expected to be a $5 million, $10 million, or $20 million job. It is the cost of labor and materials and the contractor's judgment of his/her competition for the job that determine the contractor's bid, not the budget amount appropriated for the project.

c) Feedback from contractors suggests that carrying an unrealistically low budget number may actually deter contractors from submitting bids. Preparing a bid is an investment of time and resources for a contractor. Potential bidders are wary of projects with unrealistically low budgets. An unrealistic budget may lead to a re-bid or supplemental funding situations which adds cost, time, and uncertainty to the process.

B. RECOMMENDATIONS

OLO's first three recommendations (#1-#3) suggest a series of changes to the budget process to reduce, perhaps even eliminate, the need for emergency or supplemental appropriations for school construction projects. In sum, the recommended strategy is to strengthen how construction costs are estimated, improve how project costs are adjusted for market conditions, and adopt a consistent decision point early enough in the process that allows the Council, in consultation with the Board and Executive, to reconcile the cost and timing of projects with budget affordability.

Recommendation #1: Strengthen the process of estimating school construction costs:

- **Eliminate the use of ballpark estimates with large margins of error;**
- **Minimize the use of across the board inflation adjustments; and**
- **Rely on independent cost estimates for specific projects.**

The use of placeholder or ballpark cost estimates with large margins of error for individual projects should be eliminated. The use of these numbers with 25-40 percent margins of error sets the stage for making budget decisions on inferior information and erodes the credibility of subsequent cost estimates.

No construction cost budget number should be approved in the capital budget/CIP for a specific project until an independent cost estimate within a reasonable margin of error is obtained. Whenever a construction cost estimate is provided for a project, it should identify the source of the estimate (e.g., in-house MCPS staff, project architect, independent cost estimator) and indicate the expected margin of error between the estimate and eventual project construction cost.

The Council, in consultation with the Board of Education and County Executive should decide whether construction cost estimates should reflect the cost of construction in today's dollars or the construction cost projected forward to the 50 percent point of construction. The 50 percent point is a standard industry approach to providing cost estimates. However, this would be contrary to the present practice of displaying CIP expenditures in constant (today's) dollars. While either approach will work, it is important to make a decision on this issue for purposes of consistency.

When construction cost estimates for specific projects are revised, the reasons should be clearly documented on the Project Development Form (PDF). In particular, cost changes that result from changes in project scope should be clearly differentiated from changes due to market conditions.

Recommendation #2: Develop and use a school construction cost escalator instead of a general inflation adjustment to project future costs of school construction.

The increased use of independent cost estimates for individual projects should significantly reduce the need to calculate across-the-board price adjustments for school construction projects. However, to the extent a general price adjustment for school construction projects is used, the projections should be based on a separate school construction cost escalator instead of a general inflation adjustment. While no one's "crystal ball" for projecting future costs is guaranteed to be accurate, the margin of error can be reduced by recognizing the variables that most significantly affect the costs of school construction.

If the Council wants to pursue this idea, OLO recommends hiring a certified construction cost estimator to work with Council, MCPS, and OMB staff to develop a model for projecting the costs of school construction for the next two fiscal years. The escalator would then be updated annually for the following two year period.

The purpose of this model would be to capture the factors that influence the costs of school construction that are not necessarily reflected in a general inflation index. The model would, for example, consider the number of potentially competing construction projects being bid in the region; and market projections for the price of specific materials used in school construction (e.g., concrete, masonry and steel); and wages in the region for certain trades (e.g., masons, steel erectors, drywall subcontractors).

Recommendation #3: The Council should adopt a consistent decision point early enough in the design process of each project that allows the Council, in consultation with the Board of Education and County Executive, to reconcile the cost and timing of projects with budget affordability. The adopted budget should reflect a realistic and up-to-date project cost.

The County Council should identify and adopt a consistent decision point early enough in the design process of each project that allows the Council, in consultation with the Board and County Executive, to reconcile the cost and timing of projects with budget affordability. The data used in the decision-making process should be independent and rigorous estimates of construction costs.

The challenge is to find the optimum place for this decision point, that is, when there is sufficient information to have a realistic discussion about construction costs, but early enough to enable scope, design, and/or timing decisions to be adjusted if necessary for the project to proceed within budget limitations.

OLO recommends the Council consider designating the end of MCPS' facility planning process as the place for this decision point to occur on individual projects. At this point, the guideline educational specifications and feasibility plan will be completed, but the project will not as yet have proceeded to design. Enough will be known about the project for staff to have had initial discussions with the County and State regulatory agencies, so that major costs associated with meeting regulatory requirements can be estimated.

By the end of facility planning, it is fair to expect that an independent construction cost estimate of the project can be obtained with a margin of error of plus or minus 10-15 percent for new construction projects and 15-20 percent for modernizations. This should provide a reasonable degree of cost information for intelligent decision making, but retain sufficient flexibility for changes to project scope and design.

When the County Council determines a budget for a specific project, the project budget should be clearly and firmly held to that amount. It must be understood that the Council will consider changes to the amount only under extraordinary circumstances. It also must be clear whether the Council's budget decision does or does not include funds to cover changes in the project's construction cost due to changes in market conditions. As noted above, a project budget can be adopted in constant dollars or projected forward to the time of construction.

Once the decision is made about a project's budget, the Council should review projects in subsequent years to ensure that independent cost estimates continue to align the budgeted amount and projected cost.

The adopted budget should reflect the realistic and up-to-date project cost. **As discussed earlier, carrying an unrealistically low budget number is not an effective strategy for holding down contract bids.** Furthermore, it may actually deter potential contractors from submitting a bid due to the potential it raises for a re-bid or supplemental funding scenario.

OLO's following four recommendations (#4-#8) address potential opportunities for reducing the costs of school construction. OLO recommends pursuing changes in: the educational specifications; the use of alternate construction delivery methods; the use of value analysis; and the policy of bidding 10 percent as add-alternates. It is important to remember that reducing the costs of school construction without addressing the budget process issues will not resolve the pattern of emergency or supplemental appropriations.

Recommendation #4: The Council staff should participate in MCPS' effort to review the educational specifications for elementary, middle, and high schools, and encourage the review to include both comparative and fiscal analysis.

Recognizing the profound influence that educational specifications (ed specs) have on the costs of school construction, the Council staff should participate in MCPS' announced effort to review the educational specifications for elementary, middle, and high schools. The ed specs outline the number of classrooms, offices, and core areas required, the size of each space, and the relationships between spaces. The final ed specs for each project reflect a planning committee's determination of how MCPS' standards should be modified to reflect an individual schools' unique program requirements, special needs, enrollment size, and diversity.

The Council should recommend to MCPS that the review of ed specs include a fiscal analysis of MCPS' standard and updated requirements, and provide options and trade-off for reducing costs. In addition, the Council may want to suggest the study include some comparative analysis of MCPS' ed specs to parallel documents used by a sample of other school systems.

Recommendation #5: The Council should request that MCPS investigate and report back later this year on the pros, cons, and logistics of alternate delivery systems for school construction.

With few exceptions MCPS builds and modernizes schools using the traditional delivery system known as "design-bid-build". This delivery method is encouraged in Maryland because State reimbursement for school construction is limited (by law) to contracts awarded to the lowest responsible bidder.

The Council should request MCPS to report back on the pros, cons, and logistics of using alternate delivery systems for school construction. MCPS' review should identify what legal or regulatory changes would be needed to enable MCPS to use the different approaches. This analysis should evaluate the results of the model being used to construct Blair High School (Construction Manager-Agency); and include exploration of using Design/Build or other Construction Manager methods.

It would also be helpful for MCPS to look into the pros, cons, and legal changes required to use more flexible procurement methods, such as the use of competitive negotiation and ability to negotiate with the lowest bidder.

Recommendation #6: MCPS should maximize the use of value analysis, to include the use of financial incentives.

MCPS should make maximum use of value analysis by employing the appropriate expertise early and continuously throughout the planning, design, and construction processes. MCPS should also explore the use of financial incentives for conducting value analysis even after a contract has been awarded. This would encourage contractors to share ideas or efficiencies that they uncover when bidding (and later constructing) the project.

The Maryland Department of Transportation, State Highway Administration, and some federal agencies allow contractors to propose and share in cost savings after the contract is awarded. For example, the State Highway Administration permits value engineering change proposals (known as "VECP's). If the agency accepts a contractor's VECP, then the contractor is able to share half of the net savings from the VECP. The net savings is calculated after the SHA is compensated for the cost of evaluating the VECP and the contractor is compensated for the cost of preparing the VECP.

Recommendation #7: The Council and Board should re-visit the policy of bidding 10 percent of construction project costs as add-alternates.

Feedback from contractors indicates that MCPS tends to list a larger number of alternates than surrounding jurisdictions and that the large number of alternates creates confusion in the bidding process. MCPS staff indicate it has been a difficult task in recent years to identify 10 percent of project costs as bid alternates. In recently bid projects even where the base bid exceeded the budget amount, the Board has selected a number of project alternates in the final award.

The Council should find out more from MCPS staff why identifying 10 percent of project costs as bid alternates has become so difficult. The Council should invite the Board to propose a substitute policy that retains the use of alternates when it makes sense, but does not force the use of alternates when it is not in the best fiscal interest of the project.

Recommendation #8: The Council should ask MCPS staff to keep them informed about the level of competition occurring in school construction projects, and encourage the Board to seek changes to maintain a healthy bid environment.

The price of building a school is influenced by the number of bidders, especially in a market where contractors have plenty of job opportunities. Up to a point, a larger number of bidders will mean a more competitive environment and lower prices.

Because the level of competition is a key factor in determining the eventual costs of construction, the Council should ask MCPS staff to provide regular updates on the level of competition occurring in the school construction marketplace. This includes data on the number of bidders on MCPS projects as well as information about the competition occurring for other school systems and related projects in the region.

The Council should encourage the Board to seek changes that will maintain a healthy competition among bidders. Areas worth exploring include: contractor bonding requirements; the complexity of the bid process; and the timing of MCPS' bids.

OLO's final two recommendations address other issues. Recommendation #9 concerns the use of square foot cost data for comparative analysis, and Recommendation #10 identifies a number of related topics for the Council to consider for further study.

Recommendation #9: The problems associated with comparing MCPS" square foot costs to those reported by other jurisdictions should be acknowledged. To the extent these comparisons are desired, however, MCPS staff should work with a few other school systems in the region to develop a consistent methodology for calculating square foot costs.

To enable more accurate comparative cost analysis with neighboring jurisdictions, MCPS staff should initiate a process with a few other school systems in the region to develop a common methodology for calculating and reporting data on school construction costs. At present, the different approaches used to calculate square foot costs limit the validity of comparative analysis.

It may also be useful for MCPS staff to develop a plan for more routine sharing of other relevant data, including lessons learned from value analysis, the use of alternate delivery systems, and the timing of procurements.

Recommendation #10: OLO recommends the Council consider the following list of issues as potential topics for further study.

During the course of research for this report, OLO identified a number of issues that seem worth exploring further.

MCPS' procurement calendar for school construction projects. At present, MCPS begins the procurement process for awarding construction contracts after the Council's appropriation action is completed. This timing means that MCPS is not able to take full advantage of the summer building months. It makes sense to explore whether MCPS' procurement practice could be changed to provide some flexibility in this area.

Placing a price tag on the increased costs of school construction projects that are attributed to meeting Federal, State, and County regulatory requirements. Given that the private sector complains about the "regulatory burden," it would be instructive to calculate for a selected number of school construction projects how much each project's costs increased as a result of proceeding through the regulatory process.

Tracking the total costs of construction for projects that are completed. OLO's review tracked the costs of construction until the point of contract award. This does not include what happens during the course of construction, e.g., the use of the project contingency, change orders, etc. For a selected number of projects, it would be interesting to track the cost history from the time to contract award to the time the project is deemed completed.

Creating a budget mechanism that enables the Board to maintain a "construction cycle fund." It is worth exploring whether the Board should be able to maintain some type of reserve fund similar to that maintained by Fairfax County Public Schools. When budgeted amounts are higher than contract bids, the school system would contribute and hold the difference in the fund; and when bids exceed the budgeted amount, the school system would be expected to turn first to the fund to solve the problem.

Appendix A

Resolution: 13-747
Introduced: December 3, 1996
Adopted: December 10, 1996

COUNTY COUNCIL
FOR MONTGOMERY COUNTY, MARYLAND

By County Council

Subject: Amendment to the FY 1997 Work Program of the Office of Legislative Oversight

Background

1. On July 23, 1996, the Council adopted Resolution 13-602, to establish the initial FY 1997 work program of the Office of Legislative Oversight. Chapter 29A, Montgomery County Code, specifically authorizes the Office of Legislative Oversight to conduct special program or budget analyses on selected operations or activities for which funds are appropriated or approved by the Council.

2. The Council is concerned about the continued increases in school construction costs well above the general rate of inflation. Since July, the Board of Education has requested supplemental appropriations for school construction costs totaling $12.64 million for the new construction of three high schools and one middle school. The BOE's supplemental requests were based on contractor responses to MCPS' request for bids that ranged from 14% to 30% above approved funding levels.

3. Before making decisions on the FY 98 capital budget, the Council is interested in gaining a more detailed understanding of: school construction costs from the time of initial project approval through contract award; an analysis of the reasons contributing to cost changes; MCPS' process for procurement and contract award; and how Montgomery County's experience compares to that of comparable jurisdictions.

Action

The County Council for Montgomery County, Maryland, approves the addition of the following project to the Office of Legislative Oversight's FY 97 Work Program:

Appendix A

PROJECT: BUDGET INQUIRY INTO SCHOOL CONSTRUCTION COSTS

Principal agency: **Montgomery County Public Schools**
Origin of project: **Education Committee**

Abbreviated Description: The purpose of this inquiry is to provide the Council with greater understanding of the construction cost increases currently being experienced by Montgomery County Public Schools' new construction and modernization projects. This inquiry is intended to be a relatively short-term assignment that results in a report back to the Council before Committee worksessions on the FY 98 capital budget.

The scope of the inquiry is outlined below:

1. For a sample of four to six MCPS new construction and modernization projects currently underway:
    - Track the history of construction costs in the MCPS capital budget from the Superintendent's initial recommendation of the project through Board of Education and County Council approval action to contract award; and
    - Analyze cost changes over time, including the timing of projects, changes in construction cost indices, and other factors (both internal and external) contributing to cost increases.
2. Review MCPS' methods of contract procurement and management, bid evaluation, and contract award, and explore the feasibility and advantages of alternative approaches.
3. Gather data on relevant experience of comparable school systems.
4. Summarize findings.

The Office of Legislative Oversight will staff this project jointly with Council staff familiar with the MCPS capital budget, and in cooperation with appropriate MCPS and Executive branch staff.

This is a correct copy of Council action.

Mary A. Edgar

Mary A. Edgar, CMC
Secretary of the Council

Definitions

This section provides definitions of terms as they are used throughout this report.

1. The Capital Improvements Program (CIP) outlines the six year expenditure plan for accomplishing all capital projects which involve County funding. By Charter, the Council used to approve a six-year CIP every year. Due to the voters' approval of a Charter amendment last November, the Council will now review and approve a six-year CIP only in even numbered years. In odd numbered years, the Council will approve a capital budget for those projects already approved in the six-year CIP. In odd-numbered years, the Council will also review amendments to the CIP that constitute a change in scope which could have an impact in the following year.

2. Project Description Forms (PDF) are included in the CIP document. Each project has a PDF, which provides a detailed description of the scope, funding source(s), appropriation level, and expenditure schedule for the project.

3. The capital budget is the amount of spending authority appropriated each year for specific projects.

4. Construction costs refers to both the costs of constructing the school facility and the costs of normal site development. In a typical school project, excluding the costs of land, these costs constitute approximately 80% of total project costs. The other 20% (which are not the focus of this study) includes professional fees and furniture and equipment costs.

   Normal site development is defined to include the typical amount of clearing and grading, excavation, and utility costs. It does not costs associated with rock removal or dealing with unusual soil conditions, severe topography, or unusual environmental situations.

5. Education specifications or "ed specs" is a document that is used by an architect to design new or modernized school facilities. The ed specs outlines the number of classrooms, offices, and core areas required, the size of each space, and the relationship between spaces. The ed specs interprets specific program requirements into appropriate and functional facility layout and design. The ed specs are developed in three phases:

   The guideline educational specifications is prepared in the pre-planning stages for a project, based on basic MCPS' standards used for all new and modernized facilities. MCPS' Department of Planning and Capital Programming prepares the guideline ed specs, with input from the school's principal and PTA President, and provides the architect with background for performing a feasibility study

The draft educational specifications is prepared during the planning phase of a project for review by the facilities planning committee appointed for each new construction or modernization project. The facilities planning committee includes MCPS staff (both central office and school-based) and community representatives.

A final educational specifications results from the review by the facilities planning committee. According to MCPS staff, the final ed specs reflect the committee's determination of how the standards should be updated to reflect, "an individual school's unique program requirements, special needs, enrollment size, and diversity." The Board of Education formally reviews and approves the final ed specs for each new construction or modernization project.

6. The Modernization Assessment Process is MCPS' process for ranking schools in order of their need for modernization. It consists of two equally weighted components, a Facilitates Assessment with Criteria and Testing (known as "FACT assessment") and an educational program assessment. The maximum total score for a school is 2000 points.

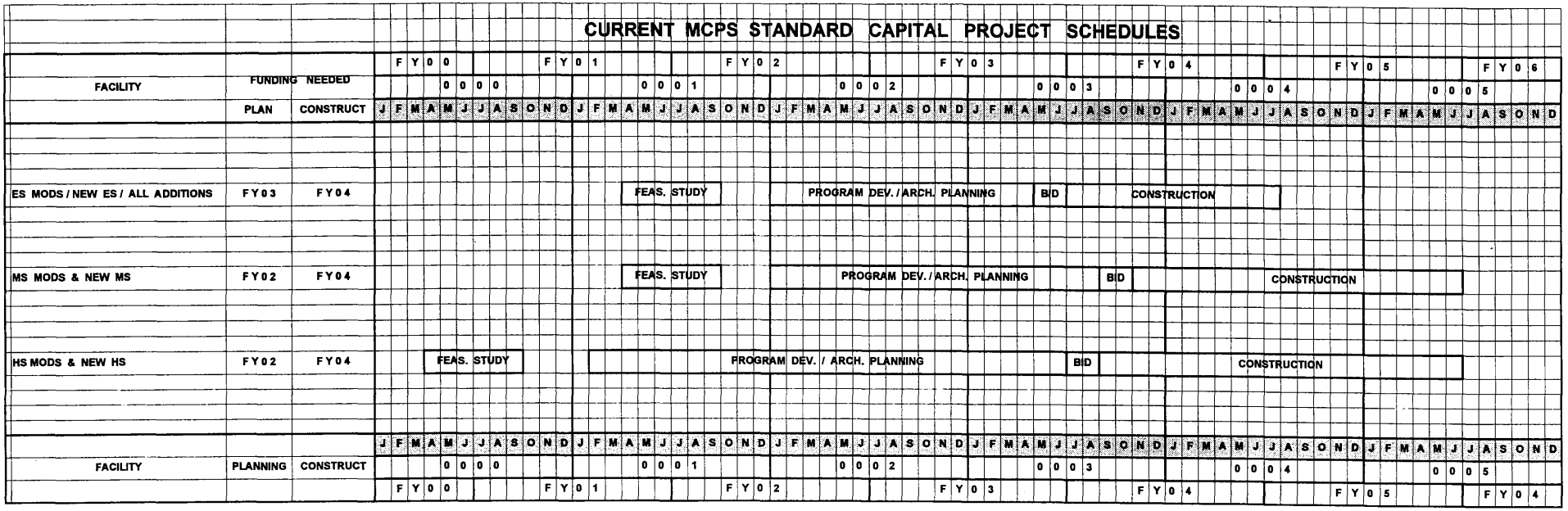
   The FACT assessment evaluates the physical condition of a school building's systems, such as HVAC and plumbing. Engineers perform the assessment and rank the condition of current systems compared to the condition of new systems. The final score is weighted and translated into a total FACT score with a maximum value of 1000 points.

   The educational program assessment evaluates how well a facility meets educational program objectives. It includes assessment to space deficiency and addresses program requirements of safety, security, and comfort. This assessment is also carries a maximum value of 1000 points.

7. Value analysis or value engineering is an interdisciplinary analysis of the design and function of a building or system for the purpose of identifying the maximum use of materials or construction techniques to produce the lowest cost possible without sacrificing quality, performance, or desired aesthetics. It can mean either getting the best possible product for a given cost, or getting the same quality of product for a lower cost.

   When used to the fullest extent, value analysis applies to all aspects of the development process, from project planning through design and construction, and includes life cycle analysis. Because some individuals reserve the terms value engineering to reviews conducted by a licensed engineer, this report primarily uses the broader term of value analysis.

CURRENT MCPS STANDARD CAPITAL PROJECT SCHEDULES



Appendix C

Appendix D

SECTION X
SUMMARY OF CIP REQUESTS FY 1998-FY 2003
MARYLAND PUBLIC SCHOOL CONSTRUCTION PROGRAM
($000 omitted)

LEA	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	TOTAL
ALLEGANY	560	4,385	3,306	2,075	1,620	2,343	14,289
ANNE ARUNDEL	9,459	6,293	7,543	6,603	13,045	4,919	47,862
BALTIMORE CITY	17,001	6,408	17,416	12,185	16,002	14,993	84,005
BALTIMORE	38,087	10,000	25,729	10,000	10,000	10,000	103,816
CALVERT	3,292	4,020	5,980	690	0	11,285	25,267
CAROLINE	2,443	2,320	6,166	102	2,907	667	14,605
CARROLL	15,970	19,994	8,030	4,337	1,627	3,771	53,729
CECIL	2,949	3,063	3,032	1,406	1,772	1,884	14,106
CHARLES	21,747	572	572	3,211	4,040	0	30,142
DORCHESTER	1,186	950	440	3,264	425	56	6,321
FREDERICK	14,040	13,286	22,821	7,365	6,051	9,480	73,043
GARRETT	550	488	443	296	105	70	1,952
HARFORD	6,097	17,783	5,798	12,488	9,228	6,323	57,717
HOWARD	47,389	10,998	8,405	14,815	10,650	5,000	97,257
KENT	316	549	313	286	370	210	2,044
MONTGOMERY	72,683	24,178	24,207	45,167	21,093	7,837	195,165
PRINCE GEORGE'S	20,203	26,925	34,914	16,324	3,524	5,292	107,182
QUEEN ANNE'S	5,270	4,319	2,000	5,165	3,900	2,300	22,954
ST. MARY'S	13,661	15,268	2,746	6,289	4,794	2,998	45,756
SOMERSET	72	143	110	363	190	140	1,018
TALBOT	1,149	0	2,746	0	374	0	4,269
WASHINGTON	2,659	2,900	1,844	1,394	4,027	1,394	14,218
WICOMICO	9,116	9,208	6,411	7,856	3,289	2,350	38,230
WORCESTER	4,005	4,899	580	1,947	1,792	1,569	14,792
Total State (1)	**309,904**	**188,949**	**191,552**	**163,628**	**120,825**	**94,881**	**1,069,739**
Total State Adj. (2)	**309,904**	**198,396**	**211,186**	**189,416**	**146,863**	**121,097**	**1,176,862**

(1) All projects at estimated July 1997 cost with no adjustment for inflation in subsequent years.

(2) Total adjusted for inflation from July 1997 at 5 percent per year (compounded).

Exhibit 14

Montgomery Blair High School - New Construction

Table A. Construction Cost Funding from Request in FY94-99 CIP to Contract Award in FY97-02 CIP ($000)

	FY94-99 CIP			FY95-00 CIP			FY96-01 CIP			FY97-02 CIP			With FY97-02 EA**	
	Nov-92	Jan-93	May-93	Nov-93	Jan-94	May-94	Nov-94	Jan-95	May-95	Nov-95	Jan-96	May-96	Nov-96	Dec-96
Supt/BOE Request	$ 26,420			$ 23,863			$ 35,010			$34,490			$ 38,380	
Executive Rec. *		$ 22,420			$ 21,264			$ 31,578			$ 34,490		$ 38,380	
Council Approved			$ 20,430			$ 25,575			$ 33,039			$34,490		$ 37,240

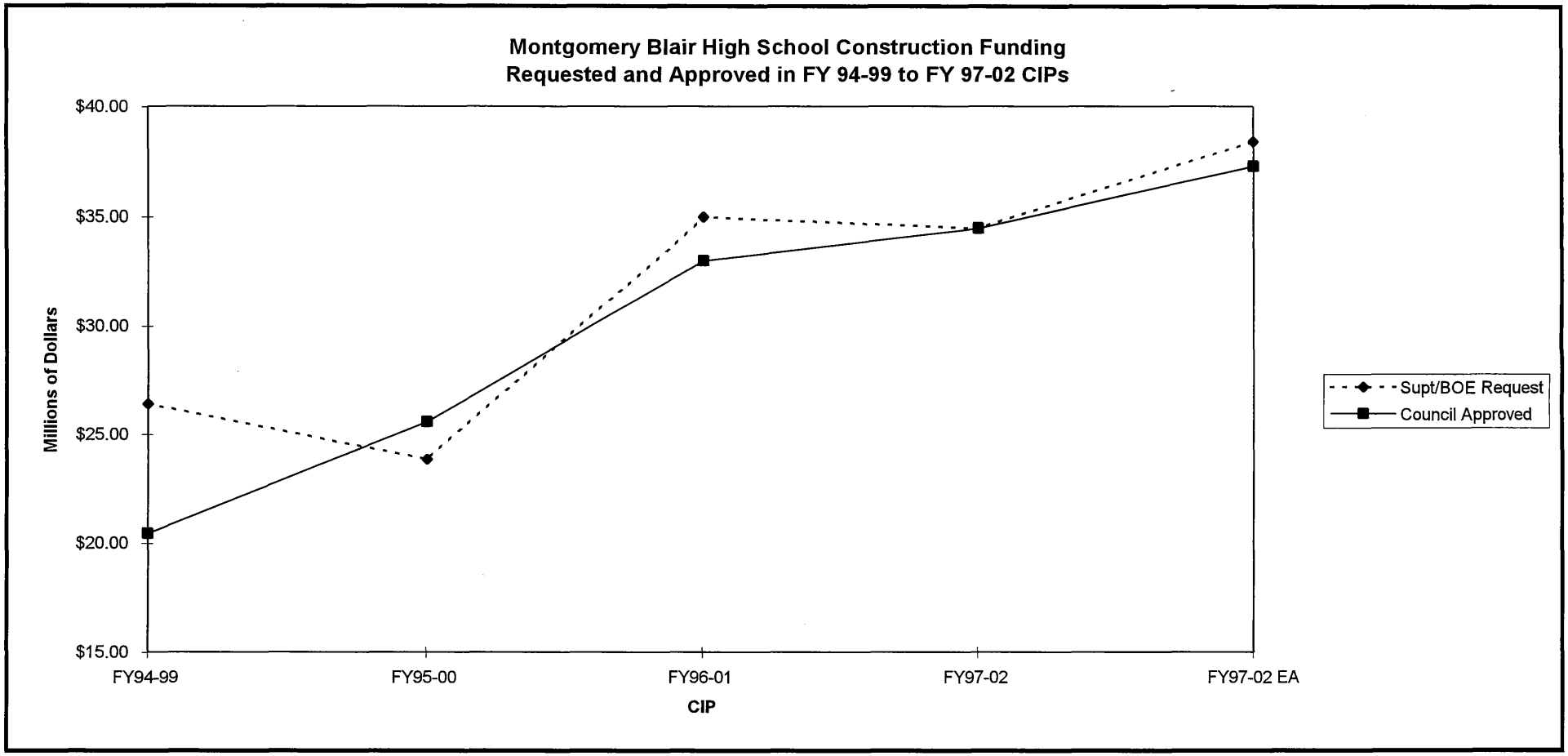
* Based on information provided by MCPS and County OMB staff.

** EA- Emergency Appropriation

Table B. Explanation of Net CIP Adjustments by Board of Education (BOE), County Executive (CE), and County Council (CC) Based on Information Available in Published Project Development Forms

CIP	Who	% Net Change *	Rationale for Cost Adjustment: Scope Change	Reg. Require.	Market Condition	Summary Description
FY94-99	BOE	NA				BOE requests construction funding for project.
	CE	-15%	X			Reduced amount for project pending final decision on scope and location.
	CC	-23%	X			CC reduced budget to reflect cost of a replacement school on the Wayne Ave. site instead of a new HS on Kay Tract.
FY95-00	BOE	+17%	X	X		Added systems development charge and funds for design related scope changes including funds to provide windows in 80% of the classrooms.
	CE	-11%	X			Reduced budget associated with design-related scope changes requested by BOE for school at Wayne Ave site.
	CC	+7%	X			Added dollars to build new school on the Kay Tract.
FY96-01	BOE	+37%			X	Added inflation adjustment of 20% to reflect current construction costs.
	CE	-10%			X	Reduced inflation adjustment to 10%.
	CC	-6%			X	Reduced inflation adjustment to 14%.
FY97-02	BOE	+4%		X	X	Added 3% inflation adjustment (consistent with OMB guidelines) & added final design costs of the sound wall and wetlands protection.
	CE	0%		X	X	Recommended approval of BOE request.
	CC	0%		X	X	Approved budget request.
EA FY97-02	BOE	+11%			X	Requested $3.8 million emergency appropriation for construction costs because low bids exceeded budget.
	CE	0%			X	Recommended approval of BOE request for emergency appropriation.
	CC	-3%		X	X	Approved emergency appropriation of $3.7 million with decision on final SDC charge deferred.

* For Council and Executive, the net change is calculated as the difference from the Board request.



Observations:

1. The construction cost funding for Montgomery Blair High School increased $10.8 million or 41%, between the Board of Education's request in the FY 94-99 CIP and the final amount appropriated for construction in FY 97. The final site decision was made in the FY 95-00 CIP.

2. The approved funding level for construction costs in the FY 94-99 and FY 96-01 CIPs were lower than the Board of Education's request. The differences were: $6 million (23%) in FY 94-99 and $2 million (6%) in FY 96-01. The approved funding in the FY 95-00 CIP was $1.7 million (7%) higher than the Board of Education request.

3. For the FY 97-02 CIP, the Council approved the Board of Education's initial request for construction funding. The approved amount was $3.7 million less than the amount needed for project construction. This led to a $3.7 million emergency appropriation request from the Board of Education, which was approved by the Council, except for $950,000 associated with the payment of the systems development charge. (There is not a single contract award amount for Blair because MCPS is using a construction management delivery method, which includes multiple prime contracts).

Exhibit 15

Northeast High School - New Construction

Table A. Construction Cost Funding from Initial Request in FY94-99 CIP to Contract Award in FY97-02 CIP ($000)

	FY94-99 CIP			FY95-00 CIP			FY96-01 CIP			FY97-02 CIP			With FY97-02 EA **	
	Nov-92	Jan-93	May-93	Nov-93	Jan-94	May-94	Nov-94	Jan-95	May-95	Nov-95	Jan-96	May-96	Nov-96	Dec-96
Supt/BOE Request	$ 19,300			$ 20,096			$ 23,659			$ 22,681			$ 27,916	
Executive Rec. *		$ 9,440			$ 19,572			$ 21,531			$ 22,681		$ 27,916	
Council Approved			$ 18,440			$ 19,572			$ 21,309			$ 22,681		$ 27,666

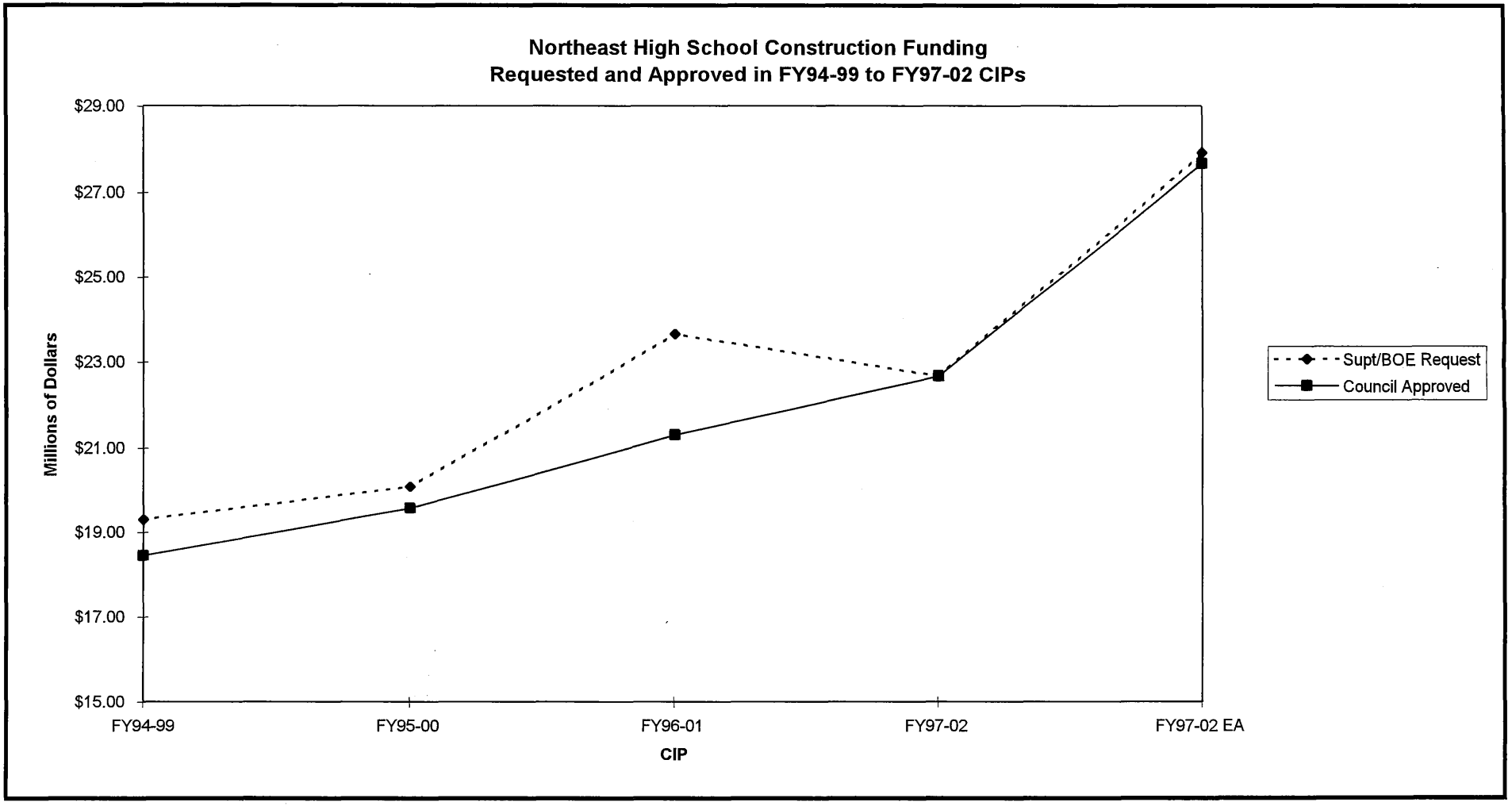
* Based on information provided by MCPS and County OMB staff.

** EA- Emergency Appropriation

Table B. Explanation of Net CIP Adjustments by Board of Education (BOE), County Executive (CE), and County Council (CC) Based on Information Available in Published Project Development Forms

CIP	Who	% Net Change *	Rationale for Cost Adjustment: Scope Change	Reg. Require.	Market Condition	Summary Description
FY94-99	BOE	NA				BOE requests construction funding for project.
	CE	-51%	X			Reduced funding pending final decision on how to meet Blair/Eastern area high school capacity needs.
	CC	-5%			X	Reduced inflation adjustment by 5%.
FY95-00	BOE	+9%		X	X	Added inflation adjustment and funds for environmental mitigation plan.
	CE	-3%		X	X	Reduced inflation adjustment, reduced estimate for environmental mitigation, and added $20,000 for SDC for net reduction of 3%.
	CC	-3%		X	X	Agreed with CE recommendations.
FY96-01	BOE	+21%	X		X	Added inflation adjustment and cost of additional site development.
	CE	-9%			X	Reduced inflation adjustment to 10%.
	CC	-10%	X		X	Reduced inflation adjustment to 14%, reduced number of teaching stations, and deferred construction start date by one year.
FY97-02	BOE	+6%			X	Added inflation adjustment to reflect current construction costs and accelerated construction by one year.
	CE	0%			X	Recommended approval of BOE request.
	CC	0%			X	Approved budget request.
EA FY97-02	BOE	+23%			X	Requested $4.985 million supplemental because low bid exceeded budget, and transferred $260,000 from surplus funds in the MCPS West Farm Transportation depot project.
	CE	0%			X	Recommended approval of BOE request for emergency appropriation.
	CC	-.9%			X	Approved emergency appropriation except for $250,000 associated with SDC.

* For Council and Executive, the net change is calculated as the difference from the Board request.



Observations:

1. The construction cost funding for Northeast High School increased $8.4 million or 43%, between the original Board of Education's request in the FY 94-99 CIP and the final amount appropriated for construction in FY 97.

2. The approved funding level for construction costs in the FY 94-99 through FY 96-01 CIPs were lower than the Board of Education's request. The differences were: $860,000 in FY 94 (4%), $524,000 (3%) in FY 95-00 and $2.4 million (10%) in FY 96-01.

3. In the FY 97-02 CIP, the Council approved the Board of Education's initial request for construction funding. The approved amount turned out to be $5.2 million less than the lowest bid received for construction of the base project plus selected alternates. This led to a $4.985 million emergency appropriation request and $260,000 transfer of funds. The Council approved the Board of Education's request except for $250,000 associated with the systems development charge.

Exhibit 16

Northwest High School - New Construction

Table A. Construction Cost Funding from Initial Request in FY94-99 CIP to Contract Award in FY97-02 CIP ($000)

	FY94-99 CIP			FY95-00 CIP			FY96-01 CIP			FY97-02 CIP			With FY97-02 EA**	
	Nov-92	Jan-93	May-93	Nov-93	Jan-94	May-94	Nov-94	Jan-95	May-95	Nov-95	Jan-96	May-96	Sep-96	Oct-96
Supt/BOE Request	$19,300			$ 19,968			$ 22,575			$ 22,999			$ 25,799	
Executive Rec. *		$ 18,329			$ 18,655			$ 21,002			$ 22,999			$ 25,799
Council Approved			$ 18,329			$ 18,655			$ 21,727			$ 22,999		$ 25,799

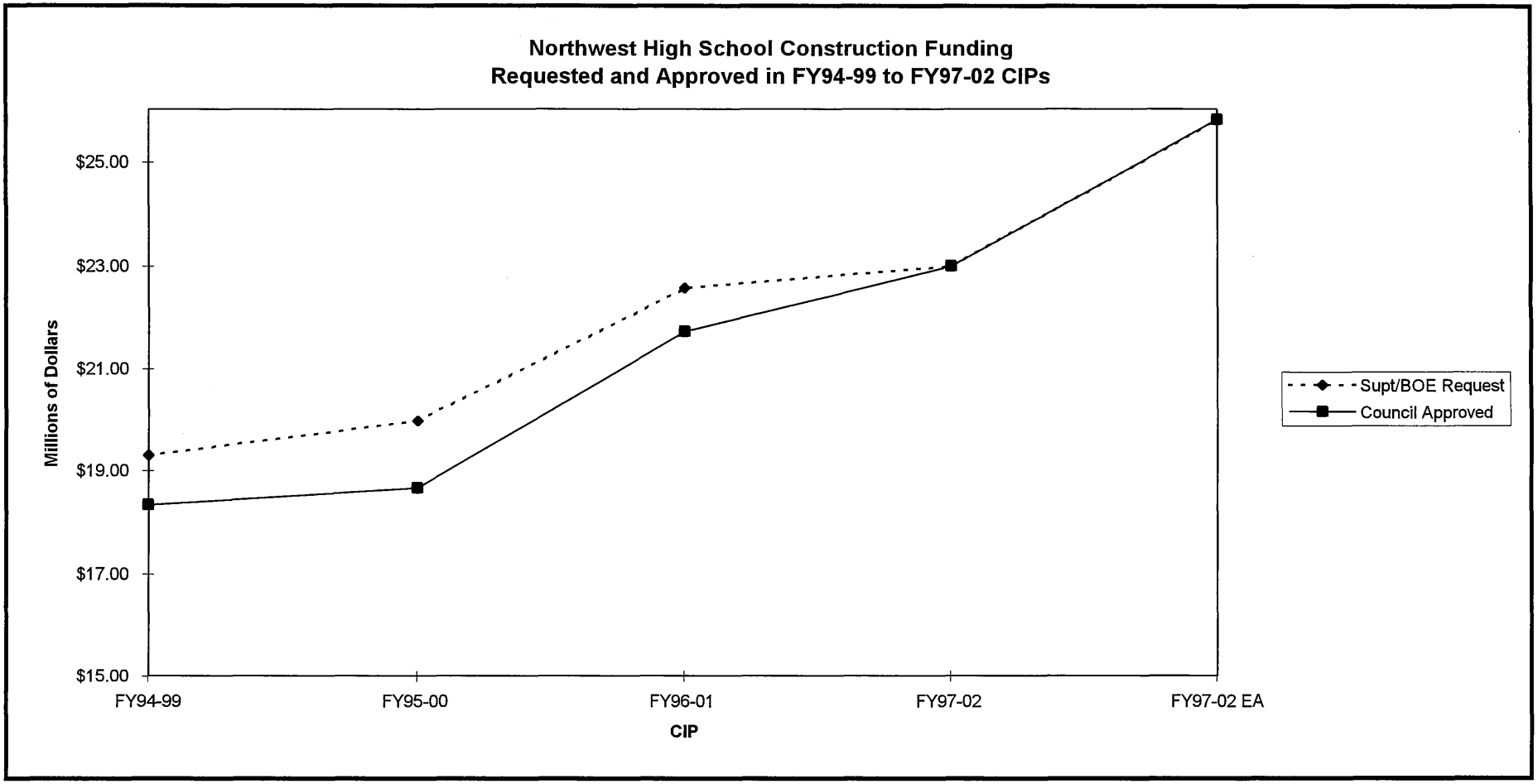
* Based on information provided by MCPS and County OMB staff.

** EA- Emergency Appropriation

Table B. Explanation of Net CIP Adjustments by Board of Education (BOE), County Executive (CE), and County Council (CC) Based on Information Available in Published Project Development Forms

CIP	Who	% Net Change *	Rationale for Cost Adjustment: Scope Change	Reg. Require.	Market Condition	Summary Description
FY94-99	BOE	NA				BOE requests construction funding for project.
	CE	-5%	X		X	Reduced inflation adjustment by 5%, deferred 10 classrooms and adjusted expenditure schedule.
	CC	-5%	X		X	Agreed with CE's recommendation.
FY95-00	BOE	+9%		X	X	Added system development charge and reduced inflation adjustment for a net increase of 9%.
	CE	-7%	X	X	X	Reduced inflation adjustment, reduced funds for classrooms, and reduced amount for SDC.
	CC	-7%	X	X	X	Agreed with CE's recommendation and deferred construction start date one year.
FY96-01	BOE	+21%			X	Added inflation adjustment of 20% to reflect current construction costs.
	CE	-7%			X	Reduced inflation adjustment to 10%.
	CC	-4%			X	Reduced inflation adjustment to 14% and deferred construction start date one year.
FY97-02	BOE	+6%			X	Added inflation adjustment to reflect current construction costs and accelerated construction by one year.
	CE	0%			X	Recommended approval of BOE request.
	CC	0%			X	Approved budget request.
EA FY97-02	BOE	+12%			X	Requested $2.8 million emergency appropriation for construction costs because low bid exceeded budget.
	CE	0%			X	Recommended approval of BOE request for emergency appropriation.
	CC	0%			X	Approved emergency appropriation request.

* For Council and Executive, the net change is calculated as the difference from the Board request.



Observations:

1. The construction cost funding for Northwest High School increased $6.5 million or 34%, between the original Board of Education's request in the FY 94-99 CIP and the amount needed for actual contract award in FY 97.

2. The approved funding level for construction costs in the FY 94-99, FY 95-00, and FY 96-01 CIPs were lower than the Board of Education's request. The differences were: $971,000 (5%) in FY 94-99, $1.3 million (7%) in FY 95-00, and $848,000 (4%) in FY 96-01.

3. For the FY 97-02 CIP, the Council approved the Board of Education's initial request for construction funding. The approved amount turned out to be $2.8 million less than the lowest bid received for construction of the base project plus selected alternates. This led to a $2.8 million emergency appropriation request from the Board of Education, which was approved by the Council.

Exhibit 17

Poolesville Middle School - New Construction

Table A. Construction Cost Funding from Initial Request in FY95-00 CIP to Contract Award in FY97-02 CIP ($000)

	FY95-00 CIP	FY96-01 CIP			FY97-02 CIP			With FY97-02 EA***	
	May-94	Nov-94	Jan-95	May-95	Nov-95	Jan-96	May-96	Jun-96	Jul-96
Supt/BOE Request	**	$ 7,210			$ 6,932			$ 7,892	
Executive Rec. *			$ 6,490			$ 6,742		$ 7,892	
Council Approved	$ 5,490			$ 6,730			$ 6,742		$ 7,892

* Based on information provided by MCPS and County OMB staff.

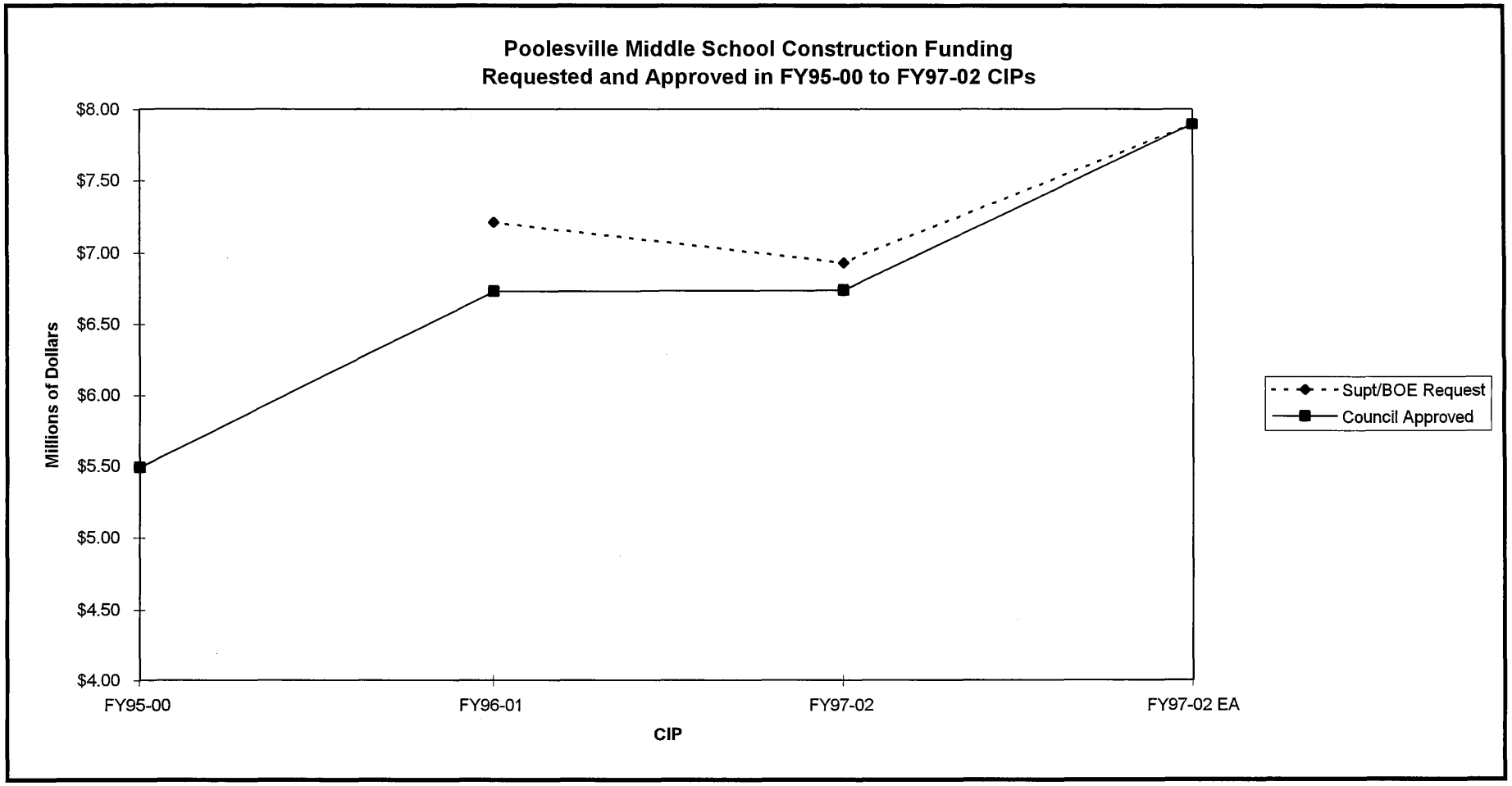
* * The BOE's FY 95-00 CIP request included a project to construct a relocatable addition at the existing Poolesville HS/MS facility, with the long-range goal to provide a separate middle school facility. The approved CIP included estimated funding for construction of a separate middle school.

*** EA- Emergency Appropriation

Table B. Explanation of Net CIP Adjustments by Board of Education (BOE), County Executive (CE), and County Council (CC) Based on Information Available in Published Project Development Forms

CIP	Who	% Net Change *	Rationale for Cost Adjustment: Scope Change	Reg. Require.	Market Condition	Summary Description
FY95-00	CC	N/A	X			Approved CIP was based on CC request for BOE to explore building a separate middle school in lieu of expanding the existing HS/MS facility.
FY96-01	BOE	+31%	X		X	Added inflation adjustment of 22% and added cost of rock removal.
	CE	-10%			X	Reduced inflation adjustment to 10%.
	CC	-7%			X	Reduced inflation adjustment to 14%.
FY97-02	BOE	+3%			X	Added 3% inflation adjustment (consistent with OMB guidelines).
	CE	-3%			X	Eliminated 3% inflation adjustment (based on fact that project construction funds were appropriated in FY 96-01 CIP) and adjusted expenditure schedule to accomodate accelerated schedule in Blair HS project.
	CC	-3%			X	Agreed with CE's recommendation.
EA FY97-02	BOE	+17%			X	Added $1.15 million emergency appropriation for construction costs because low bid exceeded budget.
	CE	0%			X	Recommended approval of BOE request for emergency appropriation.
	CC	0%			X	Approved emergency appropriation request.

* For Council and Executive, the net change is calculated as the difference from the Board request.



Observations:

1. The construction cost funding for the separate Poolesville Middle School increased $2.4 million or 44%, between the first Council approved amount in the FY 95-00 CIP and the amount needed for actual contract award in FY 97.

2. The approved funding level for construction costs in the FY 96-01 and FY 97-02 CIP was lower than the Board of Education's request. The differences were $480,000 (7%) in FY 96-01 and $190,000 (3%) in FY 97-02.

3. When MCPS bid the construction for the new Poolesville Middle School the first time (April 1996), the contract bids all exceeded the construction budget, as approved in the FY 97-02 CIP. The Board of Education authorized the re-bidding of the project.

4. MCPS staff reduced the scope of the project and new bids were received in late May 1996. Scope changes were primarily design changes within the facility. All contract bids on the re-bid continued to exceed the construction budget. This led to a $1.15 million emergency appropriation request from the Board of Education, which was approved by the Council.

Exhibit 18

Einstein High School - Modernization

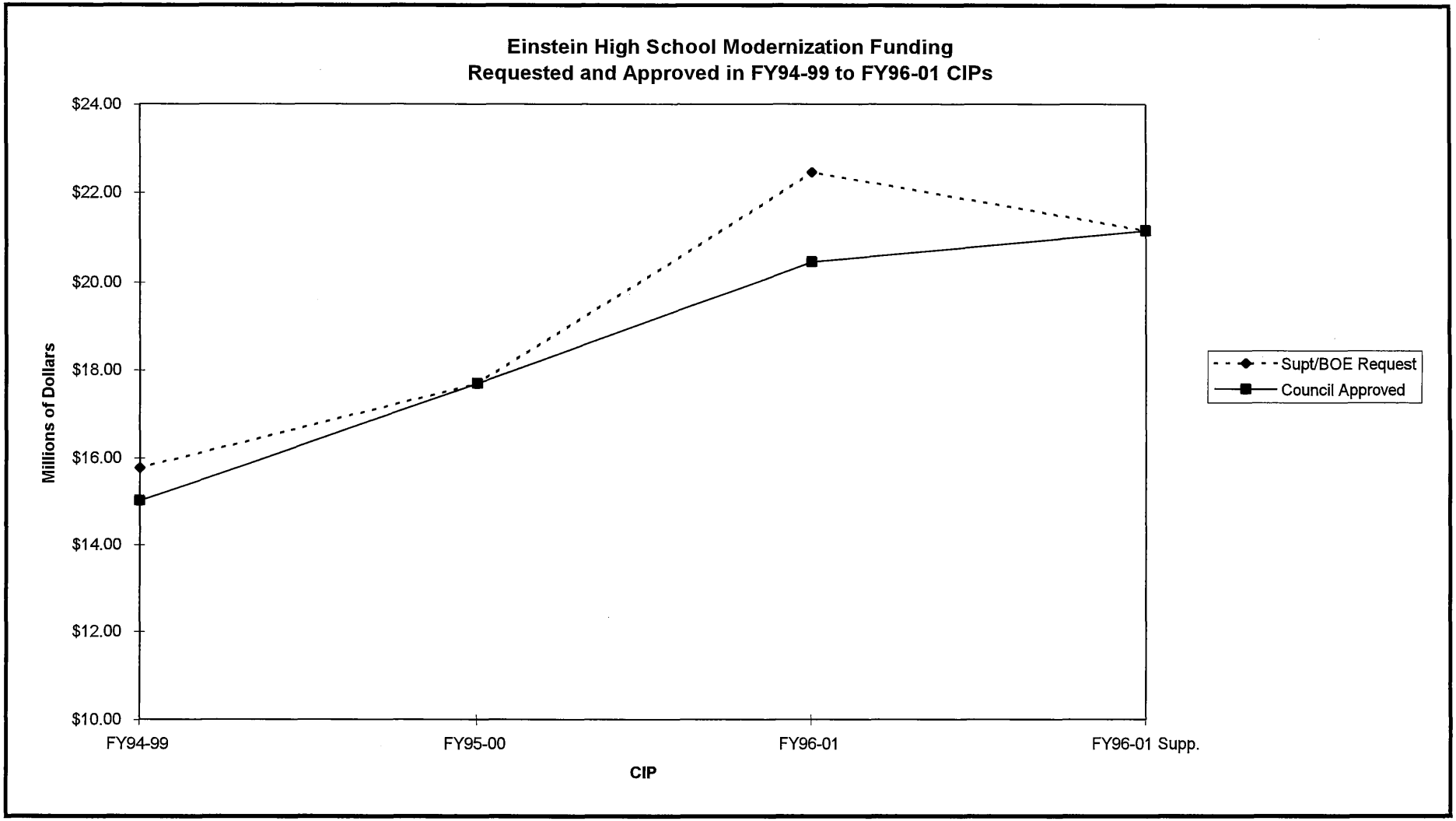
Table A. Construction Cost Funding from Initial Request in FY94-99 CIP to Contract Award in FY96-01 CIP ($000)

	FY94-99 CIP		FY95-00 CIP		FY96-01 CIP		With FY96-01 Supp.	
	Nov-92	May-93	Nov-93	May-94	Nov-94	May-95	Nov.-95	Feb-96
Supt/BOE Request	$ 15,775		$ 17,692		$ 22,450		$ 21,147	
Council Approved*		$ 15,024		$ 17,692		$ 20,457		$ 21,147

* The Council does not separately appropriate construction funds for modernization projects. The number shown here represents the amount associated with the Einstein modernization project, as identified by MCPS staff.

Table B. Explanation of Net CIP Adjustments by Board of Education (BOE) and County Council (CC) Based on Information Available in Published Project Development Forms

CIP	Who	% Net Change	Rationale for Cost Adjustment: Scope Change	Reg. Require.	Market Condition	Summary Description
FY94-99	BOE	N/A				BOE requests construction funding for project.
	CC	-5%			X	Reduced inflation adjustment by 5% and deferred construction start date by one year.
FY95-00	BOE	+18%	X	X	X	Added system development charge, added a 5% inflation adjustment and added 6 classrooms. Requested that project be deferred one year based on availability of holding school (Northwood).
	CC	0%				Approved budget request and accelerated construction start date by two years (compared to FY95-00 request).
FY96-01	BOE	+27%		X	X	Added 20% inflation adjustment to reflect current costs and increased costs for stormwater management.
	CC	-9%	X		X	Reduced inflation adjustment and deleted two classrooms.
Supp. FY96-01	BOE	+3%	X		X	Deleted two classrooms and requested $690,000 supplemental because low bid exceeded budget.
	CC	0%	X		X	Approved supplemental request.



Observations:

1. The construction funding associated with Einstein High School's modernization increased $5.4 million or 34%, between the original Board of Education's request in the FY 94-99 CIP and the amount needed for actual contract award in FY 96.

2. The approved funding level for modernizations in the FY 94-99 and FY 96-01 CIPs were lower than the Board of Education's request. For the Einstein modernization, the differences were: $751,000 (5%) in FY 94-99, and $1.993 million (9%) in FY 96-01.

3. For the Einstein modernization, the approved amount in the FY 96-01 CIP turned out to be $690,000 less than the lowest bid received for construction of the base project plus selected alternates. The Board of Education requested a $1.5 million supplemental appropriation for modernizations, of which $690,000 was for Einstein. The Council approved the supplemental request.

Exhibit 19

Wyngate Elementary School - Modernization

Table A. Construction Cost Funding from Initial Request in FY95-00 CIP to Contract Award in FY97-02 CIP ($000)

	FY95-00 CIP		FY96-01 CIP		FY97-02 CIP	
	Nov-93	May-94	Nov-94	May-95	Nov-95	May-96
Supt/BOE Request	$ 4,361		$ 5,120		$5,185	
Council Approved*		$ 4,356		$ 5,022		$5,185

* The Council does not separately appropriate construction funds for modernization projects. The number shown here represents the amount associated with the Einstein modernization project, as identified by MCPS staff.

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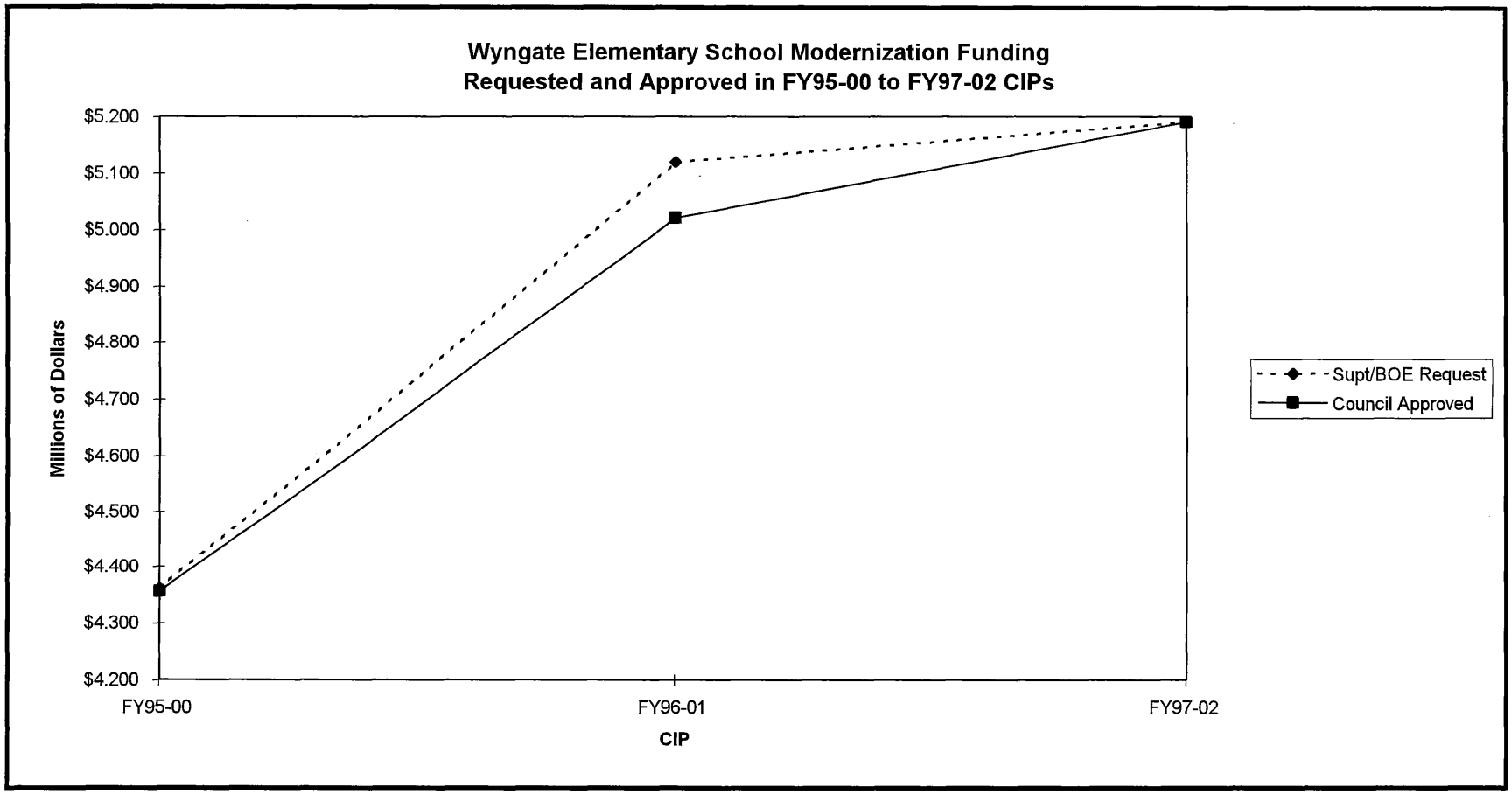
Table B. Explanation of Net CIP Adjustments by Board of Education (BOE) and County Council (CC) Based on Information Available in Published Project Development Forms

CIP	Who	% Net Change	Rationale for Cost Adjustment: Scope Change	Reg. Require.	Market Condition	Summary Description
FY95-00	BOE	NA				BOE requests construction funding for project.
	CC	-.1%				No reason indicated.
FY96-01	BOE	+18%			X	Added inflation adjustment of 20% to reflect current construction costs.
	CC	-2%			X	Reduced inflation adjustment and accelerated project one year.
FY97-02	BOE	+3%			X	Added inflation adjustment to reflect current construction costs.
	CC	0%			X	Approved budget request.



Observations:

1. The construction funding associated with Wyngate Elementary School's modernization increased $824,000 or 19%, between the original Board of Education's request in the FY 95-00 CIP and the amount needed for actual contract award in FY 97.

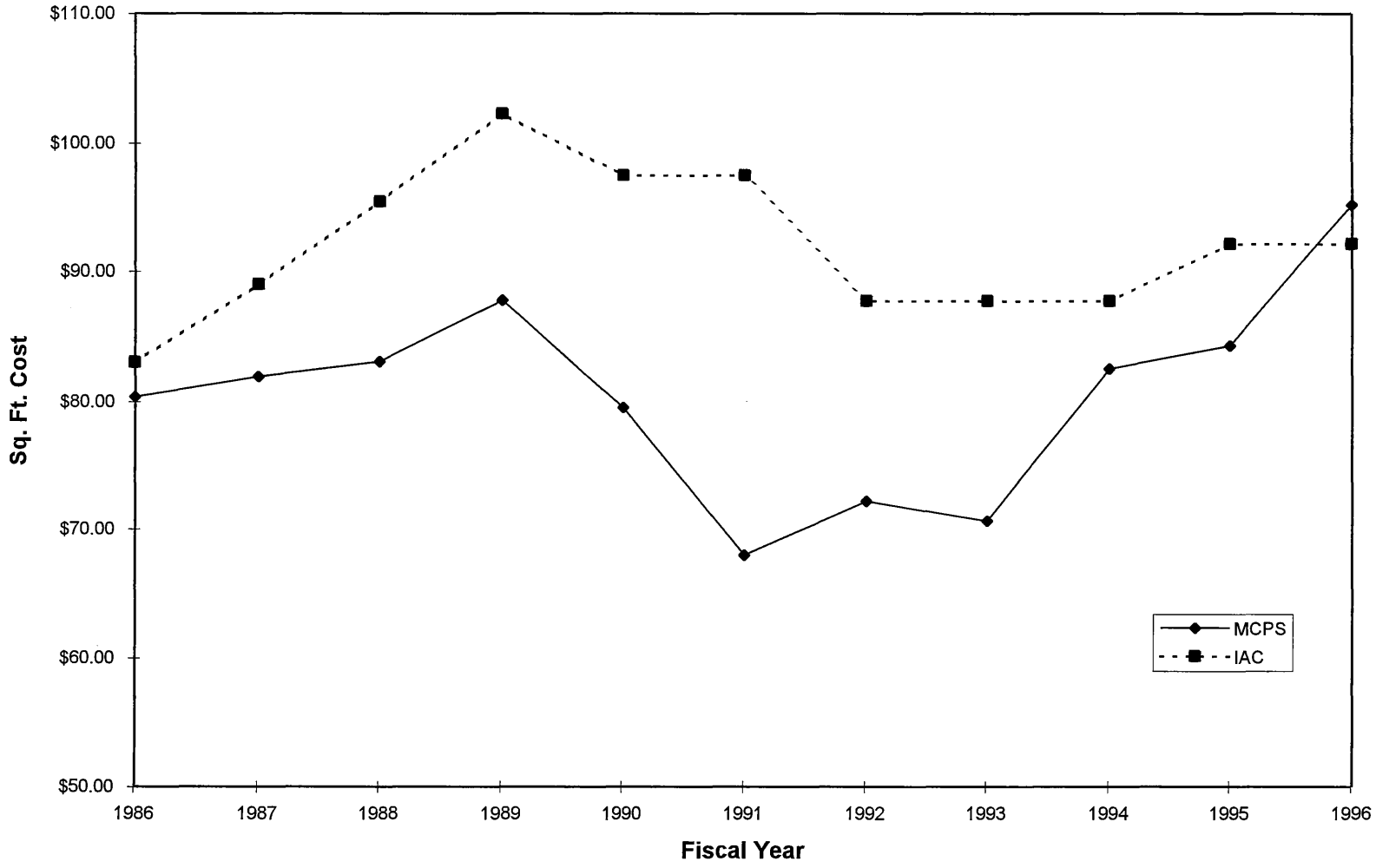
2. The approved funding level for modernizations in the FY 95-00 and FY 96-01 CIPs were lower than the Board of Education's request. For the Wyngate modernization, the differences were: $5,000 (.1%) in FY 95-00 and $98,000 (2%) in FY 96-01.

3. The amount approved in the FY 96-01 CIP associated with the Wyngate modernization was less than the lowest bid received for construction of the base project and alternates selected. However, the difference was relatively small (less than $25,000) and was paid for out of the project's contingency budget.

4. In the FY 97-02 CIP, the Council approved the additional amount in the Modernizations project development form associated with the Wyngate modernization.

Exhibit 22

Square Foot New Construction Costs from 1986 to 1996
MCPS vs. Interagency Committee on School Construction



MCPS data represent the average (mean) square foot costs of new construction during each fiscal year. Interagency Committee on School Construction (IAC) data represent the dollar amount the IAC develops and uses each year to determine State contributions to local school construction projects. By law, Montgomery County can be reimbursed for up to 50% of "eligible" school construction costs, as determined by the IAC.

Appendix A

Resolution: 13-747
Introduced: December 3, 1996
Adopted: December 10, 1996

COUNTY COUNCIL
FOR MONTGOMERY COUNTY, MARYLAND

By County Council

Subject: Amendment to the FY 1997 Work Program of the Office of Legislative Oversight

Background

1. On July 23, 1996, the Council adopted Resolution 13-602, to establish the initial FY 1997 work program of the Office of Legislative Oversight. Chapter 29A, Montgomery County Code, specifically authorizes the Office of Legislative Oversight to conduct special program or budget analyses on selected operations or activities for which funds are appropriated or approved by the Council.

2. The Council is concerned about the continued increases in school construction costs well above the general rate of inflation. Since July, the Board of Education has requested supplemental appropriations for school construction costs totaling $12.64 million for the new construction of three high schools and one middle school. The BOE's supplemental requests were based on contractor responses to MCPS' request for bids that ranged from 14% to 30% above approved funding levels.

3. Before making decisions on the FY 98 capital budget, the Council is interested in gaining a more detailed understanding of: school construction costs from the time of initial project approval through contract award; an analysis of the reasons contributing to cost changes; MCPS' process for procurement and contract award; and how Montgomery County's experience compares to that of comparable jurisdictions.

Action

The County Council for Montgomery County, Maryland, approves the addition of the following project to the Office of Legislative Oversight's FY 97 Work Program:

Appendix D

SECTION X
SUMMARY OF CIP REQUESTS FY 1998-FY 2003
MARYLAND PUBLIC SCHOOL CONSTRUCTION PROGRAM
($000 omitted)

LEA	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	TOTAL
ALLEGANY	560	4,385	3,306	2,075	1,620	2,343	14,289
ANNE ARUNDEL	9,459	6,293	7,543	6,603	13,045	4,919	47,862
BALTIMORE CITY	17,001	6,408	17,416	12,185	16,002	14,993	84,005
BALTIMORE	38,087	10,000	25,729	10,000	10,000	10,000	103,816
CALVERT	3,292	4,020	5,980	690	0	11,285	25,267
CAROLINE	2,443	2,320	6,166	102	2,907	667	14,605
CARROLL	15,970	19,994	8,030	4,337	1,627	3,771	53,729
CECIL	2,949	3,063	3,032	1,406	1,772	1,884	14,106
CHARLES	21,747	572	572	3,211	4,040	0	30,142
DORCHESTER	1,186	950	440	3,264	425	56	6,321
FREDERICK	14,040	13,286	22,821	7,365	6,051	9,480	73,043
GARRETT	550	488	443	296	105	70	1,952
HARFORD	6,097	17,783	5,798	12,488	9,228	6,323	57,717
HOWARD	47,389	10,998	8,405	14,815	10,650	5,000	97,257
KENT	316	549	313	286	370	210	2,044
MONTGOMERY	72,683	24,178	24,207	45,167	21,093	7,837	195,165
PRINCE GEORGE'S	20,203	26,925	34,914	16,324	3,524	5,292	107,182
QUEEN ANNE'S	5,270	4,319	2,000	5,165	3,900	2,300	22,954
ST. MARY'S	13,661	15,268	2,746	6,289	4,794	2.998	45,756
SOMERSET	72	143	110	363	190	140	1,018
TALBOT	1,149	0	2,746	0	374	0	4,269
WASHINGTON	2,659	2,900	1,844	1,394	4,027	1,394	14,218
WICOMICO	9,116	9,208	6,411	7,856	3,289	2,350	38,230
WORCESTER	4,005	4,899	580	1,947	1,792	1,569	14,792
Total State (1)	**309,904**	**188,949**	**191,552**	**163,628**	**120,825**	**94,881**	**1,069,739**
Total State Adj. (2)	**309,904**	**198,396**	**211,186**	**189,416**	**146,863**	**121,097**	**1,176,862**

(1) All projects at estimated July 1997 cost with no adjustment for inflation in subsequent years.

(2) Total adjusted for inflation from July 1997 at 5 percent per year (compounded).