Mount Vernon School District Facilities Plan

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EXECUTIVE SUMMARY

Aging buildings, the demand of new technologies, safety concerns, handicapped accessibility and overcrowding are problems facing many schools today. Unsatisfactory environmental factors such as lighting, heating, ventilation, air quality, acoustic or noise control, and physical security of buildings create inadequate conditions for students to learn. Studies show that students who attend overcrowded schools or buildings in poor condition did significantly worse on reading and mathematics exams than students from school with less crowded classrooms. When provided a choice, quality teachers frequently are drawn to schools with more positive physically environments. Local communities considering the need to build and modernize public schools must also plan for introduction of new technologies requiring expensive computers, high speed internet access, and associated wiring. Rising enrollment and aging buildings have dramatically increased local and state expenditures for school construction around the country.

All of these factors combine to create difficult choices for school boards attempting to finance upgrades to their educational infrastructure. To help the local school board with these difficult decisions, a decision model was created based on Analytic Hierarchy Process and provides the user with a mechanism for making decisions based on a set of objectives.

For the problem defined in this paper, several objectives have been identified to guide the school board to a decision on how best to use public funds to upgrade the educational infrastructure. Four alternatives were also identified and analyzed using the model. The current status of the school building project is discussed and compared to the results of the decision model. New issues related to rising costs are identified as are the need for modifications to the original model. Also discussed are open board decisions and the value the decision model brings to these open issues. (NCES, 2000)

INTRODUCTION

BACKGROUND

Unlike many small towns in Iowa, Mount Vernon has a largely white-collar, highly educated professional work force. Many residents commute to University of Iowa jobs in Iowa City and commercial jobs in Cedar Rapids. Mount Vernon is also uniquely positioned as the home to a vibrant, private liberal arts college, Cornell College. A highly educated citizenry is one reason Mount Vernonites have always taken pride in their educational institutions.

The corridor between Iowa City and Cedar Rapids has experienced high growth in the last ten years. As a town within that corridor, Mount Vernon has shared in that growth. Recently, the appearance of an exceptionally large class of students raised questions about the ability of the existing facilities to meet the growing educational demands of the community. (Appendix A)

PROBLEM DEFINITION

Questions centered around whether the existing school infrastructure was capable of supporting the expanding roles of education and the likely expanding number of students entering the school system. Concerns were expressed about the condition of existing buildings and the need to either renovate existing facilities or build new facilities. The Elementary School lacks adequate classroom space for the growing number of students. The Elementary School also lacks adequate cafeteria space, teachers lounge and special needs facilities. The High School building is the newest facility having been built in the 1970's. Complaints include a gym that is not up to competitive standards and an auditorium that is too small. The Middle School is a 75-year-old three-story brick structure. Its deficiencies include a very small gym, non-accessibility of some rooms to handicapped students, poor environmental controls, inadequate outdoor activity space, and high maintenance costs.

The school board took several steps before beginning the decision process. Using local papers, the board advertised these concerns and solicited the community's help with defining and understanding what the issues were. District and commerce resources were used to determine projected community population growth. A group of community volunteers was used to gather information about the existing school facilities. This information included square footage, number of rooms, usage of rooms, maintenance costs, and surveys of teacher/staff needs and opinions. The boards then used community volunteers, led by a district facilitator, to categorize real needs and identify possible solutions. The output of this exercise was a prioritized list of school needs and several potential options that, to varying degrees, meet these needs. The school board then formed a committee consisting of Mount Vernon citizens who have been active in the community, have children in the

school system, are not board members, and are not employees of the school system. This committee reviewed the options and proposed the best solution for the school board to pursue.

Solution Alternatives

The committee settled on four different options. 1) Do no construction and renovate the three existing buildings. 2) Construct a new building for grades 7-8, remodel the Middle School for grades 5-6 and renovate the Elementary School. 3) Construct a new building for grades 5-8, remodel the High School and remodel the Elementary School. 4) Construct a new High School, remodel the Elementary School, and remodel the High School for use as the Middle School. These alternatives are reviewed in further detail later on in this paper.

Methodology: Analytic Hierarchy Process (AHP)

Complex problem

The development of Mount Vernon School District Facilities Plan presented a complex problem for the Mount Vernon School Board. Following the structure and process of the Analytical Hierarchy Process (AHP) will allow the decision makers to focus on the objectives of the goal and thus make a better choice among the alternatives. The process will produce a decision that not only is defendable but should also have a high level of buy-in from all of the decision makers.

AHP background

The Analytical Hierarchy Process developed by Thomas Saaty, provides a framework for modeling complex problems like the one facing the Mount Vernon School Board. AHP is ideal for structuring the problem in an easy to understand model. It “allows decision makers to model a complex problem in a hierarchical structure showing the relationships of the goal, objectives (criteria), sub-objectives, and the alternatives.” (Forman et al, 2001)

IMPLEMENTATION OF THE AHP

The recommendation for the Mount Vernon School Board defined in this paper and an associated presentation are based upon using the Analytical Hierarchy Process (AHP). AHP was implemented using the Expert Choice 11 software from Expert Choice Incorporated, using the following five steps:

1. Decomposition of the problem
2. Establish priorities
3. Synthesis
4. Sensitivity analysis
5. Iteration

Decomposition of the problem

This step focused on researching the problem and structuring it in the form of a hierarchy. The hierarchy provided a framework to view the problem in the format of the goal and its objectives, sub objectives, and alternatives.

Establish priorities

The priorities of the objectives and sub objectives were derived by a pair wise comparison of each based in the context of the goal. This was accomplished through a process of applying the data gained from researching the problem and through interviews with decision makers. This process ensured that the objectives were prioritized in the context of the goal and not arbitrarily assigned ranks.

Synthesis

"Synthesis is the process of weighting and combining priorities throughout the model after judgments are made to yield the final result. Global priorities are obtained for nodes throughout the model by applying each node's local priority and its parent's global priority. The global priorities for each alternative are then summed to yield overall or synthesized priorities." (Expert Choice, 2004)

Sensitivity analysis

A sensitivity analysis is performed to understand how the alternatives perform with respect to each of the objectives. This analysis also shows how sensitive the alternatives are to changes in the priority of the objectives.

Iteration

This process involved repeating the above steps several times. As more information was uncovered by progressing through each step it was beneficial to review each step with this new insight. Iteration allowed the decision to be checked against our intuition in several cases our intuition was revised based on understanding the problem better through the model development.

ALTERNATIVES

The committee responsible for identifying potential solutions settled on four alternatives.

Option 1: This is the only option that does not include the construction of any new buildings. Instead, all three existing buildings would be extensively renovated with structural improvements, technological upgrades, improved environmental controls and increased space through building expansions at the Elementary Building. The absence of new construction make this alternative the lowest cost solution. A big disadvantage of this option is the failure to adequately address classroom overcrowding, inadequate Elementary cafeteria and teachers lounge, inadequate gym, and inadequate auditorium.

Option 2: This option requires construction of a new building for grades 7-8. The existing Middle School would be renovated for grades 5-6 and the Elementary building would be remodeled. Construction costs are kept to a minimum with the construction of a smaller building holding only two grades. This option addresses classroom overcrowding in grades K-8. The main disadvantage is the reliance on continuing use of the existing Middle School building.

Option 3: The third option requires construction of a new building for grades 5-8 to replace the existing Middle School building. The High School and Elementary School would both be remodeled. Moving the 5th grade to a new Middle School relieves the classroom overcrowding in grades K-8. Construction of a new large school building also provides for the construction of a new gym and a new auditorium. Another advantage with this option is the co-location of all school buildings on the same campus.

Option 4: The final option is very similar to option three in that it involves new construction, except in this case the new building is targeted for a new High School. The existing High School building would be renovated for grades 5-8. The Elementary School would also be remodeled. Moving the grades 5-8 to a renovate High School building relieves the classroom overcrowding in grades K-8. Construction of a new large school building also provides for the construction of a new gym and a new auditorium. This option has the same advantage of co-location of all school buildings on the same campus. A key factor in building a High School is perception that this building is the ‘flagship’ of the local school and therefore should be the most modern.

OBJECTIVES

OBJECTIVE AND SUB OBJECTIVE DEFINITION PROCESS

The objectives and sub-objectives were defined through a multi-step process:

1. Research of industry literature on the adequacy of school facilities
2. Draft of initial list of generic objectives and sub-objectives, applicable to any school expansion project
3. Addition of objectives and sub-objectives specific to Mount Vernon's situation
4. Brainstorming of objectives and sub-objectives through pros and cons
5. Revision of the objectives and sub-objectives

STUDENT ACHIEVEMENT

Through interviews with the decision makers it was clear that in the Mount Vernon decision student achievement was a key objective. Student achievement as a core goal of all educational systems received the highest priority after the pair wise assessments were performed. Research has shown a strong correlation between student achievement and the physical aspects of the learning environment. The student achievement objective was further decomposed into athletic facilities, academic facilities, student capacity, and human ergonomics sub-objectives.

The decomposition of the student achievement objective was guided by the objectives and priorities defined by Professor Earthman in his paper “Prioritization of 31 Criteria for School Building Adequacy” (Earthman, 2004). By using Dr. Earthman’s criteria as a guideline it was possible to tailor the objectives to better meet the needs of the Mount Vernon decision. The priorities derived from the model for these objectives were similar to Dr. Earthman’s but were not identical.

The student achievement objective was further decomposed into ‘Athletic Facilities’, ‘Academic Facilities’, ‘Student Capacity’, and ‘Human Ergonomics’. These objectives were included for completeness as these are important considerations for any new construction project. Academic Facilities and Student Capacity are given higher weighting because they are key areas where deficiencies in the current facilities have been identified. Other sub-objectives do not heavily factor in for this project either because they are not currently perceived as existing problems or due to the specific nature of Mount Vernon’s situation. Human Ergonomics is given less weight because it is not perceived as currently being a problem. Athletics are considered important in Mount Vernon, but the school can get by with existing gym and doesn’t want a new football field. That is because the existing football field is in a location that provides a unique elevated viewing for fans due to steep hillside on the home side. This is a cherished feature that could not be duplicated in the immediate area. Therefore little or no consideration is given to building a new football field. On the other hand, although the school has a competitive gym, most residents believe it is too small and outdated for current usage.

Building Facilities

The building and facilities objective is based upon the overall usage of the school facilities. Besides housing the community's educational system, the school facilities have been a central part of the community and social activities. Building Facilities objective was further decomposed into daily usage issues, faculty issues, community issues, and federal regulation issues sub-objectives.

Site

In defining the site objective it was important to take into consideration that the schools have traditionally been part of the neighborhood. Care needed to be taken when balancing the need for the schools to remain part of the neighborhood, to also accommodate the physical needs of the school buildings today, and to allow for future expansion.

The site objective was further decomposed into site adequacy, location, sewer and water systems, parking and traffic control, playgrounds and playfields, and environmental problems sub-objectives. These objectives were included for completeness as these are important considerations for any new construction project. These objectives do not heavily factor in for the Mount Vernon project due to the specific nature of the project. In anticipation of future expansion, the school district secured an agreement with the owners of land adjacent to existing schools. This site poses no unique environmental, traffic or parking challenges.

Cost

The cost objectives were based on several financial issues. Costs associated with the existing buildings include structural condition and operating expenses. Cost associated with potential new buildings included estimated construction costs and estimated operating costs of new buildings. Costs associated with expansion decisions include passage of the bond issue and capacity for future expansion.

Specific estimated costs for maintenance and operating expenses are not available. These costs are handled in general terms. It is understood that maintenance and operating costs are more for older buildings than for new buildings.

Future expansion weighs how well the community can deal with potential expansion needs in the future. The property adjacent to the existing High School currently is owned by Cornell College. The College has agreed to sell this land to the Mount Vernon school district if a new building is constructed. If the building is not built now, there is no guarantee that this land would be available in the future as the College could decide to use the land for

its own expansion needs. Land available now may not be available in the future. Availability and cost of land could be an issue if the decision to build is delayed.

Construction costs are based on estimates provided to the school by OPN Architects, Inc. Estimates are available for all four options.

The existing buildings are of varied condition. The Middle School is a 75-year old four-story brick building. The building has a small gym, library and a small auditorium. There is no room for expansion. The Elementary building is structurally sound and functional but has inadequate space for the growing student population. The High School was constructed in the 70's, is structurally sound and has adequate space for the existing population.

The cost objective was further decomposed into future maintenance costs, capacity for future expansion, construction costs, operating expenses, bond issues, and existing condition of building sub-objectives.

Community Perceptions

Many of Mount Vernon's residents went to school in the current Middle School building. Some citizens feel that the Middle School building is solidly built and can still serve the educational needs of the community. This attitude can be summed up by the expression "It was good enough for me, and its good enough for these kids."

A large percentage of Mount Vernon residents are college educated, white collar professionals. This group believes that new standards for teaching, main-streaming, handicap accessibility as well as technological advances have changed what is required of educational buildings. This group believes that the Middle School has become obsolete and a new building is needed.

Those that desire a new building are divided into two groups, those that want the new building to be a Middle School and those who want the new building to be the High School. A majority want the new building to be the High School. They consider the High School to be the flagship building. The rest believe the existing High School is fine and want a new Middle School.

Although Mount Vernon is an affluent community, passage of a bond was not a given. In the past, tax increases were voted down because the description of how the money would be spent was too vague. The bond issue was passed because the board was very specific that the money raised would go toward building a new school building to replace the existing Middle School.

The community perception objective was further decomposed into sentimentality toward middle school building, preference for new high school, preference for new middle school, and attitude toward bond sub-objectives.

DECISION MODEL

DEVELOPMENT APPROACH

This decision model was developed using a combination of the top down and bottom up approaches. After the goal was defined the objectives were identified and structured in the context of the goal. Next the alternatives were identified. Then the prioritization of the objectives in respect to the goal was performed. Last the alternatives were evaluated based how they performed based on the objectives.

DECISION HIERARCHY

The hierarchy shown below (Figure 1) was created by dividing the decision into objectives and sub-objectives. Figure 1 is a snap shot of the tree view in Expert Choice. The objectives reflect the areas considered most important by the community when considering significant expenditures for facilities.

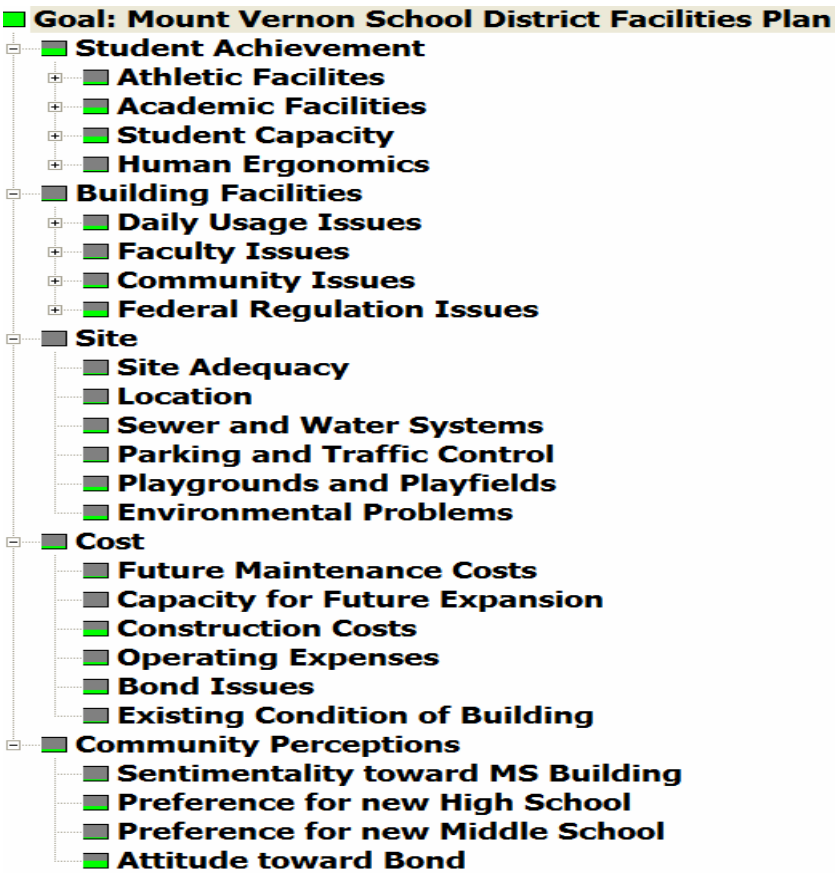
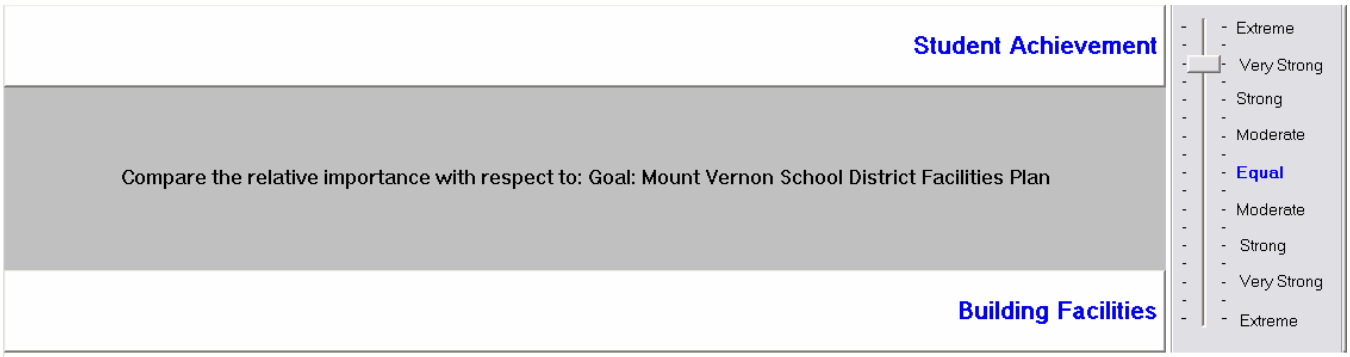


Figure 1: Tree View of Objective Hierarchy

PAIR WISE COMPARISON

The top level objective priorities were derived through pair wise comparisons. The image below shows a verbal comparison between the Student Achievement objective and the Building Facilities objective.



	Student Achievement	Building Facilities	Site	Cost	Community Perceptions
Student Achievement		7.0	5.0	3.0	7.0
Building Facilities			4.0	3.0	3.0
Site				4.0	2.0
Cost					1.0
Community Perceptions	Incon: 0.11				

Figure 2: Pair Wise Comparisons

OBJECTIVE PRIORITIES

The above process of pair wise comparisons was completed for all of the objectives and sub objectives. At this point all of the objective priorities in respect to the goal were derived. The image below shows the top level objectives sorted from highest to lowest priority.

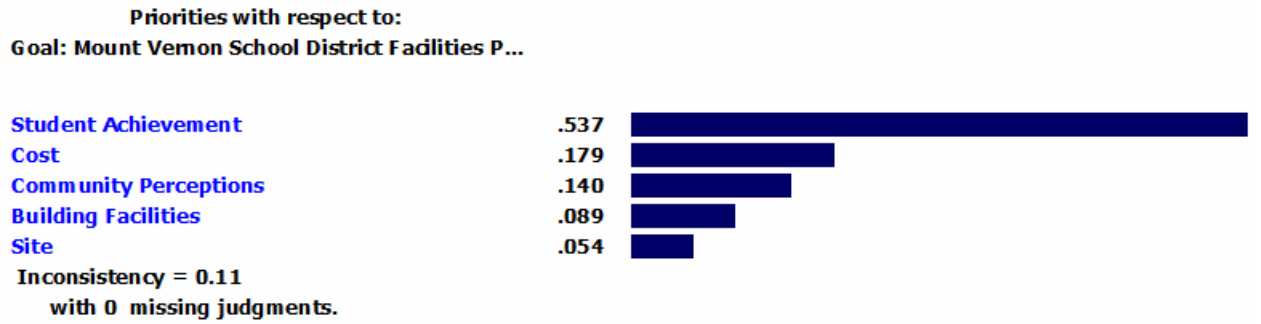


Figure 3: Objective Priorities

SYNTHESIS

The synthesis of the model shows that option4 is the most preferred alternative.

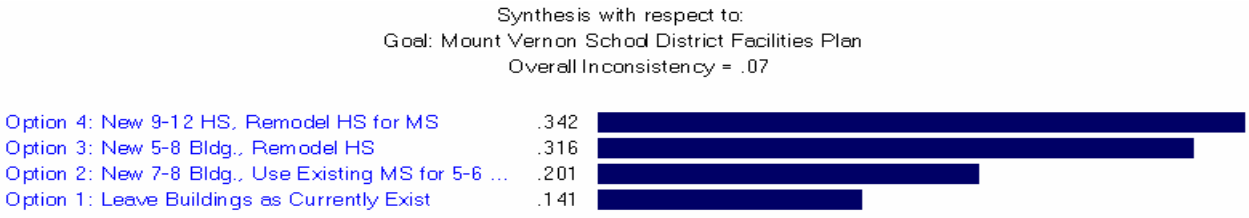


Figure 4: Synthesis Summary

SENSITIVITY ANALYSIS

The performance sensitivity graph below (Figure 5) shows how each alternative performed with respect to each of the top level objectives. The enclosed movie (performance.exe) highlights the effect of changing the priorities of each objective on the alternatives. From this movie it can be seen that only changes to the cost objective change the order of the preferred alternative. Increasing the priority of the cost objective will cause option 3 to be preferred over option 4.

Click on the icon to play the movie. performance.exe

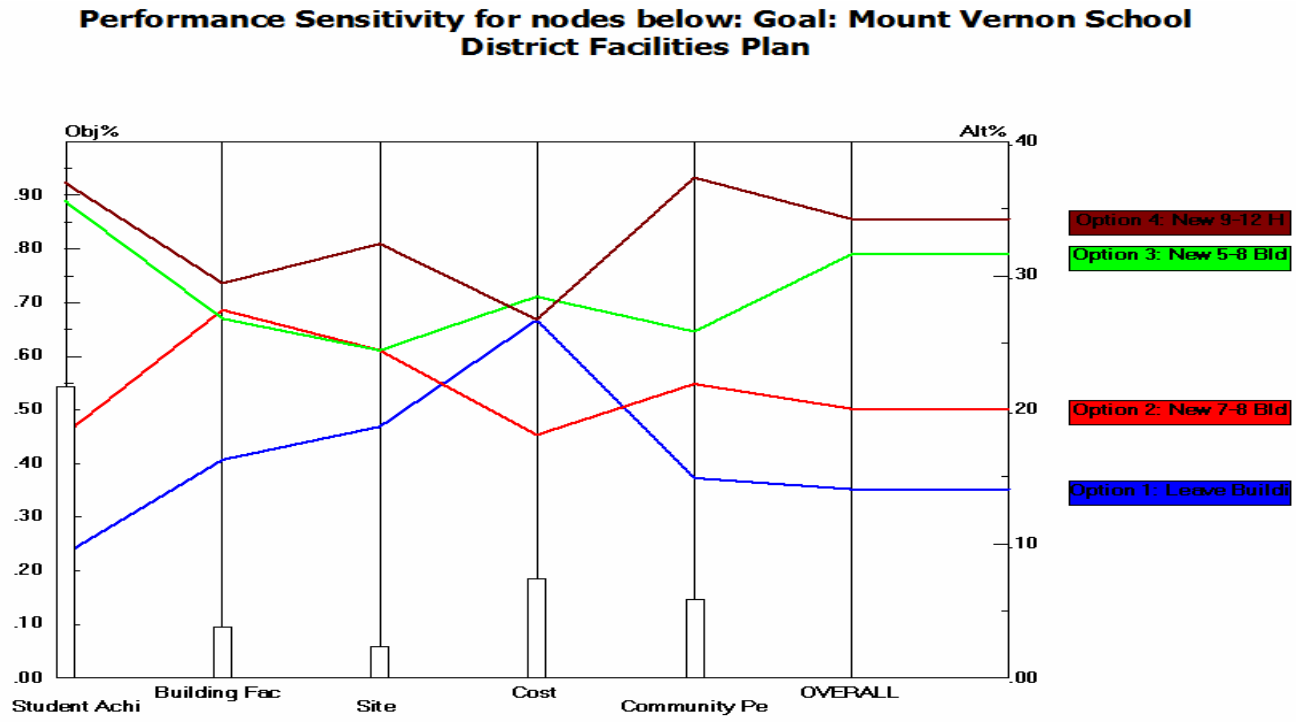


Figure 5: Performance Sensitivity

ORIGINAL APPROACH

COMMUNITY DECISIONS

The first discussion on facilities occurred about five years ago and continued over the next several years. Questions centered around whether the existing school infrastructure was capable of supporting the expanding roles of education and the likely expanding number of students entering the school system. Concerns were expressed about the condition of existing buildings and the need to either renovate existing facilities or build new facilities. Early sessions involved community volunteers brainstorming over issues, problems, perceptions and possible solutions. A committee appointed by the school board down-selected from potential options, prioritize those options and selected a financial solution.

The outcome of this BOGSAT process was a decision to construct a new high school, remodel the current high school building into a middle school, move grades 5-8 to the remodeled high school building to create elementary classroom space. Property tax bonds worth $8,900,000 were voted on and passed by the residents of Mount Vernon. Construction was expected to begin in 2005. All renovations and construction of the new High School were expected to be completed by the fall of 2007.

The decision to build a new high school has recently come under question due to a $500,000 increase in the estimated cost.

VALUE AND CONCLUSION OF FIRST MODEL

To insure the decision model was reflecting the decision faced by the school board, information was gathered from the School Board President and selection committee members. The final list of alternatives and cost projections was received from the school Treasurer.

The initial intent was to analyze how the results of the decision model would compare to the BOGSAT style of the selection committee. To this end, the model agreed with the conclusions of the selection committee. Construction of a new high school building was determined to be a slightly more preferred alternative. The closest second choice was to build a new middle school.

Second Pass (Re-shampoo)

Changing Realities Force New Decisions and Modified Models

The first model was valuable as a tool to validate the original decisions of the selection committee. However, inflation in the original estimated cost of the project required new decisions and modifications to the original decision model.

After the decision was made, project estimates dramatically increased due to the rising cost construction material. Because of the personality charged nature of small town politics, and because the projected cost had risen $500,000 in the past 6 months (inflation in the cost of steel) the people on the final committee have come under fire for their decision to build a new high school. Although the bond has passed, the school has not approved any architectural plans and some consider this an opportunity to influence a late change in direction. The school will not break ground until next year. Architectural plans have not been approved. The school is reconsidering their original plan in light of unexpected increase in costs estimates due to rising price of steel.

By modifying the original decision model, the committee can examine how large of factor cost must be to change their decision. The original model combined 'Construction Cost' in with several other cost factors. This arrangement did not give adequate visibility to the importance of Construction Cost to committee decisions. This became apparent when rising construction cost did not change the model, but did cause the committee to rethink their decision.

Modified Decision Model

The new decision model is based on the original model with the primary difference being the separation of 'Construction Cost' as stand-alone objective. The objectives were then re-prioritization by committee members with 'Construction Cost' being given a more significant level. The alternatives were then re-evaluated based how they performed considering their restructured objectives.

Decision Hierarchy of Modified Model

The hierarchy of the modified model is shown below (Figure 6). This modified hierarchy was created by reviewing and re-dividing the decision into objectives and sub-objectives based on a new understanding of how well the original objectives were, or were not, working to reflect proper prioritized decision. All the objectives/sub-objectives from the original model are still present, but some sub-objectives have been relocated to other existing objectives.

An earlier objective named 'Cost' has been renamed 'Maintenance Expense' and still contains the sub-objectives 'Future Maintenance Cost' and 'Existing Condition of Building'. 'Capacity for Future Expansion' and 'Bond Issue' sub-objectives were moved from 'Cost' to 'Community Perceptions'. Construction Cost has been removed as a sub-objective and given higher visibility as an objective on its own.

The modified objectives reflect the more significant importance placed by the community on initial Construction Cost. Figure 6 is a snap shot of the modified tree view in Expert Choice.

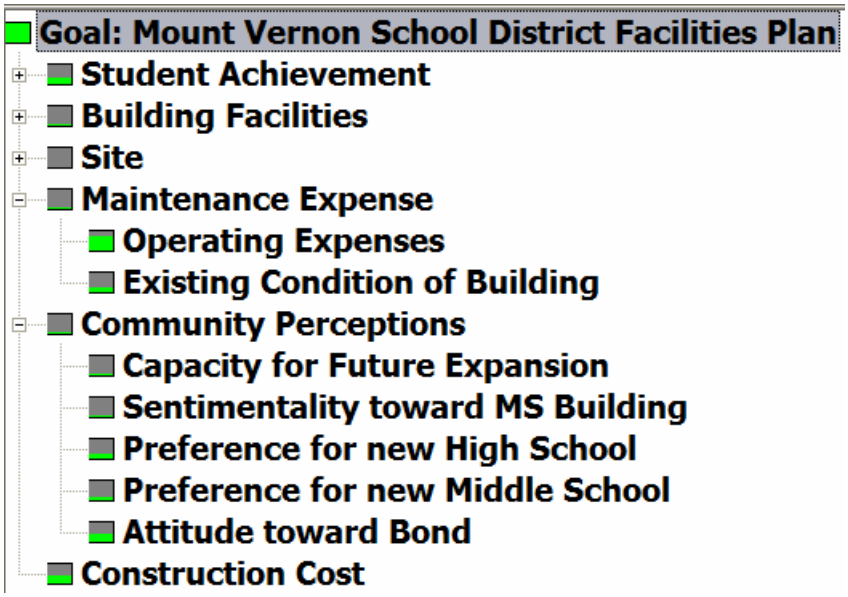
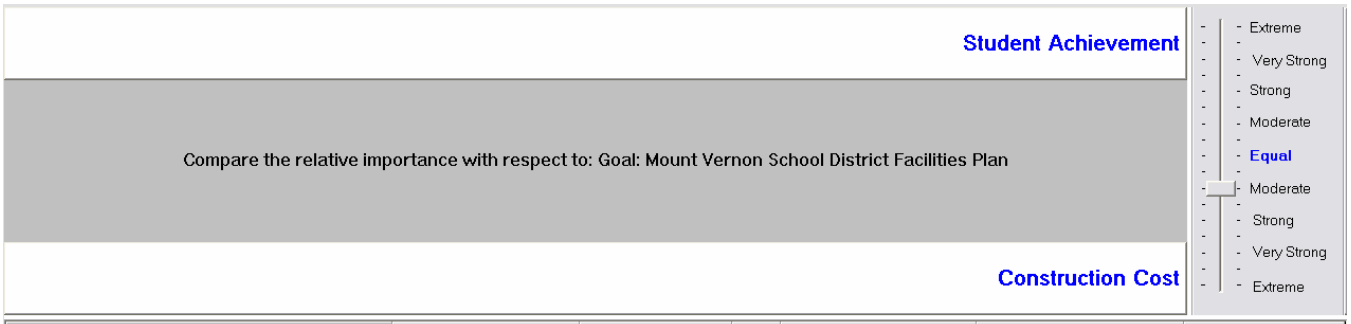


Figure 6: Tree View of Modified Objective Hierarchy

Pair wise comparison of Modified Model

The top level objective priorities of the modified model were derived through pair wise comparisons. Note the addition of Construction Cost as a new objective. An earlier objective named 'Cost' has been renamed 'Maintenance Expense'. The image below shows a verbal comparison between the Student Achievement objective and the Building Facilities objective.



	Student Achievement	Building Facilities	Site	Maintenance Expense	Community Perceptions	Construction Cost
Student Achievement		7.0	5.0	3.0	7.0	3.0
Building Facilities			4.0	3.0	3.0	4.0
Site				4.0	2.0	5.0
Maintenance Expense					2.0	4.0
Community Perceptions						4.0
Construction Cost	Incon: 0.11					

Figure 7: Pair Wise Comparison

Objective Priorities of Modified Model

The above process of pair wise comparisons was completed for all of the objectives and sub objectives of the modified model. The image below shows the modified top level objectives sorted from highest to lowest priority. Note that Construction Cost is now considered the highest priority followed by Student Achievement.

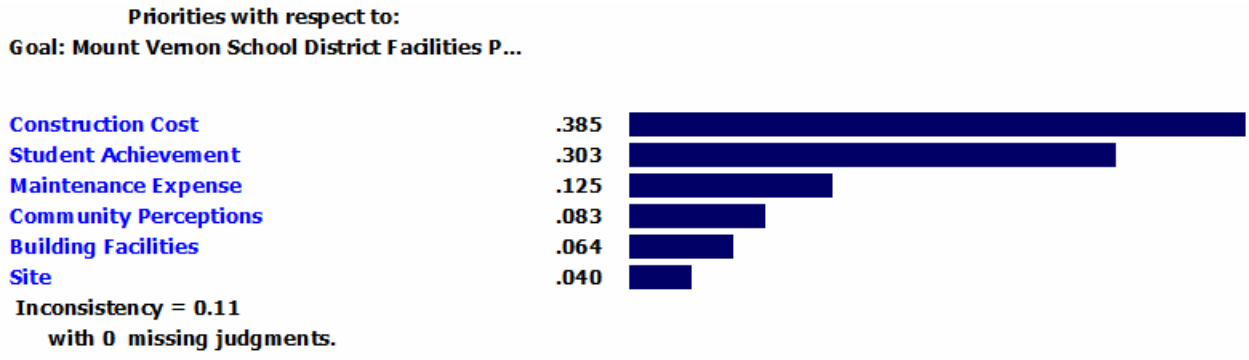


Figure 8: Modified Objective Priorities

Synthesis of New Model (Option #4 Original Costs)

As with the original model, synthesis of the new model using the original Construction Cost weightings results in original pair-wise comparisons that indicate option #4 as the most preferred alternative.

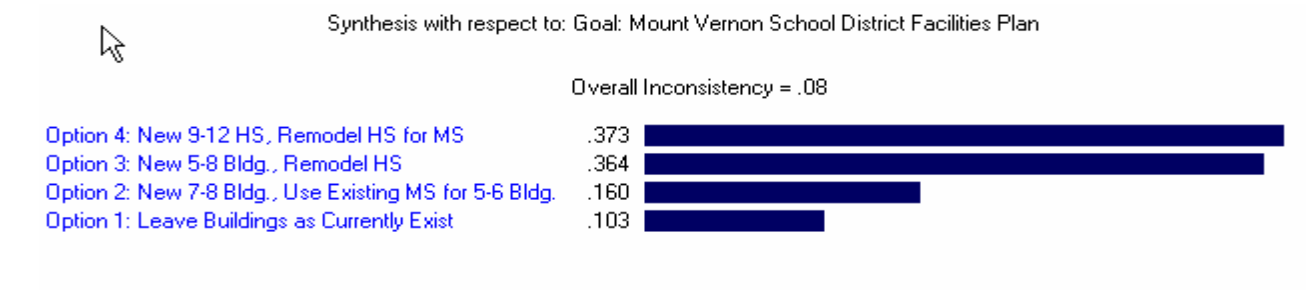
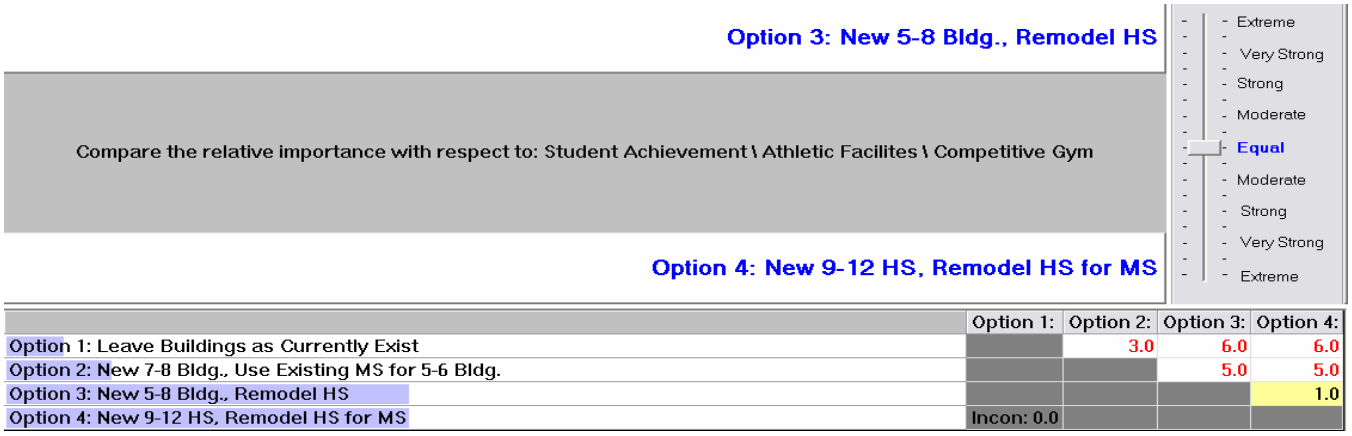


Figure 9: Synthesis Summary - Option 4; Original Cost

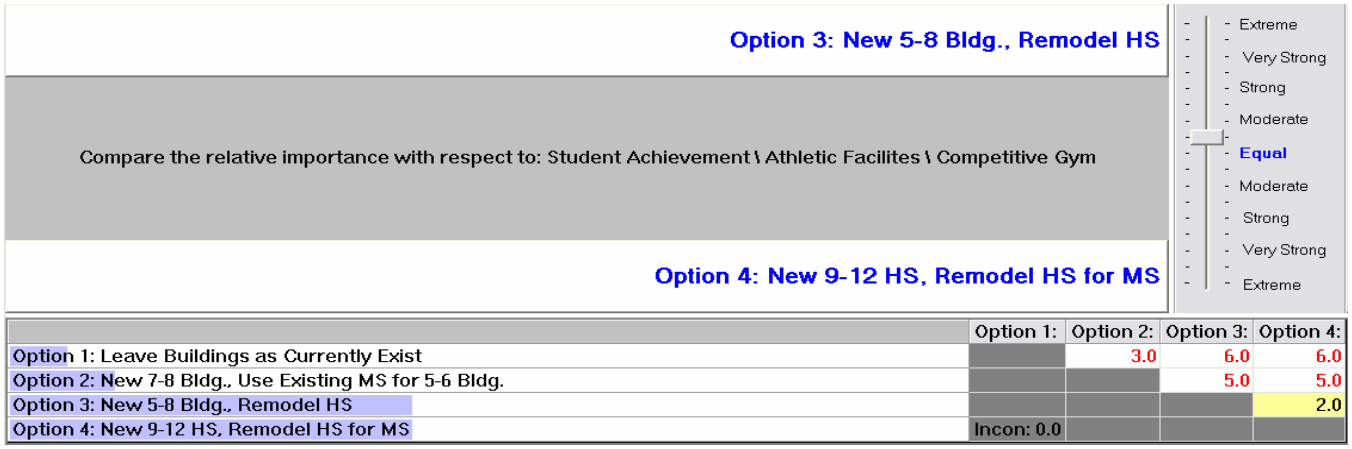
Reflecting Increased Cost by Changing Relative Preference

To reflect the increased cost of Option #4, the judgment for relative preference with respect to Construction Cost between Option 3: New 5-8 Bldg and Option 4: New High School was changes slightly from 1.0 to 2.0 to reflect that increased cost of Option 4 now makes Option 3 a slightly preferred option as far as Construction Cost is concerned.



	Option 1:	Option 2:	Option 3:	Option 4:
Option 1: Leave Buildings as Currently Exist		3.0	6.0	6.0
Option 2: New 7-8 Bldg., Use Existing MS for 5-6 Bldg.			5.0	5.0
Option 3: New 5-8 Bldg., Remodel HS				1.0
Option 4: New 9-12 HS, Remodel HS for MS	Incon: 0.0			

Figure 10: Original Relative Preference



	Option 1:	Option 2:	Option 3:	Option 4:
Option 1: Leave Buildings as Currently Exist		3.0	6.0	6.0
Option 2: New 7-8 Bldg., Use Existing MS for 5-6 Bldg.			5.0	5.0
Option 3: New 5-8 Bldg., Remodel HS				2.0
Option 4: New 9-12 HS, Remodel HS for MS	Incon: 0.0			

Figure 11: Cost Adjusted Relative Preference

Re-Synthesis of Modified Model Reflecting New Cost Information

The pair-wise comparisons of Construction Costs were changed to reflect the new estimate for construction costs of Option #4. The synthesis of the modified model with revised relative preference between options 4 and 3 shows that option #3 is now the most preferred alternative.

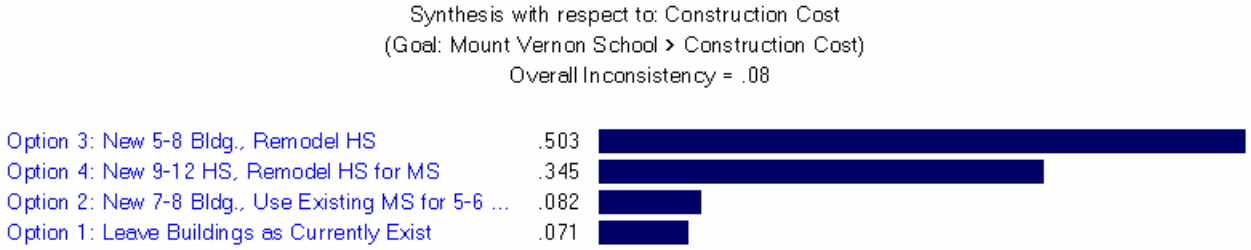


Figure 12: Synthesis Results; New Costs

Sensitivity Analysis of New Model

Using the modified decision model, the performance sensitivity graph below (Figure 13) shows how each alternative performed with respect to each of the updated top level objectives. Using the modified model, increasing the priority of the cost objective still causes option 3 to be preferred over option 4.

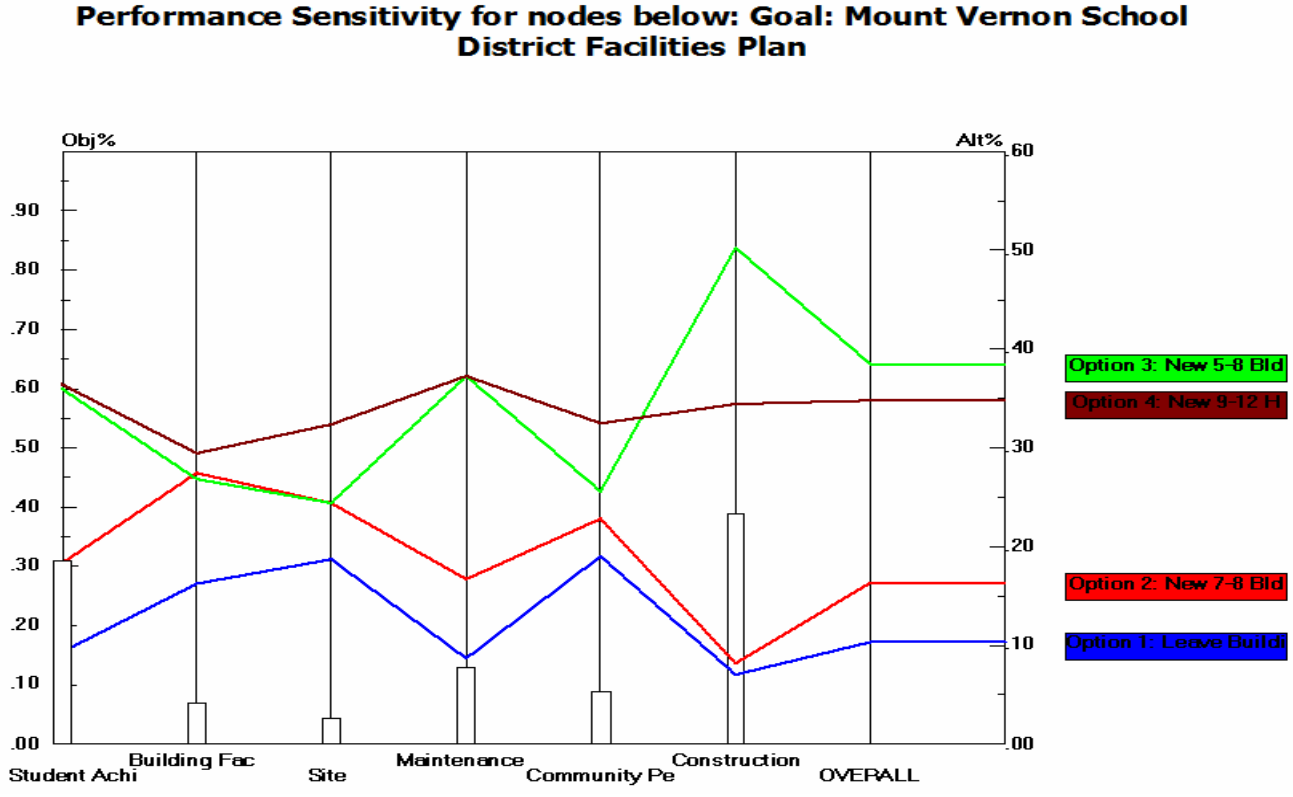


Figure 13: Performance Sensitivity; Modified Model

CONCLUSIONS ON MODIFIED DECISION MODEL

SUMMARY

The original model did not effectively highlight the differences in cost factors that the committee needed to weigh. Changing circumstances required a re-thinking of the original model. The increase in estimated construction costs versus the savings from not remodeling the existing high school was not adequately reflected by adjustments to the pair-wise judgments of the original model.

By modifying the model to allow greater priority of Construction Cost, and by allowing preferences to be changed based on changes in cost, this model can be used by the school district to help with decide whether to continue forward with building a new High School or, based on increased cost, change their decision to building a Middle School instead.

Modification of the model involved increasing the visibility of Construction Costs as an objective. This was necessary to adequately emphasis the importance of construction cost to the committee's decision.

In the modified model, Student Achievement and Construction Costs are the most significant objectives in the decision model. In the case demonstrated above, the Construction Cost pair-wise relative preference between Option #4 and Option #3 was changed to reflect the rising estimated construction cost of Option #4. The change in relative preference between Construction Costs of Options #4 and #3 in turn changed the priority of alternatives. The end result was a change in the decision from building a new High School (option 4) to building a new Middle School (option 3).

The committee will need to reevaluate the pair-wise judgments based on continuing increased costs of the project. As costs goes up, the comparative significance of cost to options 3 & 4 will change in relationship to each other. The newly synthesized results may change the preferred alternatives based on the new judgments. In the above example, the outcome of the decision would change from building a new high school to building a new middle school.

RECOMMENDATION

The development of Mount Vernon School District Facilities Plan presented a complex decision to the committee. Use of a structured decision process allows the decision makers to focus on the objectives of the goal and therefore make a better choice among the alternatives. This often involves revising the model when it doesn't adequately reflect changing attitudes or changing issues faced by the decision makers.

In the case presented here, it was found that the model did not adequately represent the impact that rising construction costs had on the final decision. Modifications have improved the model to where it is again useful to the committee for making decisions on the need for new educational facilities.

The first model and the modified model served their purpose in identifying a very large priority gap between the key activities in option 3/4 (build new building) and options 1/2 (remodel existing building). The modified model identified the impact in construction costs and should change the committee's decision from building a new High School to building a new Middle School. The school committee will need to meet in the near future to reevaluation of their original decision and gain consensus on the recommendation of this modified model. Even with continued increase in costs, it is unlikely that the committee will want to change their position away from construction of some new building. Unfortunately, costs may continue to rise prior to the start of construction.

Future increases in cost will not change the decision to build a new building, but will require decisions about the priority of many features of the new building. Therefore, it is our recommendation that yet another resource allocation model be developed for the school committee. The resource allocation AHP model assumes a new building and prioritizes the feature alternatives being designed into that building. These alternatives include a gymnasium, auditorium, wrestling room, playground equipment, auditorium sound system, science labs, library, and weight room. Associated costs will need to be identified for each of these features. If necessary, by using a resource allocation model which prioritizes these features and applies cost constraints, the school committee can determine what features can be included or excluded based on changing cost constraints.

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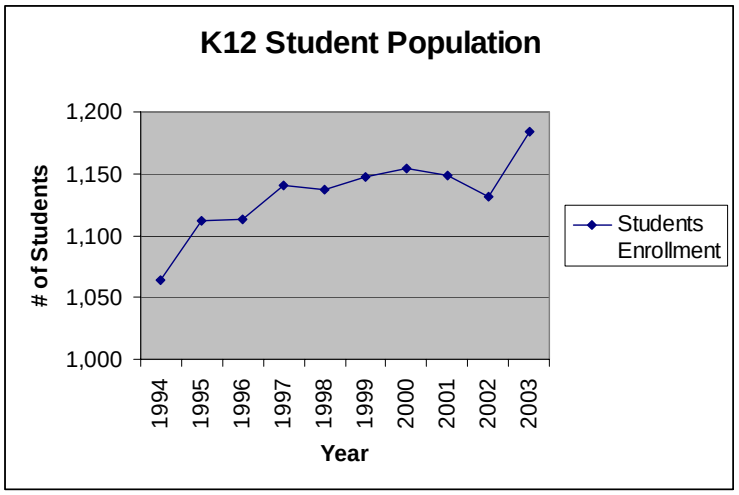
APPENDIX A: STUDENT POPULATION GROWTH

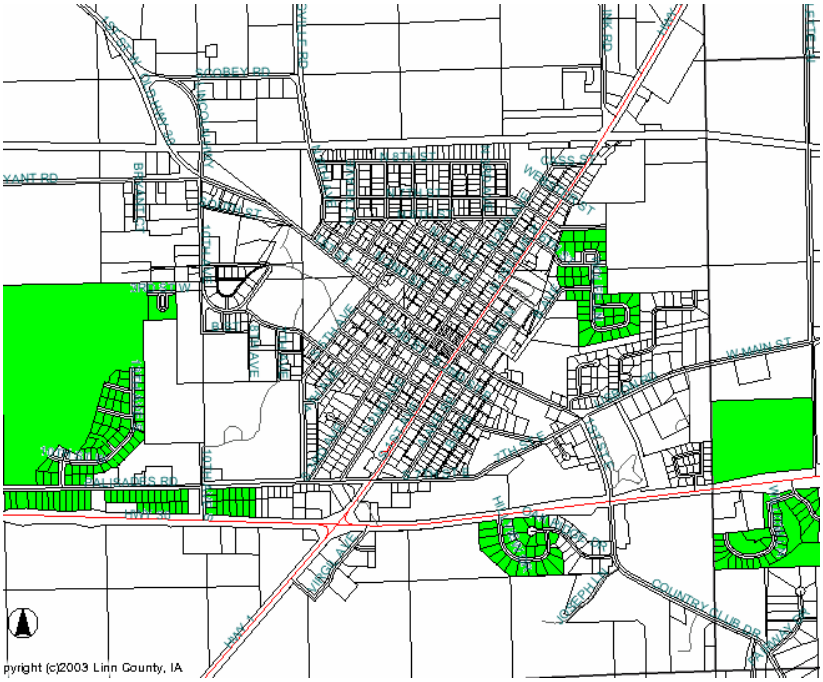
Two primary factors contribute to the projected growth of student enrollment in Mount Vernon schools.

- Iowa has Open Enrollment which allows students in neighboring schools to enroll in Mount Vernon. Many students from the surrounding area apply to transfer into Mount Vernon because of the schools reputation for quality education.
- Mount Vernon is also going through a sustained growth in residential housing.

Other issues that may have been considered only marginal are exacerbated by the growth in class enrollment.



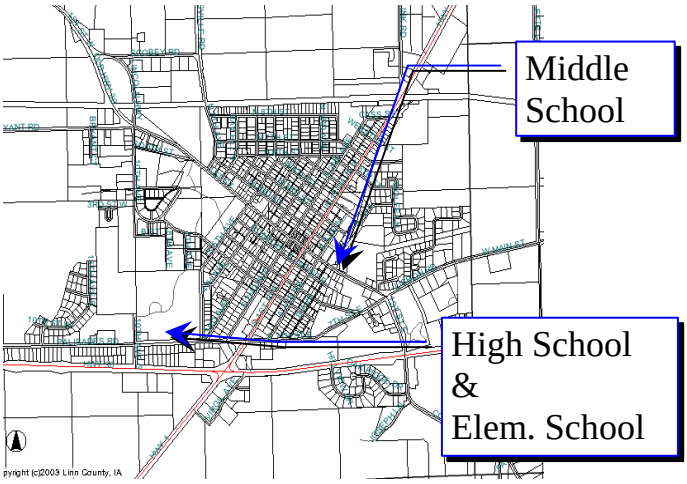
Community Growth Shown in Green



APPENDIX B: LOCATION

Mount Vernon is located in Eastern Iowa at the intersection of Highway 30 and Highway 1. The town of Mount Vernon sits on a high mound that rises above the gently rolling farmland of Iowa. Cornell College and the main street business district are at the top of the hill. The Middle School is also located at the top of the hill near the business area. Access is difficult and parking is limited. The High School and Elementary buildings are on adjacent properties in a low flat area on the southwest corner of town.

The Elementary and High School facilities are on a 37 wooded acre campus complex that includes private drive, parking, soccer practice field, tennis courts, playground and track facilities. To insure the capacity for growth in the future, the school recently purchased another 22 acres immediately west of the High School.



1. New Building
2. Existing High School
3. Existing Elementary School
4. Existing Playground