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ABSTRACT

The community/school relationship is considered vital in helping rural school districts adapt to changing needs through renovation and/or expansion of its school facilities. How these needs are met involves choices that include consolidation with another district, new school construction, or renovation and adding on to an existing school. This paper argues that the addition/renovation choice can often be a successful one in meeting the changing needs of a school or district, and presents the "integrated sequence" method for analyzing an existing building's reusable resources in meeting those needs. It presents an overview on how the rural school is the center of community life and the consequences of consolidating school districts, followed by a discussion of the issues surrounding an integrated sequence of development, such as site size, the planning process, building valuation, creation of a flexible design, issues involving construction, and environmental concerns. Two case histories of school districts using this approach are presented. (Contains 13 references). (GR)

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Rural Schools Facilities: *Additions & Renovations As An Integrated Sequence*

ABSTRACT

The symbiotic nature of communities and rural schools is an important part of our American culture. In examining this relationship, a theory is proposed that outlines the way that addition/renovations can be meaningful in enhancing and supporting community while accommodating new building needs in rural schools. A particular approach to addition/renovations is recommended which is the "integrated sequence". This method significantly ties together the past, present, and future. A successful integrated sequence requires technique and experience in many phases of work to assure a successful project. Analyzing the existing building under the concept of "mining the existing building" for its reusable resources is an early key ingredient of a successful effort.

As needs change in our small rural schools, the options of consolidation with another district, building a replacement school, or renovating and adding onto the existing school are pondered. This article will demonstrate that the addition/renovation choice can often be a successful one in meeting the evolving and comprehensive needs of a school or district. Consolidation of districts and total replacement facilities will, at times, still be needed. Before moving to such a drastic change, however, the potentials of addition/renovation projects need full examination. It is this author's belief that addition/renovations that are developed as integrated sequences (upon completion existing building and additions work synergistically as one composition and anticipate needs of the future) have the potential for bringing more meaning to a student's life, than a building created at one point in time. In an integrated sequence approach to (addition/renovation) projects, the technique called "mining the existing building" is an essential step. This step is to fully understand the existing elements as design parameters necessary for the final composition.

An integral part of the theory that addition/renovations can provide a superior school environment evolves from the close kinship of schools and community life. The essential component of feeling grounded can be enhanced by the continuity of its institutions and in rural areas, this means to a large degree, the continuity of the school.

In studying resistance to addition/renovations, there are national and state policies that encourage consolidation or total replacement approaches. Evolution away from the "larger is better" model is occurring throughout all geographic settings, as well as a new appreciation for the benefit of the small rural setting. Common obstacles will be reviewed in the process of existing building analysis, program/planning, and design that can lead to a integrated sequence project. Among these obstacles are changing standards, lack of documentation, concealed conditions, and hazardous materials. The unique benefit of having students on site and available for interviewing for preferences, is important to utilize. We will show further that with careful organization and planning, the many and varied demands of an addition/renovation project can be managed and lead to predictable and successful results.

As the build environment becomes more established, it is also important to recognize that the best sites are already occupied, and, therefore, the challenge of an addition/renovation to both owners and designers becomes more prevalent. The suggested goal of utilizing an integrated sequence approach and understanding the challenges to achieve it, can provide wide spread benefits.

RURAL SCHOOLS AS THE CENTER OF COMMUNITY LIFE

From the earliest times of organized education in rural areas, schools have formed the heart of community life. Early schools were used for a variety of entertainment and social events, as well social services, political meetings, and even worship and housing out-of-town guests (Gulliford, 1996). As well as serving children of the community in the early 1900s, country schools served adults for education at night under the name of, "moonlight schools." This close connection between school and community has been heavily documented in publications throughout this century. The connection between schools and communities is so great, that they are often mutually dependent upon one another. The rise or fall of the social economic condition of a community will be greatly reflected in the condition of its school(s). Similarly, an event such as the removal of a school from a community is well known to have a significant deteriorating affect on its social economic condition.

In examining community, it is important to recognize the importance of the family and inter-generational connections. In a community school, values of the family and community are tight knit and passed from one generation to the next. School has another function, however, of opening up new horizons to the student. In a small rural community, this freedom can be tempered with a rich framework of familiar family, friends, and acquaintances, all of whom can monitor and provide feedback to a child regarding his/her actions.

The strengths that rural environments offer warrants in-depth examination. Recently, a rural attitude survey was conducted at Western Carolina University in Cullowhee, North Carolina. The majority of responses were positive with one student stating that when he thinks of "rural," he thinks of "common people, good people, love of land, beautiful scenery, men without shirts, kids without shoes, women without make-up, many people without a care in the world, small churches, not much traffic on dusty back roads" (Herzog & Pittman, 1995). Responses emphasize the importance of relationships and relatedness and references to nature were common. The most common words and response were ... "peaceful, safe, and warm. Closeness, comfortable, friendly, home, quiet, and relaxing were also used frequently."

In Article 2 of a special section on rural schools of *Phi Delta Capa*, 1995, the role of rural environments in promoting meaning is further developed,"...knowledge of place — where you are and where you come from - is intertwined with knowledge of self. Place holds the promise of contributing to the development of meaningful identify...the more students understand their community and its environments — its social structure, its economy, its history, its music, its ecology — the more they become invested in that community" (Theobald & Nachtigal, 1995).

Consolidation of schools and their loss from communities has become a common fact. In 1913, there were still 250,000 one-room schoolhouses in the U.S.A. Since the end of World War II, the number of schools districts in the United States has dropped from over 100,000 to approximately 15,000 by the late 1980s. During the 90s, Minnesota's 432 school districts consolidated to 350; 48% of these districts are considered rural with 28% of the state's students in 1,460 schools. With the upturn of the economy since 1994, substantially fewer consolidations are under consideration, however, with only three or four districts in discussion on the issue this year and only one or two groups expected to finalize consolidation.

Determining the minimum effective school size and what educational goals are to be measured appears to be two critical factors in the consideration of consolidation. Past legislation in Minnesota on cooperative school grants and revenue sharing have limited participation to those schools averaging 60 or 66 persons per grade level, which would translate into a 9-12 high school minimum size of 240 to 264 students. In guidelines for those considering consolidation, a one section elementary school or approximately 175 students in a K-6 school is considered a minimum size (Minnesota Department of Children, Families, and Learning, 1997).

At the national level, goals calling for dominance in global competition have been used by some educators to promote larger schools. A recent list of these national educational goals is as follows (National Network of Regional Educational Laboratories):

Goal 1: School Readiness
All Children will start school to learn.

Goal 2: School Completion
Graduation rates will increase to at least 90 percent.

Goal 3: Student Achievement and Citizenship
Students will demonstrate competency over challenging subject matter.

Goal 4: Teacher Education and Professional Development
The teaching force will have access to necessary improvement programs.

Goal 5: Mathematics and Science
United States students will be first in the world in mathematics and science.

Goal 6: Adult Literacy and Lifelong Learning
Every adult will be literate and possess the knowledge and skills necessary to compete in a global economy.

Goal 7: Safe, Disciplined, and Alcohol-and Drug-Free Schools
Every School will be safe and conducive to learning.

Goal 8: Parent Participation
Every school will promote partnerships with parents.

Certainly goals 5 and 6 speak to a desire to be dominant in the world economy through our educational achievements. Educators have often used these goals to define that larger schools, through consolidation, are necessary. Large school advocates profess higher economic efficiencies, more opportunity for specialized and accelerated courses and languages beyond the main stream such as Russian or Japanese (National Network of Regional Educational Laboratories). Other voices indicate that any over emphasis of such a single issue will do harm to our national culture contributed to significantly by the many unique community level cultures found in rural areas throughout the country.

A way of looking at the issue of the purpose of schools calls up the Greek root of the term "School, *Schol*, referred to contemplation, to the suspension of activity, and to leisure" as examined by Allen J. Young and Craig Beholy in the *Political Economy of Rural Consolidation* (DeYoung & Howley). They point out the distinction between schools as important places for people to create their culture and schooling as an attempt at systematic construction of predetermined bodies of knowledge. Schools are a place where meaning is created by the participants. Schooling would differ in that it would be systematic in providing what has already been determined.

AASA Executive Director, Paul Houston, in the October, 1996 *Leadership News,* (Leadership News, 1996) references a recent study of the Northwest Regional Laboratories in Portland, Oregon, "(study) shows that small schools are superior to large ones on almost every measure...when small schools are not superior to large ones, they are just as good. This is true for both elementary and secondary schools, and is true for students of all ability groups and in every town and City in this country." Mr. Houston concedes that larger schools offer more varied activities than small ones, but that the average student in a large school does not take advantage of these opportunities. Based on this view an obvious benefit of rural schools is that they are naturally small and commonly include cross-age teaching, using the community as the curriculum, are not shy about experimenting, and naturally fall into interdisciplinary methods of teaching.

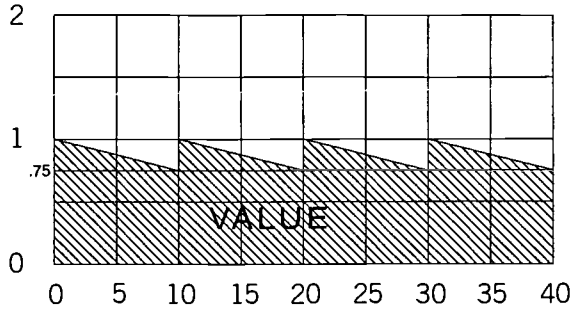
Perhaps the world domination language of National Education Goals 5 and 6 and the large school advocacy that had accompanied them are already being tempered. President Clinton's 10 points in his call to action for America's Education in the Twenty-First Century and the U.S. Department of Education "President and Secretary's Seven Priorities" now utilize terms such as "will master" (U.S. Department of Education, 1998) as opposed to "be first in the world".

Consolidation for the purpose of school efficiencies and student outcome improvements seems certainly in question from this evidence. Is a more viable solution for many communities to consider retaining their existing school, upgrading it through renovations as needed, as well as sensitive and effective additions. Jane Jacobs in her book, *Life and Death of Great American Cities* describes the large scale disasters created by urban renewal projects which eradicated neighborhoods, left gaping holes of undevelopment through years of indecision, and even when fully rebuilt, lacked a flavor and groundedness found in the old destroyed communities. She proposed constant renewal of neighborhoods through intermingled buildings of all ages. This constant renewal provides a vitality that keeps the overall neighborhood operating at a high level with an appropriate full range of price opportunities for space. Regarding environments built at one moment in time she states..."in places stamped with the monotony and repetition of sameness, you move but in moving you seem to have gotten nowhere..." contrived differences give rise to esthetic difficulties, too... the contrivance represent the desire merely to *appear* different" (Jacobs, 1961). Application of this thinking of celebrating integrated sequences could also be important to the community of school. In schools the continuity, yet constant infusion of vitality within the environment, is equally important.

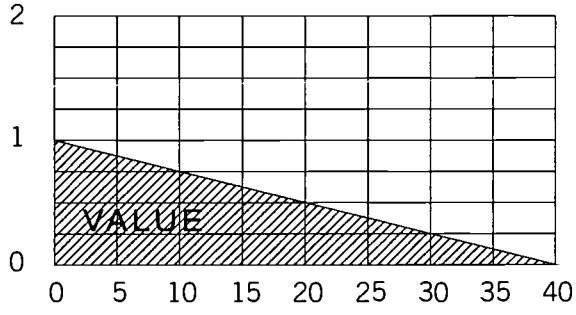
This approach supports the alternative of reusing older buildings for related community functions, even if reuse as schools proves unfeasible. It is common that school functions, such as district offices, community education, staff development, early childhood, alternative, and at risk programs, can creatively use existing structures. A common alternative reuse of abandoned school facilities is also as a community cultural and/or recreational center or senior center. Particularly, gyms, pools, auditoriums, kitchens, shop spaces, and the general placement of the institution in the community attract this consideration as opposed to demolition. Even if buildings must be demolished often, distinctive elements can be salvaged for reuse to form some continuity with the past.

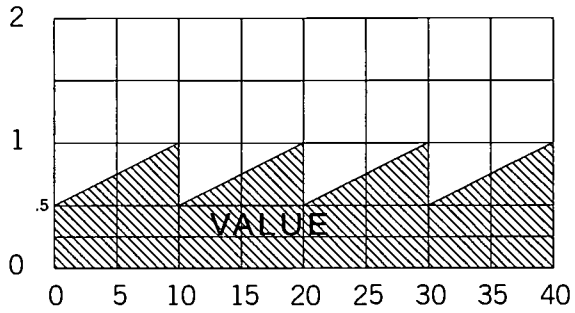
A rational way to consider design options would be to examine the value comparisons of the two options of 1) building new at one time and 2) providing additions and renovations to a building of similar size at 10 year intervals over a 40 year life. With two assumptions, first, that full deterioration occurs on a building over 40 years, and secondly, that ability to utilize a new space and new systems requires use and adjustment (assume 10 years for full utilization) comparisons on chart 1 can be drawn. This shows that the addition/renovation configurations out perform the built totally new environment for all years except a small period between years ten and fifteen.

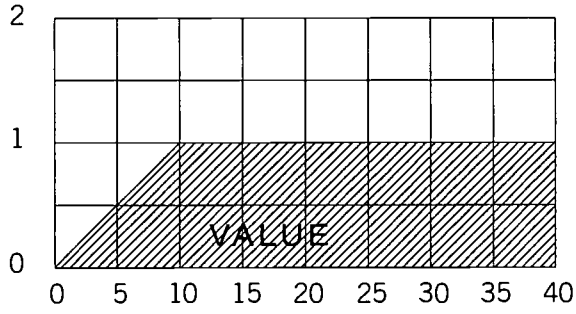
ADDITION/RENOVATION
(EVERY 10 YEARS)

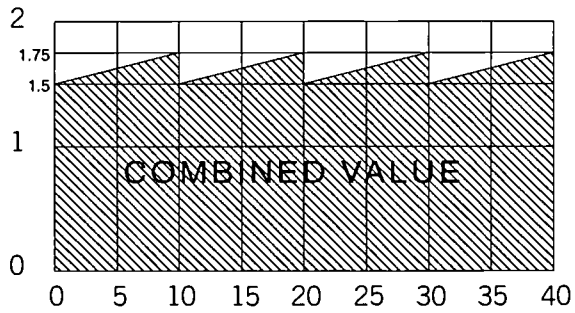


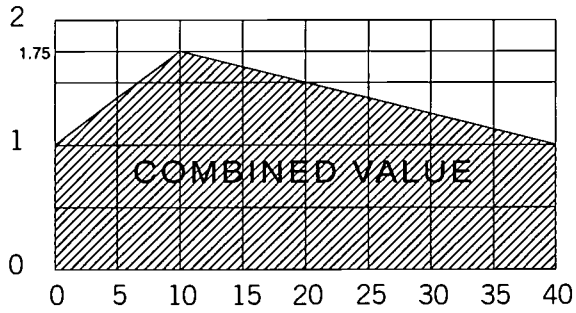
BUILT ONCE NEW











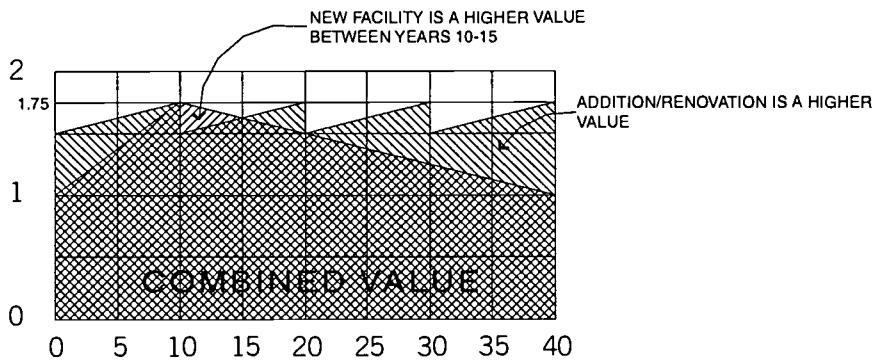


CHART ONE

It is true that an addition/renovation approach does not have the opportunity to dramatically start new with the environment in a totally coordinated effort. This is certainly the right approach at times when a full replacement is found to be clearly beneficial (refer to planning process explained later in the text). The integrated sequence approach, however, allows the deferral of the expenditure of resources to future years. This is a financial benefit if the growth of resources exceeds the rate of inflation of development costs. Importantly, it also allows decisions on the priority of what is to be renovated and built new to be delayed to future years when an analysis of needs can obviously be more current. This stepped development, however, points out the clear need for flexibility and directions of future expansion to be available at all points of incremental growth. It also becomes evident that a consciousness in use of building elements relative to their ability to be renovated in the future, is highly beneficial.

An important aspect in the evolution of schools whether they be new or renovated, urban or rural, is the integration of technology. Resources of the Internet, cable and satellite T.V. programming, and distance learning through interactive T.V. create a great leveling of opportunity for schools independent of their location. The primary scope of renovation within existing schools, is to upgrade their capabilities in these areas. A revisit to our McGregor School project of 1991 indicates that the integration of these techniques has created new pride in the McGregor community (details in McGregor case study).

Consolidation of rural schools has often been tied to the migration of rural people to urban areas. This movement seems to be currently reversing, at least in part due to the advances in communication technologies mentioned above. This shift is described in Time Magazine's December 8, 1997 cover article "The Great Escape" (Pooley, 1997). Migration in America is skewed by a sizable number, 2 million persons in this decade, of primarily suburban people moving to small towns. This move seems to be precisely to obtain the "quality of life" benefits often identified as rural virtues which creates a better opportunity to feel grounded. Even though new arrivals have chosen the rural areas for their values, the newcomers are creating "school wars." Insightful comments from a "rancorous school-board meeting" reported in *Time* speak for themselves - "you folks are getting a reputation, you're always trying to enlighten us", said the old-timer.

"Then I guess we are not succeeding," the newcomer replied.

Perhaps this seemingly incongruous conversation will show the beginning of a direction to even better schools in rural areas. If each participant truly cares about the basic values of the community, open dialog has the potential to retain but continually enhance the value of a rural school experience. This would be consistent with the "integrated sequence" approach to a facility improvement. Sharing core values yet challenging for improvement is a reflection of healthy communities and healthy schools.

STANDARDS

The State of Minnesota's Department of Education (currently renamed Department of Children, Families, and Learning) provides a "Guide for Planning New and Improved School Facilities in Minnesota" last revised in July, 1988. Currently, a committee has begun the process of new revisions. Projects calling for improvement above $400,000 per school site require a Review and Comment from State officials. This Review and Comment has considerable clout for a negative response would change a school referendum vote from a simple majority to a 50% of voters required to approve issuing of bonds to an amount of 60% approval. Issues relating to the choice of consolidation, replacement, or reuse in upgrading a facility, are found throughout the guide. A few points of key interest:

- If the cost of bringing existing facilities up to code/standard exceeds 40-50% of cost of new facilities, it may be discouraged.
- High school classroom utilization is suggested at full utilization minus one class period (for teacher preparation) or at 80% of full utilization.
- Minimum recommended school site sizes are 10 acres for elementary schools, 20 acres for middle schools, 25 acres for junior high schools, and 30 acres for senior high schools with added size for larger enrollments.
- An apparent unwritten guideline is that otherwise appropriate addition/renovation projects not meeting minimum site size are to include plans that resolve deficiencies of the site.

The push for adequate site size for future needs has been a key value from state planners in reviewing past design proposals. Issues around an existing school site for possible addition/renovation have several complexities. Often the existing school site is ideally located with its relationships in the community in that priority was given to its location when planning options were wider at the time of its initial construction. It is also quite common that the site size is significantly below standards that are recommended. Such attention to having enough size is important for the current and future life of the school due to the desire for future flexible growth. Also, coordination is required for vehicular drop-off and parking (explained in more detail in the Cambridge case history), and a variety of other needs such as increased demand for athletic fields, increased parking needs, and newly emerging needs such as on-site storm water detention. Storm water detention is required on site by Minnesota Statutes as opposed to utilizing more broad regional solutions. On sites that are already stressed due to the size, these (generally dry) ponds require early planning and knowledgeable design for their successfully integration.

National standards in building accessibility (ADA) have a significant impact on reuse of older facilities. In the past 15 years, many of these concerns have been proactively addressed but improvements for that specific purpose are still ongoing in many Districts. Older buildings with larger spaces and fewer floor level complications generally fare better in reuse, but areas such as exterior steps, entry vestibules, room doors, hall widths, toilet areas, stairs, ramps, and elevators often require corrective action. Places of assembly have special concerns of dispersed spaces to accommodate wheelchairs, opportunities for auditory reinforcement and viewing of action at sporting events by wheelchair bound patrons over standing spectators.

Another regulatory issue recently complicating addition/renovation projects is changing code requirements on structural live loads. Live loading (the weight of people, furnishings, rainwater, snow, etc.) of floors and roofs have increased in many instances above the loading required at the time of the design of the original building. In Minnesota, in particular, the effect of drifted snow loading (snow banked into corners at vertical surfaces) has made it very difficult to build even a new structure higher than adjacent low existing roofs. Reinforcement of existing structure may be required, and the costs vs. benefits of such a plan, need to be considered early in planning.

Wind loading requirements have also been increased significantly beyond building design of previous years. These issues can be compounded by conditions found at existing buildings. One experience this author is aware of was the finding that when the wood window frames were removed for window replacement in a 60-year old three-story brick veneer building, it was found that the frames alone were supporting the wind loading of the brick. All of the original brick ties had rusted through and the brick veneer had no horizontal support. This required either new mechanical support or full replacement of veneer. This experience points out the importance of a thorough discovery in the analysis of an existing building.

What distinguishes an integrated sequence approach to an addition/renovation is primarily the commitment and effort applied to the analysis of the existing building and to integrating existing and new elements. The goal of this approach is to renew, but with continuity in transition to the new and future environments.

The technique called "mining the existing building" is important to understand. This is an analysis to not only find out code related and technical building issues, but, more importantly, to fully understand the essence of the existing building regarding its major contributions towards reuse and integration. Often a facade of a historic element can form the signature in defining a new entry space such as our additions and renovations to St. Joseph's Home for Children in Minneapolis, Minnesota. Another example of the importance of this discovery is the strategically located exterior light well at Owatonna High School in Owatonna, Minnesota. This was transformed into an interior atrium and student center forming a heart to the building which connected three levels and provides orientation for a dispersed plan. In subsequent additions in Owatonna, a unique under plaza expansion in front on the historic old school is now under construction on a tight urban site.

An important issue at the beginning of a project is to establish the documentation of existing conditions. Often early design documents are either lost or remain as sketchy versions of what actually is in place. It is important to budget time and effort to document conditions and at times provide tests to confirm future suitability of use.

THE PLANNING PROCESS

HGA's educational facility planning process, focused on obtaining "the biggest bang for the buck," consists of seven simple steps of which the first five on plan formulation are explained below:

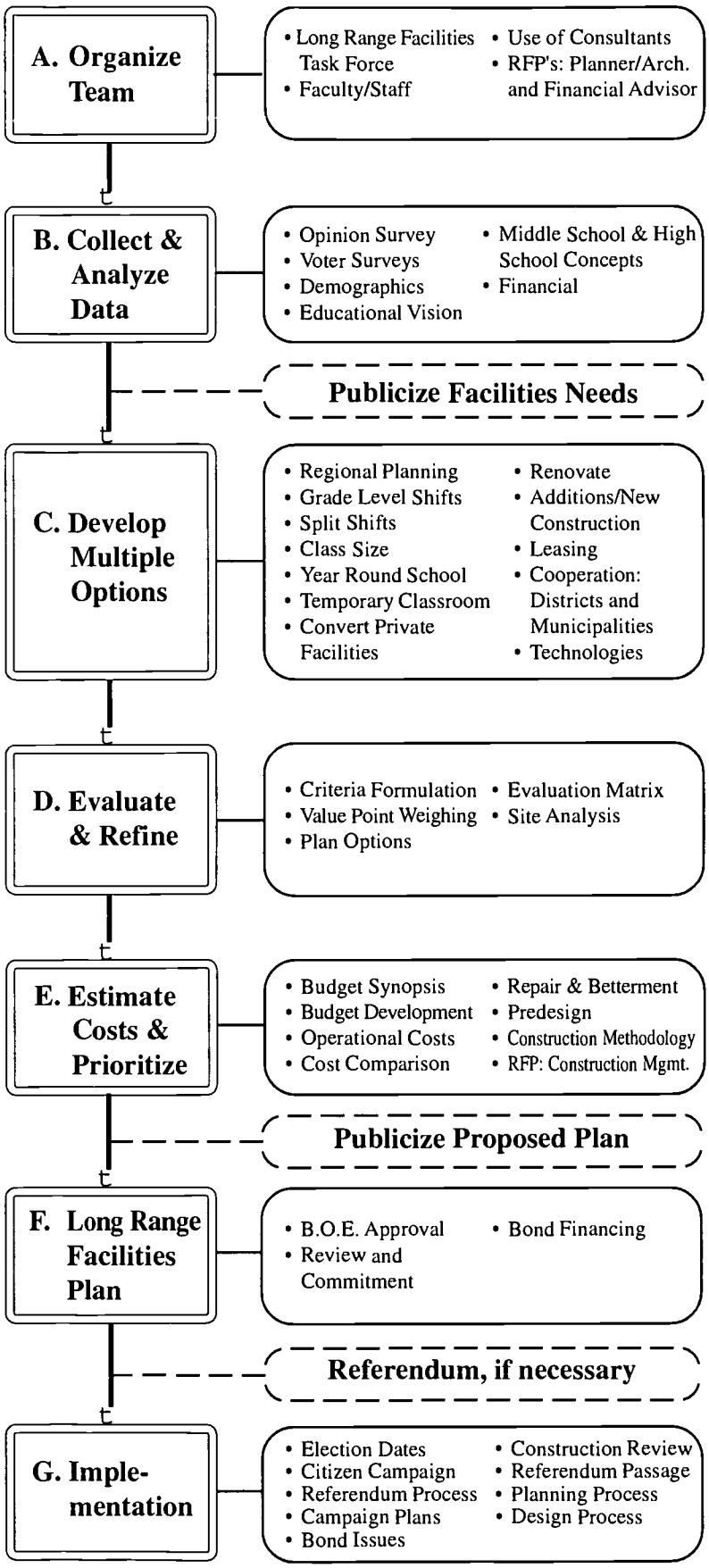
A. Organization of participants
B. Gathering of all relevant information culminating in a needs analysis
C. Developing all imaginable options to meet needs and establishing with community stakeholders ranked and weighted criteria by which all options are judged (by the stakeholders).
D. Refinement of the most promising options and financial evaluations of each as to annualization of new development cost and annual operating costs.
E. This final step includes comparisons of options by dividing their point total (from design criteria evaluations) by combined annual development and operating costs to obtain value point per dollar spent.

A + B = C; C/D = E

In this planning process, work involving renovation and smaller additions to existing buildings can be influenced by the life expectancy of the existing building receiving the renovation or small addition. Life expectation is defined as the time in years a building could exist before improvements to keep it in operation would be required which would reach the amount of its initial cost. This may be estimated at 40 years for a free standing new building. This may also be reduced to 30 years for an addition 50% the size of a 30 year old building, or 20 years for an addition 10% the size of a 60 year old building). As in any addition/renovation approach, significant judgment is required in reviewing the age and evaluating the existing condition of buildings slated for improvement.

The formula utilizing design criteria and cost analysis commonly provides a strong framework for deeper understanding of issues and their interrelatedness for committee members. Results of the planning formula do not always lead immediately and directly to a numerical solution for, with discussion, design criteria can evolve with progress on the study. The process does, however, set up a series of in-depth examinations of needs, possible solutions, and analysis of benefits and costs to help uncover new approaches not previously seen. When direction is chosen, a strong consensus can be expected as the result. With thorough efforts it is significant that each committee member can relate how issues of value and cost were established upon future questioning. A more thorough outline of the process is listed below (see next page).

Facilities Planning Process



VALUE ANALYSIS IN REUSING A BUILDING

Elements of a building to be available for reuse might be based on the priority of the following list:

- Foundations
- Site Utilities
- Structure
- Site Surface Features
- Demountable Walls
- Penetrations (doors and windows)
- Mechanical Systems (plumbing)
- Roofing, Insulation, and Waterproofing
- Interior Partition/Doors and Frames
- Electrical Systems
- Ceiling Systems
- Floor and Wall Finishes
- Fixtures and Equipment
- Communications and Electronic Equipment
- Furnishing Items

Elements are more likely to be saved for reuse the higher they are on this list, unless there is an unusual significance associated with the building or site feature. In determining value of existing 2-3 story junior high building to remain, the following information was drawn from Means National Cost Index, 1997 (pg. 187):

System/Component	% of Subtotal
Foundations	3%
Substructure	2.3%
Superstructure	14.4%
Exterior Closure	14.5%
Roofing	2.7%
Interior Construction	23.8%
Conveying	0.8%
Mechanical	24.0%
Electrical	13.5%
Special Construction	1.0%
Total	100.0%

An example of such a building to be retained where 100% of foundations, substructure, and superstructure were to be reutilized but only 50% of roof, exterior enclosure, mechanical systems, and electrical systems, would yield a net reuse value of approximately 47%. Subtracted from that amount, however, would be the demolition costs, hazardous material removal or abatement, and other preparation necessary to make a renovated building comparable to a new building at a similar level of partial completion.

For a more comprehensive view of cost options, several other factors would also need weighing such as:

- The benefits of producing remodeling work in a structure that is already enclosed.
- The benefits of working in a space that may already provide efficient heat and easy access for construction needs such as water, power, and paved site features for accessibility.
- The time of year the improvement is anticipated relative to seasonal availability and premiums within the labor force.
- The impact of scheduling work in a facility that continues to be occupied regarding the limitation in hours in the day of certain construction activities, temporary entrances and exiting required for building occupancy, and at times, significant phasing of construction and occupancies over the course of the work.

In developing full project budgets for an addition/renovation project, the level of contingency funds is required to start higher and be utilized for non-required purposes slower than new building projects. Each condition needs analysis for an appropriate plan but twice as much contingency relinquished half as fast may be a median condition.

FLEXIBLE DESIGN

In establishing design criteria for our planning process, it is encouraged that the issues of flexibility and adaptability of facilities be fully developed and understood. Flexibility for the future needs attention at all stages of design. This characteristic can be described as three types (Pena).

- Expansibility-easy to expand
- Convertibility-easy to reconfigure
- Versatility-easy to utilize in multiple ways

The concept of the one room schoolhouse has amazing versatility. This space, prevalent in 1913, is very similar to the studio/lab room model, which is the key flexible room in modern school planning. The hot stove has been replaced by a variety of projectors, but the concepts of movable seating, multi-age grouping, large group/small group flexibility, and resources built flexibly into the somewhat super sized classroom space are all common elements. It is even quite similar to the current cutting edge teaching spaces integrating defined small groups spaces, teacher planning/office/conference and small technical/lab spaces adjacent to an open classroom space. Adjustable and adaptable, with multiple concurrent activities, the schoolhouse concept continues to inspire.

CONSTRUCTION PHASE

Particularly in larger projects, special attention to management of the construction process is desired by Owners on these tasks. The traditional relationship is for Owner, Architect, and one or more prime builders selected through open, competitive bidding to compose the project team. At times more frequent, on-site representation can be desired of the architect/engineer beyond the periodic on-site representation common in basic services. At these times, additional services for Owner representation can be tailored to meet the specific need which may provide the clearest responsibility to the Owner.

Rural areas frequently desire that opportunities for local builders be created. Early solicitation can encourage this to happen. Additional techniques, such as using a "letter of credit" substituting for performance bond requirements (where allowed), can further encourage small local participants who cannot easily or do not wish to obtain bonding.

Use of volunteers in a community to build projects often contains mixed results in quality of end product and ability to finish the job. One area that has proven successful is to coordinate desired site work with the needs of nearby street or highway construction or encouraging practice operations from other nearby activities (such as military maneuvers).

In managing the construction phase of addition/renovation projects, it is important to organize effectively for a good start. Lines of communication are essential between Owner's representatives, design representatives, and the builders. Our firm's approach to starting this process involves a detailed list of expectations in a letter of Notice of Award to the successful builder with copies to Owner's representatives. Also, immediately following is an even more extensive agenda for a pre-construction conference to meet and discuss these procedural items in detail so it is assured that their meaning is understood and that line of communications between parties are fully established. At this time, it is not uncommon within the industry to have team building sessions that can be formalized into the experiences of "partnering workshops." This technique was initiated by the Corp. of Engineers and has led to several successful applications.

The core issue communicated at these sessions is that individual benefits on the project are directly tied to overall project success and that active cooperation is expected of each team member to lead to such a success. Strong leadership is needed to demonstrate that sincere efforts are not only required, but also prove to provide the tangible benefits that the process advertises.

Due to the frequent desire to continuously occupy a facility undergoing additions and renovations, it is common to have phased occupancies as different elements of the building are completed, which then allow other areas to be vacated for improvement.

This process of construction provides frequent changes in environment and identifies the important focus of safety for occupants during construction. Although students are quite resilient to change, they are also quite independent on interpreting the importance of issues regarding areas limited to construction related access. This means that continuous feedback between school administration, and the construction and design team is important to adjust for best results.

Occupancy, or the final element of construction also requires full communications between Owner, architect, and builders. The time of a building project for occupancy is called "Substantial Completion" which is commonly one to two months prior to "Final Completion." Substantial Completion is the time for punchlists to be prepared by architect and engineer (and it is advisable to include a knowledgeable Owner's representative for these inspections) to clarify for the builder what steps are necessary for Final Completion. This record of building status prior to occupancy is critical when questions arise after occupancy as to the responsibility for new defects that may occur.

ENVIRONMENTAL CONCERNS

It is further desirable to schedule another step between substantial completion and occupancy identified as the commissioning of a building. This would be a time to test major mechanical and electrical systems within the building, and to provide a significant period of full building ventilation to carry away what can be undesirable levels of off gassing of volatile organic compounds within new building materials. Although reduction in off gassing of these compounds has been achieved by many construction materials in recent years, there is still a percentage of the population that is highly affected by even small amounts of these elements.

The issue of hazardous materials is a concern within any building environment, but action on its remedy is often unavoidable when renovations or additions are planned. Materials such as asbestos in building insulation, insulation of pipes, fire proofing, and floor and ceiling tile, are frequent abatement targets. Lead content within paint and possible leakage from below-ground oil storage tanks also require special investigation and precautions. These concerns can lead to soil contamination issues which affect how a building can be placed on a site as well as site surface improvements. In any development, site development costs are the one area where costs to develop can differ wildly from one location to another. In the integrated sequence approach to renovation/addition projects, all aspects of the existing building necessary for remedy are considered in the site development category of improvements.

Air quality concerns are currently a major topic in many school districts. Regarding this issue, it is surprising that buildings older than 1970 can often perform more effectively than buildings that have been built more recently. This is due to factors such as older materials being more inert and free of off gassing that can occur from newer materials. Older facilities may also be more loosely built with air infiltration providing a degree of freshness not found in younger, more tight structures built to conserve interior heat loss/heat gain. Buildings built from the early 1970s to early 1980s have posed the most difficulty with air quality due to reductions in fresh air delivered as well as tightening of the building envelope. These changes were developed in response to the national energy crisis of that era. Current fresh air standards of 15 cfm per student are now three times the volume of that era.

Utilizing Student Feedback

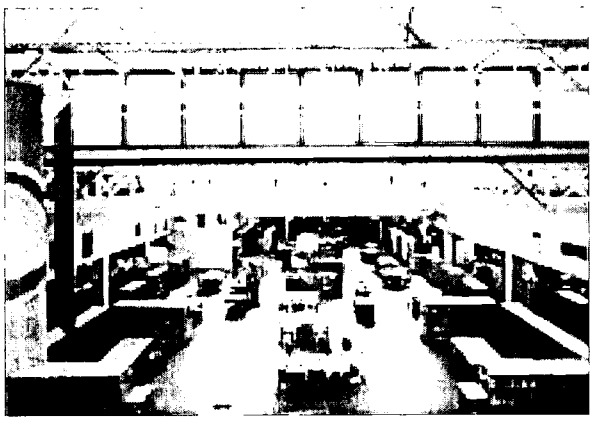
Unlike most new projects, with an addition/renovation, existing students are in place and available for feedback in formulating the building and design techniques such as surveys, and focus group discussions. Presentation of progress development in program and design often provides unique insight into practical needs of students such as safety concerns from crowded areas of student movement, comfort concerns on ventilation, heating and cooling, and the importance of features in the identity of the school.

Experienced technique in existing building analysis and the application of additions and renovations is required for a successful integrated sequence. Utilization of students that are on site for preferences is uniquely available. Although more complex than a new building project in analysis and design, unique benefits can make the approach quite accepted and popular.

CAMBRIDGE, MINNESOTA SCHOOLS

Cambridge is a rural community in Minnesota that has advanced in the category of being under rather constant change and growth through urban migration. In the 1960s, Cambridge consolidated with the adjacent community of Isanti to nearly double in size. The continual development of addition, renovation, and replacement accommodated on one particular school site in Cambridge shows the effect of this evolution in the manner of a history lesson with physical form.

Cambridge Schools began in 1869 with their first one-room schoolhouse serving 31 students. Primarily a Scandinavian immigrant community, the first structure was replaced with two rooms, followed by additions, to a total of five rooms with 160 students by 1899. By 1906, student size had risen to 255, and the original wooden building was replaced by an eight classroom brick building which was in use in the mid 70s when this author first became familiar with school needs. Other building additions/renovations are listed below with the accompanying diagrams showing development through 1976 and secondly, beyond 1976 to the current date.

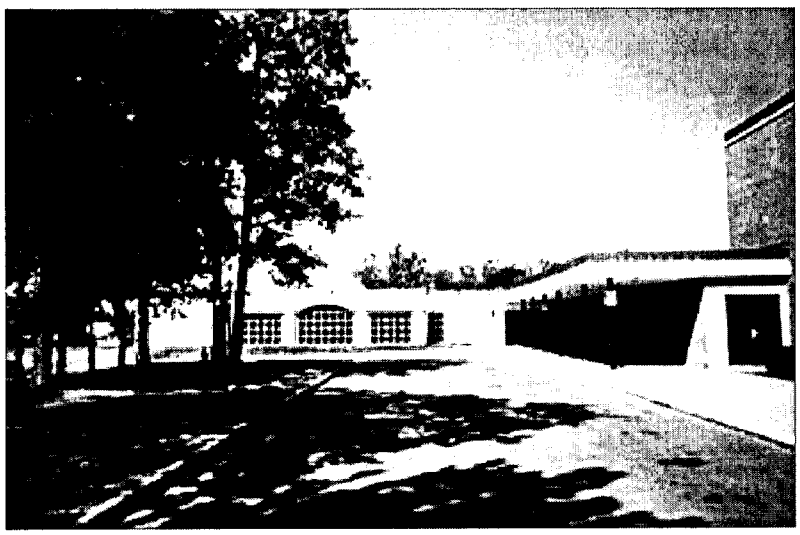


Cambridge School Site Improvement List

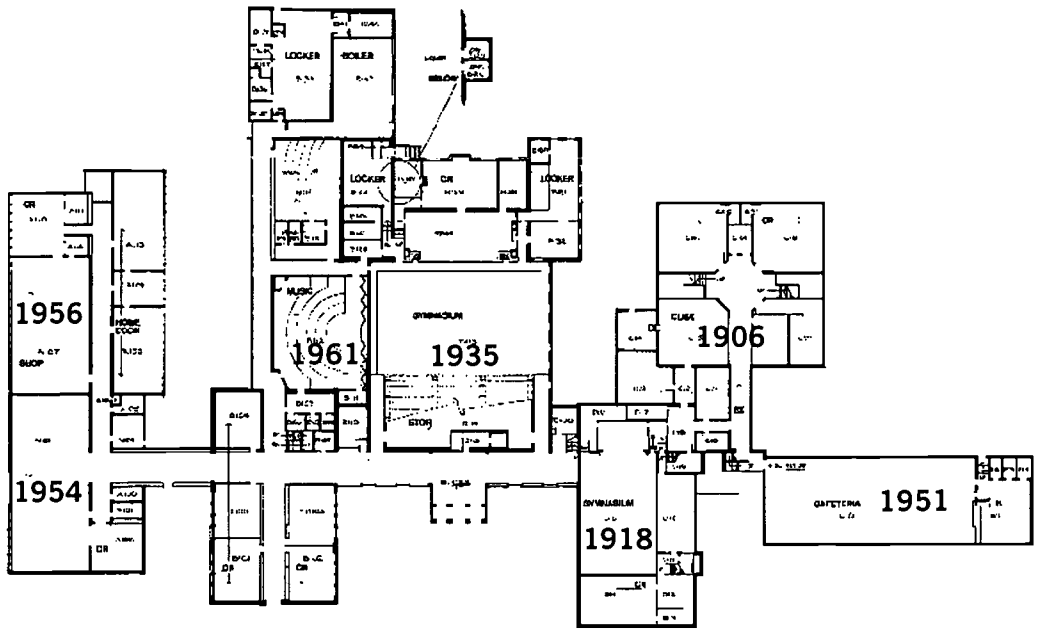
1906	Original eight room brick building
1918	Original high school addition
1936	Major high school expansion including gymnasium/auditorium with full stage
1951	Addition consisting of kitchen, cafeteria, with classrooms above
1954	Addition consisting of shop spaces
1957	Addition consisting of shop and classroom
1960	Separate new elementary school built adjacent with steamline connections, high school varsity gyms as part of elementary school
1961	Addition consisting of a music room and locker room
1967	Two-story classroom addition to elementary school
1976	Conversion of building to Cambridge Junior High School with construction of new remote senior high
1986	Conversion of shop space to District Community Education offices and refinishing of auditorium space
1989	Elementary media center addition
1994	Addition of classrooms, new circulation areas, new kitchen and dining space with multiple renovations

With the removal of the original elementary and high school buildings from additions in the mid 1970s, the original cupola and bell tower for the elementary school was retained as a historical marker east of the subsequent school additions. It is likely that current students had parents, grandparents, and even great grandparents involved in similar pursuits at this site.

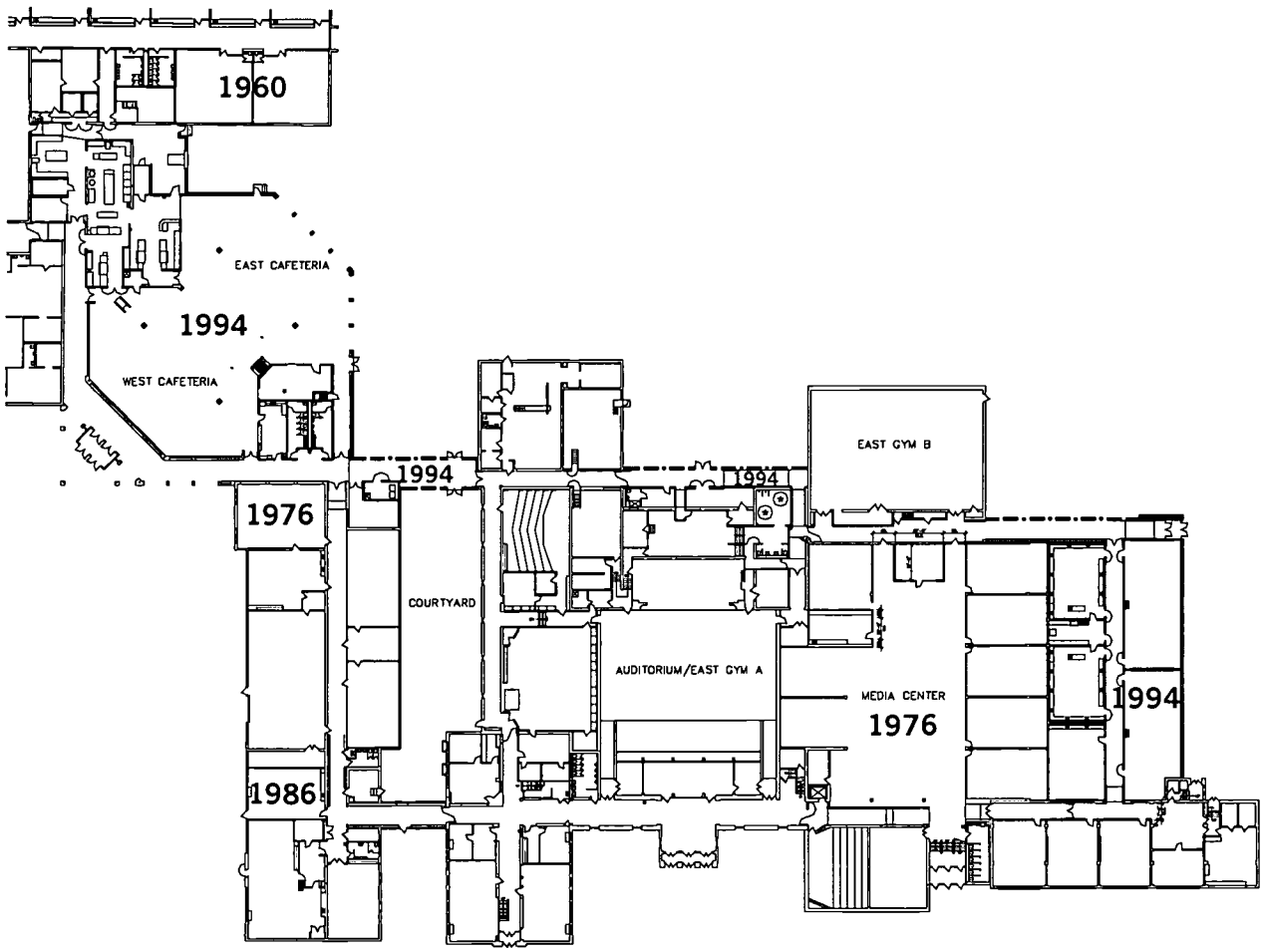
Additions of the 1970s had the challenge of connecting the gaps formed by the removal of the two original buildings, providing timely needed improvements, greatly simplifying the circulation and providing a point of orientation through the central media center. Additions in the 1990s provided for new student capacity and circulation improvements while creating a connecting link with the elementary school. This link consists of a shared kitchen and separate dining spaces.



Site improvements at this time also greatly clarified student bus loading and staff and visitor parking and access to campus. The need for separate zoning of the three areas of bus drop-off/pick-up from auto drop-off/pick-up and auto parking, presents sizable site issues when working at a school site conceived for simpler transportation needs. Add in the separation of delivery vehicle traffic, access to playgrounds, and the need for none of these routes to cross traffic presents a sizable challenge in addition/renovation design. This vehicle and pedestrian traffic also needs management for after-hour community activities which could include athletics, night classes, or a variety of club and social events utilizing school facilities.



1906-1975



1976-Present

CAMBRIDGE SCHOOL

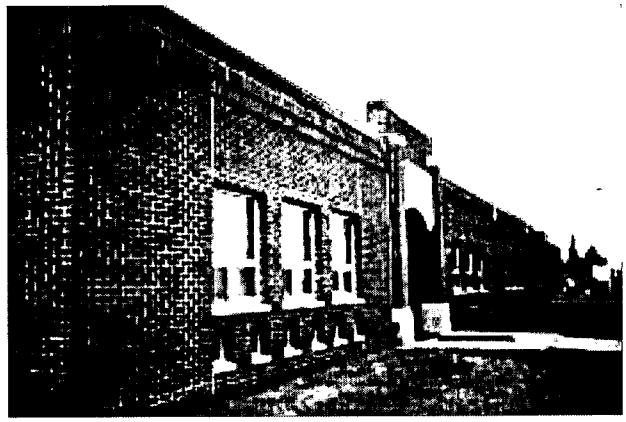
MCGREGOR, MINNESOTA SCHOOLS

The case history on McGregor Schools differs markedly from Cambridge, in that, the school is located in a remote, very sparsely populated portion of the State (only one of twelve Minnesota districts containing less than one student per square mile). McGregor also differs in that its evolution and growth is happening much more slowly, and our experience with the district consisted of one engagement for substantial improvements.

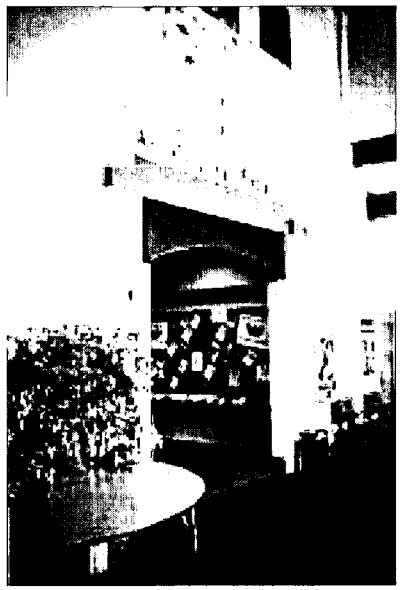
The first school in McGregor opened in 1903. Leading up to the last consolidation in 1972 of the McGragh School, mostly one room schools from nearby communities of Clark, Haugen, Rat Lake, Lawler, Tamarak, Grayling, East Lake, and Cornish joined to create the current McGregor School District.

In 1990, the School District had conducted about six unsuccessful referendum bond campaigns to meet their space needs and decided to begin the process with fresh contributors. An open invitation for design contributions was made leading to proposal submission and shortlisting, interview, and selection of the HGA team. It is interesting to recall comments of the School Board members concerning their comfort with personal relationships in making the selection.

At the first organizational meeting, ideas toward changing the tone towards a future referendum proposal was the main concern. It was determined that the architect would meet individually in the home or workplace of approximately a dozen, influential community members. From these first visits, insight on past frustrations and possible new solutions began to emerge. Next, the establishment of a school planning committee occurred interweaving effective staff members, community leaders, and parents (several with multiple roles). This group met on multiple occasions utilizing the seven step planning process. The result was a defined integrated sequence that received community support and bond issue passage.



The existing McGregor School, originally constructed in 1921, consisted of three levels with a central gymnasium/auditorium space. Subsequent additions included six elementary classrooms on one level to the south, library space above kindergarten classroom and kitchen to the west, and major high school expansion to the north. New program needs defined in our 1991 effort included elementary classrooms and media center, elementary gym space/cafeteria/community room and replacement kitchen, locker space integrated with student center for upper grades, new boiler and renovated back-up system, and various miscellaneous improvements. To accommodate new building attached to the existing, significant code analysis was required including the establishment of the new fire-rated separation within existing building elements, and between the new and existing building.



Upon successful passage of the referendum, a new priority was established by the School District. In their belief, it would be many years before the community would approve other major building improvements, so it was desired to maximize the amount of space that could be built with referendum dollars to be flexible to meet what might be future needs. Two new classroom spaces were added to the program which were divided to allow four special small group activity spaces by relocating these functions from existing classrooms now opened up for music and other special uses. Major efforts toward economical construction means in the full addition allowed this to occur. Another project element planned to anticipate further needs is a stage addition to end of the new gym/community room.

As is common to each rural area, service to the McGregor School, in the middle of a large timber producing area of the state, had unique goals. McGregor leaders did insist that their new boiler be capable of burning wood chips in support of local industry and as a renewable resource. This request was followed in specifying new boiler equipment, but our engineers wisely created the flexibility of back-up burner capabilities for gas. After an energy audit a few years ago, a switch to propane gas did occur currently allowing considerable current savings and reduced maintenance. Capability still remains, however, if energy costs dramatically change to consider returning to the use of the renewal resource.

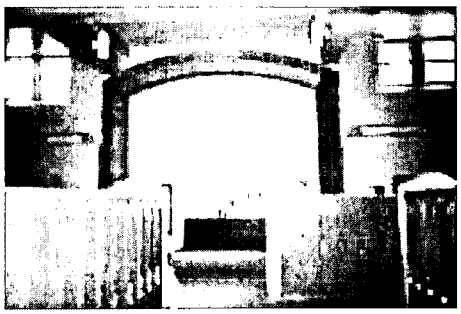
A current review of activities in McGregor School indicates that the school is the hub of community life with ever expanding use for school related and non-school related activities. According to the school secretary "any and all things that happen within the community, happen at the school". As well as traditional scouting, athletic and club activities, McGregor School opens its door to a variety of county assemblies, political party caucuses, community breakfasts and dinners, and community education functions. Frequently, funeral and bridal receptions utilize facilities and even marriage and funeral services upon occasion.

As well as housing community activities, a number of programs draw in local business and student participation. *Kids Plus* is an independently-funded grant which coordinates a group activities program aimed at drawing students in that are not already involved with the multitude of traditional school activities. Plans are also underway to institute local participation in Minnesota's School to Work Program offering financial encouragement for modest size local industries to provide employment and student internship this year. In 1998, a budget of between $750,000 and $1.25 million is set aside in the State of Minnesota to operate this program.

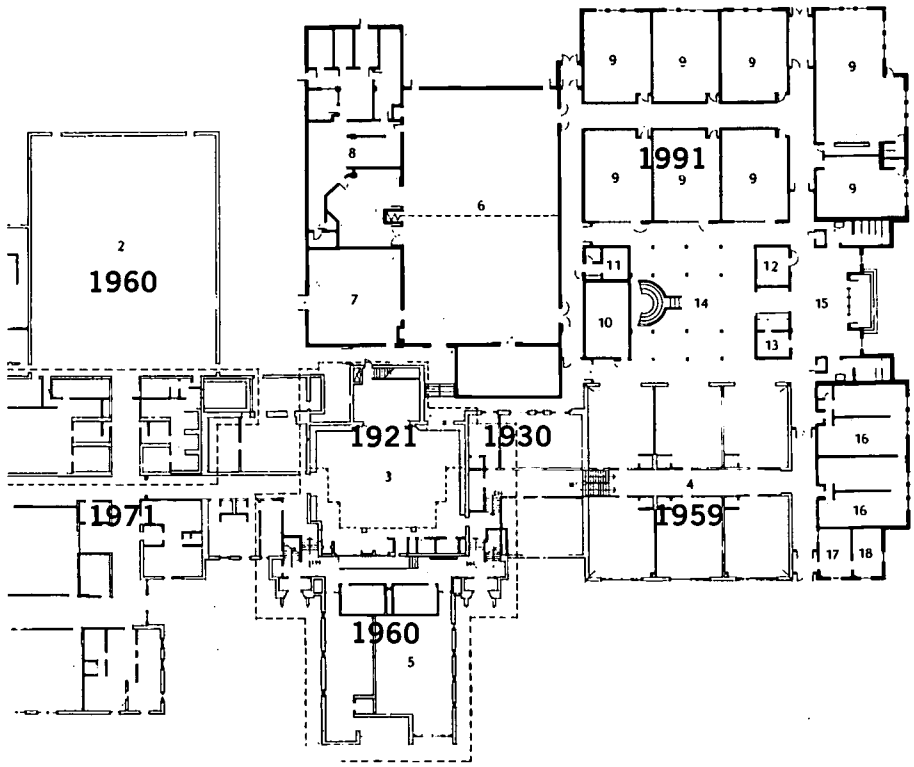
Since the addition improvements of 1991 primarily to the elementary grade spaces, there is a distinct new pride within the community as to the benefits of this environment for K-6 grade students. With a computer and cable and satellite T.V. connections to monitors in every classroom, elementary students have a connection to wide resources. The new plan has media center and breakout spaces located outside the door of 50% of the classrooms for convenient access.

Since the completion of the addition/renovation in 1991, the number of minority (native American) high school students has risen from approximately 7% to 10% of total population. Improving programs to these students is a special challenge to the school as demonstrated by graduation results. Currently about 25% of native American students graduate while in the remaining population — the figure rises to 95%.

The demographics of the McGregor community are changing to some extent. In the last year, 47 new homes were built in adjacent lake communities to the north. New arrivals are often retired persons, but several are of working age primarily in support of summer recreation industries. New school age families have brought new ideas, particularly in promoting technology applications within the schools. Currently, five McGregor students participate in optional college enrollment programs (at college sites) that are offered to qualified students in Minnesota. Ten other students are obtaining credit for college courses through an interactive T.V. programming in concert with 15 other rural schools in northern Minnesota.



1 Existing High School
2 Existing Gymnasium
3 Existing Student Center
4 Existing Classroom Wing
5 Existing Kindergarten Wing
6 Multi-purpose Space/Cafeteria
7 Boiler Room
8 Kitchen
9 Classroom
10 Computer Lab
11 Teacher's Lounge
12 Conference Room
13 Librarian's Office
14 Media Center
15 Entry Foyer
16 Special Education Classrooms
17 Administrative Office
18 Principal's Office



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