STATE OF HAWAII
OFFICE OF THE LEGISLATIVE AUDITOR

A PROPOSAL TO CONDUCT AN AUDIT OF THE SCHOOL CONSTRUCTION PROGRAM FOR THE STATE OF HAWAII

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A PROPOSAL TO CONDUCT AN AUDIT OF THE SCHOOL CONSTRUCTION PROGRAM FOR THE STATE OF HAWAII

PREPARED FOR:

MR. CLINTON T. TANIMURA

LEGISLATIVE AUDITOR – STATE OF HAWAII

OCTOBER 1970

October 5, 1970

Mr. Clinton T. Tanimura
Legislative Auditor
State of Hawaii
Kana'ina Building
Iolani Palace Grounds
Honolulu, Hawaii 96813

Dear Mr. Tanimura:

We are extremely pleased to submit this revised proposal to conduct an audit of the school construction program for the State of Hawaii. We have carefully evaluated your specifications for the proposed audit, and, combined with our in-depth knowledge of governmental operations and detailed experience in providing consulting, architectural, and engineering design services for the planning and construction of public schools, have developed a comprehensive work program for the conduct of this audit.

We are confident that our technical approach to the project is both practical and responsive to the needs of Hawaii. In addition, we firmly believe we have assigned an outstanding project team to the audit who have both the technical expertise and operational knowledge to effectively carry out the examination of the Hawaii school construction program.

We would welcome the opportunity to provide the consulting services to the State of Hawaii on this interesting and important project. We would commit the full resources of our two firms in order to assure its successful conclusion.

Yours very truly,

NARAMORE, BAIN, BRADY & JOHANSON

David C. Hoedemaker

by David C. Hoedemaker, Partner

ARTHUR YOUNG & COMPANY

Donald H. King

by Donald H. King, Partner

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I. INTRODUCTION

I. INTRODUCTION

The Office of the Legislative Auditor is interested in obtaining the services of a qualified consultant or consultants to assist in the evaluation of the administrative and technical aspects of the school construction program in the State of Hawaii. The efforts of the consultant during the proposed audit will include a detailed examination of the adequacy of: (1) the school program planning process, (2) the facility design process, and (3) the construction and maintenance process as related to the construction of public school facilities in Hawaii.

1. BACKGROUND

House Resolution No. 96, Fourth Legislature, Regular Session, 1968, directed the Office of the Legislative Auditor to conduct a study of all aspects of the school construction program in Hawaii "with a view toward determining whether capital improvement expenditures provide the most economical return in the public interest." This examination of the school construction program is also an integral part of the ongoing operational audit programs conducted by the Office of the Legislative Auditor pursuant to Article VI, Section 7, of the Constitution of the State of Hawaii, and Chapter 23 of the Hawaii Revised Statutes.

2. AUDIT OBJECTIVES

The purpose of the school construction program, as defined in the audit specifications, is to provide timely, up-to-date facilities in support of the statewide lower education school program **at the least total cost consistent with efficient planning and design, and prescribed quality of materials and standards of construction.**

The overall objective of this audit is the performance of a detailed analysis and evaluation of the related planning, design, and construction and maintenance functions and processes to determine the degree to which the above cost effectiveness goals are being met. This includes an evaluation of the school construction program to determine the effectiveness with which this activity is being administered with regard to minimizing total cost of public school facilities, to identify weaknesses within the functions and processes as they are now being handled, and to recommend such actions necessary to improve cost reduction effectiveness. Thus the audit will examine the effectiveness of the administration as well as the adequacy of the three major processes involved —— planning, design, and construction and maintenance —— with a view towards minimizing total costs.

3. AUDIT SCOPE

The school construction program refers to those activities and processes which are directed toward construction of public school facilities. It involves the participation of various state agencies and, therefore, will require an examination of the functions and processes relating to the school construction program within the following agencies:

- Department of Education (DOE)
- Department of Accounting and General Services (DAGS)
- Department of Budget and Finance
- Department of Planning and Economic Development
- Office of the Governor
- Department of Attorney General

The audit will require an examination of the effectiveness of the activities and operations relating to the school construction program in each of the above agencies as well as the three major processes of planning, design, and construction and maintenance as they are now being performed within these agencies and the interface of these six executive departments with the construction industry. The processes referred to above and specific areas to be examined in detail are described below.

The **planning process** includes that aspect of the program which dictates that the facilities that do get built are needed and properly located (required to support overall education program), that they are efficient and up-to-date facilities, and that they are constructed on a timely basis.

The **design process** includes that aspect of the program which deals with the architectural and engineering design of a school facility (preparation of schematic and preliminary drawings and final plans and specifications) and related technical considerations which directly affect costs, such as building code requirements, guide specifications, systems construction, facility design life criteria (planned obsolescence), etc.

The **construction and maintenance process** includes the phase of the program which encompasses advertising for bids, bid opening and awarding of the construction contract, activities related to actual construction of the facility, and repair and maintenance of completed facilities. Actual construction activities include review of plans and specifications, on-site project inspection, and processing of required changes to the final construction plans. Other aspects of the program related to the construction and maintenance process include construction cost analysis, bidding procedures, contract administration procedures, and repair and maintenance cost analysis.

To determine effectiveness in minimizing total costs of school facilities and to identify weaknesses and recommend action necessary to improve cost reduction effectiveness, the audit will examine specific areas within the above three processes in detail as follows.

A. PLANNING PROCESS

Since planning provides the emphasis and direction necessary for timely implementation of any construction program, the audit will examine the effectiveness of DOE's current planning policies and procedures in minimizing the total cost of school facilities. Particular emphasis will be placed on the evaluation of time delays resulting from inadequate planning which lead to higher total costs. This investigation will include, as a minimum, an examination of:

- The adequacy of the demographic information and related data (subdivision growth, zoning changes, future freeway alignments, etc.) in projecting future student enrollments, and the propriety of translating these enrollment projections into predictions of future (when and where) school facility needs.

- The adequacy with which the DOE's educational planning (teaching techniques and methods, special teaching programs —— mentally retarded, physically handicapped) is coordinated with educational facilities planning to develop current and long-range specifications for school facilities design and construction.

- The adequacy of available inventory data on existing school facilities and its usefulness in determining maximum capabilities and present utilization of each facility. Also, the extent to which this type of information is utilized in determining whether school facilities needs are to be met by new construction, renovation of existing facilities, or relocation of portable buildings.

- The adequacy of policy and procedure which the DOE follows in determining land requirements and selecting sites for school facilities.

- The adequacy of the DOE's method in establishing meaningful priorities for proposed school facility projects considering overall statewide needs.

- The adequacy (from the standpoint of controlling school facilities costs) of the present method in which the DOE capital improvement program appropriation request is prepared —— determine if the appropriation estimates are realistic and whether the project descriptions are specific and meaningful.

- The appropriateness of the DOE's planning policy governing the use of portable classrooms and their role in meeting facility needs —— ascertain the "temporary" nature of these structures, their total cost relative to permanent classrooms, and the degree to which costs and benefits are considered in the decision to use portables.

- The reasonableness of the DOE's criteria in determining the "permanency" of facilities being built through its school construction program. Historically, a permanent structure (reinforced concrete and steel) has had an average useful life of about 60 years. In view of today's changing instructional programs to accommodate tomorrow's pupil and facility makeup, we will examine the need to consider new planned-life concepts such as "planned obsolescence."

- The adequacy of the DOE's "Educational Specifications and Standards for Facilities" in providing meaningful guidelines to architects and planners in developing school facility designs. Assess the effectiveness of the "Educational Specifications and Standards" in serving as a basis for planning educational complexes and designing specific facilities.

- The adequacy of inter-departmental (Facilities and Auxiliary Services Branch – DOE, and Public Works Division – DAGS) coordination efforts involved in the planning of school facilities —— assess coordination effectiveness in terms of the time required in accomplishing planning of individual projects and determine if there is a duplication of effort.

B. DESIGN PROCESS

The audit will examine the adequacy of the various aspects within the design phase of the school construction program in minimizing total costs. This investigation will include, as a minimum, an examination of:

- The extent to which "architectural freedom" characterizes design of school facilities and the effect which this latitude has on ultimate construction costs.

- The general adequacy of the review process in coordination of the plans and specifications during the schematic development, design development, and final plan stages of a project design —— examine Public Works Division's (DAGS) project scheduling and reporting procedures and policies.

- The criteria which determine acceptable architect submissions of final plans and specifications —— this refers to the "completeness" of the plans (design details as shown in the drawings) and the compatibility of the drawings with the specifications.

- The extent of technical review of preliminary and final plans and specifications by the Division of Public Works (DAGS) and the adequacy of this review in eliminating design deficiencies which result in increased costs (through change orders) during construction.

- The method whereby architect selections are made by the State. (Designs by competent architects generally result in lower construction costs; designs of less competent architects result in higher construction costs due to unnecessarily complicated and inefficient space designs.)

Additionally, the audit will examine specific elements related to the design process and determine their effectiveness in reducing construction costs of school facilities. The specific elements include:

- GUIDE SPECIFICATIONS. The audit will assess the guide specifications used by DAGS in conveying to architects and design engineers the minimum construction standards with which a school facility must comply. These specifications are the basis for determining the minimum quality of materials to be used and the precise methods and techniques to be employed by the contractor in accomplishing specific tasks in the field. The analysis will assess the guide specifications with respect to the following:

  - Their adequacy in conveying to architects and engineers the desired minimum construction standards to be maintained in school construction. The purpose of this analysis is to determine if the guide specifications have a positive influence on architects and engineers in developing efficient designs at the least total cost.

  - Their adequacy from the standpoint of "completeness" —— determine if the topics (concrete, site work, masonry, etc.) discussed cover all facets of construction necessary in order for the designer to fully understand what is required in a completed school facility.

  - Their adequacy in describing methods and techniques of construction in a clear and concise manner in order to avoid misunderstanding on the part of the contractor as to what is required in the field.

- Whether the various sections of the latest published guide specifications (September 1969) are "current" with respect to present standards (materials and construction methods) employed in private construction.

- Whether the construction standard as dictated by the guide specifications is unnecessarily increasing the cost of school facilities. Investigate the possibility of recommending lower quality and less costly materials consistent with post-construction requirements (this aspect of the audit will be covered in the "Construction and Maintenance Process").

- The adequacy of the review and evaluation procedure in updating the guide specifications. Determine the extent of periodic review necessary in order to insure that the State's guide specifications are a "current", viable, and changing document.

TECHNOLOGICAL ADVANCES. The audit will assess the extent to which technological advances can contribute toward minimizing school construction costs. The need to seek economies in school construction costs becomes more imperative with the acceleration of the rate of increasing costs, the cause of which is the result of rising material, labor, and land costs in conjunction with a rapidly expanding demand on the local construction industry. Full investigation of recent technological advances in construction methods and design procedures will be conducted with a view toward incorporating new economically feasible construction advances into the State's capital improvement program for school facilities. The investigation will include, but not be limited to, the following areas:

- The use of the Systems Approach to constructing more economical school facilities. The systems concept in building schools was first applied in California under a project known as School Construction Systems Development (SCSD). Basically, the systems concept is a means of using the efficiency of modern industrial mass production to construct schools, while still avoiding the standardized plans or monotonous repetition of either rooms or general appearance. The investigation will determine the extent to which this approach can be adapted to the local construction industry and contribute towards the minimization of school construction costs.

- The determination of the present effectiveness of using portable classrooms and demountable facilities in lieu of other types of structures. We will assess the use and possible use of these structures from the standpoint of improving their effectiveness through better structure designs and space-use concepts.

- The possibility of incorporating more "new indigenous materials" such as bagasse, low strength concrete using special local aggregates, etc., into designs for construction of school facilities. We will assess the possibility of utilizing new (other than those presently used) prefabricated structural designs in constructing portable classrooms. We will also investigate the feasibility of developing a construction materials research and testing facility within the State structure as a step towards incorporating new and more economical material and methods into the local construction industry in general, and for building of school facilities in particular.

- The determination of the feasibility of incorporating the "value engineering" concept for reducing construction costs in the design process. We will review the approach used by the federal government to determine if such approaches can meaningfully be applied to the State's process.

. ZONING ORDINANCES AND BUILDING COSTS. The audit will assess present zoning ordinances and building codes with a view toward ascertaining whether zoning and code restrictions unjustifiably increase school construction costs. We will assess the various aspects of the ordinances and codes as they affect school facilities including, but not limited to, fire restrictions, building space requirements, population density zoning, and electrical, mechanical and structural building restrictions.

C. CONSTRUCTION AND MAINTENANCE PROCESS

The audit will examine those aspects of the school construction program that make up the construction and maintenance process. This examination, which will be addressed to the minimizing of construction costs, will include the following, as a minimum:

. PROJECT INSPECTION POLICIES AND PROCEDURES. An evaluation will be made with respect to the following areas:

- Checking to insure that construction adheres to contract plans and specifications and complies with applicable provisions of building codes and zoning ordinances —— determine if the present practices are applied consistently to all contractors and whether these practices tend to be more stringent than necessary to accomplish the job and contribute to higher bids and therefore higher costs.

- Preparation of daily, weekly, and monthly progress reports designed to show whether the work schedule is being met —— determine if the present requirements for reporting lead to incurring of unnecessary overhead costs (office engineer, secretary, rent, etc.) by the contractor and the inspecting State agency.

- CHANGE ORDER PROCEDURES. An evaluation of present change order procedures and the causes of change orders will be made. Since change orders directly increase the cost of a project, a review of the causes of change orders which resulted in connection with completed school construction projects appears to be appropriate. The analysis will include the following:

  - An assessment of change order procedures and practices within the school construction program.

  - An examination of project documentation (project folders) to determine the origin and nature of change orders.

  - An assessment of the extent to which change orders might have been reduced or avoided. (This determination will primarily be based on professional judgment regarding the quality and completeness of the contract plans and specifications.)

  - Determination of indirect costs resulting from change orders —— delays in construction and cost of "red tape" in the processing (DAGS, contractor, architect) of change orders. Ascertain whether the "red tape" in processing a change order is unnecessarily excessive (compared to other agencies —— private or government).

  - An inventory and categorization of the various causes of change orders including a tabulation of the number and dollar amounts (actual costs) of the change orders in each of the categories will be made. An assessment as to what extent the change orders could have been avoided (number of cases and total dollar amount) and the percentage which could not have been avoided and reasons for unavoidability will also be made.

- BIDDING AND CONTRACT ADMINISTRATION PRACTICES AND PROCEDURES. An evaluation of the effectiveness of these practices and procedures in minimizing total cost of school facilities will be made. This evaluation will include:

  - An assessment of the present lump sum method of bidding for school facilities construction contracts including:

    .. A determination if the present method secures the fairest and most economical bids at all times —— both during periods of high construction activity as well as periods of average or low construction activity.

.. A determination if the present bid advertising practice is fair to both the State and the bidder.

.. An assessment of the adequacy of the State's bidding procedures in light of the experience of other governmental agencies (federal, city and county) in securing fair and economical bids.

- An assessment of the practicability of utilizing other bidding methods in order to achieve lower construction bid prices and better cost control. Examination of other approaches shall include, but not be limited to, the "turnkey" method, incentive contracts (premium payment for completion of project ahead of schedule), cost plus, and unit price.

- An assessment of present contract administration practices and a determination of whether procedures and requirements are reasonable from the viewpoint of the contractor and efficient and necessary from the State's point of view so that indirect costs are kept to a minimum. A determination will also be made of the adequacy of the contract administration process including bonding requirements, shop drawing submittals, progress reporting procedures, and change order submittals.

. VALUE ENGINEERING PROGRAM. An evaluation of the State's value engineering program will be made. The program was designed to elicit, from contractors, proposals which would result in construction cost savings to the State. The incentive to the contractor is that cost reductions arising from value engineering proposals would be shared by the State and the contractor submitting the proposal. To date, the program apparently has had no effect in reducing school construction costs. Evaluate the program with respect to the following:

- Documentation of the apparent failure of the value engineering program to promote reductions in construction costs.

- Determination of the reasons for the program's ineffectiveness from the standpoint of both the contractor and the State's contracting agency.

- Examination of VE programs administered by federal agencies (Corps of Engineers, Navy, etc.) and assess the possibility of modifying and improving the State's program based on this examination.

- Development of recommendations for improving or discontinuing the program.

- MAINTENANCE AND REPAIR COSTS. This post-construction aspect of the school construction program affects the costs of facilities in that the quality of materials specified in the guide specifications are presumably influenced by the expected repair and maintenance costs. Investigation in this area will include:

  - Documentation of the maintenance costs on which determination of material quality is presumably based.

  - Definition of the policy and criteria used to determine what maintenance and repair cost level is considered acceptable.

- DIRECT CONSTRUCTION COSTS. An investigation of the direct construction costs which the State pays for school facilities will be made to determine the reasonableness of those costs. This will include:

  - A detailed comparative analysis of the construction costs of the public and private sectors.

  - A detailed examination of specific projects to illustrate the instances where costs are significantly lower for comparable private facilities.

The audit will focus on the 1969–1970 fiscal year. All comparisons and projections shall refer to the 1969–1970 fiscal year as the base year. The working papers and other related information developed during the course of the audit will be available for review at all times by the Office of the Legislative Auditor.

A summary of our technical approach to the conduct of the audit, the translation of this approach into a detailed work program by task, and a detailed description of the individual task objectives and methodology to be followed in achieving these objectives follows in Section II.

4. OUR QUALIFICATIONS

To effectively plan and execute the comprehensive work effort involved in the conduct of an audit of this type, an understanding of the operational processes and the interrelationships of the governmental agencies involved in a school construction program is essential. Our two firms, plus the technical support specialists included on our project team, bring to this project in-depth experience in the school construction and governmental management consulting fields.

Naramore Bain Brady & Johanson has a wide range of experience in providing consulting, architectural, and engineering design services for the planning and construction of public schools. The firm maintains offices in Honolulu and Seattle with capabilities in all areas of architectural and engineering design including programming, planning, design, preparation of final plans and specifications, construction management, office planning and interior and graphic design. A partial listing of educational facilities projects includes:

Washington State Community College District Number 8

Bellevue Community College, Phase I and Phase II and Master Planning

Washington State Community College District Number 4

Skagit Valley College, Master Planning, Vocational-Technical, Audio-Visual, Physical Education and Recreation Technology, Occupation Education, and Multiple Activity Facilities.

University of Washington

Health Sciences Teaching Increment

Mental Retardation and Child Development Building

Preventive Medicine and Environmental Health Building

Biological Sciences Building

Cancer – Primate Research Building

University Hospital

Health Sciences Complex

Washington State University

Design Disciplines Building

Physical Sciences Building

Academic Athletic Complex

Central Washington State College

Phase II Science Building

Whitman College

Cordiner Hall

Penrose Stuart Library Addition

Evergreen State College

Phases I and II Science Building

Seattle School District

Ingraham High School

Sealth High School

Louisa Boren Junior High School

West Seattle High School

Queen Anne High School

Southeast Education Center

Bellevue School District

Bellevue High School Additions

Bellevue Junior High School Additions

Highland Junior High School

Chinook Junior High School

Tyee Junior High School

Sammammish High School

Lake Hills Elementary School

Sunset Elementary School

Three Points Elementary School

Phantom Lake Elementary School

Enatai Elementary School

Eastgate Elementary School

Medina Elementary School

Cherry Crest Elementary School

Clyde Hill Elementary School

Ashwood Elementary School

Somerset Elementary School

Olympia School District

Miller High School

Reeves Junior High School

Arthur Young & Company maintains a regional governmental consulting office in Sacramento, California and has a wide range of experience in governmental consulting at the state and local levels in the fields of long-range planning, systems analysis, systems design and implementation, organization planning and analysis, industrial engineering, cost benefit analysis, and operations research. Examples of state agencies served include:

California

State Department of Education

Department of Highway Patrol

Office of Traffic Safety

Division of Highways

Office of Management Services

Department of Water Resources

Department of Agriculture

Department of Human Resources Development

Office of the Governor

Department of Mental Hygiene

Department of Parks and Recreation

Department of Public Works

Franchise Tax Board

Department of Public Health

State Personnel Board

Intergovernmental Board on Electronic Data Processing

II. TECHNICAL APPROACH

II. TECHNICAL APPROACH

The purpose of Hawaii's school construction program is provide timely, up-to-date facilities at the least total cost consistent with efficient planning and design, and prescribed quality of materials and standards of construction. This proposed audit is aimed at:

- Determining the effectiveness with which the current program is being administered with regard to minimizing total cost of public school facilities.

- Identifying weaknesses and opportunities for improvement within the program planning, design, and construction and maintenance processes and recommending such actions as necessary to improve the cost reduction effectiveness of the program.

This requires that the audit be two-dimensional in character. The first area of examination will deal with the effectiveness of those school construction program activities which are conducted on an organization by organization basis. The second area of examination will deal with the three major processes —— planning, design, and construction and maintenance —— which cut across organizational lines and interface with the architects, engineers, and contractors.

As in all broad-based management studies, a major milestone toward the solution of the problems that exist is the definition of the problems themselves. Our technical approach will be aimed at a step-by-step definition of the problems. This is a four step process:

- The identification and documentation of the organizational responsibilities and the determination of functional requirements necessary to effectively administer the school construction program to minimize the total cost of public school facilities.

- The identification and documentation of the existing program planning, design, and construction and maintenance processes.

- The analysis and evaluation of the administrative activities and program processes to identify existing weaknesses and areas which offer opportunities for additional cost reduction improvement.

- The conduct of additional analysis, investigation, and research into those areas offering potential improvement to determine their feasibility for implementation and the magnitude of the potential improvement.

Having identified the existing problems and alternatives for their solution that are possible through revisions in functional responsibilities, methods and procedural changes, uses of advanced technologies, etc., we will evaluate the range of alternatives and recommend those changes which we believe will most appropriately satisfy, on a cost effectiveness basis, the needs of the Hawaii school construction program.

We will then prepare a preliminary draft report, accompanied with the study work papers, for review and discussion with the Legislative Auditor. After review and approval of the draft report by the Legislative Auditor, we will prepare and issue the final report.

1. SUMMARY OF WORK PROGRAM BY TASK

It is, of course, impractical at this time to determine all of the detailed activities required for this audit. We have, however, identified the activities just discussed and, for purposes of further describing our approach, we have translated these activities into their major tasks and sub-tasks. The major tasks, which are described in detail later in this section, are summarized below.

Task 1 – Complete Project Planning Activities and Finalize Detailed Work Plan.

Task 2 – Conduct an Examination of the Administrative Effectiveness of the Functions Performed by the Individual State Agencies.

Task 3 – Conduct an Examination of the Effectiveness of the Program Planning Process.

Task 4 – Conduct an Examination of the Effectiveness of the Program Design Process.

Task 5 – Conduct an Examination of the Effectiveness of the Program Construction and Maintenance Process.

Task 6 – Develop Summary Recommendations and Prepare Preliminary Draft Report.

Task 7 – Prepare Final Report.

A schematic diagram of our detailed work program depicting the time phasing, interrelationships, management review points, and task outputs is shown in Exhibit I, following this page.

EXHIBIT I

WORK PROGRAM SCHEMATIC FOR AN AUDIT OF THE SCHOOL CONSTRUCTION PROGRAM FOR THE STATE OF HAWAII

TASK No. 1
COMPLETE PROJECT PLANNING ACTIVITIES AND FINALIZE DETAILED WORK PLAN

- 1.1 COORDINATE PROJECT PLANNING ACTIVITIES WITH THE OFFICE OF THE LEGISLATIVE AUDITOR
- 1.2 IDENTIFY NECESSARY INFORMATION REQUIREMENTS AND SOURCES
- 1.3 FINALIZE DETAILED WORK PLAN

(1) UPDATED WORK PLAN

CONTAINS
- STATEMENT OF PROJECT OBJECTIVES
- DEFINITION OF END PRODUCTS
- CHANGES TO TECHNICAL APPROACH
- DETAILED STAFFING ASSIGNMENTS

REVIEW AND APPROVAL BY LEGISLATIVE AUDITOR OF WORK PLAN

TASK No. 2
CONDUCT AN EXAMINATION OF THE ADMINISTRATIVE EFFECTIVENESS OF THE FUNCTIONS PERFORMED BY THE INDIVIDUAL STATE AGENCIES

- 2.1 DEFINE AND DOCUMENT PRESENT ORGANIZATION STRUCTURE AND FUNCTIONAL RESPONSIBILITIES
- 2.2 INTERVIEW KEY AGENCIES AND SELECT CONSTRUCTION INDUSTRY PERSONNEL
- 2.3 IDENTIFY AND DOCUMENT THE EXISTING ADMINISTRATIVE PROCESS
- 2.4 ANALYZE AND EVALUATE DATA COLLECTED AND PREPARE INTERIM REPORT

(2) INTERIM REPORT NO. 1

CONTAINS:
- DESCRIPTION OF ORGANIZATION, STAFFING, AND FUNCTIONAL RESPONSIBILITIES OF INVOLVED AGENCIES
- DESCRIPTION OF INFORMATION FLOWS AND ORGANIZATION INTERACTION
- SUMMARY INTERVIEW RESULTS
- SUMMARY OF PRELIMINARY FINDINGS

TASK No. 3
CONDUCT AN EXAMINATION OF THE EFFECTIVENESS OF THE PLANNING PROCESS

- 3.1 DEFINE AND DOCUMENT PRESENT ORGANIZATION STRUCTURE AND FUNCTIONAL RESPONSIBILITIES
- 3.2 DETAILED INVESTIGATION OF THE PLANNING PROCESS IN THE DEPARTMENT OF EDUCATION
  - BASIC PLANNING DATA
  - PLANNING POLICIES
  - PLANNING PROCESSES
  - SPECIFICATIONS AND STANDARDS
- 3.3 ANALYZE AND EVALUATE DATA COLLECTED AND PREPARE INTERIM REPORT

(3) INTERIM REPORT NO. 2

CONTAINS
- DESCRIPTION OF PLANNING PROCESS
- DESCRIPTION OF INFORMATION FLOWS AND ORGANIZATION INTERACTIONS
- SUMMARY OF PRELIMINARY FINDINGS

TASK No. 4
PERFORM AN EXAMINATION OF THE EFFECTIVENESS OF THE EXISTING DESIGN PROCESS

- 4.1 DEFINE AND DOCUMENT PRESENT ORGANIZATION STRUCTURE AND FUNCTIONAL RESPONSIBILITIES
- 4.2 REVIEW AND EVALUATE STATE AGENCY - ARCHITECT ENGINEER RELATIONSHIPS
- 4.3 ASSESS THE EXTENT TO WHICH TECHNOLOGICAL ADVANCES CAN CONTRIBUTE TOWARD MINIMIZING SCHOOL CONSTRUCTION COSTS
- 4.4 REVIEW, DOCUMENT, AND EVALUATE GUIDE SPECIFICATIONS
- 4.5 REVIEW AND EVALUATE EXISTING ZONING ORDINANCES AND BUILDING CODES
- 4.6 DETERMINE FEASIBILITY OF ESTABLISHING A VALUE ENGINEERING PROGRAM
- 4.7 ANALYZE AND EVALUATE DATA COLLECTED AND PREPARE INTERIM REPORT

(4) INTERIM REPORT NO. 3

CONTAINS
- DESCRIPTION OF DESIGN PROCESS ACTIVITIES
- EVALUATION OF STATE-ARCHITECT ENGINEER RELATIONSHIPS
- EVALUATION OF TECHNOLOGICAL ADVANCES
- EVALUATION OF GUIDE SPECIFICATIONS
- EVALUATION OF BUILDING CODES AND ZONING ORDINANCES
- EVALUATION OF DEVELOPING MATERIAL RESEARCH FACILITY
- EVALUATION OF ESTABLISHING A VALUE ENGINEERING PROGRAM
- SUMMARY OF PRELIMINARY FINDINGS

TASK No. 5
CONDUCT AN EXAMINATION OF THE EFFECTIVENESS OF THE CONSTRUCTION AND MAINTENANCE PROCESS

- 5.1 IDENTIFY AND DEFINE EXISTING CONSTRUCTION AND MAINTENANCE PROCESS PROCEDURES
- 5.2 EVALUATE PROJECT INSPECTION POLICIES AND PROCEDURES
- 5.3 DOCUMENT AND EVALUATE PRESENT CHANGE ORDER PROCEDURES
- 5.4 DOCUMENT AND EVALUATE BIDDING AND CONTRACT ADMINISTRATION PROCEDURES
- 5.5 EVALUATE THE EXISTING VALUE ENGINEERING PROGRAM
- 5.6 EVALUATE MAINTENANCE AND REPAIR COSTS
- 5.7 DETERMINE REASONABLENESS OF DIRECT CONSTRUCTION COSTS
- 5.8 ANALYZE AND EVALUATE DATA COLLECTED AND PREPARE INTERIM REPORT

(5) INTERIM REPORT NO. 4

CONTAINS
- DESCRIPTION OF CONSTRUCTION AND MAINTENANCE PROCESS ACTIVITIES
- EVALUATION OF CHANGE ORDERS
- EVALUATION OF BIDDING AND CONTRACT ADMINISTRATION PROCEDURES
- EVALUATION OF CURRENT VALUE ENGINEERING PROGRAM
- EVALUATION OF MAINTENANCE AND REPAIR COSTS
- EVALUATION OF THE ADMINISTRATION OF MAINTENANCE AND REPAIR COSTS
- ASSESSMENT OF THE REASONABLENESS OF CONSTRUCTION COSTS
- IDENTIFICATION OF PROJECTS WHERE COSTS WERE LOWER IN THE PRIVATE SECTOR

TASK No. 6
DEVELOP SUMMARY RECOMMENDATIONS AND PREPARE PRELIMINARY DRAFT REPORT

- 6.1 REVIEW AND EVALUATE ALTERNATIVE SOLUTIONS
- 6.2 PREPARE PRELIMINARY DRAFT REPORT

(6) PRELIMINARY DRAFT REPORT

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  - ANALYSIS PERFORMED
  - EVALUATION AND CONCLUSIONS
  - RECOMMENDATIONS
- SUMMARY
- APPENDIX

REVIEW AND APPROVAL DRAFT REPORT

TASK No. 7
PREPARE FINAL REPORT

(7) FINAL REPORT

600 COPIES DELIVERED TO THE LEGISLATIVE AUDITOR BY DECEMBER 27 1971

DELIVERABLE ITEMS INCLUDE:

1. UPDATED WORK PLAN
2. INTERIM REPORT NO. 1 - ADMINISTRATIVE PROCESS
3. INTERIM REPORT NO. 2 - PLANNING PROCESS
4. INTERIM REPORT NO. 3 - DESIGN PROCESS
5. INTERIM REPORT NO. 4 - CONSTRUCTION AND MAINTENANCE PROCESS
6. PRELIMINARY DRAFT REPORT
7. FINAL REPORT

Note:
The Tasks depicted here are described in greater detail immediately following this exhibit.

START DATE: MARCH 1, 1971

Project Planning

TASK 1 COMPLETED BY MARCH 15, 1971 (Project Review Point)

TASK 2 COMPLETED BY MAY 3, 1971 (Project Review Point)

TASK 3 COMPLETED BY JULY 5, 1971 (Project Review Point)

TASK 4 COMPLETED BY OCTOBER 4, 1971 (Project Review Point)

TASK 5 COMPLETED BY OCTOBER 18, 1971 (Project Review Point)

TASK 6 COMPLETED BY NOVEMBER 22, 1971 (Project Review Point)

TASK 7 COMPLETED BY DECEMBER 27, 1971 (Project Review Point)

Data Gathering, Analysis, and Evaluation

2. DETAILED TASK OBJECTIVES AND METHODOLOGY

This section defines the individual tasks, their objectives, and the methodologies to be followed in carrying out our general work plan.

The major tasks and sub-tasks are presented in detail in the following pages.

TASK 1 COMPLETE PROJECT PLANNING ACTIVITIES AND FINALIZE DETAILED WORK PLAN

Previous experience in major studies of this type has shown that a comprehensive review, orientation, and pre-planning activity at the beginning of a project is invaluable in developing a sound foundation for project execution. Thorough pre-planning frequently precludes potential misunderstandings about project objectives and requirements and often accelerates the execution of the entire project.

The objectives of this task are to gain a broad overall understanding of the Hawaii school construction program and the organizations responsible for carrying it out, to complete the detailed project planning activities, and to finalize the project work plan. While considerable detailed planning is presented in this proposal, this planning must be revalidated and the remaining planning activities completed. The following sub-tasks will be accomplished in performing this task.

1.1 COORDINATE PROJECT PLANNING ACTIVITIES WITH THE OFFICE OF THE LEGISLATIVE AUDITOR

We will meet with the Legislative Auditor and his staff, and personnel from the other concerned agencies, as appropriate. The purpose of these meetings will be:

- To obtain an in-depth understanding of the background information and the history of the development of the project to date.
- To assure a mutual understanding of the purpose, objectives, performance requirements, and any constraints which may exist in performing the project.
- To obtain general approval of our approach to the conduct of the project as a basis for completing the project planning activities and finalizing the comprehensive work plan.
- To solicit any suggestions relative to the conduct of the project and to determine reference materials and other information available through the Office of the Legislative Auditor or other sources.

- To define the specific working relationships between the consultant and the State.

1.2 IDENTIFY NECESSARY INFORMATION REQUIREMENTS AND SOURCES

We will finalize the planning for the organizations and individuals to be contacted during the study. We will also define the detailed information requirements, their sources, and methodology for data acquisition as part of this sub-task.

As a minimum, the functions and activities involved at the state level will be investigated in depth. Field interviews with various contractors and architects who have performed work on the Hawaii school construction program will also be conducted. A determination will also be made at this time regarding the selection of other governmental agencies or private organizations to be visited regarding the use of improved methods and procedures, advanced technologies, or other practices which may have applicability in Hawaii.

1.3 FINALIZE DETAILED WORK PLAN

Following completion of sub-tasks 1.1 and 1.2, we will update and finalize the work plan presented in this proposal. This plan will include, as a minimum:

- A clear comprehensive statement of project objectives.
- A definition of the products of the study.
- Summary statements of any proposed changes to the technical approach described in this proposal.
- The detailed staffing assignments of the consultant project team for each task and sub-task.

The elements of the detailed work plan will be developed in full cooperation with the Legislative Auditor's staff and will be submitted to his office for approval prior to actual project initiation.

TASK 2 CONDUCT AN EXAMINATION OF THE ADMINISTRATIVE EFFECTIVENESS OF THE FUNCTIONS PERFORMED BY THE INDIVIDUAL STATE AGENCIES

The objectives of this task will be to identify, document, and evaluate the functions and responsibilities of the individual State agencies involved in the school construction program and to determine the effectiveness with which the program is being administered with regard to minimizing the total cost of public school facilities.

The purpose of this task is to gain a comprehensive understanding of the functions, activities, and operations performed by each organization in support of the school construction program, the problems associated with the administration of the school construction program, and the existing forces and constraints which inhibit the performance of the assigned functions and responsibilities, particularly as related to minimizing the total cost of public school facilities.

The following sub-tasks will be performed to accomplish the objectives of this task.

2.1 DEFINE AND DOCUMENT PRESENT ORGANIZATION STRUCTURE AND FUNCTIONAL RESPONSIBILITIES

We will define and document the present organization structure, staffing, and functional responsibilities of those portions of each of the State agencies involved in the school construction program.

These include the functions involved in the following agencies:

Department of Education (DOE)
Department of Accounting and General Services (DAGS)
Department of Budget and Finance
Department of Planning and Economic Development
Office of the Governor
Department of Attorney General

As part of this sub-task, we will also review existing statutes and codes as related to the assignment of functions and responsibilities in administering the school construction program.

2.2 INTERVIEW KEY AGENCY AND SELECTED CONSTRUCTION INDUSTRY PERSONNEL

Interviews will be conducted with key management and operating personnel who are responsible for the administration of the program within the various State agencies. The purpose of these interviews will be to identify problems and to solicit opinions regarding existing weaknesses, problems, or constraints related to the administration of the program.

Interviews will also be conducted with selected contractor and architect personnel who have had firsthand involvement with the Hawaii school construction program. The purpose of these interviews will be to identify problems in dealing with the "system" and solicit opinions regarding opportunities for improvement in the administrative process. A minimum of six contractor and architectural firms who have been heavily involved in

Hawaii's school construction program will be interviewed. This will include firms such as T. Y. Lin, Hawaii, Inc.; Walter H. Tagawa, A. I. A. & Associates; Hogan & Chapman, Architects, Inc.; Robert M. Matsushita & Associates; Wilson, Okamoto & Associates; and R. Wakefield Ward & Associates.

2.3 IDENTIFY AND DOCUMENT THE EXISTING ADMINISTRATIVE PROCESS

Using the background information developed in sub-tasks 2.1 and 2.2, we will identify and document, in management level summary flow chart format, the overall information flow related to the existing Hawaii school construction program.

The major objectives of this sub-task are:

To identify the data flow in planning, research, and administrative processes to determine key decision points and where information is used and acted upon.

To analyze the interaction of agency operations and related information processes including the generation of new data, abstraction of data, transmission or dissemination of data, etc.

To identify the tentative requirements for the flow of data to effectively satisfy the overall administrative requirements of the school construction program.

In conducting this analysis, we will identify the administrative and operational requirements of each of the individual agencies taking into consideration the legal, organizational, and other constraints currently in existence. Standardized methods of flow charting will be utilized which will identify the basic program inputs and outputs involved in the administrative process. Copies of all documents and reports utilized as part of the process will also be collected.

2.4 ANALYZE AND EVALUATE DATA COLLECTED AND PREPARE INTERIM REPORT

The data and information collected in sub-tasks 2.1 through 2.3 will be analyzed and evaluated to determine the effectiveness with which the school construction program is currently being administered.

An interim report will be prepared which will include as a minimum:

- A description of the existing organization, staffing, and functional responsibilities of the State agencies involved in the school construction program.

- A summary management level flow chart of the information flow and interactions of the organizations involved.

- A summary of the results of the interviews with agency and selected architect and construction industry personnel.

- A summary of our preliminary findings, conclusions, and recommendations related to our examination of the administrative effectiveness of the functions performed by the individual State agencies.

Copies of our interim report will be submitted to the Office of the Legislative Auditor. The preliminary information developed in this task will later be combined with the outputs of Tasks 3, 4, and 5 to form the basis for our final recommendations in the performance of Tasks 6 and 7.

TASK 3 CONDUCT AN EXAMINATION OF THE EFFECTIVENESS OF THE PLANNING PROCESS

Planning provides the emphasis and direction necessary for the timely implementation of construction programs. Inadequate planning usually results in time delays during construction and thus leads to higher costs. The objectives of this task are:

- To determine the effectiveness of the facility planning process in minimizing the total cost of school facilities.

- To identify weaknesses in the planning process and recommend ways to improve the effectiveness of the process.

To meet these objectives, we will:

- Determine the effectiveness with which the program planning process delivers school facilities **when** they are needed.

- Determine the effectiveness with which the program planning process delivers schools **where** they are needed.

- Determine the effectiveness of the education facility program in meeting the needs of the community.

- Determine the effectiveness with which the planning process meets the needs of architects, engineers, and contractors.

3.1 DEFINE AND DOCUMENT PRESENT ORGANIZATION STRUCTURE AND FUNCTIONAL RESPONSIBILITIES

We will define and document the functional responsibility, organization structure, and staffing of those parts of each agency or department involved in the planning process. Specific planning functions in the Department of Education, however, will be investigated to a greater level of detail in sub-task 3.2. This sub-task will identify the roles of the various agencies and departments and investigate, in detail, those functions performed outside of the Department of Education. These investigations will result in the definition of the various aspects of planning operations at a level of detail sufficient to provide a basis for the subsequent evaluation of the necessity and effectiveness of individual agency and department functions.

The definitions will consist of, as appropriate, management and detail level flow charts, documentation of interviews, copies of relevant documents and reports utilized, and a narrative description of activities. These definitions will allow identification and subsequent analysis of: (1) information flow, (2) decision points, (3) time relationships, (4) performance requirements, and (5) any procedural or organizational "gaps" in the process.

We will define, as a result of sub-tasks 3.1 and 3.2, the planning activities in each of the following agencies and departments:

- Department of Education
- Department of Accounting and General Services
- Department of Budget and Finance
- Department of Planning and Economic Development
- Office of the Governor
- Department of Attorney General

3.2 DETAILED INVESTIGATION OF THE PLANNING PROCESS IN THE DEPARTMENT OF EDUCATION

The objective of this sub-task is to thoroughly define and document all aspects of the planning process performed by the Department of Education. We will expand the definition developed in sub-task 3.1 to an additional level of detail. This will include the identification of the functional responsibilities of the various organizational units within the

Department and the development of a definition of their roles in the overall process. The definition will be documented with management and detailed flow charts, relevant documents and reports, etc., as appropriate. As a part of this investigation, a number of specific areas will be evaluated in-depth. These include:

- The use and adequacy of basic planning data.
- The effectiveness of basic planning policies.
- The adequacy of various planning process including inter-department coordination.
- The adequacy of the Educational Specifications and Standards for Facilities.

A description of the analysis and evaluation to be performed in each of these areas follows:

- BASIC PLANNING DATA

  - We will assess the adequacy of demographic information and related data in projecting future student enrollments and the propriety of translating these enrollment projections into predictions of future facility needs. The data currently used in this process will be inventoried and the specific uses of the data identified. Prior enrollment projections will be compared with actual conditions to determine if the process results in facilities when and where they are needed. The amount and cause of the difference between the projection and actual conditions will be investigated. The need for additional data or different prediction techniques will be identified as appropriate.

  - We will identify, document, and evaluate the adequacy with which the DOE's educational planning (teaching techniques and methods, special programs, including but not limited to those for the mentally retarded and physically handicapped) is coordinated with educational facilities planning to develop current and long-range specifications for school facilities design and construction. This will include a summary analysis of current trends in educational program planning and the implications of these trends in terms of facility location (few large educational centers versus numerous small neighborhood schools, etc.), construction scheduling, and facility costs.

  - We will investigate the adequacy of available inventory data regarding the capacity and utilization of the existing facilities. We will identify the use made of this data in determining how the need for school facilities is to be met. The specific data elements and their uses will be inventoried. We will verify the accuracy of the current inventory data by checking it with actual field conditions. This will be done on a

sampling basis. We will identify those data which could be used in determining the most desirable way to meet facility needs (new construction, renovation of existing facilities, and additional use or relocation of existing portable buildings), but are not currently available.

- PLANNING POLICIES

  - We will assess the appropriateness of the Department of Education's planning policy governing the use of portable classrooms. We will define the role played by portable facilities, ascertain the "temporary" nature of these structures, and establish their absolute and relative costs. We will identify the specific components of the criteria used in the decision regarding the use of portable facilities including the consideration given to costs and benefits. We will review the historical use of these facilities to determine if the stated criteria have been uniformly applied in comparable situations.

  - We will investigate, document and identify the adequacy of policies and procedures used by the DOE in determining land requirements and selecting sites for school facilities. This would include an analysis of whether sound planning objectives, such as safety, convenience, and optimum land use (joint use of playground areas with park facilities, etc.), or extended use of school facilities (now limited to an uneconomical seven hours/day) for community center activities are considered in site acquisition.

  - We will assess the adequacy of the Department of Education's current method of establishing facility priorities. We will document the method and review historical performance to determine if the method has been uniformly applied. For representative situations, we will explore alternative priority methods and measure the impact of these alternatives.

  - We will ascertain the reasonableness of the Department of Education's criteria for determining the permanency of new facilities. In view of today's changing instructional programs, the long-range value of a structure with an average useful life of 60 years is questionable. We will identify the time frame for which the requirements of various instruction programs can reasonably be predicted and then determine the need to consider new planned-life concepts such as "planned obsolescence." Possible cost benefits of alternative approaches ranging from long-life, extremely flexible facilities to new "street school" concepts will be investigated.

- PLANNING PROCESS

  - The present method of preparing the Department of Education's capital improvements appropriation request will be defined, documented, and evaluated. The adequacy of this method to realistically project

facility costs will be determined. Interviews will be held with selected members of the legislature to determine if the project descriptions provide sufficient data for their review and approval process.

- We will evaluate the adequacy of the DOE's method in establishing meaningful priorities for proposed school facility projects considering overall statewide needs.

- We will define, document, and evaluate the present inter-departmental (Facilities and Auxiliary Services Branch, DOE and Public Works Division, DAGS) coordination efforts involved in facility planning. We will evaluate the current procedures to identify duplication of effort by the various departments and any gaps in the process which may later cause additional costs to be incurred. The timing of the various coordination points will be reviewed to determine if alternative sequences of actions would improve the process. If appropriate, a critical path analysis of inter-departmental coordination procedures will be undertaken. This analysis would provide estimates of performance for alternative procedures.

. SPECIFICATIONS AND STANDARDS

- We will assess the adequacy of the Educational Specifications and Standards for Facilities to provide meaningful guidelines to architects and planners. One source of data for this assessment will be interviews with individual architects. Questions about the current guidelines will be made a part of the interview guides that will be developed and used as part of the work in sub-task 2.2. The existing specifications and standards will be reviewed to determine their ability to serve as a basis for planning educational complexes and for designing specific facilities. We will identify those specifications and standards which are very helpful or alternatively, very constraining to architects and planners and identify their potential effect on costs.

3.3 ANALYZE AND EVALUATE DATA COLLECTED AND PREPARE INTERIM REPORT

The data and information collected in sub-tasks 3.1 and 3.2 will be analyzed and evaluated to determine the effectiveness of the program planning process.

An interim report will be prepared which will include, as a minimum:

. A description of the organization structure, staffing, and functional responsibilities of agencies involved in the program planning process.

- A summary management level flow chart of the information flow and interactions of the organizations involved.

- A summary of our preliminary findings, conclusions, and recommendations related to our examination of the effectiveness of the program planning process.

TASK 4 PERFORM AN EXAMINATION OF THE EFFECTIVENESS OF THE EXISTING DESIGN PROCESS

The objective of this task will be to identify, document, and evaluate the design process to determine the adequacy of the various aspects within the design phase of the program in minimizing total costs.

The purpose of this task is to gain a thorough understanding of the design process by examining all aspects of the process —— State and supporting architectural and engineering consulting —— and analyzing selected key elements of the process in-depth.

The following sub-tasks will be performed to accomplish the objective of this task.

4.1 DEFINE AND DOCUMENT PRESENT ORGANIZATION STRUCTURE AND FUNCTIONAL RESPONSIBILITIES

We will define and document the functional responsibilities, organization structure, and staffing of those parts of each agency or department involved in the design process. This will include an identification of those points of State agency – architect/engineer interaction. We will interview key agency personnel, several architects and one or more engineers representing each type of design activity to develop an overall definition of the existing design process and the role of the various agencies and architects/engineers in the overall design process. A management level flow chart will be developed which will describe the salient parts of the typical design process.

4.2 REVIEW AND EVALUATE STATE AGENCY – ARCHITECT/ENGINEER RELATIONSHIPS

The objective of this sub-task is to evaluate the key aspects of the State agency - architect/engineer relationships which were documented in sub-task 4.1. Specifically to be evaluated are:

- The extent to which "architectural freedom" characterizes the design of school facilities and the effect this latitude has on ultimate construction costs. Based on the experience of those members of the project team who are architects and the results of field interviews with local architects, we will develop a definition of "architectural freedom" and determine if it is reflected in recent State school projects. We will assess the effect on costs, positive or negative, and determine if it impacts the professional fee structure.

- The general adequacy in coordination of the plans and specifications review process during the schematic development, design development, and final plan stages of project design. We will document the Public Works Division's project scheduling and reporting procedures and policies. The overall coordination process will be reviewed to identify duplication of effort, lack of timeliness and voids or gaps in the present system.

- The criteria which determines acceptable architectural submission of final plans and specifications —— this refers to the "completeness" of the plan. We will document the current criteria and determine if it results in uniform performance by architects. If the current criteria result in too few design details, and drawings which are not compatible with the specifications being submitted, we will develop a new criteria of "completeness."

- The extent of technical review of preliminary and final plans and specifications by the Division of Public Works and the adequacy of this review in eliminating design deficiencies which result in increased costs (through change orders) during construction.

- An evaluation of the method of architectural selection used by the State. It is recognized that designs by competent architects generally result in lower construction costs, while those of less competent architects result in higher construction costs due to unnecessarily complicated and inefficient space designs. We will compare Hawaii's method of selection with that of the federal government and with California and Washington. The selection procedure will be reviewed to identify unnecessary steps, etc.

4.3 ASSESS THE EXTENT TO WHICH TECHNOLOGICAL ADVANCES CAN CONTRIBUTE TOWARD MINIMIZING SCHOOL CONSTRUCTION COSTS

The objective of this sub-task will be to identify, document, and evaluate major technological advances with potential for reducing the total cost of public school facilities in Hawaii. In carrying out this sub-task we will:

- Identify and document systems building techniques for the purpose of assessing their applicability to the State of Hawaii's capital improvement program for school facilities. A thorough investigation of the SCSD (School Construction Systems Development) in California, the RAS (School Systems Research) project in Montreal, the GSSP (Georgia School Systems Program), the SEF (Study of Educational Facilities) program in Toronto, and the URBS (University Residential Building Systems) has recently been completed by a member of our team under a 1970 Naramore Foundation Grant. Each systems building program will be evaluated with regard to market organization (financial, legal, and administrative) requirements, performance specifications, systems design, systems development, and program evaluation. Other programs which will be investigated are the Stanford Flexible (Modular) Scheduling System, the "pod" construction concept, and "fast-track" scheduling.

- Investigate market and manufacturing potentials in the State of Hawaii for a school building system developed to serve local needs, including an evaluation of marketing such a system outside the State of Hawaii.

- Investigate the systems approach to building school facilities. This is a "software" approach to solving the problems of cost and deals primarily with the elements of programming, planning, design, and management. The architectural firm of Caudill, Rowlett & Scott, internationally recognized for their pioneering efforts in the programming and design of educational facilities, have successfully applied the systems approach, which may or may not include building systems, to the problems of Hartford, Baltimore, and Minneapolis. The Caudill, Rowlett & Scott Team will be extensively involved in Tasks 1, 3, and 4 of this project.

- Identify, document, and evaluate initial, long-range, moving, and maintenance costs of prefabricated "portable" and "relocatable" units designed for, or applicable to, school use.

- Determine the present effectiveness of using portable classrooms and demountable facilities and assess the program from the standpoint of improving their effectiveness through better structure designs and space-use concepts, assuming this approach is recommended for continued use.

- Identify, document, and evaluate the use of new indigenous materials, such as bagasse, which have potential for use in school facilities. The purpose of this investigation will be to reduce the total cost of school facilities in Hawaii, and secondarily, to identify a market for local industry.

- Investigate the feasibility of developing a construction materials research and testing facility within a State agency for the purpose of incorporating new and more economical materials and methods (including building systems) into the construction industry, with particular emphasis on its potential for savings in the total cost of public schools in Hawaii. We will estimate the order-of-magnitude costs of operating such a facility and identify the general organizational form. We will then identify those agencies which might have goals compatible with a materials research program (DAGS, DOT, UH) giving particular attention to the use of the facilities of the "Center for Engineering Research" at the University of Hawaii. We will interview the heads of those agencies to determine their ability and interest in developing a successful research program. Alternative organization forms will be identified and evaluated. One alternative, the formation of an independent not-for-profit research capability to serve various agencies will be explored.

4.4 REVIEW, DOCUMENT, AND EVALUATE THE GUIDE SPECIFICATIONS

The guide specifications are used by the Department of General Services in conveying to architects and design

engineers the minimum construction standards with which a school facility must comply. These specifications are the basis for determining the minimum quality of materials to be used and the precise methods and techniques to be employed by the contractor in accomplishing specific tasks in the field.

In meeting the objectives of this sub-task, we will:

- Determine the adequacy of the guide specifications in conveying to architects and engineers the desired minimum construction standards to be maintained in school construction. Determine if the guide specifications have a positive influence on architects and engineers in developing efficient designs at the least total cost and recommend the addition to, deletion, or complete revision of all or part of the current specifications. This will be accomplished through a technical review of the specifications and field interviews with a minimum of six architectural and six engineering firms.

- Determine the adequacy of the guide specifications in describing methods and techniques of construction in a clear and concise manner in order to avoid misunderstandings on the part of the contractor as to what is required in the field. This will be accomplished through a technical review of the specifications and field interviews with a minimum of six contractors.

- Analyze the guide specifications with regard to completeness, determining if the topics discussed in the guide specifications cover all facets of construction necessary for the designers to fully understand what is required in a completed school facility.

- Evaluate the latest published guide specifications (September 1969) with respect to present standards (materials and construction methods) employed in private construction.

- Evaluate the guide specifications to determine if the specified standards of performance are unnecessarily increasing the cost of school facilities; investigate the possibility of recommending lower quality and less costly materials consistent with post-construction maintenance requirements. Examples of evaluations to be made include:

  - Are premium materials specified?

  - Are frequent upgrades in the specifications made to reflect new materials and new methods of construction?

- Are specifications (or procedures) flexible enough to allow material changes when strikes affect availability or prices are affected by availability?

- Are materials not handled locally, or handled locally but not serviced locally, specified?

- Have the merits of a "performance" specification been investigated?

. Evaluate the review and evaluation procedures for updating the guide specifications, if such a procedure exists; determine the extent of periodic review necessary in order to insure that the State's guide specifications are a "current", viable and changing document.

As a part of our interviews with architects, engineers, and contractors, we will solicit their opinions on the relative merits of the guide specifications. These opinions will serve to identify specific components of the guide specifications to be evaluated in-depth during this sub-task.

4.5 REVIEW AND EVALUATE EXISTING ZONING ORDINANCES AND BUILDING CODES

The objective of this sub-task is to evaluate the effect of code and ordinance restrictions on the total cost of public schools in Hawaii.

We will, in meeting the objective of this sub-task:

. Document and evaluate a comparison of the codes and ordinances of Hawaii with those of other areas. As a minimum, we will compare those of Honolulu to those of three other comparable cities —— Seattle, Portland, and San Diego. We will also compare the codes and ordinances of several Hawaii rural areas with those of Honolulu. It will be difficult to compare "code for code" in each area as codes and ordinances are often combined. We will, however, compare total "limitation" in one area with the total "limitation" in another.

. Document and evaluate interviews with Department of Education personnel, architects, engineers, and contractors to identify codes and ordinances considered unnecessary, unreasonable, and costly. We will interview:

- Two firms from each of the following categories.
  .. architects
  .. structural engineers
  .. electrical engineers
  .. mechanical engineers

- Six active construction contractors.

- Document and evaluate interviews with City and County of Honolulu and County of Hawaii, Kauai, and Maui building officials to identify unnecessarily restrictive codes and ordinances and to establish degrees of latitude in interpretation of codes and ordinances.

- Identify, document, and evaluate excessively restrictive sections, codes and ordinances, and inconsistencies in code and ordinance interpretations that result in the increased total cost of school facilities in the State of Hawaii.

4.6 DETERMINE FEASIBILITY OF ESTABLISHING A VALUE ENGINEERING PROGRAM

The objective of this sub-task is to determine if a value engineering program in the design process would contribute to lower total costs.

The purpose of this sub-task is to define the approach used by the federal government, and to evaluate this approach to identify possible benefits that would result if such a program were implemented in the State.

To meet the objective of this sub-task, we will:

- Review the value engineering programs utilized by the federal government in the engineering design area. We will investigate value engineering programs in at least two federal agencies: (1) the U.S. Army Corps of Engineers, and (2) DOD requirements for defense contractors.

- Identify the key components of these programs and the nature and quantity of benefits from the programs.

- Identify the type of resources (professional engineer time, research capability, technical managerial skills, etc.) required to implement such a program.

- Determine the feasibility and possible benefits of incorporating a value engineering program into the State's design process.

4.7 ANALYZE AND EVALUATE DATA COLLECTED AND PREPARE INTERIM REPORT

The data and information collected in sub-tasks 4.1 through 4.6 will be analyzed and evaluated to determine the effectiveness of the existing design process program.

An interim report will be prepared which will include, as a minimum:

- A description of existing design process activities identifying functional responsibilities of State agencies, architectural and engineering consultants, and code and ordinance enforcing agencies.

- An evaluation of State——architect/engineer relationships including:

  - The effect of architectural freedom on costs
  - The coordination process during the design process
  - The criteria used to determine a "completed" plan
  - The method of selecting architects

- The evaluation of technological advances as related to the public school systems including the use of building systems, the systems approach to building, the use of new indigenous materials for construction, and the use of prefabricated portable and relocatable units.

- An evaluation of the guide specifications.

- An evaluation of existing building codes and zoning ordinances.

- An evaluation of the feasibility of developing a construction materials research and testing facility within the State.

- An evaluation of the feasibility of establishing a value engineering program within the design process.

- A summary of our preliminary findings, conclusions, and recommendations related to our examination of the design process for school facilities.

In summary, the Task 4 audit activities will examine the adequacy of the various activities within the design phase of the school construction program in minimizing total costs. Particular emphasis will be given to the evaluation of the adequacy of educational facilities programs in providing adequate information to architects and engineers; the performance level of a representative number of architectural and engineering consultants with particular regard to their evaluation of alternative concepts, design quality, construction document accuracy and completeness, and accuracy of preliminary and final cost estimates; and time losses in the design process resulting from approval delays by governmental agencies.

TASK 5 CONDUCT AN EXAMINATION OF THE EFFECTIVENESS OF THE CONSTRUCTION AND MAINTENANCE PROCESS

The objectives of this task will be to identify, document, and evaluate the construction and maintenance process phase of the school construction program which encompasses advertising for bids, bid opening, and awarding of the construction contract, activities related to the actual construction of the facility, and repair and maintenance of the completed facilities. In addition, a detailed breakdown of the construction costs and repair and maintenance costs will be analyzed.

The purpose of this task is to gain a comprehensive understanding of the actual construction activities including the review of plans and specifications, on-site project inspection, and processing of required changes to the final construction plans.

The following sub-tasks will be performed to accomplish the objectives of this task.

5.1 IDENTIFY AND DOCUMENT EXISTING CONSTRUCTION AND MAINTENANCE PROCESS PROCEDURES

Interviews will be conducted with key management and operating personnel who are responsible for the construction and maintenance phase of the school construction program. The purpose of these interviews will be to identify functional areas of responsibility and current operating procedures now being followed within the various State agencies; in addition, any published procedures will be obtained and documented.

The major objectives of this sub-task are:

- To identify the pattern of information flow, determine key decision points, and determine where information is used and acted upon.
- To identify the interaction of State agencies involved in the construction and maintenance process.
- To identify information gaps in the process.
- To identify possible duplication of functions.
- To identify need for improving information flow.

In conducting this analysis we will identify the administrative and procedural requirements of each of the individual agencies taking into consideration the legal, organizational, and other constraints currently in existence. Standardized methods of flow charting will be utilized which will identify the basic construction and maintenance program inputs

and outputs. Copies of all documents and reports utilized as part of this process will also be collected and documented.

5.2 EVALUATE PROJECT INSPECTION POLICIES AND PROCEDURES

Current procedures provide for checking to insure that construction adheres to contract plans and specifications and complies with applicable provisions of building codes and zoning ordinances. The objective of this sub-task is to evaluate the effect on total project cost of the present inspection policy and procedures.

We will, in meeting the objectives of this sub-task:

- Document and evaluate the relationship between architectural site visits and State agency site visits to determine if adequate supervision is being employed.
- Document and evaluate the current methodology used to insure that construction adheres to contract plans and specifications and complies with applicable provisions of the building codes and zoning ordinances.
- Document and evaluate the consistency applied to construction management practices to determine if excessive control contributes to higher construction costs.
- Document and evaluate the current progress reporting procedures to determine whether unnecessary overhead costs (office engineer, secretary, rent, etc.) are being incurred by the contractor and the inspecting State agency.
- Evaluate the possibility of establishing a construction management section within the State hierarchy to perform all inspections.

In carrying out the above activities, we will analyze available documents on a minimum of six construction projects and interview State, architectural and contractor personnel involved, and thoroughly evaluate existing State project inspection policies and procedures.

5.3 DOCUMENT AND EVALUATE PRESENT CHANGE ORDER PROCEDURES

The objective of this sub-task is to evaluate the causes of, and present procedures for processing change orders. Since change orders directly increase the cost of a project, a reduction in their number and an improvement in the procedures for effecting project changes will result in decreased project costs. We will undertake a detailed analysis of change order procedures which will include:

- An assessment of change order procedures and practices within the school construction program.

- A determination of the origin and nature of change orders. The project documentation (project folders) on a minimum of 25 completed projects will be examined to provide the data for this determination.

- An assessment of the extent to which change orders might have been avoided or have been reduced in magnitude. Our project team will use professional judgment to classify the change orders into three general categories:

  - Necessary changes
  - Optional changes
  - Avoidable changes

- Document and evaluate indirect costs resulting from change orders in the selected sample -- delay in construcion and cost of "red tape" in processing (DAGS, contractor, architect) of change orders.

- Evaluate whether the "red tape" in processing a change order is unnecessarily excessive (compared to other agencies – private or government).

- Document and categorize the various causes of change orders.

- Document and evaluate the number and dollar amounts (actual costs) of the change orders by category.

- Evaluate to what extent the change orders could have been avoided (number of cases and total dollar amount) and the percentage which could have been avoided and the reasons for their unavoidability.

5.4 REVIEW AND EVALUATE PRESENT BID AND CONTRACT ADMINISTRATION PROCEDURES

The objective of this sub-task will be to identify, document, and evaluate current bid procedures and contract administration procedures and practices as they relate to minimizing total cost of school facilities.

We will, in meeting the objectives of this sub-task:

- Determine if the present methods secure the fairest and most economical bid prices during periods of high construction activity as well as during periods of low construction activity.

- Determine if the present bid activity practices are fair to both the State and the bidder.

- Assess the adequacy of the State bidding procedure in light of the experience of other governmental agencies (federal, city, and county) in securing fair and economical bids.

- Assess the practicality of utilizing other bidding methods in order to achieve lower construction bid prices and more effective cost control. This examination will include, but not be limited to, "turnkey" method, incentive contracts (premium payment for completion of project ahead of schedule), cost plus, unit price, and separate bids on the general, mechanical and electrical portions of the contract.

- Determine if present contract administration procedures and requirements are reasonable from the viewpoint of the contractor, and efficient and necessary from the State's point of view so that indirect costs are kept to a minimum.

- Document and evaluate the adequacy of the contract administration process, including bonding requirements, shop drawing submittals, progress reporting procedures, and change order proposals.

We will document the results of the present school construction program bidding practices on a minimum of six recent projects as a basis for analysis. We will compare Hawaii's practices with those of the federal government (Corps of Engineers) and with California and Washington. We will interview a minimum of six active contractors to obtain their viewpoints.

5.5 REVIEW AND EVALUATE THE EXISTING VALUE ENGINEERING PROGRAM

Hawaii has implemented a value engineering program in the construction and maintenance phase of the school construction program. The program is designed to elicit cost savings proposals from contractors. The savings resulting from such proposals are to be shared equally by the State and the contractor. To date, this program has no apparent effect in reducing school costs. The objective of this sub-task is to evaluate this program to determine what changes (including discontinuing the program) are required to reduce costs.

To meet this objective, we will:

- Document and evaluate the current value engineering program.

- Assess the apparent failure of the program by identifying those instances where proposals have been submitted and analyze them on an individual case basis.

- Determine the reasons for the program's ineffectiveness by analyzing the possible benefits to be received by contractors and the problems and possible delays which might be incurred. Reasons for the program's ineffectiveness from the standpoint of the State's contracting agency will be identified and analyzed.

- Examine the value engineering programs administered by federal agencies (Corps of Engineers, Navy, etc.) and assess the possibility of modifying and improving the State's program based on their experience. We will define the major components of the successful federal programs, and identify the resources required to successfully operate the program.

Based on the above, we will make specific recommendations for improving or discontinuing the program.

5.6 REVIEW AND EVALUATE MAINTENANCE AND REPAIR COSTS

The post-construction activity of maintenance and repair affects the costs of facilities in that the quality of materials specified in the guide specifications and utilized in the buildings are presumably influenced by the expected level of maintenance and repair costs. We will investigate the current level of maintenance and repair costs. The objective of this investigation is to evaluate the overall maintenance and repair activity and to make recommendations to minimize current and future maintenance and repair costs.

We will, in meeting the objectives of this sub-task:

- Review existing records to identify maintenance and repair costs.

- Document and evaluate the yearly maintenance and repair costs by selected facility to determine on what basis the construction material quality is specified.

- Determine if expenditures for the installation of higher quality materials during construction are or could be offset by lower maintenance and repair costs over an established time frame.

- Evaluate the policy and criteria which are applied to determine what cost level is tolerable with regard to maintenance and repair costs.

- Determine if maintenance and repair costs appear to be spent in the most efficient manner and that safeguards exist in the system to prevent excessive expenditures from recurring.

- Assess the daily maintenance costs as they relate to the type of material used in construction (carpet versus floor tile, wall glazings versus ceramic tile, etc.) to determine if any correlations between cleaning and material costs exists.

- Assess maintenance costs in relation to building repair costs to determine if any relationships exists——determine if maintenance costs equate to the building repair costs. (Higher maintenance — lower repair.)

- Determine if adequate equipment parts lists, assembly drawings, detail drawings, and user manuals for mechanical and electrical equipment are provided and maintained.

- Determine if adequate courses for user (maintenance and repair) personnel exist.

- Determine if complete records of materials used (i.e., paints, roofing materials, floor materials, ceiling tiles, etc.) exist to assure that compatibility can be maintained in the normal course of building repair.

- Determine if an adequate inventory of spare parts is obtained at the completion of construction (floor tiles, ceiling tiles, etc.) to insure consistency.

- Evaluate current inventory control methods for maintenance of materials and spare parts.

5.7 DETERMINE REASONABLENESS OF DIRECT CONSTRUCTION COSTS

The objective of this sub-task is to determine the reasonableness of direct construction costs (accepted low bid plus change orders). Many factors contribute to the total direct cost of a project. However, the determination of reasonableness will be made on a relative basis by comparing the costs incurred for school facilities with those of comparable private projects. To meet the objective of this sub-task we will:

- Identify the basis for comparing projects.

  - Location and time of construction:
    - all selected projects will have been constructed in Honolulu between 1965 and 1970. Projects elsewhere on Oahu will be used if the number in Honolulu proves inadequate.

  - Type of facility:
    - public projects
      - elementary standard and multi-purpose classrooms

        - other school facilities, libraries, and high school science buildings
        - other public facilities, office buildings, courthouses, military barracks, and fire stations

    - private projects
        - elementary standard and multi-purpose classrooms
        - other school facilities, science classrooms and libraries
        - apartment buildings and condominiums
        - office buildings

- Identification of sub-categories for comparison
    - number of stories
    - floor areas
    - elevators
    - construction quality
    - type of construction
    - pertinent ratios
    - treatment of variable cost items

- Select projects and gather data.

- Analyze cost data for public and private sectors.

    - Determine effect of time on construction costs.

    - Determine effect of time on the rate of increase in construction costs.

    - Determine rate of increase in construction costs exclusive of the rise in material and labor costs.

- Identify causes of, and analyze differences between, public and private sector costs.

- Examine "handpicked" public and private projects to detect specific cost items which are skewed in favor of the private sector. Examination to be based on:

    - Actual contract costs incurred

- Final plans and specifications
- Shop drawings of changes to contract plans
- Visual inspection of completed projects

. Compare selected categories of projects.

5.8 ANALYZE AND EVALUATE DATA COLLECTED AND PREPARE INTERIM REPORT

The data and information collected in sub-tasks 5.1 through 5.7 will be analyzed and evaluated to determine the effectiveness of the construction and maintenance process. An interim report will be prepared which will include as a minimum:

. A description of the existing organization and functional responsibilities of the State agencies involved in the construction and maintenance process of the school construction program.

. A summary management level flow chart of the information flow, interactions, and key decision-making points of the organizations involved.

. An evaluation of the current project inspection policies and procedures to:

- Determine the impact of current practices on total project costs.
- Determine if current practices are consistently applied to all contractors.
- Determine if current practices are more stringent than necessary.
- Determine if the present progress reporting system leads to unnecessary overhead costs for the contractor or the inspecting State agency.

. An evaluation of change order procedures to:

- Assess the change order procedures and practices within the school construction program including an examination of the project documentation (project folders) to determine the origin and nature of the changes.

- Assess the extent to which change orders might have been reduced or avoided. (This determination will primarily be based on professional judgment regarding the quality and completeness of the contract plans and specifications.)

- Determine the indirect costs resulting from change orders — delays in construction and cost of "red tape" in processing (DAGS, contractor, architect) of change orders; determine whether the "red tape" in processing a change order is unnecessarily excessive (compared to other agencies — private or governmental).

. A change order cost analysis, including:

- An inventory and categorization of the various change orders including a tabulation of the number and dollar amounts of change orders in each category.

- An assessment of avoidable change orders (number of cases and dollar amounts) and the percentage which could not have been avoided and the reasons for their unavoidability.

. An evaluation of present bid procedures and contract administration procedures to:

- Determine if the present methods secure the fairest and most economical bid prices during periods of high construction activity as well as during periods of low construction activity.

- Determine if the present bid activity practices are fair to both the State and the bidder.

- Assess the adequacy of the State bidding procedure in light of the experience of other governmental agencies (federal, city, and county) in securing fair and economical bids.

- Assess the practicality of utilizing other bidding methods in order to achieve lower construction bid prices and more effective cost control. This examination will include, but not be limited to, "turnkey" method, incentive contracts (premium payment for completion of project ahead of schedule) cost plus, unit price, and separate bids on the general, mechanical, and electrical portions of the contract.

- Determine if the present contract administration procedures and requirements are reasonable from the viewpoint of the contractor, and efficient and necessary from the State's point of view so that indirect costs are kept to a minimum.

- Assess the adequacy of the contract administration process, including bonding requirements, shop drawing submittals, progress reporting procedures, and change order procedures.

- An evaluation of the State's value engineering program to:

  - Determine the reasons for failure of the current program to promote deductions in school construction cost.

  - Compare the current VE program to value engineering programs administered by Federal Agencies.

  - Determine the possibility of modifying, improving, or discontinuing the existing State value engineering program.

- An evaluation of the existing maintenance and repair costs including:

  - A review of existing records to identify and document maintenance expenditures.

  - An analysis to determine if these expenditures were made in the most efficient manner and that safeguards exist in the system to guarantee that these expenditures will be made efficiently.

  - An analysis of maintenance cost by facility to determine how the materials used affect the maintenance cost.

  - A cost correlation to determine if expenditures for the installation of higher quality materials are offset by lower maintenance costs over an established time frame.

  - An analysis of maintenance costs as related to types of material used in construction.

  - An analysis of maintenance cost as it relates to building repair cost.

  - An assessment of the policy and criteria which are applied to determine acceptable maintenance and repair cost levels.

- An evaluation of the administration and operation of the maintenance and repair program.

- A detailed comparison and analysis of costs for public and private projects to determine the reasonableness of the direct construction costs incurred by the State.

- An identification of specific projects and cost items where the costs were typically lower in the private sector than they were in the school construction program.

TASK 6 DEVELOP SUMMARY RECOMMENDATIONS AND PREPARE PRELIMINARY DRAFT REPORT

The preliminary information developed in Tasks 2, 3, 4, and 5 will form the basis for the development of the recommendations resulting from the study. Having identified the existing problems and possible alternatives for their solution in these four preceding tasks, the first objective of this task is to evaluate these factors as a whole and select the alternative solutions to problems identified which most appropriately satisfy the needs of the Hawaii School Construction Program. The second objective of this task is to prepare the draft of the audit report.

The specific sub-tasks to be performed are as follows:

6.1 REVIEW AND EVALUATE ALTERNATIVE SOLUTIONS

The interim reports from the previous tasks will have identified the existing organizations, functions, activities, and processes relative to the administration and operation of the Hawaii School Construction Program and the effectiveness with which they are being carried out. In addition, the problems and the tentative alternative solutions or other recommended actions will also have been identified.

In this sub-task we will concern ourselves with assessing the potential overall effects and benefits to be derived from each alternative. In addition, we will consider the problems associated with implementing those solutions which offer the greatest potential benefits, particularly on a cost-effectiveness basis.

The result of this effort will be the selection of those alternatives which have the greatest feasibility for implementation and magnitude for improvement. These will then be developed into a specific set of recommendations.

6.2 PREPARE PRELIMINARY DRAFT REPORT

The preliminary draft report will be prepared in six copies for submittal to the Legislative Auditor, with a copy of supporting work papers. The format of the report will be as follows:

- Table of Contents
- Introduction, consisting of:
  - an explanation or statement of the purpose of the report
  - a brief description of the scope of the study
  - an outline of the organization of the material in the report
- The Body, containing:
  - the laws, rules, and regulations examined
  - the facts gathered
  - the analysis performed
  - the evaluation and conclusions reached
  - recommendations
- A Summary
- An Appendix, containing additional pertinent information in tabular, chart, or narrative form

The recommendations to be included in the report will result from a comparative analysis of the alternative approaches to improving program effectiveness that were examined. These will be evaluated and presented from four basic standpoints:

- The degree to which each alternative solution will resolve the problem to which it was addressed.
- The relative or cumulative effect of each alternative solution on other aspects of the School Construction Program.

- The practicality of each approach in terms of the effort and cost required for its implementation compared to the actual benefits to be derived.

- The feasibility of each approach in terms of the existing social, political, economical, and personal attitudes relative to the School Construction Program.

Consideration will also be given in the preliminary draft report to the implementation planning requirements associated with major recommendations which might involve such things as functional realignments of responsibilities, significant methods and procedure changes, etc.

TASK 7 PREPARE FINAL REPORT

Upon approval of the preliminary report by the Legislative Auditor, or after agreement on any changes required, we will prepare and deliver 600 copies of the final report. The distribution of the report to the officials of state agencies and to other state officials shall be made by the Legislative Auditor.

The project will be considered completed upon delivery of the acceptable final report to the Legislative Auditor.

III. SCHEDULE AND COSTS

III. SCHEDULE AND COSTS

In this section, we describe the scheduling of the various tasks, the consulting level of effort, and our detailed costs for conducting the audit.

1. WORK PLAN AND STAFFING SCHEDULE

The time phasing for accomplishment of each of the seven (7) major tasks described in the preceding section is shown on Exhibit II, following this page. We are prepared to initiate the audit on or before March 1, 1971. We estimate that approximately nine and one-half (9–1/2) elapsed months will be required to complete this comprehensive audit and the resultant report.

2. FEES AND EXPENSES

Our detailed cost breakdown by task is as follows:

(1) PROFESSIONAL SERVICES

	MAN WEEKS	FEE
Task 1	4	$ 4,000
Task 2	12	12,000
Task 3	17	17,000
Task 4	43	43,000
Task 5	36	36,000
Task 6	7	7,400
Task 7	3	3,600
TOTAL PROFESSIONAL STAFF	122	$123,000

EXHIBIT II

WORK PLAN AND STAFFING SCHEDULE

TASK	TASK DESCRIPTION	1971 MAR. (1 2 3 4 5)	APRIL (6 7 8 9)	MAY (10 11 12 13)	JUNE (14 15 16 17 18)	JULY (19 20 21 22)	AUG. (23 24 25 26 27)	SEPT. (28 29 30 31)	OCT. (32 33 34 35)	NOV. (36 37 38 39)	DEC. (40 41 42 43 44)	TOTAL MAN WEEKS
1	COMPLETE PROJECT PLANNING ACTIVITIES AND FINALIZE DETAILED WORK PLAN	2 2										4
2	CONDUCT AN EXAMINATION OF THE ADMINISTRATIVE EFFECTIVENESS OF THE INDIVIDUAL AGENCY FUNCTIONS	2 2 2	2 2 1 1									12
3	CONDUCT AN EXAMINATION OF THE EFFECTIVENESS OF THE PROGRAM PLANNING PROCESS			2 3 3 2	2 2 1 1 1							17
4	CONDUCT AN EXAMINATION OF THE EFFECTIVENESS OF THE PROGRAM DESIGN PROCESS			2 2 2 2 2	3 3 3 3	3 3 3 3 3	2 2 1 1					43
5	CONDUCT AN EXAMINATION OF THE PROGRAM CONSTRUCTION AND MAINTENANCE PROCESS					2 2 2 2	2 2 2 2 2	3 3 3 3	3 3			36
6	DEVELOP SUMMARY RECOMMENDATIONS AND PREPARE PRELIMINARY REPORT								1 1 1 1	1 1 1		7
7	PREPARE FINAL REPORT										1 1 1	3
	EQUIVALENT CONSULTING MAN WEEKS	2 2 2 2 2	2 2 1 1	2 3 3 2	4 4 3 3 3	5 5 5 5	5 5 5 5 5	5 5 4 4	4 4 1 1	1 1 1	1 1 1	122

(2) EXPENSES	FEE
Transportation Costs	$ 13,000
Per Diem @ $25 per day	10,000
Report Preparation	2,000
TOTAL EXPENSES	$ 25,000

(3) TOTAL COSTS	
Fee	$123,000
Expenses	25,000
TOTAL COST	$148,000

Assuming no inordinate schedule delays nor program changes beyond our control, our maximum costs for the work described in this proposal will not exceed $148,000.

IV. PERSONNEL AND RELATED EXPERIENCE

IV. PERSONNEL AND RELATED EXPERIENCE

The project team to be assigned to this audit is extremely well qualified to provide the consulting services to perform an in-depth examination of the school construction program for the State of Hawaii. A project as encompassing as this will require a full range of management and architectural and engineering consulting staff experienced in government in general and in the design and construction of public school facilities in particular.

While it is important that the consultant firms have a wide range of experience in the school construction and management consulting fields, it is more important that the staff to be assigned to the audit have specific experience in the areas under study. In this respect, we believe our project team is uniquely qualified to perform this audit.

1. PROJECT ORGANIZATION

Exhibit III, following this page, shows the project organization structure and staffing for the various project tasks. Individual consultants at the project management and task leader level will be assigned for the duration of the study. Other consultants and technical specialists will be assigned for specific study or technical review activities as required.

2. PROJECT TEAM ASSIGNMENTS

Our project team assignments are listed below.

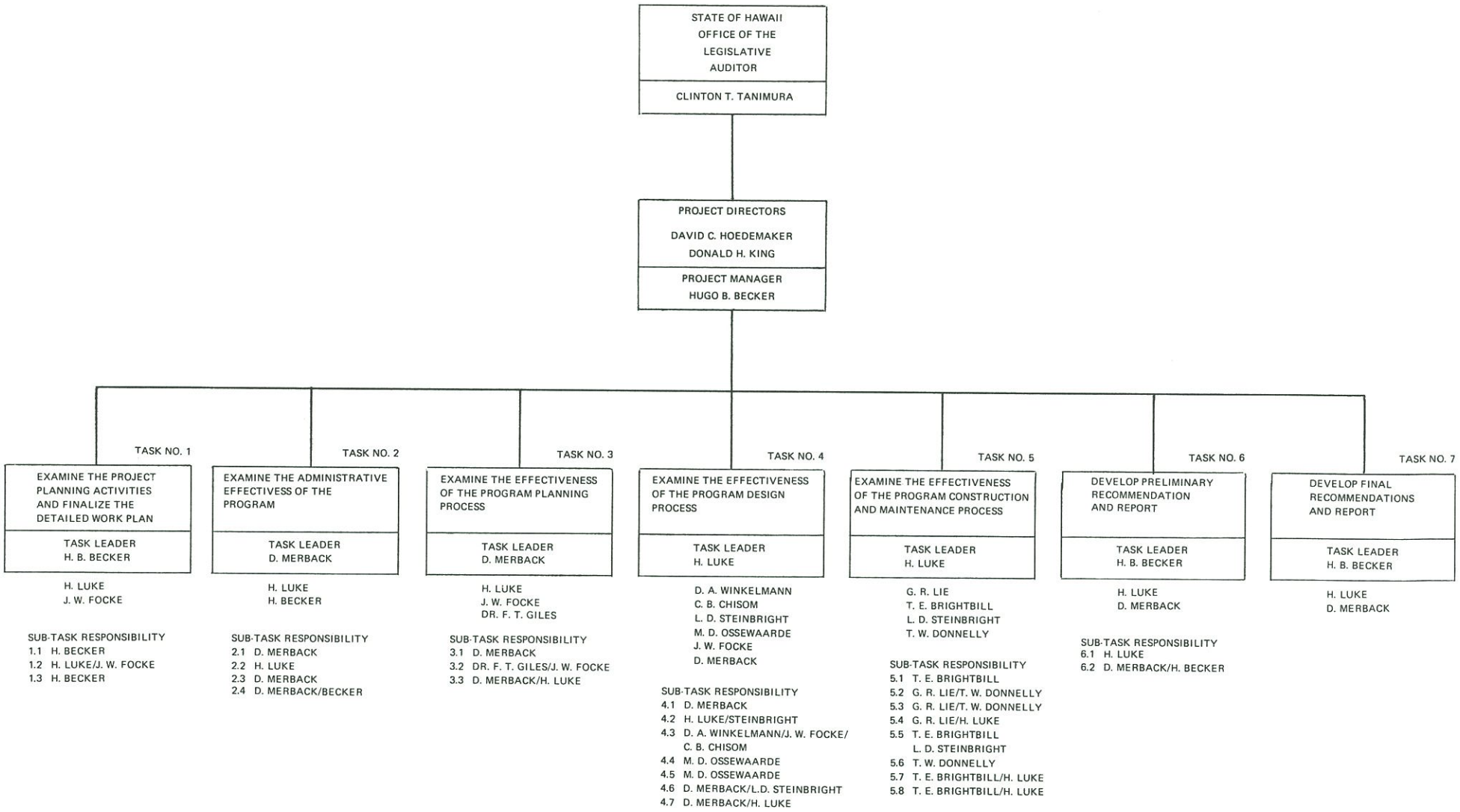
(1) PROJECT DIRECTORS

The project directors will assume overall responsibility for the administration of all phases of the project and will closely coordinate with the Legislative Auditor to assure satisfactory performance of our project team. The Project Directors will devote a minimum of twenty-five percent of their combined time to the administrative direction of this project. This dual role will be performed by:

DAVID C. HOEDEMAKER, A.I.A.

Partner in the Seattle Office of Naramore Bain Brady & Johanson responsible for educational facilities design. Bachelor of Arts, 1955, Stanford University; Bachelor of Architecture, 1960, University of Washington; M.A. in Architecture, 1962, Yale University. High Scholarship Award, 1955; Tau Sigma Delta, Architectural Honorary, 1958; U.W. College of Architecture Travelling Scholarship, 1960; High Scholarship Award, 1960; A.I.A. Award, Henry Adams Fund, 1960; Lecturer, U.W. College of Architecture and Urban Planning. Past design work includes numerous educational facilities as well as research centers, condominiums, and large scale site planning.

EXHIBIT III
PROJECT ORGANIZATION CHART



DONALD H. KING

Partner-in-charge of Arthur Young & Company's regional governmental consulting practice headquartered in Sacramento. Graduate of Holy Cross College — B. S. Degree (Math major). Registered Professional Engineer in the State of California. Mr. King is the Firm's specialist in the State and local government consulting field. Related State project management assignments include:

- Development and implementation of EDP system for control of construction and development costs, design of property accounting system and preparation of related procedural manuals, and performance of organization and management administrative studies for the San Francisco Bay Area Rapid Transit District's billion dollar transit system.

- Guidance, suggestion, advice, and training in the techniques and approaches to studies, experiments, and systems development work related to the implementation of a Management Improvement and Cost Reduction (MICP) program for the Department of Human Resources Development.

- Preparation of Annual Highway Safety Work Program for California.

- Assistance in the review and evaluation of the Interim EDP Master Plan for California.

- Development of internal and external specifications for data processing standards and procedures for the California Department of Education.

- Conduct of a cost/benefit analysis on a manual versus automated Catalog and Processing Center for the California State Library.

- Performance of a study to provide work standards and planning values for allocating manpower in the engineering design functions of the California Division of Highways.

- Systems design and computer programming to automate the Teacher Credentialling System for California.

- Development of a computer-generated management cost reporting system for the Division of Highways.

- Design Cost Reporting/Data Collection System for Local Community Mental Health Services.

- Analysis, design, and installation of the Sacramento Medical Center integrated accounting system.

- System design, programming, and implementation of Statewide Milk Pooling System.

Past experience includes seven years as a division manager for a major aerospace firm and as a senior management consultant (Booz, Allen, and Hamilton).

(2) **PROJECT MANAGER**

In order to carry out this important and challenging engagement, the direct supervision of the project will be assigned to the project manager. He will closely coordinate with the project directors in carrying out the project management functions of: (1) the definition of specific goals and objectives for each project task, (2) the planning and organization of project assignments, and (3) direct participation in task execution as necessary. This role will be performed by:

HUGO B. BECKER

Principal, Sacramento Office of Arthur Young & Company. Graduate of the University of California – B.S. Degree in Business Administration. Registered Professional Industrial Engineer in California. Seventeen years of experience in organization planning, systems analysis, and industrial engineering. Examples of prior related project management assignments include:

- Management and organization study of the construction management of the billion dollar San Francisco Bay Area Rapid Transit District (BART) Project.

- Preparation of the Annual Highway Safety Work Program for California.

- Development of a Statewide Integrated Traffic Records System for California.

- Systems design, programming and implementation of a statewide Milk Pooling System for California.

- Conduct of a nationwide survey for the improvement of public assistance administration for the U.S. Department of HEW.

Mr. Becker has been involved in a number of other consulting engagements for both government and industry. These include work in the fields of public transportation, construction, education, food processing, and aerospace.

(3) PROJECT TASK LEADERS

In addition to Mr. Becker, other task leaders will be assigned to the project. Task leaders will average eighty percent of their time in carrying out the tasks to which they have been assigned.

W. DENNIS MERBACK

Managing Associate, Sacramento Office. Graduate of the University of Utah with a B.S. Degree in Electrical Engineering and has completed studies at the University of California at Los Angeles toward a Masters in Business Administration. Nine years experience in management consulting, industrial engineering, cost analysis, and project management. Examples of prior related consulting experience include:

- Development of a plan to construct a new manufacturing plant, including scheduling and monitoring of the move from an existing facility.

- Installation of method improvement and work measurement programs for the California Division of Highways, First National Bank of Minneapolis, and Rand McNally & Company.

- Development of industrial engineering and economic data of the automotive industry product development cycle for the National Highway Safety Bureau of the Federal Highway Administration to provide a framework for introduction and evaluation of motor vehicle safety standards.

- Installation of an integrated cost accounting system including hourly machine rates, work order costing, and financial reporting.

Mr. Merback has been involved as a senior consultant in numerous other consulting assignments which have encompassed detailed evaluations of operating and control systems, organization studies, cost analysis and cost accounting, and EDP systems development. These assignments have been in the fields of government, manufacturing, food processing, warehousing, and retailing.

Prior to joining Arthur Young & Company, Mr. Merback was an industrial engineer with Litton Industries and Eldon Industries.

HERBERT K.C. LUKE

Partner-in-charge of the Honolulu Office of Naramore Bain Brady & Johanson. Bachelor of Architecture, 1955, University of Michigan. Registered Architect, Hawaii. Member of American Institute of Architects —— President of the Hawaii Chapter, 1969. Past experience as Principal Architect, Luke, Miyamoto & Associates, Inc., Honolulu, Hawaii; Chief Architect, Building Department, City and County of Honolulu; Architect, McAuliffe, Young & Associates, Honolulu, Hawaii. Mr. Luke has a wide range of experience in programming, conceptual design, design, construction management, and contract administration in the Hawaiian environment. A representative list of projects follows:

- Kona Civic Center Master Plan, Kona, Hawaii
- Housing for the Elderly, HA 1-36 (150 Units), Honolulu, Hawaii
- Kalani High School Classroom Building, Honolulu, Hawaii
- United States Naval Facility, Midway Island
- Ewa District Court, Honolulu, Hawaii
- Washington Intermediate School Classroom Building, Honolulu, Hawaii
- Hawaii Technical School Electricity/Electronics Building and Classroom, Hilo, Hawaii
- Kaala Elementary School Classroom Building, Kaala, Hawaii
- Kailua Elementary School Classroom Building, Kailua, Hawaii

(4) PROJECT STAFF

In addition to the individuals assigned to the Project Management team, the following professional staff will work on specific tasks as required. Time allocation percentages will be predicated on need. These staff members include:

DONALD A. WINKELMANN, A.I.A.

Mr. Winkelmann has been a partner in the firm of Naramore Bain Brady & Johanson since 1969 and a project designer and associate since 1961. He received a Bachelor of Architecture Degree from the University of Washington in 1955 and a Master of Architecture Degree from Yale University in 1959. He is a corporate member of the Seattle Chapter of the American Institute of Architects and a member of Tau Sigma Delta, Architecture Honorary. Mr. Winkelmann is a Registered Architect in the State of Washington. Projects for which he has been project designer include the Seattle– First National Bank Building, College Club of Seattle, Pacific Northwest Bell Telephone Building, University of Washington Cancer–Primate and Biological Research Buildings, The Financial Center, and Cordiner Hall at Whitman College. Mr. Winkelmann is presently conducting a design process analysis within the firm of Naramore Bain Brady & Johanson.

MICHAEL D. OSSEWAARDE, A.I.A.

Mr. Ossewaarde is Senior Associate and Chief of Plan Production for the Seattle office of Naramore Bain Brady & Johanson. He received a Bachelor of Architecture from the University of Washington in 1951 and is a Registered Architect in the State of Washington. Mr. Ossewaarde is a corporate member of the Seattle Chapter of the American Institute of Architects and a member of Tau Sigma Delta honorary society. His professional experience as a project architect includes Northeast Junior High School, Cherry Crest Elementary School, Three-Points Elementary School, Sunset Elementary School, Chinook Junior High, Lake Hills Elementary, Olympia High School, Lincoln High School Additions, Sealth High School, Wenatchee Junior High, and Wenatchee Junior College.

THOMAS E. BRIGHTBILL

Associate, Sacramento Office of Arthur Young & Company, Mr. Brightbill is a graduate of the Case Institute of Technology with a B.S. in Chemistry and a minor in Management Science. He has an M.B.A. from Western Reserve University with concentration in the area of statistics. Mr. Brightbill has over seven years of experience in management systems analysis, operations research, and data processing in both industry and government. Prior experience pertinent to this project includes:

- Participated in analysis of space needs, material handling requirements, and processing functions of a Federal Reserve Bank. The study resulted in the development of new processing and space use concepts.

- Project Manager on a nine month study of the information system needs of the Kentucky Department of Highways. The study included a survey of the requirements of all organizational units and programs in the

Department, a definition of the total information system needs, and the development of a comprehensive action plan.

- Participated on a national study for the Department of Transportation of driver licensing and motor vehicle registration system being utilized by the states.

- Participated in the development of the Statewide Integrated Traffic Records System for California.

- Participated in the statewide systems analysis, systems design conceptualization, and implementation planning for the Cost Reporting/Data Collection System for Local Community Mental Health Services for California.

- Participated in systems analysis and problem definition studies on separate engagements in vehicle registration and EDP for Maricopa County, Arizona, and Napa, California.

- Involved in a number of market research studies of data communication needs and alternative approaches or identifying these needs between metropolitan areas.

Prior work experience with the Cleveland Electric Illuminating Company performing economic feasibility studies of EDP systems, development and implementation of computer based systems, and supervision of a computer/unit record operating group. Past consulting experience with Spindletop Research, Incorporated as a project leader or team member on both commercial and governmental operations research and systems analysis studies.

T. WARREN DONNELLY

Mr. Donnelly is Chief of Manpower and Production Cost Control for Naramore Bain Brady & Johanson's Seattle office. He has attended the University of Puget Sound, University of Washington, and University of California at Los Angeles, and the Harbridge House Management Seminar and Boeing Executive Management Training Course. Until he joined Naramore Bain Brady & Johanson in 1969, Mr. Donnelly was a Project Administrator in the Cost Management section of Division Finance for the Boeing Company's Engineering Operations Analysis Unit. His duties included administrative and technical responsibility for study teams involved in establishing work measurement based indices for improving the quality of information available to management for the effective deployment of people, time and talent; investigation, evaluation, justification, and implementation of new or improved methods of operating all departments within the Boeing Company; and improving work flow as well as equipment evaluation.

GUNNAR R. LIE, A.I.A.

Mr. Lie is Director of Construction Management with the firm of Naramore Bain Brady & Johanson, Seattle office. He attended the University of Minnesota and received a B.A. degree in 1939. Mr. Lie is a registered architect in the State of Washington (1947) and is an associate member of the Seattle Chapter of the American Institute of Architects. His professional experience record includes:

- Job Captain
  - U.S. Army, Corps of Engineers – Permanent Guardhouse at Fort Lewis, SAGE Facility at Pendleton, Oregon, Missile Master Facility at Fort Lawton
  - Air Force – Barracks and Mess Facilities at Great Falls and Glasgow, Montana Air Force Bases
  - Office Building for Crown Zellerback, Port Townsend, Washington
- Field Supervisor
  - Educational facilities, commercial, medical, research, industrial, residential, and recreational buildings.

CHARLES B. CHISOM, A.I.A.

Mr. Chisom is an associate and project architect in the Seattle office of Naramore Bain Brady & Johanson. He received a Bachelor of Architecture Degree from the University of Washington in 1963 and a Master of Architecture Degree from Columbia University in 1964. Mr. Chisom has been designer and project architect on numerous projects, including a variety of educational facilities. He is the recipient of the 1970 Naramore Foundation Grant, researching the applicability of systems methodology to school facilities. Mr. Chisom is also a member of a Washington State committee investigating ways by which the total cost of state schools can be reduced. He is currently President of the University of Washington Architectural Alumni and a member of the American Institute of Architects.

L. DIXON STEINBRIGHT

Mr. Steinbright is a project architect in the Honolulu office of Naramore Bain Brady & Johanson. He received his Bachelor of Architecture Degree from the University of Washington in 1962 and is a registered architect in the States of Hawaii and Washington. Mr. Steinbright was the recipient of a Chicago Department of Planning Applied

Study Grant in 1960 and participated in the University of Washington Community College Conference in 1967. His architectural experience includes a high school, an elementary school, community college facilities, a library, and various commercial buildings. Mr. Steinbright was a member of the team successful in winning the Honolulu Municipal Office Building competition.

JOHN WILLIAM FOCKE

Mr. Focke is an associate with the architectural firm of Caudill, Rowlett & Scott in Houston, Texas. He received a Bachelor of Science in Architecture from Texas A & M in 1965 and a Master of Architecture from Massachusetts Institute of Technology in 1968. Mr. Focke is co-author of the **Report on Fast Track to the New York State Construction Fund** and **Problem Seeking: Two Directions in Architectural Programming.** Currently Mr. Focke is involved in the reorganization of Caudill, Rowlett & Scott's Houston operation, coordinating new computer applications in that organization, and is involved in in-office research on building systems as a construction systems specialist.

DR. FREDERIC T. GILES

Dr. Frederic T. Giles, Dean of the College of Education at the University of Washington since November, 1967, joined the faculty in 1961 as Professor of Education and Coordinator of College Relations. From 1965, he also served as Director of the Center for the Development of Community College Education at the University.

In July, 1967, Dr. Giles accepted the position of Acting Dean of the College of Education which he held until his appointment to the deanship. He was President of Everett Junior College from 1953 to 1961.

For three years, he was a board member of the American Association of Junior Colleges, which represents more than 870 junior colleges across the nation. He has also held administrative and legislative positions with the Association and is currently national chairman of the Council of Universities and Colleges of the Association.

Dean Giles is past secretary of the Washington College Association, and is a past president of the Washington Education Association and the Northwest Association of Junior Colleges.

He has served as a consultant for school systems both locally and nationally and took an active part in the planning that resulted in the authorization of the State's new four-year college. He has published several articles on various aspects of education in state and national journals.

A native of Sprague, Washington, Dean Giles was graduated from Eastern Washington State College in 1939. He received his Master of Arts degree in 1946 and Doctorate in Education in 1961, both from Washington State University.

After several years of high school teaching in Albion, Pullman and Kelso, he became assistant superintendent of the Sunnyside school system. In 1949 he was appointed Director of Personnel Services at Everett Junior College and in 1953 became President.

3. PROJECT RELATIONSHIPS

This project is being undertaken as a joint venture between the firms of Naramore Bain Brady & Johanson and Arthur Young & Company. Special consulting services are provided to this joint venture by the architectural firm of Caudill, Rowlett & Scott in Houston, Texas. While Mr. J. W. Focke will be the primary representative of the Caudill, Rowlett & Scott team on this project, other members of the organization will participate as deemed appropriate. In addition, Dr. Frederic T. Giles, Dean of the College of Education of the University of Washington will provide consulting services in the education field.

The examination of the activities of the Hawaii school construction program will take place in the Honolulu office of Naramore Bain Brady & Johanson at 1210 Auahi Street, Suite 223.

As shown on the project organization chart, Exhibit III, we have integrated the project team personnel into a single, dynamic organization that effectively blends the personnel skills of the two joint venture firms and special consultants under a single project management structure.

4. FIRM INFORMATION AND RELATED EXPERIENCE

This section presents background and other specific information on the firms as requested in your request for proposal.

(1) NARAMORE BAIN BRADY & JOHANSON

BACKGROUND

Naramore Bain Brady & Johanson was established as a firm in 1943 by individuals having a wide range of experience in larger projects of all types. Since that time the firm has continued to offer a comprehensive architectural and planning service of integrity and excellence.

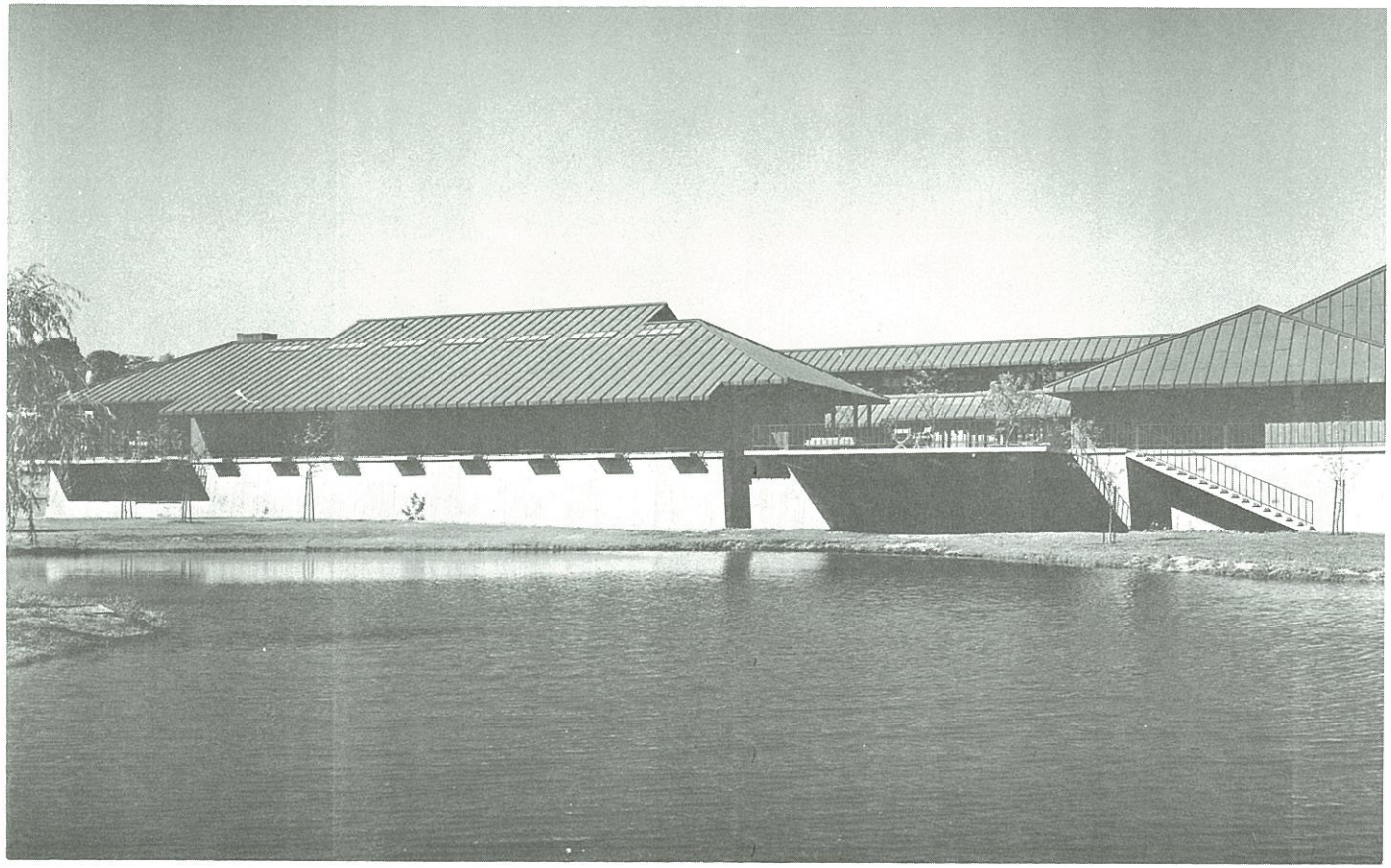
The firm has won numerous awards, including first place in the Honolulu Municipal Office Building Competition, first place in the national competition for the design of the Pacific War Memorial on Corregidor Island, and two out of the twelve national design awards in the 15th Annual Progressive Architecture Design Awards Competition; both in the educational facilities field.

Naramore Bain Brady & Johanson's services include programming, planning, design, cost estimating, working drawings, specifications, construction management, interior and graphic design, and electrical engineering.

The firm employs approximately 180 personnel of which 140 are professional staff.

Naramore Bain Brady & Johanson has a permanent office in Honolulu to handle projects in Hawaii and the South Pacific. This office maintains close coordination with Seattle for information and support, yet is located where it can provide most effective service for Pacific area work.

RELATED EXPERIENCE

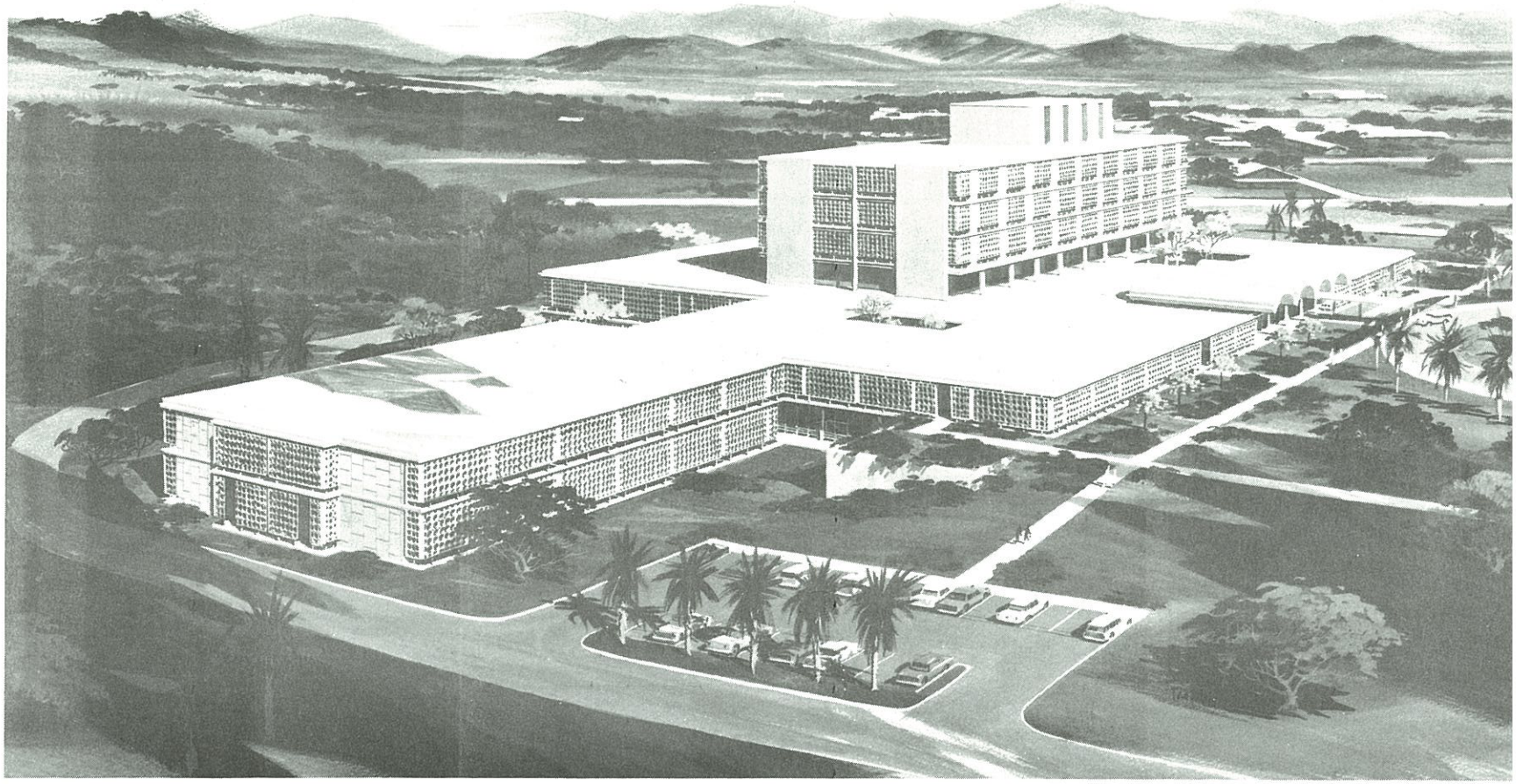


BATTELLE MEMORIAL INSTITUTE – SEATTLE RESEARCH CENTER
Seattle, Washington

Designed to accommodate the occupational as well as domestic demands of internationally known scholars and scientists, the offices, seminar rooms, auditorium, and apartments are sited within a tranquil environment conducive to thinking. The Research Center is the recipient of a 1968 Award of Merit from the Seattle Chapter American Institute of Architects and a 1969 Honor Award from the Northwest Region American Institute of Architects.

IBM BUILDING
Seattle, Washington

This 20-story building is designed to provide maximum flexibility for multiple tenant use. A major factor in achieving this was an unusual structural system placing small steel columns within each of the precast concrete fins on the exterior of the building, thereby eliminating large structural columns which could reduce rentable area and limit flexibility. Supplemental space at and below the plaza level provides for specialized requirements of the major tenant. Consideration has been given to the urban design impact on the area by including plazas, a fountain, and landscaping at the pedestrian level. This building is the winner of the Construction Award of Merit from the Seattle Northwest Chapter, Inc. of Associated General Contractors at the 50th Anniversary Program, and the 1965 Design in Steel Award from the American Iron and Steel Institute. (Naramore, Bain, Brady & Johanson—Minoru Yamasaki and Associates, Associated Architects.)



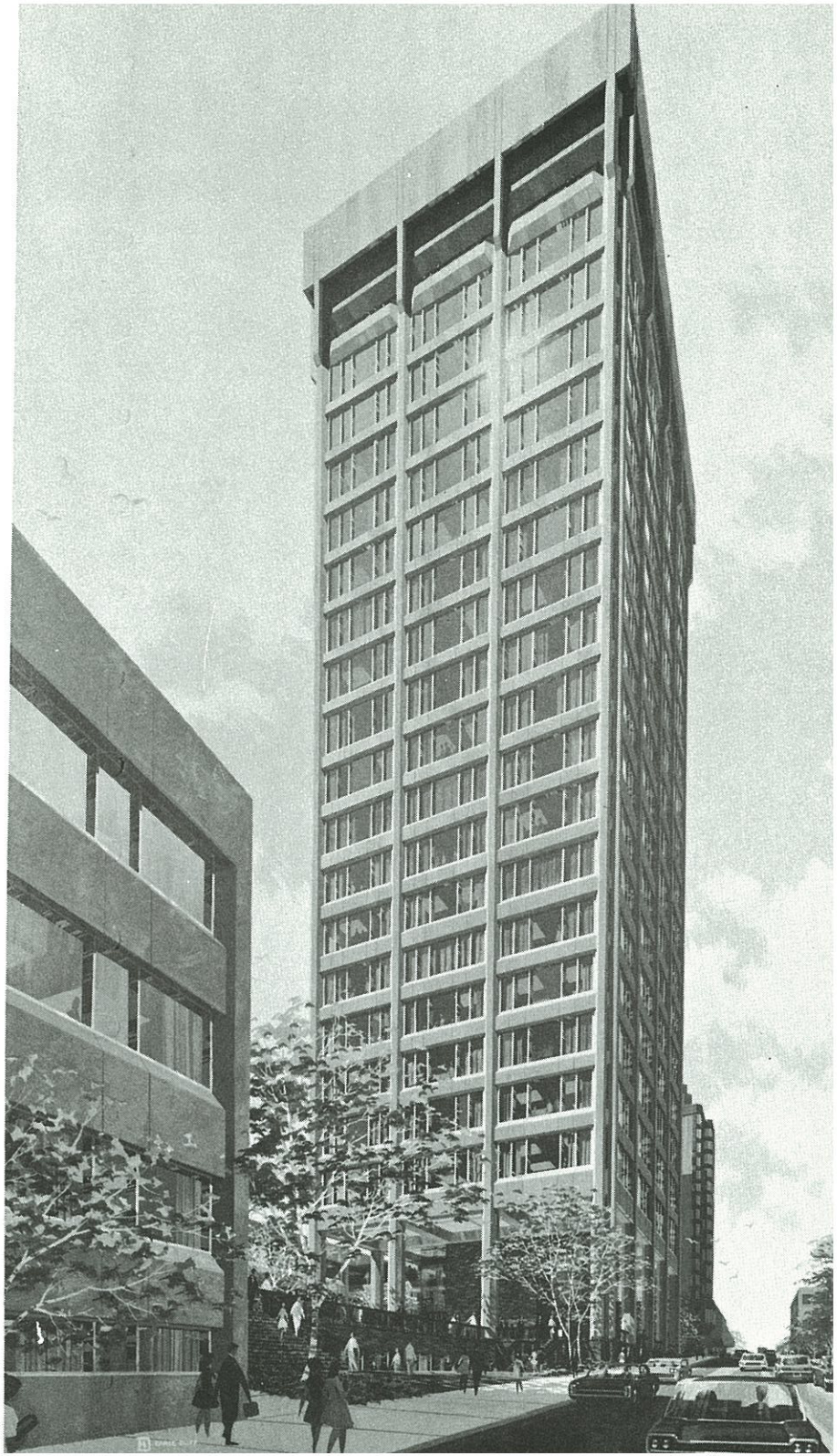
CLARK AIR BASE HOSPITAL
Philippine Islands

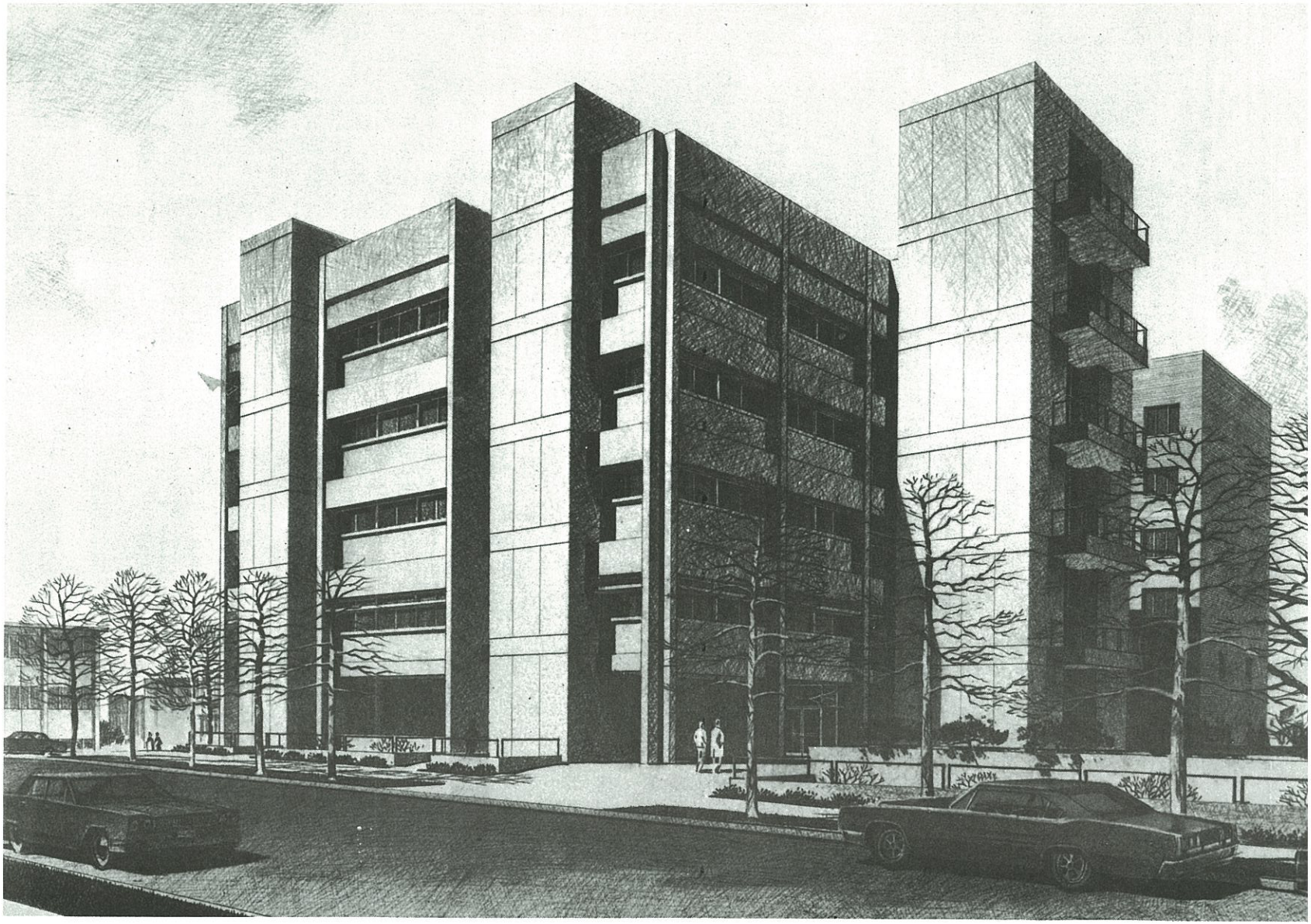
This project consists of a major addition of patient beds to an existing hospital facility and alterations to most of the outpatient facilities to accommodate an unforeseen patient load generated by the war in Vietnam.

THE FINANCIAL CENTER
Seattle, Washington

This 30-story structure is designed as a key element in the comprehensive plan of the University Tract to separate the pedestrian and automobile in the heart of the commercial district. A pedestrian bridge joins the second floor plaza to the Olympic Hotel and the Northern Life Tower.

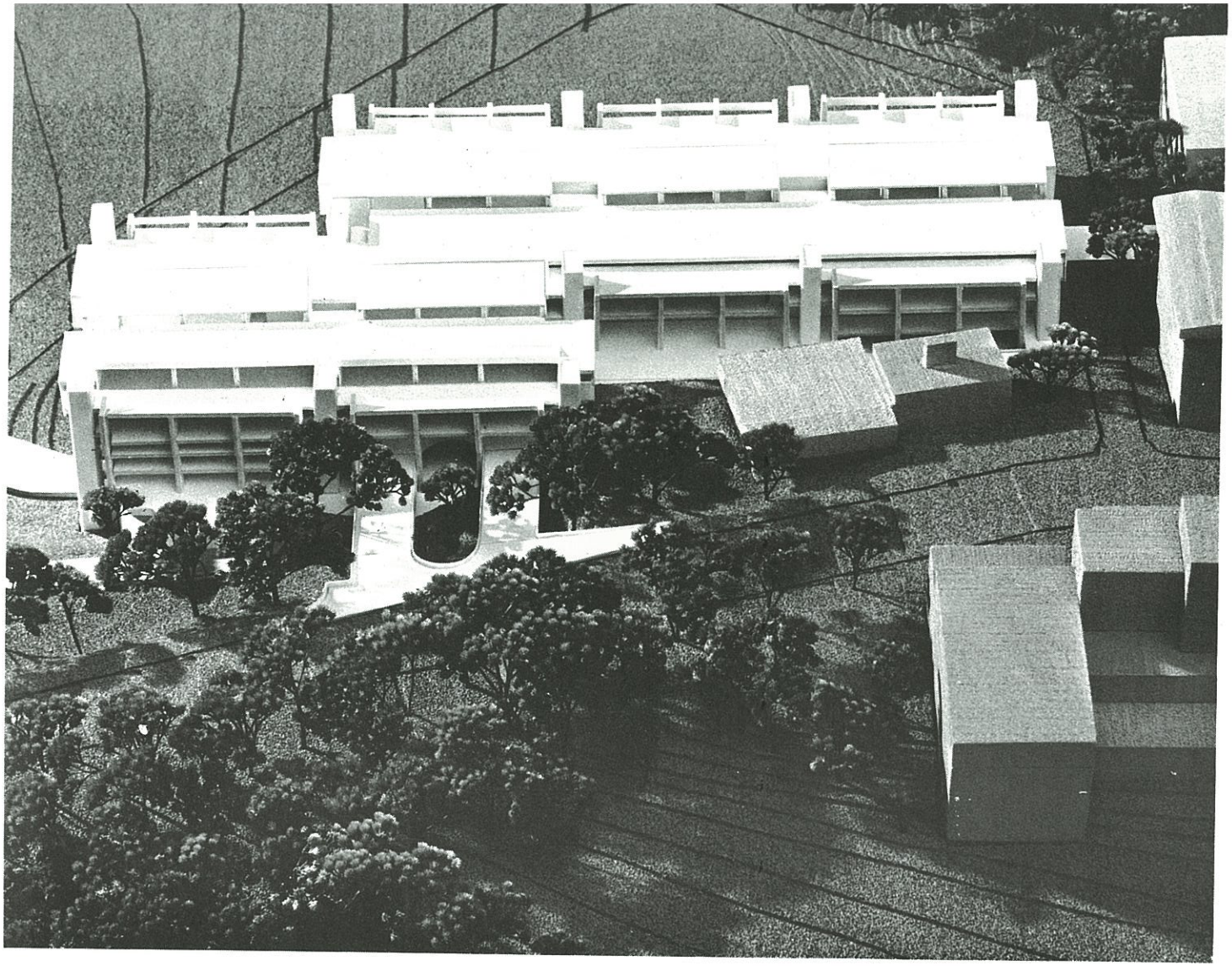
The building is of monolithic reinforced concrete with precast stone windowsills and solar bronze glazing. Granite facing will be used from the rustic terrazzo sidewalk line to the first floor windowsill. The entry court is landscaped and will have a major sculpture as a focal point.





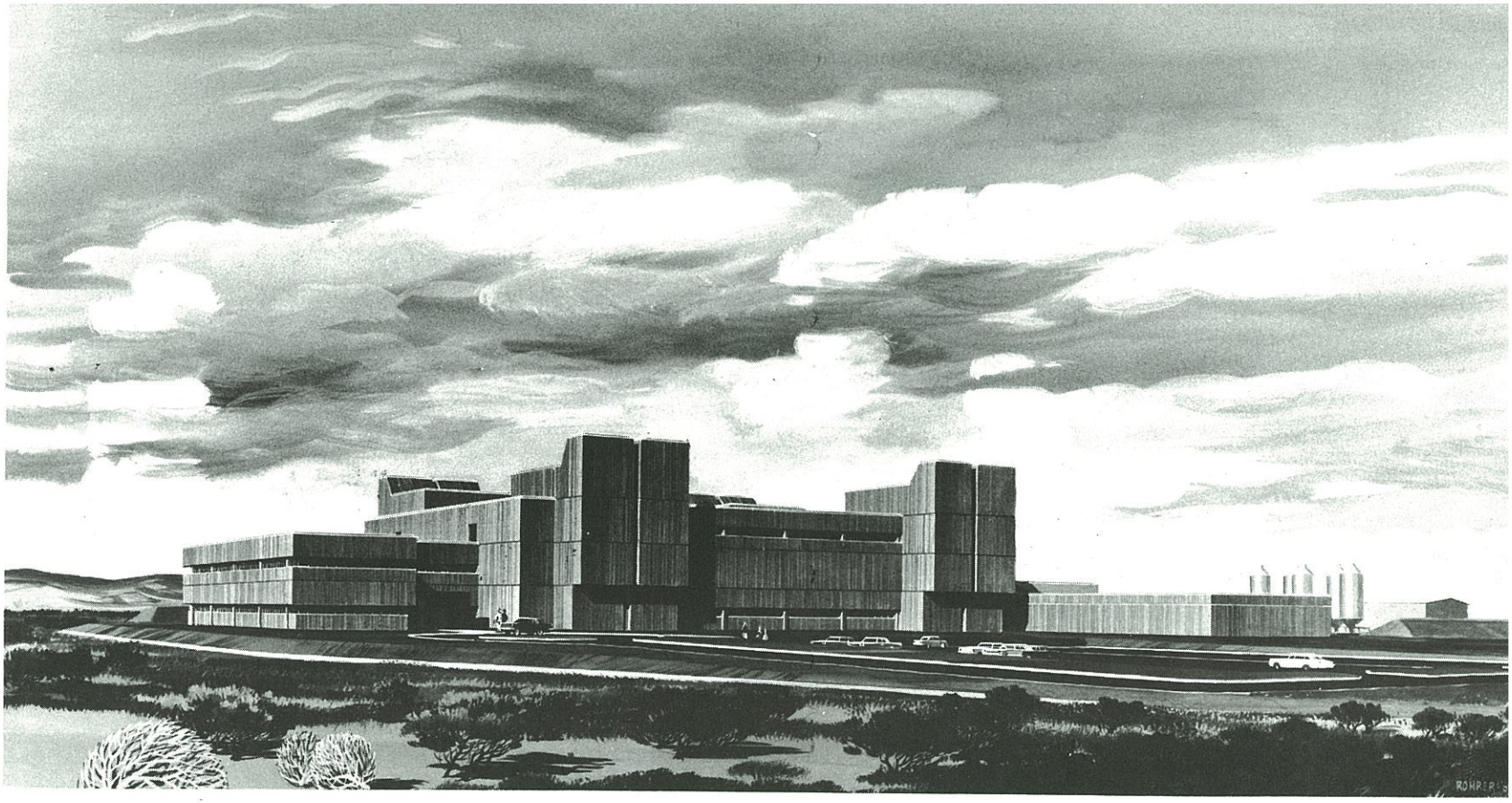
FRED HUTCHINSON CANCER CENTER
Seattle, Washington

Connected by underground tunnels to the Swedish Hospital, this proposed facility provides both laboratory and clinical research facilities including a 20-patient clinical research nursing care floor. The building is programmed for expansion to four times the size shown in the rendering.



DESIGN DISCIPLINES BUILDING
Washington State University
Pullman, Washington

Designed to bring together the disciplines of Architecture, Fine Arts, Landscape Architecture, Interior Design and Industrial Design, the building is conceived as a series of flexible and linear loft spaces separated and served by high top-lighted pedestrian streets. The structure takes advantage of its sloping site by placing the multi-level parking garage under the building. Materials consist of indigenous brick and exposed concrete. Mechanical ducts are exposed wherever possible so the building itself can serve as a teaching aid. The building recently won a national design award in the 15th Annual Design Awards Competition sponsored by Progressive Architecture magazine.



ATOMIC ENERGY COMMISSION – BIOLOGY LABORATORY

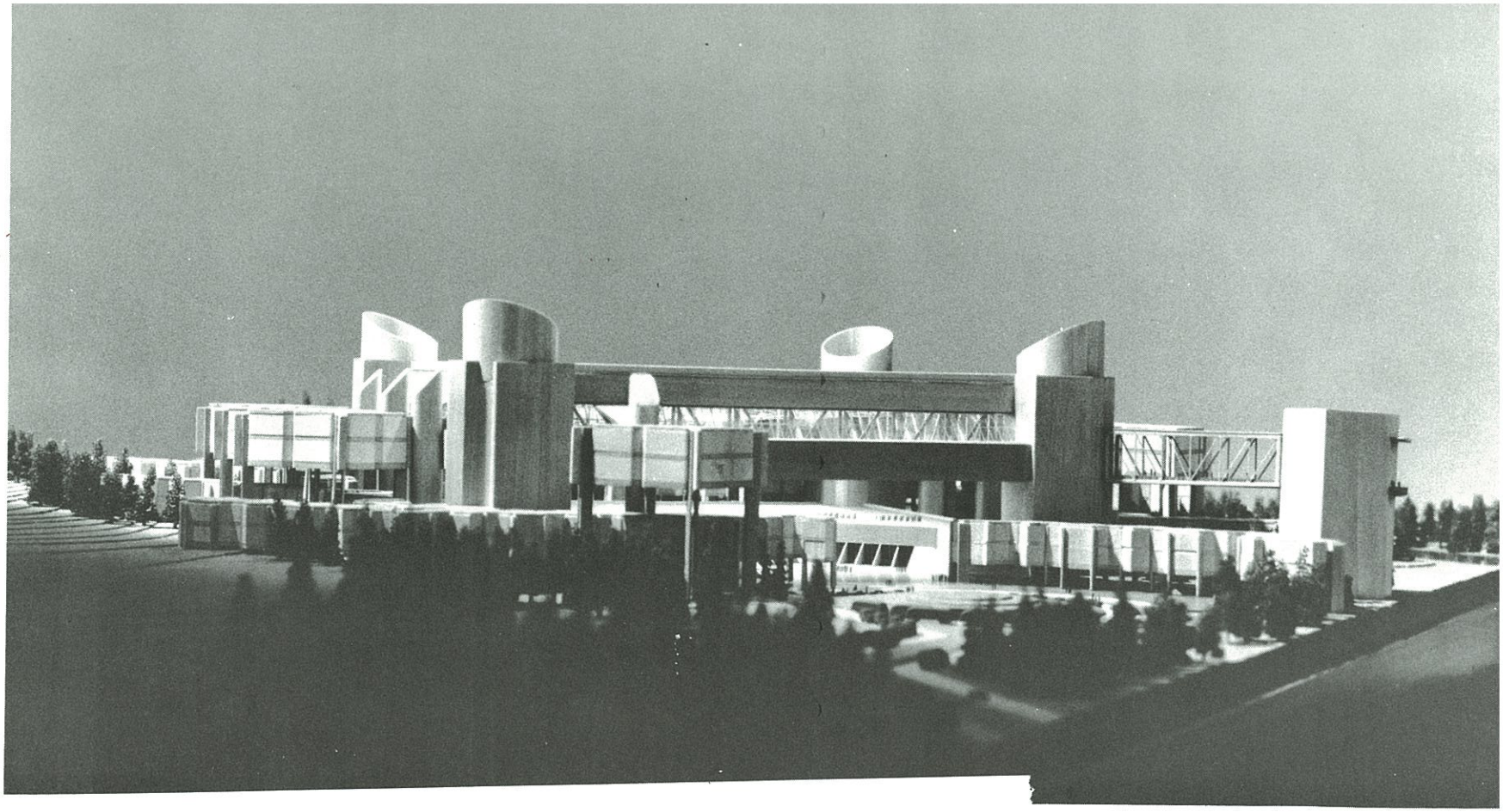
Richland, Washington

Designed for maximum flexibility for changing developments in research, the building is constructed of reinforced concrete with an exposed textured concrete exterior. Its mechanical systems are concentrated at mid-level to permit ease of operation and allow services to feed directly up or down to each laboratory with a minimum of disturbance.

BATTELLE MEMORIAL INSTITUTE – NORTHWEST RESEARCH CENTER
Richland, Washington

In planning the $6.3 million first phase of this industrial research complex, high priority was placed on the environmental quality of staff areas. The inner courtyards and a major reflecting pool form an oasis-like counterpoint to the highly functional research areas. The first phase of construction provided for research operations, mathematics and physical science buildings; the second phase consists of additions to the research operations and physical science facilities.

This project was designated Laboratory of the Year in a 1968 national competition sponsored by ***Industrial Research*** magazine. The complex was cited for "clearly demonstrating that it is possible to have a highly functional laboratory with aesthetic design."



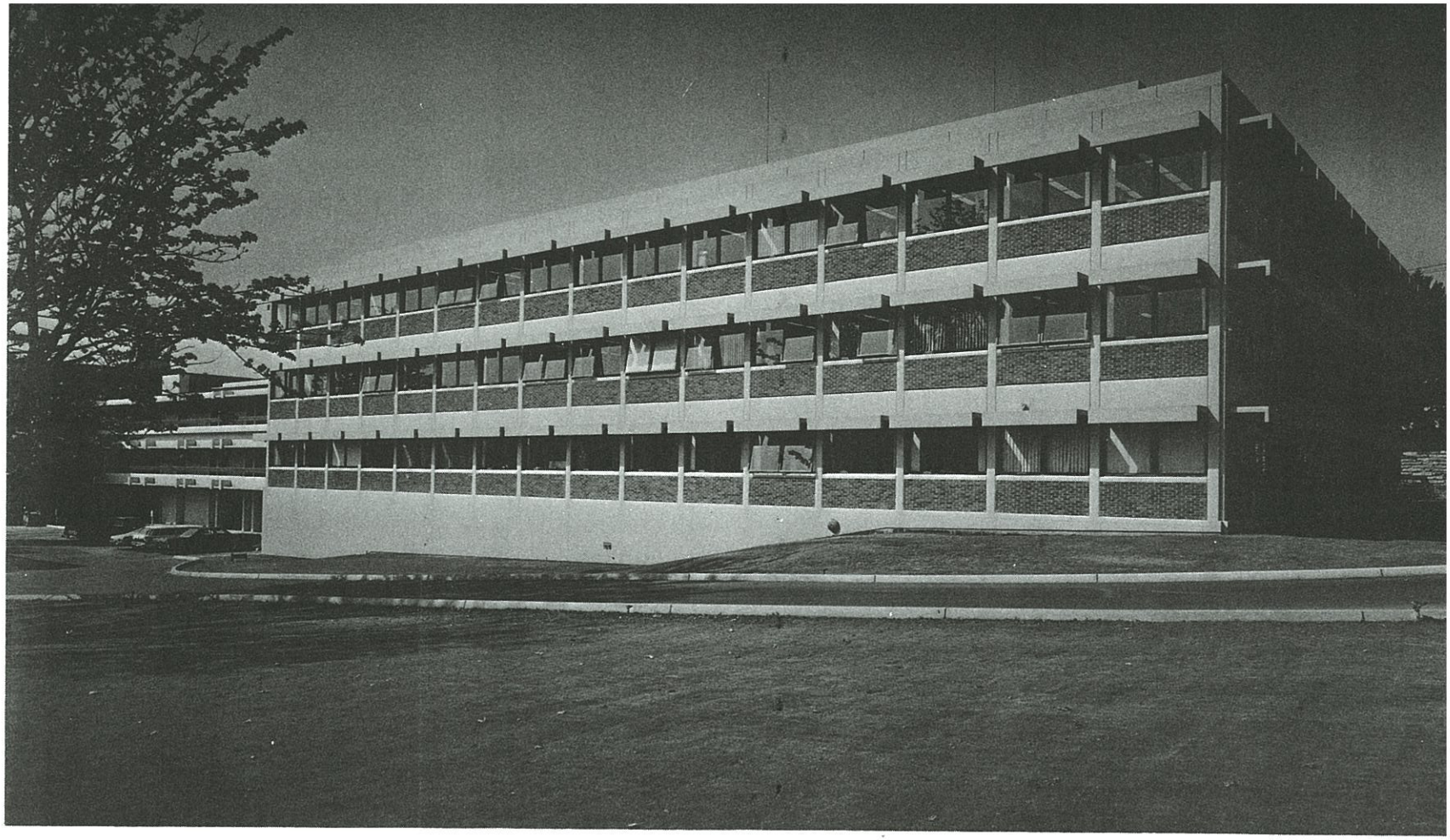
A MILITARY ACADEMY
Olympic Peninsula, Washington

As part of its Design Innovations Program, the Weyerhaeuser Company commissioned NBB&J to design a major military academy primarily of wood.

The proposed structure is heroic in scale. An elevated ring of circulation corridors surrounds a covered central drill area 500 feet square. This pedestrian concourse provides support for the roof, as well as access to all cadet quarters and academic areas. Laminated wood beams and steel tension cables form a giant diagrid roof truss. Glazed openings in the roof allow natural light to penetrate the drill area, while the mountain backdrop and nearby ocean coastline form the academy's suitably spartan setting.

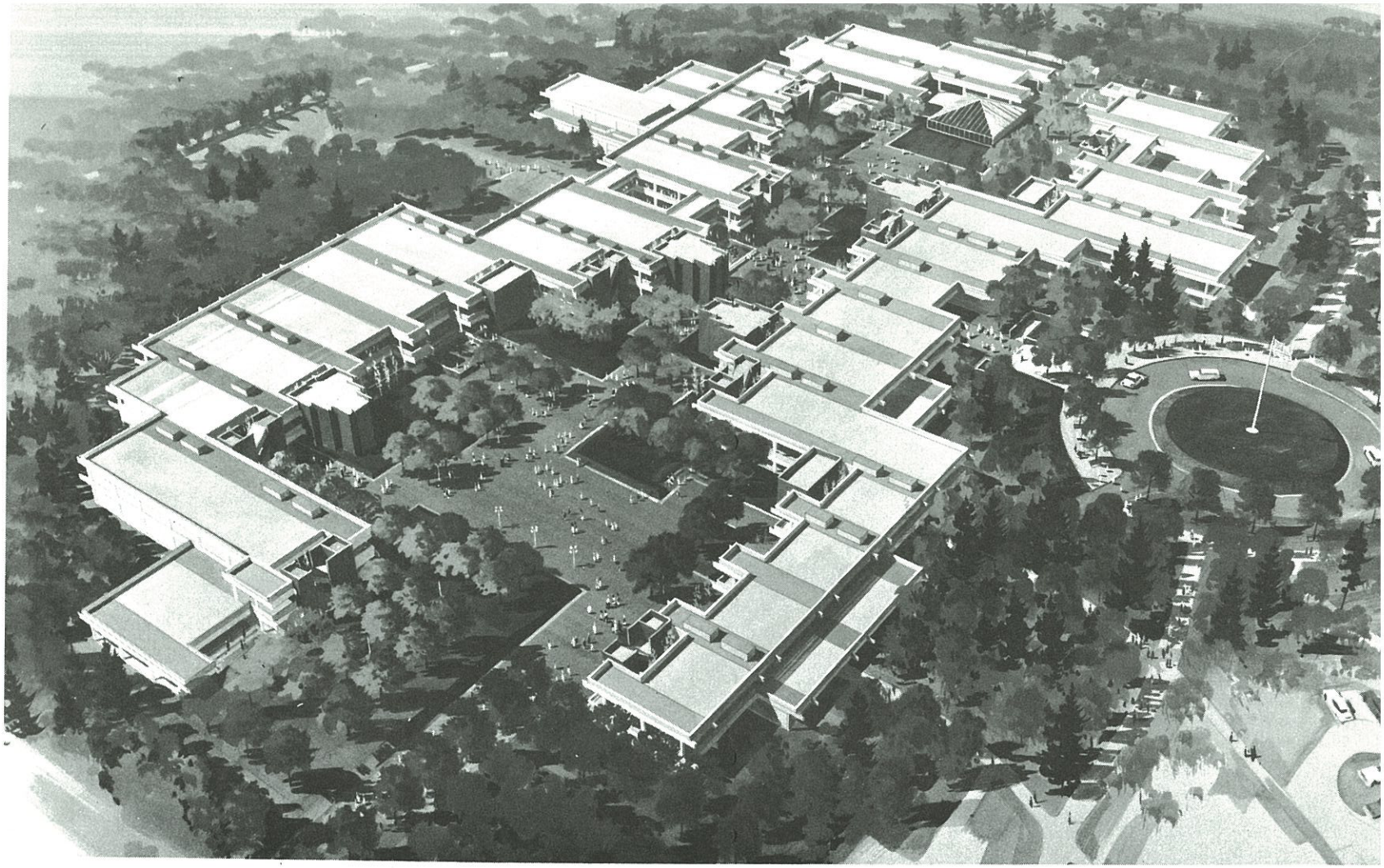
FEDERAL SCIENCE PAVILION
Seattle, Washington

Six buildings of various heights and shapes, to house innumerable scientific exhibits, made up the United States participation in Seattle Century 21 Exposition, sanctioned as a World's Fair. The towers pictured above which mark the entrance to the complex became symbolic of the space-age theme of the Fair. From the upper platforms the viewer is treated to a delightful play of light and sound in the fountains and pools which make up most of the interior court. The buildings are framed with modular, precast concrete roof and load-bearing wall members, obtaining clear spans for the exhibit spaces. Wall units are integrally faced with white quartz aggregate. Significantly, after serving the fair, these buildings have remained as the home of the Pacific Science Center providing a broad spectrum of scientific interests for the community. The Federal Science Pavilion is the winner of a Design in Steel Award from the American Iron and Steel Institute, 1965, an Award of Merit from the Prestressed Concrete Institute and a Seattle Chapter AIA Honor Award. (Minoru Yamasaki and Associates—Naramore, Bain, Brady & Johanson, Associated Architects.)



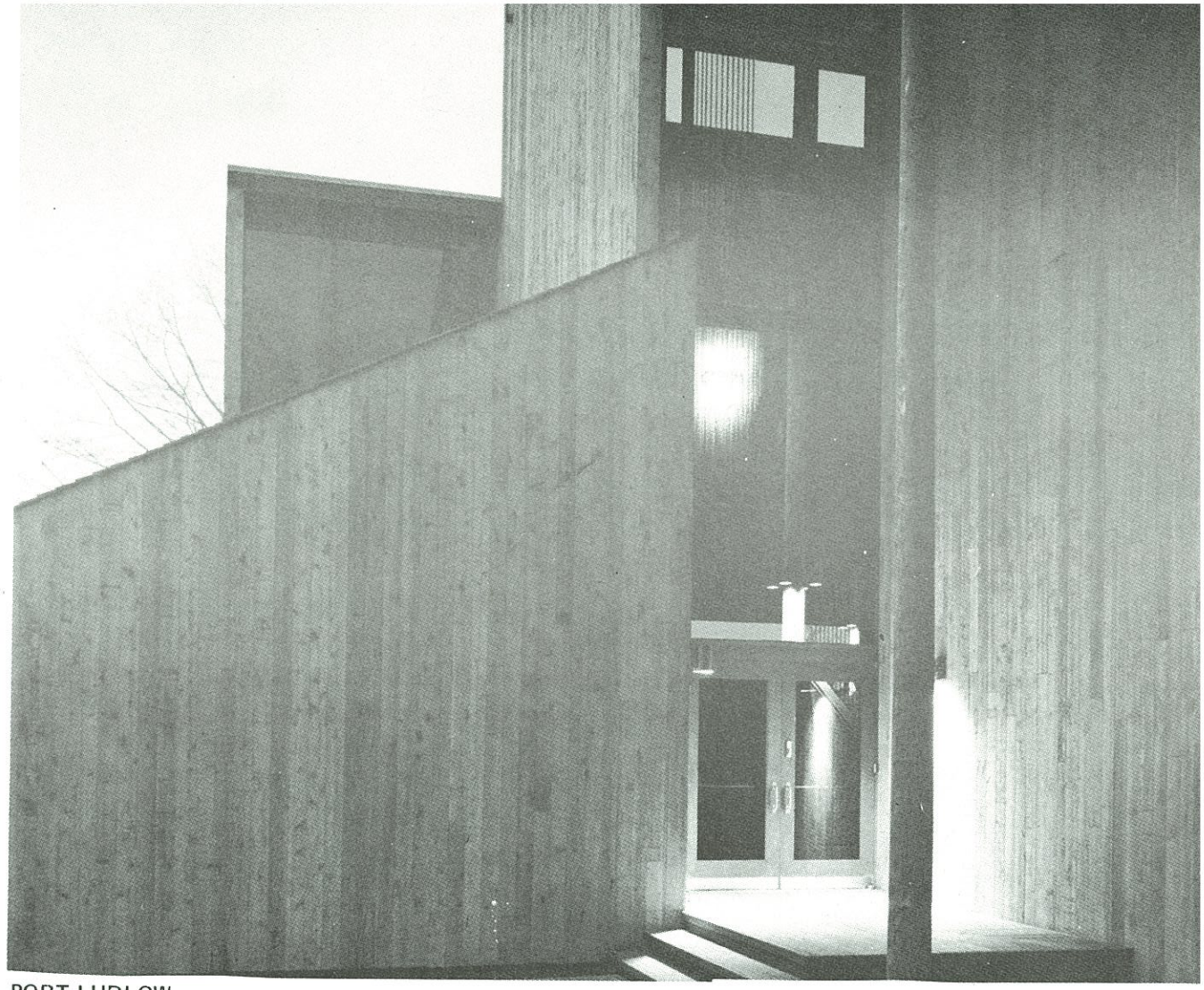
U. S. BUREAU OF COMMERCIAL FISHERIES
Seattle, Washington

Flexible laboratory working space with efficient distribution of services is provided in this major two part addition to an existing research laboratory. The entrance, auditorium, and library are contained in the central building which form a connecting link with the older existing structure.

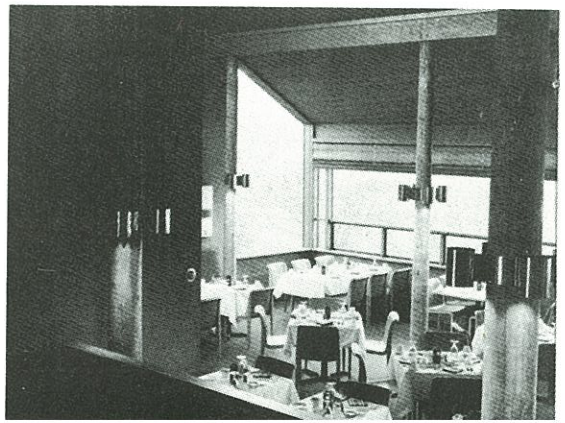


BELLEVUE COMMUNITY COLLEGE
Bellevue, Washington

Conceived in the same spirit of investigation that has characterized recent two-year college development, Bellevue Community College makes a new and significant contribution to the problems of growth and flexibility. An exciting and vital pedestrian street forms the permanent core of the campus, with incremental expansion possible longitudinally, horizontally, and vertically. Bellevue Community College has been presented as a case study to a West Coast Conference on Community Colleges sponsored by the Center for the Development of Community College Education at the University of Washington and received a national design award in the 15th Annual Progressive Architecture Design Awards Competition.



PORT LUDLOW
Jefferson County, Washington



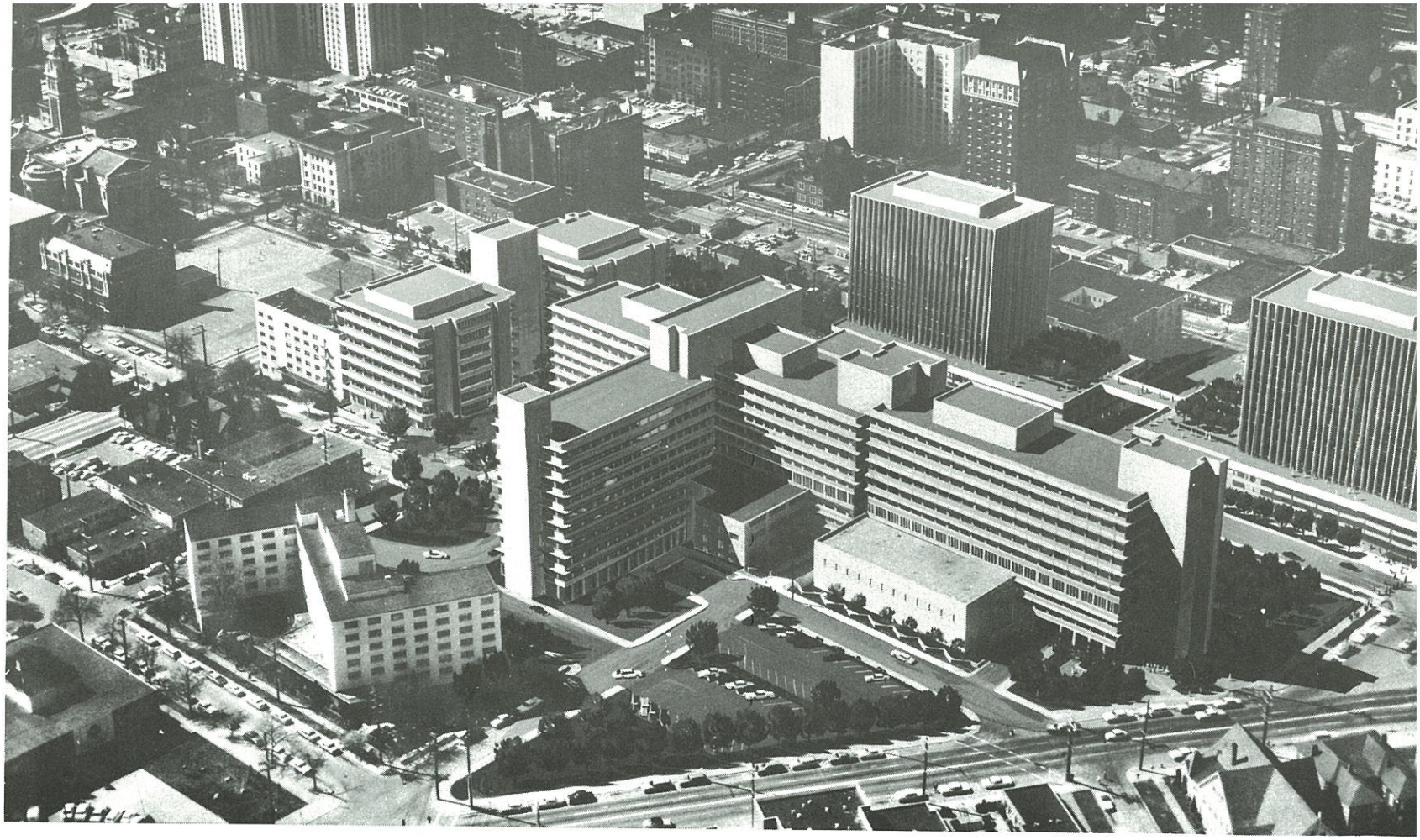
A major shipbuilding and lumber port before the turn of the century, Port Ludlow is now planned to become a new town for 20,000 people. Development of the 3,000 acres, situated around one of the finest harbors in the Northwest, will be carefully phased to create a balanced and well-integrated series of residential neighborhoods. There are also provisions in the comprehensive plan for future commercial and light industrial growth.

The Harbormaster—a marina office, store and restaurant building—is the nucleus of the first phase of construction.

This building received a 1968 Award of Merit from the Seattle Chapter of the American Institute of Architects, as well as an Award of Special Distinction for Superlative Achievement in Interior Design in Institutions magazine's International Design Awards Program for 1969.

PARK SHORE HOTEL
Honolulu, Hawaii

The 227 rooms of this resort hotel are carefully situated to take full advantage of the spectacular views of Diamond Head on one side and Kuhio Beach on the other. Maximum land utilization was achieved by placing the sun terrace and swimming pool on the third floor level, with the major public areas of the hotel below—related to the pedestrian activity generated by the adjacent beach.



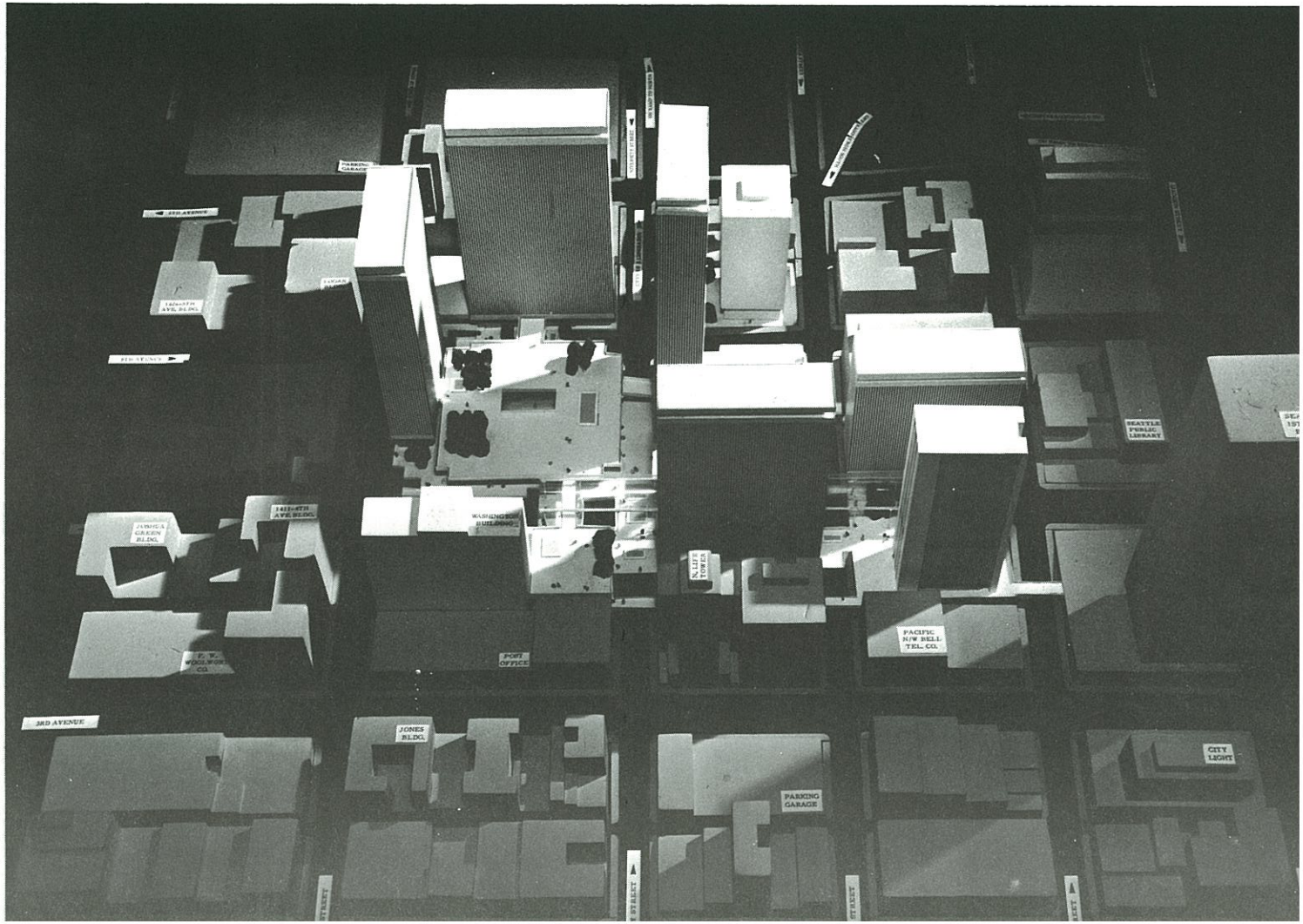
SWEDISH HOSPITAL MEDICAL CENTER
Seattle, Washington

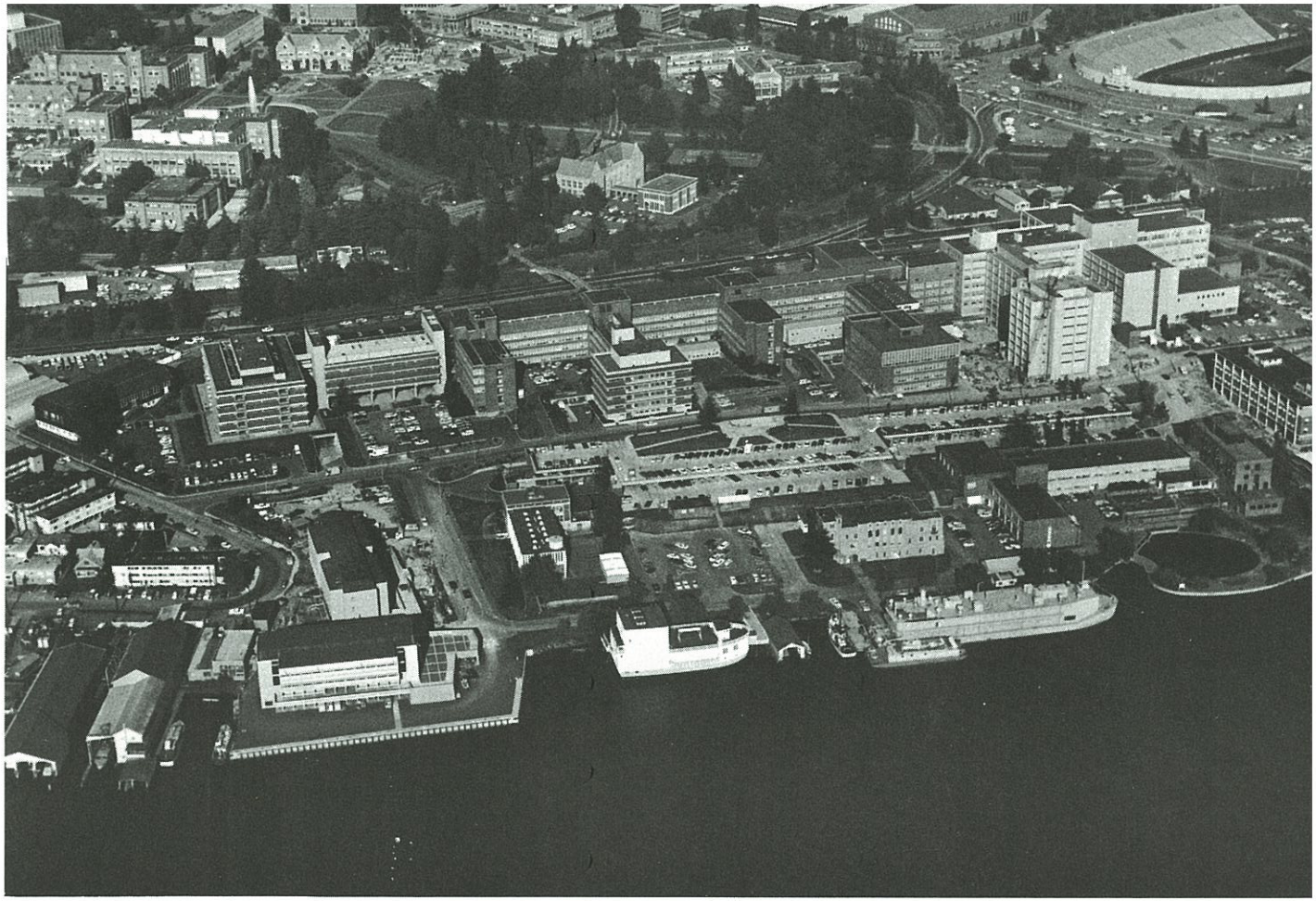
This aerial view shows the proposed development of the Swedish Hospital based upon the present master plan. The master plan has been periodically updated to reflect changes in medical and community needs.

Swedish Hospital's present bed capacity is 450. In its ultimate development it will have over 750 beds. The parking area in the foreground of the picture will be both at surface level and below grade and will be achieved by the vacation of a street which now exists. Shown in this photograph is a new Cancer Research Center, the Hutchinson Cancer Center, which is in the planning stage at the present time.

OFFICE CORE PROJECT 2009
University Properties
Seattle, Washington

This study projects the development of the University of Washington Metropolitan Tract to the year 2009. The concept envisions complete separation of pedestrian and vehicular traffic by locating all new buildings on a raised plaza linked to adjoining blocks by a series of over-street bridges. The development would be accomplished under incremental construction.

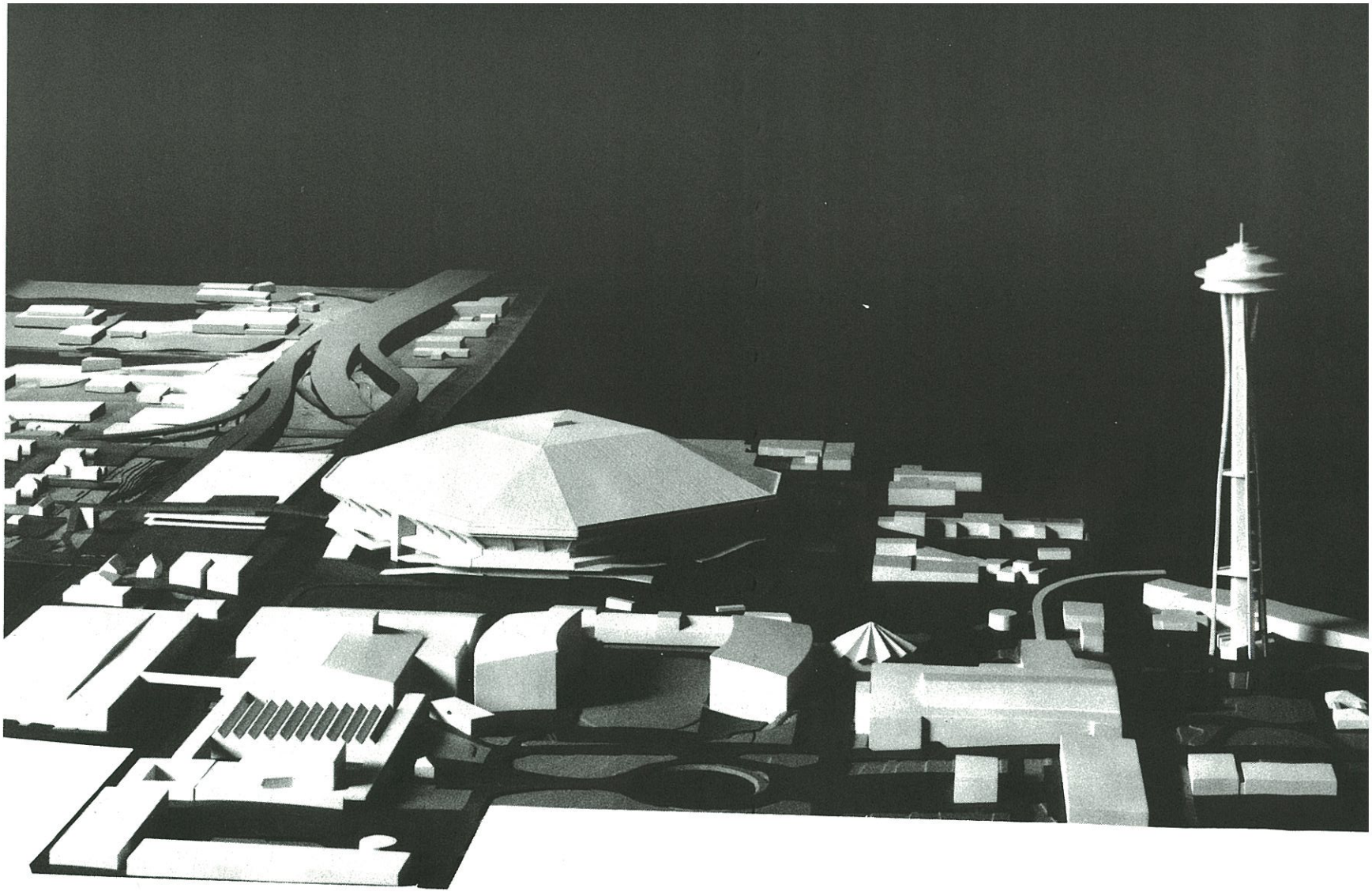




UNIVERSITY HOSPITAL AND HEALTH SCIENCES DIVISION
Seattle, Washington

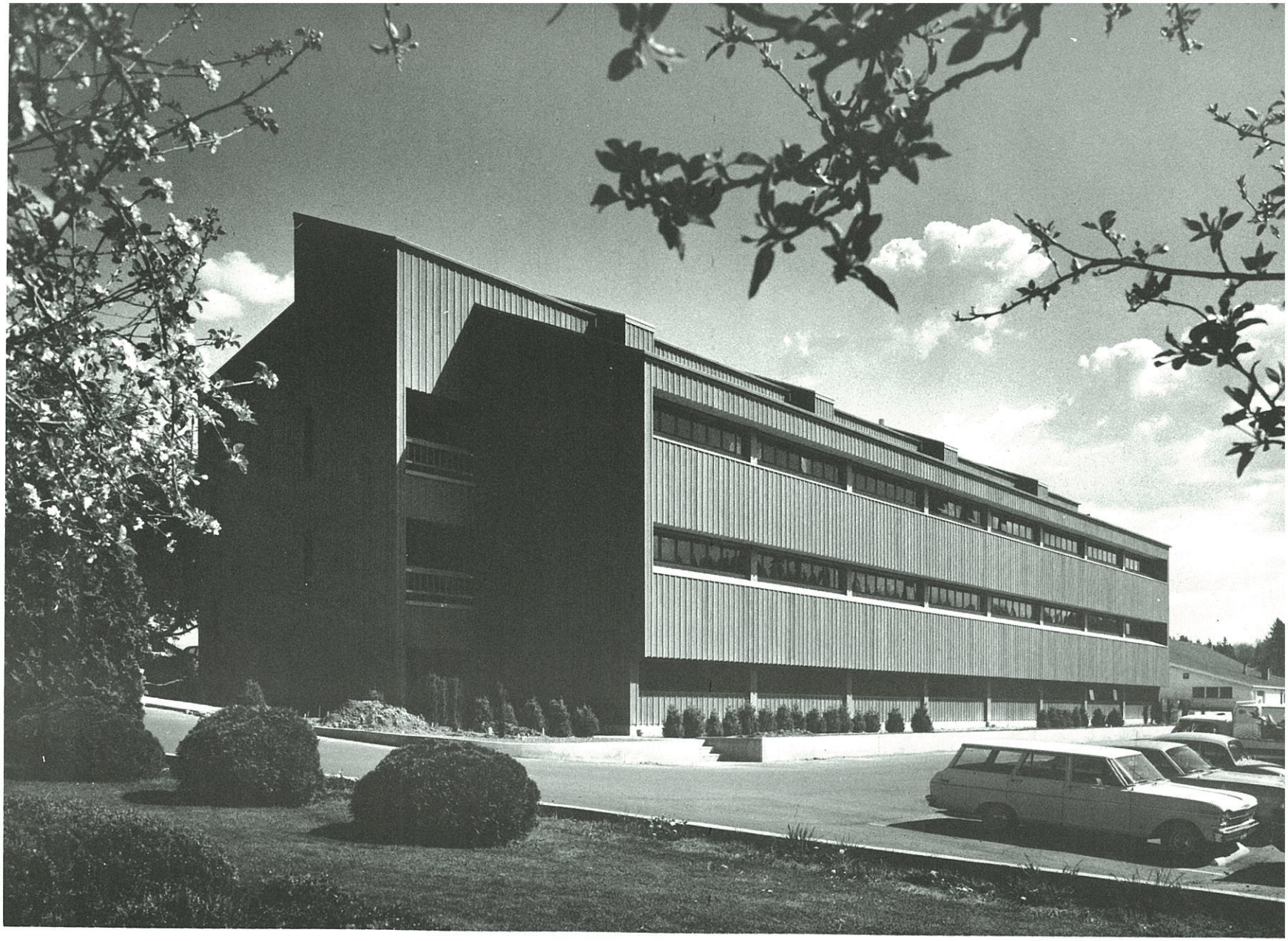
The building at the right is the University Hospital, an institution of 350 beds, which was completed in 1956. The hospital and supporting services are planned and are structured for expansion to 800 beds.

The group of buildings to the left of the hospital, houses the Health Sciences Division. This is a continuing project being developed under an overall Master Plan.



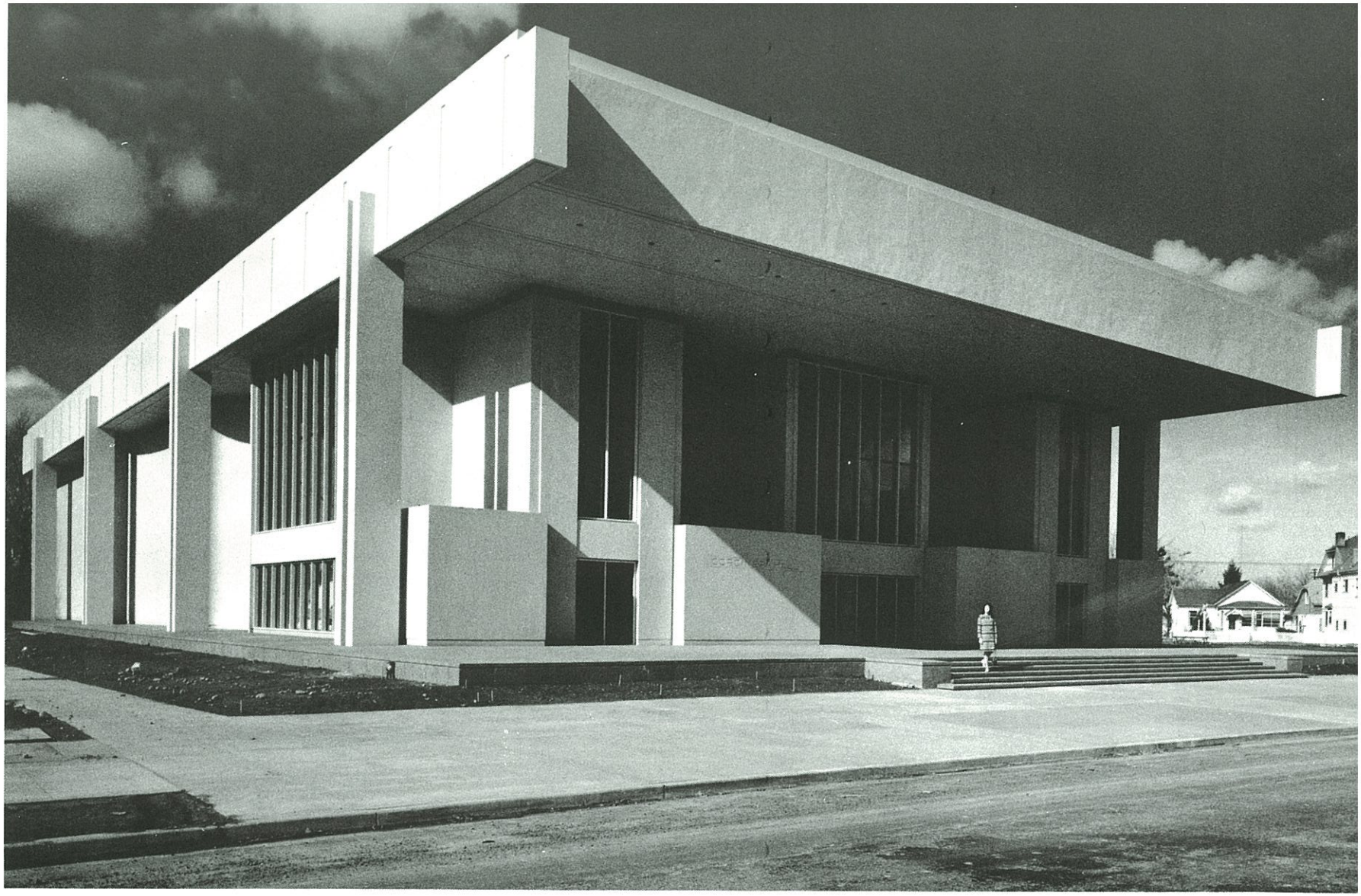
KING COUNTY MULTI-PURPOSE STADIUM
Seattle, Washington

Designed for sports events, exhibitions, trade and consumer shows, the proposed stadium with a capacity exceeding 55,000 will provide new and supplement existing facilities in the adjacent Seattle Center. Appearing at the left of the Stadium is a proposed 2300 car parking garage connected directly to the future Bay Freeway. Design of all three projects is being developed to implement future development of the Center and vicinity. Construction is scheduled for completion in April, 1973.



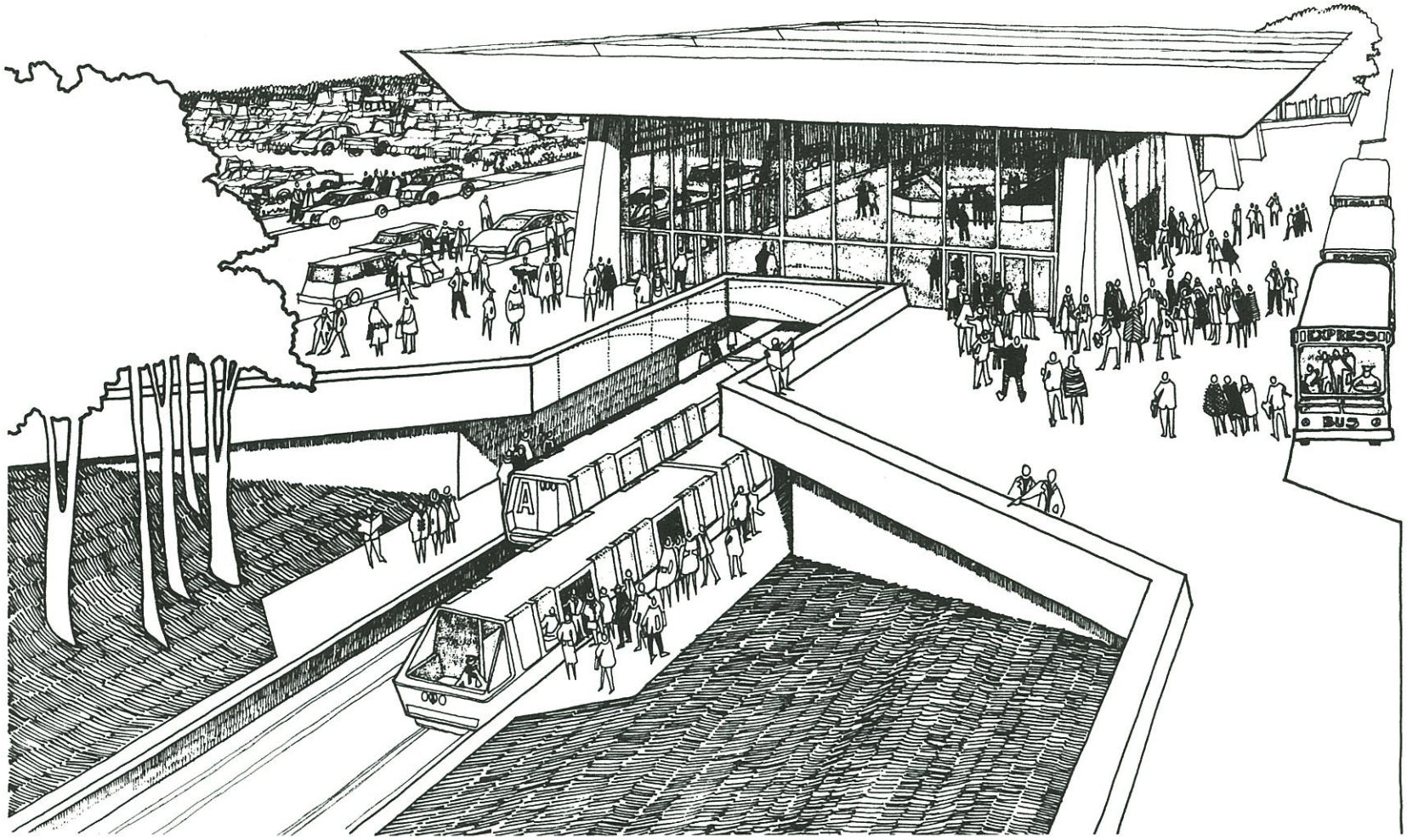
WASHINGTON STATE UNIVERSITY
OFFICE AND LABORATORY FACILITIES
Puyallup, Washington

This facility provides flexible office and laboratory space for the University's Western Washington Research and Extension Center in Puyallup, Washington.



CORDINER HALL – WHITMAN COLLEGE
Walla Walla, Washington

Constructed in honor of Ralph Cordiner, alumnus and former Chairman of the Board of the General Electric Company, this building was designed primarily as a concert hall but will also be used by Whitman College for lectures, pageants, films and commencement activities. Convex interior walls enclose an acoustically superior space that provides continental seating for 1,500. This project received a 1968 Honor Award from the Seattle Chapter of the American Institute of Architects.



RAPID TRANSIT
Seattle, Washington

Since 1966 NBB&J has been engaged as architectural and urban design consultants, with Okamoto/Liskamm, to DeLeuw, Cather and Company in planning a comprehensive public transportation system for the Seattle metropolitan area. Of particular concern has been the design quality of all the system's visual elements: stations, way structures, vehicles, landscaping, and graphics. More recently, major emphasis has been placed on comparative analysis of alternative systems involving both motor-vehicle and rail equipment.

This project received two awards in 1968 from the Department of Housing and Urban Development—one for Excellence in Item Design for station design prototypes, and another for Excellence in System Design for a comprehensive transit plan.

RECENT PROFESSIONAL AWARDS

1968 A.I.A. Honor Award, Seattle Chapter American Institute of Architects, for Cordiner Hall, Whitman College, Walla Walla, Washington.

1968 A.I.A. Award of Merit, Seattle Chapter American Institute of Architects, for the Harbormaster, Port Ludlow, Washington.

1968 Laboratory of the Year, National Award from Industrial Research Magazine, for Battelle Northwest Technical Center, Richland, Washington.

1968 Progressive Architecture Design Award Citation for Bellevue Community College, Bellevue, Washington.

1968 Progressive Architecture Design Award Citation for Design Disciplines Building, Washington State University, Pullman, Washington.

1968 U.S. Department of Housing and Urban Development (HUD) Merit Award, for Excellence in Item Design for Station Design Concepts for the Seattle Rapid Transit System.

1968 U.S. Department of Housing and Urban Development (HUD) Merit Award, for Excellence in Systems Design for Comprehensive Transit System Plan Concept for the Seattle Rapid Transit System.

1969 Institutions Magazine Award for Superlative Achievement in Interior Design, for the Harbormaster in Port Ludlow, Washington.

1969 Architectural Award of Excellence, American Institute of Steel Construction, Inc., for the Seattle- First National Bank Building, Seattle, Washington.

1969 A.I.A. Honor Award, Northwest Region American Institute of Architects, for Battelle Memorial Institute, Seattle, Washington.

(2) ARTHUR YOUNG & COMPANY

BACKGROUND

Arthur Young & Company was founded in 1894 and provides accounting, tax, and management consulting services to a wide variety of clients throughout the free world. The firm has 58 offices in the United States. Two of these offices —— Sacramento, California and Washington, D.C.—— specialize in the governmental consulting field.

Areas of general management consulting competency include:

- General Management Surveys
- Organization Planning, Job Evaluation, and Compensation Planning
- Systems Analysis, Problem Definition, Conceptual Systems Design, and Implementation Planning
- Detailed Systems Design and Implementation Including Computer Systems Design and Programming
- Operations Research
- Industrial Engineering Including Conventional and Professional Work Measurement, Facilities Planning, Operational Analysis, etc.
- Financial Planning and Control

Areas of specific governmental knowledge include:

- Traffic Safety
- Law Enforcement
- Welfare
- Agriculture

- Education
- Traffic Records Systems
- Electronic Data Processing
- Employment
- Parks and Recreation
- Public Works
- Community Mental Health
- Hospitals
- Criminal Justice Systems
- Public Health

The firm has over 7,000 professional staff including 500 management consultants. Over 100 of our management consultants are located in our Western Regional Offices in California, Oregon and Washington.

CLIENT	SERVICES PROVIDED
California Department of Highway Patrol	Survey of the California state-level law enforcement data processing requirements for the next five years.
California Office of Traffic Safety	Analysis of requirements and the preparation of the "Annual Highway Safety Work Program" for California. Involves the identification of the specific goals to be achieved in state and community highway safety for FY 1970—71 and preparation of the comprehensive multi-year program for implementation of the Federal Highway Safety Program Standards.
California Division of Highways	Determination of management reporting requirements and upgrading of computer-generated management cost reports.
California Office of Management Services	Review and evaluation of Interim EDP Master Plan for California.
California Department of Education	Systems design and programming to automate the Teacher Credentialling System for California. Involves a large multi-file data base, operating in an on-line terminal environment.
California Department of Water Resources	Design and programming of a detailed accounting system for the Department and the State Water Project.
California Department of Education	Development of internal and external specifications for data processing standards and procedures.
California Department of Education	Conduct of a cost/benefit analysis on a manual versus automated Catalog and Processing Center for the California State Library.
California Department of Agriculture	Systems design, programming, and implementation of the Statewide Milk Pooling System. Involves Department of Agriculture and Grade A milk handlers and producers in the state.

California Department of Human Resources Development	Guidance, suggestion, advice, and training in the techniques and approaches to studies, experiments, and systems development work related to the implementation of an accelerated Management Improvement and Cost Reduction (MICR) Program.
California Department of Public Health	Assistance in the development and implementation of a Program Accounting and Management Information System.
U.S. Department of Health, Education, and Welfare	Assistance at the federal level in the conduct of a nationwide survey for the improvement of public assistance administration in relation to ADP systems of state and local welfare agencies.
U.S. Department of Health, Education, and Welfare	Assistance at the state level in the Phase I planning for the National Demonstration Project (NDP) for implementation of Social Information Systems. Five model states are involved: (1) California, (2) New York, (3) Florida, (4) Maine, and (5) Oklahoma.
Utah State Compensation Commission	Review and evaluation of executive compensation practices for the state and assistance in the development of an executive compensation plan.
U.S. Department of Labor	Conduct of nationwide seminars for field tax auditors from State Employment Security Agencies.
California Department of Highway Patrol	Systems analysis, systems design conceptualization, and implementation planning to establish a Statewide Integrated Traffic Records System for California. Project involves coordination with the County Supervisors Association, League of California Cities, and State Departments of Highway Patrol, Motor Vehicles, and Public Works and the Administrative Office of the Courts. Involves review of AUTO-STATIS, AMIS, CLETS, PIN, and CJIS. Cities and counties were contacted in order to review their traffic records and courts information system.

California Department of Mental Hygiene	Systems analysis, systems design conceptualization and implementation planning for Statewide Cost Reporting; Data Collection System for Local Community Mental Health Services. Involves Department of Mental Hygiene and counties in the state.
California Department of Parks & Recreation	Systems design and programming for State Park Visitor Attendance System.
California Department of Public Works	Implementation of pilot work measurement programs in the design, maintenance, and clerical areas of the Division of Highways, including: A study to provide work standards and planning values for allocating manpower in the Landscape Design area. A study to provide work standards and planning values for allocating manpower in the Engineering Design area. Assistance in the development and application of work standards to cover the various highway maintenance activities throughout the state and the integration of the standards into a maintenance management system. Assistance in the development and application of work standards to cover clerical employees in District 04 (San Francisco).
California Department of Public Works	Implementation of a statewide clerical work measurement program covering 2100 clerical employees in the Department.
California Franchise Tax Board	Assistance in the implementation of work standards applications in the clerical and auditing functions.
California Personnel Board	Assistance in the implementation of work standards in the clerical function of the Board.

San Francisco Bay Area Rapid Transit District	Organization studies of construction management and data processing functions; development and implementation of EDP system for control of construction and development costs; design of an accounting system.
Wismer and Becker Contracting Engineers	Systems analysis, design, programming, and implementation of an integrated financial and project management information system.