SUSITNA
HYDROELECTRIC PROJECT

FEDERAL ENERGY REGULATORY COMMISSION
PROJECT No. 7114

PROJECT MANAGEMENT PLAN

Conceptual Plan Development

Bechtel Group, Inc.
HYDRO & COMMUNITY FACILITIES DIVISION

DECEMBER 1984
DOCUMENT No. 2501

ALASKA POWER AUTHORITY

CONCEPTUAL PLAN DEVELOPMENT

Index

Susitna Management Plan
Development of the Alternatives

In accordance with the work plan submitted with the Bechtel proposal dated September 10, 1984, a study was made for a management plan for Susitna.

The approach was to review a variety of concepts used by other large projects, or variations of such concepts, eliminating those that upon consideration proved less appropriate for Susitna.

The Bechtel staff made the study in three cycles. The first cycle involved use of management concepts in a very general way on triangular shaped charts which were enumerated as A through H (see following). These concepts were reviewed with the Alaska Power Authority staff on October 26, 1984 and from this review it was decided to procede with a second cycle of charts in block diagram format. These were subsequently developed and listed as concepts IA through ID and IIA through IID (the roman numerals delineated two major subdivisions based upon whether or not the organization would include a separate CM contractor). At this point, some of the first cycle concepts were discarded as being less appropriate for Susitna, but some others were added.

These second cycle concepts were viewed in detail and discussed with the Alaska Power Authority staff. Subsequently, they were ranked by the Bechtel staff in order of preference and then reviewed on a more formal basis with the Power Authority Executive Committee on November 1, 1984. As a result of this meeting another concept "turnkey" was added and ranked as the ninth alternative. These concepts were listed as alternatives 1 through 9, and further detailed as the third cycle of development.

Minutes from the meeting of October 26 and November 1 are included in this appendix with the first and second cycle charts. These are proceded by a listing of "Points of Reference" developed by the Bechtel staff after these various discussions including the above meetings. Also included is the data contained in the "Briefing Book" furnished to the Alaska Power Authority Board showing the 3rd cycle charts.

On November 7, a meeting was held with the members of the Power Authority staff with Director Lee Nunn present, and on the following day a presentation was given by the Bechtel staff to the Management Committee of the Power Authority Board of Directors and the Power Authority staff. After discussion, the Committee agreed to recommend eliminating six of the nine alternatives considered and in subsequent action the following day the full Board agreed that Bechtel should proceed with the development of three approaches as covered by Alternatives 1, 2 and 5. (See memorandum dated November 9, 1984).

7208/082

Susitna Project Management Plan
Concepts Considered

	1st Cycle	2nd Cycle	3rd Cycle and Ranking
APA Provides All Management	A	IA	8
Integrated Management with Construction Management (CM) Contracted	B	IB	3
Integrated Management Organization	C	IIB	
Joint Venture Provides Mgmt., Engineering, Procurement, and CM Svcs.	D		
Architect/Engineer (A/E) Provides Project Management (PM) and CM	E		
Contracted PM and CM Services, A/E Provides Design and Eng. Mgt.	F		
Project Management and CM Contracted Separately, APA Cadre	G	IC	2
A/E as Project Manager and Design Engineer	H		
APA Management Augmented by Contracted Services and Constructed Mgmt.		ID	5
APA Management Augmented by Contracted Construction Management		IA	6
APA Management Augmented by Contracted Services		IID	7
One Contractor Provides All Management, APA Cadre		IIC	1
Turnkey			9

7208/082

SUSITNA MANAGEMENT PLAN

Points of Reference

As a result of numerous meetings between members of the Power Authority staff and the Management Study team, a picture has evolved of the factors which impinge on the organization which will be developed to realize this major project. These factors have an influence on how the project will be undertaken and they have been taken into consideration by the Management Study team in its evaluation of organization alternatives.

Considerations

The Power Authority:

- Is a state organization but is exempt from Civil Service rules.
- Will monitor environmental impact
- Operations are funded annually. Budget request for next FY submitted September of previous year. (Note: a special budget supplemental request can be submitted in February preceding the July start of the next FY).
- Currently considers Case III (start of design engineering July 1985 and start of Watana access July 1987) as the schedule to use for purposes of the Susitna management study.
- Work packaging breakdown elaborated in 1983 FERC license application should be considered as the starting point insofar as packaging concerned.
- Bradley Lake project is the only other large capital project in the foreseeable future. (Any other hydro projects will most likely be in the 20 to 40 MW class). Other current plans call for installation of heat exchange equipment on existing thermal plants and addition of interties. Due to lack of any other planned major capital projects following the Susitna project, no need exists for creation of a permanent management organization.
- Will perform QA. (the construction manager will perform QC).
- Prefers one designer for the transmission lines; another for the balance of work.
- Will retain control of major decisionmaking (the organization which is adopted should use contractors to the extent possible without loss of essential decisionmaking control by the Power Authority).

7205/011

- Wishes to minimize its own involvement in procurement (except where required for schedule reasons and possible large-volume bulks).

- Desires that the management alternative selected include formation of a "management committee" as well as a management overview group (with representation by power purchasers).

- Is open to consideration of target contracts.

Objectives

A project organization incorporating:

- Centralized "war room" or data center for management information.

- "Best" personnel performing the various functions.

- "Streamlined" organization

- Owner involvement in controls

- Separation of construction management from design.

- Optimized use of "outside" contractors (where there is a lack of specialists in Alaska Labor Pool).

Constraints

- The Power Authority Board has decided that detail design cannot start until Power Sales Agreements are finalized. (Current planning date: July 1, 1985).

- The Power Authority environmental organization does not presently have the staff required to monitor project work, but they do intend to monitor environmental activities and to hire staff needed.

Assumptions

- FERC license approval: March/April 1987 in accordance with CASE III.

Minutes of Meeting
October 26, 1984
Alaska Power Authority Main Conference Room

Subject: Susitna Management Plan

Present: L. Crawford, Executive Director
W. Batt, Associate Executive Director, Finance/Administration
M. Yerkes, Associate Executive Director of Operations
J. Perkins, Associate Executive Director of Projects
J. Ferguson, Susitna Project Manager
L. Prentice, Manager/Cost & Schedule Control
J. Anderson, Vice President, Bechtel
R.N. Seemel, Project Manager, Bechtel
S. Harwell, Management Systems Specialist, Bechtel
R. Tripp, Control Manager, Bechtel
R. Picard, Construction Manager, Bechtel

R.N. Seemel described eight alternative concepts of organization being considered for the Susitna Project and invited comments from the audience. Each alternative was showed on a color slide that identified the major functions, participants and interfaces.

A chart entitled "Comparison of Alternative Concepts" was also presented for use by interested persons in further study of the question by trial weighting of the various issues under any personal weighting system preferred.

The major comments are summarized below:

Comments on charting Technique

Organization chart with boxes rather than pyramid shape and showing a band depicting "contractors" management under the pyramid were suggested.

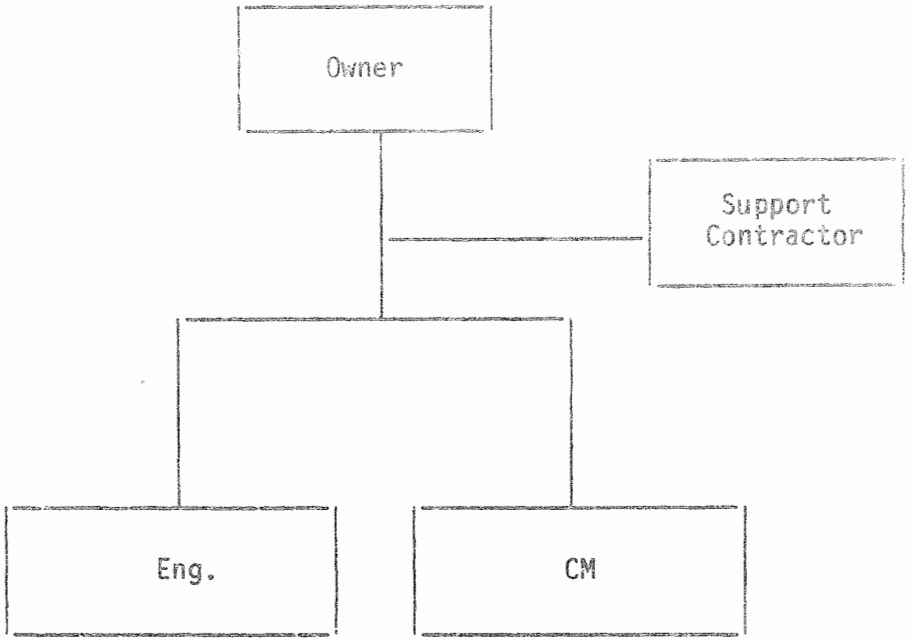
Comments on Alternatives

- Engineering management (depicted by the lower left triangle) should be part of the Project Manager function and not part of the Engineering Contractor's functions.

  Action: Correct Alternative A, B, G accordingly.

- Alternative A: Correct the chart to show the Procurement/Construction interface being done by the Owner, to reflect the present Power Authority policy on Susitna.

- Alternative B: Power Authority suggests that an alternative to this would be a support contractor who does controls and Quality Assurance work for the Owner who retains management control. This was apparently used by Bechtel on a gas centrifuge uranium facility for DOE in Portsmouth, Ohio in 1977.



- Alternative C: Good possibility.

- Alternative D & F: Perceived as the same from Power Authority's standpoint. Develop "D" further without the joint venture aspect.

  It was thought that the owner's role/control can be maintained by an organization of 50-60 people under such an arrangement.

- Alternative E, F, H: Perceived as being the same. One combined alternative should be retained for study.

- Alternative G: Perceived as a possibility.

- Alternative E: To be eliminated. As a matter of Power Authority policy the Engineering and CM will not be done by the same firm.

- Additional Alternative: An all-owner alternative as PM/CM should be shown and analyzed and then excluded from further study.

Further Comments and Questions by the APA Staff:

1) Need to define the functions, the work activities and our assumptions and criterias for the next presentation.
2) The Power Authority is a State corporation but excluded from Civil Service constraints regarding permanency of employees. However the present pay scale is lower than engineering/construction firm pay scales, and this is perceived as a problem regarding direct hire by the Power Authority.

3) Considerations:

- Owner to keep major decisions
- Owner to keep financial control. The question is how to structure.
- MIS project control center "war room" is important.
- Optimize use of outside contractor in management because of lack of expertise in Alaskan labor pool and the restricted state based pay scale. However not to give up essential controls.
- Owner involvement in controls desirable.
- Need to streamline owner's organization to do the above.

4) APA will want Bechtel to look at the configuration of Control Boards.

5) A question was raised about how a shadow organization for the Power Authority would give sufficient control and how was interface between Contractor and Owner arranged at Churchill Falls? Answer: by copies of correspondence, meetings, procedures, etc...

6) Quality control on Susitna is expected to be done by the CM.

7) There is a need for a "Power purchasers committee" represented in some kind of overview group and there will also be a need for a management committee.

8) The Power Authority will monitor environment impact themselves - they don't think they can delegate responsibility except perhaps for the actual testing, i.e., turbidity, measurements.

9) Contractors have more flexibility in procurement. As a policy, the Power Authority may consider purchasing long lead items or bulk items in order to meet the schedule.

10) Who holds the contract with the Engineer (Option D)? Answer: Owner.

11) How is liability handled in an integrated org? In any case liability of contractor is limited to redoing work. Owner has most of the liability.

12) How is personnel evaluation and administration handled in an integrated organization? Answer: Personnel policies are established and applied by the project organization.

13) There is a need for a long term power plan.

14) There is a need for interties and a combined power dispatch system - should be part of development.

Alaska Power Authority

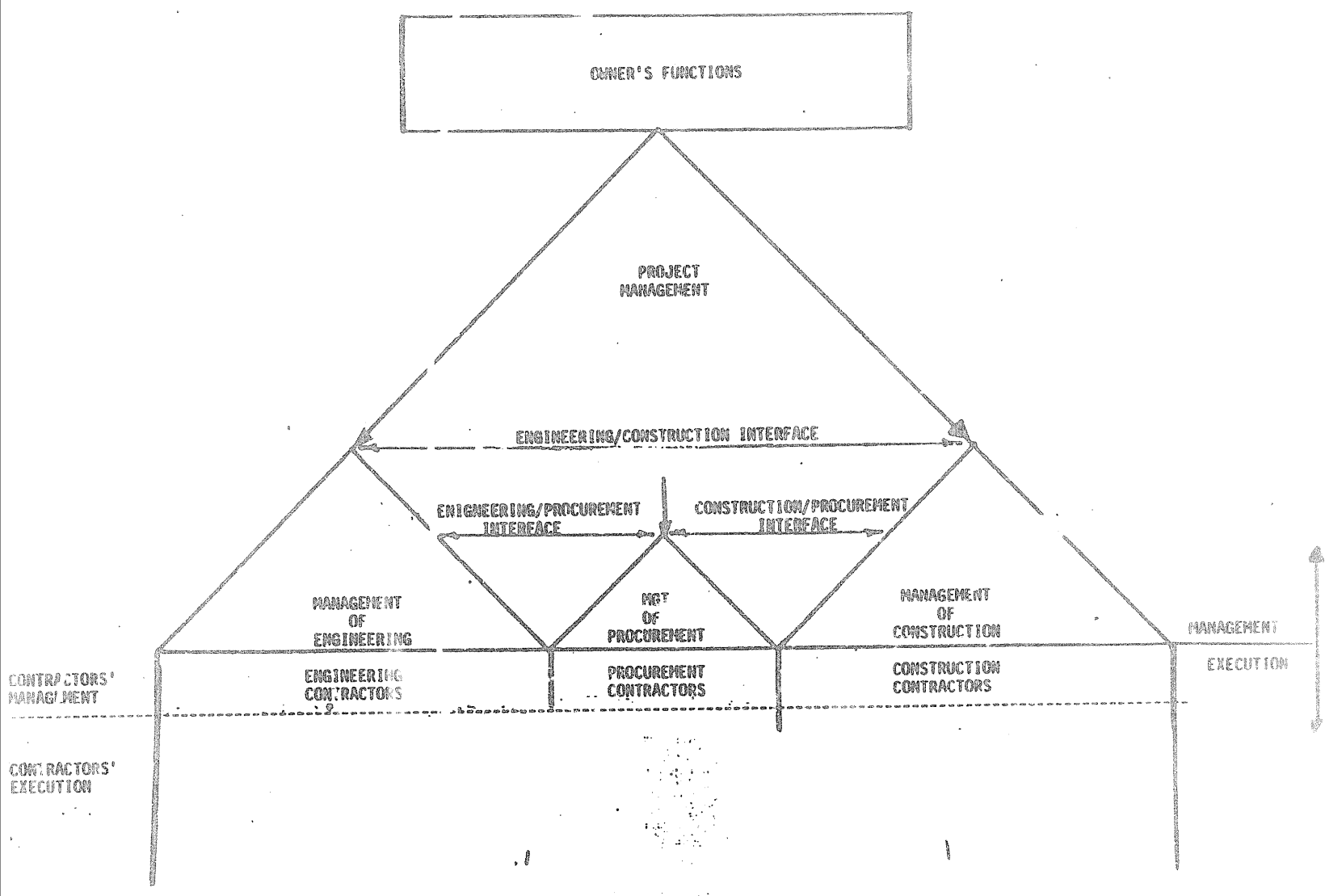
SUSITNA MANAGEMENT PLAN

Presentation of Alternative Management Concepts
October 26, 1984

Presented by Bechtel Civil & Minerals, Inc.

Alaska Power Authority

SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT



Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

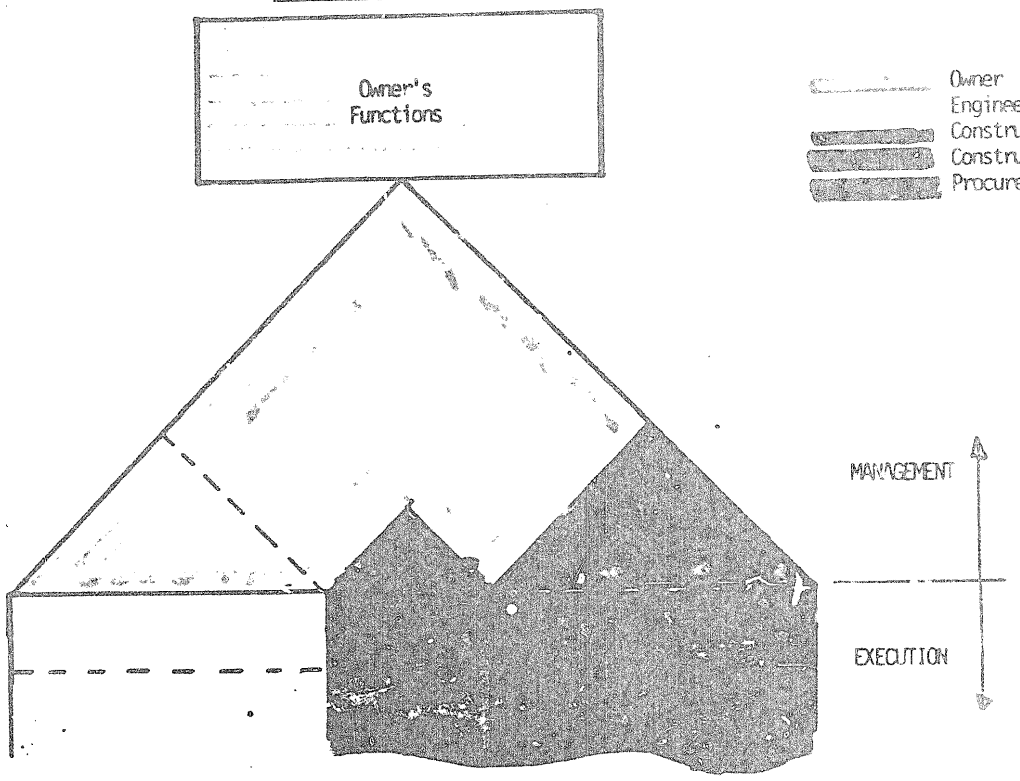
A. Owner is Project Manager

Description

Owner performs Project Management role with its own relatively large staff, coordinating the activities of an A/E and a Construction Manager

Applications

° Current APA policy for Susitna



Owner
Engineer
Construction Manager
Construction Contractors
Procurement Contractors

Owner's Role

° Construction Management Contractor Direction
° Engineering Contractor Direction
° Engineering/Construction Coordination
° Engineering/Procurement Coordination
° Procurement/Construction Coordinator

Others

° OM provides Procurement Management

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

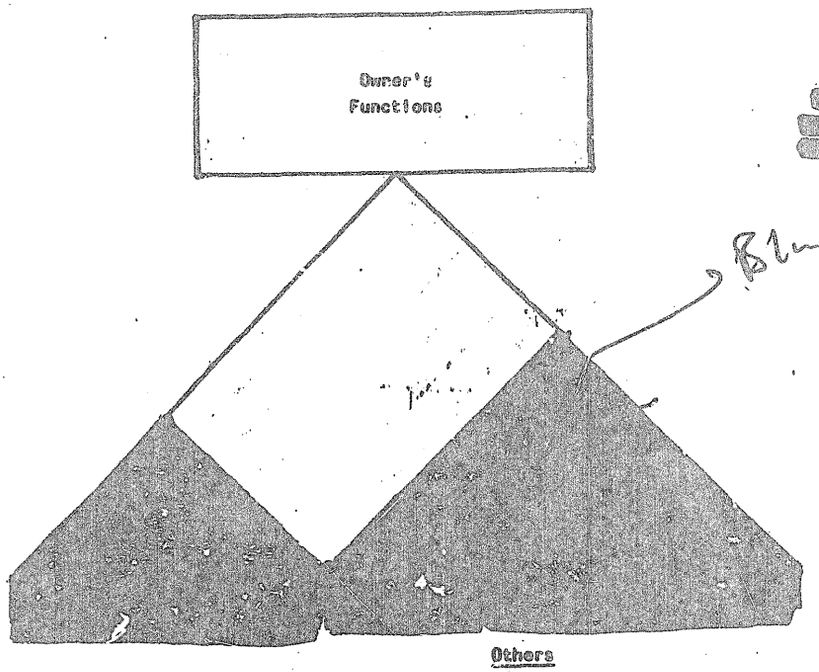
A. Owner is Project Manager

Description

Owner performs Project Management role with its own relatively large staff, coordinating the activities of an A/E and a Construction Manager

Applications

- Current APA policy



Owner
Engineer
Construction Manager
Construction Contractor

Owner's Role

- Construction Management Contractor Direction
- Engineering Contractor Direction
- Engineering/Construction Coordination
- Engineering/Procurement Coordination

Others

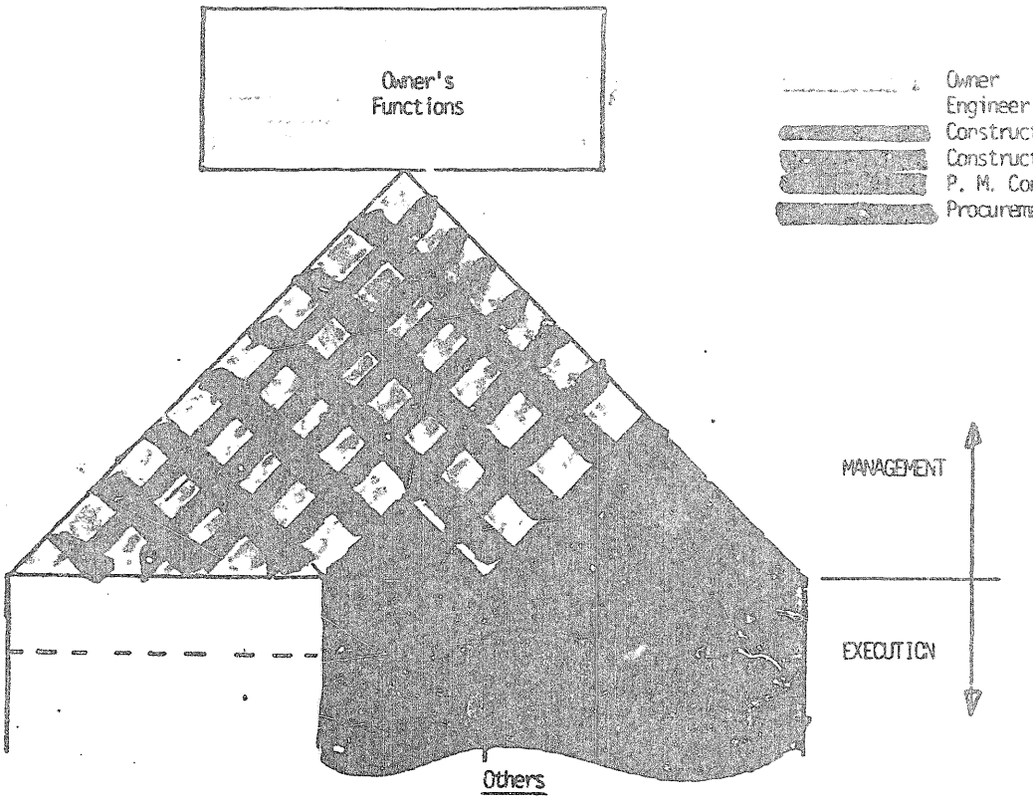
- CM provides Procurement Management
- CM provides Procurement/Construction Coordination

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

B. Integrated Project Management Organization

Description

Owner establishes an integrated project management organization comprised of its own personnel plus those of a qualified Contractor



Applications

Owner's Role

° Participate in an integrated organization with qualified contractor to perform same role as A.

Others

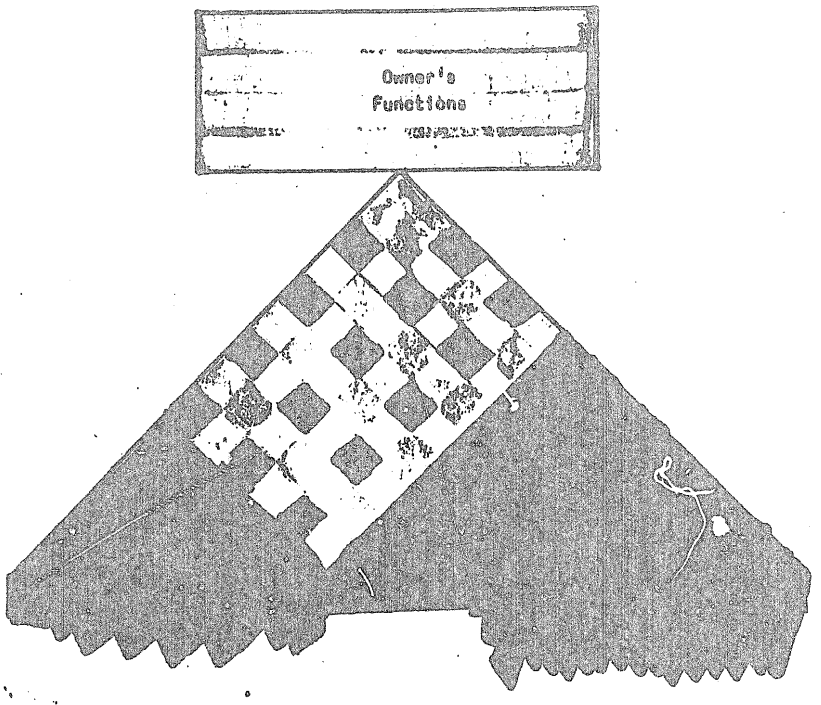
OM provides Procurement Management

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

B. Integrated Project Management Organization

Description

Owner establishes an integrated project management organization comprised of its own personnel plus those of a qualified Contractor



Owner
Engineer
Construction Manager
Construction Contractor
P. M. Contractor

Applications

Owner's Role

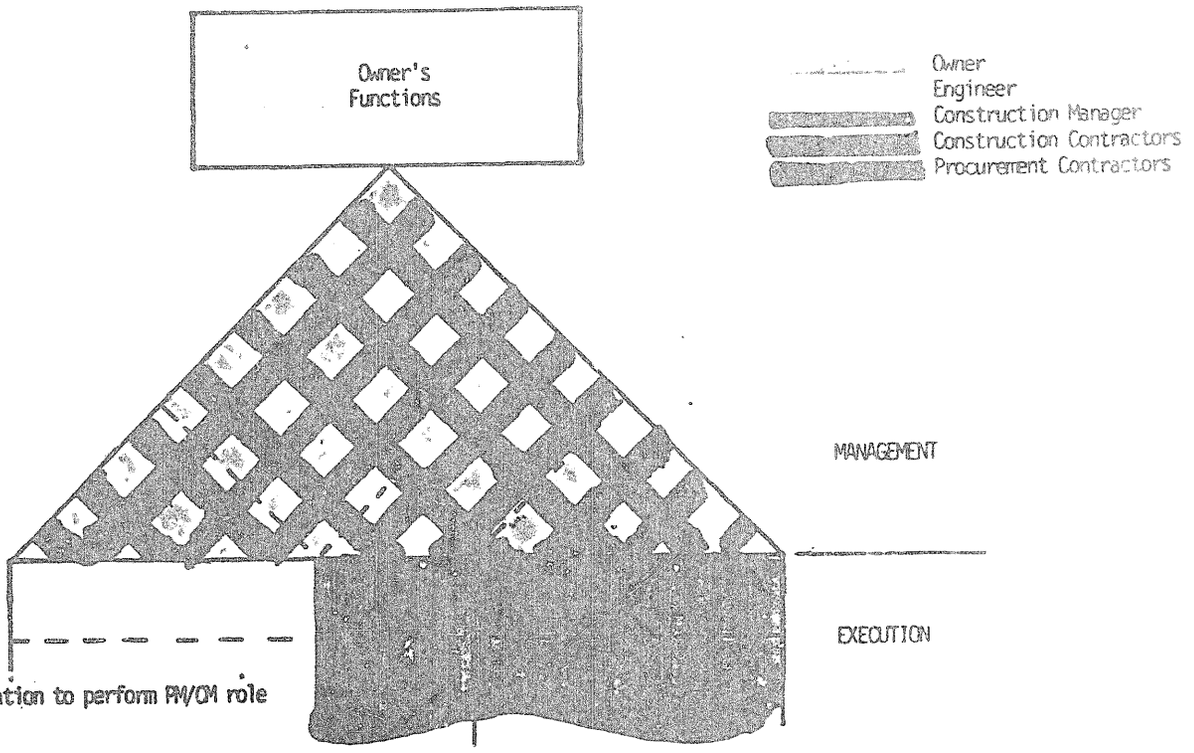
° Participate in an integrated organization with qualified contractor to perform same role as A.

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

C. Integrated PM/CM Organization

Description

Owner establishes an intergrated Project Management/Construction Management organization comprised of its own personnel plus those of a qualified contractor



Applications

° James Bay

Owner's Role

° Participates in integrated organization to perform PM/CM role including :

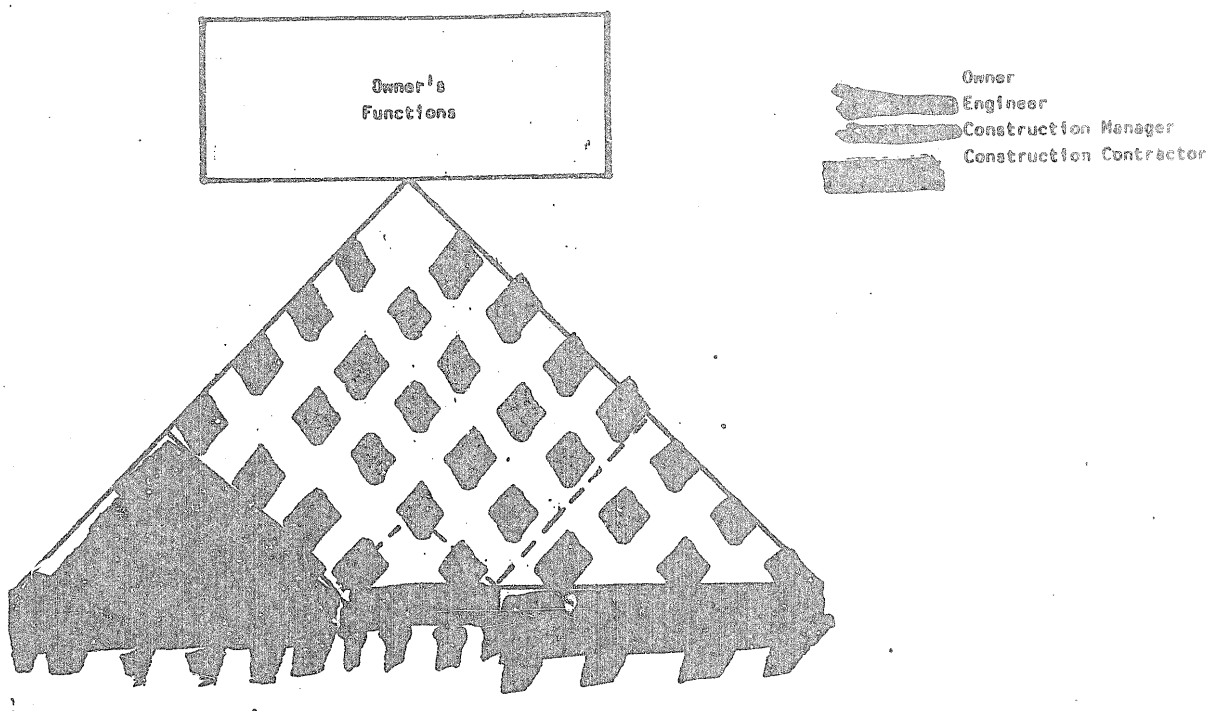
- Engineering Contractor Direction
- Construction Management
- Procurement Management
- Engineering/Construction Coordination
- Engineering/Procurement Coordination
- Procurement/Construction Coordination

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

C. Integrated PM/CM Organization

Description

Owner establishes an intergrated Project Management/Construction Management organization comprised of its own personnel plus those of a qualified contractor



Applications

- James Bay
- Jubail

Owner's Role

- Participates in integrated organization to perform PM/CM role including :
  - Engineering Contractor Direction
  - Construction Management
  - Procurement Management
  - Engineering/Construction Coordination
  - Engineering/Procurement Coordination
  - Procurement/Construction Coordination

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

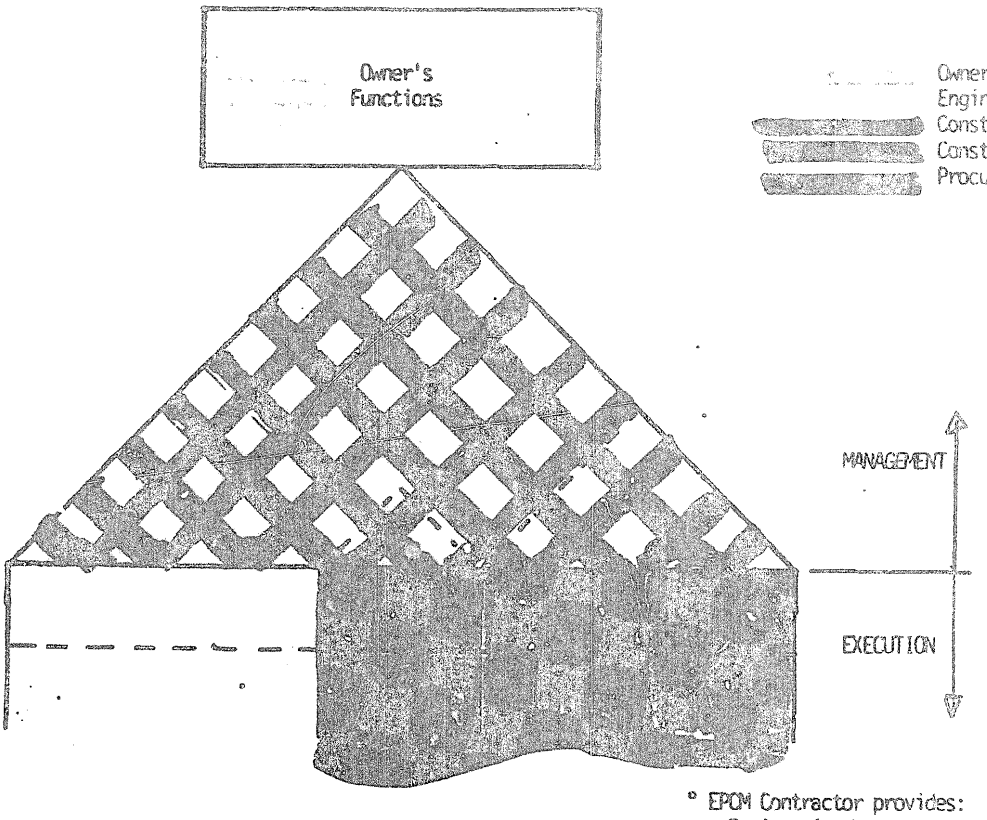
D. Joint Venture Provides EPCM Services

Description

Owner contracts with a joint venture of an A/E and major engineering/construction company to provide Engineering and Project Management/Construction Management services

Applications

° Churchill Falls



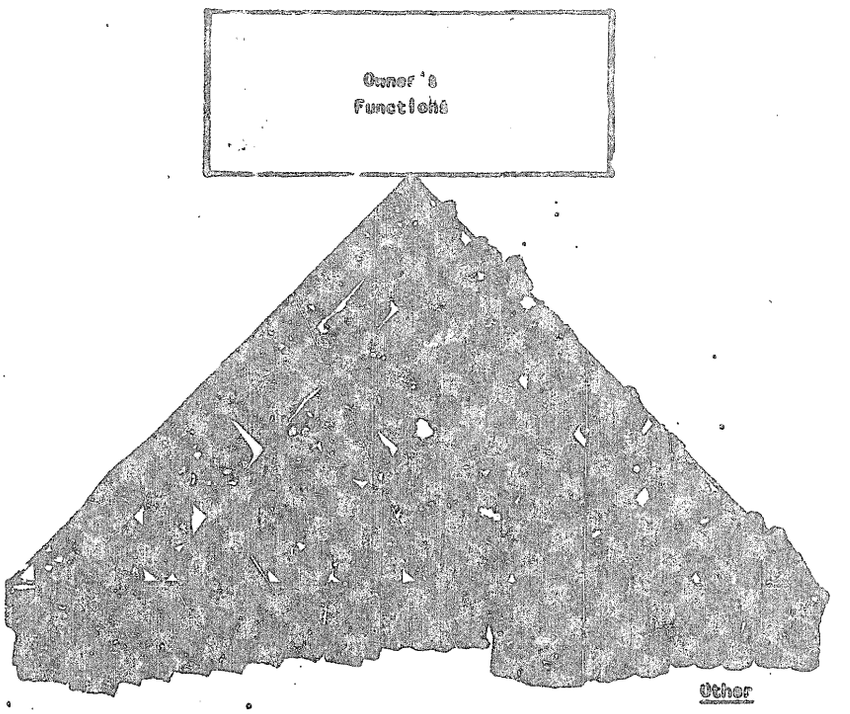
Owner's Role

° EPCM Contractor Director

° EPCM Contractor provides:
- Engineering Management
- Procurement Management
- Construction Management
- Engineering/Construction Coordination
- Engineering/Procurement Coordination
- Procurement/Construction Coordination

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

D. Joint Venture Provides EPCM Services



Owner
Engineer
Construction Manager
Construction Contracts

Description

Owner contracts with a joint venture of an A/E and major engineering/construction company to provide Engineering and Project Management/Construction Management services

Applications

- Churchill Falls

Owner's Role

- EPCM Contractor Director

Other

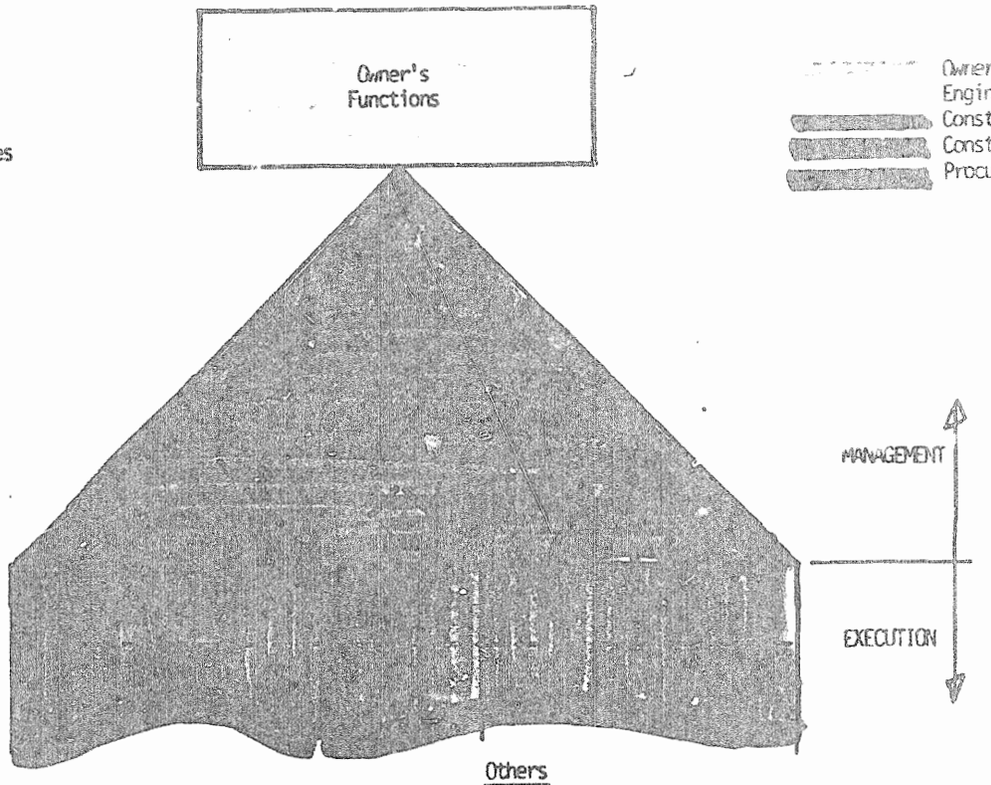
- EPCM Contractor provides:
  - Engineering Management
  - Procurement Management
  - Construction Management
  - Engineering/Construction Coordination
  - Engineering/Procurement Coordination
  - Procurement/Construction Coordination

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

E. Contractor Provides E plus EPCM

Description

Owner contracts with a single Engineering/Construction Company to provide Project Management, A/E and Construction Management services



Owner
Engineer
Construction Manager
Construction Contractors
Procurement Contractors

Applications

° KKIA

Owner's Role

° E plus EPCM Contractor Director

Others

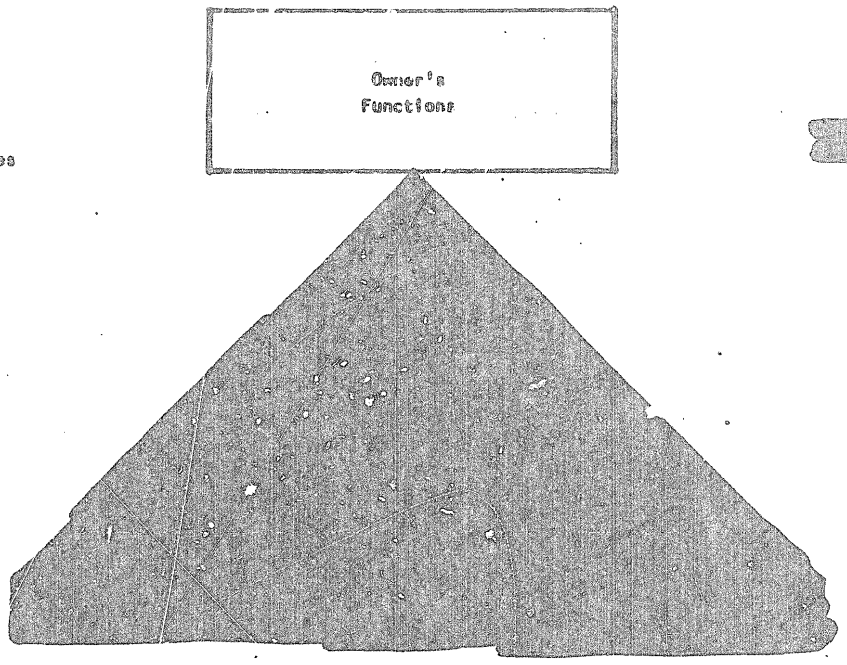
° E plus EPCM Contractor provides same management roles as EPCM Joint Ventures in D.

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

E, Contractor Provides E plus EPCM

Description

Owner contracts with a single Engineering/Construction Company to provide Project Management, A/E and Construction Management services



Owner
Engineer
Construction Manager
Construction Contractor

Applications

° Turnkey Project

° KKIA

Owner's Role

° E plus EPCM Contractor Director

Others

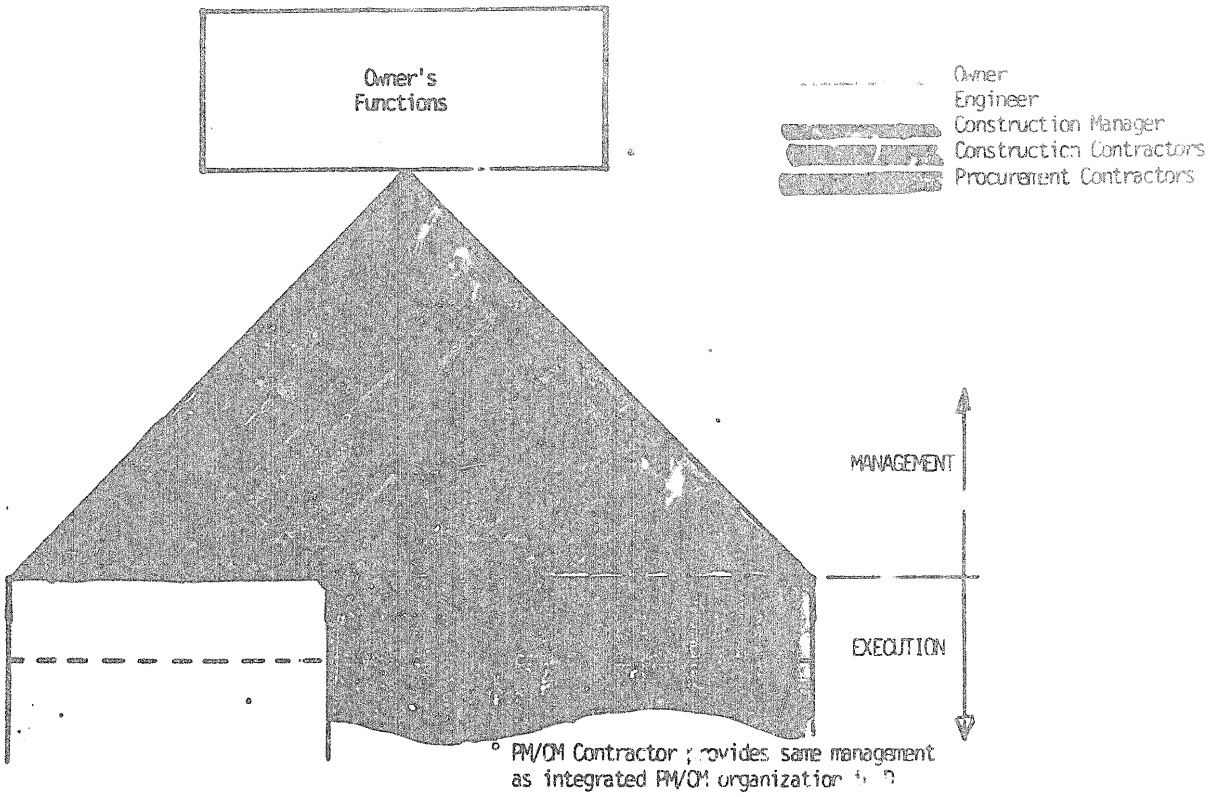
° E plus EPCM Contractor provides same management roles as EPCM Joint Ventures in D.

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

F. Contracted PM/CM Services

Description

Owner contracts for Project Management/Construction Management services



Applications

°Jubail

Owner's Role

° PM/CM Contractor Direction

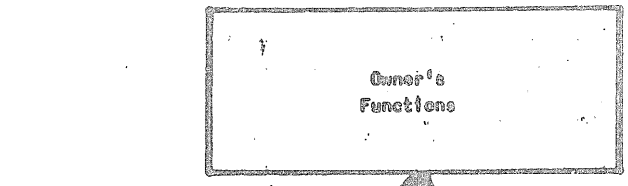
° PM/CM Contractor provides same management as integrated PM/CM organization

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

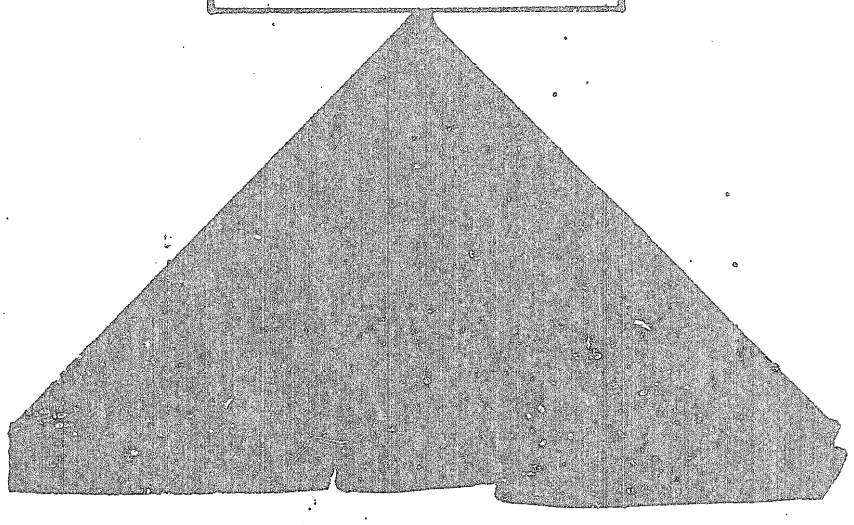
F. Contracted PM/CM Services

Description

Owner contracts for Project Management/Construction Management services



Applications



Owner's Role

° PM/CM Contractor Direction

Others

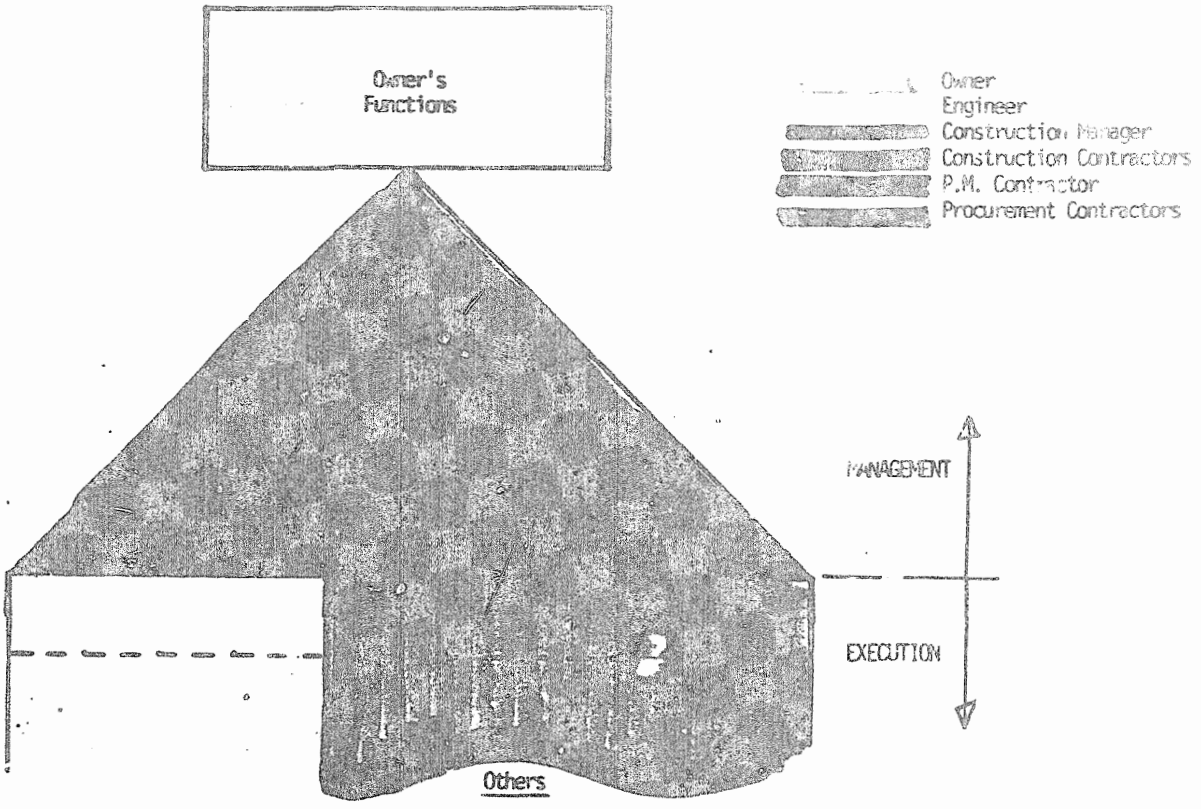
° PM/CM Contractor provides same management as integrated PM/CM organization in D.

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

G. Contracted Project Management Services

Description

Owner contracts for Project Management services



Applications

Owner's Role

° PM/OM Contractor Direction

Others

° PM provides same services as Owner in PM role in A

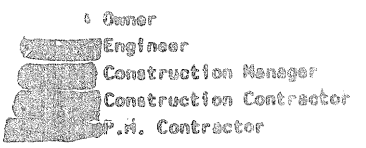
° OM provides same functions as in A

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

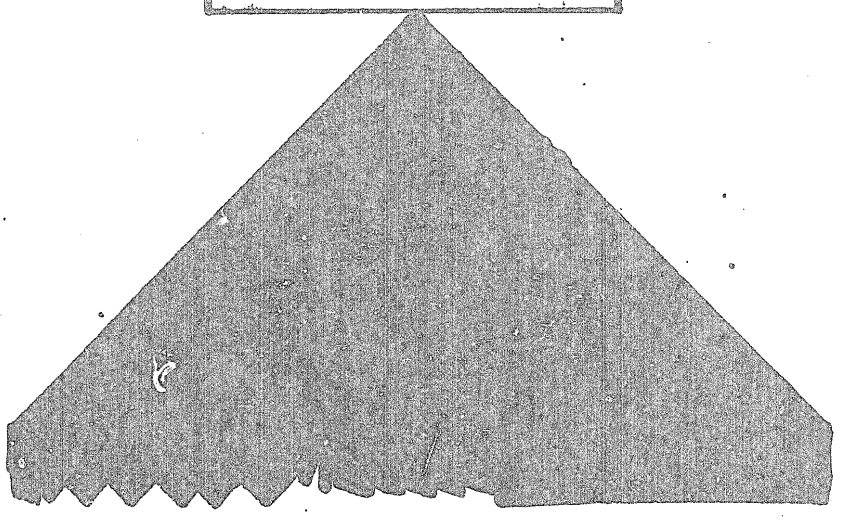
G. Contracted Project Management Services

Description

Owner contracts for Project Management services



Applications



Owner's Role

- PM/CM Contractor Direction

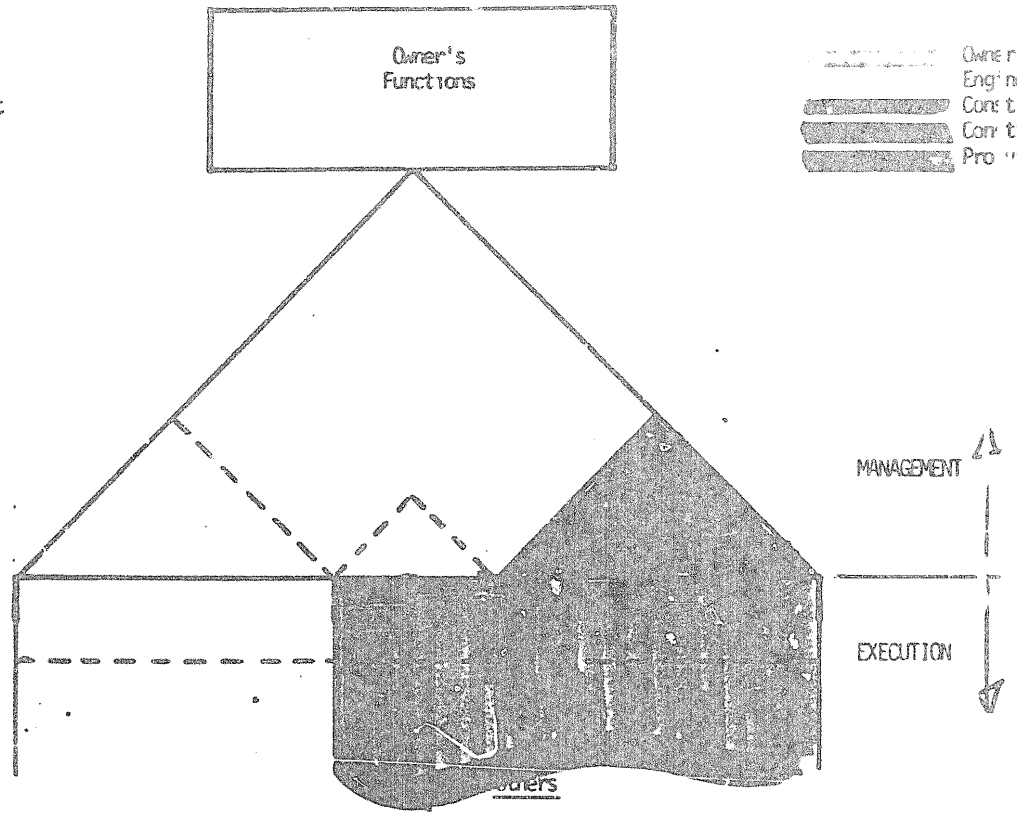
Others

- PM provides same services as Owner in PM role in A
- CM provides same functions as in A

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

H. Architect/Engineer as Project Manager

Description
Owner contracts with A/E for Engineering and Project Management services



Owner
Engineer
Construction Manager
Construction Contractor
Procurement Contractors

Applications

Owner's Role

° A/E Contractor Director

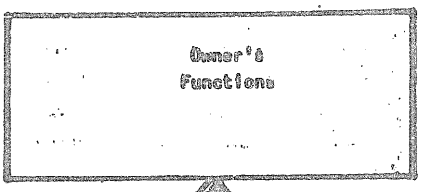
° A/E Contractor provides:
- Engineering Management
- Procurement Management
- Construction Management Contractor Direct on
- Engineering/Construction Coordination
- Engineering/Procurement Coordination
- Procurement/Construction Coordination

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

M. Architect/Engineer as Project Manager

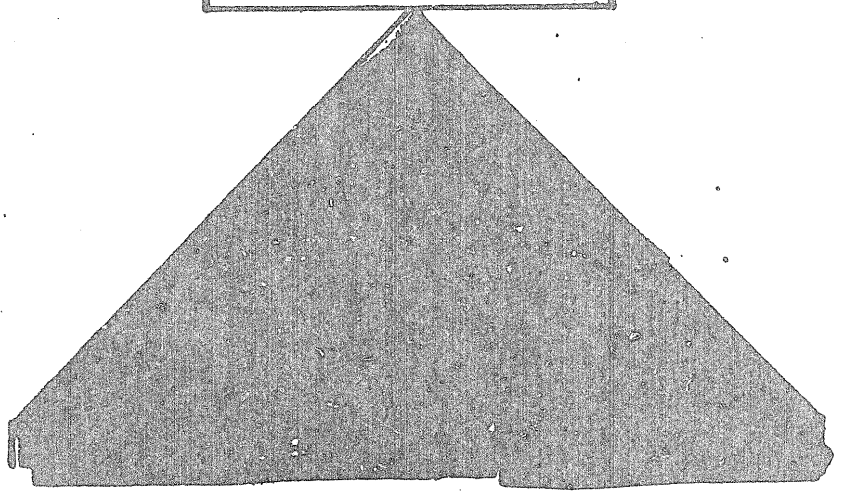
Description

Owner contracts with A/E for Engineering and Project Management services



Owner
Engineer
Construction Manager
Construction Contractor

Applications



Owner's Role

- A/E Contractor Director

Others

- A/A Contractor provides:
  - Engineering Management
  - Procurement Management
  - Construction Management Contractor Direction
  - Engineering/Construction Coordination
  - Engineering/Procurement Coordination
  - Procurement/Construction Coordination

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN DEVELOPMENT

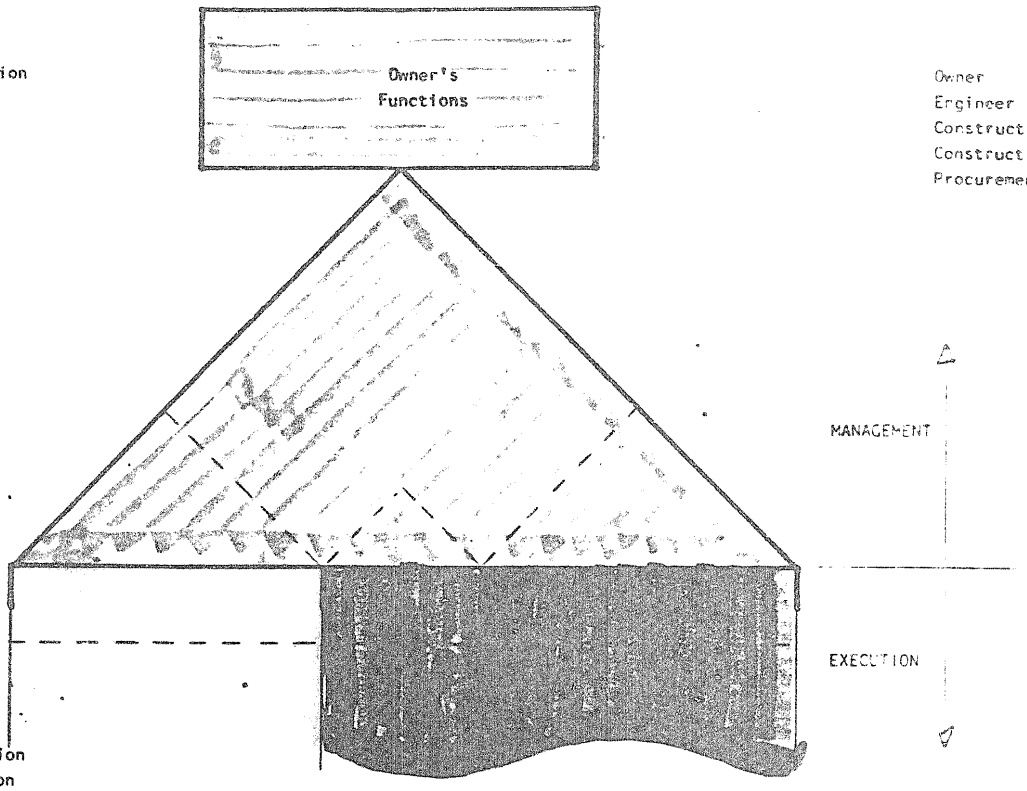
I. Owner is Project Manager/Construction Manager

Description

Owner performs Project & Construction Management role with its own large staff.

Applications

- Idaho Power Authority Policy



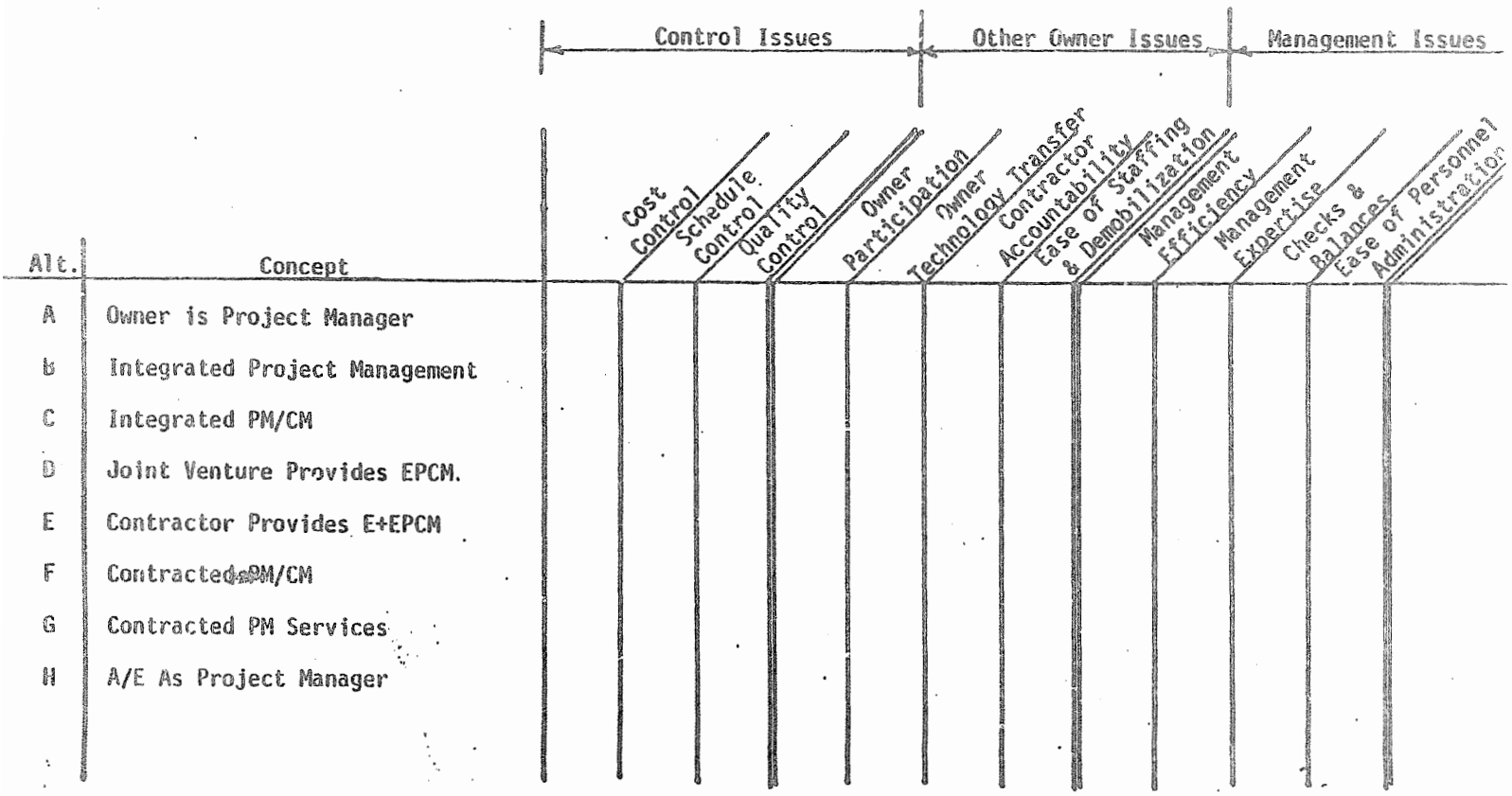
Owner
Engineer
Construction Manager
Construction Contractors
Procurement Contractors

Owner's Role

- Engineering Contractor Direction
- Engineering/Construction Coordination
- Engineering/Procurement Coordination
- Procurement/Construction Coordinator
- Engineering Management
- Procurement Management
- Construction Management

Alaska Power Authority
Susitna Project Management Plan Development

Comparison of Alternative Concepts



Alt.	Concept
A	Owner is Project Manager
b	Integrated Project Management
C	Integrated PM/CM
D	Joint Venture Provides EPCM.
E	Contractor Provides E+EPCM
F	Contracted PM/CM
G	Contracted PM Services
H	A/E As Project Manager

For individual weighting of alternatives

Meeting November 1, 1984

Present APA:	L. Crawford	Bechtel:	R. T. Loder
	J. Perkins		R. N. Seemel
	W. Batt		S. Harwell
	M. Yerkes		R. Tripp
	J. Ferguson		R. Picard
	L. Prentice		
	M. Isaacs		
	B. Petrie		
	J. Larson		

Subject: Susitna Management Plan

R. Seemel opened the meeting outlining the work done since the last meeting, the different charting used, and the fact that it is an open meeting. He welcomed comments from APA.

R. Seemel proceeded in describing the 4 level management organization chart and the respective responsibilities of each organizational level (see attached copy of chart). The following comments were made:

Owner Level

Add Labor Relations, Risk Management, Environmental Policies, Land Acquisition, Power Sales/Utilities Relations

Project Management Level

Add O/M interface, environmental programme.
Entitle one function: "Environment and Other Functional Specialties".

Functional Management

Add "Environmental Compliance".

Then R. Seemel briefly described each of the eight alternatives studied. (See attached list).

Comments:

- Show title and legend on the viewgraphs.
- Explain the brackets.
- Add a turnkey alternative.

7074/288/D3/F1

R. T. Loder explained the criteria used for the comparisons of the alternatives, stated that each of the Bechtel team members ranked each of the alternatives independently, and that the results were unanimous for the first three best choices and very consistent for the others. He then enumerated the alternatives by preferred order. (See attached list).

R. Seemel went through the list of advantages and disadvantages for each alternative. (See attached lists).

Comments by APA

Generally agree with choice number 1 and 2 and comfortable with ranking through 4.

Choice number 1 - appears to have a clear reporting responsibility and a good management information system. Also, the number of people APA would have is low. The fewer people on State payroll the better.

It was suggested that Bechtel consider the cost of options and their potential effect on the cost of the project if poor management leads to increase costs. A cost/benefit analysis of alternatives is required for the Board. Also, Bechtel should develop a range of Authority staffing for the different alternatives.

With Choice number 1, a question was raised about who performs QA? It was mentioned that FERC might see a problem if the same organization does both the QA and QC.

With Choice number 2, a question was raised about who does contructability reviews? The CM doing such reviews was seen as an advantage compared to choice number 1.

It was noted, choice number 2 was similar to the organization used at Intermountain Power Agency (IPA) in Utah.

At that time, the meeting was adjourned until 2:30 p.m.

Meeting resumed at 2:40 p.m.

Present APA:	L. Crawford	Bechtel:	R. T. Loder
	J. Perkins		R. N. Seemel
	W. Batt		S. Harwell
	J. Ferguson		R. Tripp
	L. Prentice		R. Picard

R. Seemel continued enumerating the pros and cons of various alternatives 1 through 4.

Comments by APA Staff

- Use bullet type sentences.
- Rather see Procurement done by CM than engineer.
- How to handle QA/QC by same firm.
- Safety of dam is a critical item.
- How to handle scope changes.
- Mentioned the sequence of hiring in choice number 2: First PM, then Engineer, then CM
- A major advantage of using management contractors (vs. APA staff) is supervision of the design engineer firm.

- The State pay levels are not an absolute limitation, but a political consideration.
- Asked that scope changes be mentioned in the charts.
- A unified management information system is a plus.
- Asked if choice number 1 could be started without including the CM - then make a later decision on the CM (either a different company or the same as PM). Response was positive.
- Referred to where "Official Files" are to be kept in financial reporting.
- Wants to be able to fix accountability on contractor. Will not go for an integrated organization.
- Finance fits well into either of the first two organizations - 1 or 2.

- Bradley Lake project is managed under alternative IA (choice number 6 for Susitna, but not necessarily so low a choice for a small project). It uses 6 permanent APA people plus two temporaries.

- Fairbanks-Anchorage Intertie is also alternative IA and uses 2-3 people.

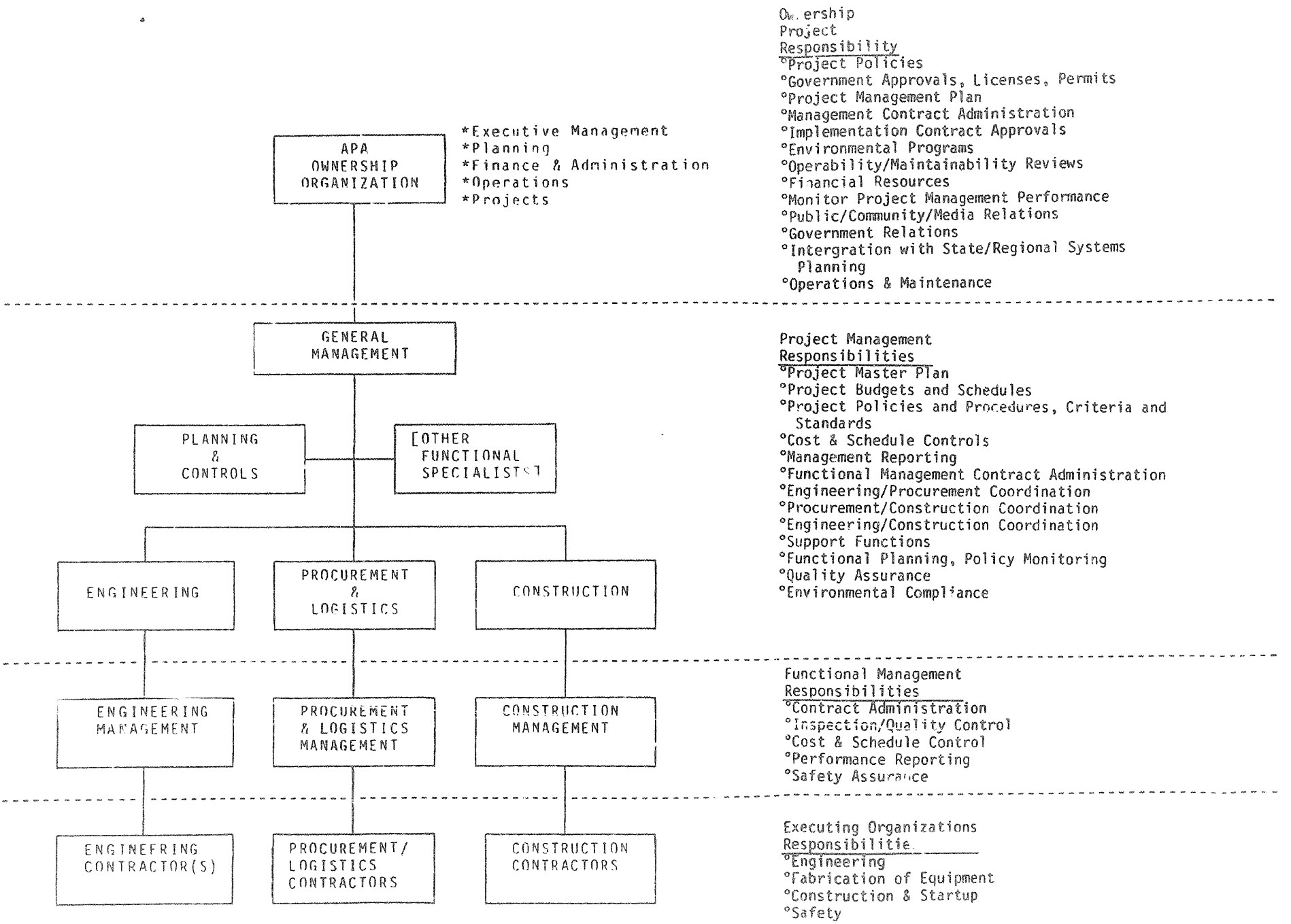
- An estimate for Susitna of 200 people in APA and PM organizations (excluding CM) was mentioned.

- Bechtel should present all the alternatives to the Board of Directors next week, starting from the bottom up, moving up the line quickly, and spending most of the time with the top two choices.

Attachments as stated.

RP/tmm

7074/288/D3/F1


APA
OWNERSHIP
ORGANIZATION
*Executive Management
*Planning
*Finance & Administration
*Operations
*Projects
Ownership
Project
Responsibility
°Project Policies
°Government Approvals, Licenses, Permits
°Project Management Plan
°Management Contract Administration
°Implementation Contract Approvals
°Environmental Programs
°Operability/Maintainability Reviews
°Financial Resources
°Monitor Project Management Performance
°Public/Community/Media Relations
°Government Relations
°Intergration with State/Regional Systems Planning
°Operations & Maintenance
GENERAL
MANAGEMENT
PLANNING
&
CONTROLS
OTHER
FUNCTIONAL
SPECIALISTS
ENGINEERING
PROCUREMENT
&
LOGISTICS
CONSTRUCTION
Project Management
Responsibilities
°Project Master Plan
°Project Budgets and Schedules
°Project Policies and Procedures, Criteria and Standards
°Cost & Schedule Controls
°Management Reporting
°Functional Management Contract Administration
°Engineering/Procurement Coordination
°Procurement/Construction Coordination
°Engineering/Construction Coordination
°Support Functions
°Functional Planning, Policy Monitoring
°Quality Assurance
°Environmental Compliance
ENGINEERING
MANAGEMENT
PROCUREMENT
& LOGISTICS
MANAGEMENT
CONSTRUCTION
MANAGEMENT
Functional Management
Responsibilities
°Contract Administration
°Inspection/Quality Control
°Cost & Schedule Control
°Performance Reporting
°Safety Assurance
ENGINEERING
CONTRACTOR(S)
PROCUREMENT/
LOGISTICS
CONTRACTORS
CONSTRUCTION
CONTRACTORS
Executing Organizations
Responsibilities
°Engineering
°Fabrication of Equipment
°Construction & Startup
°Safety

PRESENTED AT THE NOV, 1 MEETING

EVALUATION CRITERIA

CONTROL ISSUES

COST CONTROL
SCHEDULE CONTROL
QUALITY CONTROL

OTHER OWNER ISSUES

OWNER PARTICIPATION
OWNER TECHNOLOGY TRANSFER
CONTRACTOR ACCOUNTABILITY
EASE OF STAFFING & DEMOBILIZATI

MANAGEMENT ISSUES

MANAGEMENT EFFICIENCY
MANAGEMENT EXPERTISE
CHECKS & BALANCES
EASE OF PERSONNEL ADMINISTRATIO

PRESENTED AT THE NOV 1 MEETING

RANKING

1. ALT II C - PM/CM SERVICES CONTRACTED TO MANAGEMENT CONTRACTOR. OWNER CONTROL THROUGH MANAGEMENT CADRE

2. ALT I C - PM SERVICES CONTRACTED TO ONE MANAGEMENT CONTRACTOR.
CM SERVICES CONTRACTED TO ANOTHER ORGANIZATION
OWNER CONTROL THROUGH MANAGEMENT CADRE

3. ALT IB - PM SERVICES BY INTEGRATED TEAM OF OWNER & MANAGEMENT CONTRACTOR
CM SERVICES CONTRACTED TO ANOTHER ORGANIZATION

4. ALT II B - PM/CM SERVICES BY INTEGRATED TEAM OF OWNER & MANAGEMENT CONTRACTOR

PRELIMINARY LIST OF
ADVANTAGES/DISADVANTAGES
PRESENTED AT THE NOV 1, MEETING.

CHOICE NO. 1 : PM/CM SERVICES CONTRACTED TO MGMT. CONTRACTOR;
(Alternative No. IIC) OWNER CONTROL THROUGH MANAGEMENT CADRE

ADVANTAGES

- Operational organization can be constituted of personnel who have worked together before and who have worked on similar projects before.

- High level of technical expertise (& experience) of personnel is possible

- An efficient working organization should be easier to attain due to choice of single organization to manage work

- Ease of staffing for APA is maximized with this scheme (also mob/demob problems minimized small APA staff size

- Project cost and schedule control should be maximized in this organization due to use of tried and proven systems by experienced personnel using proven procedures.

- Owner only has to look to one management contractor to hold accountable for results. No fragmentation of responsibility.

- This alternative requires the fewest number of people to manage the work (except the alternative where the Owner staffs up to act as his own project manager). This is because redundancy in management functions is limited only to the single interface between the management contractor and the Owner's management cadre.

- Owner's management cadre organization retains control of all major decisions by overviewing each or selected function of the project. Owner can staff selectively to suit his needs.

- Quality control is maximized in this formula by employment of an experienced project management force.

DISADVANTAGES

- Owner direct participation in operational decisions is less than in a fully integrated organization. However, strong owner's management cadre staffing will yield good control.

- The checks and balances inherent in two or more separate organizations responsible for different functions of project management are not present. The checks and balances function will therefore have to be assured by the Owner's management cadre.

- Little technology transfer is realized by the Owner.

CHOICE NO.2: PM SERVICES CONTRACTED TO ONE MANAGEMENT ORGANIZATION.

(ALTERNATIVE I-C) CM SERVICES CONTRACTED TO ANOTHER ORGANIZATION. OWNER CONTROL THROUGH MANAGEMENT CADRE.

ADVANTAGES

- As in IIC, high level of technical expertise and experience can be obtained in management organization with choice of two qualified firms.

- The creation of an organization from two different firms - one who is responsible for engineering management, and the other responsible for construction management will tend to enhance a checks and balances between the engineering and construction activities.

- The owner can look to others to hold accountable for project results (i.e., the Project Management Contractor). However, the existence of a separate CM contractor diminishes somewhat, the accountability of the project management contractor.

- As with choice number 1, ease of staffing for the Power Authority is maximized with this alternative. Mobilization and demobilization problems are minimized because of the relatively small Power Authority staff required.

- As with choice number 1, the owner's management cadre organization retains control of all major decisions by overviewing each project management function.

- Quality control is also maximized in this alternative by employment of an experienced project management force.

DISADVANTAGES

- A "combined" organization created from two different management firms may have growing pains until both learn to work together, coordinate and marry their traditional ways of doing things.

- Differences of opinion between the two management organizations could require increased intercession by the Owner management cadre to resolve differences. Greater owner involvement, and hence more cadre, could be required.

- Cost and schedule control could potentially be as effective as in the number 1 choice. However, some conflict is inherent in attempted marriage of two different control approaches.

- As with choice number 1, Owner direct participation in operational decisions is less than in a fully integrated organization.

- Technology transfer is realized by Owner staff, but from an overview rather than operational standpoint.

- The Owner overview of the project management is not as complete as in choice number 1 due to hiring of a separate management contractor for direct contractor management and procurement management. Owner management cadre proximity to construction management operational decisic making is consequently more remote.

CHOICE NO. 3: PM SERVICES BY INTERGRATED TEAM OF OWNER &
ALTERNATIVE 1B MANAGEMENT CONTRACTOR.
CM SERVICES CONTRACTED TO ANOTHER ORGANIZATION.

ADVANTAGES

- Direct participation by owner is increased over choices No's 1 & 2 due to assignment of his personnel to operational positions within the Project Management Organization.

- Project cost and schedule controls probably rank as high as in choice No. 2 if proven methods and systems of the two management contractors are successfully married.

- Results in good quality control because of the ability to hire experienced CM organization.

- Allows more technology transfer than choices 1 & 2.

- Checks and balance is high due to number of organizations involved.

DISADVANTAGES

- The corollary to increased participation by the owner in the management of the project is increase size of staff required. However, the total owner manning required is less than required by choices 4 & 5.

- Increased problems with personnel administration.

- Not as efficient organization from a management standpoint because of the diverse background of the three groups involved.

- Contractors accountability lower than choices 1 & 2.

- Benefits of an independent overview group are inexistent as the owner participates in the PM functions.

CHOICE NO. 4: (ALTERNATE IIB) PM/CM SERVICES BY INTEGRATED TEAM OF OWNER AND MANAGEMENT CONTRACTOR

ADVANTAGES

- Many of the people will have worked together on other jobs.
- Experienced and trained people available from outside sources.
- Organization tends to be identified as "APA" which is beneficial.
- Good management control and involvement by the Power Authority is possible.
- Good quality control.

DISADVANTAGES

- Requires largest build-up of personnel by the Power Authority next to the total staffing plan - IA.
- Organization takes some time to develop smooth working relationships of the people.
- Personnel administration is difficult because of different organizations

- Checks and balances not available as in some other organizations.

CHOICE NO. 5: OWNER IS THE PROJECT MANAGER.

(ALTERNATIVE I-D) OWNER CONTRACTS OUT TO A "SERVICES" CONTRACTOR AND TO A CONSTRUCTION MANAGEMENT CONTRACTOR.

ADVANTAGES

- Owner's level of participation is high after his build-up of staff but not as high as in some other plans.

- Leads to good quality control.

- Cost control and scheduling are professional but management is cumbersome compared to some other plans and therefore less efficient.

- Ability to bring in experienced and trained people is present.

- Checks and balances are available.

- Good opportunity for "Service group" to identify with the Power Authority.

DISADVANTAGES

- Management is not clear cut - more complicated than in some other plans.

- Mobilization/demobilization difficulty.

- Diminished accountability as the owner deals with two contractors (Eng & CM).

- Functional interfaces to be managed by a group of people who have not worked together before and who lack systems and procedures.

- Benefits of an independent overview group are inexistent as the owner executes the Project management function.

CHOICE NO. 6: (ALTERNATE IA) PM SERVICES BY OWNER - CM SERVICES CONTRACTED TO ANOTHER ORGANIZATION.

ADVANTAGES

- Owner has a high degree of participation.
- Construction management services from an experienced organization.
- Checks and balances between engineering and construction is enhanced.

DISADVANTAGES

- Control system not tested and are manned with technical people from diverse sources.
- Owner's mobilization and demobilization is a problem although not as much as in Choice No. 8 (Alternate IIA).

CHOICE NO. 7 (ALTERNATIVE II-D) OWNER PERFORMS PM AND CM FUNCTIONS ITSELF AND CONTRACTS CONTROLS TO A SERVICES CONTRACTOR

ADVANTAGES

- Owners participation is high.
- Brings in experts in cost control and scheduling.

DISADVANTAGES

- Requires a high level of manning by the Power Authority.
- Services contractor accountability is low.
- Less efficient organization than in some other arrangements.
- Control may not be as effective as anticipated.
- Technology transfer low.
- Few checks and balances.

CHOICE NO. 8 PM/CM SERVICES PERFORMED BY OWNER (ALTERNATIVE IIA):

ADVANTAGES:

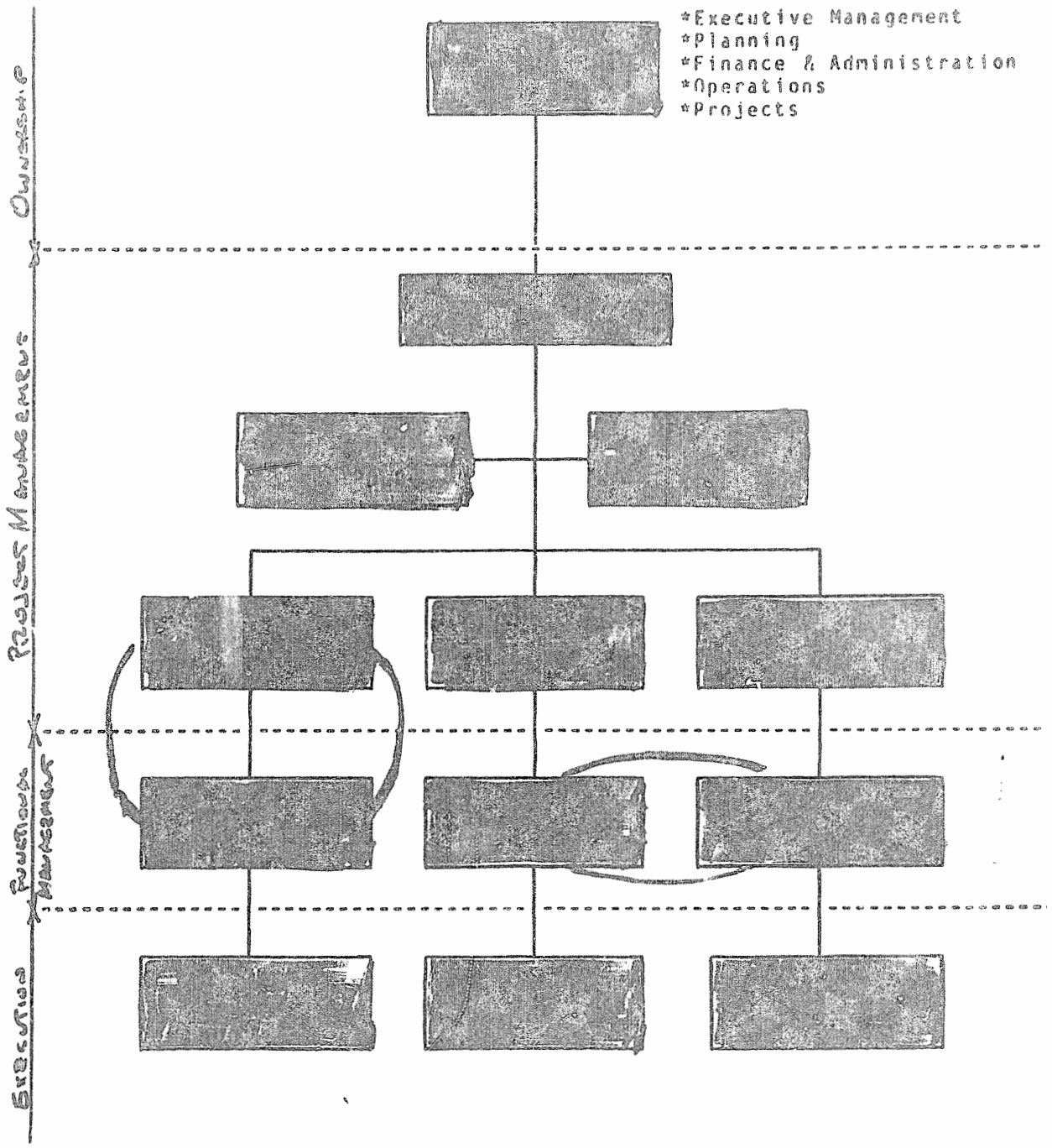
- Owner participation is, of course, higher.
- Ease of personnel administration, once the larger organization is established.

DISADVANTAGES:

- Lack of ability to hire experienced specialists because of state pay scales.
- Lack of team members who have worked together elsewhere (which could be available under other alternatives).
- Owner problems with mobilizing and then de-mobilizing are significant under this alternative.
- Lack of established procedures and systems for management and controls.

1A

Alaska Power Authority
SUSITNA PROJECT MANAGEMENT PLAN
Alternative Management Concepts



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SUSITNA PROJECT MANAGEMENT PLAN
Alternative Management Concepts

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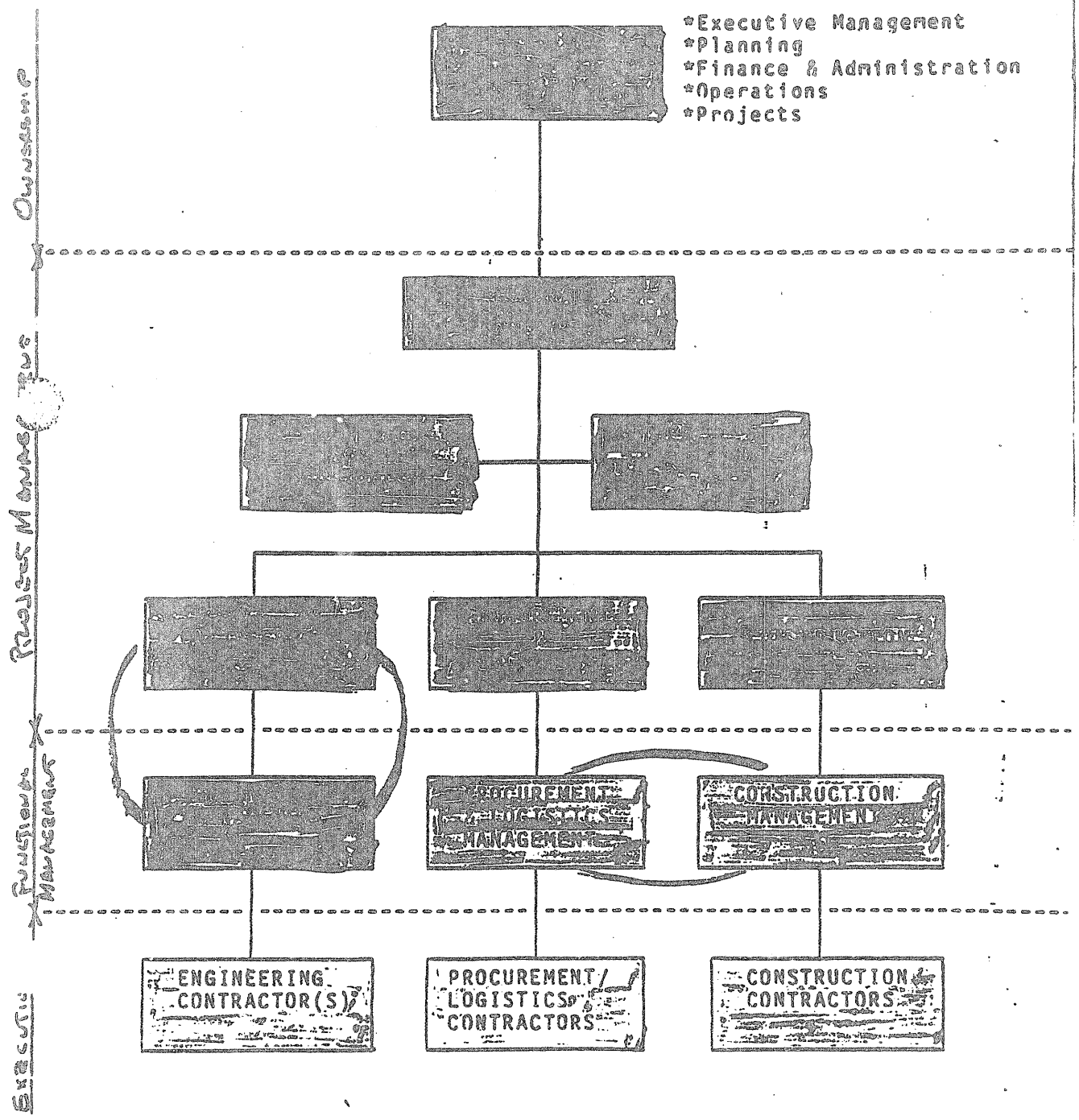

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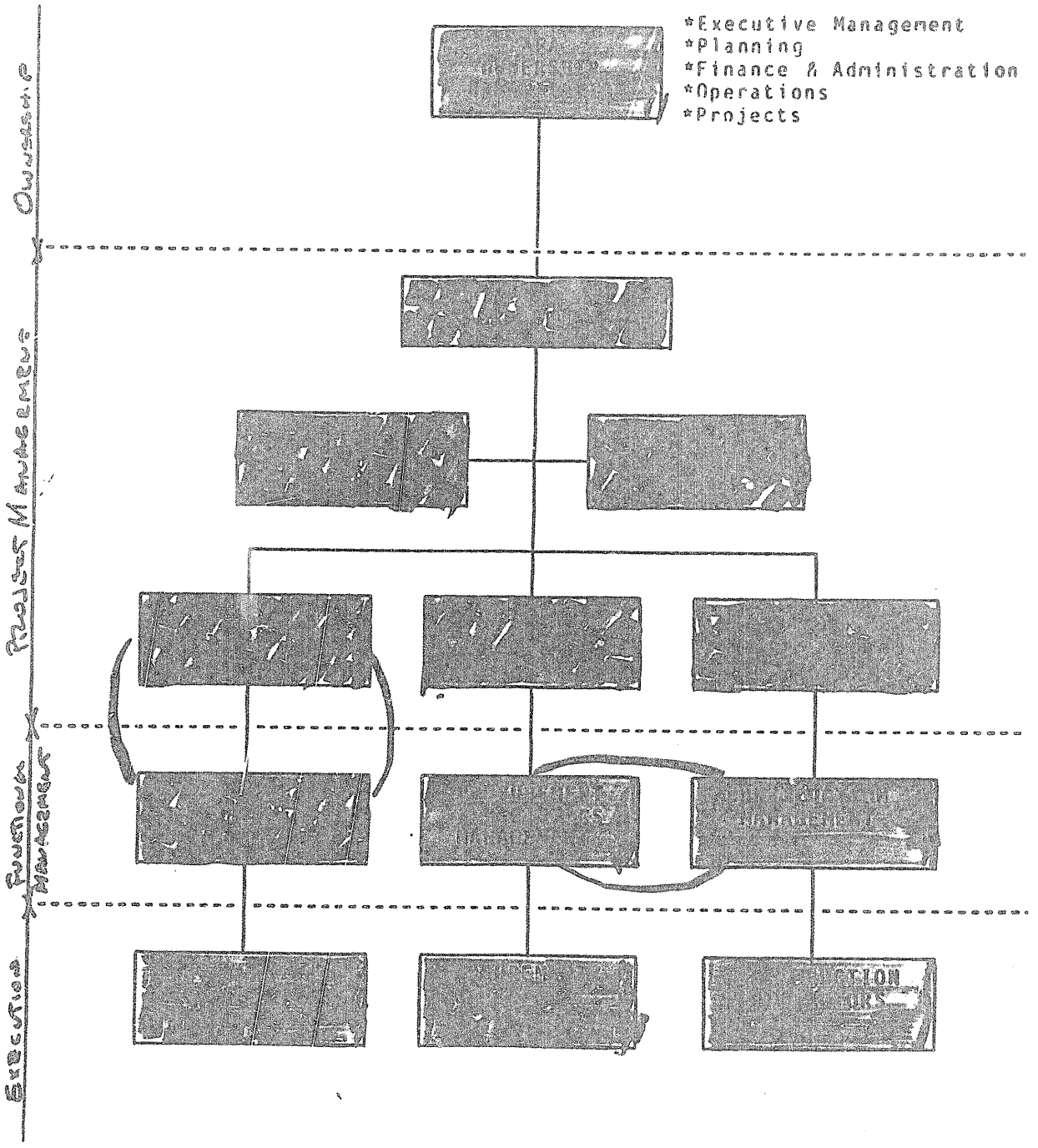
Alternative Management Concepts



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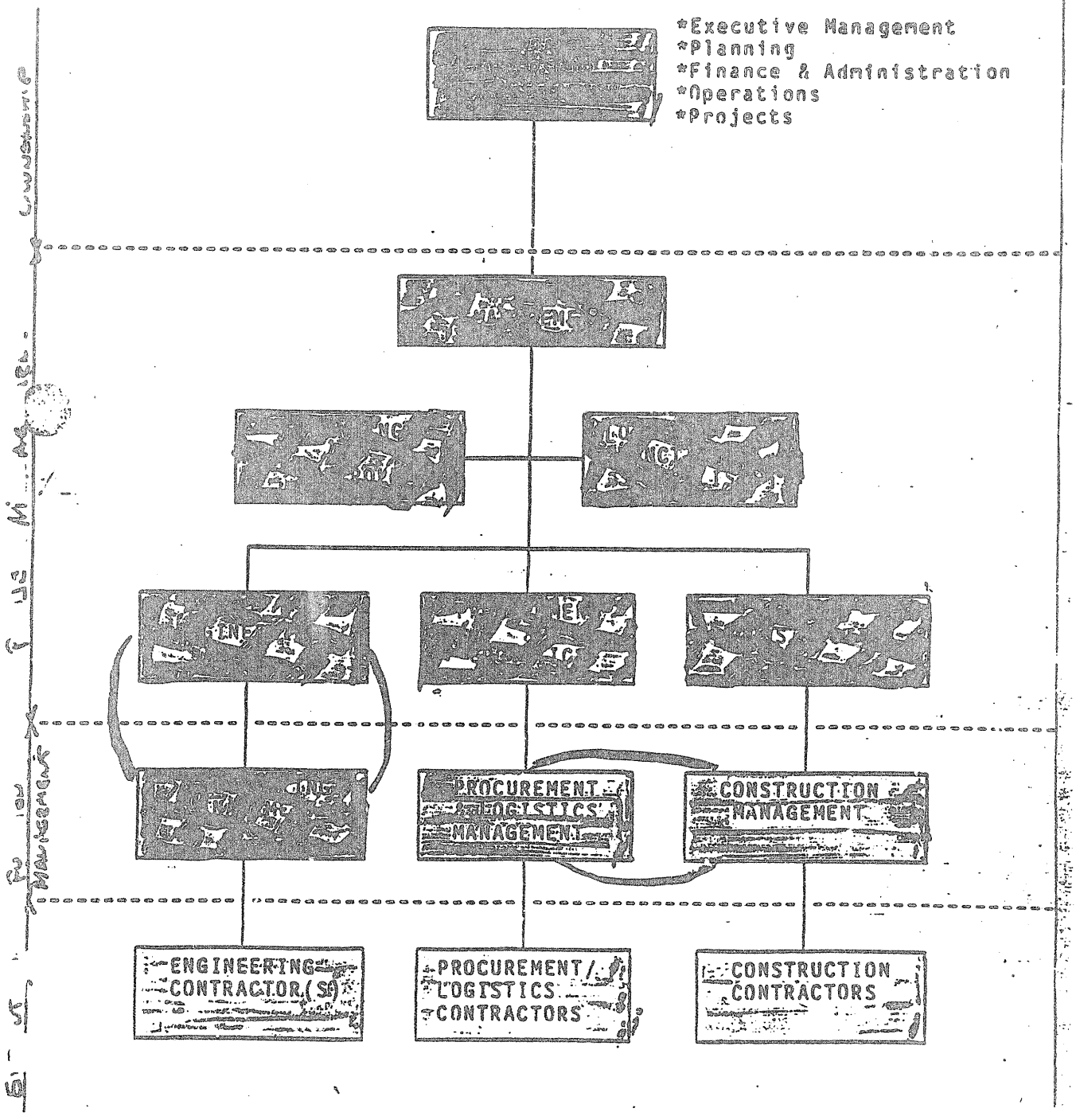

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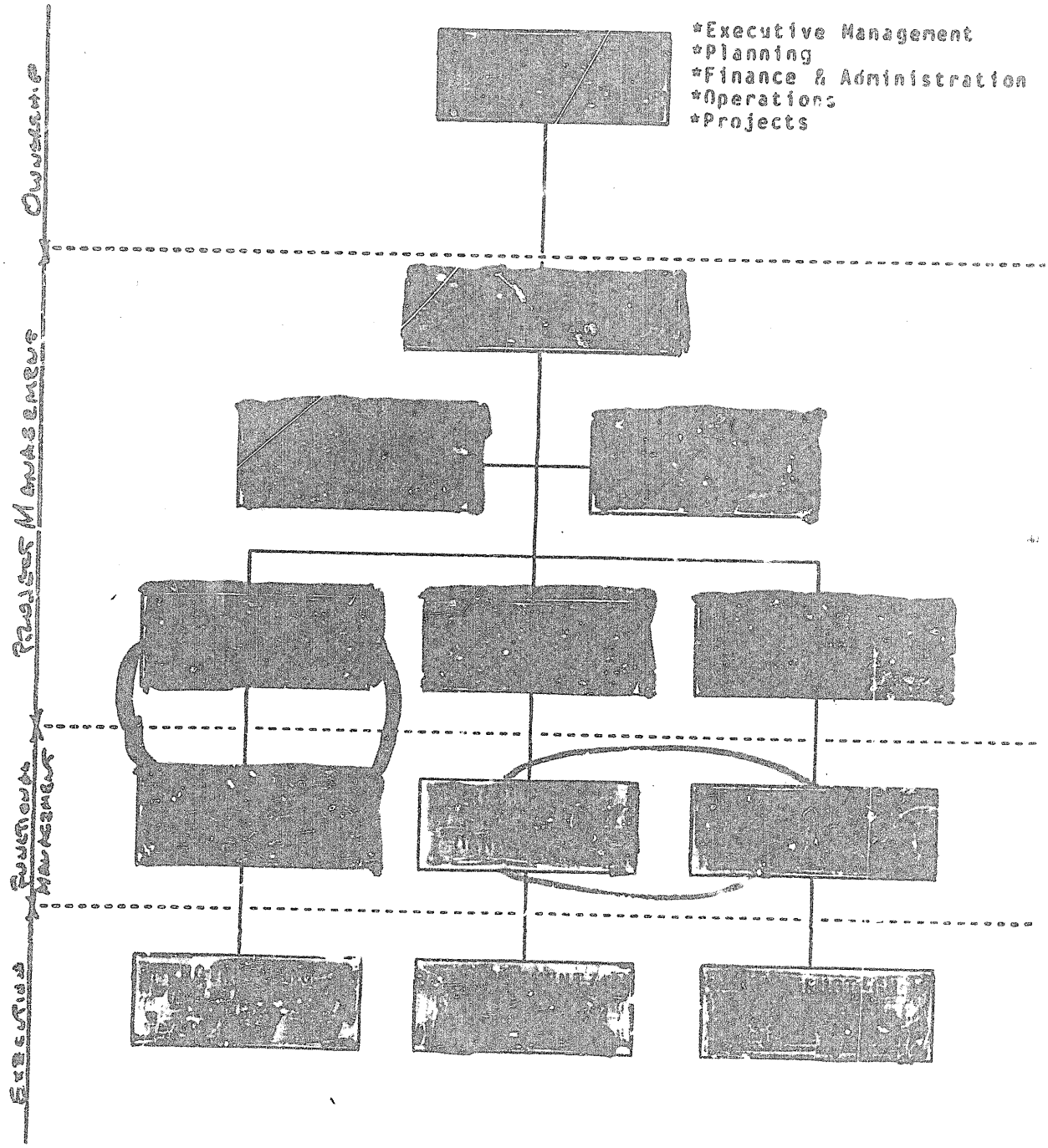

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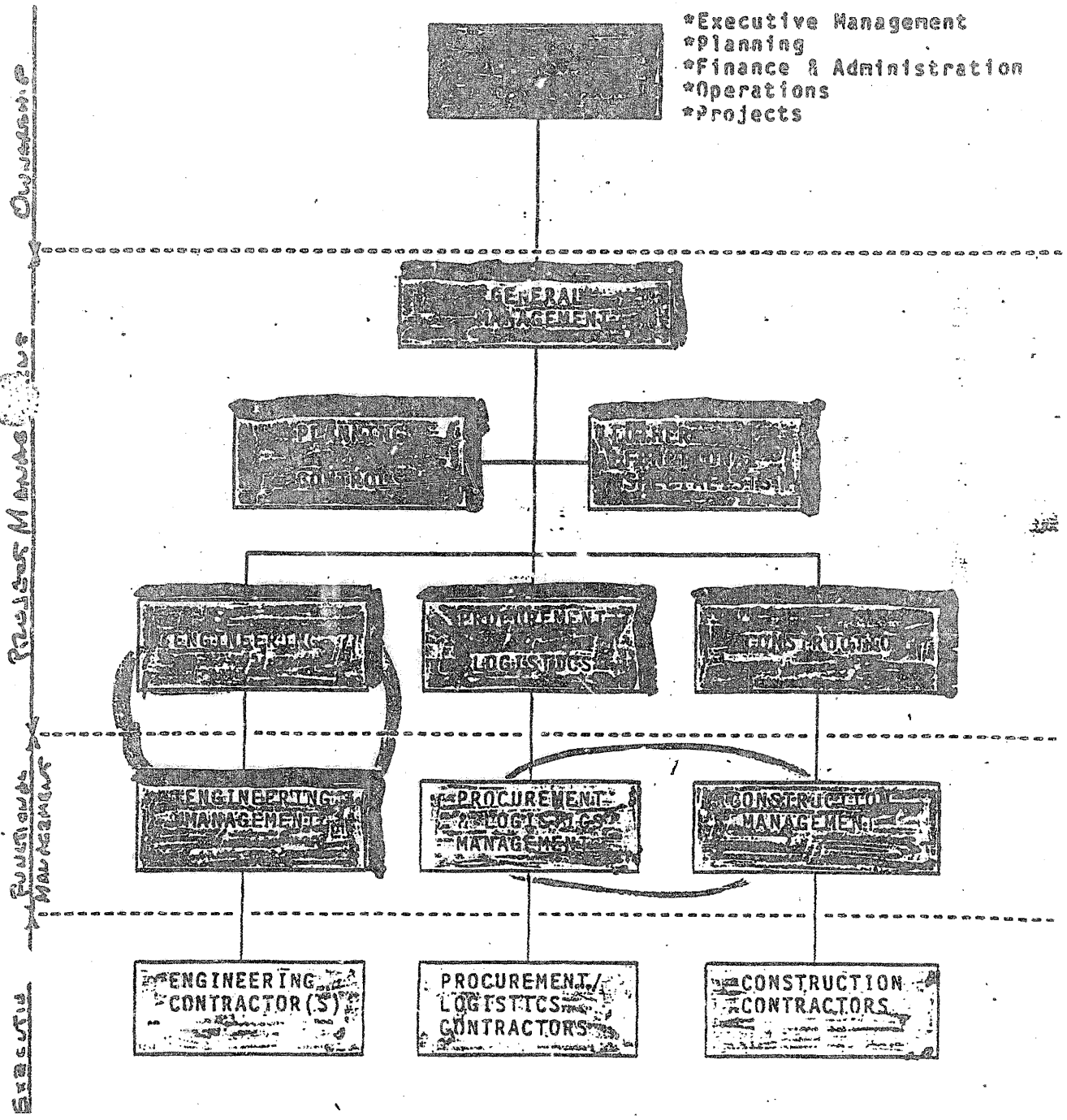
Alternative Management Concepts



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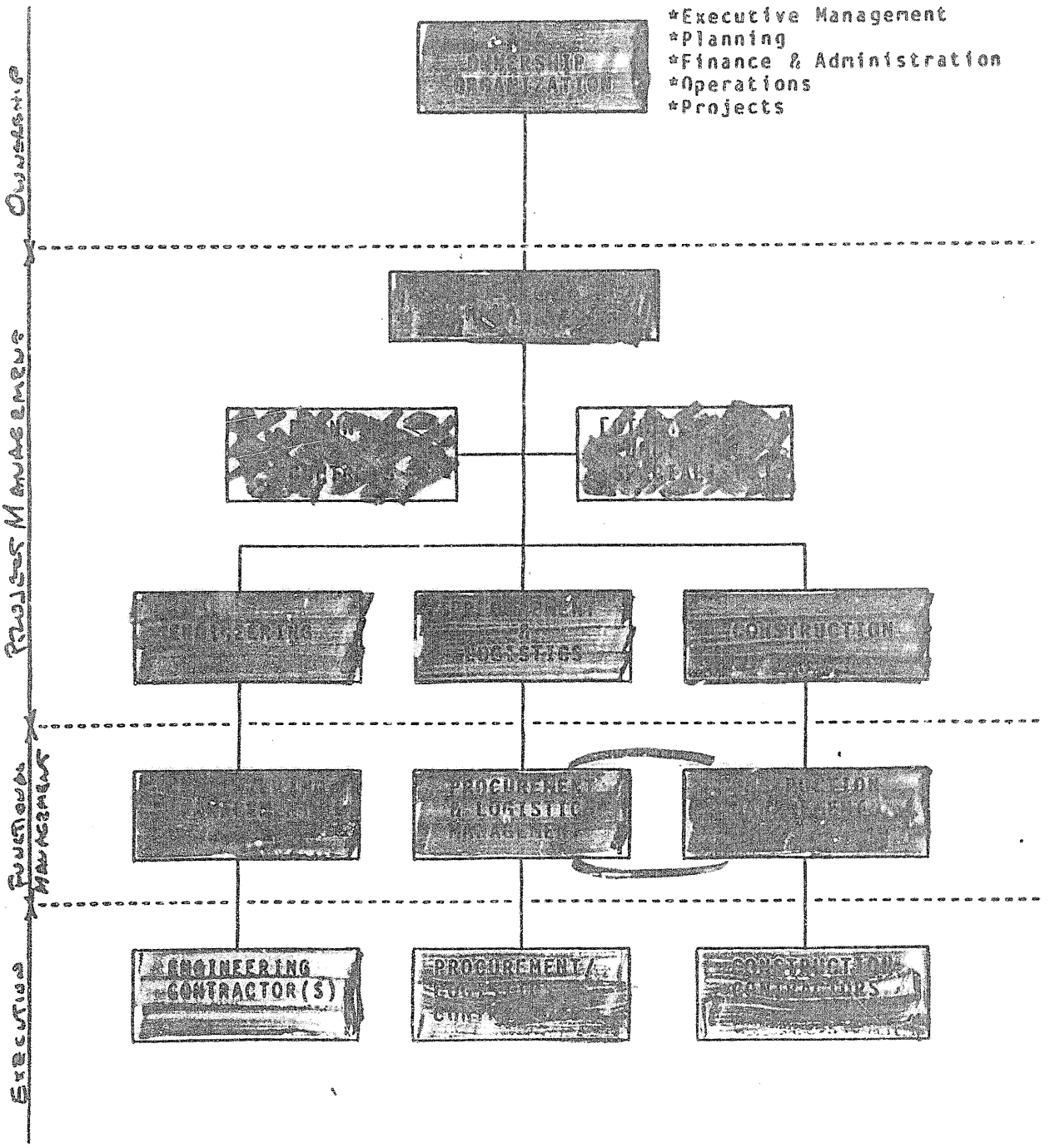
Alternative Management Concepts



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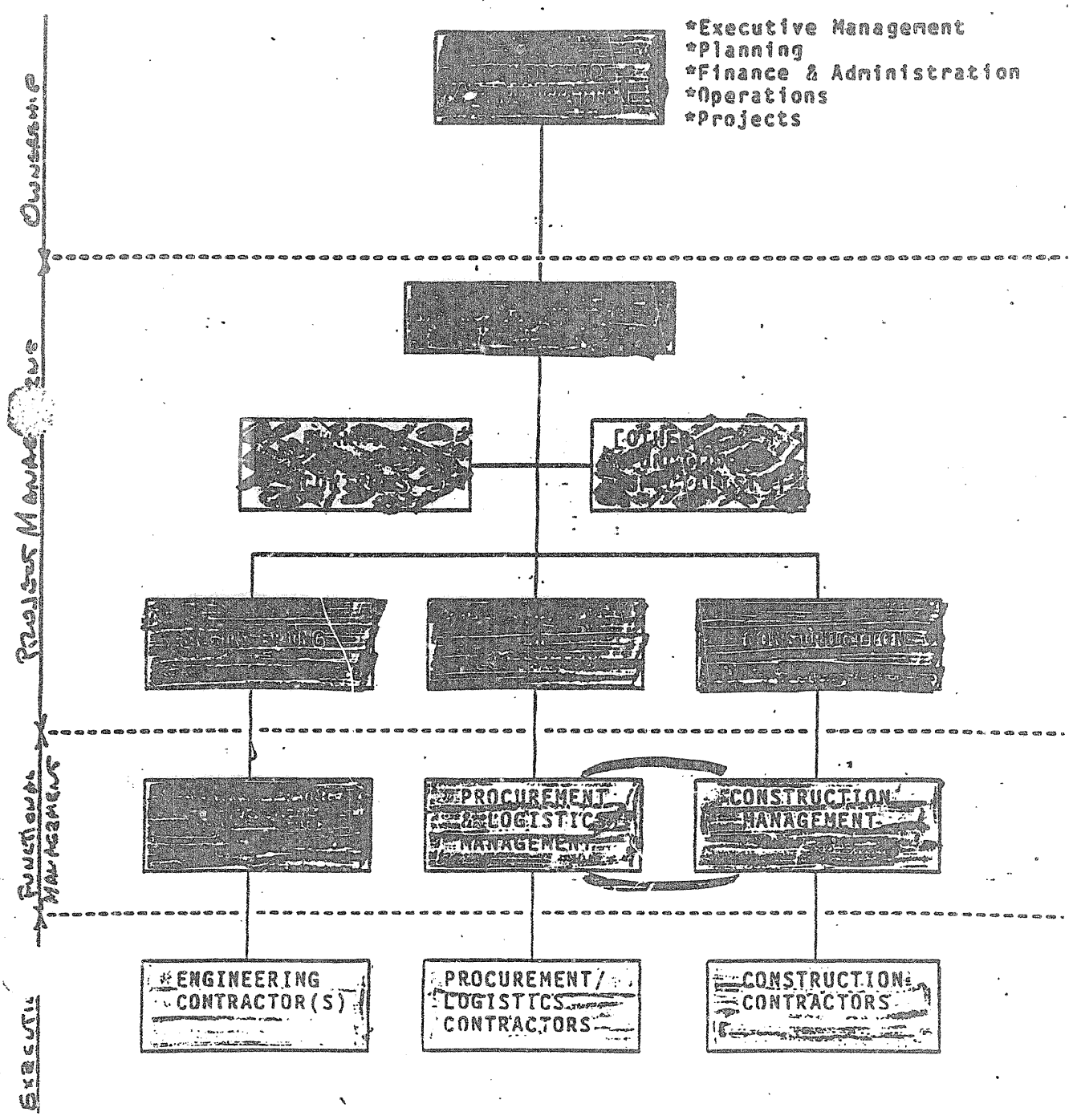

IIA

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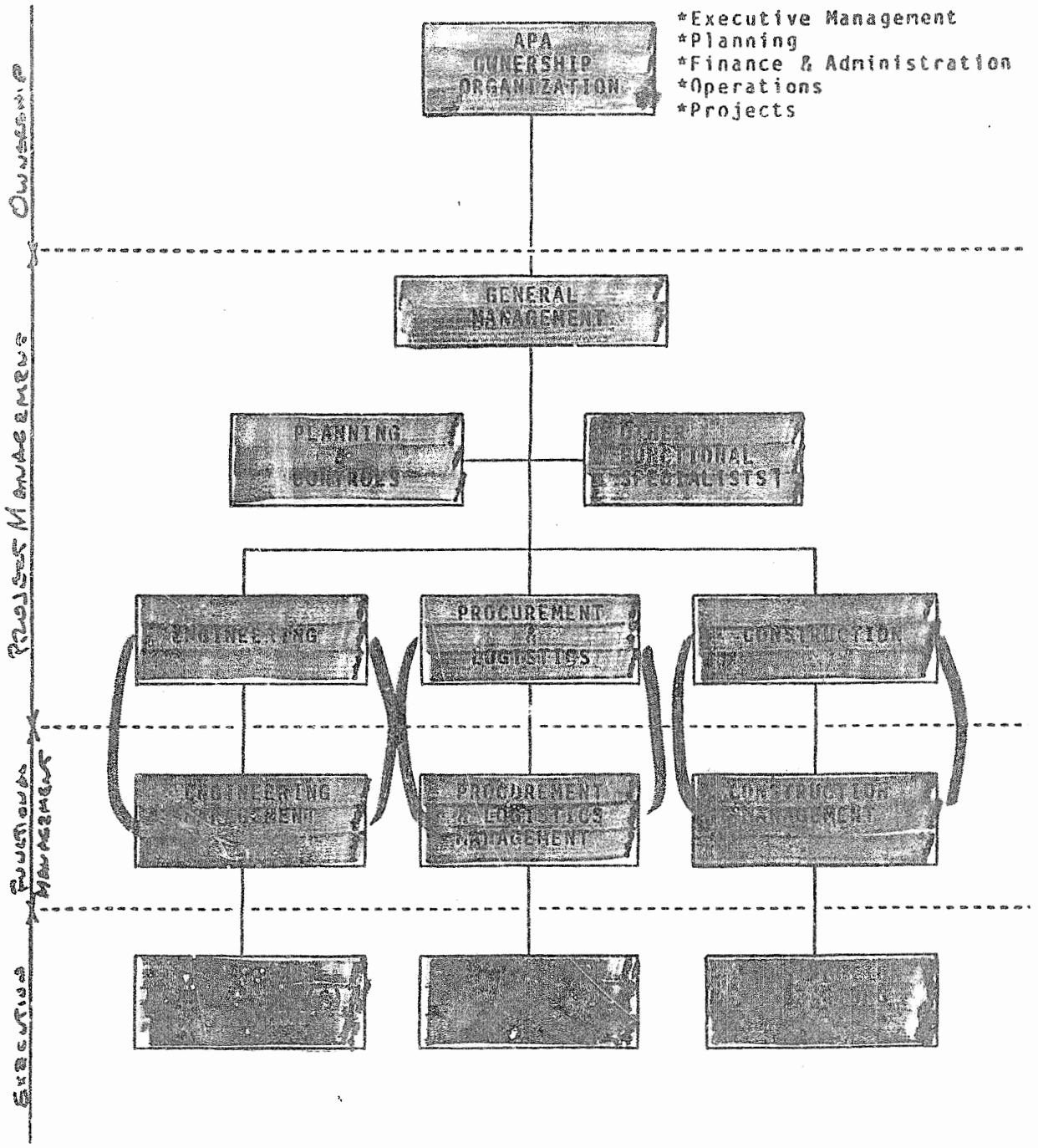

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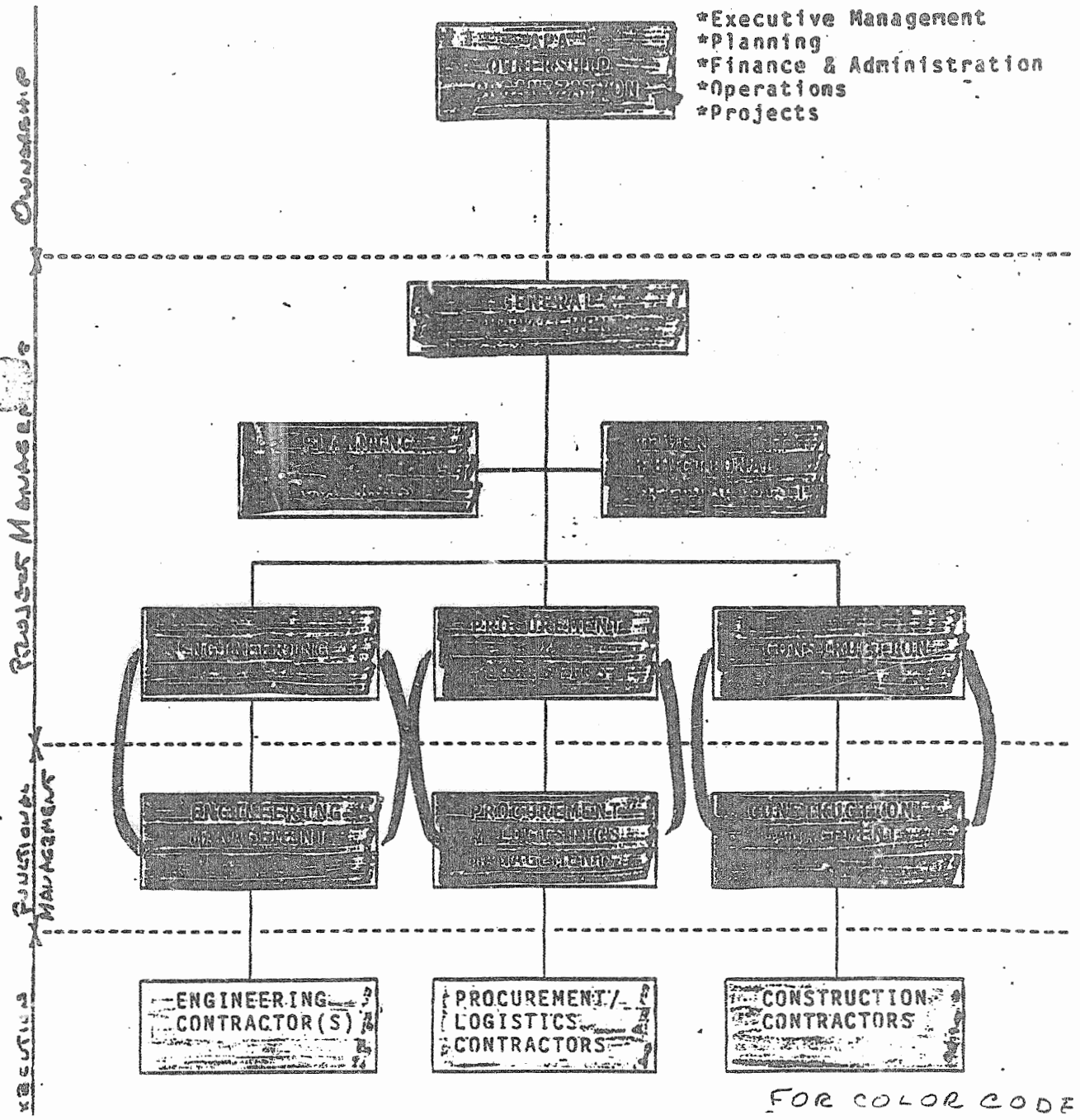
Alternative Management Concepts

IIA



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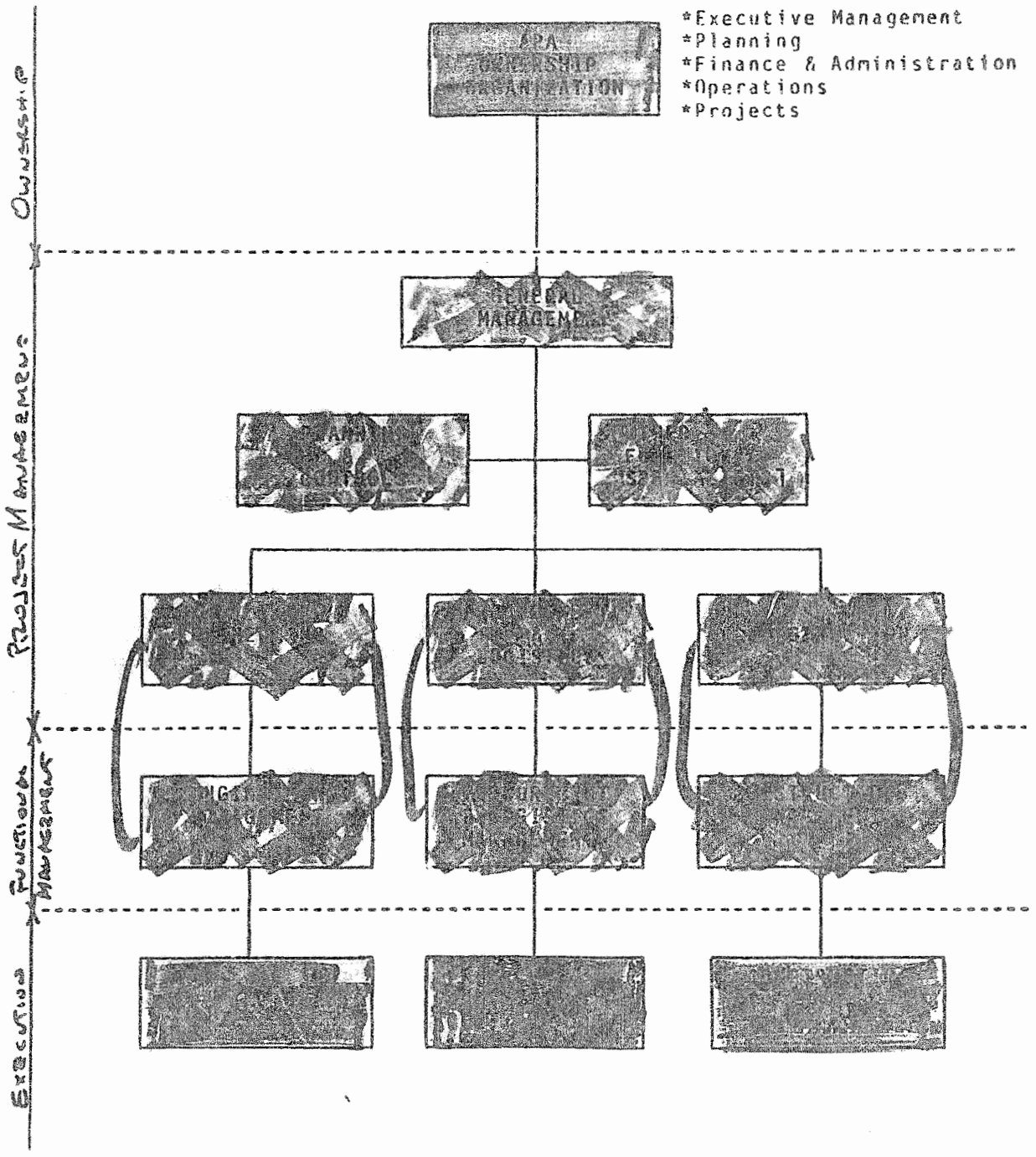
SUSITNA PROJECT MANAGEMENT PLAN
Alternative Management Concepts



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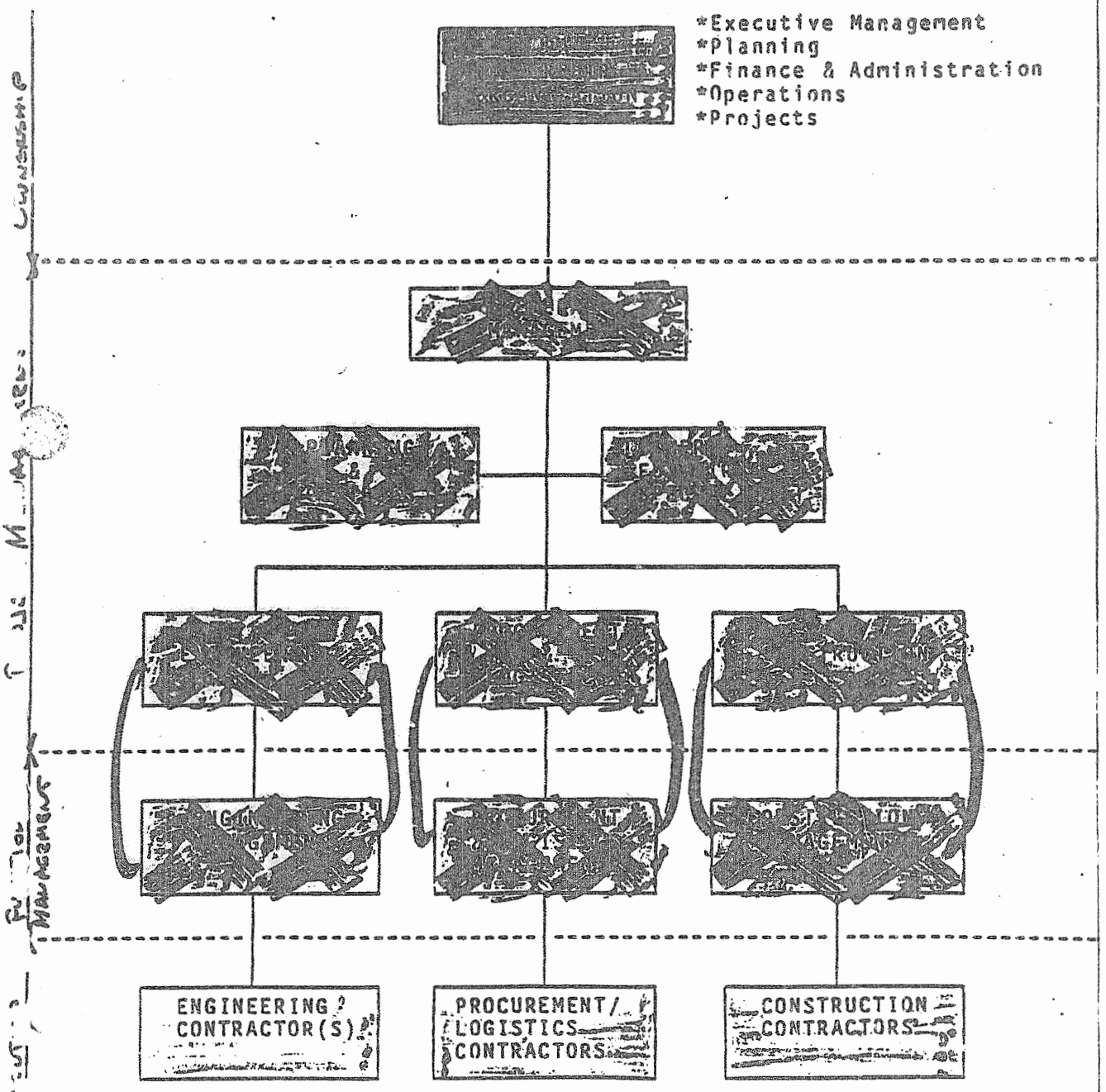
Alternative Management Concepts



II C

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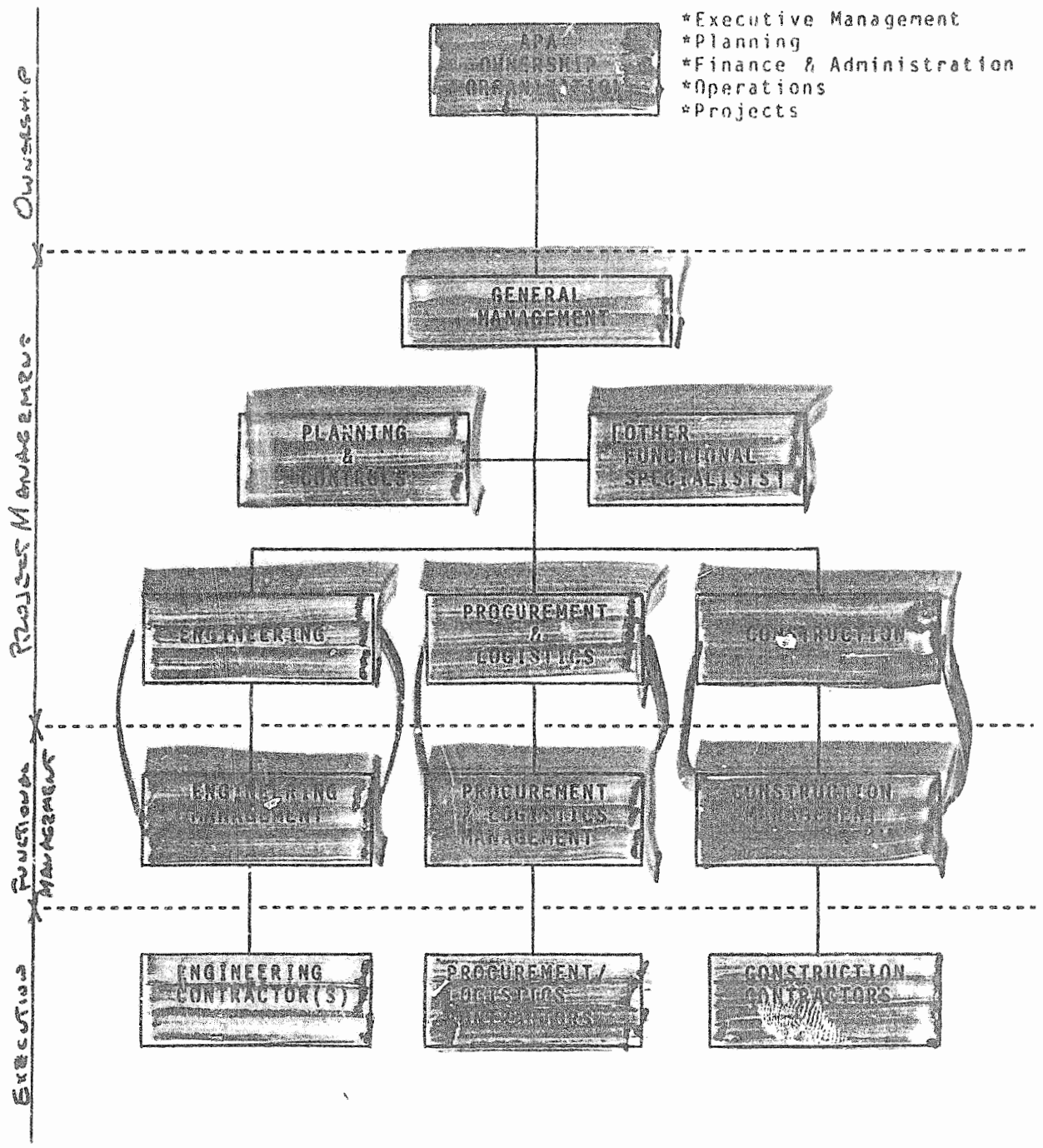
Alternative Management Concepts



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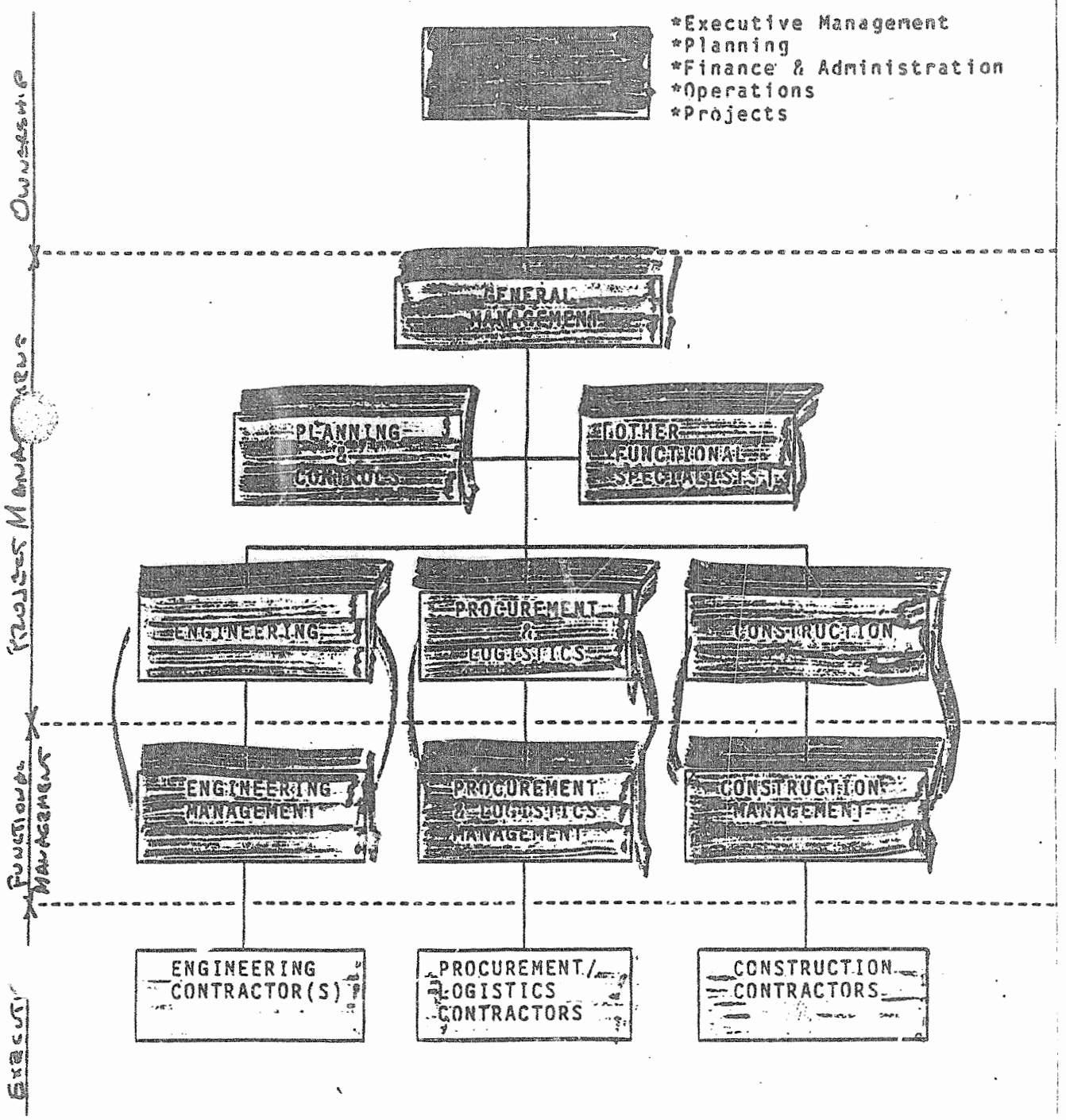

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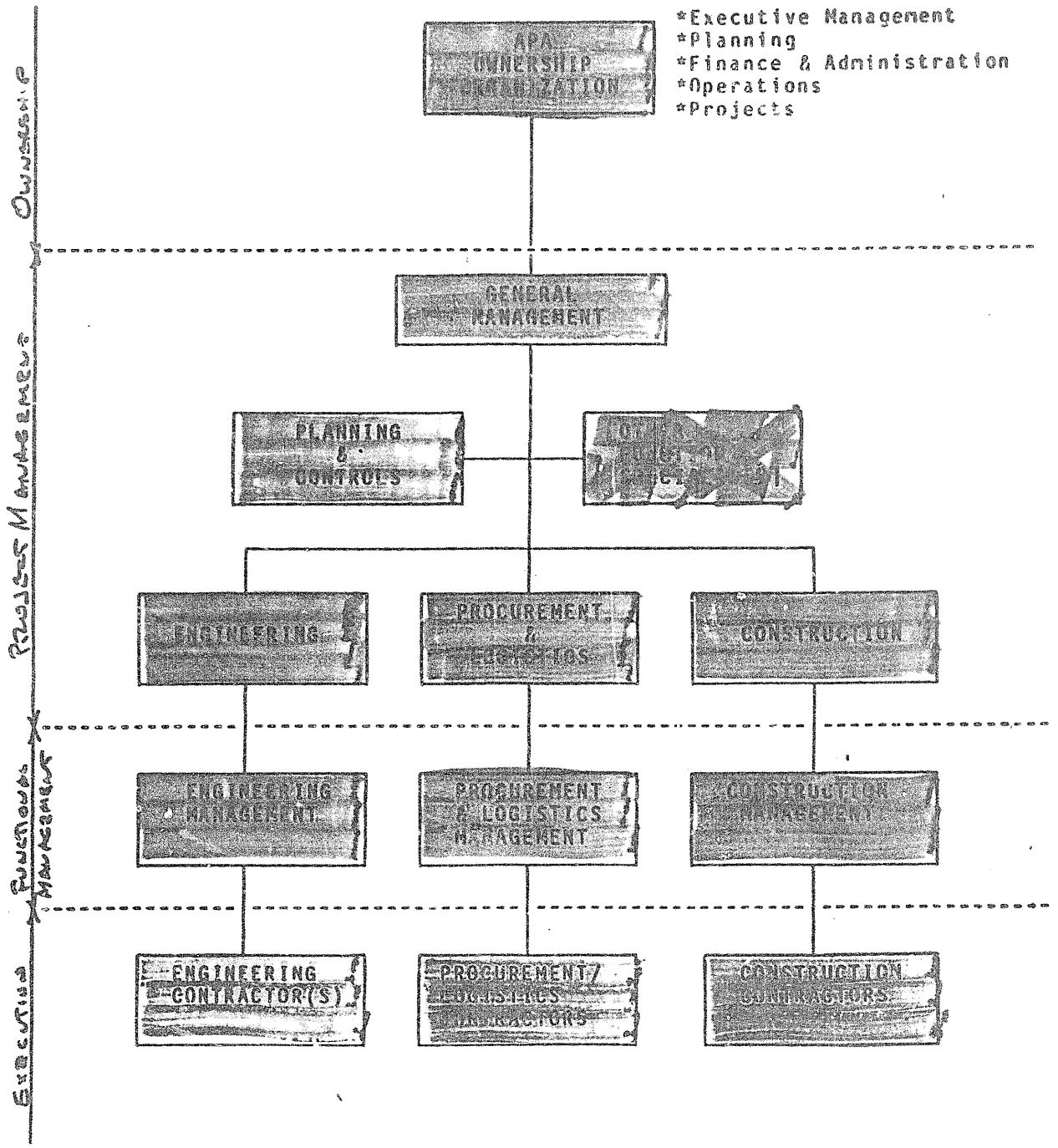

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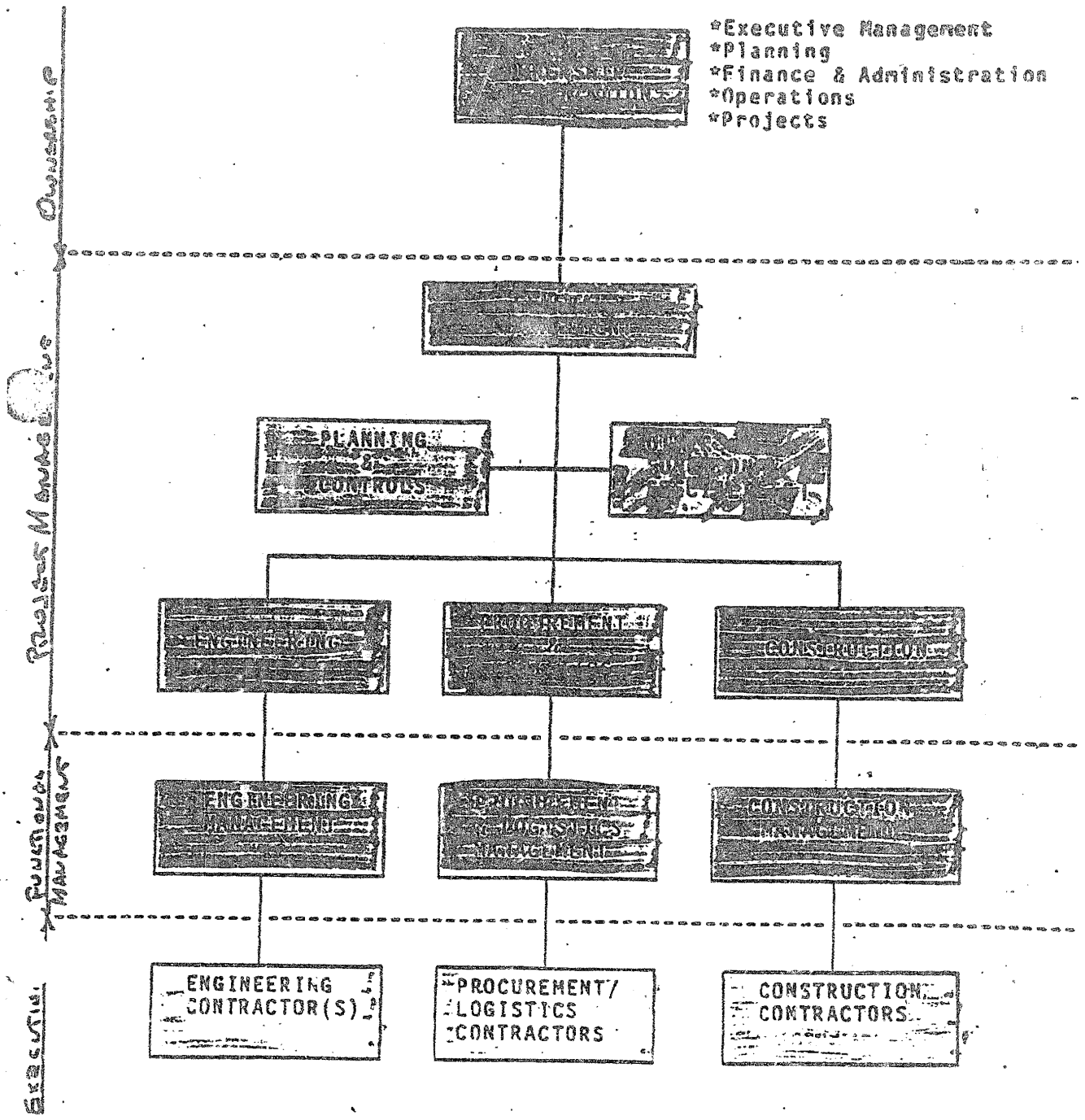
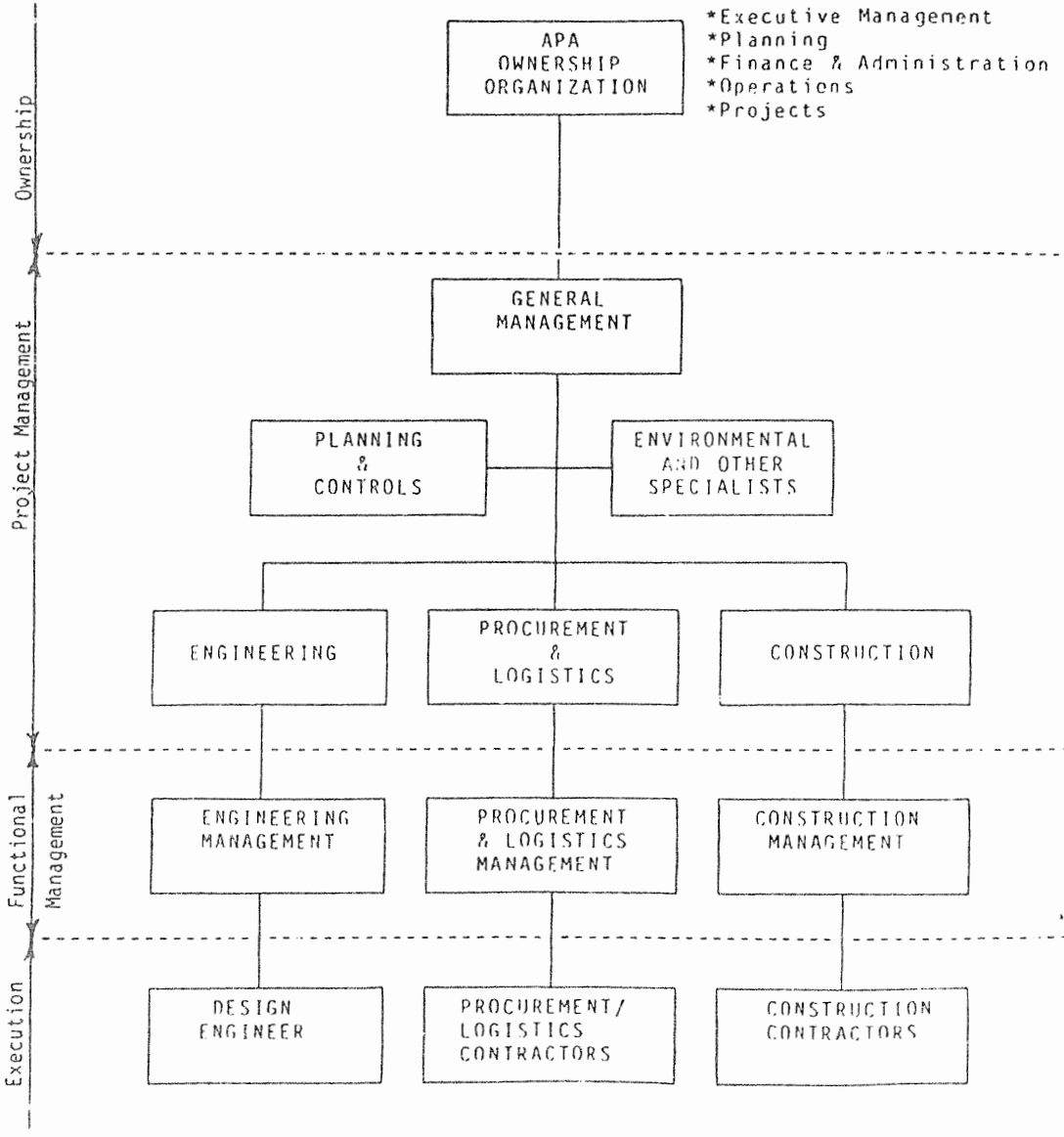


SUSITNA HYDROELECTRIC PROJECT
MANAGEMENT STUDY

BRIEFING BOOK

9 Nov 84



Ownership Project Responsibilities
- °Project Policies (Labor Relations, Risk Management, etc.)
- °Government Approvals, Licenses, Permits
- °Right-of-Way Acquisitions
- °Power Sales/Utility Relations
- °Project Management Plan
- °Management Contract Administration
- °Implementation Contract Approvals
- °Environmental Policy
- °Operability/Maintainability Reviews
- °Financial Resources
- °Monitor Project Management Performance
- °Public/Community/Media Relations
- °Government Relations
- °Integration with State/Regional Systems Planning
- °Operations & Maintenance

Project Management Responsibilities
- °Ownership/Engineering Coordination (including Operations & Maintenance Considerations)
- °Ownership/Procurement Coordination
- °Ownership/Construction Coordination
- °Project Master Plan
- °Project Budgets and Schedules
- °Project Policies, Procedures, Criteria and Standards
- °Cost & Schedule Controls
- °Management Reporting
- °Functional Planning, Policy Monitoring
- °Functional Management Contract Administration
- °Engineering/Procurement Coordination
- °Procurement/Construction Coordination
- °Engineering/Construction Coordination
- °Support Functions (Labor Relations, Legal, Insurance, Etc.)
- °Quality Assurance
- °Environmental Programs

Functional Management Responsibilities
- °Contract Administration
- °Inspection/Quality Control
- °Cost & Schedule Control
- °Performance Reporting
- °Environmental Compliance

Execution Contractors' Responsibilities
- °Engineering
- °Fabrication of Equipment
- °Infrastructure Operation
- °Construction & Startup

SUSITNA PROJECT MANAGEMENT PLAN
Alternative Management Concepts

EVALUATION CRITERIA

CONTROL ISSUES

- COST CONTROL
- SCHEDULE CONTROL
- QUALITY CONTROL

OTHER OWNER ISSUES

- OWNER PARTICIPATION
- OWNER TECHNOLOGY TRANSFER
- CONTRACTOR ACCOUNTABILITY
- EASE OF STAFFING & DEMOBILIZATION

MANAGEMENT ISSUES

- MANAGEMENT EFFICIENCY
- MANAGEMENT EXPERTISE
- CHECKS & BALANCES
- EASE OF PERSONNEL ADMINISTRATION

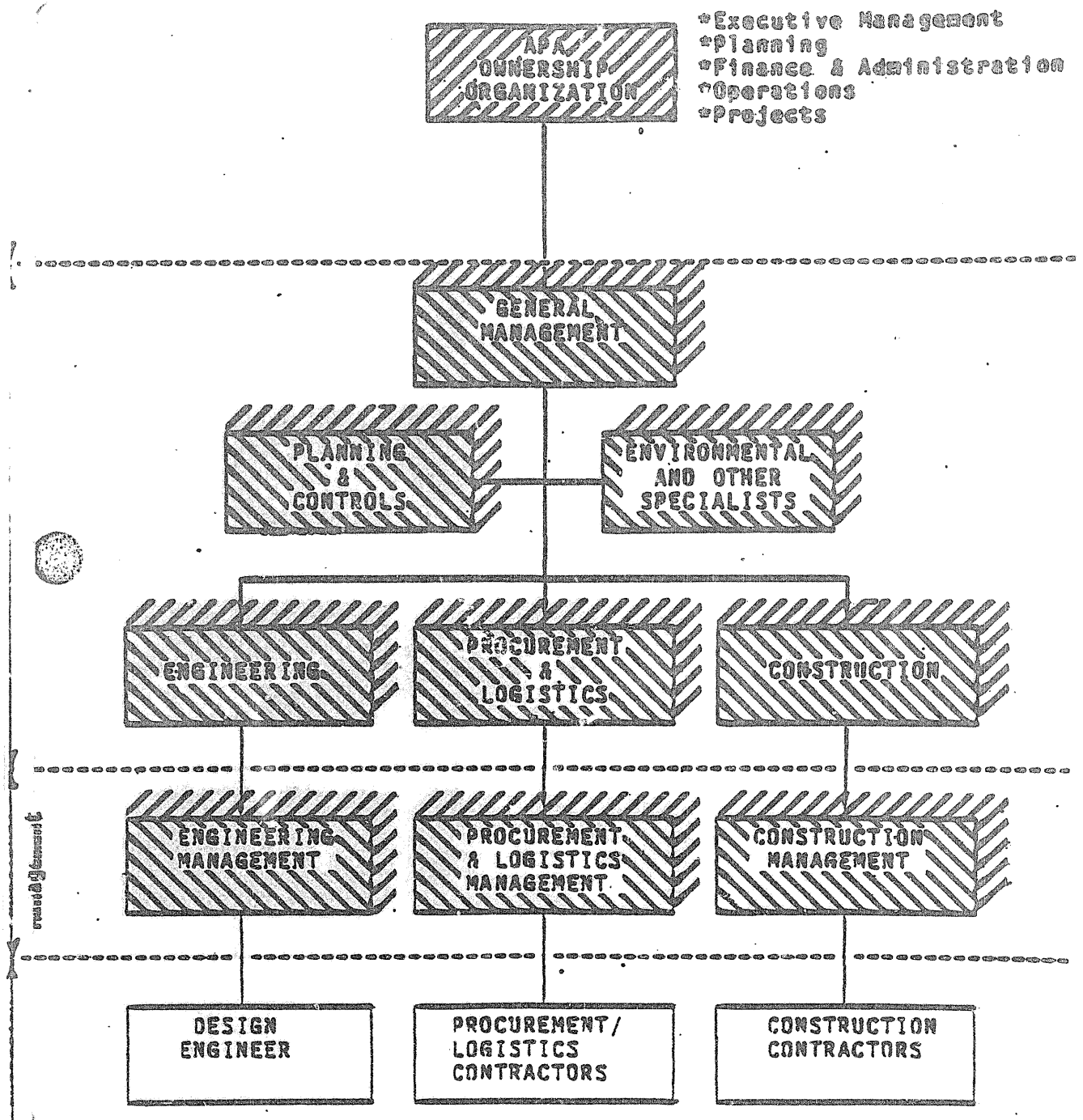
SUSITNA PROJECT MANAGEMENT PLAN
Alternative Management Concepts

SUMMARY COMPARISON OF ALTERNATIVES 1 AND 2

	ALTERNATIVE 1 ONE CONTRACTOR PROVIDES ALL MANAGEMENT	ALTERNATIVE 2 PROJECT AND CONSTRUCTION MANAGEMENT CONTRACTED SEPARATELY
*STAFFING		
-TOTAL	340-420	360-440
-APA	30-40	30-40
*LEVELS OF MANAGEMENT	2	3
*INDEX OF MANAGEMENT ACTIONS	220	290
:OTHER ISSUES		
-MANAGEMENT SYSTEMS EFFICIENCY	+	-
-CHECKS & BALANCES	-*	+
-ORGANIZATIONAL CONFLICT	+	-
-CONTRACTOR ACCOUNTABILITY	+	-
*NET ORGANIZATIONAL EFFECTIVENESS	+	-

*ANY DEFICIENCIES TO BE ELIMINATED BY SPECIAL PROVISIONS AS APA OVERSIGHT, COMMITTEES, OUTSIDE EXPERTS, ETC.

Alternative 1: One Contractor Provides All Management



PROJECT MGMT. & CONSTR. MGMT.
CONTRACTED TO SINGLE MANAGEMENT FIRM
OWNER'S CONTROL IS EXERCISED THROUGH MGMT. CADRE

- PREFERRED ORGANIZATIONAL CONCEPT
- TOTAL PROJECT MGMT. UNIFIED - ONE MANAGEMENT CONTRACTOR
- OWNER CONTROL THROUGH STRATEGICALLY PLACED CADRE PERSONNEL

ADVANTAGES

- OWNER STAFFING OPTIMIZED (REQUIREMENTS REDUCED TO ABOUT 30-40 PEOPLE)
- ORGANIZATIONAL EFFICIENCY IS MAXIMIZED BY EMPLOYING AN ESTABLISHED TEAM
- MANAGEMENT/TECHNICAL EXPERTISE BENEFITS FROM USING EXPERIENCED CONTRACTOR
- OWNER CONTROL - MAXIMIZED WITH MINIMUM PERSONNEL THROUGH PROJECT PROCEDURES (OWNER APPROVAL PROCESS)
- PROJECT MANAGEMENT ACCOUNTABILITY - UNIFIED IN SOLE MANAGEMENT FIRM
- QUALITY - MAXIMIZED BY EMPLOYMENT OF EXPERIENCED MANAGEMENT FIRM
- PROJECT CONTROLS - OPTIMIZED (UNIFIED CONTROL AND REPORTING SYSTEM)

DISADVANTAGES

- OWNER PARTICIPATION LESS THAN IN FULLY INTEGRATED ORGANIZATION
- CHECKS AND BALANCES - OWNER CADRE MUST PLAY GREATER ROLE IN ORDER TO ASSURE CHECKS AND BALANCES BETWEEN MAJOR FUNCTIONS
- TECHNOLOGY TRANSFER TO OWNER LESS THAN IN FULLY INTEGRATED ORGANIZATION

PROJECT MGMT. AND CONSTR. MGMT. SERVICES
CONTRACTED TO ONE MANAGEMENT FIRM
OWNER CONTROL EXERCISED THROUGH MGMT. CADRE

SUMMARY

This form of project organization is considered the preferred organizational concept for the Susitna project. It unifies in one project management firm, the responsibility for management of all elements of the project. The Owner retains control of important project decisions through a shadow organization of owner cadre personnel strategically placed to overview the operations of the management organization. Owner control is exercised through the approvals procedures established for the project. The owner's management cadre interfaces with the project management organization at the functions and levels chosen by the owner to provide desired control. This cadre provides owner direction to the project management group.

ADVANTAGES

° Organizational Efficiency

The management organization created by assigning the project management to a single firm should benefit from assignment of personnel who have worked together before on similar projects. Consequently, the functioning of the total organization should be maximized through this unified approach compared to alternatives where management is split between two firms. This would be particularly true in the early stages of the project. Redunancy in management functions is limited only to the single interface between the management contractor and the Owner's management cadre.

° Management and Technical Expertise

This alternative likewise permits maximization of the expertise brought to the project. Selection of an experienced firm with a proven record on like projects can permit assignment of qualified personnel with proven track records. This reduces the risk to the project of depending on relatively inexperienced personnel to "grow into the job."

° Impact on Owner Organization (Staffing)

This alternative, although requiring more owner involvement (and staffing-up) than the "turnkey" approach where he exerts effectively no operational control, represents an optimization of his resources. The owner is able to exercise control of the Project Manager's operations through a relatively small cadre who monitors the PM/CM's operations. These cadre represent the interface between the PM/CM and the "Owner" and this interface exists

throughout the upper echelons of the management organization, not just at the top. The order of magnitude of the number of owner personnel needed to create such a cadre is about 30 to 40. Due to the relatively small investment in additional personnel by the Owner, this minimizes problems of mobilization and demobilization of a project management staff.

- Owner Control

  This form of organization permits excellent control of important project decisions by the owner. It is achieved primarily through implementation of practical procedures for the administration of the project approvals function by the owner.

  Owner's management cadre organization retains control of all major decisions by overviewing each (or selected) function of the project. Owner can staff selectively to suit his needs.

- Project Accountability

  Owner only has to look to one management contractor to hold accountable for results. No fragmentation of responsibility.

- Quality Control and Quality Assurance

  Quality control can be exercised by the Project Management organization under the basic philosophy that: nothing gets done by the Contractor or supplier/installer without the approval of the Project Manager or its designated representative. This control includes continuous verification of quality of concrete, both in the mixing plant and in the forms, gradation of fill materials in embankment work, embedment, alignment and job interfaces with other contractors before allowing any one contractor to proceed. The Owner, through its management cadre quality assurance staff can directly monitor this program at the site.

- Project Controls and Management Information Systems

  The selection of a single management firm to manage all activities of the project should result in emplacement of compatible controls systems at all working levels of the project. The only interface then becomes the establishment of the interface between the Project Manager's control systems and the Owner's reporting and management information system. (NOTE: In all probability, the Project Manager who is selected will possess a completely integrated project controls reporting and management information system proven on previous projects. The Power Authority may want to consider

evaluating the PM's proprietary system for possible adoption in its entirety on the Susitna project).

DISADVANTAGES

- Owner Participation

  Owner direct participation in operational decisions is less than in a fully integrated organization. However, strong owner's management cadre staffing can yield good control.

- Checks and Balances

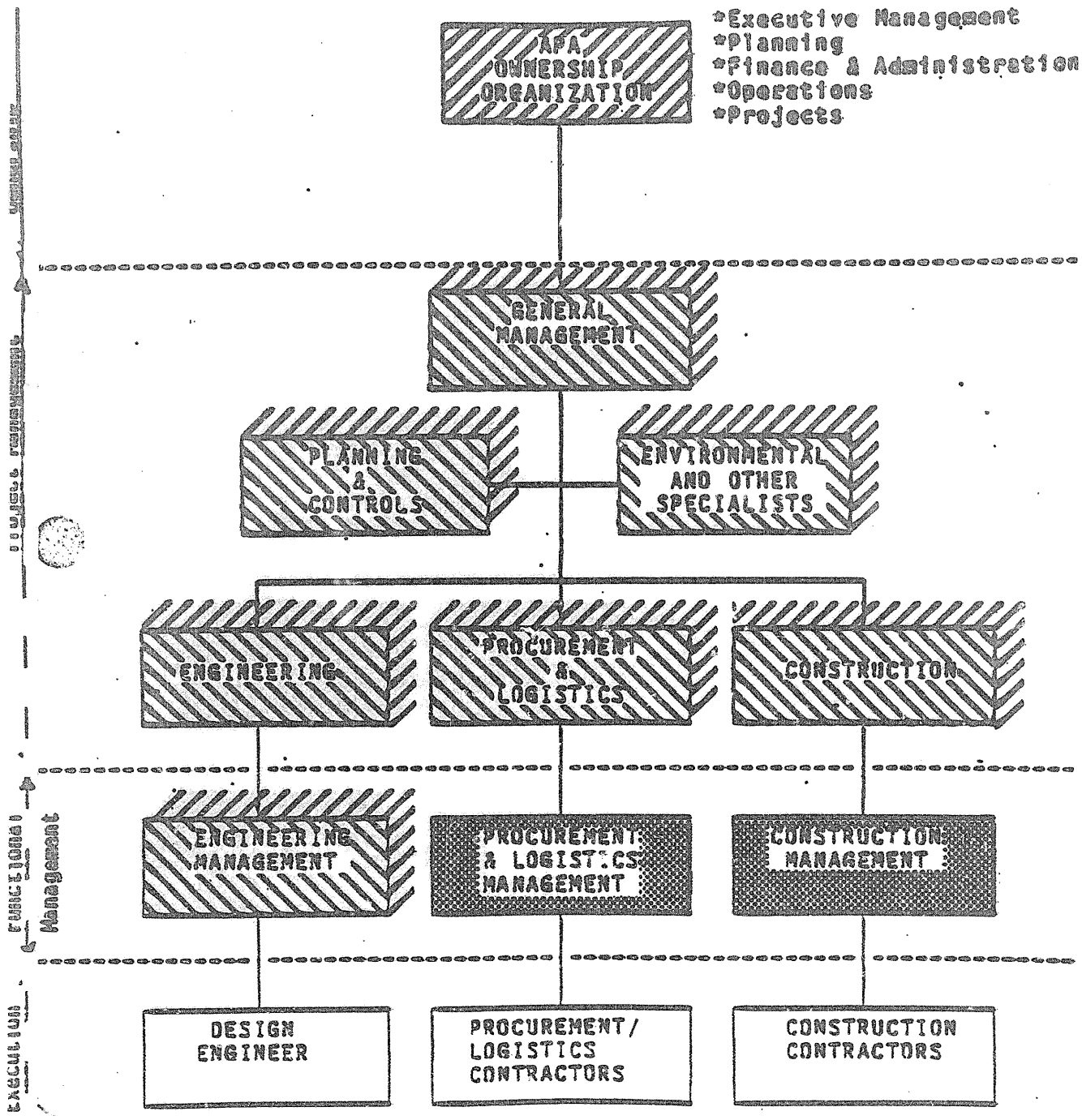
  The checks and balances inherent in two or more separate organizations responsible for different functions of project management are not present. The checks and balances function will therefore have to be assured by the Owner's management cadre.

- Technology Transfer

  Extensive project experience is not acquired by owner personnel under this organization concept due to the limited size of the owner's cadre staff.

ALTERNATIVE MANAGEMENT CONCEPTS

Alternative 2: Project and Construction Management Contracted Separately



PROJECT MANAGEMENT SERVICES CONTRACTED TO ONE ORGANIZATION
CONSTRUCTION MANAGEMENT SERVICES CONTRACTED TO ANOTHER

- TOTAL PROJECT MANAGEMENT SPLIT BETWEEN TWO FIRMS
- OWNER CONTROL EXERCISED THROUGH OWNER MANAGEMENT CADRE

ADVANTAGES

- HIGH LEVEL OF EXPERTISE IN FUNCTIONS POSSIBLE WHEN EXPERIENCED FIRMS' PERSONNEL PERFORM MANAGEMENT
- SPLIT OF MANAGEMENT FUNCTIONS ENHANCES "CHECKS & BALANCES"
- OWNER CAN HOLD OTHERS ACCOUNTABLE FOR PROJECT RESULTS
- OWNER REQUIRES LESS ADDITIONAL STAFF THAN IN FULLY INTEGRATED MANAGEMENT APPROACHES
- OWNER CAN EFFECTIVELY CONTROL THE PROJECT THROUGH A CADRE TEAM OVERVIEW
- EFFECTIVE QUALITY CONTROL BY EXPERIENCED PERSONNEL

DISADVANTAGES

- SPLIT OF MANAGEMENT BETWEEN TWO ORGANIZATIONS CAN CREATE INTERFACE PROBLEMS (EXAMPLE: QUALITY CONTROL AND QUALITY ASSURANCE, PROJECT CONTROL & REPORING SYSTEMS)
- OWNER PROXIMITY TO THE CONSTRUCTION MANAGEMENT MORE REMOTE THAN IN FIRST CHOICE ALTERNATIVE
- UNIFICATION OF PROJECT CONTROLS SYSTEMS-POTENTIAL DIFFICULTY
- OWNER PARTICIPATION LESS THAN IN FULLY INTEGRATED ORGANIZATION
- TECHNOLOGY TRANSFER TO OWNER, LESS THAN IN FULLY INTEGRATED ORGANIZATION

PROJECT MANAGEMENT SERVICES CONTRACTED TO ONE ORGANIZATION
CONSTR. MGMT. SERVICES CONTRACTED TO ANOTHER
OWNER CONTROL THROUGH MGMT. CADRE OVERVIEW
OF THE PROJECT MANAGER

SUMMARY

This alternative was considered the second best organizational concept for the Susitna project. As with the first choice alternative, owner control is exercised through a management cadre performing an overview function, except that instead of contracting all of the project management to a single firm, management responsibility is split between two different management organizations. One is awarded procurement and construction management, the other is awarded management of the balance of the project activities and management of the Construction Manager. This second firm is considered the total project manager. Owner control is exercised through a strategically placed management cadre organization in parallel with the project management organization.

ADVANTAGES

- Management and Technical Expertise

  As with the first choice alternative, a high level of experience and technical competence can be obtained in a management organization comprised of two different management companies when two highly qualified firms are selected.

- Checks and Balances

  The creation of an organization from two different firms - one who is responsible for engineering management, and the other responsible for construction management, will tend to enhance a checks and balances between the engineering and the procurement/construction activities.

- Project Accountability

  As with the first choice alternative, the owner can look to others to hold accountable for project results. However, the existence of a separate CM contractor diminishes the accountability of the project management contractor.

- Impact on Owner Organization (Staffing)

  Likewise ease of staffing for the Power Authority is maximized. Mobilization and demobilization problems are minimized because of the relatively small Power Authority staff required. Compared to the first choice alternative where total responsibility is awarded to a single management organization, the interface between the

Project Manager and the Construction Manager, could require increased intercession by the Owner management cadre to resolve differences. Greater owner involvement, and hence more cadre, could be required.

- Owner Participation

The Owner Management Cadre retains control of all major decisions by overviewing key project management functions.

- Quality Control

Both choices one and two potentially lend themselves to a high level of quality control as the selection of two highly qualified firms can permit staffing of the inspection and quality assurance functions by experienced personnel. In addition, this form of organization, whereby the Construction Management contractor is itself managed by the Project Management Contractor, permits separation of quality assurance from quality control. However, split of this responsibility has the potential for creating interface problems.

DISADVANTAGES

The split of project management functions between the different organizations creates a potential for interface difficulties, which may require considerable Owner resources to manage. At the very least, an organization created from two different management firms, will have growing pains until both learn to work together and coordinate their respective ways of doing things. This requires increased intercession by the Owner's Management Cadre to resolve differences. Also, the owner's proximity to and control of the Construction Management function is not as complete as in Choice Number 1 in view of the fact that the Owner Cadre functions at the project management level. Consequently, owner involvement in construction operations decision making is necessarily more remote. (NOTE: The construction management contractor could furnish up to three times the number of people furnished by the project management contractor. This could make the construction management contract the most lucrative. This could potentially have undesirable effects on the bidding for these packages).

- Cost and Schedule Control

Cost and schedule control could potentially be as effective as in the number 1 choice. However, some conflict is inherent in the joining of two different control approaches.

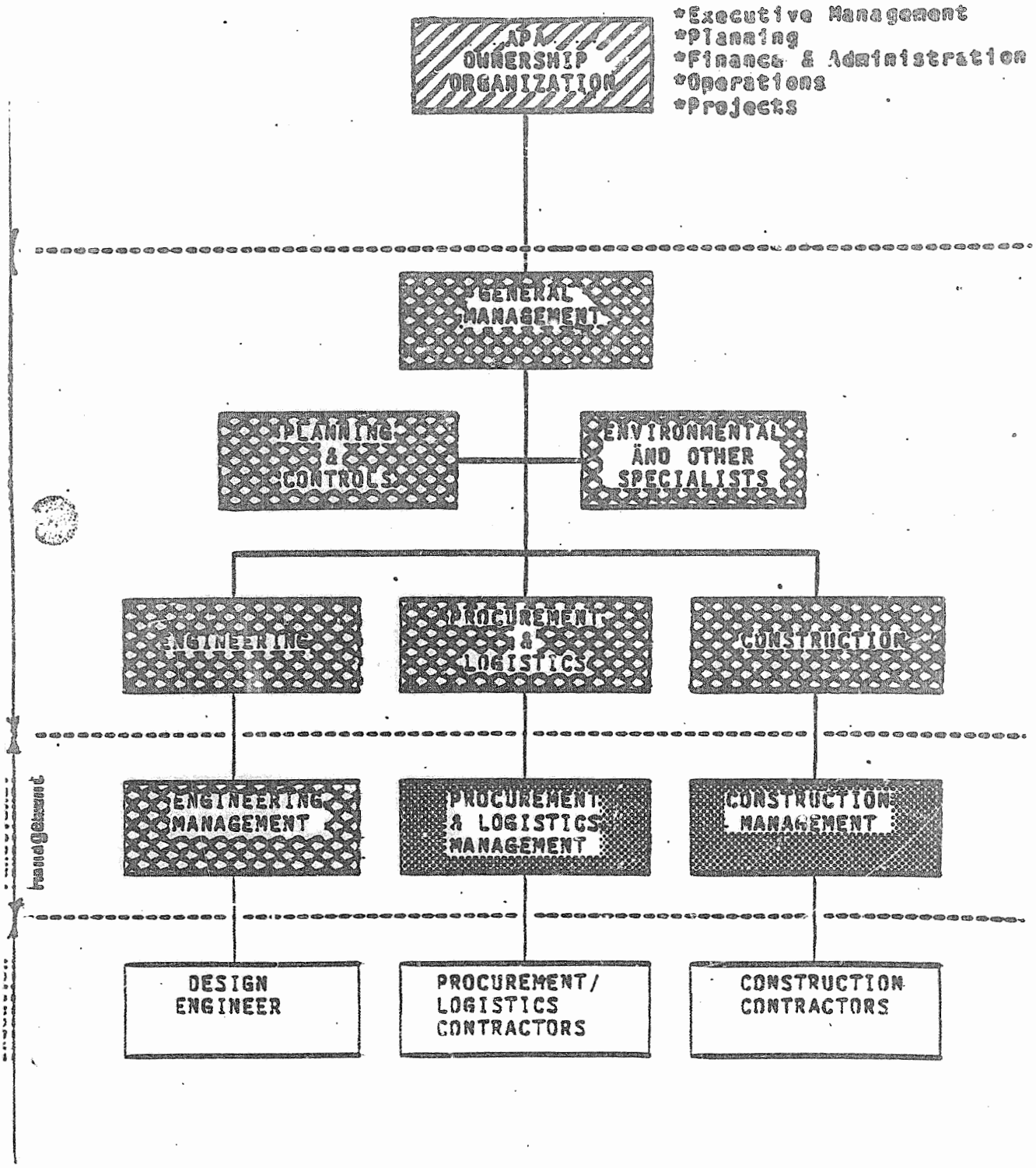
- Owner Participation

  As with Choice Number 1, the owner's direct participation in project operations is less than in a fully integrated organization.

- Technology Transfer

  Technology transfer is realized by Owner staff, but from an overview rather than operational standpoint.

Alternative 3: Integrated Management with Construction Management Contracted



PROJECT MANAGEMENT PERFORMED BY INTEGRATED PROJECT MANAGEMENT ORGANIZATION CONSTRUCTION MANAGEMENT CONTRACTED TO ANOTHER MANAGEMENT FIRM

- THE MANAGEMENT FUNCTIONS SPLIT BETWEEN TWO ORGANIZATIONS
- OWNER CONTROL IS ACHIEVED THROUGH ASSIGNMENT OF OWNER PERSONNEL TO KEY POSITIONS IN PROJECT MANAGEMENT ORGANIZATION

ADVANTAGES

- DIRECT OWNER PARTICIPATION IN MANAGEMENT FUNCTION
- EXPERIENCED PERSONNEL IN QUALITY CONTROL FUNCTION
- OWNER OBTAINS DIRECT PROJECT EXPERIENCE
- CHECKS AND BALANCES ENHANCED BY SEPARATE CM AND PM ORGANIZATIONS

DISADVANTAGES

- INTEGRATED PROJECT MANAGEMENT ORGANIZATION PRESENTS PERSONNEL ADMINISTRATION DIFFICULTIES
- SPLIT RESPONSIBILITY BETWEEN CM AND PM COMPLICATES COORDINATED EFFORT
- OWNER ACCEPTS PROJECT MANAGEMENT ACCOUNTABILITY

PROJECT MANAGEMENT IS PERFORMED BY A FULLY INTEGRATED ORGANIZATION, COMPRISED OF OWNER-PERSONNEL AND PERSONNEL FROM A MANAGEMENT CONTRACTOR. CONSTRUCTION MANAGEMENT IS CONTRACTED TO ANOTHER MANAGEMENT FIRM WHO IS MANAGED BY THE INTEGRATED PROJECT ORGANIZATION

SUMMARY

This alternative is the third choice alternative and is similar to choice Number 2, whereby the total management function is split between a Procurement/Construction Manager and a project manager. The key difference between this alternative and choice Number 2 is that the Project Management organization is staffed by personnel drawn from an outside contractor and by personnel drawn from the Owner. The organization which is created is a completely integrated project management team. Consequently, owner personnel hold positions where they will be directly involved in operational decision making. The top position and some other key positions are held by Owner personnel and effective owner control is assured through this direct involvement in the project management function.

ADVANTAGES

- Owner Participation

  Direct participation by owner is increased over choices No's 1 & 2 due to assignment of owner personnel to operational positions within the Project Management Organization.

- Project Controls

  Project cost and schedule control should be as effective as in the second choice alternative, providing that the proven methods of two different management contractors can be successfully integrated.

- Quality Control

  This alternative should permit effective quality control because of access to experienced personnel from the Construction Management organization.

- Technology Transfer

  Owner personnel obtain significantly more project experience than in Choices 1 and 2, due to the fact that owner personnel staff positions in the project management organization.

- Checks and Balances

  The creation of the management organization from two different firms - one who is responsible for engineering management and the other for construction management, tends to enhance a checks and balances between the engineering and construction functions.

DISADVANTAGES

- Personnel Administration

  The creation of an integrated, relatively long-term project management team containing owner personnel and contractor personnel working together requires considerable attention to creating uniform personnel policies for this hybrid organization. For the duration of the project, employee advancement, salary administration and other administrative actions for employees of both parent organizations will be controlled by this project management organization. One of the key prerequisites for generating a sense of identity in the employees for the organization, thus formed is the exercise of personnel administration by that organization. This requires significant attention by the owner.

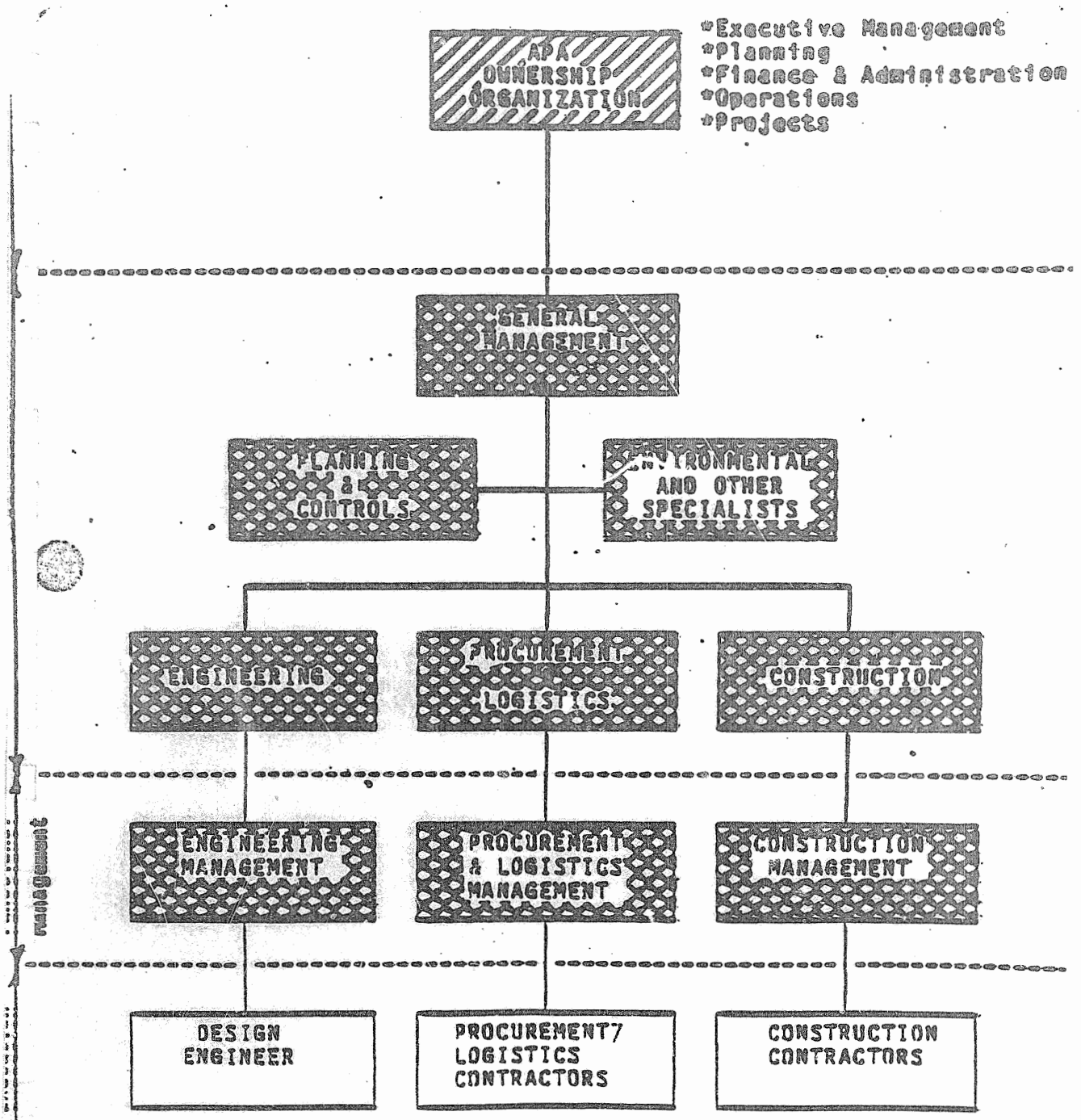
- Organizational Efficiency

  The involvement of three organizations in the project management function (one as Construction Manager and two in an integrated project management organization) could create operational difficulties - at least in the early stages of the project.

- Project Accountability

  Unlike the first two organizational choices, the owner cannot look solely to others for accountability for project results in this alternative . Direct owner involvement in the integrated project management team implicates the owner in responsibility for the results. Likewise, the benefits of independence and objectivity obtained from an independent overview group are not present when the owner directly participates in the project management function.

Alternative 4: Integrated Management Organization



FULLY INTEGRATED MANAGEMENT TEAM

- PROJECT MANAGEMENT PERFORMED BY INTEGRATED TEAM OF OWNER AND PROFESSIONAL CONTRACTOR PERSONNEL
- OWNER CONTROL ACHIEVED BY OWNER PERSONNEL IN KEY POSITIONS

ADVANTAGES

- "PROJECT MANAGER" PERCEIVED AS THE "OWNER"
- OWNER CONTROL ASSURED THROUGH DIRECT PARTICIPATION
- QUALITY ASSURANCE & CONTROL BENEFITS FROM EXPERIENCED PERSONNEL FROM PROFESSIONAL FIRM
- WORKING EFFICIENCY OF MANAGEMENT TEAM ENHANCED BY PARTICIPATION OF PROFESSIONAL FIRM
- PROJECT CONTROLS FUNCTION BENEFITS FROM CONTRIBUTION OF EXPERIENCED PROFESSIONAL FIRM
- OWNER ACQUIRES DIRECT PROJECT CONTROL EXPERIENCE

DISADVANTAGES

- SIGNIFICANT STAFF-UP BY OWNER REQUIRED
- PERSONNEL ADMINISTRATION OF LARGE INTEGRATED MANAGEMENT ORGANIZATION REQUIRED
- OWNER CANNOT LOOK TO OTHERS TO HOLD ACCOUNTABLE FOR MANAGEMENT
- FEWER CHECKS & BALANCES IN INTEGRATED PROJECT MANAGEMENT ORGANIZATION

TOTAL PROJECT MANAGEMENT BY
FULLY INTEGRATED PROJECT MANAGEMENT TEAM
COMPOSED OF OWNER PERSONNEL AND PERSONNEL FROM
A MANAGEMENT CONTRACTOR. (THIS TEAM ALSO PERFORMS CM)

SUMMARY

This alternative was the 4th choice of the study group. A fully integrated management organization composed of personnel drawn from the owner and personnel furnished by an outside firm are formed into a project management organization. This management organization performs the management of engineering, procurement and construction i.e., the total management function. Owner personnel are assigned the top position in the organization plus other key positions. Effective owner control of the project is assured through this direct involvement in the project management functions.

ADVANTAGES

- Identify with Owner

  The management organization so formed, tends to be identified as the Alaska Power Authority (the owner). This is beneficial in dealing with the contractors who tend to feel they are dealing with the "top" and not through a middleman.

- Owner Participation

  Due to the owner's contribution to staffing of the management organization in key positions, owner control of the project is possible.

- Quality Assurance/Control

  The availability of experienced quality assurance personnel from a qualified outside firm selected to participate in the project management function assures the required expertise in this important function.

- Quality of the Management Organization

  The quality of the personnel and working efficiency of the management organization under this concept should be high. Selection of an experienced and well qualified outside firm should permit assignment of high quality personnel to the job by this outside firm. Ideally, many of these personnel will have worked together before on other projects and this should enhance early attainment of a smoothly working organization.

- Project Controls

  Project cost and schedule controls should be effective assuming the outside firm selected to participate in the management organization has had successful experience on previous large projects.

- Technology Transfer

  Owner personnel acquire significant project expertise due to their operational role in the management function.

DISADVANTAGES

The creation of an integrated project management organization heavily staffed by owner personnel, requires a significant staffing-up by the Owner. The impact on the Owner could be considerable in view of the fact that he will have to create a project "arm" of the organization which could contain more personnel than the parent organization. The nature of its function will be significantly different requiring different personnel policies and pay scales. Upon completion of the project, demobilization of a large number of people will be required.

- Personnel Administration

  The creation of an integrated, relatively long term project management team, containing owner as well as third party personnel working together, requires considerable attention to creating uniform personnel policies for this hybrid organization. Employee advancement, salary administration and other administrative actions for employees of both organizations supplying personnel to this team, should be controlled by this project management organization. One of the key prerequisites for developing an employee sense of identity in the management organization is the exercise of personnel administration by that organization.

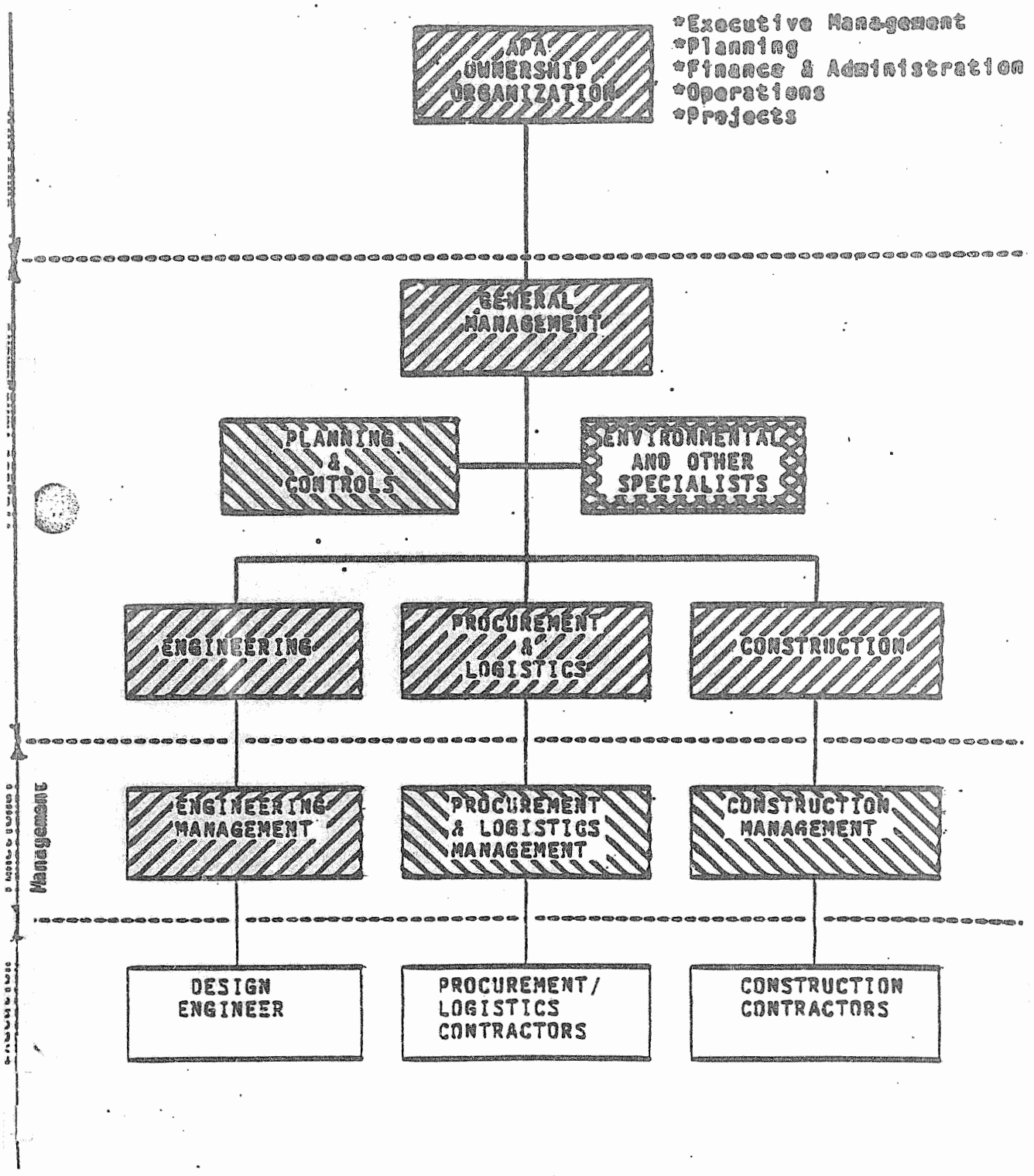
- Project Accountability

  Unlike alternatives where the owner contracts the management role out to other firms, the owner is an integral part of the project management in this management organization concept. Consequently, the owner cannot look solely to others to hold accountable for project results. Likewise, the objectivity and independence obtained from an owner overview group (management cadre) is not present in this form of organization.

Checks and Balances

The creation of an integrated total project management organization reduces, on paper, the checks and balances which would be inherent in split responsibility for different elements of the project. However, the staffing of a significant number of key positions by owner personnel would tend to inject a certain element of "checks and balances" into the project management of the job.

Alternative 5: APA Management Augmented by Contracted Services and Construction Management



OWNER PERFORMS PROJECT MANAGEMENT AND ENGAGES A TECHNICAL SERVICES CONTRACTOR FOR SPECIALIZED FUNCTIONS. CONSTRUCTION MANAGEMENT IS CONTRACTED OUT TO A THIRD-PARTY MANAGEMENT CONTRACTOR

- MANAGEMENT OF PROJECT IS SPLIT
  - OWNER IS "PROJECT" MANAGER
  - CONSTRUCTION MANAGEMENT BY THIRD PARTY FIRM
- OWNER CONTRACTS WITH TECHNICAL SERVICES CONTRACTOR FOR HELP IN SPECIALIZED PROJECT MANAGEMENT FUNCTIONS

ADVANTAGES

- OWNER PARTICIPATES IN OPERATIONAL DECISION MAKING (CONTROLS JOB)
- HIGH CALIBER QUALITY ASSURANCE/QUALITY CONTROL PERSONNEL CAN BE FURNISHED BY TECHNICAL SERVICES/CONST. MGMT. CONTRACTORS RESPECTIVELY
- COST/SCHEDULE CONTROLS POTENTIALLY HIGH QUALITY ALSO (THEIR INTEGRATION BETWEEN TWO MANAGEMENT ORGANIZATIONS COULD BE DIFFICULT)
- QUALIFIED PERSONNEL SHOULD BE AVAILABLE TO BOTH MANAGEMENT TEAMS
- "PROJECT MANAGEMENT" ORGANIZATION WILL BE IDENTIFIED AS THE "OWNER"

DISADVANTAGES

- SPLIT ORGANIZATION COMPLICATES DELINEATION OF RESPONSIBILITIES
- OWNER STAFF REQUIREMENTS GREATER THAN MOST OTHER ALTERNATIVES
- OWNER DIRECT INVOLVEMENT IN THE PROJECT MANAGEMENT FUNCTION DIMINISHES ACCOUNTABILITY OF OTHERS FOR PROJECT RESULTS
- INVOLVEMENT OF THREE DIFFERENT FIRMS MAY CREATE INTERFACE DIFFICULTIES INITIALLY
- OWNER INVOLVEMENT IN THE "PROJECT MANAGEMENT" FUNCTION MINIMIZES THE EFFECTIVENESS OF THE CHECKS & BALANCES ROLE OF THE CONSTRUCTION MANAGER

OWNER PERFORMS PROJECT MANAGEMENT AND ENGAGES A TECHNICAL SERVICES CONTRACTOR FOR SPECIALIZED FUNCTIONS. CONSTRUCTION MANAGEMENT IS CONTRACTED OUT TO A THIRD PARTY MANAGEMENT CONTRACTOR

SUMMARY

This alternative splits the management of the project. A "Construction Management" contractor manages the work of the construction contractors and takes responsibility for procurement. The owner takes responsibility for the management of the balance of the project functions as well as supervision of the construction management. The owner engages a Technical Services Contractor, who will supply personnel to the owner's project management organization to perform specialized functions.

ADVANTAGES

Owner Participation

Participation by the owner in Project Management functions is relatively high due to his direct performance of the project management functions except for certain specialized functions.

Quality Control

Engagement of an experienced technical services contractor can permit good quality assurance by the owner's project management organization. Quality control is exercised by the construction management contractor. The involvement of specialized firms in both the construction management, as well as project management functions should assure that this activity is adequately staffed.

Project Controls

Likewise, engagement of a highly qualified firm to provide certain technical services permits professional scheduling and cost control to the project. However, their successful integration into the balance of the project activities may be more difficult than in other organization structures due to involvement of three different firms in the management structure.

Qualified Personnel

Hiring of an experienced construction management contractor and optimization of the use of personnel from the technical services firm should allow employment of experienced and trained people in most of the other important areas of the project as well.

Project Identity

The project management organization is an owner organization. The technical specialist firm will integrate its people into the project management organization. Thus, the resultant team will be identified as the owner. The establishment of appropriate personnel policies for the organization thus formed can permit the complete integration of these assimilated personnel and creation of a true owner team. This administrative subject requires considerable attention by the owner.

DISADVANTAGES

Organizational Responsibilities

The delineation of the responsibilities of the participants is more complicated than in most of the other alternatives studied. Much of the effectiveness of the owner-project management team would depend on how successfully the technical service contractor personnel are integrated into the organization.

Personnel Staffing

This organizational alternative requires a significant commitment of the owner's own personnel to the project (approximately 100). Consequently, This alternative would require considerable staffing-up by the owner and eventual demobilization of a large number of people.

Project Accountability

In this organization, the owner retains responsibility for project management and consequently shares the responsibility for project results. Accountability of others is correspondingly lowered.

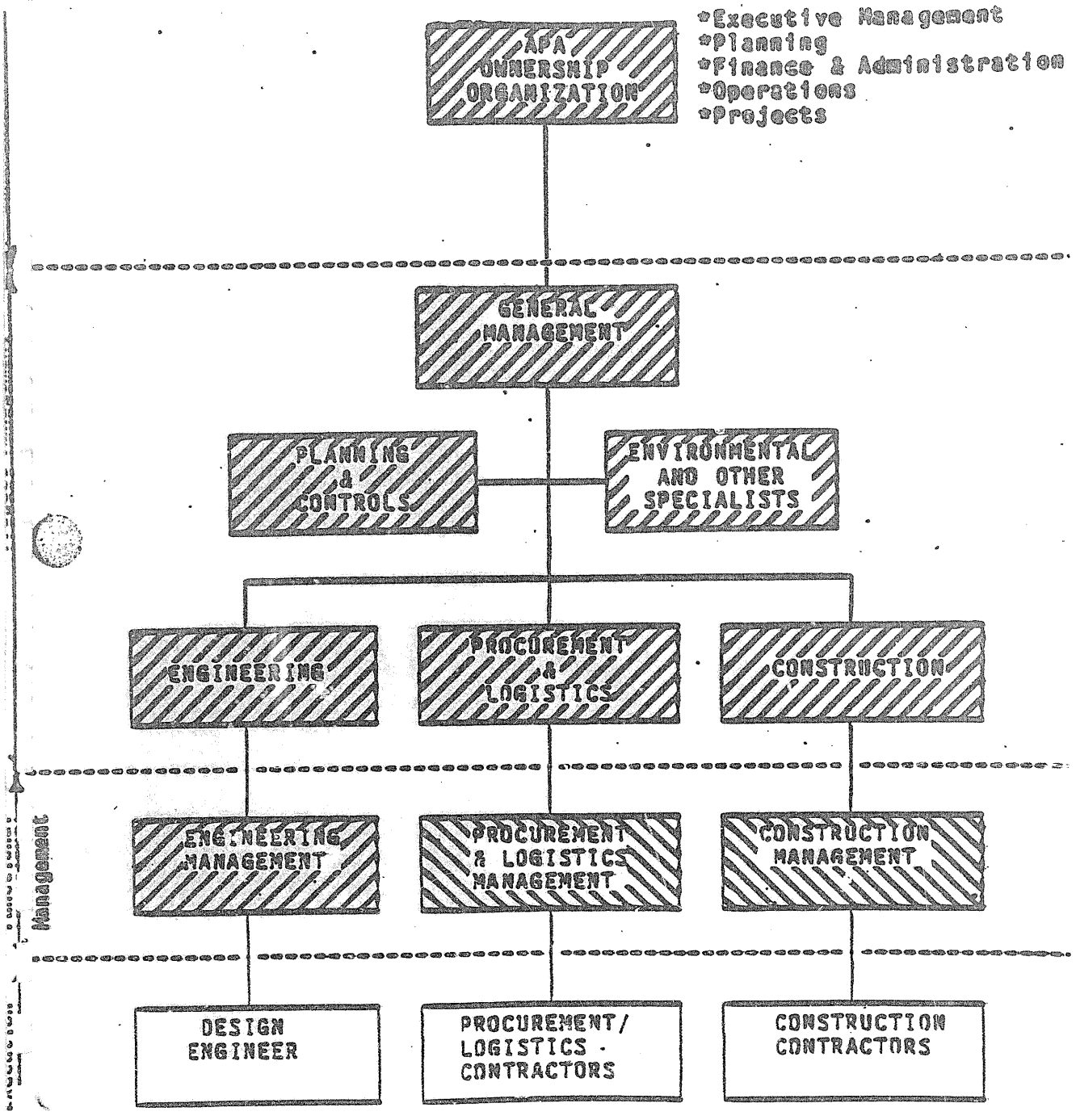
Organizational Efficiency

The staffing of the management functions with personnel from three different organizations who have not worked together before will probably create initial interface difficulties. Development of integrated systems and procedures with which all participants can work will be more difficult.

Checks and Balances

The split of "Project Management" and construction management functions produces a certain checks and balances benefit in theory. However, the fact that the project management organization is constituted of owner personnel effectively negates the Construction Manager's checks and balances role.

Alternative 6: APA Management Augmented by Contracted Construction Management



OWNER PERFORMS PROJECT MANAGEMENT (WITH OWNER STAFF) CONSTRUCTION MANAGEMENT IS CONTRACTED TO ANOTHER FIRM

- MANAGEMENT OF PROJECT SPLIT
  - CONSTRUCTION MANAGEMENT CONTRACTED TO OUTSIDE FIRM
  - PROJ. MGMT. (INCLUDING SUPERVISION OF CONSTRUCTION MANAGER) PERFORMED BY OWNER
- OWNER STAFFS PROJECT MGMT. TEAM ENTIRELY

ADVANTAGES

- OWNER HAS DIRECT CONTROL OVER MUCH OF PROJECT
- HIRING SEPARATE CONSTRUCTION MANAGER GIVES ACCESS TO EXPERIENCED CONSTRUCTION MANAGEMENT PERSONNEL
- SEPARATION OF CONSTRUCTION MANAGEMENT AND PROJECT MANAGEMENT ENHANCES CHECKS AND BALANCES

DISADVANTAGES

- INTEGRATION OF PROJECT CONTROLS/REPORTING SYSTEMS OF CONSTRUCTION MANAGER WITH PROJECT MANAGER POTENTIALLY DIFFICULT
- OWNER MUST HIRE SIGNIFICANT NEW STAFF TO STAFF PROJECT MGMT. ORGANIZATION
- OWNER FACES DIFFICULT OBSTACLES TO HIRE QUALIFIED STAFF AND MOLD INTO AN EFFECTIVE ORGANIZATION

OWNER PERFORMS PROJECT MANAGEMENT (WITH OWNER STAFF) CONSTRUCTION MANAGEMENT CONTRACTED TO ANOTHER FIRM

SUMMARY

Project Management is split between a construction manager and a project manager. The construction management (which includes procurement) is contracted entirely to a construction management firm. The balance of the project management functions are performed by an owner "project management" team which is staffed entirely by owner personnel. This project management team also supervises the construction manager.

ADVANTAGES

- Owner Participation

  Complete owner staffing of the project management team with owner personnel, affords the owner a large measure of direct control of the conduct of the project.

- Construction Management Expertise

  Engagement of a qualified construction management firm to perform the construction management function permits this important function to be staffed with experienced construction personnel. The construction management function represents about twice the number of people as in the project management organization.

- Checks and Balances

  The separation of the construction management from the balance of the "project management" functions enhances the checks and balances between the engineering and construction activities. However, the complete owner control of the project management function tends to diminish somewhat the effectiveness of the construction manager in the checks and balances role.

DISADVANTAGES

- Project Controls

  The integration of the construction manager's project control systems with the control and reporting system of the owner's project management organization could be difficult. This could be exacerbated if the systems and reporting requirements of the owner are incompatible with those of the construction management firm.

The basic control systems employed by the construction manager must be left intact in order to allow him the use of the control tools with which he habitually manages construction contracts.

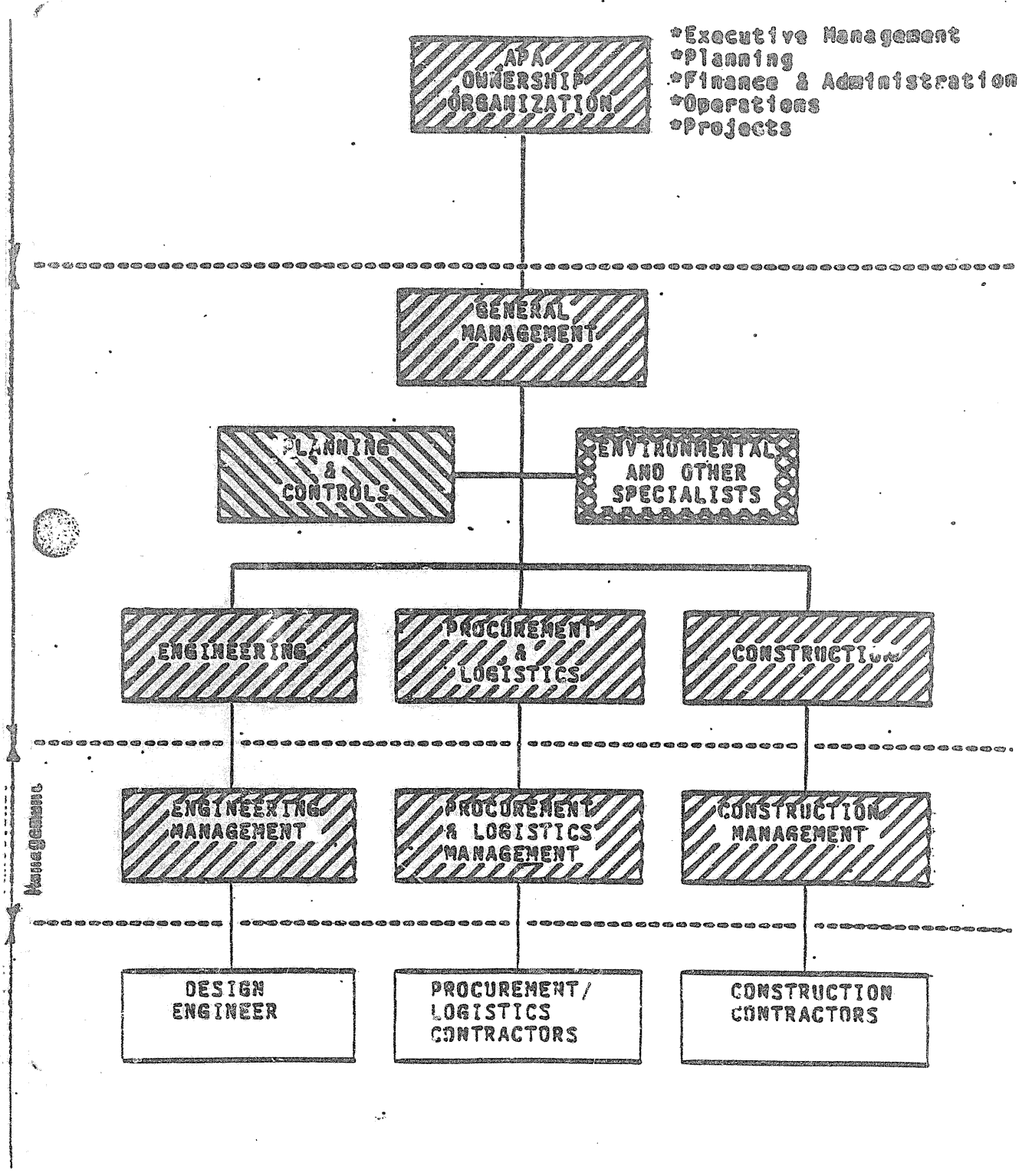
- Owner Staffing

Next to the alternative whereby the entire project management function (including construction management) is performed by owner personnel, this management alternative requires the greatest number of owner people (over 100). Consequently, this alternative requires significant staffing-up by the owner and attendant demobilization at the end of the project.

- Overall Technical/Management Expertise

The creation of a project management organization essentially from a zero base, poses enormous obstacles in the way of building an efficient, effective project management team in a reasonable period of time. The problems include, not only finding qualified personnel, but molding them together into a team which operates as an integrated organization.

Alternative 7: APA Management Augmented by Contracted Services



OWNER PERFORMS PROJECT MANAGEMENT AND CONSTRUCTION MANAGEMENT ITSELF CONTROLS ARE CONTRACTED TO A SERVICES CONTRACTOR

- THE OWNER PERFORMS THE ENTIRE PROJECT MANAGEMENT FUNCTION
- A SERVICES CONTRACTOR IS ENGAGED TO FURNISH PERSONNEL TO PERFORM SPECIFIED CONTROL FUNCTIONS

ADVANTAGES

- OWNER INVOLVEMENT IN PROJECT MANAGEMENT IS HIGH
- ENGAGEMENT OF SERVICES CONTRACTOR PERMITS DIRECT ACCESS TO SOME OF SPECIALTIES REQUIRED TO MANAGE PROJECT

DISADVANTAGES

- OWNER STAFF-UP REQUIREMENTS ENORMOUS (OVER 300 PEOPLE).
- OWNER CANNOT LOOK TO OTHERS FOR PROJECT ACCOUNTABILITY
- CREATION OF LARGE, EFFICIENT PROJECT MANAGEMENT ORGANIZATION FROM ZERO BASE - VERY DIFFICULT
- PROJECT CONTROLS MAY NOT BE AS EFFECTIVE AS ANTICIPATED
- CHECKS AND BALANCES BETWEEN MAJOR PROJECT ACTIVITIES MINIMIZED BECAUSE OF CONTROL OF ALL MANAGEMENT BY ONE ORGANIZATION

OWNER PERFORMS PROJECT MANAGEMENT AND CONSTRUCTION MANAGEMENT ITSELF CONTROLS ARE CONTRACTED TO A SERVICES CONTRACTOR

SUMMARY

The owner is responsible for all aspects of project management, including management of construction. A services contractor is hired to perform selected functions where the owner needs outside help. Project controls and quality assurance/control would be likely functions covered by this contract.

ADVANTAGES

- Owner Participation

  Owner staffing of construction management as well as the balance of project management functions assures direct owner control of operational management of the project.

- Controls Expertise

  Hiring an experienced services contractor to perform selected control functions permits staffing with highly qualified personnel in these functions. Their complete integration into the owner organization is important and would require serious attention by the owner.

DISADVANTAGES

- Owner Staffing

  The owner would need to hire over 300 additional staff in order to staff this project. The attendant problems to this staff-up, their integration into a cohesive project organization and their eventual demobilization would be formidable.

- Project Accountability

  Accountability of others for project results would be almost nil. The services contractor accountability would be low as the nature of this contract would be to furnish personnel to perform a function, rather than assignment of responsibility for the function.

Organizational Efficiency

It would be difficult to create an efficient organization from scratch to manage a mega-construction project. The effort to recruit qualified personnel would be significant. Once hired, the creation of a large, efficient organization from an assemblage of personnel from diverse backgrounds would, in all probability, be impossible in a short period of time.

Project Controls

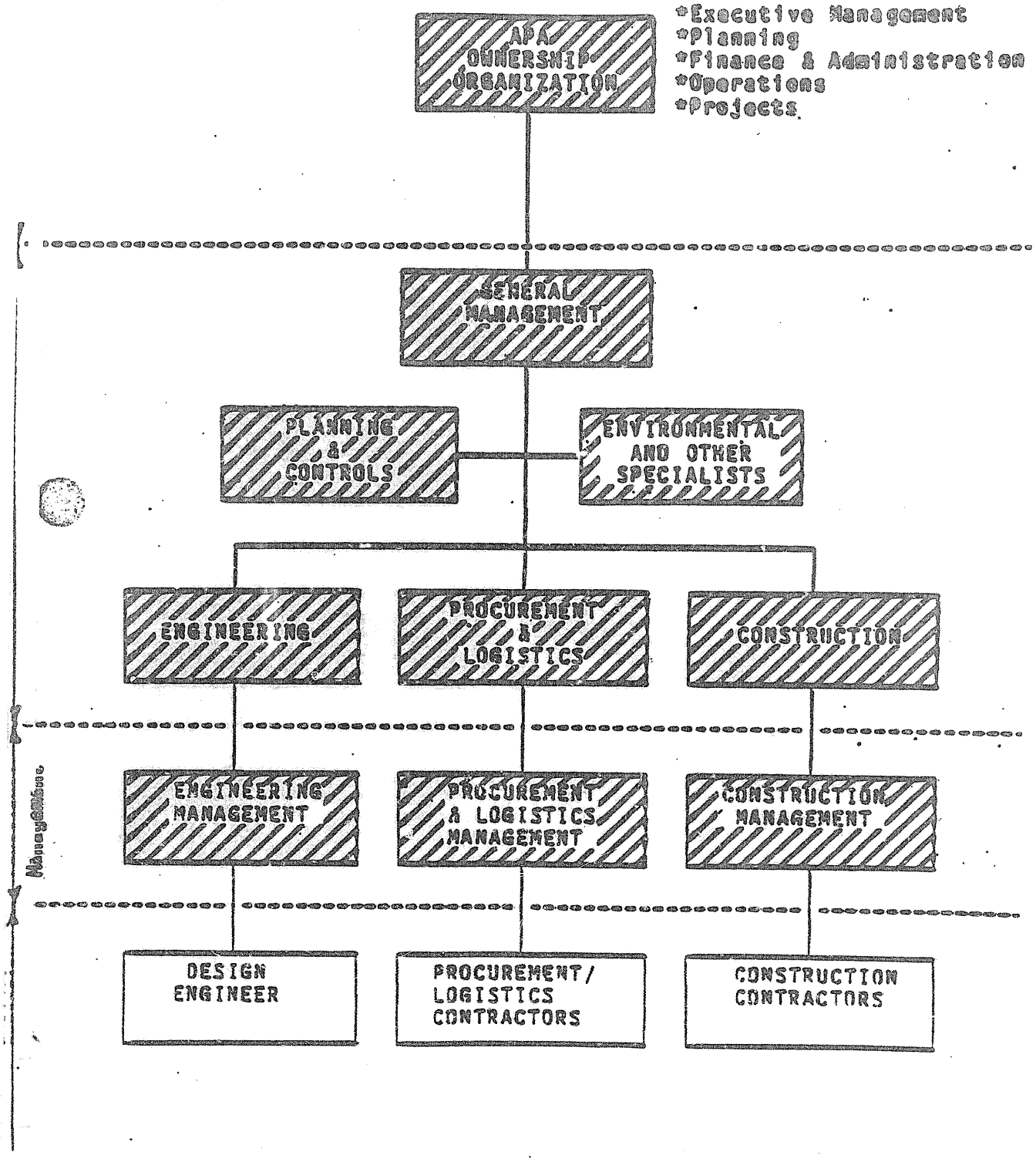
Cost/Schedule control would probably not be as effective as desired. In large measure, the success of cost/schedule control comes from the experience in their application as well as through use of proven systems, procedures and policies. Development of this controls environment in a one-time project organization would be very difficult.

Checks and Balances

Owner staffing and control of the entire project management function minimizes the checks and balances between the various functions of the project management effort.

ALTERNATIVE MANAGEMENT CONCEPTS

Alternative 2: APA Provides All Management



PROJECT MANAGEMENT
PERFORMED BY AN ALL-OWNER TEAM
(CONSTRUCTION MANAGEMENT ALSO PERFORMED BY OWNER TEAM)

- OWNER COMPLETELY STAFFS UNIFIED PROJECT MANAGEMENT TEAM (OVER 350 PEOPLE)

ADVANTAGES

- COMPLETE OWNER INVOLVEMENT IN PROJECT OPERATIONS
- UNIFIED PROJECT MANAGEMENT ORGANIZATION COULD FACILITATE PERSONNEL ADMINISTRATION

DISADVANTAGES

- EXISTING PAY SCALES MAY NOT GIVE THE ABILITY TO HIRE ALL REQUIRED SPECIALTIES
- THE TIME REQUIRED TO TRANSFORM LARGE NUMBER OF NEW HIRES INTO AN EFFICIENT MANAGEMENT TEAM COULD BE SIGNIFICANT
- IMPACT ON OWNER OF HIRING AND SUBSEQUENTLY DEMOBILIZING LARGE PROJECT STAFF POTENTIALLY GREAT

PROJECT MANAGEMENT
PERFORMED BY AN ALL-OWNER TEAM
(CONSTRUCTION MANAGEMENT ALSO PERFORMED BY OWNER TEAM)

SUMMARY

The salient characteristic of this alternative is that the entire project management function (including management of the construction contractors) is executed by the owner's project management organization. The size of this project management organization is upwards of 350 people and would be entirely comprised of personnel hired by the owner.

ADVANTAGES

- Owner Participation

  Due to complete execution of project management by owner personnel, owner participation in operational decision making is maximized. This may be mitigated by initial inexperience of the newly created management organization and the time required to familiarize the owner project management staff with the owner's objectives and policies.

- Personnel Administration

  In view of the fact that the project management organization envisioned in this alternative is an entirely unified organization, personnel policies and administration should be simplified when compared to integrated management organization alternatives. However, it is likely that the creation of a construction arm by the Power Authority which could effectively quadruple its total employee staff would have significant impact on the Power Authority's structure itself, as well as its personnel policies and pay scales.

DISADVANTAGES

- Pay Scales

  Existing pay scales may not give the Power Authority the ability to hire all the construction specialists required in the management organization.

- Organizational Efficiency

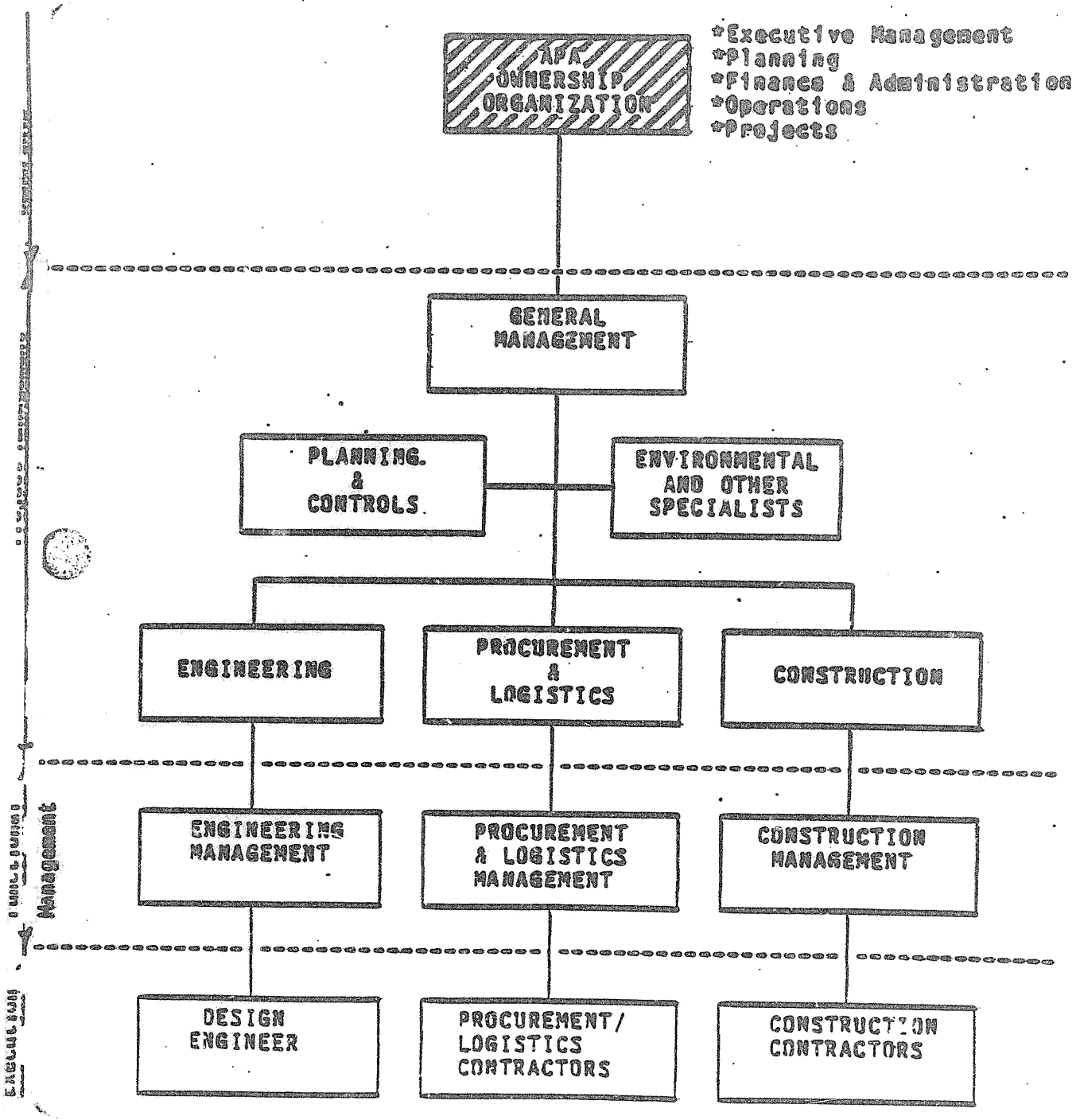
  Creation of a complete project management organization by the owner from the ground up, will produce a group of individuals who have not worked together before. Likewise, they will not have a shared experience working with common systems and procedures. The effort required to mold these individuals into a smoothly running team

will be considerable and represents a serious drawback to this organizational alternative.

Owner Staffing

Hiring by the owner of the large number of people required to staff the entire management organization and their eventual demobilization also represent important disadvantages of this organizational concept.

Alternative 9: Turnkey



"TURNKEY"

- COMPLETE UNIFICATION OF PROJECT RESPONSIBILITIES IN SINGLE FIRM RESPONSIBLE FOR ENGINEERING, PROCUREMENT AND CONSTRUCTION
- OWNER PARTICIPATION LESS THAN IN OTHER ALTERNATIVES

ADVANTAGES

- PROJECT CONTROLS SYSTEMS SHOULD BE EFFICIENT
- QUALITY CONTROL CAN ALSO BE WELL MANAGED
- ACCOUNTABILITY IS UNIFIED IN ONE SINGLE FIRM
- OWNER STAFF REQUIREMENTS THEORETICALLY SMALL
- ORGANIZATIONAL EFFICIENCY IS POTENTIALLY HIGH

DISADVANTAGES

- OWNER EXERTS LESS DIRECT CONTROL DURING EXECUTION
- CHECKS & BALANCES PRACTICALLY NON-EXISTENT
- RELATIVELY LITTLE PROJECT EXPERIENCE OBTAINED BY OWNER STAFF
- UNTENABLE CONTRACTING POSITION FOR OWNER

"TURNKEY" APPROACH
ALL SERVICES CONTRACTED TO ONE GEN. CONTRACTOR
(i.e., PROJECT MANAGEMENT MGMT., CONSTR. MGMT.,
PROCUREMENT MGMT., ENGINEERING MGMT., AS WELL AS
EXECUTION OF ENGINEERING, PROCUREMENT AND CONSTRUCTION)

SUMMARY

The salient characteristic of this alternative is a completely unified responsibility for management and execution of all elements of the project. The company hired will be responsible for planning, executing and controlling the engineering procurement and construction of the project. The owner essentially turns control of decision making over to the firm selected which is completely responsible for the completed project. The owner's participation in the execution of the work can be minimal unless he elects to verify project execution against plans and specifications and other direct overview functions at his option.

ADVANTAGES

- Project Controls

  This variant permits excellent control of project cost and schedule. Selection of an experienced constructor/manager of successful hydro projects will, in all liklihood, result in implementation of proven control systems by experienced personnel. The results could be as good as in the alternative chosen as first choice.

- Quality Control

  Quality Assurance/Control could also be high for the same reasons as above. The unification of the quality assurance and control functions within the same organization may reduce the potential checks and balances feature which exists when these two functions are performed by different organizations. This may be offset to some extent however, by improved harmony in the operations of an organization which has been brought to the project "intact".

- Unified Project Accountability

  Accountability (as well as responsibility) for project results are more completely unified in this alternative than in any of the others considered. The owner holds one firm accountable for all aspects of the project.

- Impact on Owner Organization (Staffing)

  This alternative has the least impact on the owner in this area because the owner does not staff up to create either a management cadre or to fill a significant number of posts in an integrated organization. In essence, owner interface with project progress is at upper management level through briefings and progress reporting. No direct monitoring is performed by owner personnel.

- Organizational Efficiency

  The project organization which is created should suffer the least growing pains of any of the alternatives studied. Selection of a firm with direct Turnkey hydro project experience should result in the creation of a proven organization structure staffed by experienced personnel who have worked together before. Theoretically, organizational efficiency should be high.

DISADVANTAGES

- Owner Involvement

  The principal disadvantage of this form of project organization is that the Owner exerts relatively less direct control over the project. Most decision making is done by the turnkey firm selected. Monitoring of progress by the Owner is at a very summary level. This disadvantage may override all potential benefits which may be obtained from this form of project organization.

- Checks and Balances

  Completely unified project organization under one firm without significant operational participation by the owner minimizes the potential for checks and balances within the project organization (particularly between the engineering and construction functions).

- Technology Transfer

  Relatively little project experience is acquired by owner personnel under this organization concept for obvious reasons.

- Contracting "Turnkey" Contract

  Letting a "turnkey" contract for the Susitna project would pose a dilemma. Due to technical uncertainties in several areas of the project, bidders for a lump sum contract would be obliged to incorporate significant contingencies in their bids. In addition, due to the magnitude of the project, few lump sum bids are likely. Both of these factors work against realization of the project at lowest total cost using a lump sum "Turnkey" approach.

Establishment of a "turnkey" cost plus/target formula would undoubtedly attract more bids. However, in this formula, the monies spent during the execution of the project are the owner's money.

On a lump sum contract, the base contract price has been fixed and the primary control of construction costs is performed by the construction contractor because it is his money at stake. In a cost-plus formula, it is the owner's money at risk. Administration of a cost-plus contract without adequate owner participation and management can in some cases, leave the owner open to runaway costs. Creation of an Owner Management team however, would convert this from a "turnkey" approach to one of the "owner-managed" approaches discussed in the other alternatives.

SUSITNA PROJECT MANAGEMENT PLAN
Alternative Management Concepts

STAFFING IMPLICATIONS

ALTERNATIVE	TOTAL PERSONNEL	APA PERSONNEL
1: ONE CONTRACTOR PROVIDES ALL MANAGEMENT	340-420	30-40
2: PROJECT AND CONSTRUCTION MANAGEMENT CONTRACTED SEPARATELY	360-440	30-40
3: INTEGRATED MANAGEMENT WITH CONSTRUCTION MANAGEMENT CONTRACTED	350-430	50-70
4: INTEGRATED MANAGEMENT ORGANIZATION	330-410	100-130
5: APA MANAGEMENT AUGMENTED BY CONTRACTED SERVICES AND CONSTRUCTION MANAGEMENT	350-430	90-110
6: APA MANAGEMENT AUGMENTED BY CONTRACTED CONSTRUCTION MANAGEMENT	350-430	110-140
7: APA MANAGEMENT AUGMENTED BY CONTRACTED SERVICES	330-410	290-360
8: APA PROVIDES ALL MANAGEMENT	330-410	330-410
9: TURNKEY	330-410	5-10

MEMORANDUM State of Alaska

TO: Mr. Lee Nunn
Chairman
Project Management Committee

DATE: November 9, 1984

FILE NO:

TELEPHONE NO:

FROM: Joseph L. Perkins
Associate Executive Director
of Projects

SUBJECT: Project Management Committee Meeting November 8, 1984

The Project Management Committee held a meeting on November 8, 1984 to consider proposed organizational structures for the management of the Susitna Hydroelectric project. These organizational approaches were developed by Bechtel Civil and Minerals, Inc. as the initial phase in the development of the Susitna Project Management Plan.

Members of the Bechtel team presented the various organizational options. Following the presentation, the various organizational structures and the advantages and disadvantages of each were discussed by the Committee.

Questions from the Committee were answered by Power Authority staff and Bechtel team members. After a lengthy discussion period, the Committee agreed to eliminate six of the nine organizational approaches presented by the Bechtel team.

The Committee agreed that three organizational approaches should be considered for further study before the optimum organization structure for the Susitna Project is adopted. These structures include:

Alternative 1 - One Contractor Provides All Management;
Alternative 2 - Project and Construction Management Contracted Separately;
Alternative 5 - APA Management Augmented by Contracted Services and Construction Management.

(For more detailed descriptions of the Alternatives, please see Bechtel Briefing Book.)

The Committee will study the three selected organizational options over the next few weeks and will meet again before the December Board of Directors meeting to formulate a recommendation regarding which structure is the optimum approach. At the December Board meeting, the Committee will present its recommendation and the Board will be asked at that time to formally approve the recommended approach.

The Committee agreed that Bechtel should proceed during the next month with the development of policies and organizational requirements which are common to all three approaches. This will allow a minimum of disruption in the schedule for preparation and completion of the Project Management Plan.

../JLP/sd

cc: David Allison, Esq.
Esther Wunnicke, Commissioner, Department of Natural Resources

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