FUTURE INFRASTRUCTURE RESPONSIBILITIES; AN ANALYSIS OF A GOVERNMENT ORGANIZATION'S STRATEGY

by

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ABSTRACT

Issues concerning this country's infrastructure management are fast moving to the forefront of social and political discussion. In an attempt to address one portion of this many faceted subject, this thesis examines the current strategy of the U.S. Army Corps of Engineers regarding infrastructure management as well as the feasibility that this organization be used in a more central role for managing and planning infrastructure efforts at the national level.

These goals will be accomplished through examining several supporting topics among which includes first, a review of the historic participation of the Corps of Engineers in infrastructure construction and management within the United States; second, a review of the strategy changes the Corps of Engineers had undergone regarding civil works implementation during the 60s and 70s; third, review the present organizational structure of the Corps of Engineers as that structure pertains to its current infrastructure related missions; fourth, examine the Corps' present strategy regarding current and future infrastructure responsibilities; fifth, examine infrastructure management levels perhaps unsuited to participation by the Corps; and finally, assess the future role of the Corps of Engineers regarding infrastructure management for this nation.

Conclusions of this thesis are that the Corps of Engineers is well prepared to increase its participation in infrastructure related management. Second, regarding infrastructure management, the current strategy of the Corps of Engineers is one of cooperation with other agencies and not competition, as has been so often the case in past agency relations. Finally, although the Corps of Engineers may be suited for increased managerial responsibilities in

infrastructure related areas, perhaps no single agency is capable of orchestrating such a unified effort of infrastructure management for this nation; rather, a strong cooperative intergovernmental strategy need be adopted at all levels as a means of achieving this desired result.

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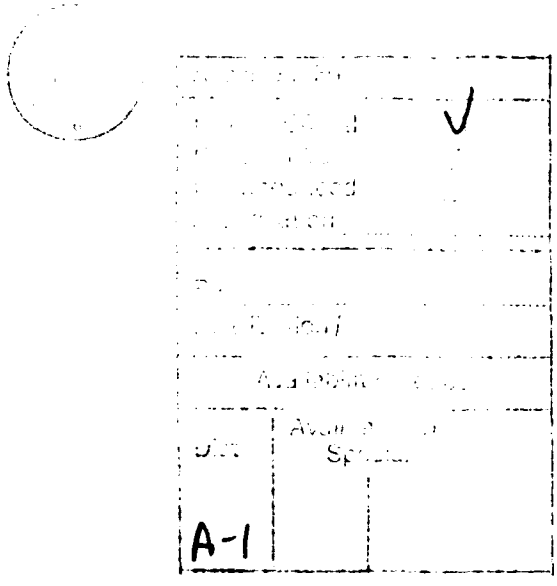

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To you all - Thanks!

THESIS

Modifications to the Corps of Engineer's strategy of implementing civil works activities may now be necessary to insure this organization's success in adopting increased responsibilities over portions of our nation's current infrastructure efforts. If these modifications are not made then, based on current federal budget reductions and ongoing personnel cuts coupled with the Corps' expected increase in infrastructure responsibilities, the Corps of Engineers may expend a significant amount of time, effort, and money in this future responsibility but at a reduced benefit to what could otherwise be achieved.

Much has been written in recent years regarding the condition of our nation's infrastructure. Countless panels have met, books have been published, and classes continue to be given, all with the hopes of contributing in some way toward mitigating our nation's current infrastructure related problems. Of itself, the severity of these problems are hard to define and certainly much harder to quantify; however, attempts have been and continue to be made.

In the early 1980s, Pat Choate and Susan Walter published two books entitled America In Ruins; with the first devoted to "Beyond The Public Works Pork Barrel" and the second targeting "The Decaying Infrastructure." These books served to 'sound the trumpet' regarding their claim that infrastructure conditions in the United States were at

a crisis level of disrepair. Considered timely though not quantifiable accurate, these books induced a resurgence in the professional concerns of managing our nation's infrastructure.

Since these publications, other authors have followed with their own versions and assessments of the condition of the country's infrastructure. Though not nearly as damning or alarming, these later publications have provided a greater insight of the complexities for our infrastructure needs and a better assessment for the maintenance, management, construction, and planning efforts required to address these needs.

Though not unified in recommendations or thinking, several of the present day authors have posed quite similar recommendations to include one in where a single organizations be made responsible for the nation's entire infrastructure management efforts. Currently, there is no organization capable of such a burdensome responsibility and the plausibility of this idea remains to be seen; however, this thought is an excellent one. At present, there are no clear answers regarding which type organization to select and few, if any, candidates. One organization, the U.S. Army Corps of Engineers, however, has had countless years of experience in a somewhat similar field of infrastructure management, namely military and civil works construction.

Based on these present day concerns for our nation's infrastructure management efforts and armed with a

significant amount of organizational structuring literature, this thesis will review the position of the Corps of Engineers in regard to increasing its own managerial responsibilities in the area of infrastructure management. To accomplish this, this paper will: First, review the history of the Corps of Engineer's effort in the civil works arena. Second, review previous changes to the civil works implementing strategies within the Corps of Engineers which have occurred as a means to adjusting to outside social demands placed on the Corps. Third, analyze the present organization of the Corps of Engineer, paying particular attention to both the internal components of the organization as well as the operational characteristics of the entire organization. Fourth, outline the present strategy of the Corps of Engineers in infrastructure management by reviewing both its "official" authorities for civil works responsibilities as well as those areas of infrastructure management the Corps may soon enter due to additional and future directives. Fifth, attempt to identify those areas that the Corps is incapable of managing based on current organizational structure, size, and authority. Finally, a conclusion will be offered regarding the current strategy of the Corps of Engineers in our nation's ongoing efforts of infrastructure management.

CHAPTER ONE:

A REVIEW OF THE CORPS OF ENGINEER'S INVOLVEMENT WITH CIVIL WORKS ACTIVITIES.

I. PURPOSE:

Central threads to the history of the Corps of Engineers include this organization's direct effort in the planning, construction, and management of many of our nation's resources. In fact, this organization has been directly involved with and responsible for many of the nation's roadways, developing the nation's intercostal waterways, construction of lighthouses along the nation's shore line, flood control activities throughout the country, hydroelectric generation, and the construction of buildings and monuments within our nation as well as on foreign soil.

The purpose of this chapter is to offer a brief historic review of the civil works accomplishments of the Corps of Engineers as well as a description of the past and present laws and regulations governing this organization's involvement in infrastructure, public works, and non-military construction related areas. Granted, the depth to which this chapter will delve is limited but, with even such a cursory review, the reader should gain a greater understanding of the role the Corps of Engineers has and continues to play in the management of our nation's infrastructure. With this groundwork for understanding

properly laid, an extrapolation toward addressing future responsibilities which the Corps might hold regarding infrastructure related management will be easier.

II. HISTORIC OVERVIEW:

The history of the U.S. Army Corps of Engineers in its involvement with civil works construction is also the history of the Corps of Engineers proper; the two are inseparable. From its inception in 1775, with the appointment of Richard Greeley as the first Chief Engineer, to the present, the Corps of Engineers has maintained a prominent role in construction and other non-military related activities directed toward the improvement of the nation's infrastructure. With but a brief nineteen year period from 1783 to 1802, during which time the Corps was disbanded, this work effort has been unbroken.

On March 16, 1802, the present Corps of Engineers was formally established. Along with this formal creation, the U.S. Military Academy at West Point was established for use as the sole school to train and supply engineer officers to the Corps of Engineers. This program for engineer specific training remained in effect until 1866, at which time the Corps lost formal control over that school. Since 1866, the Corps has continued to solicit scientific and engineering educations of its officers through this and other schools throughout the nation.

From these earliest days, the Corps of Engineer's involvement with civil works has been as a direct result of legislative bills passed through Congress. The first of these definitive bills, passed in 1824 by the House of Representatives, were known as the General Survey and Rivers and Harbors acts.[1]

Among the more technical directives, these acts provided for a "Board of Internal Improvements" whose charter was to plan for a national land and water transportation system. Comprised of three members, two of which were military, the formation of this board marked the formal start of the Corps of Engineers involvement into civil works activities. Through this board Congress authorized the President *"... to cause the necessary surveys, plans, and estimates, to be made of the routes of such roads and canals as he may deem of national importance, in a commercial or military point of view, or necessary for the transportation of the public mail."*[2] With this passage, the attention of the Corps of Engineers during the 1820s and 1830s was directed toward the survey, construction, and improvements of the canals, rivers, and harbors of the nation.

During this time as well, technologic engineering innovations were advanced through the efforts of Corps of Engineer officers in the field. For example, in 1825, MAJ Stephen H. Long devised the installation of a series of wing dams along the Ohio River as a means to increase the velocity and scouring effects of the river flow and thereby reducing the likelihood of sandbar formations. Considered a

revolutionary though practical application of theoretical design, the direct benefit of his effort was an increase in safe commerce along the Ohio River.[3]

Improvements along the Ohio River continued with the Corps' addition of wicket dams in 1877. These dams, first designed in France in 1852, were intended to provide for safer and more efficient traffic flow. In addition to providing improved service, these dams held a second distinct notoriety: They were the largest in the world at that time and among the first dams in the U.S. to be made of concrete rather than stone masonry.[4]

The Corps of Engineer's historic involvement with shoreline survey proved equally as beneficial to the nation's navigational concerns. In a twenty year period, from 1841 to 1860, the Corps effectively surveyed some six thousand miles of shoreline in and around the Great Lakes region. Conduct of this survey, among the first of its kind in the nation, provided for the recording of *"... latitude and longitude; measure the discharge of rivers into the Great Lakes; survey rivers, narrows, and shoals; develop charts and maps; and mark points of danger."*[5]

Other shoreline surveys during this era included the Mississippi Delta and Lower Mississippi River basin survey of 1861. Under the guidance of CPT A. A. Humphreys and LT H. L. Abbot, this survey proved to be a hallmark of its day in engineering and river studies.

In 1879, the Corps' responsibilities were expanded in the non-military construction field. In this year the

Mississippi River Commission was established, giving the Corps of Engineers formal supervisory responsibility over the efforts of locals inhabitants toward flood control activities along both the Mississippi and Sacramento rivers. Empowered by this act, the Corps offered technical assistance to all inhabitants living in the flood plane as a means of protection from future flooding. To this day, the Mississippi River Commission is an active, viable organization directly involved with the Corps' civil works programs. This commission still regulates projects planned or managed by the Corps throughout the Missouri River Basin.

In 1902, based on a consistent disparity in the civil works project funding and proposed methods for project execution forwarded to the Chief of Engineer's office from all Corps field offices, Senator Theodore E. Burton, then the Chairman of the Rivers and Harbors Committee of the House of Representatives, championed and won the creation of a Board of Engineers for Rivers and Harbors (B.E.R.H.) as a new advisory wing within the Corps of Engineers. This board was created within the Corps' existing structure specifically for the purpose of reviewing project recommendations made by the many Corps field offices, voting on the feasibility of those recommendations, and then forwarding their own recommendations up to the Chief of Engineers, the Secretary of the Army, and Congress for final review. Over its history the B.E.R.H. has met on a regular basis to review the projects under consideration for

construction throughout the Corps. As the table at right indicates, the frequency for these meetings has changed over the years but the quantity of projects considered and quality of output has remained consistent. At present, the board meets quarterly or on call of the chairman of the board.[6] Recommendations from the Board have carried significant weight in the ultimate approval or disapproval for projects under consideration. Since 1902, the B.E.R.H has reviewed 8,804 projects and passed along favorable recommendations on 4,037. Those projects which the Board viewed as unfavorable, some 4,817, were recommended against and, with the exception of but a few, not executed.[7]

Trend of meetings held by the Board of Engineers for Rivers and Harbors since 1902:

	# Meetings	Days Spent
1st Year:	47	57
2nd Year	56	72
10th Year:	44	65
1922:	18	
WW II & After:	Fewer meetings were held during these years but more projects were considered.	
1950s/60s:	During these years, an average of 6 meetings per year were held.	
Present Average:	Today's average runs at about four meetings per year.	

Figure 1.1

The Corps of Engineers' role in flood control activities further expanded in 1936 when Congress directed that they become responsible for like occurrence along all the nation's rivers. In this particular bill, the Congress declared that the new role of the Corps of Engineers was "... *a proper and essential federal activity and that structural improvements to prevent*

flooding were in the public interest."[8] Yet again, in 1938 this bill was expanded by Congress, directing that the Corps of Engineers install facilities along flood control projects for the purpose of hydroelectric power generation (This particular version was passed only after an agreement of operations was reached between the Corps of Engineers and the Federal Power Commission.).

In 1941, the Corps of Engineers became the in-house construction agency for the U.S. Army. At this time, Corps of Engineer officers oversaw the construction of military bases throughout the world in support of the Allied Nation's ongoing war effort. This year also marked the start of construction of the Pentagon building, located in Washington, D.C. As yet another construction project undertaken by the Corps of Engineers, the construction of the Pentagon ultimately took two years to complete at a cost of $60 Million.

Other Corps construction efforts during and after this period included construction of the Alaska Highway commencing in 1942, implementing the new construction program for VA Hospitals throughout the U.S. (a program commencing in 1946), the post-war reconstruction program in Greece from 1946-49, implementing portions of the Nuclear Power program beginning in 1952, support to NASA for the space program commencing in 1961, and implementing the nation's dam inspection program of 1977, to name but few.

With regard to water specific civil works projects, the Corps' efforts have been as numerous. Based on two separate river basin surveys conducted in 1943, Congress adopted a composite plan for multiple-purpose river basin development all along the Missouri River. Created through the effort of both the Corps of Engineers and Bureau of Reclamation, this project served as a compromise solution to the problems experienced by states all along the Missouri. This plan, often referred to as the Pick-Sloan Plan in honor of the two chief program architects, eventually cost $1 Billion to fully implement.[9]

Examples of other such waterworks studies undertaken by the Corps have included the Tennessee-Tombigbee Waterway (with its study commencing in 1945 and construction completed in 1985), the Arkansas River Navigation study of 1945 (with construction completion in 1970), the Overton-Red River Waterway study of 1946, the Chesapeake and Delaware Canal project (first identified as needed in 1939 but held for construction until final approval in 1954), the Passaic River flood control project study of 1972-73 (first recognized as needed in 1902-03 with the disastrous flooding that occurred during those years; however, due to controversies, still not fully implemented.)[10]

The most recent act passed by Congress having significant impact on the efforts of the Corps of Engineers in water related matters was the Water Resources Development Act Of 1986 (known as Public Law 99-662). Under eight

separate titles to this bill, Congress took several actions, principal of which included:

> *[To place a ceiling][11] on the annual civil works construction program, policy changes in the Federal water resources program, modification on several water resources projects, provision of a dam safety program at state level, construction authorization on new inland locks and dams, authorization of a national harbor improvement program, establishment of a new cost-sharing procedure covering non-commercial navigation water resources development work, and the authorization of new user, fuel and maintenance taxes associated with water use.*[12]

These and other efforts, taken by Congress in recent years, have served to significantly streamline and update the Corps of Engineers commitment in civil works related areas. In the Secretary of the Army's most recent biannual civil works publication submitted to Congress, the total expenditure for 1987 was $3.135 billion, which included both new construction as well as maintenance and operations of existing facilities operated by the Corps.

The table at right reflects the general trend over the four most recent years (this

FY 1987 Highlights

Annual Report, FY 1987
Volume II

	1987 $ Millions	1986 $ Millions	1985 $ Millions	1984 $ Millions
Navigation	443	299	304	257
Flood Control	787	673	676	647
Multipurpose	69	93	112	171
Beach Erosion	23	17	12	25
Other Work	1,813	1,658	1,797	1,561
TOTALS	3,135	2,740	2,901	2,688

Data has been extracted from the most current publication of the Secretary Of The Army's report to Congress on Civil Works Activities.

Figure 1.2

particular report is the most current of its type available) in Corps of Engineer's expenditures on civil works authorized by Congress. For the fiscal year 1991, the Corps is expected to spend over $3.3 Billion on infrastructure related construction, maintenance, and servicing to support many of the infrastructure interests of this nation. Above and beyond this dollar amount on civil works, Congress has authorized the Corps of Engineers, serving as the construction arm to the U.S. Army as well as many other Federal agencies, to expend more than $1 Billion of both military and civil works in strictly environmental related areas.[13]

III. SUMMARY:

From this brief review it is clear that the history of the Corps of Engineers in infrastructure related missions is rich and detailed and continues strong into this day. Missions assigned to the Corps of Engineers have been assigned due both to historic relevance as will as on an as needed basis; although, the "as needed" basis has often extended into long term commitments for the Corps of Engineers. To this day, Congress continues to assign missions to the Corps as it recognizes the need for these particular and unique missions to be addressed.

The knowledge of the Corps of Engineer's past relations with our nation's infrastructure management is necessary to

effectively project what the roll the Corps of Engineers will play in the not-too-distant future.

CHAPTER TWO:

CAN THE CORPS OF ENGINEERS CHANGE?

I. Purpose:

If modifications to the strategies of implementing civil works projects currently employed by the Corps of Engineers are needed as a prelude to its success in adopting new or increased responsibilities in our nation's infrastructure management, then the obvious question should be asked: Can the Corps of Engineers impel this change and thereby successfully adjust to these increased responsibilities?

There is no question but that the Corps of Engineers is a massive organization comprised of tens of thousands of employees, managed at all levels by both military and civilian leaders - a topic to be addressed later. Its civil works funding is complicated, coming from an assortment of areas to include Federal, State and local governments, as well as sister Federal agencies and an assortment of lesser organizations. Corps of Engineer project and field offices are numerous, extending in location throughout the United States and abroad; and equally complex within each field office location.

Answering this question of the Corps' capacity for recognizing and implementing strategic policy change is critical if this organization is to be expected to

successfully undertake any new programs, especially those which may prove cornerstones to the nation's developing infrastructure program.

II. Looking To Past Changes:

Case studies regarding the past activities of organizations are routinely conducted and reviewed as a means of providing all who review such work an opportunity to learn from the lessons they uncover. Often enough, case studies reviewed by an organization were case studies conducted on that same organization at some earlier time. Based on the findings of these case studies, that organization is then given an opportunity to improve its performance in similar, future settings. Thus, for an organization to better negotiate needed changes to its strategic planning and operations, that organization should review its past attempts at similar change and the results of those attempts. So too, to judge the future potential for change within the Corps of Engineers, we must look into its past. With all its rich and colorful history regarding civil works, the Corps has not been without troubles in pursuing its mandate for these activities within the nation.

Perhaps one of the most troublesome times for this organization has been the Corps of Engineer's pur.uit of civil works programs during the 1960s and 1970s. During these two decades, the Corps found itself forced into needed transition; from an organization dedicated to problem

solving strategies through structural construction methods to one dedicated to achieving public support through providing a choice between structural or non-structural civil works project alternatives as a means to achieve needed results. This transition was ultimately accomplished but not without casualties nor without severe budget waste.

The transition period and ultimate outcome concerning this issue are noteworthy for two reasons: First, the Corps of Engineers, comprised of civil engineers who had traditionally pursued construction in response to addressing environmental problems, was forced to readjust its organizational strategy on exactly this issue of non-construction alternatives. Given that their earlier techniques of construction to solve problems was tried and true, they pursued this policy with great fervor and equally great and earned reputation. Unfortunately, regarding environmental impact, this repetitive construction lead, in many documented instances, to greater occurrences of flooding and thus renewing the need for additional construction. Secondly, on a much larger scale, the Corps' shift of project implementing policies demonstrated quite clearly that Federal organizations, in and of themselves, are not doomed to a lifelong inability to change simply because they are government organizations. This alone was a clear departure from the perceived "status quo" reputation of Federal agencies so pervasive in the American society during those years. In short, these changes which swept

over the Corps of Engineers during this period were a significant change in the organization's manner of conducting business.

III. A Review Of Five Case Studies From The Brookings Institution:

As noted above, the 60s and 70s were times of particular tension for the Corps of Engineers. During this period, the United States experienced a surge of increased environmental awareness; so much so that once one too many Corps civil works projects had been started, private action groups rallied together, locally at first and then unified throughout regions, to oppose and halt these projects the Corps had undertaken. The direct consequence to this was a needless consumption of the Corps' civil works budget along with considerable time and effort per project lost or wasted due to inevitable cancellations. In response to this fact, the then Chief of Engineers directed in 1970 for all Corps' offices to *"... encourage as broad public and private participation as practical in defining environmental objectives and in eliciting viewpoints of what the public wants and expects as well as what it is projected to need."*[14]

In 1979, Daniel A. Mazmanian and Jeanne Nienaber published a study through the Brookings Institution of Washington, D.C., which offered a detailed and in depth review of the Corps of Engineer's internal organizational adjustments during this period. Within this work, they concentrated on five case studies of relevance to the

adjustments being made to the Corps' organizational strategies during this time. In particular, they examined the techniques employed by the Corps' district level offices in responding to these social and environmental concerns as well as in implementing the above roted Chief of Engineer's directive of encouraging broader public support for proposed civil works projects.

Outlined below are detailed summations gleaned from Mazmanian's and Nienaber's case studies. Each of the five summations are paraphrases of the referenced case studies and are presented as *Situation*, *Problem*, and *Solution*. Following the *Solution* portion of the summation, an *Assessment* section is added, separate from Mazmanian's and Nienaber's work, which relates each of the studies to a perspective view of the Corps' total shifting position in its implementing strategy for civil works projects during these troubled times.[15]

A. Unit L-15 of the Missouri River Basin Plan.

1. Situation:

In 1944, Congress approved expenditures to 'tame the mighty Missouri River' through the construction of a detailed network of flood control, navigation channels, power generation facilities, and irrigation channels, all within the Missouri River Basin area. This plan, known as the Pick-Sloan Plan, was to be implemented over many years and would involve nine states, one hundred lakes, and up to sixty "local" projects to support the effort.

Unit L-15 of this plan, a levee designed for the 100 year flood level, was to be constructed in the late 1960s in a region along both the Mississippi and Missouri rivers generally between

Alton, Illinois and St. Louis, Missouri. Once constructed, this levee would provide flood protection along both banks of each river and, as an additional benefit, safeguard a sizeable amount of land in the flood plane for industry concerns.

2. Problem:

Shortly after the L-15 portion of the Pick-Sloan Plan began to pick up momentum for construction within the circles overseeing the efforts, concerned citizens became vocal of their doubts regarding the 'great benefits' the project was to produce. Based on a series of locally sponsored studies regarding the future effects of such construction, residents and special interest organizations from throughout the region joined together to oppose the Corps' effort toward ultimate construction. With this growing controversy, the Corps recognized the immediate need to hold a series of public meetings, above those already held, in an attempt to resolve all dissatisfaction.

3. Solution:

From initiation of the Corps' direct effort toward construction of the levee in 1967 to the concluding public meetings of 1973-1974, the Corps held countless meetings, each with no apparent reduction of the public dissent.

The ultimate decision made by State and local government participants was to abandon the effort of constructing the L-15 unit. A decision which might be characterized by many as the Corps losing; but one which may also be characterized as having decidedly improved the Corps' reputation in that geographic area. Whereas the Corps was initially perceived as unapproachable and dogmatic in its thinking, residents throughout the region later recognized the Corps of Engineers as impartial and willing to listen, participate, and adjust policies to address their concerns.

4. Assessment:

The Missouri River Division office, within which this case study took place, found itself forced to change its long standing strategy of fulfilling its responsibilities in civil works through traditional engineering methods Perhaps in this case, the detriment to the Corps was the

consumption of considerable time, money, and effort to prepare plans in support of the L-15 levee. When the ultimate decision not to build was made, all the prior efforts at developing the L-15 were lost.

The attributes of the case, however, compensated for these significant detriments. Foremost, by recognizing early the need to shift its strategy regarding the execution of this work, the Corps of Engineers reestablished its reputation in the project area as a true, non-partisan public servant. The Corps ably demonstrated to the public its ability to transition from an organization perceived as having a single-mindedness toward construction solutions to one of open-mindedness, genuinely interested in hearing and discussing alternative-construction solutions to the ongoing flooding situation. Secondly, it exercised an adjustment within its organization, directed by the Chief of Engineers, that has produced long term benefits regarding relations with the community's interest organizations.

B. Centroport, U.S.A.

1. Situation:

The port of New Orleans, Louisiana is among the busiest in the world, handling hundreds of thousands of cargo each year from throughout the U.S. and abroad. It is the largest grain handling port in the U.S., number two in commerce, and third in total volume of goods shipped. Geographically, it is spread along approximately twenty five miles of waterfront of which includes the Mississippi River, the Inland Harbor Navigation Channel, and the Mississippi River - Gulf Outlet. Just after WW II, local political powers established a thirty year plan to upgrade the entire harbor facility and channels serving that harbor with the

intended goal of transforming the harbor into an ultramodern "Rotterdam" of the western hemisphere. Among the many support plans developed for this master plan, one called for construction of a connecting channel between the tide waters of the harbor and the Gulf Outlet, running directly through an existing, well established community.

2. Problem:

The plan, considered post-authorization construction by official Corps policy, met with the expectations of the industrial communities using the harbor facility, the Board of Commissioners overseeing the harbor area, and the political representatives of the greater New Orleans area. Unfortunately, the plan did not sit well with the members of the neighborhood through which the channel was intended to be built. In fact, the site location for the channel cut through an established community and would have necessitated relocating several hundred families as well as constructing countless bridges across the channel to re-link the severed neighborhood.

Though not unusual to have this type impact on a community given the size of the public works project, this one was particularly unusual, as the community impacted upon was to receive no direct benefits from the project. Further, in accordance with Federal cost sharing regulations of the time, that same community would have had to pay for construction of the needed bridges to re-linking its own land.

3. Solution:

Based on the emotions of the project, the offensiveness of forcing a civil works project on a community not intended to receive the benefits of such project, and in consideration for the dollar amount needed to eventually re-link the severed neighborhood, the Corps never received final appropriation for the project.

As directed by the Executive Office in 1976, a full sixteen years after the project had been initiated for consideration, the Corps was to return to the drawing board in its evaluation of upgrading this portion of the harbor area. Regardless of the work and studies expended to date, the Corps was to determine a new technique for needed channel improvements that would prove minimally disruptive to the inhabitants of the neighborhood area.

4. Assessment:

The New Orleans District office of the Corps failed early in the life of the project design to represent the civil works project fairly and in a non-biased manner. From inception of the channel in 1960, through the first half or its resolution around 1969, the Corps of Engineers made only minimum effort in attempting to hold public hearings, information letting, and general programs for educating the public regarding this project. Instead, the Corps favored project execution in support of the master plan.

In the latter half, from 1970 through 1976, principally due to the Chief of Engineers new directive on public participation, the Corps efforts at project representation faired much better in needed public involvement and conciliation. Overall, however, due to the sided views earlier held by Corps officials, Corps representatives were perceived to have conveyed a sense of bureaucratic favoritism; supporting channel construction for the sake of industrialization.

C. Flood Control On The Wildcat and San Pablo Creeks.

1. Situation:

The Wildcat and San Pablo creeks are two principal creeks running close together and parallel to one another north of Berkeley, CA, through three townships, and emptying out into the San Francisco Bay. Since just after WW II, all three townships through which the creeks run have grown considerably in size yet, until 1960, no appreciable efforts had been made to protect residents against severe flooding that often occurred. Based on the Flood Control Act of 1960, the Corps of Engineers initiated

such a study in 1965 to determine the feasibility of flood control measures along both creeks.

2. Problem:

In 1968, three years after initiation, the Corps concluded its study of this region, determining the flood control project unfeasible; however, this was not the last word. One year prior, in 1967, the Housing and Urban Development (HUD) agency provided a "Model Cities" planning grant to the most effected of these three townships in order to upgrade the public facilities of that area. In addition, HUD pledged a 90% total cost grant to construct storm sewers in the town as a means to mitigate excessive storm runoff. With the HUD grant, the township's planning commission invited back the Corps of Engineers to reassess the flood control project issue along the creeks. With this invitation and HUD's pledge for backing, the Corps reopened its flood control study in 1970.

3. Solution:

Working closely with the planning commission for the cities and in conjunction with the public communities, environmental groups, and the like, the Corps was able to effectively propose an action which met with the unanimous support of all concerned. In 1973, with this support, the San Francisco District office of the Corps of Engineers submitted its updated report and project request into the approval channel of the Corps of Engineers. In 1975, the project won the support from the B.E.R.H. and the Chief of Engineers. It was then forwarded to the Office of Management and Budget (O.M.B.) for final approval and funding appropriations. These were received in 1976, with construction start scheduled in 1980.

4. Assessment:

The San Francisco District office adopted a strategy of conciliation, support, and nonpartisanship virtually at the start of the study. The Corps of Engineer's position in this matter was accurate and paid extreme dividends in the final analysis of the project. It is interesting to note that the position of the

Corps office for pursuing public involvement was taken well before the Chief of Engineer's official directive was made.

D. Urban Waste Management.

1. Situation:

In 1969 the Government Accounting Office published a report indicating that the nation's rivers had deteriorated in quality to their lowest point ever. The agency reported that this was due principally to the inadequacy of Primary and Secondary wastewater treatment facilities throughout the nation. Armed with this report and a firm directive given by the Secretary of the Army, the Corps of Engineers launched its urban wastewater management program in 1971.

This program addressed, among many lessor subjects, the practice of wastewater effluent spraying over designated land areas. The intended and net effect of this practice was to significantly reduce the amount of pollutants in the wastewater; including both the storm as well as municipal and industrial waste waters. The entire Corps program, considered bold and imaginative, received broad support from throughout the environmental communities. Application of this program, however, was another matter entirely.

2. Problem:

In 1971, the Buffalo District Office of the Corps of Engineers was requested to conduct a feasibility study addressing the water pollution situation of the Three Rivers Watershed area immediately surrounding Cleveland, Ohio. This particular geographic area had been notorious for the filth of its waters and held the notoriety of having the third dirtiest river in the nation. In conducting this study, the Corps made no secret of the fact that they intended to evaluate, among several possibilities, the application of its wastewater management technique outlined above.

Early on, it was recognized that in order to affect this land spray solution, the effluent from the communities involved would have to be pumped well outside the watershed area and to a region with enough free land so as to accommodate the total acreage needed for effective spraying. In developing this solution, the Corps solicited considerable public participation

from throughout communities of the water watershed region as well as the intended target area. Over sixty meetings were held of varying levels and importance.

Unfortunately, the viability of this technologically innovative plan seemed doomed from the start. Area residents from within the target spray area were steadfastly against such treatment; not because of a perceived potential harm that might develop (there was none) but because of the idea that they were the intended recipients of another community's waste was so repulsive.

3. Solution:

After considerable effort and three years of dedicated study, the Corps of Engineers was unable to sway effected communities with the fact that this would be a viable solution. In short, while the Corps had recommended three separate solutions to the problem, the political leaders selected, as a means of conciliation, the least controversial, least effective plan which maintained the wastewater within the generator's geographic boundary.

4. Assessment:

Even with technologically advanced programs, scientific support, and an honest effort at public mediation, outcomes apparently are not always favorable. In this case, Corps personnel pursued exactly those guidelines established by the Chief of Engineers for increased public involvement with the civil works projects. While the Corps lost in its effort to win support for the best wastewater treatment solution, it won in general terms by preserving its reputation for nonpartisan public works as well as forwarding an acceptable project to the community.

E. Flood Control on the Middle Fork of the Snoqualmie River.

1. Situation:

The Snoqualmie River drains the Snohomish Basin in northwest Washington, emptying into Puget Sound just north of Seattle, WA. As is characteristic of the area, this river floods both in the winter months (heavily) and in the spring months (somewhat lighter). Direct results of this flooding include severe damage to productive farming communities as well as preventing appreciable growth in the agriculture or industry along its banks.

Based on the 1960 authorization for flood control studies, the Seattle District Engineer undertook to determine the feasibility of flood control measures along portions of the river. By 1969, the Corps had determined a structural solution to the flooding and thus requested the B.E.R.H. to approve further funding for a more detailed study be conducted in the area.

2. Problem:

Environmental groups active in the area petitioned the Corps of Engineers and the Board of Engineers for Rivers and Harbors to provide them an opportunity to present a counter argument to the structural solution of flood control under consideration. The B.E.R.H. granted this request and flew to Washington to chair the ensuing meeting. After considerable time afforded to these groups, the B.E.R.H. concluded that a structural solution to the problem might in fact be merited; thus, it recommended to the Chief of Engineers that the Corps continue with a structural solution to the flood control study. Once again, these groups persisted and called on the favor of the governor for support.

3. Solution:

After consultation with Corps leaders and State agencies, the State's Governor requested that the Corps restudy the issue, jointly with State agencies. Employing a "fishbowl" approach to conducting the study, the Corps of Engineers orchestrated the second study as requested. (At this time, "fishbowl" planning was a relatively new concept involving the organization of Workshops, Public Meetings, Citizen Committees, and publishing a brochure for general distribution as a means to update all interested parties regarding the subject at hand.)

By 1973, with no clear agreement in sight, eleven separate proposals to the problem had been developed, each with an equal number of supporters and opponents. While the intent of the Governor had been met, no clear plan for solving the flooding had been agreed upon. Further, in 1977, with the election of a new State Governor, the Corps was again asked to start over, re-study the existing situation, and make recommendations as identified.

4. Assessment:

Here again, the Corps placed its best foot forward in attempting to ameliorate the conditions of flooding along the river. It developed an initial solution to the problem, albeit structural, but with a great effort toward public participation. Unfortunately, perhaps due to the Corps' previous reputation for 'wanting to build dams everywhere,' the special interest and environmental groups would have nothing to do with a structural solution - even after the B.E.R.H. had chaired a meeting in their own front yard and specifically for them! Tnus, the outcome was one of disagreement and dissatisfaction rather than cooperative success. Seventeen years had transpired since initiation of this study, with no real product to show for it.

III. DISCUSSION:

Within each of the five case studies, the Corps of Engineers was identified as having occupied a firm position, either controversial or non-controversial, in its actions taken concerning four typically interactive environments of project construction, our society's governing laws, the user's perception for the need and value of these projects,

and the overall impact of these projects on the natural environment. In each of the above five cases, where the Corps was simply dogmatic in its approach to pursuing construction solu ions, it was influenced to adjust; where it adopted a position toward mediation and support for the concerns of the society and user, it was successful.

Through the use of a simple diagram adopted from an MIT working paper and presented below as Figure 2.1, the Corps' effort in changing its implementing strategy of civil works projects during this period may be adequately characterized.[16] Note that within this diagram the *Built Environment* block represents the total commitment of an organization to construction projects.

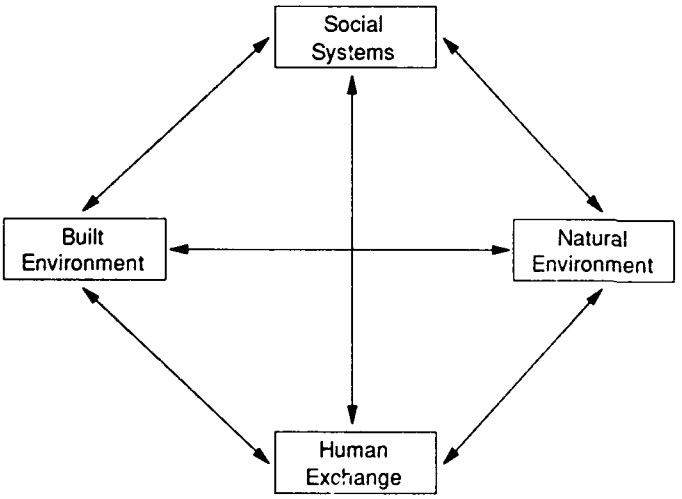


Figure 2.1

The *Social Systems* block represents our society's rules, regulations, and operating practices as well as the political forces within our society. The *Human Exchange* block represents the project user's perception of the project, to include influences and impacts from all other external factors as well as other areas of the diagram. Lastly, the *Natural Environment* block represents the interests of the natural environment and the

impact to this environment by all other influences. Arrows connecting each of the four blocks reflect the bi-directional and joint influences each block has on the other.

The compendium of this diagram captures the phenomenon of the joint and reciprocal influences which exist given the presents of the three "manmade" environments - Built Environment, Human Exchange, and Social Systems - and the Natural Environment. With this compendium established, the strategy of the Corps of Engineers used in implementing its civil works projects may be adequately characterized.

Based on Figure 2.1, during the 60s and 70s the Corps of Engineers tended to occupy a position within the diagram which favored the *Build Environment* extreme over all others; with *Social Systems* and *Human Exchange* following to a lessor degree, and with the *Natural Environment* almost not at all. With but a single exception in these case studies, the Corps of Engineers was seen to have avoided its relationship with the *Natural Environment*, favoring instead support for areas to the left of the diagram's center. Diagrammatically, the Corps' position may be viewed as located somewhere around the *Built Environment*, as

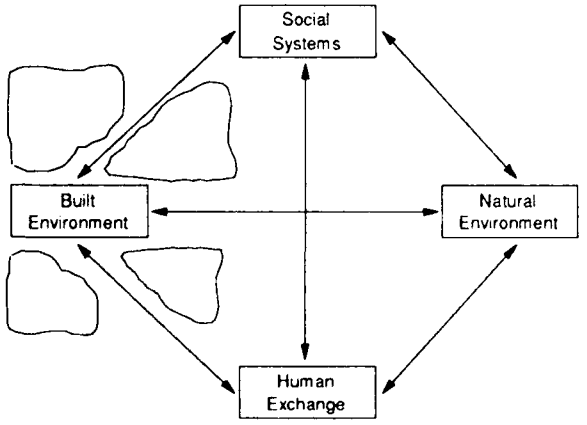


Figure 2.2

portrayed in Figure 2.2 on the preceding page.

As the controversy regarding the Corps' interaction with these general environments grew, the Corps reacted in a positive manner, addressing exactly those issues of the implementation techniques employed on its civil works projects. Through the effort of subordinate Corps offices up to the Chief of Engineers, it consciously and deliberately initiated programs targeting joint participation of project planning as a means to better determine the need and type of civil works projects to be constructed. In short, the Corps' implementing strategy employed to carry out its mandate for civil works construction was changing its effort to align itself with the public at large has been significant. Whereas the Corps had earlier held an extreme position tending to favor the *Build Environment*, it was able to align itself more to the middle ground of the four extremes, in a manner reflected in Figure 2.3, just above.

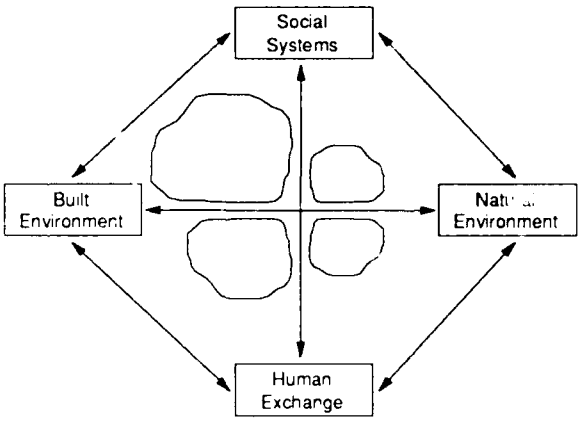


Figure 2.3

The position within this diagram that the Corps of Engineers currently occupies is even further to the favor of the *Natural Environment*. Although by no means should the Corps of Engineers be considered a 'preservationist'

organization or one dedicated to preserving the natural environment in the state its is now found; its current position regarding civil works implementation has been established due to continued legislation regarding the need for husbandry of the natural environment coming from the United States Congress. With these new laws enacted, the Corps is now finding itself restricting industrial development in favor of environmental concerns which others have fought so hard to save.

Diagrammatically, the Corps' current position may be viewed as that in Figure 2.4, just below.

IV. SUMMARY:

As concluded in their work, Mazmanian and Nienaber found that while the American society had undergone significant change in its consciousness regarding environmental awareness during the 60s and 70s, the majority of Federal agencies operating during this period had adjusted little. In fact, their report points out that the greatest agency offenders of this era included such organizations as the Forest Service, the Department of Transportation, the Atomic Energy Commission (now the Nuclear Regulatory Commission and elements of the Department

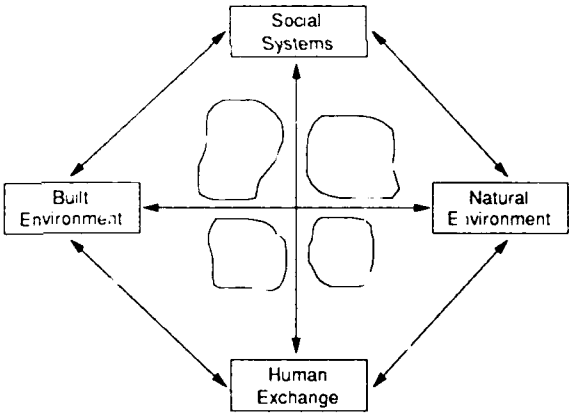


Figure 2.4

of Energy), and the Department of Interior.[17] Mazmanian and Nienaber further concluded that the Corps of Engineers was able to make significant inroads in changing its own strategies of implementation during this period. As an organizational entity, the Corps recognized needed strategy changes within itself and made those changes, shifting in position from that portrayed in Figure 2.2 to that portrayed in Figure 2.4. Thorough review of Mazmanian and Nienaber's case studies reflects this shift. Where the Corps was less than reactive to sensitive issues, it lost standing within the community and thus was forced to adjust and conform. Where the Corps demonstrated proactive involvement in these same issues, it won support for those projects it considered necessary.

From this discussion, the Corps of Engineers may be properly characterized as having successfully adjusted its organizational strategy of civil works project implementation from one that was traditionally resistant to public mediation to one now opened and even dedicated to the same. This shift was caused only when sufficient influence was brought to bear by those many outside factors. How this past ability at internal adjustment translates to its current ability to undertake greater infrastructure management responsibilities may now be addressed. This will be accomplished first through review of the Corps' current organizational structure.

CHAPTER THREE:

ORGANIZATIONAL STRUCTURE OF THE CORPS OF ENGINEERS.

I. PURPOSE:

Organizational and operational mechanisms currently employed by the Corps of Engineers as a means to pursue its civil works responsibilities vary based on the level of the Corps' organization under consideration. Naturally, those mechanisms employed by the higher organizational levels are different from those of the middle and lower levels of the organization. These mechanisms vary due, in large part, to the structuring of that particular level of the organization, either established from within or as a consequence to outside dictates.

The purpose for this chapter is to outline the civil works management of the Corps of Engineers, from the top down, and then analyze each level based on current organizational structuring literature. This analysis will provide an operating template of the Corps, level by level, to be used as an additional means to help understand and forecast reaction to anticipated future responsibilities.

II. OVERVIEW OF THE CORPS:

At all echelons, the organizational structure within the Corps of Engineers is established by the dictates of

Congress and the Secretary of the Army. At the top level, the Corps' organizational structure is designed to insure a clear communication line between the Chief of Engineers (appointed by Congress with recommendation from the President), the Secretary of the Army (answerable to the President), and Congress. Based on this relationship, the Chief of Engineer's responsibilities for reporting become split between the Executive and the Legislative branches of government. Subordinate to the Chief of Engineers is the entire Corps operation, including that for civil works.

Directly below the Chief of Engineers reside eight directorates. These directorates orchestrate the entire work effort of the Corps' civil and military works programs as well as ancillary services regarding basic support to the Corps of Engineers as an organization.

Separate from the directorates but equally important to the decision making operations are four boards within the Corps of Engineers empowered to review civil works and other programs and procedures. These boards include the Board of Engineers for Rivers and Harbors (B.E.R.H.), the Mississippi River Commission (M.R.C.), the Costal Engineering Research Board (C.E.R.B.), and the Board of Contract Appeals.

Following these boards in order of importance to the civil works functions are all division offices and subordinate district offices located throughout the nation as well as overseas.

Diagrammatically, the relationship of these directorates, boards, subordinate offices, and civil works executing offices may be presented as follows:

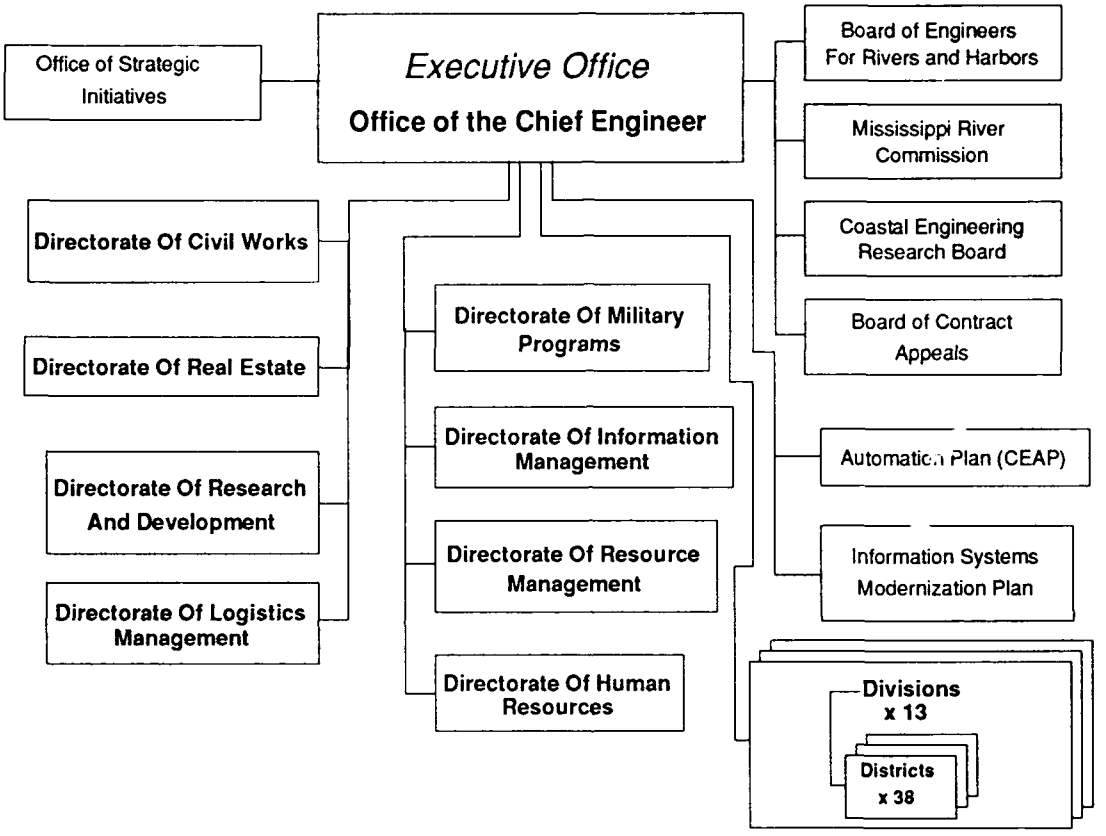


Figure 3.1

A. Project Request Process:

The process of requesting, studying, and ultimately approving a civil works project is detailed and complex, involving the Division Offices, District Offices, Civil Works Office, the B.E.R.H., and the Chief of Engineers.

Outside the Corps, local and state agencies must be actively involved at the onset of each project request and remain so throughout the request approval process. In fact, in initiating the majority of civil works project requests,

the onus for submitting the request for consideration of a project is on the congressional district within which that particular project is to be built.

Assuming that all required regulations governing the project have been addressed at the local and state levels, the Chief of Engineers may then formally recommend to the Under Secretary of the Army for Civil Works that the project be executed. Once public hearings on the project have been held and funding given, the project is, in effect, approved. Clearly, the particulars for this approval process are much more detailed but, in general, they follow this outline.

The significance of this process is that the Chief of Engineers receives a request for assistance from a congressional district, directs a preliminary investigation be conducted on that request, evaluates the feasibility and merits of the project, and then renders a purely professional, non-political recommendation to the Under Secretary of the Army for Civil Works as well as the U.S. Congress regarding the project's feasibility. Here, the Chief of Engineers is providing highly professional engineering advice, supported by both military and civilian experts, on the subject of infrastructure (civil works) construction throughout the country.

B. Project Funding Process:

As noted earlier, the principal construction efforts of the Corps are divided between military and civil

construction. Military construction, authorized and funded through Department of Defense, is clearly in support of the nation's military efforts at home and abroad. Civil works construction, authorized and funded through the Energy and Water Development appropriations passed yearly on a separate line item by Congress, are targeted to those projects deemed in the public good. The operating budget of the Corps is divided between funds targeted to support those military construction efforts and those targeted to support civil works activities. As necessary, additional expenditures are made to include funds of lesser value targeted to research, testing, and development at many of the Corps' laboratories and support facilities. Leeway is given to the Chief of Engineers to transfer funds between these two categories so as to spend as little as possible on military construction when not needed but significantly more when that form of construction is needed.

Project funding from outside agencies often find their way into the operating budget of the Corps. This occurs when special projects are assigned to the Corps which belong to other federal agencies incapable of executing these projects. Recent cases regarding this funding transfer include those actions taken by the Department of Interior (the recent project to deliver water to the Everglades National Park), the Environmental Protection Agency (both in support of Superfund cleanup sites as well as the ongoing support for wastewater treatment projects), and Department

of Treasury (assistance in the design and construction of a waste ink and solvent pretreatment facility) to name but few.[18]

Funding allocations within the Directorate Of Civil Works are made under three general categories: The first includes the *Studies* branch. The funding within this category is targeted to the conduct of project studies, feasibility reports, assessments, and the like. The second includes those expenditures for *Projects*. Here, funding is allocated to the execution of approved projects. Currently, these two categories, Studies and Projects, represent about one half of the total funding allocations given to the Corps' civil works program. The third category, *Maintenance & Operations*, represents the entire second half of the total civil works allocations. This category of expenditures covers activities on all projects owned and/or operated by the Corps after construction has been completed.

On average, these three categories of funding have accounted for about $3.3 billion of Corps funds in each of the last two years.[19] In considering cost sharing expenditures, noted in

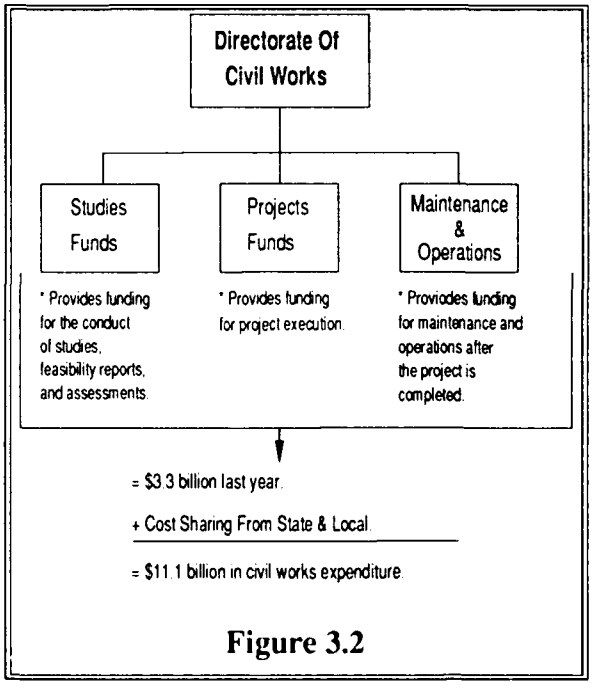


Figure 3.2

Figure 3.2 on the preceding page, the total civil works expenditure in the U.S. has been approximately $11.1 billion for each of the last two years.[20]

C. Corps Control And Project Management:

The internal organization of the Corps of Engineers includes thirteen Division offices and thirty-eight subordinate District offices. Of the Division offices, eleven share in their responsibilities between civil works and military works.

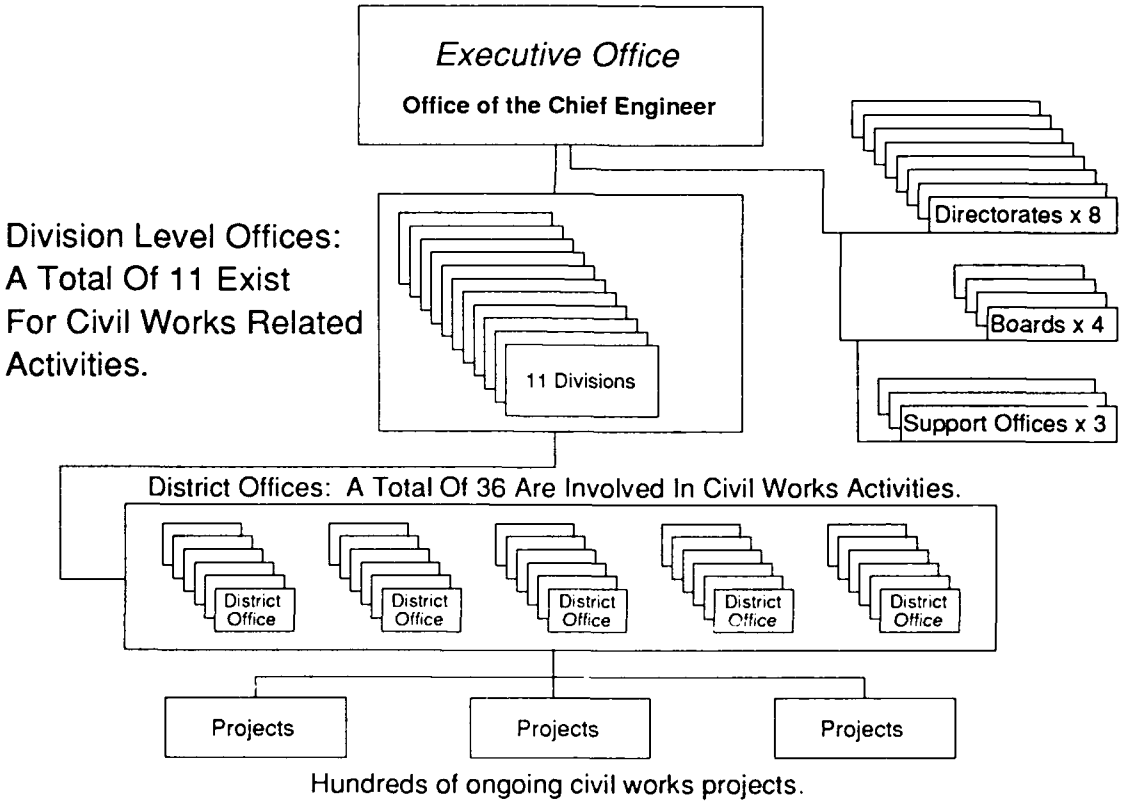


Figure 3.3

These Division offices serve as the parental organizations to the many District offices. Of these

District offices, two are solely devoted to military works, others solely devoted to civil works, and still others evenly divided between both military and civil works.[21]

At the basic office level, civil works projects are managed by two groups of people: Those few military officers assigned to manage the programs and those many civilian engineers and project specialists assigned to execute the project.

At all levels, a clear distinction is drawn between the budgetary accounts supporting military works and those directed toward civil works. In fact, by law the budgeting process is separate. Efforts are similar within all these subordinate organizations, yet each acts wholly independent in regard to the specifics of the project. The initiation and approval process for a civil works project follows a distinctly different path. Within this path, once a project is proposed by local inhabitants of a region, the Corps holds public hearings to allow dissenting views to be voiced. After these views are aired a cost analysis is conducted to identify the real merits of a project. This study is conducted at the level at which the project was requested.

III. AN ANALYSIS OF THE CRITICAL PARTS:

The study of organizational analysis has been popular within the management community since the early 1970s. Many authors have painstakingly outlined the evolution and

cyclical growth cycles which organizations competing in today's social environment live by; outlines which holds great merit when considering organizations found throughout the communities. Analyzing the Corps of Engineers under this light, however, is misleading and wrong to do given that it is not a business or "for profit" organization but rather a public organization dedicated to the fulfillment of public civil works needs and one which has been in existence almost 200 years. Regardless of the growth cycles in the economy, the emergence of competitors, or new product lines offered by other organizations, the Corps will be little effected; for the demand for its civil works services appear not to be declining but rather poised to increase in the very near future. Articles targeted to improve the internal workings and general characteristics of an organization, however, are applicable to the Corps of Engineers and should be studied and applied by that organization where and when needed.

One concise and well written article regarding the internal structures of organizations has been produced by Waterman, Peters, and Phillips.[22] In this article, the argument is made that *organizations are not strictly structures and, conversely, structures do not make up organizations*. Rather, organizations traditionally thought of as structures, are a composite of seven distinctly separate but interrelated elements (graphically displayed on the following page). Based on the opinions of the authors, an organization which adequately

maintains and regularly attempts to improve its position in all of these areas should be considered a well organized company.

These seven areas include: *Structure* (of all levels within the organization), *Strategy* (of the organization's leadership), *Systems* (of communication, training, accounting, etc., within the organization), *Style* (in the practiced daily behavior and spoken words of the organization's leadership), *Staff* (as well as those techniques associated with selecting the staff), *Skills* (of both the old and new workers), and *Superordinate Goals* (the guiding concepts of the leadership which are imparted on the organization). Using these yardsticks for measurement in appraising the Corps of Engineers, we might better judge the Corps' abilities to accept new and critical missions related to infrastructure management.

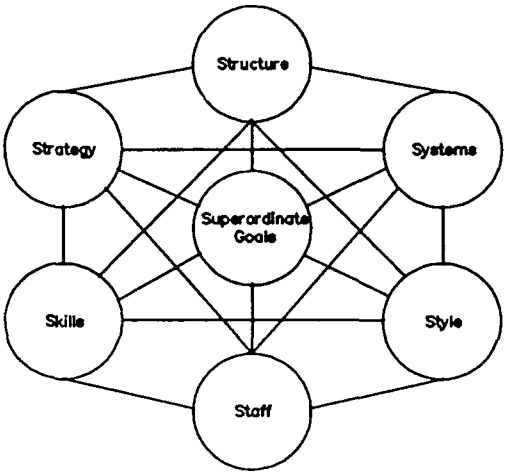


Figure 3.4

With regard to the first element, *Structure*, the Corps of Engineers is well structured in its ability to perform the tasks it has been charged with in current and past legislation. As we have seen, from the top down, the Corps has a detailed interrelated structure in existence which

accounts for checks, balances, and budget constraints in the exercise of civil works projects. The division of tasks, from the Chief of Engineers through each Directorate, to the Divisions, and again through to the Districts, is clear and well monitored. Granted, these connections are complex but, with the decentralized nature of control and management at each level, they become wholly manageable.

The element *Strategy* of the Corps of Engineers is laid out in two languages. The first is public law. Each official acting in his or her official capacity for the Corps must support the public law as written regarding the project at hand. Although arguable by many of the Corps' critics, there are no exceptions to this rule. The second language is spoken by the Chief of Engineers to his subordinates. As the leadership in this position is rotated every four years, every incoming Chief publishes his/her own philosophical strategy for implementing and improving the responsibilities of the Corps of Engineers. This written strategy produced by the Chief provides to all employees of the Corps a clear and concise guideline to follow when reacting to outside factors. Rather than being a complex group of directives, however, the Corps' strategy is simple and forthright. Regarding the study and pursuit of infrastructure related missions, the Corps has recently published a series of pamphlets detailing its strategy in these areas over the next few years.[23] These, as well as other pamphlets, all bear forwards written by the Chief of

Engineers as a means to emphasis a unified and single strategy.

The study of the *Systems* within the Corps is complex indeed. Given that the Corps is comprised of hundreds of military officers complemented by thousands of civilian workers, this fact may be better seen. Of the military members, those working in the Corps are supported principally by the military channels available in their areas. Pay, medical, training, schooling, etc... all are derived from the "soldier support center" in their area. On the civilian side, the Corps of Engineers administers the majority of its training and schooling targeted to the professional, technical, and administrative employees throughout the Corps. Pay, leaves, and career advancements occur in accordance with government services regulations. Civilian employees throughout the Corps are provided with a considerable number of "in house" training programs that further their skill in such areas as Hazard of the individuals. Presently, over two-hundred thirty courses are offered through the Huntsville Division of the Corps of Engineers (Huntsville Division serves as the "proponent" for technical and advanced training ograms within the orps of Engineers.). Beyond Huntsville's offerings, Corps employees may participate with training programs offered by the Department of the Army in general, to include courses from DESPER (Deputy Chief of Staff for Personnel), DMET (Defence Management Education and Training), as well as participation

with the Federal Executive Institute for senior level management held at the University of Virginia in Charlottesville.

At the organization level, these systems are equally complex. As mentioned earlier, project studies, budgeting, and execution are complex operations and critical to the daily conduct of the Corps' missions.

The *Style* element within the Corps of Engineers is both simple and complex. Historically and at present, the leadership is military. As such, the leadership style has been straight forward and deliberate; often dictatorial based on the mission at hand. However, as an organization comprised of professionals from both civilian and military backgrounds, this leadership style is consciously and consistently tempered into being a professional "management" style.

The single greatest civilian profession represented in the Corps is the Professional Engineer. While the military engineer is a transient, coming from perhaps a most recent job on some commander's staff, in school, or with troops, to this new setting of civil works, the civilian engineer is not. This civilian professional holds an entirely different career pattern: typically having lived in the immediate area to his office all or most of his life. The civilian professional is expected and has effectively maintained a strong education level commensurate to the most current trends in the engineering field. This civilian worker

represents the true backbone of the Corps of Engineers' civil works effort. Thus, the style of leadership at play in the Corps is tempered from one which is decidedly military to one which clearly addresses the larger professional civilian audience.

The element of *Staff* has been partially answered in the preceding sections. On the one hand, the military officer represents a small minority of the working force of the Corps of Engineers. Career patterns followed by the military officer typically include multiple assignments with troop units, schools, staffs, and the like. Selection into the project management ranks of the Corps is a significant step forward in the career of that officer. On the other hand, the civilian professionals rise in rank as well. While these civilian professionals usually do not manage the military officers, they almost always manage sections in support of the effort of the Corps offices. Further, they lend crucial advice to the military management when needed.

The dominant element *Skill* within the Corps of Engineers is historic and well documented. As noted in the first chapter to this paper, the Corps dates its existence back to the founding of the nation. In war, as in peace, it has performed its many missions well enough to have earned a world-wide reputation. In recent times, however, the more traditional approaches to solving civil works problems through the application of construction oriented engineering skills have created great problems for the Corps.

Specifically as seen, the Corps had lived an extremely difficult existence during the 1960 - 1970 time period because of its tradition of applying these construction skills to environmental problems. The traditional engineering skills found in the Corps organization remain unrivaled. In more recent times, these skills have been transferred to other federal agencies as well. The principal management "seeds" of the Environmental Protection Agency came from the Corps of Engineers. So too have the management "seeds" of other recently established agencies originated from the Corps of Engineers.

Superordinate Goals of the Corps of Engineers have always been clearly established. Since its first Chief in 1775, forty-nine other military leaders have served in this head position. Below the chief's office and within the Divisions and Districts, literally hundreds of military leaders have followed in positions to lend specific guidance to the operations of the Corps. In short, the Corps' established guide lines and goals are clear and remain consistent.

IV. AN ANALYSIS OF THE WHOLE:

Equally as important as this internal analysis is the conduct of an analysis on the external organizational grouping of the Corps; a classification of the Corps in macro terms as a means to define the operational characteristics of the organization as a whole. To achieve

this, Henry Mintzberg's study of the Structuring of Organizations will be reviewed.

A. Mintzberg's Study:

Within his study, Mintzberg has identified five uniquely different organizational structures used as frameworks for assessing organizations. Through the use of a single building block (note the figure on the left),

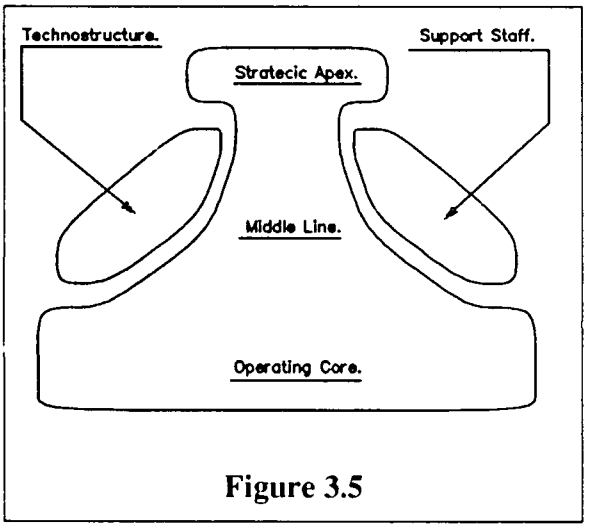
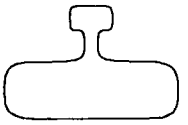


Figure 3.5

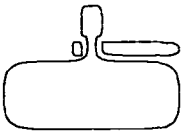
Mintzberg has effectively established a model to portray his interpretation of the extreme differences found in these organizations. Within each organizational structure is a *Strategic Apex* (considered the control brain of the organization), an *Operating Core* (the executing group of the organization), a *Middle Line* (representing the middle managers of the organization serving to connect the apex with the workers), a *Technostructure* (which provides the technical details of the organization), and *Support Staff* (which orchestrates the supporting needs of the organization). By adjusting the relative size of each of these elements within the model, Mintzberg has effectively portrayed the difference characteristics of each organization. By defining these different characteristics,

he then defines the behavior patterns of the organization. Specific characteristics of Mintzberg's organizational models include:

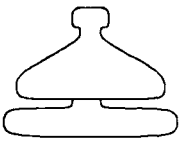
1. Organizations established as ***Simple Structure*** are typically small scale operations with one or two managers serving as the *Strategic Apex* in an autocratic and direct supervisory role over the *Operating Core* of workers. Those making up this strategic apex charismatic and highly motivated toward success of the organization. The *Middle Line* is virtually non-existent and neither a *Technostructure* nor a *Support Staff* are present. These organizations operate best in simple, sometimes hostile environments and during times of crisis.



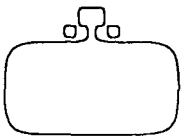
2. Organizations existing as ***Professional Bureaucracies*** tend to have a small *Strategic Apex* relative to the size of their organization; relying instead on a strong and large *Operating Core* comprised of professionals in their field. This operating core drives the direction of decision making throughout the organization and relies heavily on a *Support Staff* but virtually not at all on a *Technostructure*. Coordination throughout the organization is most typically accomplished through a standardization of skills. Here, the *Middle Line* serves only to provide communications between the apex and operating core. These organizations operate best within complex but stable environments.



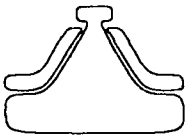
3. Organizations operating as ***Adhocracies*** tend to be highly flexible, innovative, and attractive to the typically young, aggressive, professional. This is due to the organization's aversion to establishing internal bureaucracies coupled with its practice for establishing interactive working groups for most projects. These organizations rely heavily on professionals within the *Support Staff* (or *Operating Core*, depending on certain other parameters) to band together to accomplish the project at hand. The *Strategic Apex* of this type organization serves only to monitor and, as necessary, resolve conflicts within the organization but leaves the fundamentals of operating to the *Support Staff*. Both the *Middle Line* and *Operating Core* elements are blurred with the staff elements. It is important to note that Mintzberg considers the *Adhocracy* the least stable of the organizations described. These type organizations tend to operate best within complex and dynamic environments.



4. Organizations patterned in the ***Divisionalized Form*** concentrate on standardized outputs and, consequently, are considered very formal and regulated in internal operations. The central element to this type organization is the *Middle Line;* that element of the organization which manages the daily operations and output. The *Strategic Apex* serves to control organizational performance on the large scale (but not the specifics), while the *Operating Core* follows direction given to it by the *Middle Line.* Both the *Technostructure* and *Support Staff* are typically quite intricate in their workings to support the organizational headquarters but less so within the secondary structures of the organization. The environment best suited to this type organization includes the simple, stable, sometimes diversified markets.



5. Organizations characterized as ***Machine Bureaucracies*** are also devoted to the production of a standard output. These organizations are typically old, large, and relies heavily on the *Technostructure* to drive the outputs of the organization. Here, the *Strategic Apex* serves to fine tune the production line but otherwise provides conflict resolution and little else. The *Operating Core* produces the output; which makes this element highly formalized and routinized. The *Middle Line* is more elaborate than others, serving to distinguish product types, resolve conflicts, or coordinate between production groups. The *Support Staff* of this type organization exists only to reduce uncertainty as it develops. Here again, a simple and stable environment best suits those organized in this manner.



Mintzberg notes that not only are these type framework organizations prevalent throughout the business world but as many hybrid framework organizations of each also exist. In fact, organizations may not easily be placed into one or two simple frameworks as seen above. Rather, they may be found to be in a position slightly between any of the two or more structures discussed.

Based on the following chart, Mintzberg has linked these five organizations to one another by degrees of similarity. Those organizational models similar tc one

another are positioned adjacent to one another and those with greater dissimilarities are further apart, separated by others. Thus overall, an organization's relation to the others is based on the position the particular model occupies in the chart. With the general organizations including the ***Simple Structure***, ***Professional Bureaucracy***, ***Adhocracy***, ***Divisionalized Form***, and ***Machine Bureaucracy***, Mintzberg developed the following chart:

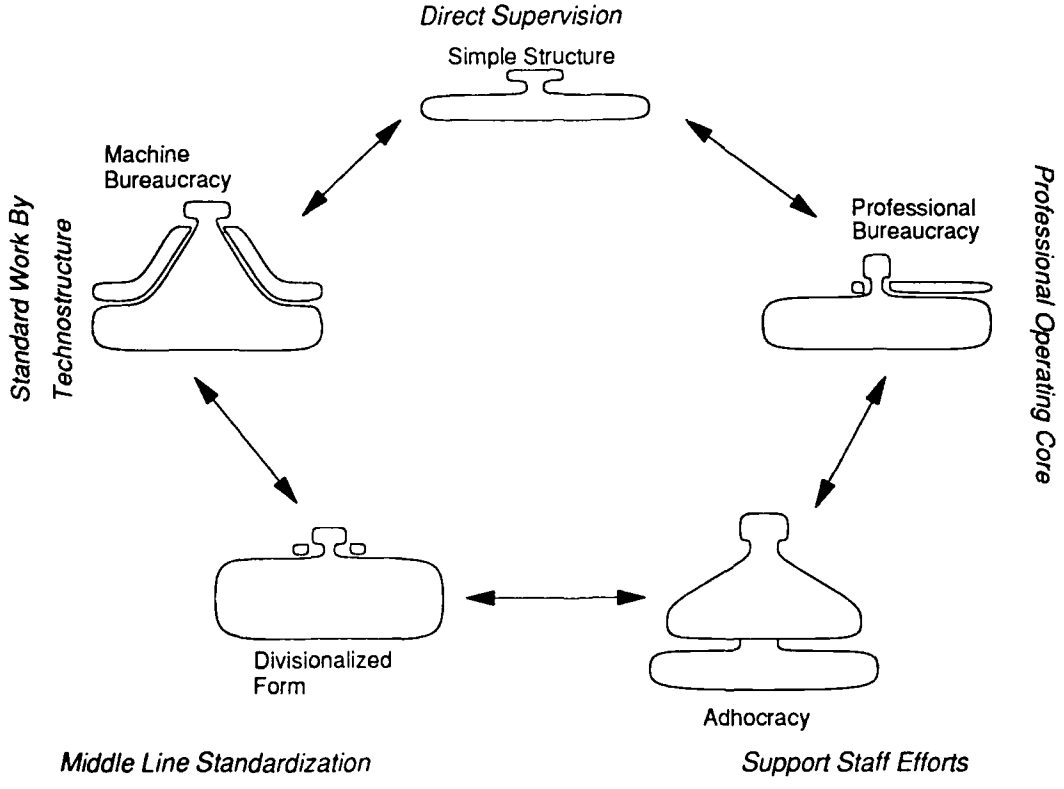


Figure 3.6

B. Mintzberg's Study Applied To The Corps Of Engineers:

How should the Corps of Engineers be characterized in light of Mintzberg's organizational framework?

Understanding how or where the Corps fits will assist in forecasting the Corps' acceptance of further infrastructure management responsibilities. Based on the above synopsis of Mintzberg's study, this question may now be assessed.

As we have seen, the Corps is a massive organization. Comprised of thirteen separate divisions, thirty eight separate districts, sundry field offices, and localized support centers within cities all across the nation as well as collocated with U.S. military bases in the U.S. and abroad. In short, it represents the largest "free world" public engineering organization in the world. Even when divided into its operating components (military, military works and civil works), it remains equally as large and difficult to categorize.

If, based solely on the hierarchy of the Corps (from the Chief of Engineers, through the Directorate of Civil Works, to the thirteen Divisions, to each of the thirty-eight Districts, and finally to the project level), the Corps may be classified as strongly *Divisionalized*. Given the standard organizational structuring, establishing the eight separate directorates as well as the subordinate divisions, the Corps certainly appears to be divisionalized. Often, in regard to Civil Works, the Corps' outputs are typically standard. In fact, volumes of regulations are available within this structure to assist an employee to "get it right" when working through a particular mission. Control for these projects clearly resides in the Middle

Line of the organization; a line comprised of the Divisional offices. Below these a second line has also been established. This one is set at the District levels and serves to manage the actual project executions. Given all this, however, a great many more considerations must be given before a firm characterization is made.

Based on Mintzberg's model and descriptive characteristics, the Corps of Engineers must be taken apart in order to be described in particular areas or locations on the graph. In so doing, the most distinct organizational levels of the Corps may be placed in the following organizational locations:

Executive Office & Directorates	Professional Bureaucracies
Division Level Offices	Adhocracies
District Level Offices	Divisionalized Forms
Project Level Operations	Machine Bureaucracies

Figure 3.7

At the top end of the Corps, the Executive Office and eight supporting Directorates are organized in a manner to take full advantage of the operating core within their respective organizations. These operating cores are

comprised principally of professionals in those fields supporting the Corps' effort in establishing policies and procedures. In short, at this level the Corps operates as a *Professional Bureaucracy*. Here, the Strategic Apex predicates its decisions on the advice and recommendations of this professional operating core. At this level there exists also a strong presence and reliance on the Support Staff used in each directorate. Coordination throughout these top level offices occurs principally due to a standardization of skills; those professionals supporting one office are well aware of the level and quality of output of the others. The Technostructure at this level tends not to exist based principally on the overwhelming presents of professionals within the Operating Core. The Middle Line, if one could be identified, serves to improve communications between the Strategic Apex and Operating Core.

Next, below the top end of the Corps, reside the Division level offices. These offices, typically commanded by the most senior Corps of Engineer Officers, orchestrate the "big picture" projects regarding Corps of Engineer construction activities. In fact, the Division level organization should be considered an *Adhocracy* form of organization as, at this level, the Corps orchestrates its mega-projects. At this level, the organization tends to be highly flexible given that it relies on its internal professional and support staffs to orchestrate missions. Unlike the standard *Adhocracies*, the Strategic Apex of this

level organization becomes increasingly involved with projects as the numbers diminish.

At the District Level, the Corps' organization tends to lean to the *Divisionalized Form*, operating in a manner with a great many standardized outputs (of projects). The central thread at this level is the Middle Line, those who manage the daily activities of the District. Here, the Operating Core follows specific guidance given by the Middle Line and produces the work of the Division. Both Support Staff and Technostructure elements are intricate in the home office but tend to disappear as one progresses toward the project site offices.

The Corps' Project Site Organizations tend to resemble *Machine Bureaucracies* given that those who make-up the permanent membership of the Corps' staff in this area produce typically standard outputs of civil works projects including flood control, beach erosion control, or river navigation services. The Operating Core, which may be civilian contractors, actually produce the output based on the direction and stipulation given by the Technostructure.

The result of this organizational configuration is one in where the organization remains highly flexible given outside influences at the top levels. Its professional structure at this level digests assigned missions and then passes these along to the next level for dissolution, to the next level for scheduling, and the last for simple execution.

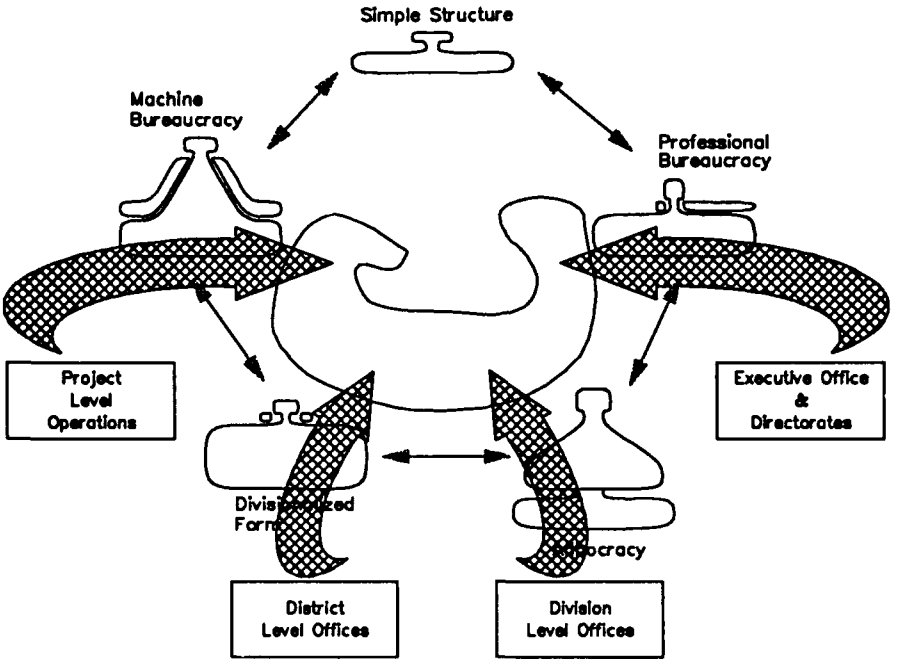


Figure 3.8

Graphically, and by using Mintzberg's model, the position of the Corps of Engineers resides somewhere in the center, favoring a close association with the lower four models and avoiding the Simple Structure entirely.

V. SUMMARY:

From the above analysis it should be concluded that the Corps of Engineers may be considered highly responsive to externally created, top driven influences. As an organization, it appears capable of digesting and acting upon these assigned requirements in the manner typified by

well known professional bureaucracies but with a significant amount of other organizational characteristics.

Once thoroughly reviewed by the Chief of Engineers and Directorates, "external" requirements are passed along to the Corps' subordinate Division levels for secondary review and pending implementation. At this lower level, assignment execution efforts take the form of efforts found in Adhocracies but with a distinct tendency toward behavior found in Divisionalized organizations. As the specific assignment is further digested and passed down the Corps' chain, each subordinate levels of the organization, from Division level to District level and again to the many project offices, continue to react somewhat differently in behavior until ultimately, the implementing level behaves much like those found in a Machine Bureaucracy; simply processing the project through to completion.

This transition in the organization's behavior pattern is in many ways a great strength for the Corps. While it is a public organization, it is expected to behave in a close-hold manner, controlling all assets through a plethora of rules and regulations, thus it is almost expected to operate as a Machine Bureaucracy. However, as an organization in which a large public purse has been entrusted, the Corps is also expected to behave (and be driven) in many ways like that of a professional organization; always the expert in the field of engineering, determining the best, most effective ways for project execution. Tempering the wide

difference of these two behavioral structures is the middle ground; the fact that the Corps is also a military organization and highly divisionalized in organization and support. Given that it is military, it is able to rely on its internal experts and direct the output of those experts, at a moments notice, in any direction of need.

The product of this relationship of varying internal patterns is an organization capable of strong professional planning, rational control over all of its projects, and an organization that effectively and efficiently performs its missions when directed to do so.

CHAPTER FOUR:

CURRENT AND FUTURE STRATEGY FOR THE CORPS OF ENGINEERS IN CIVIL WORKS ACTIVITIES.

I. PURPOSE:

The purpose for this chapter is to review current legislation governing civil works responsibilities of the Corps of Engineers and identify the strategic position which the Corps of Engineers holds regarding future expected trends in its civil works responsibilities.

As we have seen, the Corps has a unique and rich history for civil works involvement. Certainly, the past civil works activities executed by the Corps of Engineers were direct contributions made to the improvement of infrastructure within this nation. In addition to these standard and historic accomplishments, however, often unique challenges continue to be assigned the Corps in times of natural disaster as well as when normally responsible federal agencies have been incapable (or unwilling) to handle such missions. Its organizational structure, shown in chapters 2 and 3 to be characteristically flexible in responding to such taskings, is devoted to these efforts in civil works support. Answering the question of where the Corps is headed in the not-to-distant future is paramount given the social and political direction currently in play regarding infrastructure management within this nation.

These and other factors indicate that the Corps of Engineers will continue to play a direct major role in the managing of infrastructure related projects of this nation. Defining the specific direction or, at least, parameters for this future involvement is now, more than ever, a necessity for the Corps. In light of our nation's need for infrastructure revitalization, the growing budget deficit, and the shrinking military, the Corps must identify a viable and productive position to take in such management and then organizationally adjust to that position.

II. Present Responsibilities: Water Resources Development Act - 1986

As seen throughout its history, the Corps of Engineers has been equally affected by Congressional legislation as it has by all other external influences, perhaps even more so. The most recent of these Congressional influences occurred with the passage of Public Law 99-662, known also as the Water Resources Development Act (WRDA) Of 1986. The sizeable impact this legislative work has had on the Corps may best be appreciated by viewing first the justification for its passage and then the contents within the bill itself. Certainly, the net effect this bill has had on the Corps' current and future role in infrastructure management is decisive.

As outlined in the legislative history preceding the bill, several key factors regarding this nation's

infrastructure status have influenced its passage.[24] First, total construction spending by the Corps of Engineers has significantly changed over the past two decades, dropping some 78% of that of the 1960s. Second, from indications of several studies conducted within the Corps, it was found that, on average, a full twenty-six years are required for a civil works water project to transition from concept to the beginning stage of execution. Third, literally hundreds of projects, amounting to tens of billions of dollars, were awaiting to be constructed as, from years past, they had already received approval from Congress for construction yet, due to various reasons, were never initiated. Finally, based on a significant amount of disagreement among the members of Congress over the years, no noteworthy legislation concerning civil works activities have been enacted since 1976. Thus, with these and sundry other factors not mentioned, Congress enacted WRDA of 1986.

This bill is divided into eight titles and specifically addresses and realigns principal portions of the Corps' civil works responsibilities of today. Each of these titles also stipulates some new guideline for the Federal, State, and local governments to abide by. Whether these new guidelines are currently appropriate or fair given the most recent downturns (increases) in the budget deficit of the nation remains to be seen. Outlined below are the most significant aspects of each title.

Title I to the bill sets a maximum obligation ceiling for yearly expenditures on civil works projects by the Corps. As a legislated maximum ceiling, this is not an authority to spend but rather a limit to spend; with this limit being applied to both new and ongoing construction. Further, this ceiling, set at 1.3 billion for each fiscal year from 1986 through 1990, does not limit the expenditure for projects funded and paid for by other Federal agencies, nor does it directly attempt to do so.

Title II serves to enact general policy changes in the Federal program governing water resources. These policy changes were intended to address and improve the operational efficiency of implementing civil works programs within the Corps of Engineers. Separate provisions within this title serve to insure that implemented Federal projects are, in fact, a benefit to the public sector and not solely private concerns. In instances where private concerns are found to benefit by more than ten percent of the civil works project, a cost share plan is enacted. Additional provisions serve to:

* Capture the true benefit of recreational public use projects when compared to similar existing projects in the immediate area.

* Identify the theoretical pool of backlogged Corps civil works projects, valued at $36.2 billion. Once identified, establishes a program to reevaluate and de-authorize projects as needed.

* Identify the existing Corps studies currently inactive and thus also identify those in need of cancellation.

Within Title II, a total of thirty-seven separate sections are included for the purpose of improving and streamlining the Corps' civil works operations.

Title III modifies specific existing water resource projects and authorizes several new projects addressing stream bank erosion in specified areas.

Under **Title IV**, States are provided with a comprehensive and detailed Federal assistance program aimed at developing a dam safety program. The intent of this section is to assist and encourage States to establish some such program for all non-Federal dams. In cases where non Federal dams exist, if catastrophic failure should occur and such failure threatens human life or significant property damage then that dam will be registered in the National Inventory of Dams. Clearly, this title is intended to bring about increased control over the 67,000 dams estimated to presently exist in this country.

Title V specifically addresses and authorizes the construction of six new inland waterway locks for the nation.

Title VI establishes a national harbor improvement program and specifically authorizes thirty-two new projects be constructed. This title identifies specific cost sharing percentages for non Federal sponsors to projects and,

perhaps most importantly within the entire act, establishes requirements for non-Federal project sponsors to share significantly in the cost of harbor improvement projects.

Title VII establishes new cost sharing guidelines covering all non-commercial navigation water development projects. In addition, this title specifically authorizes 129 related projects for the Corps to construct. Included within this title's intent are projects addressing: Flood Control, Hydroelectric, Shoreline Erosion, Mitigation, Inland Water and Recreational Harbor, and Bank Stabilization.

Title VIII establishes new user taxes, fuel taxes, and harbor maintenance taxes for all users of navigation projects. The second section to this title establishes a Harbor Maintenance Trust Fund to be use to pay for maintaining costal channels and harbors.

Thus, the result of this Water Resource Development Act of 1986 has been to rigorously revamp the manner in which the Corps of Engineers conducted the business of civil works. In addition, it has places a responsibility of funding on the users and benefactors to civil works projects; an accomplishment noteworthy in its own right.

III. DETERMINING THE CORPS' FUTURE POSITION:

Forecasting expenditure and construction trends in the Corps' civil works program is detailed and extensive, requiring close, consistent attention by those assigned the

task. Establishing these trends alerts the Corps hierarchy to anticipated activities and anticipated needs otherwise not considered. In addition, these forecasts provide Congress with a means to recognize the impact of possibly erroneous civil works funding policies.

A. Forecasted Funding:

As a means to accomplish funding projections, the Corps employs a computer simulation program known as FORCON, which projects these anticipated expenditures based on current expenditures plus either directed or anticipated changes in Congressional mandates. Using the most current FORCON projections available, the following two graphs may be generated. Within each of these graphs are two distinct plots, plot #1 and plot #2. Plot #1, referred to as *Projection 1* in each graph, reflects the anticipated value of civil works projects given current data coupled with current legislation and laws (i.e., this projection is the "official" projection on Corps civil works projects). Plot #2, referred to as *Projection 2* in each graph, reflects the "best guess" given current data coupled with anticipated legislation as of yet not passed (i.e., this projection reflects the possibility that Congress will add new civil works projects and user fees on existing completed projects; thus, this projection is the "most likely" to occur).

Using these projection techniques, the Corps of Engineers is able to "anticipate" the future work funding

for its entire civil works operations. These total work projections include *Program Assumptions* (Graph #1) and *Workload Assumptions* (Graph #2). *Program Assumptions* are those assumptions which address the exact yearly appropriations made by Congress. *Workload Assumptions* are those which address the actual workload of the Corps for the given year (This total is equal to all carryover work from the previous year plus new work begun in that year).

Based on these definitions and a thorough review of published FORCON projection data, the following two graphs are generated.[25]

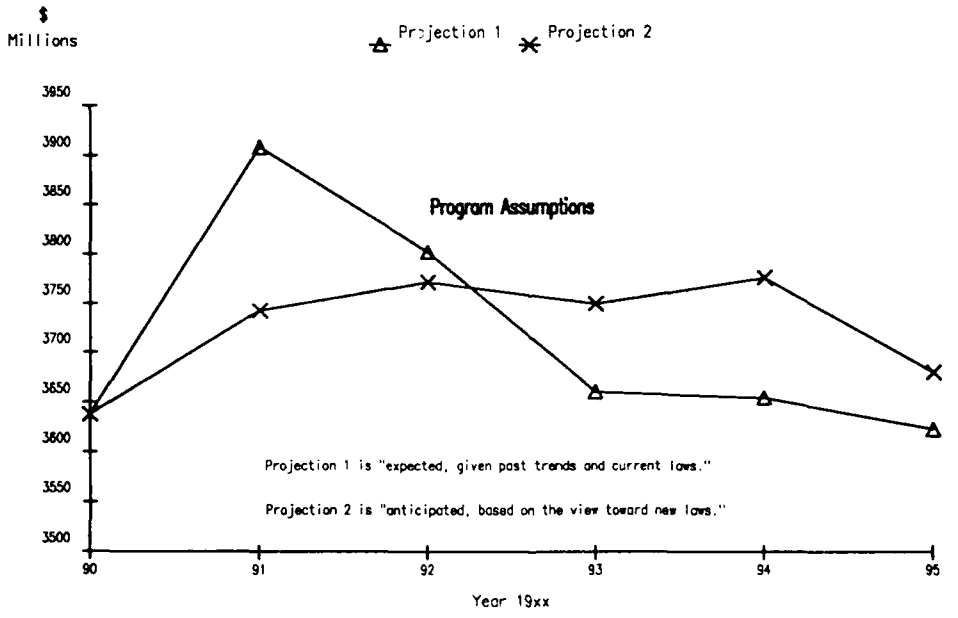


Figure 4.1

Given the above Program Assumption chart, it is clear that a significant decline or at least leveling-off of

authorized civil works projects is anticipated. In fact, the Corps expects that the actual yearly appropriations will decline by approximately 1% from FY 90 to FY 95. This is due to several factors: First, the FY 91 budget contained no new project starts. Second, the Office of Management and Budget (OMB) deleted several projects that may be added back by Congress. Third, a Benefit/Cost ratio of greater than 1.3 will be used on future civil works projects.[26] The net effect of this increase in the B/C ratio will be a reduction of those civil works projects viewed as acceptable to undertake in the near future.

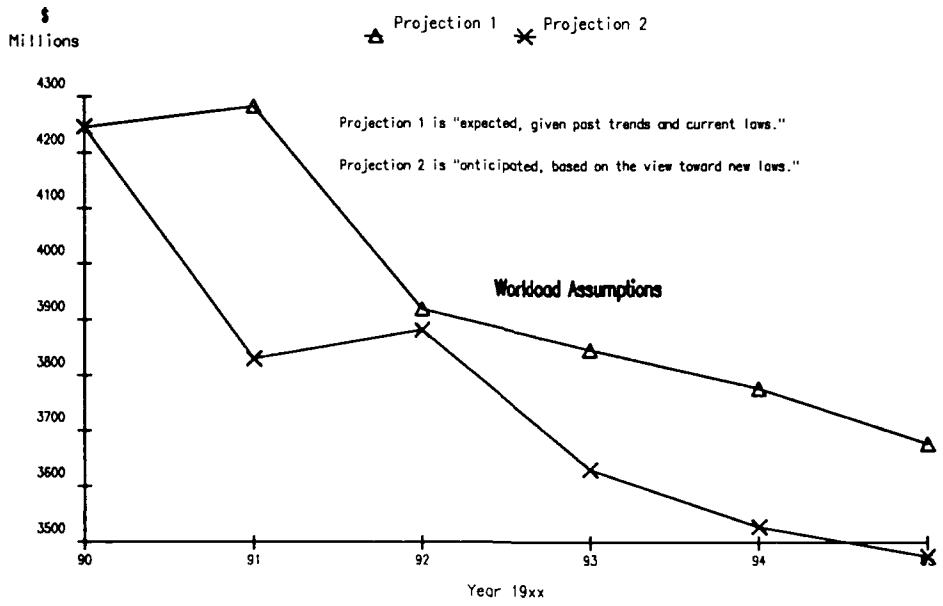


Figure 4.2

With the above Workload Assumption chart it is clear that the yearly expected work is dropping significantly as

well. Here, Projection 2 is lower than Projection 1 due to an allowance for anticipate reductions in budgeted project funding. In addition to the influential drop in Program Assumptions (previous graph), the Superfund program, orchestrated in large part by the Corps of Engineers for the Environmental Protection Agency (originally thought to be significant), is now projected at receiving a lower total value of funding.[27]

Thus, the anticipated expenditures by Congress for the Corps of Engineers to pursue its current mandate of civil works throughout the nation is declining at a time when it may be most needed. How to resolve this decline and perhaps fashion it to the favor of the public in general and improvement in infrastructure management specifically remains the challenge.

B. The Corps' Proposed Infrastructure Initiative:

Recognizing that the Corps of Engineers will be expected to play an increasing role in constructing and managing parts of the nation's infrastructure, regardless of this anticipated net decline in civil works spending over the next few years, the Chief of Engineers established an Infrastructure Task Force in December, 1989. The stated purpose for establishing this working group was to assess the present position the Corps was then playing in infrastructure management and review all control and coordination mechanisms within the Corps. Further, this

task force was intended to undertake *"... a major three year initiative to develop a national, integrated strategy for assessing and addressing the nation's infrastructure problems."*[28]

Given that the Chief of Engineers had been working closely with the Secretary Of The Army for Civil Works regarding this subject, the available funding to back such a study has recently been allocated in the amount of $3.35 million over the next three years.[29]

In March, 1990, the Director of Civil Works for the Corps of Engineers testified before Congress on the pressing need for infrastructure management reform here in the U.S. Prior to his testimony, working groups from within his directorate assessed the prominent current works addressing those problems of the nation's infrastructure; four of which were presented that day.

As noted in Figure 4.3 on the following page, the first two discussed by the director, **America's Infrastructure - A Plan To Rebuild** and **Hard Choices**, were characterized as having been too focused on the necessary structural improvements required throughout the country. His report concluded that each of these two studies tended to tabulate in a traditional manner the 'exact' structural and capital expenditures required to solve the nation's infrastructure woes. The position of the Director was that these 'exact' traditional structural studies should be considered valuable in so far as they served to lay the foundation for innovative follow-on studies, but should not be used as the

sole reports with which to assess the total infrastructure needs of the nation today.

Rather than granting blanket increases for additional funds, the Director argued that addressing low cost construction alternatives and the proper management of available public funds is needed.

America's Infrastructure: A Plan To Rebuild (1983) o Comprised Of: Δ Surveyed over 100 organizations, states, and cities. o Findings Δ Must have adequate Federal dollar support. Δ Governments at all levels must realign their priorities. Δ Must dedicate long term financing for all categories. Δ Must establish infrastructure banks.	***Hard Choices. (1984)*** o Comprised Of: Δ Evaluated 23 States, targeting surface transportation, water supply and waste water systems. o Findings Δ A national problem exists, but it is manageable. Δ The Cost/Revenue ratio leaves a $450 billion gap through the year 2000.
Public Works Infrastructure Policy Considerations for the 1980s. (1983) o Focused On: Δ Cost effective infrastructure investments. Δ Reviewed Federal policies vice infrastructure needs. Δ Addressed ways to correct noted inefficiencies. o Findings: Δ Must adjust user fees to correct the present misallignment. Δ Should limit the Federal role to infrastructure of National importance. Δ Must increase annual capital outlay by all levels of government.	***Fragile Foundations: A Report On America's Public Works. (1988)*** o Comprised Of: Δ 10 major published reports. Δ Over 60 commissioned background reports. o Findings Δ Spending patterns for infrastructure projects are of a major concern. Δ Must clarify the role of Federal, State, and local governments. Δ Must focus on the services aspect of infrastructure. Δ Must fix responsibility.

Figure 4.3

Noted also in Figure 4.3 above, the Director then characterized two other publications, **Public Works Infrastructure: Policy Considerations for the 1980s** and **Fragile Foundations: A Report On America's Public Works**, as having identified those needed financial management

strategies as well as cost effective programs for dealing with public versus private user fees. He characterized these works as having a broad applicability to the current problems associated with civil works. In addition, the Director explained that, given these progressive focuses for improved infrastructure management, the Corps of Engineers was undertaking its own internal program of improving infrastructure management targeted to three specific areas.

In the first area, the Corps would establish an internal "Infrastructure Initiatives Work Group" comprised of experts from the Corps of Engineers in infrastructure related matters. This work group would generate a Federal "Infrastructure Action Plan" that would serve to address national concerns for an integrated system of infrastructure management, recommend a national initiative on "partnershipping" infrastructure plans among Federal, State, and local governments as well as public versus private concerns and, finally, offer a detailed analysis of exactly what the Corps of Engineers may be expected to

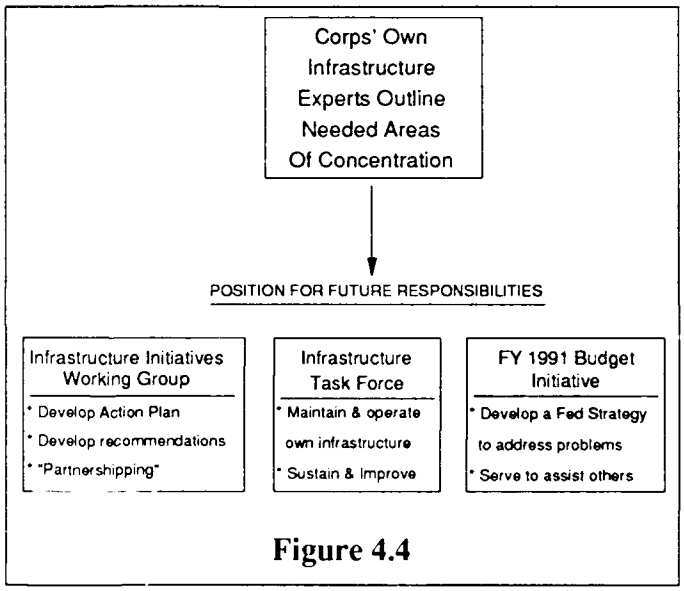


Figure 4.4

accomplish in the very near term given its existing authorities.

In the second area of focus, the Corps would establish an "Infrastructure Task Force" which would implement an infrastructure action plan under those existing authorities. Here, the Corps would sustain its current responsibilities of infrastructure management while improving in its own known areas of weak infrastructure management. Accomplishing this would call for a thorough review of the Corps' responsibilities, to include all water resources, transportation, energy producing, and all solid and hazardous/toxic waste management areas.

In the third area of focus, the Corps would develop a Federal strategy to address Federal issues and problems associated with Federal infrastructure management. Here, the Corps would assess the implementing of existing strategies, provide assistance to all branches of the Armed Forces specifically for military programs, and then serve to assist all agencies external to the military as needed or requested.

Thus, in regard to its future management roles of the nation's infrastructure and as briefed before the Congress, the position of the Corps of Engineers appeared flexible and progressive. In this case, we have a large public organization, comprised of technical and managerial experts in the field of civil works, assembled together in an effort to achieve the melding of a national infrastructure

management plan. What appears missing in its infrastructure strategy is an established time line, beyond the standard five year outlook, for subordinate programs of this effort to adhere to. Thus, the question remains: "Will the Corps' Infrastructure Task Force succeed and will the resulting programs work?"

IV. INFLUENCES OVER THE CORPS' INFRASTRUCTURE STRATEGY:

Influences over the Corps of Engineer's current strategy regarding infrastructure management have been derived from sundry forces created either from within that organization or from the many external forces impacting on the Corps. As we have seen, these internal forces have included the Corps' own organizational characteristic as defined by Mintzberg; its internal elemental characteristics as defined by Waterman, Peters, and Phillips; the knowledge, education, and participation of its resident workers and experts regarding current infrastructure management; as well as its history regarding implementing civil works projects for the nation. External forces have included those regulations governing the Corps' current civil works operations (WRDA-86 as one most recent of a major impact), directives received from the Federal agencies watching over the Corps, sister agencies associated with the Corps, as well as the Corps' own experts who, in turn, have historically served to drive reciprocal influences over many of these external influences. Taken together, these

interactions are best presented through the use of the following figure, Figure 4.6, entitled "The Corps' Regulatory and Control Environment."

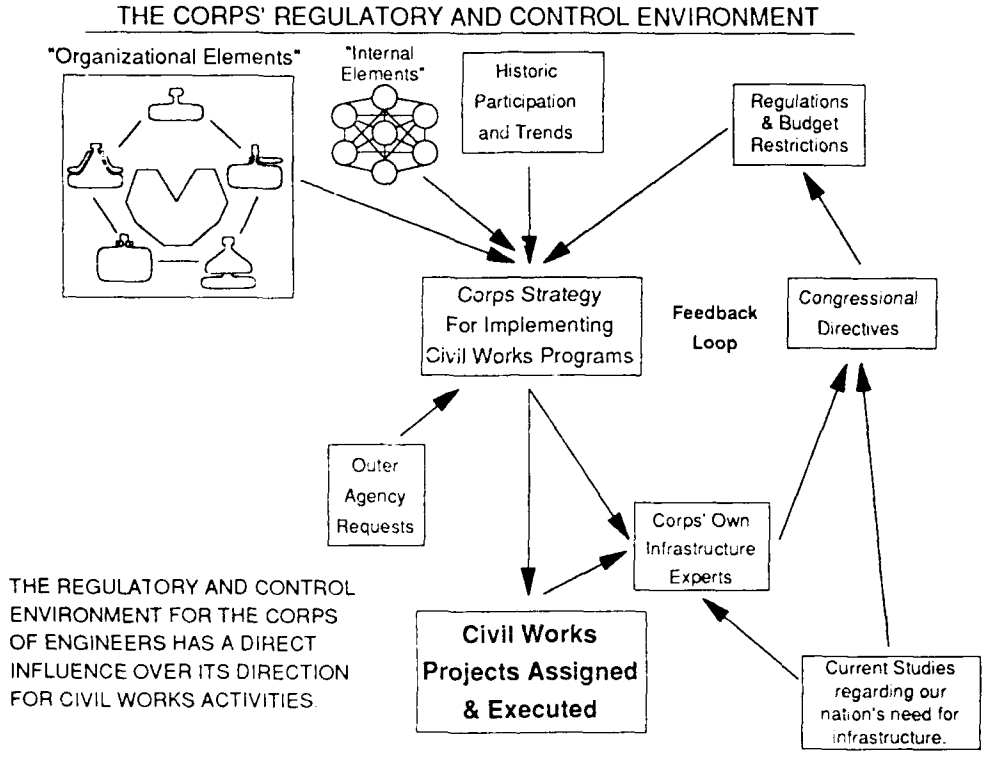


Figure 4.5

This figure reflects the overall dynamics of all the influences the Corps of Engineers must respond to either prior to, during, or as an after thought for civil works project planning. Unfortunately, with all its detail, it avoids the inclusion for consideration of the element of Time; and how this element impacts on the Infrastructure Initiative program now in force. Time, as seen earlier, holds a significant influence over the future strategies, goals, and accomplishments of the Corps' civil works

program. At present, the Corps forecasts civil works efforts through the use of a five year modeling program. This modeling program lends to the Corps planners the ability to foresee trends in the civil works funding and construction environments. Applying this same forecasting principal to the new programs established for the Corps' Infrastructure Initiative seems vital. Thus, Figure 4.5 does not adequately capture the manner by which the Corps determines these needed operating strategies.

Additional perspective on this idea requires the manipulation of yet another chart; also adopted from the earlier quoted M.I.T. working paper.[30] In this chart, noted as Figure 4.6 at right, we see that the management practices of the Corps are predicated on all the subjects previously discussed. These management practices, in turn, influence directly the *Build Systems* for which the Corps may increase its direct responsibility over.

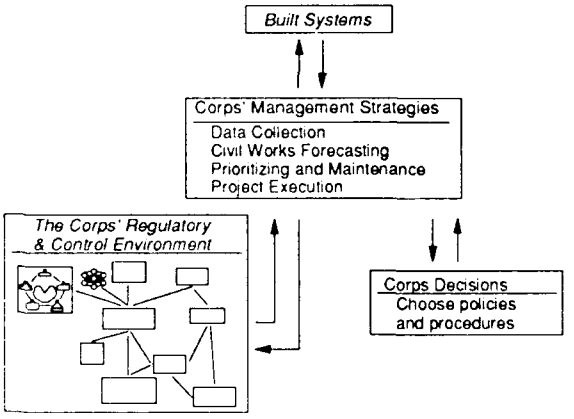


Figure 4.6

This chart effectively captures the influences shaping the infrastructure management strategies of the Corps of Engineers as those strategies interact with the Build Systems under the Corps' current responsibility, save again

for the element of time. Granted, the Corps has established a management plan for its future infrastructure effort in the United States; however, that plan seems based on a somewhat limited, near term time schedule. Extending this schedule becomes necessary given that the infrastructure woes of this nation must be addressed in the near, short, and long range planning for all agencies holding responsibility over such issues.

As the near term problems of the infrastructure management become resolved, short range goals must then be established to preclude slippage back to additional near term reactionary efforts. Long range goals established by the Corps, beyond the traditional five year estimates of Workload and Program Assumptions discussed earlier, are needed to effectively establish a comprehensive road map for both Corps and national efforts.

V. SUMMARY:

How all of the general relations examined thus far will change given the advent of the Corps' Infrastructure Task Force is unclear; however, an improvement to these relationships seems forthcoming, provided a comprehensive and long range planning program are included. The "Regulatory and Control" environment will certainly improve due to a long needed exchange of ideas and expertise at the Federal, State, and local management levels. The Federal budget, already restricted and apparently diminishing over

the immediate future, may be better applied, in part, due to this "think tank." Ultimately, the Corps' "Decisions" of future management policies, as noted in Figure 4.6 and predicated on the "Management Practices," will also improve.

Once again, the single influence missing from the preceding two figures is that of Time. While the Corps is positioned in such a manner within the infrastructure management community to lend needed assistance to what has often been characterized a crisis program in dire need of attention, it must establish a near, short, and long term program for lending such assistance. Following this forecasted time schedule, with a strong reliance on the internal expertise of the Corps organization coupled to a systematic and foresighted strategy, may pay dividends heretofore not obtained in all previous infrastructure management efforts.

CHAPTER FIVE:

LEVELS OF INFRASTRUCTURE MANAGEMENT NOT SUITED TO THE CORPS OF ENGINEERS

I. Purpose:

With today's myriad of infrastructure systems now in place supporting the nation and the significant number of problems associated with each, several, if not all infrastructure subsystems are ostensibly available for management participation by the Corps of Engineers. Whether this will occur depends first on the Corps' authority for involvement with each subsystem and second, on the Corps' 'in-house' ability at managing each subsystem found to be in need. Examining the prospect for Corps involvement with these subsystem levels thus becomes the purpose for this chapter.

II. A Current Focus Of Efforts:

First and foremost, any increase or change to the levels of participation the Corps of Engineers currently holds concerning the management of infrastructure systems at Federal, State, and local levels must be duly authorized by the U.S. Congress. As we have seen, the current levels of the Corps of Engineer's participation with national level infrastructure systems include their efforts in the management of navigation along all the inland waterways,

flood damage prevention, shoreline protection, harbor maintenance, as well as lessor missions regarding their efforts in the federal dam safety program, Superfund cleanup, wetlands management, and (effective May 10, 1990, and in testimony to the Corps' strong 'in-house' management abilities) even the mission of establishing a U.S. presence in Magnetic Levitation transportation.

If, at some future date, changes are enacted and the Corps' responsibilities are again increased, these increases must be tempered with due consideration given the concept of states' rights. In the American governmental system, specific powers regarding the management, regulation, and control of infrastructure systems are retained at the state and local levels of government, with the more generic powers for establishing minimum standards of infrastructure services retained at the Federal level. Thus, this system for responsibility creates a state's sovereignty from Federal control over many of the infrastructure related issues.

Certainly, adjustments to this governing system have and continue to occur. In particular, adjustments to this system transpire when the Federal government elects to retain control over expenditures of federal subsidies intended for application to improving specific infrastructure subsystems. In recent past, however, the net Federal expenditures on State and local infrastructure systems has been declining.[31] In fact, at present the

estimated 83,000 local governments within the U.S. are responsible for well over 70% of the funding, construction, maintenance and management of public works facilities. How this translates to increasing the Corps' responsibilities seems rather to imply that if increases occur, they occur only at the highest management levels.

III. Discussion:

Currently, infrastructure problems within this nation include those associated with the *"... highways, streets, roads and bridges; airports and airways; public transit; intermodal transportation; water supply; wastewater treatment; water resources; solid waste; and hazardous waste services."*[32] From this list, it is quite apparent that, given the Corps of Engineers present organizational structure, were the Corps to involve itself with the daily aspect of the management of these systems, it would be spread much too thin to offer quality assistance in any one area. Further, based on the history and expertise of the Corps' workers, many of these areas are well beyond the capabilities of the Corps; so much so that the Corps should simply not be involved with rendering engineering or management judgement in those subjects.

From the lowest level field offices through to the highest levels of the organization, the Corps has demonstrated a capability of executing its mandate regarding managing or constructing the many infrastructure subsystems within the nation. This is not to say that the Corps is

sufficiently large to over-watch or construct all required structures which communities may depend on, for it is not. This task alone represents the consumption of tens of billions of dollars each year in construction effort and is well beyond the Corps' capabilities. Rather, the Corps of Engineers offers considerable expertise in the management and construction of these areas. However, its authority for use of this experience in the pursuit of infrastructure management practices remains limited. These limitations are due to the independent relationships between Federal, State, and local governments. At present and given the 83,000 local government organizations orchestrating their own infrastructure efforts, coupled to the hundreds of responsible separate State and Federal agencies, cooperative coordination of the nation's infrastructure effort becomes the true goal for the Corps of Engineers to undertake.

CHAPTER SIX:

CONCLUSION OF THE THESIS

In the preceding five chapters, the Corps of Engineers has been studied with regard to examining its current strategy of implementing civil works projects as well as estimating its potential for providing increased infrastructure management assistance to this nation.

We saw in Chapter 1 of this thesis that the Corps of Engineers, in fact, holds a very detailed history in the infrastructure planning, construction, and management of this nation. Certainly, over the life of its existence, the Corps has developed a sizeable in-place organization structured to support the ongoing national infrastructure efforts.

In Chapter 2, the Corps was shown to have been highly adaptive to needed or directed changes in its strategy for enacting civil works projects, at least during the 60s and 70s. How this past ability may be used to forecast future results is unclear but, what is certain, is that the fundamental organizational structure has not changed. Thus, the Corps holds those same abilities at initiating needed change when directed. In addition, it was shown to be sensitive and even supportive of the public, local, State, and Federal governing bodies' interests, the ultimate

project's feasibility, and, as a precondition to the project's construction, the natural environment.

Chapter 3 dealt with the specific organizational structure of the Corps. Within this chapter, the conclusion reached was that both the Corps' internal characteristics as well as its organizational structure were well suited to the professional planning and detailed execution of civil works projects. In addition, as mentioned above, the Corps' organizational structure has remained generally consistent throughout its history. The benefit of this consistency is a stable performance capability.

Chapter 4 identified that a reduction in the funding of civil works projects was anticipated over the next five years. How this affects the Corps' organization is, as of yet, unclear; however, no obvious policy of staff level reductions have occurred within the Corps of Engineers, leading to the belief that additional management responsibilities at the national level may be ably supported. In addition, this chapter found that the Corps has established an initial plan to foster a cooperative and joint strategy in future infrastructure efforts at the local, State, and Federal levels of involvement. This plan appears to offer an opportunity for all agencies to improve the national level infrastructure management system. Unlike the *competitive strategy* skills which pervade the business and professional communities, and in where the clear goal is to displace a competitor with the hopes of either dominating or

fully capturing a particular market niche, the Corps of Engineers appears to be applying a distinctly different form of strategy to accomplish its goals; perhaps best termed *cooperative strategy*, in where the Corps is dedicated to assisting other organizations in the hopes of improving those other organization's effectiveness. This policy is set clearly with the intent of establishing a solid, unified strategy of infrastructure management at all levels. One weakness identified in this policy is that this strategy for cooperative management seems predicated on a five year plan rather than a longer range one, as is no doubt needed.

Chapter 5 identified the most obvious: The fact that the Corps of Engineers is not capable, neither in size nor in expertise, of handling all infrastructure problems at all levels for this nation. Rather, as predicated on the principal of states' rights, State and local management plans must be improved as a means of better caring for their own. The strength of the Corps of Engineers is found in its ability to lend assistance in the areas of infrastructure management at those levels when needed.

From this review it is clear that the Corps of Engineers possesses a clear strategy for infrastructure management and, perhaps more importantly, it offers an ability to play a greater role in infrastructure management to the nation. How this capacity for increased responsibility translates to actually increased

responsibilities assigned to the Corps remains to be determined by the U.S. Congress.

[1]. Daniel A. Mazmanian and Jeanne Nienaber, "Can Organizations Change: Environmental protection, citizen participation, and the Corps of Engineers," The Brookings Institution, 1979, pg. 10.

[2]. U.S. Army in World War II. Corps of Engineers: Troops and Equipment; Coll, Keith, and Rosenthal, pg. 2.

[3]. Martin Reuss, "The Role of the U.S. Army Corps of Engineers in Developing the Nation's Infrastructure," Office of History, HQUSACE, July 1990, pg. 4.

[4]. Ibid, pg. 7.

[5]. Ibid, pg. 11.

[6]. Annual Report Fiscal Year 1987 of the Secretary of the Army on Civil Works Activities (1 October 1986 - 30 September 1987), Volume II, pg. 41-1.

[7]. A HISTORY OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS; U.S. Army Corps of Engineers, June 1980, pg. 23; with update given by Ms. Blanch Estis (Tel #202/355-2341), Secretary to the Board, in a phone conversation on October 8, 1990.

[8]. Daniel A. Mazmanian and Jeanne Nienaber, "Can Organizations Change: Environmental protection, citizen participation, and the Corps of Engineers," The Brookings Institution, 1979, pg. 10.

[9]. A HISTORY OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS, June 1980. pg. 146-147.

[10]. Ibid, pg. 148-160.

[11]. Words within the brackets are my own based on the intent of the wording of the publication.

[12]. U.S. CODE CONGRESSIONAL AND ADMINISTRATIVE NEWS, pg 6659 - 6734 inclusive; Water Resources Development Act of 1986. Public Law 99-662.

[13]. INFORMATION BULLETIN, Corps of Engineers FY91 Environmental Activities. The U.S. Army Corps of Engineers New England Division.

[14]. Daniel A. Mazmanian and Jeanne Nienaber, "Can Organizations Change: Environmental protection, citizen participation, and the Corps of Engineers," The Brookings Institution, 1979, pg. 25

[15]. Ibid; the five case studies discussed may be found on pages 64-78, 79-100, 103-113, 113-131, 132-157, inclusively.

[16]. This chart is an adaptation of a chart created by Professor Frannie Humplick at M.I.T. and presented in her working paper INFRASTRUCTURE AS

AN ILL-DEFINED SYSTEM: AN ALTERNATIVE ANALYTIC REPRESENTATION, October 1990.

17. Daniel A. Mazmanian and Jeanne Nienaber, "Can Organizations Change: Environmental protection, citizen participation, and the Corps of Engineers," The Brookings Institution, 1979, pg. 2.

18. Ibid.

19. Phone conversation with Mr. Dale G. Ringer (Tel# 202/272-0084), Chief (CERM-BA), Budget And Programs Division, Directorate Of Resource Management, Corps of Engineers, Washington, D.C.

20. U.S. CODE CONGRESSIONAL AND ADMINISTRATIVE NEWS, pg 6639 - 6734 inclusive; Water Resources Development Act of 1986. Public Law 99-662.

21. Annual Report Fiscal Year 1987 of the Secretary of the Army on Civil Works Activities (1 October 1986 - 30 September 1987), Volume II.

22. Robert H. Waterman, Jr., Thomas J. Peters, and Julien R. Phillips, "Structure Is Not Organization," the Foundation for the School of Business at Indiana University, 1980.

23. These pamphlets include Our Vision, published in 1990 as a broad brushed guide for Corps of Engineers employees to recognize the direction of the organization in general, and Nation Builders, also published in 1990 for the benefit of the same general audience but slightly more specific in content.

24. U.S. Code Congressional and Administrative News, 1986, pg 6639 - 6734, inclusive.

25. Data generated by Corps of Engineer Directorate of Resource Management-Projections (CERM-P), dated 22 Feb 90; reflected in Executive Summary and labeled within this summary as Enclosure 3.

26. Executive Summary; USACE Integrated Program Analysis And Evaluation, February, 1990 and labeled Enclosure 1, Page 2 of 6.

27. Ibid, pg. 3.

28. ENGINEER UPDATE, U.S. Army Corps of Engineers, Volume 14, No. 10, October 1990. Article entitled: 1991 Initiative Seeks U.S. Infrastructure Plan.

29. Ibid.

30. This chart is an adaptation of a chart created by Professor Frannie Humplick at M.I.T. and presented in her working paper INFRASTRUCTURE AS AN ILL-DEFINED SYSTEM: AN ALTERNATIVE ANALYTIC REPRESENTATION, October 1990.

[31]. "Fragile Foundations: A Report on America's Public Works. Final Report to the President and Congress." National Council on Public Works Improvement. February, 1988, pg. 98.

[32]. Ibid, pg. 33.