CHAPTER V

TIME TWO: AUTHORITY, DECISION MAKING, AND COMMUNICATION

In this chapter, as in chapter four, the engineering-maintenance-service categories are employed. Thus, less attention is paid to the official structure of the public works (described in chapter three) than to the similarities and differences among the three functional elements of the department. In most cases, however, references to public works personnel are made in terms of their specific division and section. In the context of this chapter's discussion of authority and decision-making patterns during the emergency, communications during Time Two are described. The substance of this chapter, then, may be seen as the completion of the discussion of emergency priorities and tasks in chapter four. Implicit in this discussion is a comparison of Time Two patterns (figure 3) with normal times.

Engineering

> There were other people that I saw too that just happened to be in the right spot at the right time when somebody had an idea that something ought to be looked at. Then we went and did whatever needed to be done at the time. . . . You didn't necessarily worry about the authority or anything like that. The chain of command was avoided for awhile.

Members of the engineering sections of the public works consistently described authority patterns during Time Two in terms of their discontinuity with Time One. This statement from one of the members of the design section of the division of engineering, then, is typical. In the absence of normal task priorities but with strong motivations to help in the emergency, public works engineers took on a wide variety of new tasks -- tasks which were outside their normal responsibilities and, thus, outside their Time One patterns of authority. Indeed, for many engineering personnel, given their emergency activities, normal lines of authority were completely irrelevant. As was suggested in chapter four, this situation was clearer in some sections than in others. In this discussion these differences are made explicit.

Survey and Design Sections

The heads of the survey and design sections of the engineering division were most clearly out of their fields. The heads of both sections independently took on the inspection of the sewer systems. The head of the survey section indicated that this decision was completely his own; indeed, for the first several hours he made his inspections entirely alone. Similarly, of the emergency tasks of other sections, it was said:

> By and large during the first days of the emergency, decisions were just made by the people who saw

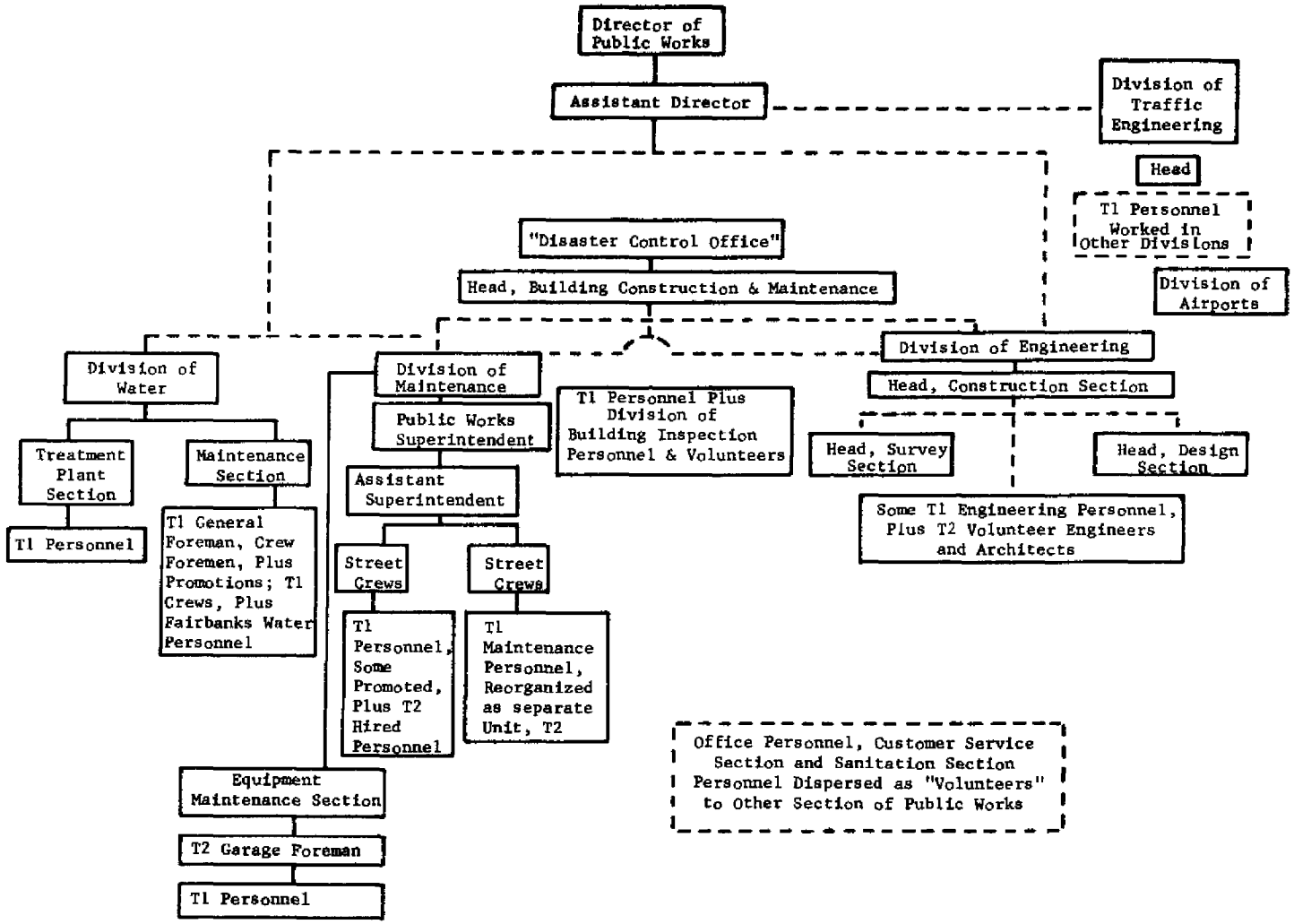

Fig. 3 - Time Two Organization Chart, Department of Public Works, Anchorage, Alaska

> the problem. The section heads here . . . certainly had wide latitude in making decisions. Frankly, I don't know if we had to get anybody's concurrence on these emergency decisions.

When they did check with other members of the public works, these conferences were chance meetings during the emergency and not conscious attempts to locate persons who had authority. Thus, the heads of both the survey and design sections spoke individually with the head of the construction section about inspection and restoration of the sewer system. This independence, as both men pointed out, resulted in considerable duplication of efforts and obvious lack of coordination. "There was a lot of duplication with other agencies," one of the engineers said, "and a lot of backing up and starting all over again." The other engineer made the same observation, "There was a definite overall lack of coordination in my opinion, and I thought that there was a tremendous waste of talent."

Coordination among all the engineering sections was the greatest problem during the first days of the disaster but, behind that problem lay a more basic one: simply that there existed no definition of appropriate emergency tasks for engineering personnel. It is difficult to coordinate the work of persons who are uncertain of what they are to do.

Nonsupervisory personnel of the survey and design sections appeared more likely to check with some superior, although they frequently indicated that the supervisor was not their own. Thus, one of the members of the survey section returned home Friday night after he was told by the head of the design section that there was little he could do. He reported back to work only on Sunday afternoon after being called in by his own supervisor. An engineer in the design section took his orders from the assistant director of public works and worked Saturday with the head of the survey section. "There was no special duty that I had to do," an engineer in the survey section said,

> but I felt that I should call in here or stop in here and find out if something had to be done. I should get a hold of my immediate supervisor -- or somebody, the next one higher.

Most engineers reported they made more decisions during the emergency than they would have during normal times, but they also reported they received orders from more persons than would normally have been the case. Supervisors of other sections, because new tasks broke down Time One authority distinctions, often suggested tasks for these men. Only one member of the engineering sections indicated that he made fewer decisions during the emergency; but he, too, received instructions from many more persons than he would have in Time One. He was in the design section and was in charge of providing utility maps for inspection teams. By Sunday, when the sewer inspection had begun to be organized, it was clear that the distribution of these maps would have to be more strictly controlled: "I couldn't give these maps to just anybody," he said, "I had to check with my boss or with the city manager over

in City Hall." The loss of irreplaceable maps during the first day and a half of the emergency demanded this checking to insure the return of other drawings and maps. Personnel of the survey section learned a similar lesson.[1]

As these incidents suggest, coordination within engineering sections was achieved with less difficulty than coordination between them. In the survey section particularly, a radio link between the head of the section -- who was operating in the field -- and his assistant and members of his staff in the office was established on Sunday. This communication facilitated sewer inspection; the supervisor was able to call back to his office for information available only from maps and drawings on file there. A member of the survey section described the establishment of this radio link and his contribution to the field work this way:

> When I came in on Sunday afternoon, I called /the head of the section/ on the radio and he asked that I come out in the field then, which I did. We talked about things and he said that he was going to be out in the field a good deal and that I should come into the office and try to keep things coordinated and just do whatever I thought was necessary. . . . I spent about ninety-five per cent of my time digging through the files coming up with information out of the field books and off the maps and relating this to the various field crews.

That the section head and his assistant were good personal friends probably added to the efficiency of this operation. On the other hand, some of the difficulty in establishing coordination between the survey and design sections probably derived from Time One antagonisms between certain officials in these two sections.

In contrast to the office-bound personnel of the survey section, members of the design section worked in the field. All interviewed members of the section reported that they worked on various inspection crews during the emergency. "Our section wasn't functioning as a whole," one member said, "we were scattered all over." He, for example, was working with the survey section head; another member of the design section was working with the head of the construction section; and the supervisor of the design section was engaged in sewer inspections. Nor did all of the members of the section have access to radios. Thus, communication and coordination within the section would have been difficult had it been required. A radio link between the head of the section and one staff member working in the office was established by Monday. As was generally true of all the sections of public works, the survey and design section personnel relied on radio or face-to-face contact.

Traffic Engineering Division

Traffic engineering had little to do with the immediate emergency tasks. "With the exception of liaison work," a member of that division said, "this office was not an instrumental part in the restoration activities." Until

Thursday of the week following the earthquake, the division head served with the National Guard and, during that time, took advantage of his dual position in the city and the military to act as liaison for both the public works and police department (with which his division normally has considerable contact), and with the National Guard and other military organizations involved in the emergency. This, it was said, was his division's principal contribution to disaster operations. He also served as coordinator for these organizations and the state department of highways and the municipal light and power department.

During the three-day emergency period, the traffic engineer exercised little authority over the members of his division; only his assistant who began assessing damages sustained by the traffic-signal system of the city reported regularly to the division head. Other members of his division were co-opted by other sections of the public works. Describing this situation one member of the division distinguished between what he called the operational units of the department -- the maintenance and water crews -- and the design and planning people, in other words, the engineering personnel like himself.

> Your operational groups /he said/ were in high gear, and your other folks, such as your design people and your planning people and so forth, were not directly involved. They did assist other agencies and operations. For example, we had a parking meter repairman dispatching heavy equipment because nobody needed the parking meters repaired during this period.

Other members of the division were not required at all, as a public works administrator noted in the following summary statement:

> The traffic engineering division here was dead. There was nothing really they could do. They don't actually have barricades; they don't actually have the traffic signals because they belong to the municipal light and power /department/. So what could the traffic division do? They could do whatever they could find to help others and whatever they were capable of doing.

The tasks of the traffic engineer himself reflected the irrelevance of his division to the emergency. He functioned less as the traffic engineer than as an extension of the administration, as liaison between the assistant director of public works and administrative personnel of other city and military organizations. Certain public works divisions and sections, however, were highly relevant to the emergency and these units, a member of the division suggested, operated almost autonomously. These observations were made in the following statement, illustrating a point to which the final chapter of this report will return.

> It's a practical matter that the public works department is too large to have everything funnel through one headquarters. I think that probably maintenance pretty well operated as a separate entity. As did water. As did the men working on sewers. And so did the building inspection division. And other agencies. I think that's the only way that it can operate -- similar to a military operation. You have a headquarters and you pretty much keep the commander advised as to what you're doing, not requesting advice on what to do. This, I think, is normal /in an emergency/. It is to be expected.

Construction Section

Certain engineers in the construction section, the building construction and maintenance section, and the building inspection division were considerably more active in the emergency than the traffic engineer. The head of the construction section, as described in chapter four, assumed major responsibility for the establishment and coordination of the equipment pool and, in addition, was important in organizing the inspection and repair of the sewer systems.

In terms of the participation of engineering personnel in the immediate tasks of the emergency period -- in the inspection of the sewer system particularly and the coordination of public and private equipment and crews -- the head of the construction section emerged as the nominal, if not the official, leader. A number of factors contributed to this development. First, he was considered by many to be a very able and knowledgeable organizer. The head of another engineering section described the construction head as a man who "commands a great deal of respect and gets things done; people are always ready to go along with his ideas." And another engineer described, with approval, the construction head's procedures during an emergency.

> He is the type of person who feels that something has got to be done in an emergency and that there is no sense in going through channels and this and that, so let's do it and get it done with. In a time like that you can't be bothered with red tape. . . . Anyone who has a knowledge of engineering and knows a little bit about these things /can get things done/. He's got the background as to what has to be done, so why go to the big people.

Again, his neutral position regarding the somewhat strained relationship between the survey and the design section heads, made him a more acceptable leader than either the survey or the design section supervisor would have been.

Secondly, the construction head's responsibilities during Time One provided valuable experience and extraorganizational resources on which he could draw during Time Two. Of the engineering personnel, he maintained the closest and most consistent relationships with private contractors. He was, of all the engineering staff, most concerned with field activities, i.e., with the actual construction and installation of city facilities; and he was familiar with the type and extent of heavy construction equipment available in Anchorage. Thus, both his official Time One tasks and his unofficial reputation contributed to his emergence as a leader of these emergency activities.

The construction head's special capacity for coordinating the activities of inspection crews and later, equipment and personnel contributed by private contractors were complemented by the specific knowledge of engineers in the survey and design sections. The head of the design section, for example, knew the location of many of the sewer installations since he had, in fact, designed many of them.[2] According to one respondent, the design head

> /was/ of immense importance in the restoration of services in that he had detailed knowledge of many of the facilities and a good knowledge of the systems -- both water and sewers, and the storm drains. This was a valuable service to the maintenance personnel in their attempts to relocate lost sewers and so forth.

Likewise, the head of the survey section went on sewer inspections because they involved more than a mere description of the damage. The emergency repairs were only temporary and, in many cases, were above ground: thus, his knowledge of what was called "field design propositions" was an important contribution to the restoration efforts. These two men, however, yielded to the construction head in organizing the equipment and crews in the total effort. That he had more experience than the assistant director of public works -- who is also the head of the engineering division -- was suggested by several engineers as part of the explanation of the construction head's emergency leadership.

The organization of the equipment pool was the construction head's own idea. When he suggested it to the director and assistant director of public works, their approval added official authority to a position he had already assumed. The equipment pool itself was functioning Saturday and, with assistance from members of the maintenance division who took over dispatching the equipment, the construction head added much to the successful emergency street repairs during the two days following the earthquake. Indeed, not until street repairs were almost completed did members of the engineering and the maintenance divisions pay systematic attention to the damaged sewers. The first important steps in the coordination of these repairs were made on Sunday afternoon. And, "by Monday," an engineer recalled, "we had everybody organized and doing something useful."

Building Construction and Maintenance Section

If the construction head became a kind of general coordinator of the survey, design, and construction sections, the head of the building construction and maintenance section took on a similar function for his own section and for the building inspection division. And, like the construction head's group, the Disaster Control Office -- as the building construction and maintenance head's group came to be called -- included a large number of persons from outside the public works who volunteered their services. The Disaster Control Office (DCO), however, emerged as a distinctive group, separate from the public works, although its core was made up of members of that department. The construction head's group, on the other hand, remained within the context of the public works. One of the major considerations, which even during the emergency period served to reinforce that group's affiliation with the public works, was the inevitability that some of the private contractors whose equipment and crews were used would wish to be reimbursed. Given the activities of the Disaster Control Office, it was clear that outsiders who offered their services did so on a purely voluntary basis.

From the immediate post-disaster period, the Disaster Control Office was involved in a range of activities which it claimed by default. The absence of a viable civil defense organization was the most often cited rationale for this claim. (As noted in chapter four the position of local civil defense director was vacant at the time of the disaster, a fact that seemed to be widely known by most Anchorage municipal officials.) A member of the Disaster Control Office, however, suggested there were others who were not prepared to assume all their disaster responsibilities and, in that case, the DCO was. He described the genesis of the group in the following statement:

> There seemed to be no command, no authority, no one taking hold. So /we/ did this. /We/ took command. The chief of police and the city attorney were there. . . . The city attorney was in full possession of his faculties and had control of himself and between the two of us we got organized with this traffic control business and began to send out rescue teams and the damage assessment teams. This is important because the functioning leadership was not in the hands of those who had the /official/ leadership positions.

Although the head of the building construction and maintenance section could see some continuity between his normal tasks and those he undertook during the disaster (i.e., at both times his principal concern was with public structures and public safety), he was aware that the specific tasks which his group performed under his direction during Time Two took him well outside his normal authority. "I'm afraid," a member of his group said, "that in many cases we overstepped the bounds of our authority." This respondent added, however, that this did not matter: "We did what we felt needed doing and where it needed doing."

The presence of the city attorney and the chief of police sanctioned the first actions of the Disaster Control Office. The first of the rescue-and-assessment-team members were deputized and given identification symbols by the police chief. Both he and the city attorney declared that securing lives and property was more important than strict adherence to legal norms. But after the first hour these officially sanctioned procedures were dropped. No additional authorization was given to the new group, although the city manager and the director of public works gave their approval rather indirectly during the emergency period. A member of the building construction and maintenance section recalled that the city manager, "sort of put his ear to the ground around our operations a few times and said, 'Okay, carry on,' and went on his way." And the section head had occasion to check with the city manager when a complaint about his crews removing hazardous debris from a damaged building was received. According to a DCO respondent the city manager said, "Forget it. Just go ahead and do it. Do what you have to do." And they did. As this same respondent put it: "Any problem that we were made aware of, we took a shot at it if we could." Only later in the emergency period did the director and assistant director of public works become involved in the Disaster Control Office; all day Saturday, a member of the group recalled, "we were entirely cut off from higher level divisions," i.e., from the public works administration.

The events which brought the director and assistant director into the new group's activities illustrate the prerogatives DCO exercised during its brief existence. As described in chapter two, a number of large buildings were so severely damaged by the earthquake they could not be repaired. Penney's department store in the downtown area was such a building; it was a six-story structure which ultimately was torn down. During the emergency period, however, there appeared to be some chance that portions of the damaged building might, in fact, collapse were there subsequent tremors and some DCO members considered the possibility of removing this hazard by destroying the building with explosives. Apparently there was talk of removing other hazards by the same means. Dynamite and caps had been collected and an announcement of the possible use of explosives had been released by the radio stations. The director of public works, as well as the city manager, learned of the project about this time and declared that such demolition would not be carried out. A Time One member of the construction section who served with DCO during the emergency described that decision.

> I was with the city manager and the director of public works when they /DCO/ said that they were going to shoot the Penney building down. But there was nobody who knew whether there were people still alive in the building. So the city manager and the director of public works definitely said that we would do nothing with that building.[3]

Another DCO respondent indicated that, "this was the only time /we were/ told something from above"; he added, however, that by the time they received the orders from the director, they had decided not to use dynamite.[4]

Other (less explosive) events also demonstrated that DCO's claim to emergency authority was not always recognized by the public. Owners of damaged buildings objected to DCO crews entering and altering their property: according to a respondent, they "came on like a herd of mad sheep." In these instances, however, the inclusion of a policeman and soldiers on DCO crews provided official sanctioning sufficient for the work to continue.

On the other hand, the Disaster Control Office became so well-known among emergency workers that apocryphal stories circulated about their activities and their reputation. One such story, which bears on the recognition of their authority, was related in the following:

> Some things about the Disaster Control Office . . . became rather a joke. Most people were working twenty-four hours around the clock on the evacuations of different buildings. Anybody who wanted to get into any roped-off area just had to say that he was part of the Disaster Control Office. He got through.[5]

Another respondent, however, declared that getting into areas which had been cordoned off was not quite as simple as that. The problem was the Eskimo guards whose command of English was less than complete making communication difficult.

> Nobody could talk their way past one of their checkpoints. If you had all the passes that we were issuing, you still had to talk like a Dutch uncle to those boys to get through.

Members of the rescue and security teams of the Disaster Control Office also experienced some problems with identification -- as did other members of the public works. Not all city employees had been issued identification cards and there were no standard insignia -- either hats or emblems -- which would set public works employees apart from curious sightseers. As a result, guards had to be convinced by maintenance-and-rescue teams that they were bona fide public works personnel. Issuing improvised passes during the emergency did little to clarify this situation: the Disaster Control Office made "police" armbands out of sheets very early in the emergency and gave them only to volunteers directly involved in the disaster work, but very shortly so many people were working that armbands were distributed wholesale. Some members of DCO security crews carried a letter from the building construction and maintenance head identifying them as official city workers; an inspector from the construction section working with the DCO said that he carried one.[6] Other passes were issued by a member of the building inspection division (also associated with the Disaster Control Office).

> The people that wanted passes were groups that came in here . . . that wanted to look at the emergency. They couldn't get in on account of the

> blockade, so I called up the police department and the Army and asked them about getting these people in. They said, "issue them a pass." So I dreamed up a little pass, had the secretary type up a whole mess of them, and started passing them out to people I thought should go into these areas -- and the thing worked. There were hundreds of people who came through here.

The problem of passes was not resolved during the emergency period. In his after-action recommendations, one engineering supervisor made a number of suggestions -- ID cards, easily recognized hats -- to avoid identification problems in future emergencies.

The core members of the Disaster Control Office were Time One employees in the building construction and maintenance section. They were augmented, first, by a number of the section head's friends who assisted him in the coordination of the group's activities; second by rescue teams from the community and the military; and third by volunteers from the community. But the Disaster Control Office also absorbed members of the building inspection division of the public works, as well as certain members of other engineering sections of the department. Normally, the head of the building inspection division occupies an authority position roughly similar to the head of the building construction and maintenance section.[7] During Time Two, however, both he and his personnel became part of the Disaster Control Office, under the direction of the building construction and maintenance head -- just as volunteer architects and engineers from the community became members of the new group.

Although others involved in rescue-and-security activities cooroborated DCO leadership by the head of the building construction and maintenance section, members of the building inspection division did not mention the Disaster Control Office at all, but referred instead to their division. This division, one member said, "was sort of the center of activity . . . of the emergency: the building inspection division suddenly sprang into prominence." It seems clear, however, that the Disaster Control Office -- which included personnel of the building inspection division -- "sprang into prominence" during the emergency.

This conclusion is reinforced by evaluations by other engineering personnel who either worked with the building construction and maintenance head or were aware of his activities. For example, these comments were made about the DCO coordinator.

> He did a magnificent job . . . in an area somewhat outside his line of work. He was tireless and did an outstanding job. I don't think there's any one man who stood quite so tall /during the emergency/ as he did.

The head of the building construction and maintenance section was singled out by a public works administrator as the man in charge of all "search and immediate relief"; in this capacity he was asked to attend all staff meetings during the emergency. And this same administrator seemed to have had the Disaster Control Office in mind when he suggested the necessity of change in the operations and authority structure of the engineering division during Time Two.

> The operation under emergency conditions changed. You have different types of organizations put together. They're born there. You have to make the organization fit the situation.[8]

The internal organization of the Disaster Control Office also suggests that the head of the building construction and maintenance section was in charge. It was said, for example, that he made all the major decisions because his new group was seldom contacted by the administration, either public works or city government: "I don't know for sure where they /the director of public works and the city manager/ were or what they were doing." In any case, he was willing to take on this new responsibility -- as were other core members of the group. Indeed, one of them explained the success of the DCO soley in terms of their willingness to take on these new responsibilities and their knowledge of community resources.

> One of the reasons this organization was so successful was because we were fortunate to get people together not only who were willing to assume the responsibility and authority, but who knew where to go to get what. Now, we had /the building construction and maintenance head/ who worked with the municipal crews. He knew the whole city setup. We had /another man/ who is closely associated with a large number of merchants around town and contractors, and then, we had myself . . . I am very closely associated with all the construction contractors and union men around town. So this was how we were able to put these guys together because we personally knew these people.

In addition to personal friends of the section head, the new group also included the members of his public works section. "Each one of /his/ men," a DCO member said, "became a foreman or a leader of a team of some kind." Thus, the foreman of the section was the leader of one of the security crews during the emergency period, and the section's plumbing-and-heating repairman organized fourteen volunteers to check the heating plants of Anchorage public buildings. As emergency leaders, each of the members of the section made many more independent decisions than they would have during normal times -- as one section member said,

> I more or less took it on myself. I mean, because /my supervisor/ wasn't available . . . he had, you know, so much to do, it would have been just a nuisance to contact him. He's told me that any decision I make, he'll stand behind it, and he trusts my judgment, so I go ahead.

The members of the section did check with each other: the plumbing-and-heating repairman talked with the section foreman, but consulted the section head only on major repairs.

The emergence and brief existence of the Disaster Control Office during the emergency period (it was phased out of operation by Wednesday of the following week) was the most dramatic example of authority and decision-making change in the public works. Its existence derived from a number of separate factors: the absence of a formal civil defense director in Anchorage; the peculiar dual functions of the building construction and maintenance section -- both engineering and maintenance; the personal characteristics of the heads of that section and the division of building inspection; and, the new priorities and tasks which the DCO head and his group were willing to take on during the emergency. The basic motivation, according to one respondent, for these new tasks and emergency authority was "moral compunction": "Here is something that needed to be done; it had to be done; so, okay, let's get it done. We didn't care if it was legally right."

Maintenance

The contrast between the emergency authority assumed by certain of the engineering personnel and the Time Two patterns of the maintenance sections -- like the differences between the emergency tasks of these two elements of the public works -- is one of the major themes of this monograph. In this discussion the authority and decision-making patterns of maintenance personnel are described and the differences between them and the altered patterns of the engineering divisions of public works analyzed.

In the maintenance units -- particularly the general maintenance section (streets and sewers) and the equipment maintenance section -- the major changes in authority occurred within the existing, normal structure. There were, for example, a number of field promotions and one shift in emergency tasks, the latter being a move toward increased specialization in Time Two operations. Additional, but less dramatic, changes in authority were required by the influx of emergency personnel in the street, sewer, and water maintenance crews but, unlike changes in the engineering units, authority changes in maintenance sections did not cross official structural lines.

General Maintenance Section

Two separate changes took place in the general maintenance section. The first was the "field" promotion of four leadmen to crew foremen. These promotions were a direct result of increased numbers of maintenance men during the emergency period (and during the weeks following). From a total of

some thirty men, the general maintenance section grew to upwards of one hundred men; it was clear that three foremen and one general foreman were insufficient to coordinate and supervise the activities of so large a maintenance crew. The promotions were made, unofficially, during the days following the earthquake. Not until the following week, however, were these changes made official.

Three of the new foremen took their responsibilities and performed very adequately -- even before their promotions became official. "They just took it upon themselves," a division administrator said, "and made decisions which we appreciated very much because they really got the problem done. And they had so much more work accomplished." The fourth of the new foremen did not do well in that position. Again, the division administrator described the circumstances:

> We tried another grader operator out /as foreman/ but he lasted only half a day. The authority went to his head. He got on that radio and he just wouldn't quit. We had to take him off before noon. He's the best grader operator we have, but he just can't control himself with the radio, so we had to take him back. He's a little bitter -- he doesn't like it -- but it's just something that had to be done.

The decisions to promote the men and the subsequent decision to denote the one man were made by the superintendent and assistant superintendent of public works and the general foreman. Time One foremen approved of the promotions: "They /the new foremen/ knew what had to be done and when they finished one job, they'd go ahead and move over to another one," said a Time One crew foreman. Similarly, there was consensus among the members of the crews: "They just had to have more leaders," a crew member said.

Associated with these formal changes in authority was a somewhat informal adjustment which took place within the crews. New personnel were added to the section in such numbers that, even with the creation of new foremen, efficient operations required additional supervision. This leadership was provided by the experienced members of the section: in some cases, men who held the position of leadmen; in others, men who (relative to new personnel) were "old-timers." These men acted as informal leaders in the crews, acquainting new personnel with procedures and serving as sources of information on city installations and equipment. One of the crew foremen indicated how he and other foremen divided up these experienced men.

> We split up our old men, you might say. Your leadmen and other men who knew the town and stuff like that; these men took so many of the new men and I tried to keep so many of the old men and /the other foremen/ tried to keep so many of them and that way if we had to put a crew out someplace, we had at least one old man that had some kind of knowledge of actually what you were trying to do.

Tentative steps had been taken the month before the earthquake to set up a separate sewer crew under one foreman whose principal task would be the maintenance of the city's entire sewer systems. During the emergency period this change in task allocation and authority was made more definite. On Sunday afternoon, with emergency street repairs nearly completed, members of the maintenance division turned to problems created by the disruption of the sanitary and storm sewer systems. The foreman nominally in charge of sewer maintenance was given full authority to supervise all operations in that area by the director of public works and the general foreman of the maintenance section. This was the second of the changes in authority in the general maintenance section. Of the results of this delegation of authority, a division supervisor said:

> I think that it speeded things up an awful lot. Otherwise /the sewer foreman/ would have had to be asking questions and it would have been more or less confusing going through two or three persons, coming down through the chain of command. And it just wasn't coming down the chain of command -- nothing was coming down. You just sort of went ahead and did the job. You had a job to do and just went ahead and did it.

At the time only three men in the general maintenance section were experienced in maintenance and repair of the sewer systems and, as already noted, the city maps and diagrams of the system were incomplete. Inspection and charting of damage began Friday night following the earthquake, but until Sunday afternoon little had been done to coordinate the various engineering teams engaged in these inspections. Thus, the sewer foreman required assistance from the engineering sections in locating the damage to the sewers and, once located, additional maintenance personnel to assist the experienced men in repairing the damage.

To satisfy the first requirement -- and to determine exactly what had thus far been done -- the sewer foreman called on the head of the construction section. The foreman had specific reason to ask for this engineer's assistance according to one respondent.

> /He/ felt that /the construction head/ would be the better man because he had worked directly with the /local/ contractors and he knew what equipment they had, what was available, and who was the best contractor for the individual job that they had to do. It worked real well.

The construction head's Time One associations with private constractors, supervision of the emergency equipment pool, and knowledge of the sewer inspection teams, made him the ideal man to assist the sewer foreman.

The second requirement, additional personnel, was satisfied by local construction crews recruited by the construction head. In these crews,

however, the experienced public works sewer men played a very important role, a role similar to that of the "old-timers" in the street crews. The dispositions of these men was described in the following:

> We'd try not to work them over sixteen hours a day, but I know that some days these men had to go eighteen or nineteen hours because they were on a particular job where they were needed and not just anybody could come and take their job over and do it. Some of this is quite technical. At the time we had only three men who knew anything about the sewer lifts and the sewer department . . . so we couldn't bring just anyone in to relieve them. They had to be worked in slowly. We would send another man with /the experienced man/ and after a couple of days the new man would gradually take over and come in and relieve him for two or three or four hours.

That they "tried not to work them over sixteen hours a day" clearly suggests the premium placed on these specialized skills during the emergency period.

Ultimately, sewer repair was taken over by the U.S. Army Corps of Engineers, but until that organization began its operations, sewer repairs were made by the public works department. In addition to the construction head, other members of the department were consulted by the sewer foreman. Other engineers who had firsthand knowledge of the sewer system, including engineers who were no longer employed by the public works, volunteered or were called in for assistance. One of the foremen in the water division, familiar with the location of both water mains and sewer systems, was also consulted. His assistance was also very valuable.

> Finding the location of some sewer lines in a particular area was hard . . . /we'd/ talked to /the water maintenance foreman/ before about things like that and he had told /us/ where the line was and approximately how far /we'd/ have to go to pick it up and get the right location. /He knew this/ because he'd been in the area before and he'd installed maybe a water-service connection. There were a lot of lines broken and that's why /we/ consulted with him.

Similarly, advice was sought of the sanitation foreman, a man who had considerable general experience in the public works. Outside the public works, the sewer foreman checked with one of the foremen in the municipal light and power department. Because the sewer-lift stations are powered electrically, some coordination with that department was required in attempting to restore service. "Everyone was very cooperative at that time," a sewer worker said in summary, "/We/ didn't get any static at all."

Early in the disaster period street repairs were coordinated by the general foreman and the crew foreman. With one foreman at the gravel pit supervising the dynamiting of the frozen gravel and the loading of the trucks and other foremen located at the faults under repair, the operation was carried out with considerable dispatch and efficiency. During this time, the sewer foreman served as radio communicator and the construction head coordinated equipment and personnel volunteered by local construction companies. "It worked out very well," a supervisor indicated,

> in two days -- Saturday and Sunday -- we hauled in the downtown area, opening up firelanes through the faults, approximately sixteen thousand yards of gravel.

The success of this project is revealed in the observation of one of the maintenance men that by Monday the section was sufficiently organized to allow the posting of written daily work assignments, a practice which had been suspended during the emergency period. Even on Saturday and Sunday, however, operations were clear enough that a man reporting for work could take his place in the gravel haul without requiring specific instructions from any of the foremen or leadmen.

> As far as the gravel haul, /one of the maintenance men said/ when I got in here, well, it seemed to have been the big deal going on so that's what I did. That was most important at the time, so I pitched in and started on that.

All that was required, he added, was to follow the truck in front of you.

In this operation, just as in the sewer repairs, the experienced men were vital to success: as one foreman put it, "These are the guys that really helped because they knew their way around." "Old-timers" served as extensions of the foremen, passing on directions and making decisions which foremen would ordinarily have made. One man, for example, directed the trucks through the damaged section of Anchorage, indicating to the drivers where they were to dump gravel.

> The foreman would come along and would say, "We are starting a new hole at so-and-so. Fill it. Send eight or nine or whatever figure of trucks there for a while." As they got one filled, they would come and tell me to cut the trucks off and send them somewhere else. . . . About the only decision I would make would be rather than have the trucks pile up I would send them on down to another hole where I knew they were working. The foremen did decide -- they told me at the start -- that they would go right down the line and take them in order. If they made any changes, they would tell me and I would in turn tell the truck drivers.