Appendix II
Maintenance and Repair Plan

CARLYLE LAKE

MAINTENANCE AND REPAIR PLAN

APRIL, 1997

APPENDIX II TO DESIGN MEMORANDUM # 10
CARLYLE LAKE MASTER PLAN UPDATE 1997

MAINTENANCE AND REPAIR PLAN

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CARLYLE LAKE MAINTENANCE AND REPAIR PLAN
FISCAL YEARS 1997 THROUGH 2007

I. OVERVIEW/BACKGROUND INFORMATION

The majority of facilities at Carlyle Lake were constructed in the early 1960's, and are nearing the end of their service life. In addition, many no longer comply with current health and safety codes. Age of the facilities, combined with increasing demands from visitors, have resulted in facility conditions in which routine maintenance is not sufficient. Many of the project's facilities do not meet current accessibility standards for the handicapped and are not in compliance with the Uniform Federal Accessibility Standards (49 FR 31528). Also, many facilities do not meet current public health and safety codes or user needs. These facilities now require either major rehabilitation or complete replacement of the existing facility in order to remain operational. By replacing or repairing facilities, operation and maintenance costs will be reduced, and in many cases revenue increased.

II. METHODS

The conclusions and recommendations of this plan are based on information gathered through an extensive inventory and analysis of all facilities and structures at the Carlyle Lake Project. Included in this analysis were factors such as efficiency, customer usage and compliance to current accessibility standards and health and safety codes. Each structure, as well as the components of each, were evaluated for necessary rehabilitation or replacement. The ten year replacement schedule is based on Service Life Determination (ER 36-2-1), condition index (ranging from 0 - very poor to 100 - excellent), construction date and visual inspection (See Appendix A).

After initial field inventory was completed and all structures and facilities were evaluated, those items which had exceeded their service life and/or had a condition index of less than sixty and/or a poor visual inspection rating were further analyzed. The extensive evaluation of existing facilities in combination with examination of visitor trends and customer feedback allowed for the development of a ten year replacement and rehabilitation schedule based on empirical data. Final replacement and rehabilitation and new construction prioritization was established by evaluating customer usage trends and attempting to reduce project operation and maintenance costs while, in some cases, increasing user fee revenues (See Appendix B).

III. MAINTENANCE PLAN

A. PROJECT OPERATIONS FACILITIES

1. ADMINISTRATION AND MAINTENANCE FACILITIES

The existing office facilities at Carlyle Lake consist of an administration building, a trailer, a section of an old maintenance building and a lunch room with a unisex shower and restroom facility. The administration building was constructed in 1962 and no longer accommodates the project staff. The complex is deficient as the project headquarters because of inadequate size, inefficiencies regarding staff meeting together or with the public, lack of handicapped accessibility, inefficient utility systems, inefficient heating and cooling systems, leaking roofs and windows and inadequate insulation and termite problems. The four buildings will be consolidated into one (See Appendix 3 to the Master Plan).

2. MAIN DAM

The Main Dam will continue to be monitored on a regular basis, and five year periodic inspections will continue to be conducted. Deficiencies found during each five year inspection will be prioritized, depending on severity, and corrected as funding becomes available. A five year periodic inspection was conducted in 1991 and inspections are scheduled for 1996 and 2001.

The 1996 periodic inspection revealed a few items of concern. The Carlyle Lake Dam has a dam safety data collection system consisting of instruments installed both during and after construction. The purpose of these instruments is to monitor the performance and safety of the earthfill embankment and the concrete structure. Given the age of the project, the life expectancy of some of the instruments and technological advances in the past 35 years, it is expected that rehabilitation or replacement of the current instrumentation monitoring system will be needed in the near future. Other major items of concern identified during the past inspection were the obsolete electrical/mechanical systems of the main dam and associated project pump stations, the stilling basin drainage system and a localized wet area in the earth embankment. In some cases studies will need to be conducted to determine cause, impact, and corrective actions required.

The Main Dam Spillway Channel is sustaining considerable erosion damage on both the east and west sides due to the continuing fluctuation of releases from the lake. The erosion is causing portions of the East and West Spillway utility roads to erode and will eventually destroy these roads completely if not revetted. An approximate 1400 feet long area along the east side of the channel will require

revetment and approximately 1700 feet on the west side will require revetment in order to prevent further erosion and to protect existing roads.

HYDRO-POWER

Southwestern Electric Cooperative has proposed the construction of a low-head (thirty-five feet) hydroelectric power plant on the main dam. The project will be electrically connected to the Municipal Electric Utility of the City of Carlyle, located about 3000 feet from the main dam. The City of Carlyle will operate the power plant in conjunction with Southwestern Electric Cooperative.

The proposed power plant will be not require additional water to be released for the sole purpose of producing electricity. Water releases from the lake will continue to be guided by the Master Reservoir Regulation Plan. The site of the proposed plant is on the east side of the channel, below the spillway. Each penstock will pass through the dam above flood level and below the roadway. A control and maintenance building will be located adjacent and south of the power plant.

The proposed project is still in the preliminary stages and the Federal Energy Regulatory Commission (FERC) license is being processed. The Corps of Engineers is cooperating fully with Southwestern Electric Cooperative. The proposed hydroelectric power plant has the potential to reduce operations and maintenance costs by supplying electricity for many Corps operation and recreation facilities at the lake.

3. SADDLE DAMS

Saddle Dam II and Saddle Dam III will continue to be inspected on a regular basis. Rip rap along Saddle Dam II will be monitored regularly and repairs will be made on an as needed basis. The rip rap will continue to be maintained by removing all emerging vegetation and by keeping the grass portions of the Saddle Dams mowed. Currently, there are no major problems with these structures. However, portions of the revetment along Saddle Dam II were damaged during the Flood of 1995 and will need minimal repairs.

The borrow area adjacent to Saddle Dam III is managed to provide both upland, forest and wetland habitat. Currently, the area is flooded by means of natural runoff and without adequate rainfall, flooding does not occur. Two wells will be drilled in order to aid in the management of this wetland area for fall flooding.

4. PUMP STATIONS

The lake's three pump stations are located at Saddle Dam II, Saddle Dam III and Keyesport and are necessary for removal of interior levee runoff. These pumps require manual activation and when in operation must be continually monitored by lake personnel. During times of heavy precipitation and run-off from adjacent private property, these pumps require twenty-four hour operation. A study to determine methods to reduce operating costs was conducted in FY-96 (See Appendix D). Recommendations of the study indicate that the most cost-effective means to improve pump-station operations will be to automate operations at all three pump stations and install new motor control centers at each .

5. COLES CREEK LAND TREATMENT SYSTEM

The existing Coles Creek Sewage Treatment Plant will be replaced with a land treatment system in 1996. This replacement was recommended in the 1990 Letter Report, Carlyle Lake, Wastewater Feasibility Study. The purpose of the study was to examine alternative wastewater treatment systems that would comply with water quality standards and reduce treatment costs, as well as operation and maintenance costs. The existing sewage treatment plant requires a National Pollutant Discharge Elimination System (NPDES) permit from the Illinois Environmental Protection Agency (IEPA). The permit identifies effluent contamination limitations, monitoring, and reporting requirements that must be met by the treatment systems and plant operators. Since the initial issuance of the NPDES permit, IEPA has made numerous revision resulting in more stringent treatment requirements. Consequently, costly upgrades to the existing treatment facility would be necessary, in order to comply. The 1990 study concluded the wastewater land treatment system, is a favorable treatment to implement because these systems meet engineering, water quality and cost objectives.

6. BOULDER SEWAGE TREATMENT PLANT

A 1990 Letter Report, Carlyle Lake, Wastewater Feasibility Study, recommended that the Boulder Sewage Treatment plant be eliminated and that wastewater from the Boulder Recreation Area be hauled via septic truck to the Land Treatment System at Coles Creek. Since 1990, the wastewater flows experienced at the Boulder sewage treatment plant have increased four fold. In addition, Clinton County has imposed additional fees on trucks hauling over their roads. Considering both of these factors, the feasibility of hauling wastewater from Boulder to the land treatment system was questioned and a Wastewater Feasibility Study for the Boulder Recreation Area, which considered both of the above factors, was completed in January of 1996. The recommendation of this

study is in-kind replacement of the existing sewage treatment plant because it has the lowest total project cost for a fifty year design life, no real estate acquisition will be required and design and construction could proceed quickly. Over a fifty year design life, the package sewage treatment plant will require four replacements with fifteen year life spans. Other alternatives which the study examined were replacement with a land treatment system, piping the wastewater to the Coles Creek Land Treatment System and hauling the wastewater to the Coles Creek Land Treatment System.

B. RECREATION AREAS

1. DAM WEST RECREATION AREA

A. Dam West Beach and Day Use

The Dam West Beach and Day Use Area is the most heavily used area at the project throughout the entire recreation season. In 1994, the Dam West Recreation Area ranked third highest in visitation out of all Corps projects, nation wide. Because of excessive use, combined with the age of these facilities, many will require major rehabilitation or replacement. The Dam West Beach and Day Use Area includes ninety-three picnic units, two picnic shelters, two comfort stations, one bath house, six fountain/hydrants and two playgrounds.

PHASE 1 - REHABILITATION

Most of the components of the two masonry comfort stations in the day use area have exceeded their service life and are showing much wear. The toilets, sinks, lights, and partitions are in poor condition, and the floors are cracked and deteriorating. In addition, these buildings do not comply with current accessibility standards for the handicapped or current plumbing codes. These conditions will require full replacement of both the buildings and foundations. By replacing these facilities, the needs of the public and persons with disabilities will be met and operation and maintenance costs will be reduced. One building also is inundated regularly during flood control operations. It will be placed at a higher elevation.

The existing beach shower building does not comply with current accessibility standards for the handicapped and will require rehabilitation and redesign of the interior. In addition, the shake shingle roof is deteriorating and will require replacement with a roof which meets current industry standards, all partitions must be replaced and the interior floor will be replaced with tile.

The ten existing concrete tables in this area are deteriorating and have

exceeded their service. They will require removal and replacement with new metal frame, wooden tables. All water fountains in this area are in poor condition, have exceeded their service life, often need repairs due to leakage and are not in compliance with current plumbing codes. These will be replaced with water fountains which comply with current accessibility standards for the handicapped. Also, the eighty-five grills and concrete grill pads in this area are in poor condition and will require replacement.

The three lift stations in this area have exceeded their useful service life and often require costly repairs to remain operational. Due to the age of these facilities, it is often difficult to find reasonably priced replacement parts. The depth of these lift stations also creates a safety hazard. These lift stations will be replaced with package pressurized lift stations and all sewer lines in this area will be replaced with four inch lines.

The area's two picnic shelters are the most popular at the lake and are reserved every week throughout the recreation season. To accommodate user demand for picnic shelters in this area and generate additional revenue, a new shelter will be constructed at the southern end of this area (see Recreational Facilities Cost Analysis).

PHASE 2 - FUTURE

The Dam West Recreation Area receives about 40% of the total Carlyle Lake visitation. Currently, there is no way to control visitor access to the Dam West Day Use Area. Once all parking lots are full, it becomes necessary to station a park ranger at the boat ramp entrance to direct traffic. During these times, the picnic area is overcrowded and unsafe. Another concern is that parking is available on both sides of the access road to the area, which is heavily used by recreational visitors and local citizens. Users of the Dam West Day Use Area who park on the west side of this road must cross it to gain access to the area, which is a safety hazard. To eliminate problems associated with the current design, the proposed solution is to build a bypass road to the west of the existing road. The road will run east of the current location of the lake's administration office. The proposed bypass road would eliminate the safety hazard of visitors crossing a road in which there is heavy through traffic, and would allow for closure of the day use area when user capacity is at maximum level, creating a safer environment for all users. The proposed bypass road for only one way traffic through the Dam West Area will also allow for easier collection of day use fees. (See Plate 4 of Master Plan.)

B. Dam West Visitor Center

PHASE 1 - REHABILITATION

This facility is located on a ten acre site west of the Dam West Beach. Existing facilities include a 2500 sq. ft. visitor center with a video/conference room, sales area and informational and historic exhibits. A handicapped accessible trail is located to the south of the Visitor Center around Willow Pond.

The Visitor Center area currently does not have an outdoor amphitheater. To allow for increased programming and implementation of ER 1130-2-428 (Interpretive Services and Outreach Program), an outdoor amphitheater, which will accommodate up to 100 visitors will be constructed behind the visitor center to replace the amphitheater destroyed by fire when the old visitor center burned. This facility will be utilized for both planned and special interpretive programming and during special events. The amphitheater will allow for expanded special events in the area by allowing for both indoor (inside the Visitor Center) and outdoor presentation areas.

PHASE 2 - REHABILITATION

The existing Audio Visual Room in the Visitor Center can accommodate about fifty people. This room is used very often for public workshops, meetings and training sessions and has not been able to fully accommodate the amount of people necessary, in the past. The Audio Visual Room will be expanded on the south side to accommodate from 100 to 150 people. This will allow for workshops, meetings and training sessions, which are now being held away from the project, to be held on site.

C. Dam West Boat Access and Marina

Existing facilities in this area include a fish cleaning station, four-lane boat launching ramp, two large parking areas, resort area and a full service marina concession operation.

PHASE 1 - FLOOD REPAIRS

The Dam West Boat Ramp parking lot was extensively damaged during the Flood of 1995. Due to the duration of inundation, the parking lot sustained base failure. All existing pavement and parking blocks will be removed and replaced and the need for a subsurface drainage system will be investigated. Fill material will be placed and the existing boat launching ramp will be extended to an

elevation of 455.0 National Geodetic Vertical Datum (NGVD). This will allow for access to the lake during most high water events, whereas the current elevation of the boat ramp makes the facility unusable when the pool elevation is 450.0 NGVD and above, which occurs frequently. A portion of the eight inch PVC sanitary sewer line will be replaced with eight inch PVC line and relocated to the north edge of the parking lot. The service panels of the existing lift stations will be raised to 457.0 NGVD and the seals in the entrance tube lids will be replaced.

PHASE 2 - MARINA EXPANSION

The Market Study of Potential Marina Development at Carlyle Lake, prepared by Harland Bartholomew and Associates, Inc., July, 1994, concluded that the West Access Marina has the potential expansion of 174 wet and sixty-five dry slips (a total of 239) (See Appendix 1 of the Carlyle Lake Master Plan). Future expansion plans for the marina could include expanding the existing harbor westerly towards the County Road. This expansion will not only accommodate more users, but will also make the marina site more accessible to the future resort development site which will be located west of the county road.

D. Dam West Campground

The Dam West Campground is comprised of three loops with 113 campsites, six walk-in tent sites, two waterborne comfort stations, a comfort station with mini-shower, two vault toilets, a shower/laundry facility, nine fountain/hydrants, and two playgrounds. Because most of the facilities were constructed in the 1960,s, many have exceeded their useable service life and many design problems exist. This campground is the most popular campground at the lake with a 68% occupancy rate in 1995, peaking to 97% occupancy in July.

PHASE 1 - FLOOD REPAIRS

A 150 yard portion of the shoreline, adjacent to several campsites is severely eroding and sustained severe damage during the Flood of 1995. In order to protect the adjacent campsites, the shoreline will be revetted with approximately 8000 tons of 1000 lb. rip rap and 1100 tons of bedding material, then back filled with 3200 cubic yards of embankment. In order to maintain boat access in this area small rip rap jetties will be constructed between rip rapped areas along a portion of the shoreline adjacent to the campground, allowing for boats to moor along the shoreline. Also a portion of road in this area becomes inundated frequently and inhibits visitors from using the area, therefore this portion of road will be raised to 453.0 NGVD.

Many of the existing electric pedestals in the campground become inundated during high pool elevation and the existing electrical breaker setup includes groups of campsites at varying elevations, causing many useable sites to have no electrical service, when other sites on the same breaker are inundated. Electrical service for thirty-two sites will be replaced and breakers will be separated based on site elevation to allow for maximum utilization of campsites which are not inundated. All electric boxes will be installed on posts at an elevation above 457.0 NGVD to prevent inundation during future flood control operations. This will also require the replacement of a portion of the area's electrical line and distribution panels which meet the current industry standards.

PHASE 2 - REHABILITATION

The masonry comfort station in Loop 2 is in poor condition and has exceeded its useable service life. Because of the location of this facility, it is more prone to flooding than the other structures in the campground. To eliminate ongoing operation and maintenance costs of this structure, it will be removed and replaced with water and sewer hookups, throughout the twenty four sites of Loop 2, which will accommodate the majority of the areas users who have compatible recreation vehicles. Also, the location of this loop is very close to the campground's main shower building for those visitors who do not have compatible recreational vehicles.

Visitor Feedback Analysis at the project has indicated that many of our customers prefer full service water and sewer services. To accommodate visitor demands, all fourteen sites in Loop 3 will be upgraded to include full service hookups. Previous plans for Loop 3 called for the addition of a shower house with flush toilets. Camping fees on these sites will be increased and will provide increased revenue. A total of thirty-eight sites (about 35%) including all of Loops 2 and 3, will be upgraded to full service sites. Based on current visitation trends, the potential revenue increase for one year is estimated at $16700.

The existing electrical lines (12000 feet) in the Dam West Recreation Area, which provide electricity to 113 campsites are deteriorating and the existing electrical hookup boxes are not in compliance with current electrical codes. Rehabilitation of the electrical service for this area will require the replacement of all in-ground service lines, as well as the replacement of electrical distribution panels which will meet current industry standards. A portion of the electrical services, which are impacted during flood control operations will be repaired prior to this phase, during Phase 1 (See Phase I - Flood Repairs).

The water fountains next to Comfort Station # 2 in Loop 1 and in Loop 3

are in poor condition, do not meet current plumbing codes or accessibility standards for the handicapped, have exceeded their service life and often need repairs due to leakage. These will be replaced with water fountains that comply with the current accessibility standards for the handicapped.

The campground has only one existing handicapped accessible site. This site is frequently occupied. In order to meet current accessibility standards and better serve our customers, four additional sites, adjacent to comfort stations and/or shower buildings, will be made handicapped accessible by adding side walk, and replacing grill and table.

PHASE 3 - REHABILITATION

The masonry comfort station in Loop 1 is showing much wear. The concrete floor is deteriorating and the toilets and partitions are in poor condition. In addition, this building does not comply with the current accessibility standards for the handicapped. In order to reduce operation and maintenance costs, and better serve our customers, these conditions require replacement of the building and foundation.

The masonry and wood comfort station/mini-shower in Loop 1 has exceeded its useable service life and has structural problems including a deteriorating floor and roof. In addition, this building does not comply with the current accessibility standards for the handicapped. These conditions require rehabilitation of this building to correct problems and make it accessible for persons with disabilities.

PHASE 4 - REHABILITATION

The two vault comfort stations in Loop 3 have an estimated service life of twenty-five years. These facilities were not constructed with material treated to resist moisture and this has allowed decay to form in the inner walls and structural framing of these facilities. The concrete vaults which collect waste water in some of these facilities are not watertight and allow groundwater to enter and exit the vault depending on the groundwater levels. These two facilities do not meet current accessibility standards for the handicapped. They will be replaced with one fully handicapped accessible waterborne comfort station with flush toilets. This will require installation of a sewer line in Loop 3 of the campground. This consolidation and upgrade will reduce operation and maintenance costs and will provide a better service to our customers in this heavily utilized area.

The three lift stations in this area have exceeded their useful service life and often require costly repairs to remain operational. Due to the age of these

facilities, it is often difficult to find reasonably priced replacement parts. The depth of these lift stations also creates a safety hazard. These lift stations will be replaced with package pressurized lift stations and all sewer lines in this area will be replaced with four inch lines.

The existing sewer line in the Dam West Campground is in poor condition and will require replacement. Currently, this sewer line connects to the line in the Dam West Day Use Area. This line will be relocated and tied into the future resort's sewer line to Carlyle's plant. The lift station at the Dam West Boat Ramp, which is prone to flooding will then be removed and replaced with a package pressure unit.

The copper water lines in the Dam West Area have had a long useful service life. The industry standard soft solder connections on these lines are beginning to break loose causing water leaks and necessary maintenance. It will be most cost effective to either partially or completely replace the system with PVC pipe instead of excavating all connections and resoldering to new standards.

2. WEST SPILLWAY RECREATION AREA

Facilities include forty-eight picnic sites, two waterborne comfort stations, two vault toilets, four fountain/hydrants, picnic shelter, fish cleaning station and nature trail.

The two masonry comfort stations in the area have exceeded their useable service life and have many structural and fixture problems. Age of the facilities, combined with increasing demands from visitors, have resulted in facilities in such a condition that routine maintenance is not sufficient. Neither facility complies with current accessibility standards for the handicapped. These two facilities will be removed and replaced with one centrally located comfort station meeting current standards. By centralizing and combining these buildings into one facility, the health and safety of our visitors and the requirements for persons with disabilities will be met. Environmental quality will be sustained and operation and maintenance costs will be reduced.

The picnic shelter in this area will require rehabilitation. At a minimum, this will include grill, electric box, repair or replacement of the concrete floor which is deteriorating and replacement of the roof with one which meets current industry standards.

This area's fish cleaning station has exceeded its service life and all components are in poor condition. Because this area is heavily utilized during both

the summer and winter months, it will be replaced with a handicapped accessible facility which is freeze-proof.

The twenty-three concrete picnic tables in the area have exceeded their service life, are deteriorating and require replacement. Metal frame, wooden tables will be used.

The four water fountains in the area are in poor condition, do not meet current accessibility standards for the handicapped or current plumbing codes, have exceeded their service life and often need repairs due to leakage. These will be replaced with water fountains that comply with the current accessibility standards for the handicapped.

The lift station in this area has exceeded its useful service life and often require costly repairs to remain operational. Due to the age of these facilities, it is often difficult to find reasonably priced replacement parts. The depth of the lift station also creates a safety hazard. The lift station will be replaced with a package pressurized lift station and all sewer lines in this area will be replaced with 4 inch lines.

3. GENERAL DEAN RECREATION AREA

Facilities include ten picnic sites, a vault toilet, a one-lane boat ramp and an interpretive overlook.

PHASE 1 - REHABILITATION

The vault comfort station located in the General Dean Recreation Area has an estimated service life of twenty five years. This facility was not constructed with material treated to resist moisture and this has allowed decay, rust and corrosion to form in the inner walls and structural framing of this facility. The concrete vaults which collect waste water in some of these facilities are not water tight and allow ground water to enter and exit the vault depending on the groundwater levels. This facility does not comply with current accessibility standards for the handicapped or health and safety codes. This facility will be rehabilitated and adapted to meet current accessibility standards for the handicapped.

4. EAST SPILLWAY RECREATION AREA

Existing facilities include forty-six picnic sites, two waterborne comfort stations, two vault toilets, one fish cleaning station, picnic shelter, one playground, and five fountain/hydrants and a handicapped fishing pier.

PHASE 1 - REHABILITATION

The two masonry comfort stations in the area have exceeded their useable service life and have many structural and fixture problems. Age of the facilities, combined with increasing demands from visitors, have resulted in facilities in such a condition that routine maintenance is not sufficient. Neither facility complies with current accessibility standards for the handicapped. To reduce operation and maintenance costs, these two facilities will be removed and replaced with one centrally located comfort station which will meet current accessibility standards for the handicapped and plumbing codes.

The picnic shelter in this area will require rehabilitation. This will include grill, electric box, repair or replacement of the concrete floor which is deteriorating and roof replacement with one which meets current industry standards.

This area's fish cleaning station has exceeded its service life and all components are in poor condition. Because this area is heavily utilized during both the summer and winter months, it will be replaced with a handicapped accessible facility which is freeze-proof.

The two water fountains in the area are in poor condition, do not meet current accessibility standards for the handicapped or plumbing codes, have exceeded their service life and often need repairs due to leakage. These will be replaced with water fountains that comply with the current accessibility standards for the handicapped and plumbing codes

Overflow camping is provided in this area during weekends of peak visitation. To accommodate visitors, fifteen grills and tables will be relocated from the east side of the East Spillway Access Road to south and southeast of the existing turnaround. The existing picnic sites will be converted to primitive campsites. The existing turnaround and parking area will be used for access and parking.

The twenty-seven concrete picnic tables in the area have exceeded their service life, are deteriorating and require replacement. Metal frame, wooden picnic tables will be used.

The lift station in this area has exceeded its useful service life and often requires costly repairs to remain operational. Due to the age of this facility, it is often difficult to find reasonably priced replacement parts. The depth of the lift station also creates a safety hazard. The lift station will be replaced with a package pressurized lift station and all sewer lines in this area will be replaced with

4 inch lines.

The vault comfort station located at the Lakeview handicapped fishing area has an estimated service life of twenty five years. This facility was not constructed with material treated to resist moisture and this has allowed decay, rust and corrosion to form in the inner walls and structural framing of this facility. The concrete vaults which collect waste water in some of these facilities are not water tight and allow ground water to enter and exit the vault depending on the groundwater levels. This facility does not comply with current accessibility standards for the handicapped or health and safety codes. This facility will be rehabilitated and adapted to meet current accessibility standards for the handicapped.

PHASE 2 - FUTURE

This area is heavy utilized throughout the entire year by fishermen and currently, camping facilities to accommodate the users are not available. Overflow camping is provided in this area during weekends of peak visitation. To accommodate increased usage, and to alleviate congestion in other recreation areas, an additional fifty full service RV sites will be constructed in this area including electrical, sewer and water hookups and impact sites.

5. DAM EAST RECREATION AREA

A. Dam East Boat Access

Existing facilities include, a four-lane boat ramp, a one-lane high water boat ramp, picnic shelter and two vault toilets.

PHASE 1 - FLOOD REPAIRS

Carlyle Lake fluctuates throughout each year, depending on rainfall and water control operations. During periods when the lake is above 450.0 NGVD, public use of the lake's boat ramps is severely restricted or closed entirely. With the loss of boat launching capability, project visitation is reduced and a significant negative economic impact is experienced. High water access at boat ramps is in demand by customers and is also needed for lake management operations. When the lake exceeds 450.0 NGVD, this area's four-lane boat ramp becomes inoperable. However, use of the high water two lane boat ramp increases significantly, causing long delays to users and severe traffic congestion, especially during the recreation season. To reduce the congestion in the area, accommodate

users and eliminate the hazard of users attempting to use lower ramps during high water conditions, a three-lane high water access, which will only be useable when the pool elevation exceeds 450.0 NGVD, will be constructed adjacent to the existing two-lane high water ramp. The ramp will consist of the placement of a concrete slab at a suitable elevation/location adjacent to existing parking/roadway infrastructure.

PHASE 2 - REHABILITATION

To accommodate user demand and generate additional revenue, a new picnic shelter will be constructed in this area (see Recreation Facilities Cost Analysis.)

B. Dam East - McNair Group Camp

Existing facilities include a sanitary dump station, three picnic shelters, two waterborne comfort stations, a comfort station with mini-showers, one vault toilet, eight fountain/hydrants, one playground, and a swimming beach.

The McNair Group Camp Area is reserved by groups nearly every weekend, from April through October. On holiday weekends, it is available to the general public and is heavily utilized during these times.

PHASE 1 - FLOOD REPAIRS

An approximately thirty yard portion of the rip rapped shoreline adjacent to the McNair Beach sustained damage during flood control operations in 1993 and 1995. This revetment will be repaired by placing additional rip rap.

PHASE 2 - REHABILITATION

Comfort Station #2, in the area has well exceeded its useable service life and has many structural and fixture problems. Age of the facility, combined with increasing demands from visitors, has resulted into a facility that routine maintenance is not sufficient. The facility does not comply with current accessibility standards for the handicapped or current plumbing codes.

Vault Comfort Station # 3, located north east of the entrance to the area, has an estimated service life of twenty five years. This facility was not constructed with material treated to resist moisture and this has allowed decay, rust and corrosion to form in the inner walls and structural framing of this facility. The concrete vaults which collect waste water in some of these facilities are not water

tight and allow ground water to enter and exit the vault depending on the groundwater levels. This facility does not meet current accessibility standards for the handicapped or health and safety codes.

The mini-shower at the north end of the area, near the beach, has exceeded its service life and has structural problems including a deteriorating floor and roof. In addition, this building does not meet current accessibility standards for the handicapped. The mini-shower portion of this facility will be removed.

These three facilities will be combined and replaced with one centrally located shower house with toilets. Replacing one facility instead of repairing the other buildings will significantly reduce operation and maintenance costs while better meeting the needs of the public, and the requirements for persons with disabilities.

The existing main sewer line in the Dam East area, which includes the East Spillway Recreation Area and the McNair Recreation area, crosses the main dam to tie into Carlyle's plant. Because of this, all waterborne facilities in this area must be winterized each fall. Visitor demands are making it necessary to keep the McNair Recreation Area open year round. To allow for waterborne facilities to remain open throughout the winter, the possibility of rerouting the existing sewer line south, across Route 50, to tie into Carlyle's system, is proposed.

The two lift stations in this area have exceeded their useful service life and often require costly repairs to remain operational. Due to the age of these facilities, it is often difficult to find reasonably priced replacement parts. The depth of these lift stations also create a safety hazard. These lift stations will be replaced with package pressurized lift stations and all sewer lines in this area will be replaced with four inch lines.

PHASE 3 - REHABILITATION

The masonry and wood comfort station/mini-shower at the north end of the area, near the beach, has exceeded its useable service life and has structural problems including a deteriorating floor and roof. In addition, this building does not comply with the current accessibility standards for the handicapped. As mentioned above the mini-shower addition to this structure will be removed during Phase I Rehabilitation. Phase 2 will include rehabilitation of the comfort station portion of this structure and adaptation to meet current accessibility standards for the handicapped.

PHASE 4 - REHABILITATION

The Comfort Station/Shelter in Group Area C will require extensive rehabilitation. In addition to the modifications to make it handicapped accessible, this facility will require replacement of lights, partitions, sinks and toilets in the comfort station portion and replacement of concrete floor in the shelter area.

Picnic Shelter # 2 in Group Use Area D will require rehabilitation. This will include grill, electric box, repair or replacement of the concrete floor which is deteriorating and roof replacement with one which meets current industry standards.

The existing electrical lines (4200 feet) in the area, which provide electricity to twenty campsites are deteriorating. Due to the age of the electric lines, insulation surrounding the electric cable has begun to break down and cause periodic faults and loss of power. Also, the existing electrical hookup boxes do not meet current electrical codes. Rehabilitation of the electrical service for these areas will require the replacement of all in-ground electrical wires, distribution panels and individual receptacle boxes with those which meet current industry standards.

To accommodate the trend of increased visitors with recreation vehicles, the existing seventeen tent sites in Area D will be converted to RV sites. This will require construction of a new asphalt road and camppads and installation of electric in this area. These seventeen new sites will generate an approximate $19584 in additional revenue each year.

The seventeen existing concrete tables in the camping area are deteriorating and have exceeded their service. They will require removal and replacement with metal frame, wooden tables. The two water fountains in this area are in poor condition, have exceeded their service life, often need repairs due to leakage and do not meet current plumbing codes. These will be replaced with water fountains that comply with the current accessibility standards for the handicapped and current plumbing codes. Also, the fifty grills in this area are in poor condition and will require replacement.

6. KEYESPORT RECREATION AREA

This area includes a marina, a four-lane boat ramp with parking, nineteen picnic units, a picnic shelter, waterborne comfort station, three fountain/hydrants, fish cleaning station, playground and beach.

A. Keyesport Beach and Day Use

The picnic shelter in this area will require rehabilitation. At a minimum, this will include grill, electric box, repair or replacement of the concrete floor which is deteriorating and roof replacement with one which meets current industry standards.

The masonry comfort station does not comply with current accessibility standards for the handicapped. These conditions will require rehabilitation of this building to correct problems and make accessible.

The water fountains in the day use area are in poor condition, do not meet current accessibility standards for the handicapped or plumbing codes, have exceeded their service life and often need repairs due to leakage. They will be replaced with a water fountain which complies with current accessibility standards for the handicapped. The wooden stairway across the levee to picnic shelter is deteriorating and requires replacement. For public health and safety, an outdoor shower will be added to the beach area.

B. Keyesport Boat Access and Marina

PHASE 1 - FLOOD REPAIRS

The existing marina breakwater sustained damage during the flood control operations of 1993 and 1995. Additional rip rap will be added to this breakwater for repairs and to provide additional protection during future flood control operations.

PHASE 2 - MARINA EXPANSION

The Market Study of Potential Marina Development at Carlyle Lake, prepared by Harland Bartholomew and Associates, Inc, July, 1994, concluded that the Keyesport Marina has the potential expansion of at least thirty wet and 100 dry slips (a total of 130) (See Appendix 1 of the Carlyle Lake Master Plan), although the demand does not currently exist due to the current operator's focus on marketing a land based restaurant concession, instead of focusing on marina operations. The study indicated that if the concession was reoriented toward a marina operation, future demand for boat slip rental would increase. Future expansion plans for the marina could include expanding the existing harbor by constructing an additional breakwater to protect slips.

7. COLES CREEK RECREATION AREA

A. Coles Creek Beach, Day Use and Boat Access

Existing facilities in this area include forty-two picnic sites, three fountain/hydrants, two vault comfort stations, three picnic shelters, swimming beach, bath house, playground, four-lane boat launching ramp, sailboat launching ramp, and fish cleaning station.

PHASE 1 - FLOOD REPAIRS

BOAT RAMP

Due to the duration of the inundation of the main boat ramp parking lot, the parking lot sustained base failure. To repair the lot, existing pavement will be removed and a subsurface drainage system will be installed. The lot will also be regraded to eliminate low areas which hold standing water. A high water access ramp will be constructed in Northwest corner of the lot which will be useable when the main ramp is flooded. The existing wooden walkway from the boat ramp parking lot to the beach area has sustained damage during past flood control operations. It will be removed and replaced with a culvert and rocked path with a five foot wide sidewalk to maintain access from the boat ramp parking lot to the beach area.

The lift station for the beach shower house was damaged during past flood control operations. All electrical components and wire within the control panel at the lift station will be replaced. Electrical wiring will be removed from between the control panel and the wet well. A non-arcing terminal box will be installed at the wet well and conduit seals will be installed from the terminal box to the control panel. All corroded components will be replaced and a battery alarm back up system will be installed.

SAILBOAT LAUNCHING AREA

Past high pool elevations have caused extensive erosion damage to the bank, causing a large portion of the asphalt parking lot to erode into the lake. To repair this area, 300 linear feet of shoreline will be re-established and revetted with 1000 lb. rip rap. The existing asphalt will be removed and replaced. The lot will also be regraded to eliminate low areas which hold standing water.

PHASE 2 - REHABILITATION

Vault Comfort Station #1, located north of the boat ramp parking lot, will require rehabilitation. The shingled roof is in poor condition, the concrete floors are cracked and deteriorating and the comfort station does not meet current accessibility standards for the handicapped. Rehabilitation of this structure will include replacing the roof with one which meets current industry standards, repairing cracks in floor and modification to meet current accessibility standards for the handicapped. This comfort station remains open throughout the entire recreation season.

Vault Comfort Station # 2, in the area has well exceeded its useable service life and has many structural and fixture problems. Age of the facility, combined with increasing demands from visitors, have resulted in a facility in such a condition that routine maintenance is not sufficient to make repairs. The facility does not comply with current accessibility standards for the handicapped. This facility will be removed and replaced with a waterborne comfort station which will meet current accessibility standards for the handicapped. The cost to replace this facility with waterborne is comparable to the cost of replacement with vault toilet and routine pumping of the vault will be reduced which will reduce future O & M costs.

The existing beach shower building will require complete rehabilitation. The shake shingle roof is deteriorating and will require replacement with a roof which meets current industry standards, all partitions, showers, doors, and toilets must be replaced and the interior floor will require repairs.

The area's fish cleaning station has exceeded its service life and all components are in poor condition. It will be replaced with a handicapped accessible facility which will be open year-round.

The forty-two grills in this area are in poor condition and will require replacement. The concrete and asphalt sidewalks in this area are in poor condition and have severe cracks and deterioration. These sidewalks will be replaced with a concrete walkway (8600 sq. feet). Currently there is no walkway between the beach/day use area and the campground, visitors must walk on the road to go from the beach to the campground. To eliminate this safety hazard, a walkway will be placed adjacent to the roadway to link the campground and beach area together.

B. Coles Creek Campground

The Coles Creek Campground includes 148 campsites, eight waterborne comfort stations, a washhouse, two playgrounds, amphitheater, eleven

fountain/hydrants, dump station and a land treatment system for sewage. The majority of the entire Coles Creek area is below the elevation of 457.0 NGVD and frequently becomes inundated during high pool elevations. The area sustained major damage during the flood of 1995 when it was inundated for a period of nearly two months and will require major renovations.

PHASE 1 - FLOOD REPAIRS

Many sites in Loops 1 through 4 in the campground become inundated when the lake exceeds 450.0 NGVD. The existing campsites which become inundated in these areas will be replaced with asphalted camping pads with impact sites. Impact sites in these areas will result in less damage during inundation and will also allow for quicker cleanup and re-opening of facilities as flood waters recede. Thirty-five sites in Loop 1 will be replaced with twenty-five asphalted camping pads with impact sites, eighteen sites in Loop 2 will be replaced with thirteen asphalted camping pads with impact sites, all ten sites in Loop 3 will be replaced with camping pads with impact sites, sites seventy-one through ninety in Loop 4 will be replaced with ten camping pads with impact sites and sites 118 and 145 in Loop 5 will be replaced with camping pads with impact sites.

The sites in Loops 1 - 4 which will be removed will be relocated to a new loop. This new loop will be Loop 6. The existing access road to the sewage treatment plant (which will be removed) will be extended south and fifteen camppads with impact sites will be constructed. These sites will include individual water and sewer hookups and electrical service which meets current industry standards to increase revenue and to eliminate the need for a restroom. The design of Loop 6 will include provisions for future expansion of the area. The sites will not flood, reducing Operation & Maintenance costs.

Many of the area's electrical hookup boxes were inundated during the flood control operations in 1995. These boxes are corroding due to inundation. The existing 30 amp receptacle boxes on sixty-three sites will be replaced with 50 amp receptacle boxes and installed on posts at an elevation above 457.0 NGVD to prevent inundation during future flood events. This will require the replacement of electrical distribution panels, portions of the area's electrical lines, and individual campsite receptacle boxes with those which will meet current industry standards. The existing electrical breaker setup includes groups of campsites at varying elevations, causing many useable sites to have no electrical service, when other sites on the same breaker are inundated. Breakers will be separated based on site elevation to allow for maximum utilization of campsites which are not inundated.

The barrier gate, located at the entrance of the recreation area, causes

difficulties for large recreational vehicles to turn around when it is closed. This gate will be relocated to west of the Lotus Group Area entrance road and a paved turn around will be constructed east of the Lotus entrance road. The turn around will include an island which will be the future location for a fee booth to collect both day use and camping
fees.

A 500 yard portion of the road between Loops 2 and 4 is below 454.0 NGVD and when inundated, prevents access to campsites which are not inundated at this elevation. This road will be raised to 456.0 NGVD to allow for access to higher campsites when the pool elevation is high.

The two package lift stations within the campground were damaged during the flood of 1995 when they became inundated from water entering through the electrical conduit. Alternatives to preventing this will be investigated and the problem will be corrected either by extending the entrance tube approximately one foot and installing conduit above 457.0 NGVD or by installing conduit seals on all exterior conduits.

EROSION REPAIR

A 150 linear feet portion of shoreline in Loop 4 has experienced extensive shoreline erosion. In order to protect existing campsites, the bank will be restored, then revetted with rip rap.

PHASE 2 - REHABILITATION

The eight waterborne comfort stations in the Coles Creek Campground are in fair to good condition without many major maintenance problems. All comfort stations will require replacement of the shingled roof with a roof which meets current industry standards and some will require replacement of toilet, partitions, and sinks to remain operable. Although none of these facilities meet current accessibility standards for the handicapped, it is not efficient to rehabilitate all eight comfort stations of this area. Instead, Comfort Station # 4 in Loop 1 will be rehabilitated and adapted to meet current handicapped accessibility standards for the handicapped, and an accessible mini-shower addition will be constructed, with two handicapped accessible campsites constructed adjacent to the comfort station.

The nine water fountains in the area are in poor condition, do not meet current accessibility standards for the handicapped, do not meet plumbing codes, have exceeded their service life and often need repairs due to leakage. These will

be replaced with water fountains that comply with current accessibility standards for the handicapped.

The thirty-six existing concrete tables in the camping area are deteriorating and have exceeded their service life, and will require replacement with new metal frame, wooden tables. The 148 grills in this area are in poor condition and will require replacement.

The existing amphitheater is constructed with untreated wood and is severely deteriorating. The existing flat benches will be replaced with treated lumber benches which will have backs.

The three lift stations in this area have exceeded their useful service life and often require costly repairs to remain operational. Due to the age of these facilities, it is often difficult to find reasonably priced replacement parts. The depth of these lift stations also creates a safety hazard. These lift stations will be replaced with package pressurized lift stations and all sewer lines in this area will be replaced with four inch lines.

The existing electrical hookup boxes are not in compliance with current electrical codes. Rehabilitation of the electrical service for this area will require the replacement of all in-ground service lines, as well as the replacement of electrical distribution panels with panels that will meet current industry standards. A portion of the electrical services, which were impacted during flood control operations will be repaired. (See Phase I - Flood Repairs)

PHASE 3 - REHABILITATION (FUTURE)

To accommodate increased usage of this area, and to alleviate congestion in the Dam West Area, an additional 100 campsites will be constructed in Loop 6, which will initially be constructed in Phase I of the rehabilitation. Fifty of the newly constructed campsites will include water and sewer hookups and two additional comfort station/mini-shelters will be constructed in this loop to accommodate the additional campsites. Based on current visitation trends, these sites will generate approximately $146000 in additional revenue each year.

C. Coles Creek Lotus - Group Camp Area

The Lotus Group Area, located within the Coles Creek Recreation Area, includes ten framed platform tents, vault toilet, enclosed shelter and playground. The facility is heavily used throughout the entire recreation season.

PHASE 1 - REHABILITATION

Visitor feedback over the past several years has indicated that users would prefer a shower building in this area. The vault toilet in this area will be replaced with a comfort station/mini-shower. This was approved in Supplement # 6 to the Carlyle Lake Master Plan, dated 1989.

The shelter is in fair condition, although rehabilitation is necessary to accommodate future visitors. Rehabilitation of the shelter will include installing windows and screens, construction of shelves, and installation of a sink and fireplace. The shingled roof will also require replacement with a roof which meets current industry standards.

The area's ten tent shelters are in poor condition. The wooden frames are deteriorating and the canvas is ripping and deteriorating. These tents will be replaced with weather-proof tent shelters, which will be more durable and have a longer service life than the existing tents.

To accommodate visitors request, generate additional revenue and promote increase use of the area, electrical service will be provided at ten pedestals for service to each tent shelter. This will require the placement of electric line and distribution panel.

8. BOULDER RECREATION AREA

A. Boulder Boat Access, Marina and Picnic

Existing facilities include a full service marina concession, four-lane boat launching ramp, fish cleaning station, thirty picnic sites, picnic shelter, two waterborne comfort stations, fountain/hydrant, and playground.

PHASE 1 - FLOOD REPAIRS

When the pool elevation exceeds 450.0 NGVD, the four lane boat ramp in this area becomes inoperable. A high water service access, which will be constructed off of the north-west corner of the boat ramp parking lot, will be available to lake users and will eliminate the hazard of users attempting to launch at the existing ramps during high water conditions. This service ramp will only be useable above the elevation of 450.0 NGVD.

PHASE 2 - REHABILITATION

The two waterborne masonry comfort stations in the area have well exceeded their useable service life and have many structural and fixture problems. The facilities have cracks in their concrete floors and the sinks, toilets, partitions, interior lights and shingled roof are in poor condition and have required extensive maintenance in order to remain operable. Age of the facilities, combined with increasing demands from visitors, have in many cases resulted in facilities in such a condition that routine maintenance is not sufficient to make repairs. Neither facility complies with current accessibility standards for the handicapped. These two facilities will be removed and replaced with one centrally located comfort station. By centralizing and combining these buildings into one facility, the health and safety of our visitors and the requirements for persons with disabilities will be met. Environmental quality will be sustained and operation and maintenance costs will be reduced.

The water fountains in the area are in poor condition, do not meet current accessibility standards for the handicapped, comply with plumbing codes, have exceeded their service life and often need repairs due to leakage. These will be replaced with water fountains that comply with current accessibility standards for the handicapped.

This area's fish cleaning station has exceeded its service life and all components are in poor condition. It will be replaced with a facility which meets current accessibility standards for the handicapped.

PHASE 3 - HARBOR EXPANSION

The Market Study of Potential Marina Development at Carlyle Lake, prepared by Harland Bartholomew and Associates, Inc, July, 1994, concluded that the Boulder Marina has the potential expansion of at least thirty wet slips, but dredging would have to be completed before additional slips could be constructed. Future expansion plans for the marina could include expanding the existing harbor to accommodate additional slips. Currently about 90% of the existing slips are rented.

B. Boulder Campground

The Boulder Campground includes seventy-seven campsites, thirteen walk-in tent sites, three waterborne comfort stations, six fountain/hydrants, shower/laundry building, amphitheater, sanitary dump-station, playground and a sewage treatment plant.

PHASE 1 - FLOOD REPAIRS

A portion of shoreline is eroding and sustained damage during flood control operations in 1993 and 1995. This area will require a minimal amount of rip rap to stabilize the shoreline.

Many of the area's electrical hookup boxes were inundated during the flood control operations in 1995. Many of these boxes are corroding due to inundation. About twenty-five existing 30 amp electrical boxes in the campground will be replaced with boxes which meet current industry standards and will be installed on posts at an elevation above 457.0 NGVD. The existing electrical breaker setup includes groups of campsites at varying elevations, causing many useable sites to have no electrical service, when other sites on the same breaker are inundated. Breakers will be separated based on site elevation to allow for maximum utilization of campsites which are not inundated.

Many sites in the campground become inundated when the lake exceeds 450.0 NGVD. About twenty-five campsites which become inundated in these areas will be replaced with asphalted camping pads with impact sites. Impact sites in these areas will result in less damage during inundation and will allow for quicker cleanup and re-opening of facilities as flood waters recede.

PHASE 2 - REHABILITATION

Comfort Station # 3 in the tent area is in fair condition but will require minor rehabilitation to remain fully functional. The concrete floor is cracking and deteriorating which will require rehabilitation and the shingled roof needs replaced with a roof which meets current industry standards.

Comfort Station # 4 is in fair to good condition with very few structural problems. Although none of the three facilities in the campground meet current accessibility standards for the handicapped, it is not feasible to modify all to meet current standards. Instead, only Comfort Station # 4 will be rehabilitated and made handicapped accessible along with two adjacent campsites.

Comfort Station # 5 is in fair to good condition with very few structural problems. This facility will require replacement of toilets and the shingled roof with one which meets current industry standards.

The shower/laundry building will require replacement of the shingled roof which leaks and is deteriorating with one which meets current industry standards.

The six water fountains in the area are in poor condition, do not meet current accessibility standards for the handicapped, comply with plumbing codes, have exceeded their service life and often need repairs due to leakage. These will be replaced with water fountains that comply with current accessibility standards for the handicapped.

The ninety grills in this area are in poor condition and will require replacement.

Through visitor feedback, our customers have expressed much interest for full service water and sewer hookups in all three major campgrounds, and are willing to pay additional fees for them. To accommodate this need and to create increased camping revenue, sites twenty-eight through forty (thirteen sites) will be upgraded to full service water and sewer sites by hooking in to the existing sewer system. Based on current visitation trends, these sites will generate approximately $5600 in additional revenue each year.

The existing electrical lines (8000 feet) in the Boulder Recreation Area, which provide electricity to ninety campsites are in fair to poor condition. The existing electrical hookup boxes provide a maximum of 30 amp service. Repairs to the electrical service in this area will require the replacement of all in-ground service lines, as well as replacement of electrical distribution panels and electrical hookup boxes which meet current industry standards. A portion of the electrical services, which are impacted during flood control operations will be repaired during Phase 1 (See Phase I - Flood Repairs).

The three lift stations in this area have exceeded their useful service life and often require costly repairs to remain operational. Due to the age of these facilities, it is often difficult to find reasonably priced replacement parts. The depth of these lift stations also creates a safety hazard. These lift stations will be replaced with package pressurized lift stations and all sewer lines in this area will be replaced with four inch lines.

C. PROJECT ROADS

Project roads will continue to be evaluated using the PAVER system. PAVER is a pavement management system that serves as a tool in determining maintenance and repair needs and priorities of pavements. One of the primary functions of the system is to predict pavement conditions in the future. A PAVER analysis, along with recommendations, is completed every three years. Yearly recommendations of the PAVER program will be prioritized and implemented depending on funding availability. As a preventive maintenance measure, roads

will be crack sealed each year with the priority being main access roads, followed by parking lots, then campsites. Roads and lots will be oil and chip sealed on a ten year cycle and striping will be completed every five years.

COST ESTIMATES

10 YEAR SCHEDULE
FY-1997 THROUGH FY-2007

IV. 10 Year Schedlue - FY-97 through FY-07
Carlyle Lake
Maintenance and Repair Plan

	FY-97	FY-98	FY-99	FY-00	FY-01	FY-02	FY-03	FY-04	FY-05	FY-06	FY-07
PROJECT OPERATIONS											
Admin. & Maint. Facilities	P & S	Construction									
Main Dam - Channel						Study	P & S	Construction			
Saddle Dams (Wells & Pumps)		Construction									
Pump Stations-Rehab	P & S	Rehab.									
Coles Creek Land Treatment System	Construction										
Boulder Sewage Treatment Plant	P & S	Construction									
RECREATION AREAS											
Dam West Beach and Day Use											
Phase 1			P & S	Construction							
Phase 2 - Future											FDM
Dam West Visitor Center											
Phase 1		Construction									
Phase 2			P & S	Construction							
Dam West Boat Access											
Phase 1 (Flood)	P & S	Construction									
Phase 2 (Future)											
Dam West Campground											
Phase 1 (Flood-Revetment)	Construction										
Phase 2	Scope	P & S	Construction								
Phase 3						Scope	P & S	Construction			
Phase 4								Scope	P & S	Construction	
West Spillway			Scope	P & S	Construction						
General Dean			Construction								
East Spillway											
Phase 1				Scope	P & S	Construction					
Phase 2 (Future)											FDM
Dam East Boat Access											
Phase 1 (Flood Repairs)	Construction										
Phase 2					P & S	Construction					
Dam East McNair Group Camp											
Phase 1					Scope	P & S	Construction				
Phase 2							Scope	P & S	Construction		
Phase 3								Scope	P & S	Construction	
Phase 4									Scope	P & S	Construction
Keyesport Beach and Day Use								Construction			
Keyesport Marina & Boat Access											
Phase 1							Construction				
Phase 2 (Future)											
Coles Creek Beach Day Use and Boat Access											
Phase 1 (Flood)	P & S	Construction									
Phase 2						Scope	P & S	Construction			
Coles Creek Campground											
Phase 1 (Flood Repairs)	P & S	Construction									
Phase 2								Scope	P & S	Construction	
Phase 3									Scope	P & S	Construction
Coles Creek Lotus Group Camp (mini-shower)		Review P & S	Construction								
Boulder Boat Access and Picnic											
Phase 1 (Flood Repairs-High water ramp)	Construction										
Phase 2					Scope	P & S	Construction				
Phase 3 (Future)											
Boulder Campground											
Phase 1	Construction										
Phase 2							Scope	P & S	Construction		

V. CARLYLE LAKE MAINTENANCE AND REPAIR PLAN - COST ESTIMATES

	Item Description	Quantity	Unit	Unit Price	Quantity Price
1. PROJECT OPERATIONS FACILITIES					
A. Admin/Maintenance Building	Consolidation and Construction of New Building	1	job		$650,000
B. Main Dam	Spillway Channel Revetment				
	East 1000 lb Rip Rap 1400 lf x 30	3900	ton	$22	$85,800
	West 1000 lb Rip Rap 1700 lf x 30	4725	ton	$22	$103,950
				SUBTOTAL	$189,750
C. Saddle Dams	Wells and Pumps	2	ea	$15,000	$30,000
D. Pumping Stations	Keyesport Pump Station - Automation and Electrical/Mechanical Rehab	1	job	$150,000	$150,000
	Pump Station 2 - Automation and Electrical/Mechanical Rehab	1	job	$160,000	$160,000
	Pump Station 3 - Automation and Electrical/Mechanical Repairs	1	job	$40,000	$40,000
				SUBTOTAL	$350,000
F. Boulder Sewage Treatment Plant	Boulder Sewage Treatment Plant				
	Demolition of existing plant	1	job	$35,000	$35,000
	Replacement with a package system	1	job	$175,000	$175,000
				SUBTOTAL	$210,000
2. RECREATION AREAS					
1. DAM WEST RECREATION AREA					
A. Dam West Beach and Day Use	**Phase 1 - Rehabilitation**				
	Comfort Stations - Demolition	2	job	$2,500	$5,000
	Comfort Stations - Replacement	2	job	$40,000	$80,000
	Bath House - Rehabilitation	1	job	$25,000	$25,000
	Construct Picnic Shelter	1	job	$30,000	$30,000
	Replace Picnic Tables	10	ea	$100	$1,000
	6 x 9 x 4 Concrete Pads	10	ea	$100	$1,000
	Replace Water Fountains	6	ea	$1,275	$7,650
	Replace Grills	85	ea	$100	$8,500
	Replace Concrete Grill Pads	85	ea	$100	$8,500
	Replace Lift Stn w/ Pressurized Lift Str	3	ea	$10,000	$30,000
	Replace Sewer Line	5150	ft	$25	$128,750
				SUBTOTAL	$325,400
B. Dam West Visitor Center	**Phase 1**				
	100 Person Outdoor Amphitheater	1	job		
	Concrete Pad for Stage 20 x 30 x 6"	600	sf	$1.91	$1,146
	Asphalt Shingle	875	sf	$3.17	$2,774
	Projector Screen 10 x 10	100	sf	$6.9	$690
	3" x 8" x 8' Wood Plank	25	ea	$120	$3,000
	Electric Service	1	job	$5,000	$5,000
				SUBTOTAL	$12,610
	Phase 2				
	Expansion of A/V Room from 50 to 100/150 Person	1	job	$52,500	$52,500
C. Dam West Access and Marina	**Phase 1 - Flood Repairs**				
	Repair Parking Lot and Boat Ramp, Install Subsurface Drainage, and Raise East End of Lot to 455 NGVD	1	job	$400,000	$400,000

V. CARLYLE LAKE MAINTENANCE AND REPAIR PLAN - COST ESTIMATES

	Abandon and Plug 8" VCP Sewer Line/	1	job	$2,000	$2,000
	Replace w/ 8" PVC/Move Location	3500	lf	$15	$52,500
	South/Extend Service Lines				
	Flood Proof Packaged Lift Stations	2	ea	$2,000	$4,000
	Raise Service Panels above 457 NGV	2	ea	$2,500	$5,000
	Install Anode Protection System	2	ea	$3,000	$6,000
	Replace Seals in Entrance Lids				
				SUBTOTAL	$469,500
	Phase 2 - Harbor Expansion	1	job	$500,000	$500,000
D. Dam West CGround	**Phase - 1 Flood Repairs (150 yds)**				
	Re-establish Bank Line and Revet	1	job		
	100 lb Rip Rap	7875	ton	$20	$158,000
	Bedding material	1100	ton	$15	$16,500
	Backfill	3200	cy	$8	$25,600
	Raise Access Road from 451 to 453	1	job		
	NGVD to Allow for Access (40 yds)				
	Fill Material	227	cyds	$8	$1,800
	Subbase	190	ton	$15	$2,850
	Asphalt	100	ton	$55	$5,500
	Replace/Seperate Electrical Service	32	sites	$1,560	$50,000
	- Based on Site Elevation				
	Install New Electrical Panels Above	1	job	$8,000	$8,000
	457 NGVD				
				SUBTOTAL	$268,250
	Phase 2 - Rehabilitation				
	Demolition of Comfort Station-Loop 2	1	job	$2,500	$2,500
	Water/Sewer Hookups-Loop 2	24	ea	$1,000	$24,000
	Water/Sewer Hookups-Loop 3	14	ea	$1,000	$14,000
	Trenching for New Conductor	6000	lf	$2	$12,000
	Campsite Conductor	6000	lf	$4.5	$27,000
	Electrical Receptacle Boxes	81	ea	$275	$22,275
	Replace Water Fountains	2	ea	$1,275	$2,550
	Handicapped Accessible Sites	2	ea	$2,000	$4,000
				SUBTOTAL	$108,325
	Phase 3 - Rehabilitation - Loop 1				
	Demolition of Masonry Comfort Statior	1	job	$2,500	$2,500
	Replacement of Masonry Comfort Stn	1	job	$40,000	$40,000
				SUBTOTAL	$42,500
	Phase 4 - Rehabilitation				
	Demolition of Vault Cmfrt Stn-Loop 3	2	ea	$1,000	$2,000
	Construct Wborn Cmfrt Stn-Loop 3	1	job	$40,000	$40,000
	Replace Lift Stn w/ Pressurized Lift Str	3	ea	$10,000	$30,000
	Replace Sewer Line	6670	ft	$25	$166,750
	Replacement of Water Line	2900	lf	$10	$29,000
				SUBTOTAL	$267,750
2. Dam West Spillway	Demolition of Waterborn Comfort Stn	2	ea	$2,500	$5,000
	Consolidate/Build Central Comfort Stn	1	job	$50,000	$50,000
	Picnic Shelter Rehabilitation	1	job		
	Concrete Pad 30 x 30 x 6"	1	ea	$2,000	$2,000
	Replace Brazier	1	ea	$3,000	$3,000
	Picnic Tables	12	ea	$100	$1,200
	Roof, Asphalt Shingle	900	sf	$3.17	$2,853
	Replace Fish Cleaning Station	1	job	$10,000	$10,000
	Replace Wooden Picnic Tables	23	ea	$100	$2,300
	6 x 9 x 4 Concrete Pads	23	ea	$150	$3,450
	Replace Water Fountain	4	ea	$1,275	$5,100
	Replace Lift Stn w/ Pressurized Lift Str	1	job	$10,000	$10,000

	Replace Sewer Line	3300	ft	$25	$82,500
				SUBTOTAL	$177,403
3. General Dean Bridge	Rehabilitate Comfort Station	1	job	$7,000	$7,000
4. Dam East Spillway	**Phase 1 - Rehabilitation**				
	Demolition of Waterborn Comfort Stn	2	ea	$2,500	$5,000
	Consolidate /Build Central Comfort Stn	1	job	$50,000	$50,000
	Rehabilitate Lakeview Comfort Station	1	job	$7,000	$7,000
	Picnic Shelter Rehabilitation	1	job		
	Concrete pad 30 x 30 x 6"	1	ea	$2,000	$2,000
	Replace Brazier	1	ea	$3,000	$3,000
	Picnic Tables	12	ea	$100	$1,200
	Roof, Asphalt Shingles	900	sf	$3.17	$2,853
	Replace Fish Cleaning Station	1	job	$10,000	$10,000
	Replace Water Fountains	2	ea	$1,275	$2,550
	Convert Picnic Sites to Primitive Sites	1	job		
	Grills	15	ea	$100	$1,500
	Tables	15	ea	$100	$1,500
	Replace Picnic Tables	27	ea	$100	$2,700
	6 x 9 x 4 Concrete Pads	27	ea	$150	$4,050
	Replace Lift Stn w/ Pressurized Lift Str	1	job	$10,000	$10,000
	Replace Sewer Line	4000	ft	$25	$100,000
				SUBTOTAL	$203,353
5. DAM EAST RECREATION AREA					
A. Dam East Boat Acces	**Phase 1 - Flood Repair**				
	Construct Highwater Access Ramp	1	job	$25,000	$25,000
	Useable to 455 NGVD				
	Phase 2 - Rehabilitation				
	Construct Shelter	1	job	$30,000	$30,000
	Rehabilitate Shelter	1	job	$10,000	$10,000
				SUBTOTAL	$40,000
B. Dam East - McNair	**Phase 1 - Flood Repair**				
Group Camp	Erosion/Revetment Repairs	1	job	$5,000	$5,000
	Phase 2 - Rehabilitation				
	Demolition of Comfort Stations-2 & 3	2	ea	$2,500	$5,000
	Demolition of One Mini-Shower	1	job	$2,500	$2,500
	Cosolidate into Centralized Bath House	1	job	$300,000	$300,000
	Relocate Dump-Station	1	job	$30,000	$30,000
	Reroute Sewer Line	1	job	$30,000	$30,000
	Replace Lift Stn w/ Pressurized Lift Stn	2	ea	$10,000	$20,000
	Replace Sewer Line	3390	ft	$25	$84,750
				SUBTOTAL	$472,250
	Phase 3 - Rehabilitation				
	Rehab Beach Comfort Station	1	job	$25,000	$25,000
	Phase 4 - Rehabilitation				
	Rehab Comfort Station/Shelter-Area C	1	job	$20,000	$20,000
	Rehab Picnic Shelter - Area D	1	job		
	Concrete Pad 30 x 30 x 6"	1	ea	$2,000	$2,000
	Replace Brazier	1	ea	$3,000	$3,000
	Picnic Tables	12	ea	$100	$1,200
	Roof, Asphalt Shingles	900	sf	$3.17	$2,853
	Replace Electrical Service	1	job		
	Campsite Conductor	6000	lf	$4.5	$27,000
	Distribution Panel	1	ea	$8,000	$8,000
	Receptacle Boxes	17	ea	$275	$4,675
	Trenching for Conductor	3000	lf	$2	$6,000
	Convert Existing Tent Sites to R.V.	17	ea	$3,000	$51,000

	Road - Asphalt	3000	sy	$6	$18,000
	Electric	1	job		
	Campsite Conductor	2000	lf	$4.5	$9,000
	Distribution Panel	1	ea	$8,000	$8,000
	Receptacle Boxes	17	ea	$275	$4,675
	Trenching for Conductor	2000	lf	$2	$4,000
	Replace Picnic Tables	17	ea	$100	$1,700
	6 x 9 x 4 Concrete Pads	17	ea	$150	$2,550
	Replace Water Fountains	2	ea	$1,275	$2,550
	Replace Grills	50	ea	$100	$5,000
	Replace Concrete Grill Bases	50	ea	$100	$5,000
				SUBTOTAL	$186,203
6. KEYESPORT RECREATION AREA					
A. Keyesport Beach and	Rehabilitation of Picnic Shelter	1	job		
Day Use	Concrete Pad 30 x 30 x 6"	1	ea	$2,000	$2,000
	Replace Brazier	1	ea	$3,000	$3,000
	Picnic Tables	12	ea	$100	$1,200
	Roof, Asphalt Shingles	900	sf	$3.17	$2,853
	Rehabilitate Comfort Station	1	job	$20,000	$20,000
	Replace Water Fountains	3	ea	$1,275	$3,825
	Replace Wooden Stairway	1	ea	$3,000	$3,000
	Install Outdoor Beach Showerhead	1	ea	$1,000	$1,000
				SUBTOTAL	$36,878
B. Keyesport Boat Acces	**Phase 1 - Flood Repairs**				
and Marina	Repair Breakwater	1	job	$50,000	$50,000
	Phase 2 - Marina Expansion	1	job	$500,000	$500,000
7. COLES CREEK RECREATION AREA					
A. Coles Creek Beach,	**Phase 1 - Flood Repairs**				
Day Use and Boat	Repair Parking Lot and Boat Ramp	1	job	$400,000	$400,000
Access	and Install Subsurface Drainage System				
	Install High Water Boat Ramp at NW	1	job	$5,000	$5,000
	Corner of Lot Useable to 455 NGVD				
	Remove and Dispose Wooden Walkwa	1	job	$4,000	$4,000
	and Construct Access Walkway across				
	Ditch				
	Embankment	30	cyds	$8	$240
	Replace Electric - Lift Station Panel	1	job	$8,000	$8,000
	for Shower House				
	Install Non-arcing Terminal Box				
	Install Conduit Seals				
	Re-install Wiring				
	Replace Corroded Components				
	Install Battery Alarm Back Up System				
	Sailboat Parking Lot - Re-establish	300	lf	$80,000	$80,000
	and Revet with Rip Rap				
	Repair and Re-pave Parking Lot	130 x 150	lf		
	Subbase	600	ton	$15	$9,000
	Pavement	2200	sy	$6	$13,200
	Backfill	6000	cyds	$8	$48,000
	1000 lb Rip Rap	2800	ton	$22	$61,600
				SUBTOTAL	$629,040
	Phase 2 - Rehabilitation				
	Demolition of Vault CS # 2	1	job	$2,500	$2,500
	Replace Vault CS # 2 w\ Waterborne	1	job	$40,000	$40,000
	Rehabilitate Bath House	1	job	$20,000	$20,000
	Replace Fish Cleaning Station	1	job	$10,000	$10,000
	Replace Grills	42	ea	$100	$4,200
	Replace Concrete Grill Pads	42	ea	$100	$4,200

	Construct Walking Path	1	job	$10,000	$10,000
				SUBTOTAL	$90,900
B. Coles Creek CGround	**Phase 1 - Flood Repairs**				
	Remove 80 Asphalt Pads and Replace	63	sites	$4,000	$252,000
	with 63 Camppads w/ Impact Sites				
	Relocate Campsites, Located Below	1	job		
	450 NGVD to New Loop				
	Impact Sites	15	sites	$3,000	$45,000
	Water and Sewer Hookups	15	sites	$1,000	$15,000
	Extend Access Road - 300 Yards	4300	sy	$6	$25,800
	Replace/Seperate Electrical Service	63	sites		
	Based on Site Elevation				
	Install New Electrical Panels Above	4	panels	$6,000	$24,000
	457.0 NGVD				
	Campsite Conductor	6000	lft	$4.5	$27,000
	Receptacle Boxes	63	ea	$275	$17,325
	Trenching for Conductor	6000	lft	$2	$12,000
	Remove Barrier Gate Located at the	1	job	$16,000	$16,000
	Entrance and Install Turn around				
	and New Barrier Gate (110' x 75')				
	Raise Low Portion of Main Access Roa	1500	ft		
	from 453 to 456 to Allow for Access to				
	Campsites				
	Embankment	1200	cyds	$8	$9,600
	Subbase	900	ton	$15	$13,500
	Pavement	3500	syds	$6	$21,000
	Repair Two Packaged Lift Stations to	1	job	$20,000	$20,000
	Prevent Future Water Damage and				
	Replace Concrete Slabs and Seals in				
	Entrance Lids/Investigate				
	Transformer Alternatives.				
	Erosion Repair - Loop 4	150	lf		
	Re-establish Bank Line and Revet				
	1000 lb Rip Rap	1400	ton	$22	$30,800
	Backfill	2000	cyds	$5	$10,000
				SUBTOTAL	$539,025
	Phase 2 - Rehabilitation				
	Rehabilitate CS # 4	1	job	$25,000	$25,000
	Mini-Shower Addition/ CS # 4	1	job	$40,000	$40,000
	Roof Replacment - 8 Comfort Stations				
	Asphalt Shingles (300 sf ea)	2400	sf	$3.17	$7608
	Handicapped Accessible Campsites	2	ea	$2,000	$4,000
	Replace Water Fountains	9	ea	$1,275	$11,475
	Replace Concrete Picnic Tables	36	ea	$100	$3,600
	6 x 9 x 4 Concrete Pads	36	ea	$150	$5,400
	Replace Campsite Grills	148	ea	$100	$14,800
	Replace Grill Pads	148	ea	$100	$14,800
	Replace Amphitheater Benches	1	job	$2,500	$2,500
	Replace Lift Stn w/ Pressurized Lift Str	3	ea	$10,000	$30,000
	Replace Sewer Line	7200	ft	$25	$180,000
	Replace/Separate Electric Service Base	1	job		
	on Elevation				
	Receptacle Boxes	25	sites	$275	$6,875
	Distribution Panels	1	ea	$5,000	$5,000
	Campsite Conductor	2500	lft	$4.5	$11,250
	Trenching for new conductor	2500	lft	$2	$5,000
	Construct 3 Car Parking Area	4	ea	$800	$3,200
				SUBTOTAL	$370,508
C. Coles Creek Lotus -	**Phase 1 - Rehabilitation**				
Group Camp Area	Vault Comfort Station Removal	1	job	$2,000	$2,000

V. CARLYLE LAKE MAINTENANCE AND REPAIR PLAN - COST ESTIMATES

	Comfort Station/ Mini Shower Additior	1	job	$200,000	$200,000
	Shelter Repairs	1	job	$10,000	$10,000
	Replacement of Tents w/ Shelters	10	ea	$3,000	$30,000
	Install Electrical Pedestals	10	ea	$1,560	$15,600
				SUBTOTAL	$257,600
8. BOULDER RECREATION AREA					
A. Boulder Boat Access,	**Phase 1 - Flood Repairs**				
Marina and Picnic	Highwater Boat Access	1	job	$5,000	$5,000
	Phase 2 - Rehabilitation				
	Demolition of w/b Comfort Stations 1&	2	ea	$2,500	$5,000
	Replace w/ Consolidated Comfort Stn	1	job	$40,000	$40,000
	Replace Water Fountains	2	ea	$1,275	$2,550
	Replace Fish Cleaning Station	1	job	$10,000	$10,000
				SUBTOTAL	$57,550
B. Boulder Campground	**Phase 1 - Flood Repairs**				
	Campsite Electrical Repairs/Rewire	25	sites	$1,560	$39,000
	According to Elevation				
	Receptacle Boxes	25	sites	$275	$6,875
	Distribution Panels	2	ea	$5,000	$10,000
	Campsite Conductor	3000	lf	$4.5	$13,500
	Trenching for new conductor	3000	lf	$2	$6,000
	Restore Flooded Campsts-Impact Sites	25	sites	$1,800	$45,000
				SUBTOTAL	$120,375
	Phase 2 - Rehabilitation				
	Comfort Station #3 Rehabilitation	1	job	$10,000	$10,000
	Comfort Station #4 Rehabilitation	1	job	$20,000	$20,000
	Handicapped Accessible Campsites	2	ea	$2,000	$4,000
	Comfort Station # 5 Rehabilitation	1	job	$10,000	$10,000
	Shower / Laundry Roof Replacement	1	job	$4,000	$4,000
	Replace Water Fountains	6	ea	$1,275	$7,650
	Replace Grills	90	ea	$100	$9,000
	Replace Concrete Grill Pads	90	ea	$100	$9,000
	Water and Sewer Hookups	13	ea	$1,000	$13,000
	Electrical Repairs	1	job		
	Electrical Conductor Replacement	5000	lf	$4.5	$22,500
	Recreation Receptacle Boxes Replac	65	ea	$275	$17,875
	Distribution Panel Replacement	3	ea	$8,000	$24,000
	Trenching for Conductor	5000	lft	$2	$10,000
	Replace Lift Stn w/ Pressurized Lift Str	2	ea	$10,000	$20,000
	Replace Sewer Line	3400	ft	$25	$85,000
				SUBTOTAL	$266,025
3. PROJECT ROADS	Misc Road / Parking / Campsite Maint	1	avg year	$20,000	$20,000
				SUBTOTAL	$20,000
4. VEGETATIVE MANAGEMENT AREAS					
A. Boulder Flats	Wetland Restoration	1	job	$130,000	$130,000
				SUBTOTAL	$130,000
			SUBTOTAL		$7,690,695
			CONTINGENCIES: (IN %)	25	$1,922,673
			SUBTOTAL		$9,613,368
			P.E. & D. (IN %)	15	$1,442,005
			C.M. (IN %)	12	$1,153,604
			TOTAL COST		**$12,208,977**

FACILITY COMPARISON CHARTS

VI. FACILITY COMPARISON CHARTS

FACILITY COMPARISONS - DAM WEST RECREATION AREA

	EXISTING	WITH PROPOSED CHANGES	DIFFERENCE
AMPHITHEATERS	1	2	+1
BATH HOUSES	1	1	0
BOAT RAMP LANES	4	4	0
CAMPSITES	118	118	0
CAMPSITE ELECTRICAL OUTLETS	113	113	0
CAMPSITE WATER/SEWER HOOKUPS	0	38	+38
COMFORT STATIONS W/ MINI-SHOWERS	1	1	0
COMFORT STATIONS- VAULT	2	0	-2
COMFORT STATIONS - WATER BORNE	4	4	0
DUMP STATIONS	1	1	0
FISH CLEANING STATIONS	1	1	0
FOUNTAINS/HYDRANTS	15	15	0
GROUP CAMP AREAS	0	0	0
PICNIC SHELTERS	2	3	+1
PICNIC SITES	93	93	0
PLAYGROUND EQUIPMENT	4	4	0
SWIMMING BEACHES	1	1	0
VISITOR CENTER	1	1	0
WASH HOUSES	1	1	0
COVERED TABLES	1	0	1

FACILITY COMPARISONS - WEST SPILLWAY RECREATION AREA

	EXISTING	WITH PROPOSED CHANGES	DIFFERENCE
AMPHITHEATERS	0	0	0
BATH HOUSES	0	0	0
BOAT RAMP LANES	0	0	0
CAMPSITES	0	0	0
CAMPSITE ELECTRICAL OUTLETS	0	0	0
CAMPSITE WATER/SEWER HOOKUPS	0	0	0
COMFORT STATIONS W/ MINI-SHOWERS	0	0	0
COMFORT STATIONS- VAULT	2	2	0
COMFORT STATIONS - WATER BORNE	2	1	-1
DUMP STATIONS	0	0	0
FISH CLEANING STATIONS	1	1	0
FOUNTAINS/HYDRANTS	4	4	0
GROUP CAMP AREAS	0	0	0
PICNIC SHELTERS	1	1	0
PICNIC SITES	48	48	0
PLAYGROUND EQUIPMENT	1	1	0
SWIMMING BEACHES	0	0	0
VISITOR CENTER	0	0	0
WASH HOUSES	0	0	0
COVERED TABLES	4	4	0

FACILITY COMPARISONS - GENERAL DEAN RECREATION AREA

	EXISTING	WITH PROPOSED CHANGES	DIFFERENCE
AMPHITHEATERS	0	0	0
BATH HOUSES	0	0	0
BOAT RAMP LANES	1	1	0
CAMPSITES	0	0	0
CAMPSITE ELECTRICAL OUTLETS	0	0	0
CAMPSITE WATER/SEWER HOOKUPS	0	0	0
COMFORT STATIONS W/ MINI-SHOWERS	0	0	0
COMFORT STATIONS- VAULT	1	1	0
COMFORT STATIONS - WATER BORNE	0	0	0
DUMP STATIONS	0	0	0
FISH CLEANING STATIONS	0	0	0
FOUNTAINS/HYDRANTS	0	0	0
GROUP CAMP AREAS	0	0	0
PICNIC SHELTERS	0	0	0
PICNIC SITES	10	10	0
PLAYGROUND EQUIPMENT	0	0	0
SWIMMING BEACHES	0	0	0
VISITOR CENTER	0	0	0
WASH HOUSES	0	0	0

FACILITY COMPARISONS - EAST SPILLWAY RECREATION AREA

	EXISTING	WITH PROPOSED CHANGES	DIFFERENCE
AMPHITHEATERS	0	0	0
BATH HOUSES	0	0	0
BOAT RAMP LANES	0	0	0
CAMPSITES	0	15	+15
CAMPSITE ELECTRICAL OUTLETS	0	0	0
CAMPSITE WATER/SEWER HOOKUPS	0	0	0
COMFORT STATIONS W/ MINI-SHOWERS	0	0	0
COMFORT STATIONS- VAULT	2	2	0
COMFORT STATIONS - WATER BORNE	2	1	-1
DUMP STATIONS	0	0	0
FISH CLEANING STATIONS	1	1	0
FOUNTAINS/HYDRANTS	5	5	0
GROUP CAMP AREAS	0	0	0
PICNIC SHELTERS	1	1	0
PICNIC SITES	46	31	-15
PLAYGROUND EQUIPMENT	1	1	0
SWIMMING BEACHES	0	0	0
VISITOR CENTER	0	0	0
WASH HOUSES	0	0	0
COVERED TABLES	3	3	0

FACILITY COMPARISONS - DAM EAST RECREATION AREA

	EXISTING	WITH PROPOSED CHANGES	DIFFERENCE
AMPHITHEATERS	0	0	0
BATH HOUSES	0	0	0
BOAT RAMP LANES	5	6	+1
CAMPSITES	66	66	0
CAMPSITE ELECTRICAL OUTLETS	25	42	+17
CAMPSITE WATER/SEWER HOOKUPS	0	0	0
COMFORT STATIONS W/ MINI-SHOWERS	1	0	-1
COMFORT STATIONS- VAULT	3	2	-1
COMFORT STATIONS - WATER BORNE	2	2	0
DUMP STATIONS	1	1	0
FISH CLEANING STATIONS	0	0	0
FOUNTAINS/HYDRANTS	8	8	0
GROUP CAMP AREAS	5	5	0
PICNIC SHELTERS	4	5	+1
PICNIC SITES	57	57	0
PLAYGROUND EQUIPMENT	2	2	0
SWIMMING BEACHES	1	1	0
VISITOR CENTER	0	0	0
WASH HOUSES	0	1	+1

FACILITY COMPARISONS - KEYESPORT RECREATION AREA

	EXISTING	WITH PROPOSED CHANGES	DIFFERENCE
AMPHITHEATERS	0	0	0
BATH HOUSES	0	0	0
BOAT RAMP LANES	4	4	0
CAMPSITES	0	0	0
CAMPSITE ELECTRICAL OUTLETS	0	0	0
CAMPSITE WATER/SEWER HOOKUPS	0	0	0
COMFORT STATIONS W/ MINI-SHOWERS	0	0	0
COMFORT STATIONS- VAULT	0	0	0
COMFORT STATIONS - WATER BORNE	1	1	0
DUMP STATIONS	0	0	0
FISH CLEANING STATIONS	1	1	0
FOUNTAINS/HYDRANTS	3	3	0
GROUP CAMP AREAS	0	0	0
PICNIC SHELTERS	1	1	0
PICNIC SITES	19	19	0
PLAYGROUND EQUIPMENT	1	1	0
SWIMMING BEACHES	1	1	0
VISITOR CENTER	0	0	0
WASH HOUSES	0	0	0
COVERED TABLES	4	4	0

FACILITY COMPARISONS - COLES CREEK RECREATION AREA

	EXISTING	WITH PROPOSED CHANGES	DIFFERENCE
AMPHITHEATERS	1	1	0
BATH HOUSES	1	1	0
BOAT RAMP LANES	5	5	0
CAMPSITES	148	148	0
CAMPSITE ELECTRICAL OUTLETS	148	148	0
CAMPSITE WATER/SEWER HOOKUPS	0	17	+17
COMFORT STATIONS W/ MINI-SHOWERS	0	1	+1
COMFORT STATIONS- VAULT	3	1	-2
COMFORT STATIONS - WATER BORNE	8	8	0
DUMP STATIONS	1	1	0
FISH CLEANING STATIONS	1	1	0
FOUNTAINS/HYDRANTS	15	15	0
GROUP CAMP AREAS	1	1	0
PICNIC SHELTERS	4	4	0
PICNIC SITES	42	42	0
PLAYGROUND EQUIPMENT	4	4	0
SWIMMING BEACHES	1	1	0
VISITOR CENTER	0	0	0
WASH HOUSES	1	2	+1

FACILITY COMPARISONS - BOULDER RECREATION AREA

	EXISTING	WITH PROPOSED CHANGES	DIFFERENCE
AMPHITHEATERS	1	1	0
BATH HOUSES	0	0	0
BOAT RAMP LANES	4	4	0
CAMPSITES	90	90	0
CAMPSITE ELECTRICAL OUTLETS	77	77	0
CAMPSITE WATER/SEWER HOOKUPS	0	13	+13
COMFORT STATIONS W/ MINI-SHOWERS	0	0	0
COMFORT STATIONS- VAULT	0	0	0
COMFORT STATIONS - WATER BORNE	5	4	-1
DUMP STATIONS	1	1	0
FISH CLEANING STATIONS	1	1	0
FOUNTAINS/HYDRANTS	7	7	0
GROUP CAMP AREAS	0	0	0
PICNIC SHELTERS	1	1	0
PICNIC SITES	30	30	0
PLAYGROUND EQUIPMENT	2	2	0
SWIMMING BEACHES	0	0	0
VISITOR CENTER	0	0	0
WASH HOUSES	1	1	0

FACILITY COMPARISONS - ALL AREAS

	EXISTING	WITH PROPOSED CHANGES	DIFFERENCE
AMPHITHEATERS	3	4	+1
BATH HOUSES	2	2	0
BOAT RAMP LANES	23	24	+1
CAMPSITES	422	437	+15
CAMPSITE ELECTRICAL OUTLETS	363	380	+17
CAMPSITE WATER/SEWER HOOKUPS	0	68	+68
COMFORT STATIONS W/ MINI-SHOWERS	2	3	+1
COMFORT STATIONS- VAULT	13	8	-5
COMFORT STATIONS - WATER BORNE	25	20	-5
DUMP STATIONS	4	4	0
FISH CLEANING STATIONS	6	6	0
FOUNTAINS/HYDRANTS	57	57	0
GROUP CAMP AREAS	6	6	0
PICNIC SHELTERS	14	16	+2
PICNIC SITES	345	330	-15
PLAYGROUND EQUIPMENT	15	15	0
SWIMMING BEACHES	4	4	0
VISITOR CENTER	1	1	0
WASH HOUSES	3	5	+2
COVERED TABLES	12	12	0

FACILITY COST ANALYSIS

VII. FACILITIES COST ANALYSIS

REPLACEMENT ITEMS

PROPOSED REHAB/ REPLACEMENT	INITIAL COST REPLACEMENT	*30 YEAR COST	O&M COSTS	ADDITIONAL REVENUE	TOTAL COSTS	INITIAL COST REHAB	30 YEAR COST	O&M COSTS	TOTAL COST	RECOMMENDED OPTION
Dam West Spillway Comfort Stations 1&2	50,000	125,500	60,000		189,000	60,000	154,000	120,000	274,000	189,000
Dam East Spillway Comfort Stations 1&2	50,000	125,500	60,000		189,000	60,000	154,000	120,000	274,000	189,000
McNair-Cnsldt Bath Hse Rehab CS..2,3 & Shwr	300,000	753,150	90,000	540,000	322,000	90,000	232,000	180,000	412,000	322,000
Boulder Day Use Comfort Stations 1&2	40,000	100,000	60,000		160,000	60,000	154,000	120,000	274,000	163,000
Lotus - Replace Shelters	30,000	75,300	30,000		105,300	15000	37,650	180000	217,650	105,300

NEW ITEMS

PROPOSED CONSTRUCTION	INITIAL COST REPLACEMENT	*ANNUAL COST	ANNUAL O&M	YEARLY REVENUE	BENEFIT/ COST RATIO	YEARS PAYBACK
Dam West Day Use Construct Picnic Shelter	30,000	2,510	1,000	4,200	1.2	25
Dam East Boat Ramp Construct Picnic Shelter	30,000	2,510	1,000	4,200	1.2	25
Dam West-Water/Sewer 39 Sites	39,000	3,260	1,000	16,700	3.9	7.65
East Spillway - Picnic Sites to Campsites	1500	125	1000	7560	6.7	4.4
McNair - Picnic Sites tp RV Campsites	94675	7922	1000	21420	2.4	12.5
Boulder-Water/Sewer 13 Sites	13,000	1,090	500	5,600	3.5	8.5
Lotus Electrical	15600	1305	1,500	10080	3.6	8.34

*7.375%

APPENDICIES

APPENDIX A
SAMPLE FACILITY INVENTORY FORM

MAJOR MAINTENANCE AND REPLACEMENT PROGRAM
FOR CARLYLE LAKE
INVENTORY

Date:_____ Inspector:_____

1. Location (Area or Park):_____

2. Item Name:_____

_____

2(a). Subitem:_____

_____

2(b). Dimensions:_____

_____

_____

3. Date Constructed:_____

3(a) Date of last major maintenance:_____

3(b) Nature of maintenance:_____

_____

3(c) Source of information:_____

_____

4. Service Life (From ER 37-2-10)_____

5. Projected Replacement Year_____

6. Condition Index (0-100):_____

7. Visual Inspection Result:_____

8. Replacement Cost:_____

NOTES:_____

_____

_____

MAJOR MAINTENANCE AND REPLACEMENT PROGRAM
FOR CARLYLE LAKE
INVENTORY

Guidance for filling out inventory sheets for major maintenance and replacement program at Carlyle Lake:

1. Location: Park name or general area

2. Items: General Item: (i.e. sidewalk, grill picnic table, culvert water fountain, lift station, electric line, camping pad)

2(a) Sub-Item: This will include any portions of the general items (i.e. pumps in pump station, pumps in lift stations, roofs, air conditioning units, carpet, etc.). All items must be inventoried individually.

2(c) Dimensions: This may include a variety of things (i.e. measurements of a structure, measurements of a parking lot, roof, or shower partition). This will not be applicable to all items.

3. Date Constructed: Year; If estimated note on inspection sheet. This will be the most time consuming portion of the entire project. It will be necessary to look at old contracts, files, workplans and to inquire to staff who have been working at the project for several years. Many items will probably have to be estimated.

3(a) Date of last major maintenance: This will include year of last major maintenance (i.e. re-paving of roads, paving of parking lots, replacement of parking blocks, etc.) This item will not be applicable in all cases.

3(b) Nature of maintenance: (i.e. re-paving of roads, paving of parking lots, replacement of parking blocks, etc.)

3(c) Source of Information: This will include where or who the information was obtained from (i.e. Replacement Contract, Roads Maintenance Schedule, Joe Leuke, etc.)

4. Service Life: We will assign a service life to each item after the initial inventory is compiled, using ER 37-2-10.

5. Projected Replacement: This will be the estimated replacement year. It will be determined by researching date constructed, determining service life and then by factoring in the condition index and visual inspection results.

APPENDIX B
SAMPLE FACILITY DATA REPORT

COLES CREEK DAY USE - FACILITIES TO BE ANALYZED

LOCA SUBLOCATIO	ITEM	ITEM SUBITEM	CONSTRDATE	LASTMAINT	INTERMAINT	LIFE REPLCEYR	COND	VISUAL REPLC A NOTES
CCC COMFORT STATION 7	COMFORT STATION	LIGHTS - INTERIOR	06/06/1984	/ /		15 06/06/1999	80	GOOD
CCC COMFORT STATION 7	COMFORT STATION	LIGHTS - EXTERIOR	06/06/1984	/ /		15 06/06/1999	80	GOOD
CCC COMFORT STATION 7	COMFORT STATION	WATER HOLDING TANK	06/06/1972	/ /		50 06/06/2022	40	POOR NOT FUNCTIONAL, DOOR TORN OFF
CCC COMFORT STATION 8	COMFORT STATION		06/06/1965	06/06/1994	PAINTED	20 06/06/2015	40	FAIR N PAINT PEELING, DOORS RUSTING —OVERALL
CCC COMFORT STATION 8	COMFORT STATION	ROOF - SHINGLED	06/06/1965	06/06/1970	REPLACED	20 06/06/1990	80	GOOD
CCC COMFORT STATION 8	COMFORT STATION	FLOOR - CONCRETE	06/06/1965	06/06/1994	PAINTED	50 06/06/2015	60	GOOD N CONCRETE BROKEN
CCC COMFORT STATION 8	COMFORT STATION	WINDOWS	06/06/1965	06/06/1994	PAINTED	50 06/06/2015	60	GOOD ONE WINDOW BUSTED, SCREENS BUSTED OUT
CCC COMFORT STATION 8	COMFORT STATION	BATHROOMS	06/06/1965	06/06/1972	CHANGED FROM PIT TO WATER	50 06/06/2015	60	FAIR N RUST ON DOORS
CCC COMFORT STATION 8	COMFORT STATION	TOILETS	06/06/1972	/ /		20 06/06/1992	60	GOOD N
CCC COMFORT STATION 8	COMFORT STATION	SINKS	06/06/1972	/ /		20 06/06/1992	70	GOOD SOME RUST
CCC COMFORT STATION 8	COMFORT STATION	PARTITIONS	06/06/1965	06/06/1994	PAINTED	20 06/06/1985	70	GOOD SOME RUST
CCC COMFORT STATION 8	COMFORT STATION	LIGHTS - INTERIOR	06/06/1984	/ /		15 06/06/1999	80	GOOD
CCC COMFORT STATION 8	COMFORT STATION	LIGHTS - EXTERIOR	06/06/1984	/ /		15 06/06/1999	80	GOOD
CCC COMFORT STATION 9	COMFORT STATION		06/06/1965	06/06/1994	PAINTED	50 06/06/2015	40	GOOD N —OVERALL
CCC COMFORT STATION 9	COMFORT STATION	ROOF - SHINGLED	06/06/1965	06/06/1970	REPLACED	20 06/06/1990	60	FAIR SOME SHINGLES COMING UP
CCC COMFORT STATION 9	COMFORT STATION	FLOOR - CONCRETE	06/06/1965	06/06/1994	PAINTED	50 06/06/2015	60	GOOD N
CCC COMFORT STATION 9	COMFORT STATION	WINDOWS	06/06/1965	06/06/1994	PAINTED	50 / /	60	FAIR
CCC COMFORT STATION 9	COMFORT STATION	BATHROOMS	06/06/1965	06/06/1972	CHANGED FROM PIT TO WATER	50 06/06/2015	50	GOOD N
CCC COMFORT STATION 9	COMFORT STATION	TOILETS	06/06/1972	/ /		20 06/06/1992	50	GOOD N
CCC COMFORT STATION 9	COMFORT STATION	SINKS	06/06/1972	/ /		20 06/06/1992	80	GOOD
CCC COMFORT STATION 9	COMFORT STATION	PARTITIONS	06/06/1965	06/06/1994	PAINTED	20 06/06/1985	80	GOOD
CCC COMFORT STATION 9	COMFORT STATION	LIGHTS - INTERIOR	06/06/1984	/ /		15 06/06/1999	80	GOOD
CCC COMFORT STATION 9	COMFORT STATION	LIGHTS - EXTERIOR	06/06/1984	/ /		15 06/06/1999	80	GOOD
CCC	CULVERT - METAL	13	06/06/1965	/ /		25 06/06/1990	80	GOOD
CCC	DUMPSTER PAD	10	06/06/1982	/ /		25 06/06/2007	60	GOOD SOME CRACKING

COMFORT STATION 8

COMFORT STATION 9

APPENDIX C
WASTEWATER FEASIBILITY STUDY

WASTEWATER FEASIBILITY STUDY

AT

BOULDER ACCESS RECREATIONAL AREA

CARLYLE LAKE
KASKASKIA RIVER, ILLINOIS
CLINTON COUNTY, ILLINOIS

Revised Feb1, 1996

DECEMBER 1995

CARLYLE LAKE ILLINOIS
WASTEWATER FEASIBILITY STUDY
BOULDER ACCESS RECREATIONAL AREA

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CARLYLE LAKE
WASTEWATER FEASIBILITY STUDY
BOULDER ACCESS RECREATIONAL AREAS

LIST OF TABLES

WASTEWATER TREATMENT ALTERNATIVE ANALYSIS

FOR BOULDER RECREATIONAL AREA

1. INTRODUCTION

A wastewater feasibility study was completed in September 1989 for both Coles Creek and Boulder Access Recreational Areas. The recommendations resulting from this study were to construct a wastewater land treatment system near Coles Creek recreational area and pump the wastewater from Coles Creek to the land treatment system and to haul the wastewater from Boulder Access Area via septic truck to the land treatment system. Since 1989, the wastewater flows experienced at Boulder sewage treatment plant have increased by a factor of 4. In addition, the city of Carlyle has imposed additional fees on trucks hauling over their roads. Considering both of these factors, the feasibility of hauling the wastewater from Boulder to the land treatment system has been questioned. Consequently, the alternatives considered in the feasibility study have been re-examined to determine which alternative is now the most feasible.

2. ALTERNATIVE ANALYSIS

a. Alternative Development. Four alternative plans were considered from the original study. The alternatives are described below, along with their corresponding advantages and disadvantages.

1. Alternative I. Replace the existing treatment plant in kind.

The existing treatment plant has reached the end of its useful life. Currently, the system continues to operate with band-aid type maintenance. Replacement of this system will be required in the immediate future to continue providing wastewater treatment that complies with water quality standards. A new plant will be constructed in its place. The new plant will be a package sewage treatment plant with all the necessary treatment processes to comply with state standards. The design life of a package sewage treatment plant is 15 years. The project life is 50 years. Therefore, the treatment plant abandonment, removal, and replacement would occur four times during the project life. Table 6 shows the estimated project costs for this alternative.

Advantages:

1. Replacement in kind would be immediate.
2. No additional land is required.

Disadvantages:

1. High O&M costs.
2. Requires an NPDES permit.

2. Alternative II. Construct a land treatment system near Boulder Access Recreational Area.

This alternative consist of demolishing the existing sewage treatment plant and constructing a wastewater land treatment system near the recreational area. The surge basin at the existing treatment plant would be retained to collect the wastewater from the recreational area. The wastewater would then be pumped from the surge basin to the land treatment site. The current land treatment size has been sized for future growth in the Coles Creek recreational area. This size is comparable to the size required to treat Boulder Access areas wastewater flows. Therefore, under the current land treatment design no size modifications are required at this time to accept Boulders wastewater flows. However, when expansions does occur in Coles Creek, the land treatment system will require expansion. As a result, the costs for these modifications would be associated with this alternative, but they were not included at this time. If the cost for this alternative would have been more competitive against the other alternatives, these costs would have been generated and included.

Advantages:

1. Lower O&M costs.
2. Minimal pretreatment of wastewater required.
3. No NPDES permit required.

Disadvantages:

1. Land would have to be purchased increasing costs and delaying construction by a significant time period to acquire the land.

3. Alternative III. Pump the wastewater from Boulder to the land treatment site at Coles Creek.

This alternative consist of eliminating the sewage treatment plant at Boulder, except for the surge basin. Converting the surge basin into a lift station that would collect the wastewater from Boulder recreational area and pump it to the land treatment system near Coles Creek recreational area.

Advantages:

1. Minimal pretreatment of wastewater required.
2. No NPDES permit required.
3. Low O&M costs.

Disadvantages:

1. Long distances of pressure sewer pipe are required to transport the wastewater to the land treatment site increasing the potential of septic sewage at the point of discharge.
2. Larger or more pumps would be required to pump the long distance increasing power usage and costs.
3. Land would have to be purchased increasing costs and delaying construction time to acquire easements.
4. The pressure sewer alignment crosses two creeks requiring river crossing pipe increasing costs.

4. Alternative IV. Hauling waste from Boulder via septic tank truck to the land treatment site near Coles Creek recreational area.

This alternative would eliminate the sewage treatment plant at Boulder Access Area, except for the surge basin. The surge basin would be retained as a holding tank. Wastewater would be collected and stored in the surge basin. The wastewater would be pumped from the surge basin into a septic tank truck and hauled acrossed public roads to the land treatment site near Coles Creek recreational area.

Advantages:

1. Eliminates a sewage treatement plant that discharges to the lake.
2. No NPDES permit required.

Disadvantages:

1. Due to the increase in wastewater flows numerous trips would be required increasing cost and wear and tear on the roads traveled.
2. Availability/reliability of hauler to pump out at times that coincide with our fluctuating recreational flows.

3. ECONOMIC ANALYSIS

Construction and annual O&M costs were developed for each alternative plan. A present worth analysis using these costs were computed to give an accurate relative comparison between each of the alternative plans.

a. Interest rate used = 7 5/8%.
b. Inflation was not considered.
c. STP has no salvage value.
d. Existing treatment plant design life = 25 years.
e. Land treatment system design life = 15 years.
f. Annual O&M was considered uniform.

The most economical and engineeringly feasible alternative plan was selected based on the present worth cost of each plan and its corresponding advantages and disadvantages.

4. SUMMARY AND RECOMMENDATIONS

a. Summary. This analysis re-examined the alternative treatment systems that would reduce the overall costs for wastewater treatment at Boulder Access Area. Table 8 summarizes the estimated project costs for the alternatives considered.

b. Recommendations. Alternative I is the recommended plan based on the following reasons: 1) Alternative I has the lowest total project cost for a 50 year design life; and 2) no real estate acquisition required, consequently design and construction could proceed immediately.

TABLE 1

BOULDER TREATMENT PLANT WASTEWATER FLOWS, GAL/MO

MONTH	1988	1993	1994	1995
MARCH	33,096	53,591	271,713	-------
APRIL	64,638	203,896	656,954	264,049
MAY	37,513	330,163	1,225,396	260,740
JUNE	24,577	290,585	627,151	272,900
JULY	21,035	316,310	603,848	284,578
AUGUST	18,459	275,253	569,948	314,290
SEPTEMBER	18,781	179,023	227,188	342,202
OCTOBER	5,292	262,314	53,359	175,033
WASTEWATER (WW) (GAL/YR)	223,391	1,911,135	4,235,557	1,913,792
WATER SUPPLY (WS) (GAL/YR)	NA	2,446,600	1,359,900	1,717,300
WW/WS X 100	---	78%	311%	111%

Increase of wastewater flow since 1989 feasibility study:

% Flow Increase = (1,913,792/223,391)(gal/yr)(100) = 857%

NOTES:

1. Wastewater flows are approximately 75% of the water supply flow. However, other factors can cause this percent to vary. Wastewater flows for 1994 are in an extreme excess of the water supply flows. A pipe line break was identified that year that attributed to excessive infiltration.

2. Wastewater flows for 1995 are greater than the water supply flow. This difference is attributed to receiving new wastewater flows from the marina in 1995, but not distributing any water to the facility, plus any infilitration experienced. Therefore, the wastewater flows experienced for 1995 reflect an accurate account of the wastewater generated from the recreational area.

3. The increased wastewater flows from 1988 to 1993 is attributed to upgrading the campsites at Boulder with electric service, consequently increasing the visitation. In addition, in 1995 increased wastewater flows from the marina were experienced.

TABLE 2

OPERATION AND MAINTENANCE COSTS OF EXISTING TREATMENT PLANT

ANNUAL OPERATION AND MAINTENANCE

Power	$6100
Repair Costs	1000
Contract Labor	6345
Water	450
Sludge Disposal	200
SUBTOTAL	$14,095
8% ADMINISTRATION	1,128
TOTAL ANNUAL O&M	$15,223

NOTE: Operation and maintenance costs compiled from data provided from Carlyle Lake administration and contract labor records.

TABLE 3

OPERATION AND MAINTENANCE COSTS OF PROPOSED LAND TREATMENT SYSTEM

ANNUAL OPERATION AND MAINTENANCE

Power	$1200
Repair Costs	100
Contract Labor	2500
Material/Supplies	200
Water	200
Mowing	3900
SUBTOTAL	$8,100
8% ADMINISTRATION	650
TOTAL ANNUAL O&M	$8,750

NOTE: Operation and maintenance costs were compiled from data provided from lake resident offices.

TABLE 4

OPERATION AND MAINTENANCE COSTS OF PROPOSED PRESSURE SEWER SYSTEM

ANNUAL OPERATION AND MAINTENANCE

Power	$1200
Repairs	100
Contract Labor	2500
Subtotal	$3800
8% Administration	304
TOTAL ANNUAL O&M	$4104

TABLE 5

OPERATION AND MAINTENANCE COSTS OF PROPOSED WASTE HAULING

ANNUAL OPERATION AND MAINTENANCE

Power	$2033
Repairs	333
Contract Labor	2115
Water	150
Sludge Disposal	67
Hauling Costs	63195
Subtotoal	$67,893
8% Administration	5,431
Total Costs	$73,324

Note: Operation and maintenance costs were assumed to be approximately 1/3 of current STP O&M costs.

TABLE 6

COST ANALYSIS - ALTERNATIVE I
(Replacement in Kind)

ITEM DESCRIPTION	PRESENT WORTH COST
New package treatment plant, 1996	$175,000
Demolition of old plant, 1996	35,000
New package treatment plant, 2011	58,100 *
Demolition of old plant, 2011	11,620 **
New package treatment plant, 2026	19,250 ***
Demolition of old plant, 2026	3,850 ****
New package treatment plant, 2041	6,475 *****
SUBTOTAL	$309,295
25% Contingencies	77,324
	$386,619
12% E&D	46,394
8% S&A	30,930
SUBTOTAL	$463,943
O&M	193,941 ******
TOTAL	$657,884

NOTE: PRESENT WORTH COST CALCULATIONS USING STANDARD FORMULAS FOR SINGLE PAYMENT PRESENT WORTH FACTORS.

* Sewage Treatment Plant (STP), 2011 = ($165,000)(P/F,7 5/8,15)
= $58,100

** Demolition of old STP, 2011 = ($35,000)(P/F,7 5/8,15)
= $11,620

*** STP, 2026 = ($165,000)(P/F,7 5/8,30)
= $19,250

**** Demolition of old STP, 2026 = ($35,000)(P/F,7 5/8,30)
= $3,850

***** STP, 2041 = ($165,000)(P/F,7 5/8,45)
= $6,475

Assume any salvage value would equal the cost of removing and shipping STP in 2041. On all STP demolition/removal projects to date, no salvage value has ever been obtained. Contractors have attempted to obtain salvage value, but could never find an interested party.

UNIFORM SERIES COST CALCULATIONS USING STANDARD FORMULAS FOR SINGLE PAYMENT UNIFORM SERIES FACTORS.

****** Operation and Maintenance, O&M = ($15,223)(P/A,7 5/8,50)
= $193,941

TABLE 7

PRESENT WORTH CONSTRUCTION COST ESTIMATE

CONSTRUCTION COSTS

ITEM	UNIT	UNIT COST	ALTERNATIVE PLANS II	III	IV
Clear & Grub	acre	$1500	$7500	$9000	----
Earthwork	SJ	-----	53600	----	----
Crush Stone (6"-)	ton	24.30	12462	----	----
Crush Stone CA-10	ton	26.20	9313	----	----
Geotextile	SJ	-----	3350	----	----
Est. of Turf	SJ	-----	2100	2560	500
STP Demolition	SJ	-----	30000	30000	30000
PVC Water Line	LF	15.00	22500	----	----
WW Irrigation Sys	SJ	-----	68750	----	----
Chain Link Fence	LF	15.00	18000	3000	3000
Operator's Bldg	SF	208.00	30000	----	----
4" PVC Pres Sewer	LF	15.00	30000	376800	----
4" HDPE PresSewer	LF	30.00	27750	----	----
4" PVC Grav Sewer	LF	20.00	1000	----	----
8" DIP Grav Sewer	LF	50.00	6000	----	----
4" Jack & Bore	LF	200.00	----	30000	----
Anitbouyancy Wts.	EA	100.00	----	9000	----
Lift Stations	SJ	35000.00	35000	105000	----
Air/Vacuum Valve	EA	2500.00	5000	75000	----
Pressure Gauges	EA	1500.00	----	6000	----
Electrical Work	SJ	-----	50000	50000	----
Real Estate	acre	2000.00	34000	10800	----
Vault Waste Tank	SJ	-----	----	----	30000
Subtotal			$446,325	$707,160	$63,500
25% Contingencies			111,581	176,790	15,875
Total Est Const Cost			$557,906	$883,950	$79,375
12% E&D			66,949	106,074	9,525
8% S&A			44,633	70,716	6,350
Subtotal			$669,488	$1,060,740	$95,250
O&M Costs			111,475	52,285	934,148
TOTAL EST PROJECT COSTS			$780,963	$1,113,025	$1,029,398

TABLE 8

ALTERNATIVE COST SUMMARY

Alt. No.	Construction Cost ($)	E&D ($)	S&A ($)	O&M ($)	Total Project ($)
I	386,619	46,394	30,930	193,941	657,884
II	557,906	66,949	44,633	111,475	780,963
III	883,950	106,074	70,716	52,285	1,113,025
IV	79,375	9,525	6,350	934,148	1,029,398

APPENDIX D
PUMP STATION AUTOMATION STUDY

CARLYLE LAKE
PUMP STATION AUTOMATION STUDY

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CARLYLE LAKE
PUMP STATION AUTOMATION STUDY

1. SCOPE

This study describes a plan for automating the three pump stations at Carlyle Lake and provides estimated costs for implementing the plan.

2. BACKGROUND

a. Saddle Dam No. 2 Pump Station. This pump station is the largest station at Carlyle with a capacity of 58 cfs. This station has three 18-inch vertical stormwater pumps, each driven by a 100 hp electric motor. Each pump has a manually operated grease lubricator for the pump bearings. The pump station has a 5 hp sump dewatering pump, a manually operated, 3 ton overhead bridge crane, roof ventilator, dehumidifier and pneumatic actuated siphon breakers.

b. Keyesport Pump Station. This pump station is the second largest station with a capacity of 36 cfs. The station has three 16-inch vertical stormwater pumps, each driven by a 60 hp electric motor. This station is the only one of the three with the inlet facing north. An air bubbler system is used to keep ice from forming in the sump. Each pump has a manually operated grease lubricator for the pump bearings. The pump station has a 20 hp sump dewatering pump, a manually operated, 1 ton overhead bridge crane, roof ventilator, dehumidifier and pneumatic actuated siphon breakers.

c. Saddle Dam No. 3 Pump Station. This pump station is the smallest station with a capacity of 24 cfs. The station has two 12 inch vertical stormwater pumps, each driven by a 40 hp electric motor. This station is the only one of the three that has a gravity drain. Each pump has a manually operated grease lubricator for the pump bearings. The pump station has a 3/4 hp sump dewatering pump, a manually operated, 1 ton overhead bridge crane, roof ventilator, dehumidifier and pneumatic actuated siphon breakers. The 36-inch gravity drain has a cast iron sluice gate and manually operated gate hoist.

3. GENERAL AUTOMATION PLAN

a. Automating the three pump stations involves replacement of some equipment, rehabilitation of other equipment, and the installation of new equipment. What follows is a general description of required items to automate the three pump stations, optional equipment or work items for increasing safety and reliability when automated, and items to reduce operating

costs. A detailed description of the mechanical and electrical work is included after the general plan.

b. Required Features. All three pump stations require some new equipment to operate automatically. Because of their age, the existing motor control centers need replacement. The existing motor starters are roughly 35 years old and were not designed for automatic starting. A programmable logic control (PLC) system will be required to control the automatic starting and stopping of the stormwater pump motors. All other associated equipment such as new automatic lubricators, a new ventilation fan, electric actuated air intake louvers, and new siphon breaker valves will also be controlled by the PLC system. A water level sensing system will be installed to monitor the water levels inside the sump and outside the trash rack. The water levels will be used by the PLC system to start and stop the pumps. Alarms generated by any of the equipment, such as lubricator alarms, electrical fault alarms, or equipment failure will cause the PLC system to start an automatic telephone dialer calling the appropriate personnel, notifying them of the problem. At least two new telephone lines will be installed at each pump station: one for voice communications and one for data communications by the autodialer. Because of the new electrical equipment, the existing lighting panelboards will have to be replaced with ones including more circuits. The existing ten-circuit lighting panelboards contain only one spare circuit. Finally, a lightning protection and transient voltage surge suppression system will need to be installed at each pump station to protect the new electronic equipment.

c. Optional Features. The three pump stations are roughly 35 years old and all should be rehabilitated, including the 20 hp sump pump at Keyesport Pump Station. Automation will not give an operator the opportunity to monitor problems the pumps may exhibit while running. Rehabilitating the pumps will decrease the chance of problems developing while operating without an operator present. The scope of the pump rehabilitation is described below. Likewise, the motors for each pump should also be rehabilitated as described below. At Saddle Dam No. 3 Pump Station, the gravity drain gate could be automated to reduce the amount of pumping required at the pump station. While not strictly required, certain safety features could be added to each station. These include: audio and visual warning alarms to notify anyone in the vicinity of the station that pumping is about to begin; temperature monitors used to notify personnel, via the autodialer, that excessive heat has built up inside the station; and smoke/heat detectors to notify personnel, also via the autodialer, that a potential fire exists.

d. Operating Costs. There are at least four optional items that could be considered to reduce operating costs. The first is the combination of the two electrical services at each of Saddle

Dam No. 2 and Keyesport Pump Stations. Currently the single-phase, 120/240 volt, service is metered by the utility company separately from the three-phase service. The cost of the single-phase service would be reduced due to the lower rates per kilowatt-hour for three-phase power. A small single-phase transformer would have to be installed inside the station similar to that at Saddle Dam No. 3 Pump Station. The second item is to convert the air compressor controls for the bubbler system at Keyesport Pump Station to operate based on sump air temperature rather than on time. The air compressor currently operates with a timer and needlessly increases the cost of the single-phase utility bill. The third item is to use the sump pump at Keyesport Pump Station as a baseflow pump. Because of its size, the baseflow pump could reduce larger stormwater pump usage, thereby reducing operating costs. Finally, the gravity drain gate at Saddle Dam No. 3 Pump Station could be automated, thus reducing pumping. The gate would automatically open based either on lake levels or the water level outside the gravity drain. Pumping would take place only when rising water levels cause the gate to automatically close.

4. MECHANICAL EQUIPMENT. There is mechanical equipment in the stations that must be replaced if the operation of the pump stations is automated. In addition, there is mechanical equipment that, if replaced or rehabilitated, will increase the reliability of the pump stations and automated control of the stations.

a. Required Equipment Replacement. Following is a description of the equipment that requires replacement to automate the pump station:

(1) Lubricators. The existing manual grease lubricator for each pump will be replaced with an automatic, electric powered grease lubricator. The lubricators would be similar to those in all pump stations constructed or rehabilitated by the St. Louis District since 1975. The lubricator controls would be provided with a fault alarm (activated if various components of the lubricator fail) and a low lubricant reservoir level alarm.

(2) Louvers. Each pump station has two windows that need replacement with automatically controlled, electric actuated louvers. Each pump station's overhead ventilator will be automatically operated if the temperature inside the station exceeds a preset level during station operation. The louvers must insure a supply of fresh air for ventilation. The louvers will be a combination of fixed blades and adjustable blades constructed of aluminum. This design will insure maximum weather protection.

(3) Roof Ventilators. Each of the 35 year old roof ventilators is sealed from inside the pump station when the ventilator is not required. The ventilators are started manually by using a wall mounted switch. The ventilators must be operated automatically to insure that dangerous temperatures inside the pump station do not occur. In addition, the wooden door will need to be removed and an automatic gravity operated damper added underneath the ventilator. It is therefore recommended that the entire ventilator be replaced with a gravity damper installed integral to the ventilator assembly.

(4) Siphon Breakers. The existing siphon breaker valves are operated by a pneumatic actuator through an electric solenoid valve. The pneumatic actuator is supplied with air by an air compressor located in the siphon breaker enclosure. The compressor is manually started when the pump station is put into operation. This is different from the system originally installed at these stations. The original system used an electric solenoid operated valve to break the siphon developed through the discharge pipes. At other stations, these solenoids could not develop enough force to open the valves against the suction pressures encountered. As part of recent projects for the East St. Louis Flood Protection Rehabilitation Project and the Palmer Creek Pump Station Addition, the St. Louis District has been installing motorized butterfly valves instead of solenoid operated valves. The motors on these valves can develop much higher torques that will operate the valves at any suction pressure. In addition, the units have been supplied with a backup system that will open the valve during an electric power failure at the pump station. These valves can be automatically controlled by the pump control system to operate whenever a pump is shutdown. This system, controlled automatically from the pump control system, would be the most reliable means of insuring that the siphon breaker system operates automatically.

b. Optional Equipment Rehabilitation/Replacement. Following is a description of the equipment that, while not required to be replaced to automate the pump stations, is recommended for rehabilitation/replacement.

(1) Stormwater Pumps. Each of the 35 year old stormwater pumps should be rehabilitated to reduce pump failures while operating automatically. The scope of the rehabilitation will include new bearings, pump shaft and enclosing tube, epoxy metal repair of the suction and discharge bowls, remachining of flange fits, inspection of line shafts, balancing the impeller and painting of all pump surfaces with coal tar epoxy. This is typical of the scope of work used during the final stages of the East St. Louis Flood Protection Rehabilitation project. The only other repair that could be required is replacement/repair of any cracked castings or damaged line shafts.

(2) Saddle Dam No. 3 Gravity Drain. The 36-inch gravity drain sluice gate is presently operated using a manual gear hoist. The gate is closed at required high lake levels and, when closed, requires all inflow to be pumped. The existing gate hoist should be replaced by an electric hoist that would automatically operate according to lake levels as discussed in Paragraph 5b.(2) below. The existing gate stem, stem guides and thrust block would also be replaced and the gate slide, guides and frame cleaned, inspected and painted. This is similar to the sluice gates repaired for the East St. Louis Flood Protection Rehabilitation Project.

5. ELECTRICAL EQUIPMENT. Most of the electrical equipment in the stations must be replaced if the operation of the pump stations is automated. The mechanical equipment replaced will also require electrical interconnection for automation.

a. Required Equipment Replacement. Following is a description of the equipment that requires replacement to automate the pump stations:

(1) Motor Control Centers. The existing motor control centers (MCC) will be replaced with modern ones that use combination circuit breakers and starters. The existing motor controllers use air circuit breakers that are not easily modified to operate automatically. In addition, the existing air circuit breakers are obsolete and replacement parts are no longer available. The new MCC would be provided with a full compliment of indicators and hardwired manual controls for manual operation. These include voltage and current meters for each motor in addition to voltage and current meters for the main power into the MCC. Each starter would be provided with manual start and stop pushbuttons, an automatic/manual selector switch, a keyed water level bypass switch, elapsed time meter, indicating lights for motor running, motor stopped, lubricator alarms, siphon breaker valve status, pump required status, trash rack blocked, and power fault indication. The starters would be designed to operate the pumps either manually or automatically through the programmable logic controller described below.

(2) Programmable Logic Controller. A new programmable logic controller (PLC) at each station will serve as the primary means of automating the pump operation at each station. With the PLC, there will be three modes of operation: hardwired emergency mode in case the PLC fails, a manual mode for operating the station locally using the PLC, and a fully automatic mode for operating the station using the PLC without anyone present. The PLC system will consist of a small controller unit mounted in a modular rack. Also mounted in the rack would be input and output modules for control of the electrical equipment in the station. The input modules would accept signals such as the start and stop pushbuttons, lubricator functioning, siphon breaker valve

energized, and so forth. The output modules would generate signals to start or stop motors, turn indicating lights on or off, display water levels, force the autodialer to telephone someone, and so forth. All of these functions would be controlled by the main controller unit that executes the logic specifically written to control all equipment at each pump station. The logic would be written using either a laptop or desktop personal computer. The PLC components would be housed in a small wall-mounted enclosure.

Note that the capability to remotely monitor or operate the pump stations was considered beyond the scope of this study. However, the type of equipment used to automate the stations allows remote monitoring and operation to be added in the future.

(3) Water Level Sensors. Automation of the stations requires a reliable water level sensing system. The proposed water level sensors are similar to the ones currently in use at Locks 27 and Melvin Price Locks and Dam. These sensors are pressure transmitters that produce a 4-20 mA current signal proportional to the pressure at which they are submerged in water. For reliability, two sensors would monitor the sump water level and two sensors would monitor the water level immediately outside the trash rack. Each sensor of each pair would serve as a check on the other sensor. If either sensor did not provide the correct water level within tolerance, the PLC would indicate a sensor malfunction locally at the station and would also notify personnel via the autodialer. The sensors outside the trash rack would indicate a trash blockage by sensing a higher water level than inside the sump. Again, the PLC would indicate a blocked trash rack locally inside the station and would also notify personnel via the autodialer. The sensors inside the sump would be used to start and stop each pump at different water levels. The water levels would be written into the control logic and could easily be changed as needed. For testing purposes, a keyed switch may be provided that will bypass the normal start levels and allow the pumps to be operated at any water level.

(4) Automatic Telephone Dialer. An automatic telephone dialer (autodialer) will be provided at each station to notify Corps personnel of any malfunction or alarm at the station that requires attention. These include such events as failure of a pump to start or stop, lubricator alarm or failure, water level sensor failure, trash rack blockage, power fault or failure, PLC fault or failure, and so forth. The autodialer will include enough inputs to handle all alarms or conditions that require notification, be capable of dialing many telephone numbers in any prescribed sequence, and be provided with a back-up battery so that it can make calls during a power failure. One normal telephone line will be installed at each station for the autodialer. A second telephone line for voice communication is recommended for each station.

(5) Lightning and Surge Protection. A lightning protection and transient voltage surge suppression (TVSS) system is required at each station. Electronic systems of the type required to automate the stations do not survive electrical storms without damage. The proposed lightning protection system consists of an early streamer emission device mounted on the roof of the station, either pole-mounted, or directly to the roof, with dual down conductors routed to ground grids consisting of three ground rods each. Similar systems have been installed at other Corps projects in the St. Louis District. This system requires the fewest components and is the easiest to install, especially on existing structures. TVSS panel protection units will be provided for the 120/240 volt service at each station. These units protect against damaging over-voltages and can be mounted adjacent to the lighting panelboard. The PLC system will have its own TVSS unit for protection. The telephone lines will also be protected against surges and transient voltages.

(6) Lighting Panelboard. The existing lighting panelboards in each station are limited to ten circuits. Installation of new electrical equipment requires that the panelboards be replaced with new ones containing more circuits. TVSS units will be installed with each panelboard.

(7) Mechanical Equipment. The lubricators, louvers, roof ventilators, and siphon breakers described above will require power and control connections. Power loads for all of this equipment can be powered directly from the new lighting panelboard. The equipment will be manually or automatically controllable through small wall or unit-mounted starters.

b. Optional Equipment and Rehabilitation.

(1) Motors. Each of the stormwater pump motors should be rehabilitated to reduce the chance of failure during operation. The scope of the rehabilitation will include a complete rewind of each motor, replacement of all bearings, addition of winding heaters, painting, and testing. The sump pump motor at Keyesport Pump Station would also be rehabilitated under this option.

(2) Gate Operator. The gravity drain gate operator at Saddle Dam No. 3 Pump Station would require electrical control and power if automated. Gate operators are typically provided with modular control packages that are self contained and eliminate the need for outside controllers. However, if the gate were automated, the status of the gate, whether open or closed, would be sent back to the station so that the PLC could monitor the gate position. With the water levels, the PLC would use this information to determine when to start the pumps and also to know when to signal the gate to open or close. Two additional water level sensors, for a total of six at this station, would be

installed on the outlet side of the gravity drain to monitor water level. Optionally, the lake level could be monitored and sent back to the station to serve the same purpose. The existing lake monitoring equipment may be useable for this purpose.

(3) Combined Utility Services. Saddle Dam No. 3 Pump Station is the only station that has a single three-phase utility service. The other two stations have separate single-phase and three-phase services. The single-phase energy charge for Saddle Dam No. 2 Pump Station is currently 11.2 cents per kilowatt-hour (kwh) for the first 2,000 kwh per month. The peak monthly energy usage at this station has exceeded 2,000 kwh per month only once in the last five years (see Appendix B) so there is rarely an opportunity to take advantage of the lower rate of 6.35 cents per kwh for higher energy usage. The three-phase energy charge is currently 7.3 cents per kwh for the first 100,000 kwh per month. Because the cost of single-phase power is substantially higher than three-phase power, the single-phase service could be combined with the three-phase service at both Saddle Dam No. 2 and Keyesport Pump Stations to reduce operating costs.

Note that the high utility costs at Saddle Dam No. 2 Pump Station are the result of the demand charge (see Appendix B). The demand is the peak energy usage for any 15 minute period during the month as measured by the utility company. The current demand charge is $7.00 per kilowatt. Clinton County Electric Cooperative indicated that there is currently no means to reduce this charge because they have "frozen" the off-peak billing option. This option may be made available in the future, possibly as early as January 1997. The operation of the station could be adjusted to pump during the off-peak hours to take advantage of lower demand charges.

(4) Thermostatic Bubbler Control. Keyesport pump station uses an air bubbler system to keep the sump from freezing and to keep ice from blocking the trash rack. Contrary to the other two stations, the sump faces north and does not get warmed by the sun. The controller for the air compressor now runs one hour at a time every three hours for a total of eight hours per day during the winter months. The air compressor motor is 5 hp in size and consumes roughly 44 kilowatt-hours per day. This could potentially be reduced if the air compressor was thermostatically controlled instead of controlled by timer.

(5) Safety Alarms. Safety alarms such as warning sirens and flashing strobes may be needed to warn anyone near the stations pumping will start, especially at Keyesport Pump Station. The gravity drain at Pump Station No. 3 would also need alarms if automated.

(6) Temperature Monitors. The automatic louvers and roof ventilator should keep the stations cool. Temperature

sensors could be installed to monitor the inside air temperature, ith the autodialer telephoning the appropriate personnel if bnormal heat in the station is detected.

(7) Smoke/Heat Detectors. Smoke and heat detectors could be installed to monitor excessive smoke and heat, with the autodialer telephoning the appropriate personnel to check for fire at the station.

6. COST ESTIMATE

Saddle Dam No. 2 Pump Station

Electrical (required items)		$73,662	
Mechanical (required items)		$52,030	
	Subtotal	$125,692	
Contingencies (15%)		$19,308	
	Total	$145,000	
Electrical (optional items)		$11,667	
Mechanical (optional items)		$74,822	
	Subtotal	$86,489	
Contingencies (20%)		$17,511	
	Total	$104,000	
TOTAL FOR STATION			**$249,000**

Keyesport Pump Station

Electrical (required items)		$75,242	
Mechanical (required items)		$61,859	
	Subtotal	$137,101	
Contingencies (15%)		$20,899	
	Total	$158,000	
Electrical (optional items)		$13,790	
Mechanical (optional items)		$73,623	
	Subtotal	$87,413	
Contingencies (20%)		$17,587	
	Total	$105,000	
TOTAL FOR STATION			**$263,000**

Saddle Dam No. 3 Pump Station

Electrical (required items)		$66,840	
Mechanical (required items)		$37,255	
	Subtotal	$104,095	
Contingencies (15%)		$15,905	
	Total	$120,000	
Electrical (optional items)		$15,706	
Mechanical (optional items)		$79,695	
	Subtotal	$95,401	
Contingencies (20%)		$18,599	
	Total	$114,000	
TOTAL FOR STATION			**$234,000**
TOTAL FOR ALL THREE PUMP STATIONS			**$746,000**
Engineering and Design			$75,000
Supervision and Administration			$75,000
GRAND TOTAL			**$896,000**

Electrical Total (required items)	$215,744
Mechanical Total (required items)	$151,144
Subtotal (required items)	$366,888
Contingencies	$56,112
TOTAL FOR REQUIRED ITEMS	$423,000

Electrical Total (optional items)	$41,163
Mechanical Total (optional items)	$228,140
Subtotal (optional items)	$269,303
Contingencies	$53,697
TOTAL FOR OPTIONAL ITEMS	$323,000

Note: Required items are those that are necessary to automate the pump stations. Optional items are those that, while recommended, are not strictly necessary for automation and could be accomplished at any time. See the Appendix A for more detailed breakdowns of the cost estimates.

APPENDICES

APPENDIX A

Cost Estimate Breakdown

COST ESTIMATE ANALYSIS

FOR USE OF THIS FORM, SEE TM 5-800-2; THE PROPONENT AGENCY IS USACE.

PROJECT: Pu ion Aut ion Study -- Required Electrical

LOCATION: Ca. Lake, Saddle Dam No. 2 Pump Station

CODE (CHECK ONE) ___ A ___ OTHER ___ ___ C

23 September 1996

DRAWING NO. None

ESTIMATOR: Mike Sommars

23 September 1996

SHEET 2 SHEETS

CHECK B. Mik ars

TASK DESCRIPTION	QUANTITY NO. OF UNITS	QUANTITY UNIT MEAS	LABOR MH UNIT	LABOR TOTAL HRS	LABOR UNIT PRICE	LABOR COST	EQUIPMENT UNIT PRICE	EQUIPMENT COST	MATERIAL UNIT PRICE	MATERIAL COST	TOTAL	SHIPPING UNIT CWT	SHIPPING TOTAL WT
emoval of Existing MCC	1	SUM				1,000.00					1,000.00		
emoval of Existing Light Panel	1	SUM				200.00					200.00		
otor Control Center	1	EA	100	100	35.87	3,587.00			11000	11,000.00	14,587.00		
rogrammable Logic Controller	1	EA	100	100	35.87	3,587.00			5000	5,000.00	8,587.00		
ater Level Sensing System	1	EA	16	16	35.87	574.00			4600	4,600.00	5,174.00		
elephone Dialer	1	EA	8	8	35.87	287.00			2250	2,250.00	2,537.00		
elephone Line	1	SUM			35.87	300.00					300.00		
ightning/Surge Protection	1	EA	27	27	35.87	968.00			11000	11,000.00	11,968.00		
ighting Panel, 20 circuit	1	EA	13.333	13.333	35.87	478.00			1550	1,550.00	2,028.00		
iphon Breaker Valve Hookup	3	EA	3	9	35.87	323.00			200	600.00	923.00		
utomatic Lubricator Hookup	3	EA	3	9	35.87	323.00			100	300.00	623.00		
utomatic Louver Hookup	2	EA	3	6	35.87	215.00			100	200.00	415.00		
oof Ventilator	1	EA	3	3	35.87	108.00			100	100.00	208.00		
PLC Program Development	1	EA	80	80	60	4,800.00					4,800.00		
esting/Start-Up	1	EA	40	40	60	2,400.00					2,400.00		
Training	1	EA	8	8	60	480.00					480.00		
Computer for Programming PLC	1	EA							2000	2,000.00	2,000.00		
SUBTOTAL				419.33		19,630.00				38,600.00	58,230.00		
INSURANCE/TAXES													
SUBTOTAL						19,630.00				38,600.00	58,230.00		
15.0% OVERHEAD											8,735.00		
10.0% PROFIT											6,697.00		
TOTAL THIS SHEET											73,662.00		

DA FORM 5418-R, Apr 85

COST ESTIMATE ANALYSIS
FOR USE OF THIS FORM, SEE TM 5-800-2; THE PROPONENT AGENCY IS USACE.

INVITATION/CONTRACTOR

EFFECTIVE PRICING DATE: 23 September 1996

DATE PREPARED: 23 September 1996

PROJECT: Pump Station Automation Study -- Required Electrical

CODE (CHECK ONE) ___ A ___ B ___ C ___ OTHER

DRAWING NO.: None

SHEET 1 OF 2 SHEETS

LOCATION: Carlyle Lake, Keyesport Pump Station

ESTIMATOR: Mike Sommars

CHECK BY: Mike Sommars

TASK DESCRIPTION	QUANTITY		LABOR				EQUIPMENT		MATERIAL		TOTAL	SHIPPING	
	NO. OF UNITS	UNIT MEAS	MH UNIT	TOTAL HRS	UNIT PRICE	COST	UNIT PRICE	COST	UNIT PRICE	COST		UNIT CWT	TOTAL WT
Removal of Existing MCC	1	SUM				1,000.00					1,000.00		
Removal of Existing Light Panel	1	SUM				200.00					200.00		
Motor Control Center	1	EA	100	100	35.87	3,587.00			11000	11,000.00	14,587.00		
Programmable Logic Controller	1	EA	100	100	35.87	3,587.00			5000	5,000.00	8,587.00		
Water Level Sensing System	1	EA	16	16	35.87	574.00			4600	4,600.00	5,174.00		
Telephone Dialer	1	EA	8	8	35.87	287.00			2250	2,250.00	2,537.00		
Telephone Line	1	SUM			35.87	300.00					300.00		
Lightning/Surge Protection	1	EA	27	27	35.87	968.00			11000	11,000.00	11,968.00		
Lighting Panel, 20 circuit	1	EA	13.333	13.333	35.87	478.00			1550	1,550.00	2,028.00		
Siphon Breaker Valve Hookup	3	EA	3	9	35.87	323.00			200	600.00	923.00		
Automatic Lubricator Hookup	3	EA	3	9	35.87	323.00			100	300.00	623.00		
Automatic Louver Hookup	2	EA	3	6	35.87	215.00			100	200.00	415.00		
Roof Ventilator	1	EA	3	3	35.87	108.00			100	100.00	208.00		
Automate Sump Pump	1	SUM			500	500.00			750	750.00	1,250.00		
PLC Program Development	1	EA	80	80	60	4,800.00					4,800.00		
Testing/Start-Up	1	EA	40	40	60	2,400.00					2,400.00		
Training	1	EA	8	8	60	480.00					480.00		
Computer for Programming PLC	1	EA							2000	2,000.00	2,000.00		
SUBTOTAL				419.33		20,130.00				39,350.00	59,480.00		
INSURANCE/TAXES													
SUBTOTAL						20,130.00				39,350.00	59,480.00		
15.0% OVERHEAD											8,922.00		
10.0% PROFIT											6,840.00		
TOTAL THIS SHEET											75,242.00		

DA FORM 5418-R, Apr 85

COST ESTIMATE ANALYSIS

R USE OF TH RM, SEE TM 800-2; THE PROPONENT AGENCY IS USACE.

INVITATION/CONTRACTOR

EFFECTIVE PRICING DATE 23 September 1996

DATE PREPARED 23 ber 1996

OJECT: Pu ion Auto ion Study -- Required Electrical

CODE (CHECK ON) A C OTHER

DRAWING NO. None

SHEET 2 SHEETS

CATION: Carlyle Lake, Saddle Dam No. 3 Pump Station

ESTIMATOR: Mike Sommars

CHECK BY Mike Sommars

TASK DESCRIPTION	QUANTITY		LABOR				EQUIPMENT		MATERIAL		TOTAL	SHIPPING	
	NO. OF UNITS	UNIT MEAS	MH UNIT	TOTAL HRS	UNIT PRICE	COST	UNIT PRICE	COST	UNIT PRICE	COST		UNIT CWT	TOTAL WT
moval of Existing MCC	1	SUM				1,000.00					1,000.00		
moval of Existing Light Panel	1	SUM				200.00					200.00		
tor Control Center	1	EA	70	70	35.87	2,511.00			9000	9,000.00	11,511.00		
ogrammable Logic Controller	1	EA	100	100	35.87	3,587.00			5000	5,000.00	8,587.00		
ter Level Sensing System	1	EA	16	16	35.87	574.00			4600	4,600.00	5,174.00		
lephone Dialer	1	EA	8	8	35.87	287.00			2250	2,250.00	2,537.00		
lephone Line	1	SUM			35.87	300.00					300.00		
ghtning/Surge Protection	1	EA	27	27	35.87	968.00			11000	11,000.00	11,968.00		
ghting Panel, 20 circuit	1	EA	13.333	13.333	35.87	478.00			1550	1,550.00	2,028.00		
phon Breaker Valve Hookup	2	EA	3	6	35.87	215.00			200	400.00	615.00		
tomatic Lubricator Hookup	2	EA	3	6	35.87	215.00			100	200.00	415.00		
tomatic Louver Hookup	2	EA	3	6	35.87	215.00			100	200.00	415.00		
of Ventilator	1	EA	3	3	35.87	108.00			100	100.00	208.00		
C Program Development	1	EA	60	60	60	3,600.00					3,600.00		
sting/Start-Up	1	EA	30	30	60	1,800.00					1,800.00		
aining	1	EA	8	8	60	480.00					480.00		
mputer for Programming PLC	1	EA							2000	2,000.00	2,000.00		
SUBTOTAL				353.33		16,538.00				36,300.00	52,838.00		
INSURANCE/TAXES													
SUBTOTAL						16,538.00				36,300.00	52,838.00		
15.0% OVERHEAD											7,926.00		
10.0% PROFIT											6,076.00		
TOTAL THIS SHEET											66,840.00		

FORM 5418-R, Apr 85

COST ESTIMATE ANALYSIS
R USE OF THIS FORM, SEE TM 5-800-2; THE PROPONENT AGENCY IS USACE.

INVITATION/CONTRACTOR

EFFECTIVE PRICING DATE: 23 September 1996

DATE PREPARED: 23 September 1996

OJECT: Pump Station Automation Study -- Optional Electrical

CODE (CHECK ONE): ___ A ___ B ___ C ___ OTHER

DRAWING NO.: None

SHEET 2 OF 2 SHEETS

CATION: Carlyle Lake, Saddle Dam No. 2 Pump Station

ESTIMATOR: Mike Sommars

CHECK BY: Mike Sommars

TASK DESCRIPTION	QUANTITY		LABOR				EQUIPMENT		MATERIAL		TOTAL	SHIPPING	
	NO. OF UNITS	UNIT MEAS	MH UNIT	TOTAL HRS	UNIT PRICE	COST	UNIT PRICE	COST	UNIT PRICE	COST		UNIT CWT	TOTAL WT
hab Stormwater Motors	3	EA			567	1,701.00			1662.73	4,988.00	6,689.00		
tor Removal & Reinstallation	3	EA	4	12	35.87	430.00					430.00		
mbine 1-ph with 3-ph Service	1	EA	10	10	35.87	359.00			545	545.00	904.00		
fety Alarms	1	SUM				200.00			200	200.00	400.00		
mperature Monitors (Inside)	1	SUM				200.00			200	200.00	400.00		
oke Detectors	1	SUM				200.00			200	200.00	400.00		
SUBTOTAL				22.00		3,090.00				6,133.00	9,223.00		
INSURANCE/TAXES													
SUBTOTAL						3,090.00				6,133.00	9,223.00		
15.0% OVERHEAD											1,383.00		
10.0% PROFIT											1,061.00		
TOTAL THIS SHEET											11,667.00		

A FORM 5418-R, Apr 85

COST ESTIMATE ANALYSIS

X USE OF TH[illegible] FORM, SEE TM 5-800-2; THE PROPONENT AGENCY IS USACE.

INVITATION/CONTRACTOR

EFFECTIVE PRICING DATE: 23 September 1996

DATE PREPARED: 23 September 1996

OJECT P[illegible] tion Aut ion Study -- Optional Electrical

CODE (CHECK ON) ___ A ___ C ___ OTHER

DRAWING NO. None

SHEET [illegible] 2 SHEETS

CATION: Ca[illegible]e Lake, Keyesport Pump Station

ESTIMATOR: Mike Sommars

CHECK B[illegible] Mi[illegible] ars

TASK DESCRIPTION	QUANTITY		LABOR				EQUIPMENT		MATERIAL		TOTAL	SHIPPING	
	NO. OF UNITS	UNIT MEAS	MH UNIT	TOTAL HRS	UNIT PRICE	COST	UNIT PRICE	COST	UNIT PRICE	COST		UNIT CWT	TOTAL WT
ab Stormwater Motors	3	EA			486	1,458.00			1893.51	5,681.00	7,139.00		
or Removal & Reinstallation	3	EA	4	12	35.87	430.00					430.00		
ab Sump Pump Motor	1	EA			283.5	284.00			760.43	760.00	1,044.00		
or Removal & Reinstallation	1	EA	4	4	35.87	143.00					143.00		
l T-Stat Control to Bubblers	1	SUM				200.00			200	200.00	400.00		
mbine 1-ph with 3-ph Service	1	EA	10	10	35.87	200.00			545	545.00	745.00		
fety Alarms	1	SUM				200.00			200	200.00	400.00		
mperature Monitors (Inside)	1	SUM				200.00			200	200.00	400.00		
oke Detectors	1	SUM							200	200.00	200.00		
SUBTOTAL				26.00		3,115.00				7,786.00	10,901.00		
INSURANCE/TAXES													
SUBTOTAL						3,115.00				7,786.00	10,901.00		
15.0% OVERHEAD											1,635.00		
10.0% PROFIT											1,254.00		
TOTAL THIS SHEET											13,790.00		

A FORM 5418-R, Apr 85

COST ESTIMATE ANALYSIS
FOR USE OF THIS FORM, SEE TM 5-800-2; THE PROPONENT AGENCY IS USACE.

INVITATION/CONTRACTOR

EFFECTIVE PRICING DATE: 1 October 1996

DATE PREPARED: 25 September 1996

PROJECT: Pump Station Automation Study -- Required Mechanical

CODE (CHECK ONE) ___ A ___ B ___ C ___ OTHER

DRAWING NO. None

SHEET 1 OF 2 SHEET

LOCATION: Carlyle Lake, Saddle Dam No. 2 Pump Station

ESTIMATOR: Stephen Farkas

CHECK BY Stephen Farkas

TASK DESCRIPTION	QUANTITY		LABOR				EQUIPMENT/SUPPLIES		MATERIAL		TOTAL	SHIPPING	
	NO. OF UNITS	UNIT MEAS	MH UNIT	TOTAL HRS	UNIT PRICE	COST	UNIT PRICE	COST	UNIT PRICE	COST		UNIT CWT	TOTAL WT
Replace Ventilation System	SUM	JOB				3000.00		720.00		1410.00	5130.00		
Replace Siphon Breaker System	SUM	JOB				3000.00		600.00		9000.00	12600.00		
Replace Lubrication Systems	SUM	JOB				4730.00		760.00		17910.00	23400.00		
SUBTOTAL						10,730.00		2,080.00		28,320.00	41,130.00		$.00
INSURANCE/TAXES					$.00	.00		.00		.00	.00		$.00
SUBTOTAL						10,730.00		2,080.00		28,320.00	41,130.00		$.00
15.0% OVERHEAD						1,610.00		312.00		4,248.00	6,170.00		$.00
10.0% PROFIT						1,234.00		239.00		3,257.00	4,730.00		$.00
TOTAL THIS SHEET						13,574.00		2,631.00		35,825.00	52,030.00		52030.0

DA FORM 5418-R. Apr 85

R USE OF TH 1, SEE TM 90-2; THE PROPONENT AGENCY IS USACE. COST FSTIMATE ANALYSIS	INVITATION/CC ACTOR	EFFECTIVE PRICING DATE 1 October 1996	DATE PREPARED 25 S ber 1996
OJECT: Pump ion Automa ion Study -- Required Mechanical	CODE (CHECK ONE, A ___ C ___ OTHER ___)	DRAWING NO. None	T 1 2 SHEETS
CATION: Carlyle Lake, Keyesport Pump Station		ESTIMATOR: Stephen Farkas	CHECK BY Stephen Farkas

	QUANTITY		LABOR				EQUIPMENT/SUPPLIES		MATERIAL			SHIPPING	
TASK DESCRIPTION	NO. OF UNITS	UNIT MEAS	MH UNIT	TOTAL HRS	UNIT PRICE	COST	UNIT PRICE	COST	UNIT PRICE	COST	TOTAL	UNIT CWT	TOTAL WT
place Ventilation System	SUM	JOB				3000.00		720.00		1280.00	5000.00		
place Siphon Breaker System	SUM	JOB				3000.00		600.00		9000.00	12600.00		
place Lubrication Systems	SUM	JOB				5765.00		1115.00		24420.00	31300.00		
SUBTOTAL						11,765.00		2,435.00		34,700.00	48,900.00		$.00
INSURANCE/TAXES					$.00	.00		.00		.00	.00		$.00
SUBTOTAL						11,765.00		2,435.00		34,700.00	48,900.00		$.00
15.0% OVERHEAD						1,765.00		365.00		5,205.00	7,335.00		$.00
10.0% PROFIT						1,353.00		280.00		3,991.00	5,624.00		$.00
TOTAL THIS SHEET						14,883.00		3,080.00		43,896.00	61,859.00		61859.00

COST ESTIMATE ANALYSIS
OR USE OF THIS FORM, SEE TM 5-800-2; THE PROPONENT AGENCY IS USACE.

INVITATION/CONTRACTOR

EFFECTIVE PRICING DATE: 1 October 1996

DATE PREPARED: 25 September 1996

ROJECT: Pump Station Automation Study -- Required Mechanical

CODE (CHECK ONE) ___ A ___ B ___ C ___ OTHER

DRAWING NO. None

SHEET 1 OF 2 SHEETS

OCATION: Carlyle Lake, Saddle Dam No. 3 Pump Station

ESTIMATOR: Stephen Farkas

CHECK BY Stephen Farkas

TASK DESCRIPTION	QUANTITY		LABOR				EQUIPMENT/SUPPLIES		MATERIAL		TOTAL	SHIPPING	
	NO. OF UNITS	UNIT MEAS	MH UNIT	TOTAL HRS	UNIT PRICE	COST	UNIT PRICE	COST	UNIT PRICE	COST		UNIT CWT	TOTAL WT
eplace Ventilation System	SUM	JOB				3000.00		720.00		1030.00	4750.00		
eplace Siphon Breaker System	SUM	JOB				2060.00		440.00		6000.00	8500.00		
eplace Lubrication Systems	SUM	JOB				3700.00		560.00		11940.00	16200.00		
SUBTOTAL						8,760.00		1,720.00		18,970.00	29,450.00		$.00
INSURANCE/TAXES					$.00	.00		.00		.00	.00		$.00
SUBTOTAL						8,760.00		1,720.00		18,970.00	29,450.00		$.00
15.0% OVERHEAD						1,314.00		258.00		2,846.00	4,418.00		$.00
10.0% PROFIT						1,007.00		198.00		2,182.00	3,387.00		$.00
TOTAL THIS SHEET						11,081.00		2,176.00		23,998.00	37,255.00		37255.0

DA FORM 5418-R, Apr 85

'R USE OF T. M,SEE TI COST 'TIMATE ANALYSIS J00-2;THE PROPONENT AGENCY IS USACE.

INVITATION/ ACTOR

EFFECTIVE PRICING DATE 1 October 1996

DATE PREPARED 25 ber 1996

OJECT: Pump ..ation Automation Study -- Optional Mechanical

CODE (CHECK ONE, ____ A ____ B ____ C ____ OTHER ____

DRAWING NO. None

SHEET 2 SHEETS

CATION: Carlyle Lake, Saddle Dam No. 2 Pump Station

ESTIMATOR: Stephen Farkas

CHECK BY Stephen Farkas

TASK DESCRIPTION	QUANTITY		LABOR				EQUIPMENT/SUPPLIES		MATERIAL		TOTAL	SHIPPING	
	NO. OF UNITS	UNIT MEAS	MH UNIT	TOTAL HRS	UNIT PRICE	COST	UNIT PRICE	COST	UNIT PRICE	COST		UNIT CWT	TOTAL WT
:mp Rehabilitation	SUM	JOB				19944.00		3204.00		36000.00	59148.00		
											.00		
											.00		
SUBTOTAL						19,944.00		3,204.00		36,000.00	59,148.00		$.00
INSURANCE/TAXES					$.00	.00		.00		.00	.00		$.00
SUBTOTAL						19,944.00		3,204.00		36,000.00	59,148.00		$.00
15.0% OVERHEAD						2,992.00		481.00		5,400.00	8,872.00		$.00
10.0% PROFIT						2,294.00		369.00		4,140.00	6,802.00		$.00
TOTAL THIS SHEET						25,230.00		4,054.00		45,540.00	74,822.00		74824.0(

)A FORM 5418-R, Apr 85

COST ESTIMATE ANALYSIS
)R USE OF THIS FORM, SEE TM 5-800-2; THE PROPONENT AGENCY IS USACE.

INVITATION/CONTRACTOR

EFFECTIVE PRICING DATE
1 October 1996

DATE PREPARED
25 September 1996

<ROJECT: Pump Station Automation Study -- Optional Mechanical

CODE (CHECK ONE)
____ A ____ B ____ C
____ OTHER_____

DRAWING NO. None

SHEET 1 OF 2 SHEETS

)CATION: Caryle Lake, Keyesport Pump Station

ESTIMATOR: Stephen Farkas

CHECK BY Stephen Farkas

TASK DESCRIPTION	QUANTITY		LABOR				EQUIPMENT/SUPPLIES		MATERIAL		TOTAL	SHIPPING	
	NO. OF UNITS	UNIT MEAS	MH UNIT	TOTAL HRS	UNIT PRICE	COST	UNIT PRICE	COST	UNIT PRICE	COST		UNIT CWT	TOTAL WT
imp Rehabilitation	SUM	JOB				20820.00		4080.00		33300.00	58200.00		
											.00		
											.00		
SUBTOTAL						20,820.00		4,080.00		33,300.00	58,200.00		$.00
INSURANCE/TAXES					$.00	.00		.00		.00	.00		$.00
SUBTOTAL						20,820.00		4,080.00		33,300.00	58,200.00		$.00
15.0% OVERHEAD						3,123.00		612.00		4,995.00	8,730.00		$.00
10.0% PROFIT						2,394.00		469.00		3,830.00	6,693.00		$.00
TOTAL THIS SHEET						26,337.00		5,161.00		42,125.00	73,623.00		73623.00

A FORM 5418-R, Apr 85

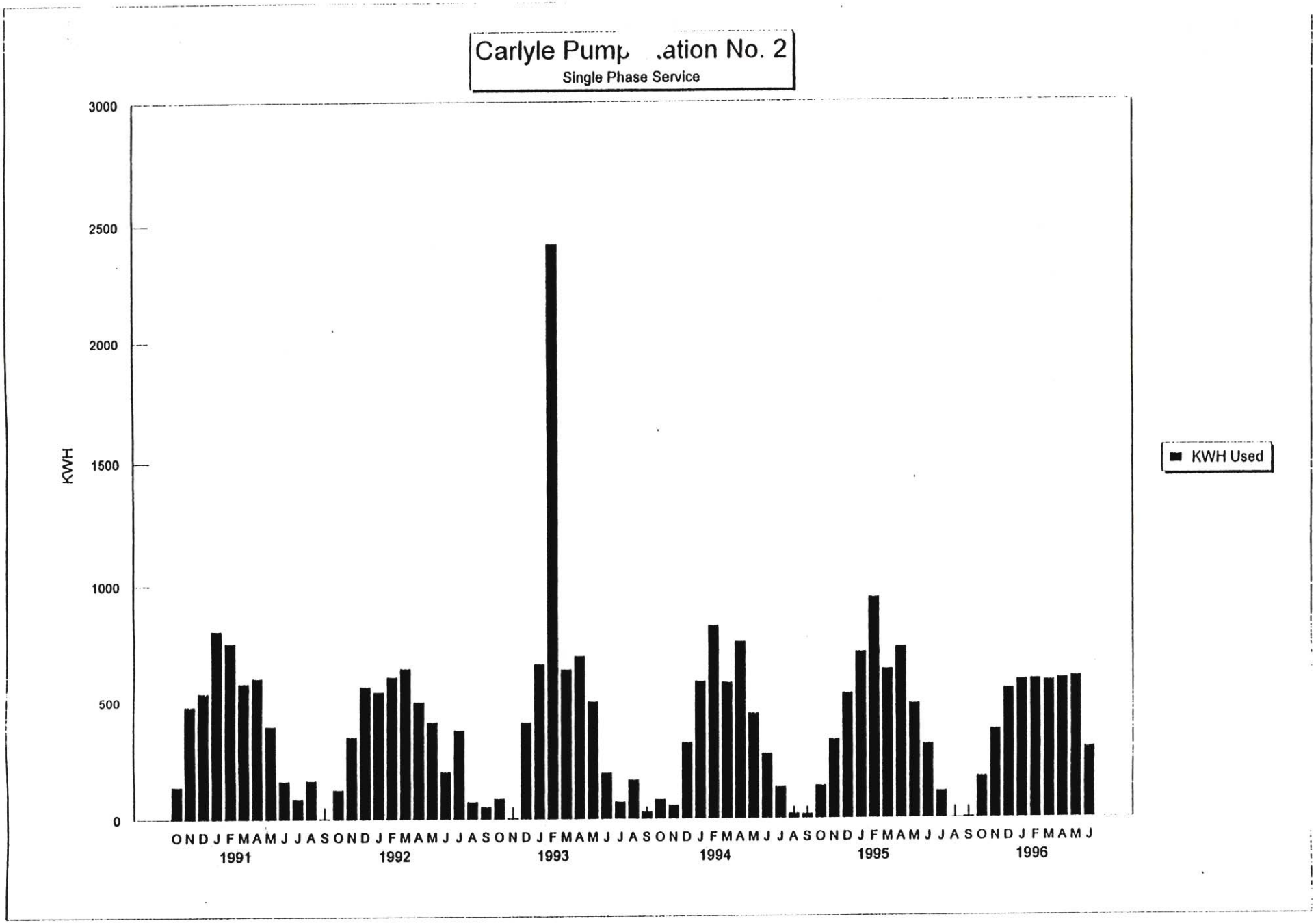
COST ESTIMATE ANALYSIS FOR USE OF ' ORM, SEE " -800-2; THE PROPONENT AGENCY IS USACE.	INVITATION ' TRACTOR	EFFECTIVE PRICING DATE 1 October 1996	DATE PREPARED 25 mber 1996
PROJECT: Pu ation Automation Study -- Optional Mechanical	CODE (CHECK ON ___ A ___ B ___ C ___ OTHER	DRAWING NO. None	SHEET 2 SHEET
LOCATION: Carlyle Lake, Saddle Dam No. 3 Pump Station		ESTIMATOR: Stephen Farkas	CHECK BY Stephen Farkas

TASK DESCRIPTION	QUANTITY		LABOR				EQUIPMENT/SUPPLIES		MATERIAL		TOTAL	SHIPPING	
	NO. OF UNITS	UNIT MEAS	MH UNIT	TOTAL HRS	UNIT PRICE	COST	UNIT PRICE	COST	UNIT PRICE	COST		UNIT CWT	TOTAL WT
Pump Rehabilitation	SUM	JOB				13400.00		2800.00		18000.00	34200.00		
Gravity Drain Sluice Gate	SUM	JOB				14400.00		2400.00		12000.00	28800.00		
											.00		
SUBTOTAL						27,800.00		5,200.00		30,000.00	63,000.00		$.00
INSURANCE/TAXES					$.00	.00		.00		.00	.00		$.00
SUBTOTAL						27,800.00		5,200.00		30,000.00	63,000.00		$.00
15.0% OVERHEAD						4,170.00		780.00		4,500.00	9,450.00		$.00
10.0% PROFIT						3,197.00		598.00		3,450.00	7,245.00		$.00
TOTAL THIS SHEET						35,167.00		6,578.00		37,950.00	79,695.00		79695.0

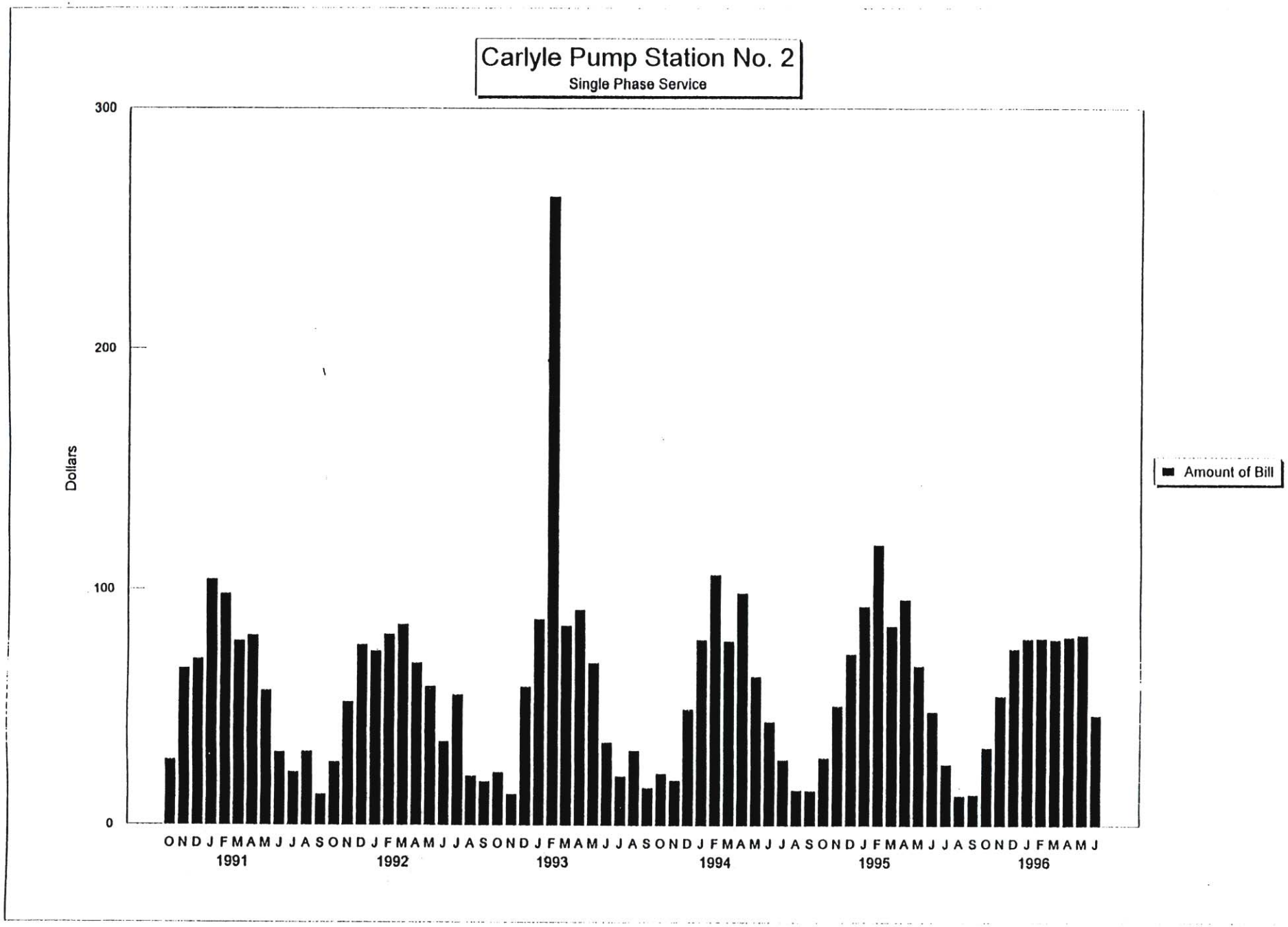
DA FORM 5418-R, Apr 85

APPENDIX B

Power Usage Charts
October 1990 — June 1996



10/18/96 CARPSTDY.WK4



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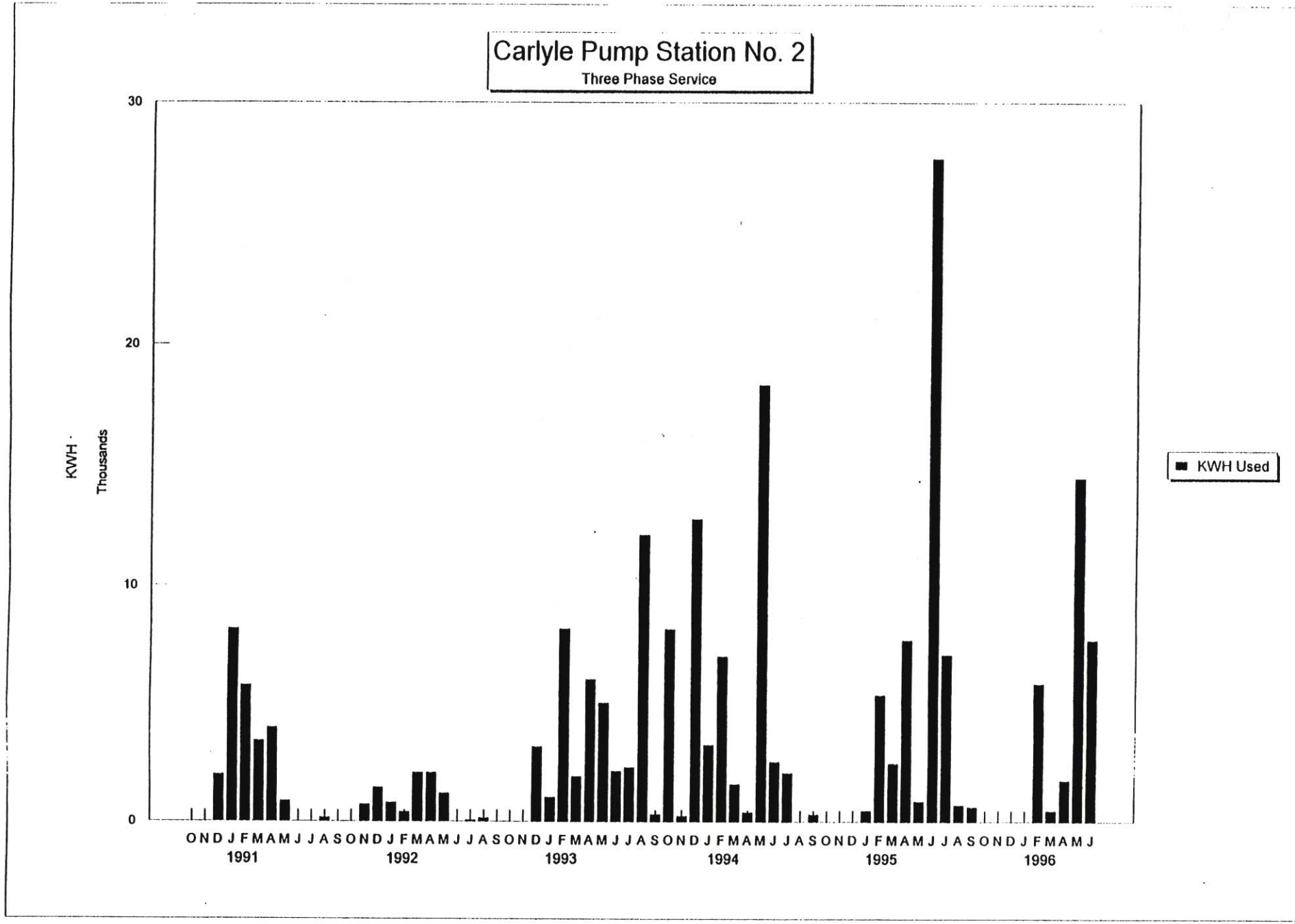

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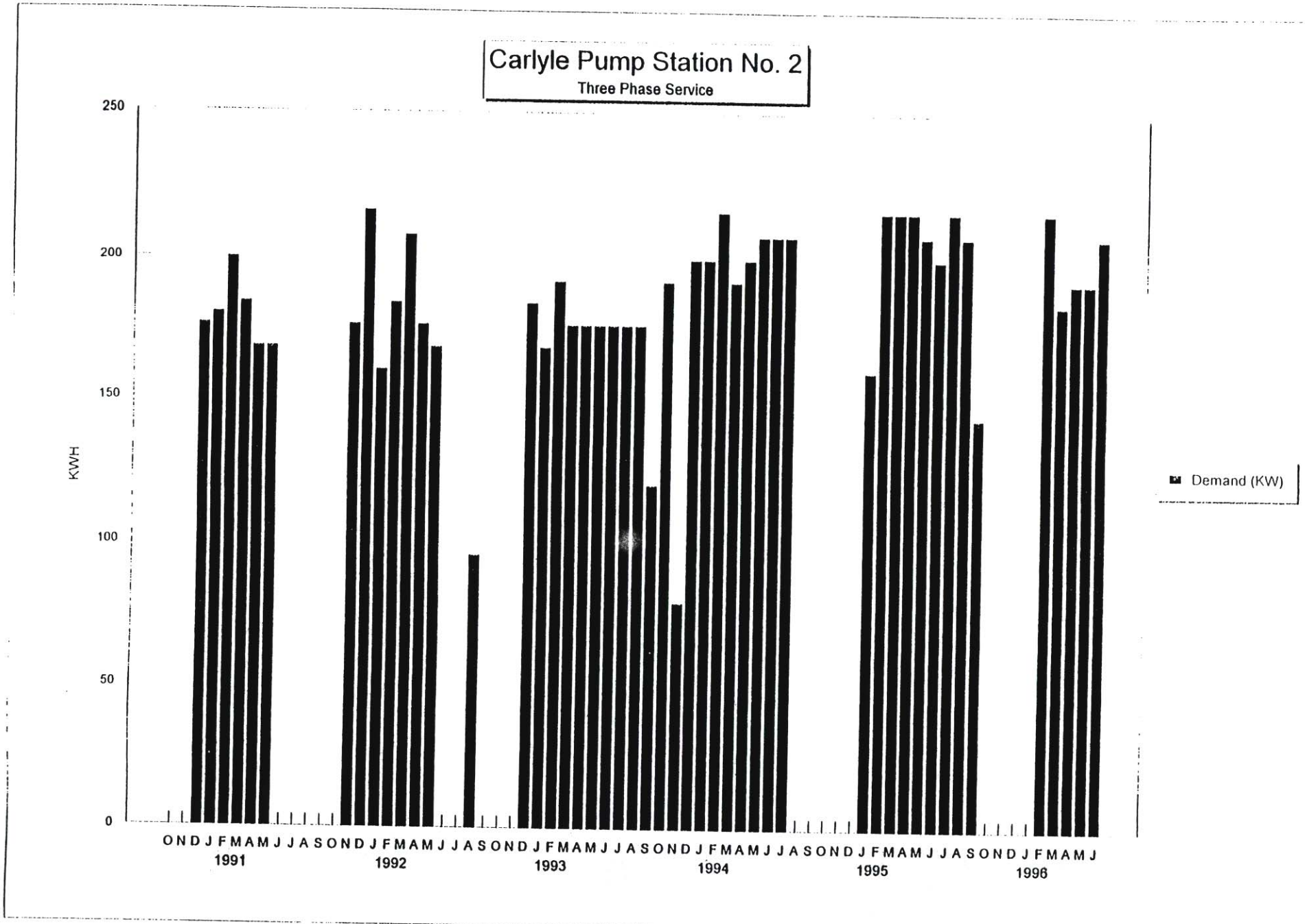
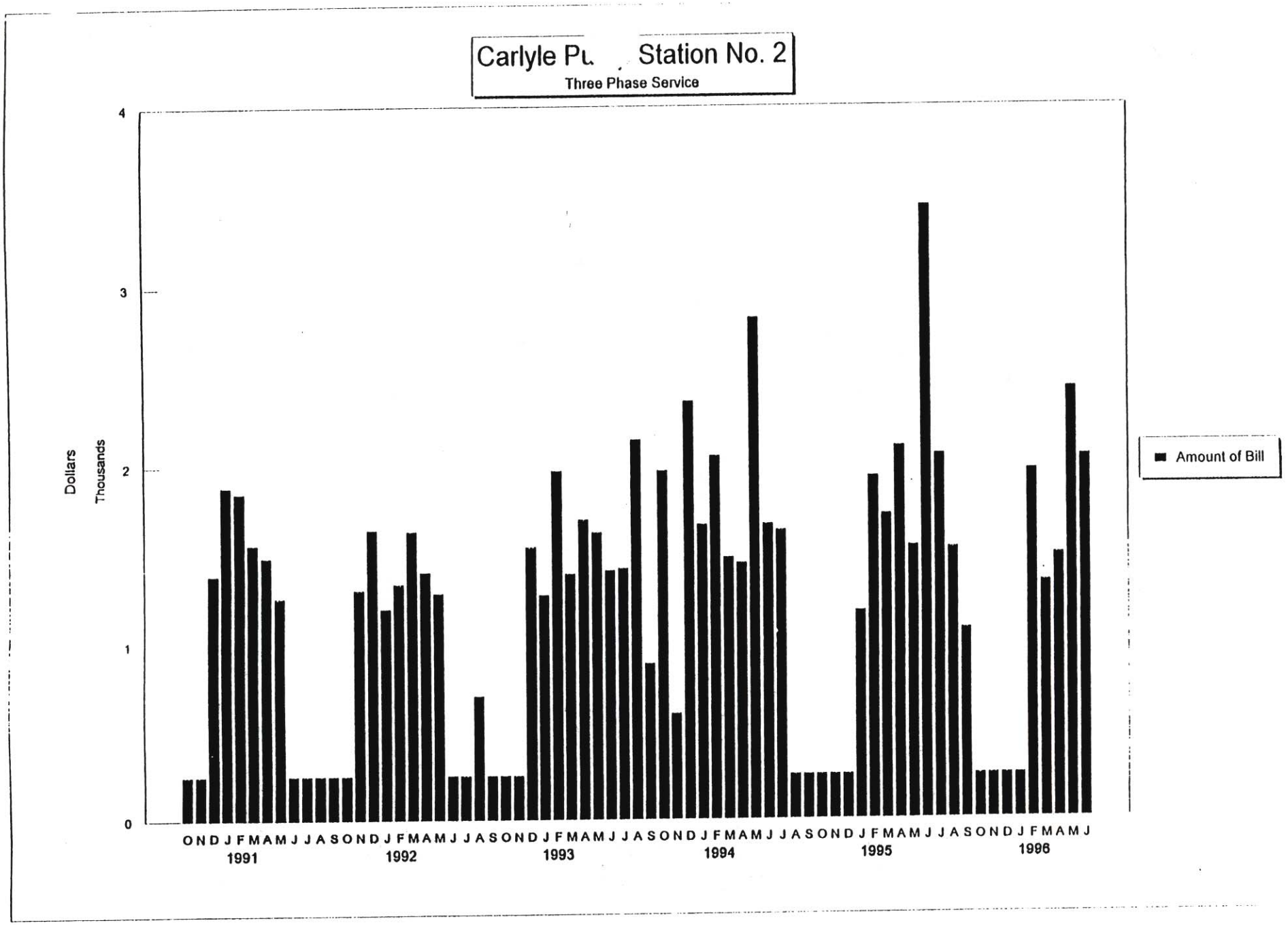
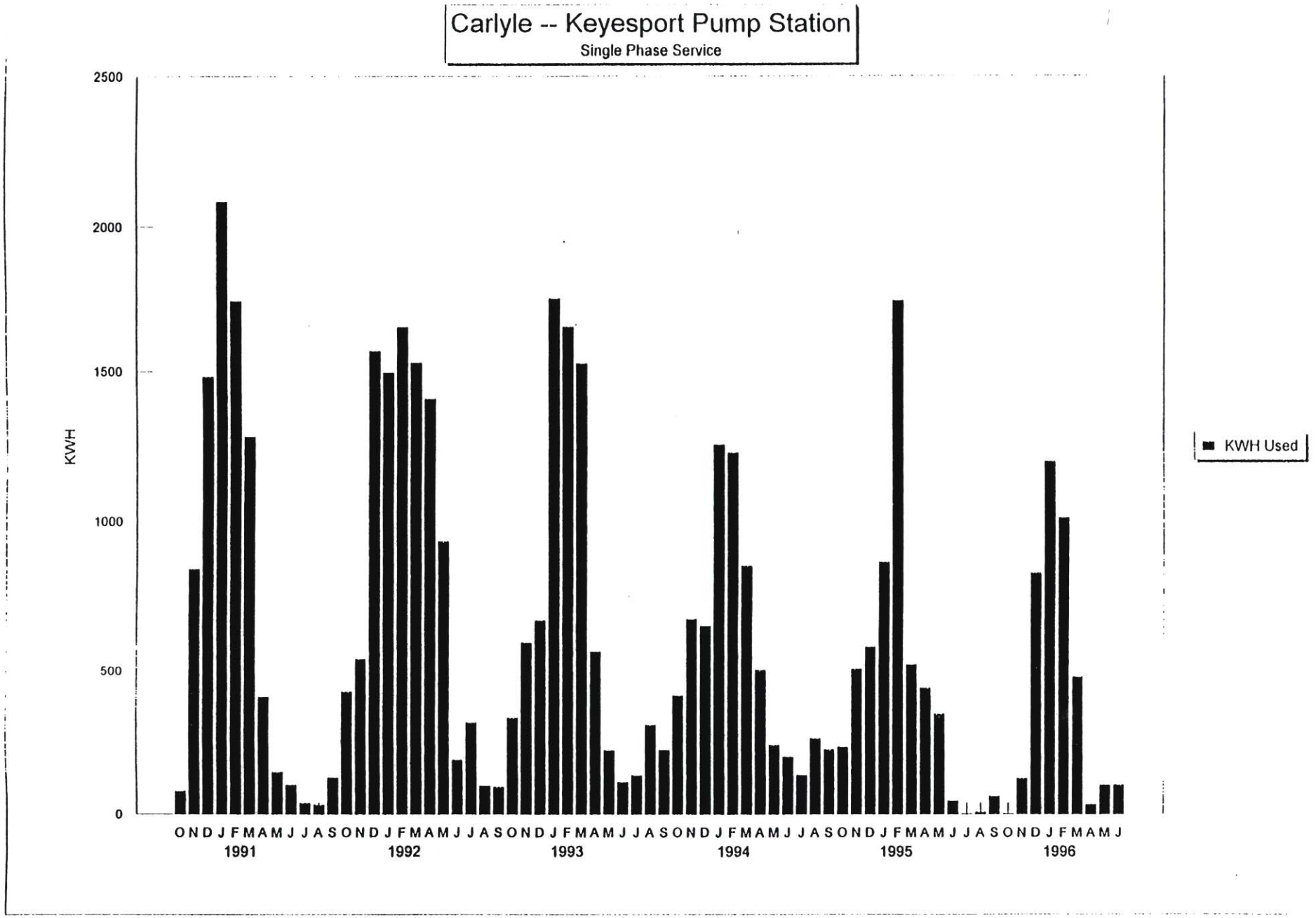

Carlyle Pump Station No. 2
Three Phase Service
KWH
250
200
150
100
50
0
O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J
1991
1992
1993
1994
1995
1996
Demand (KW)



10/18/96 CARPSTDY.W



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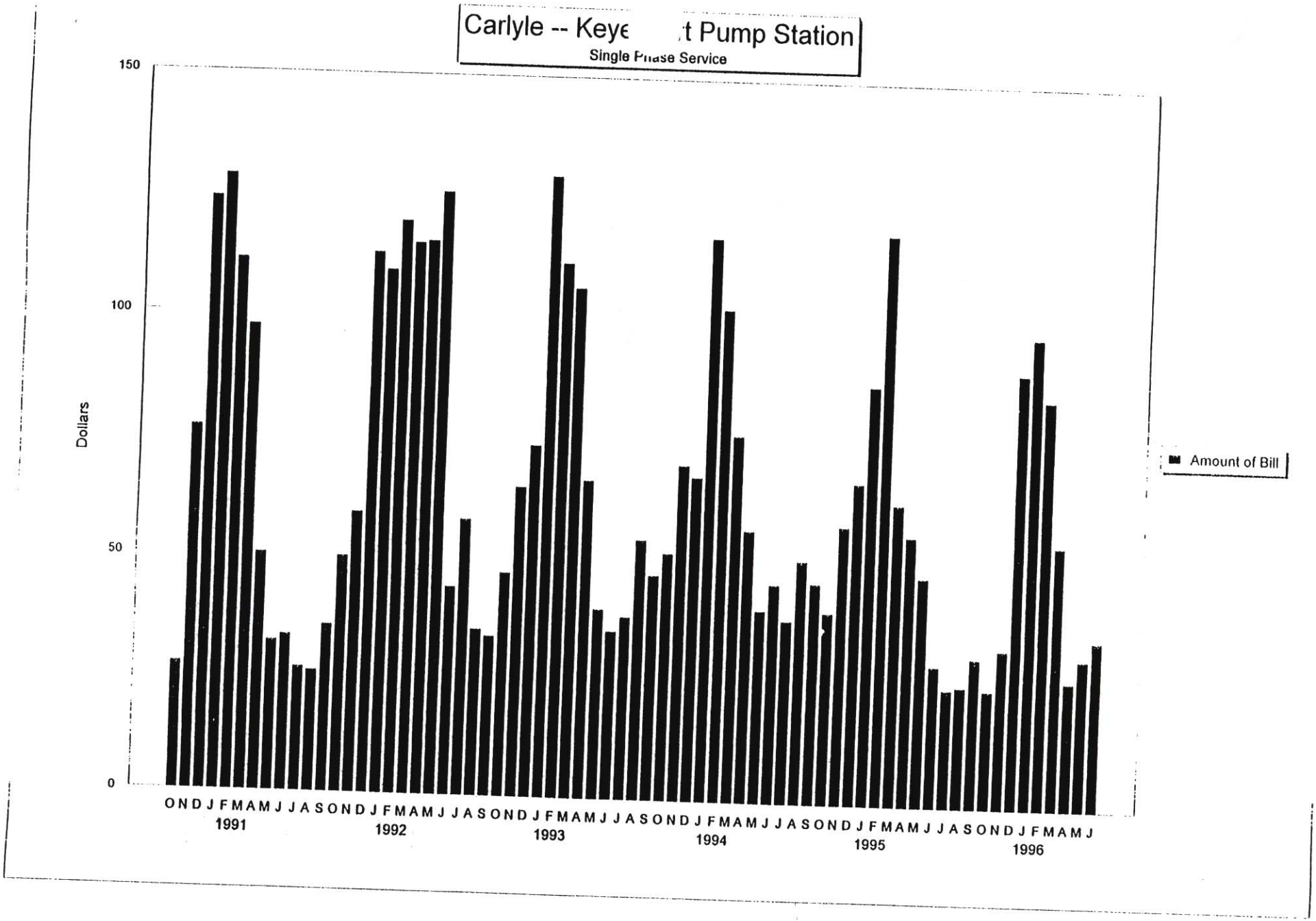

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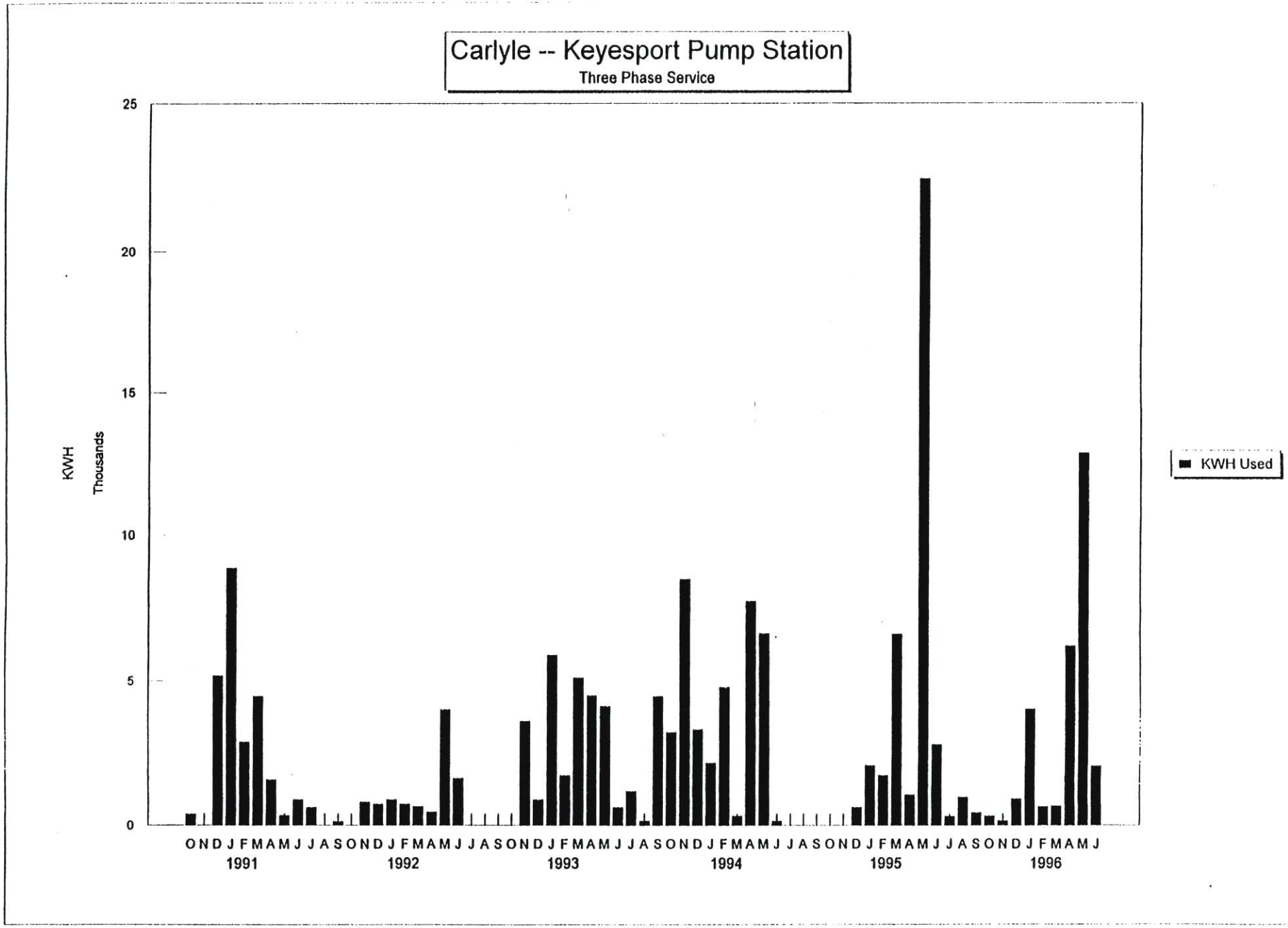

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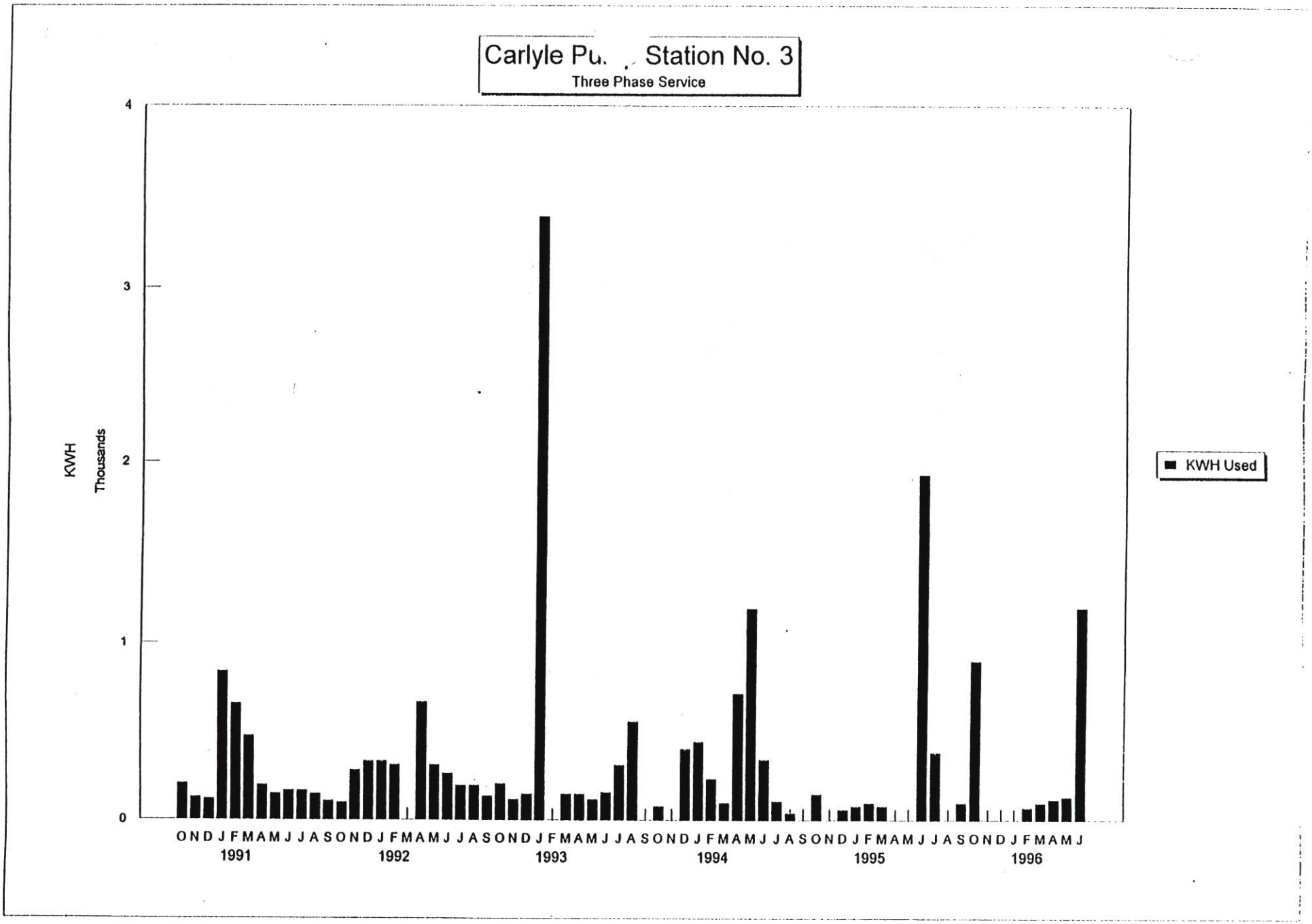

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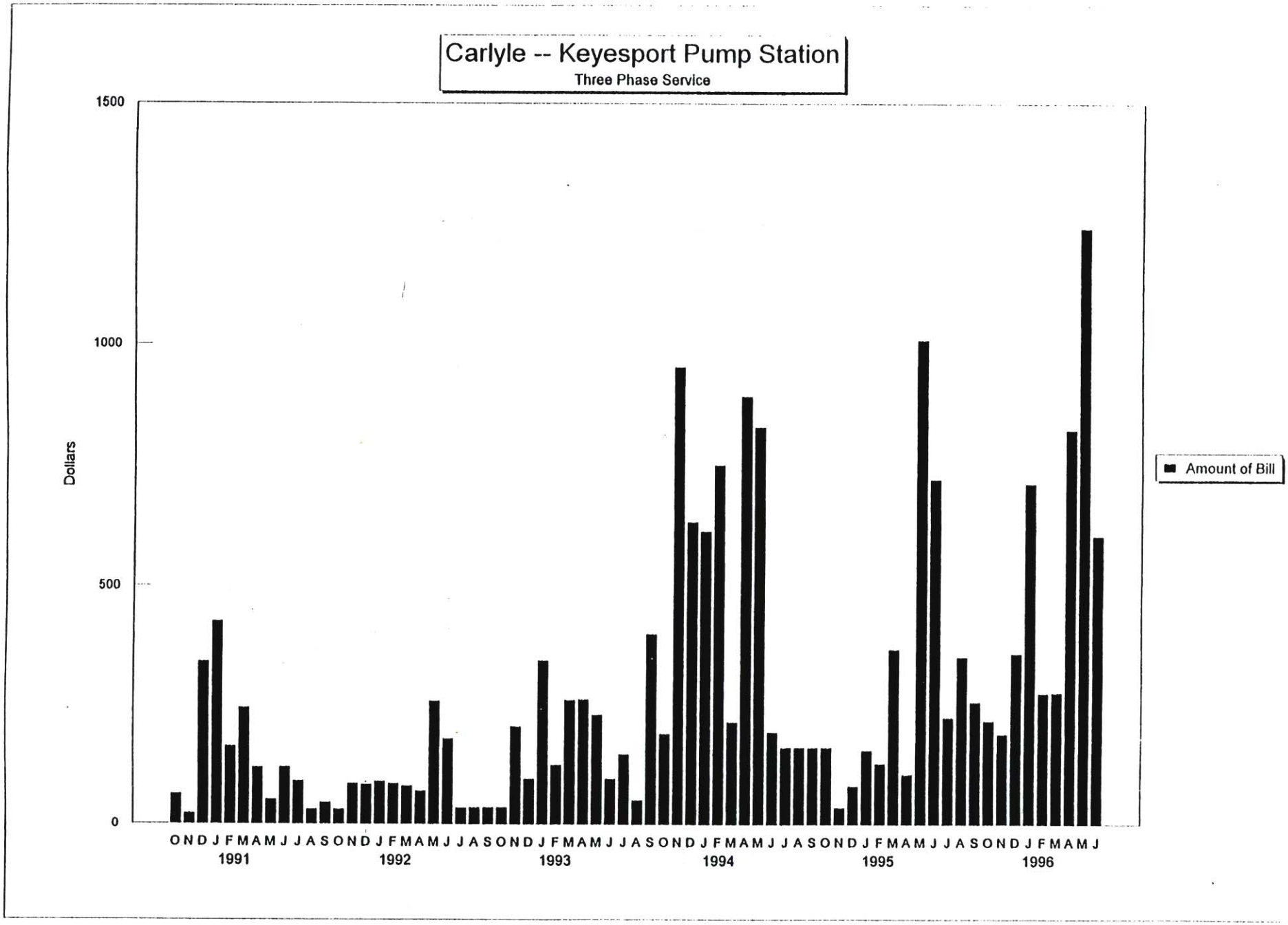
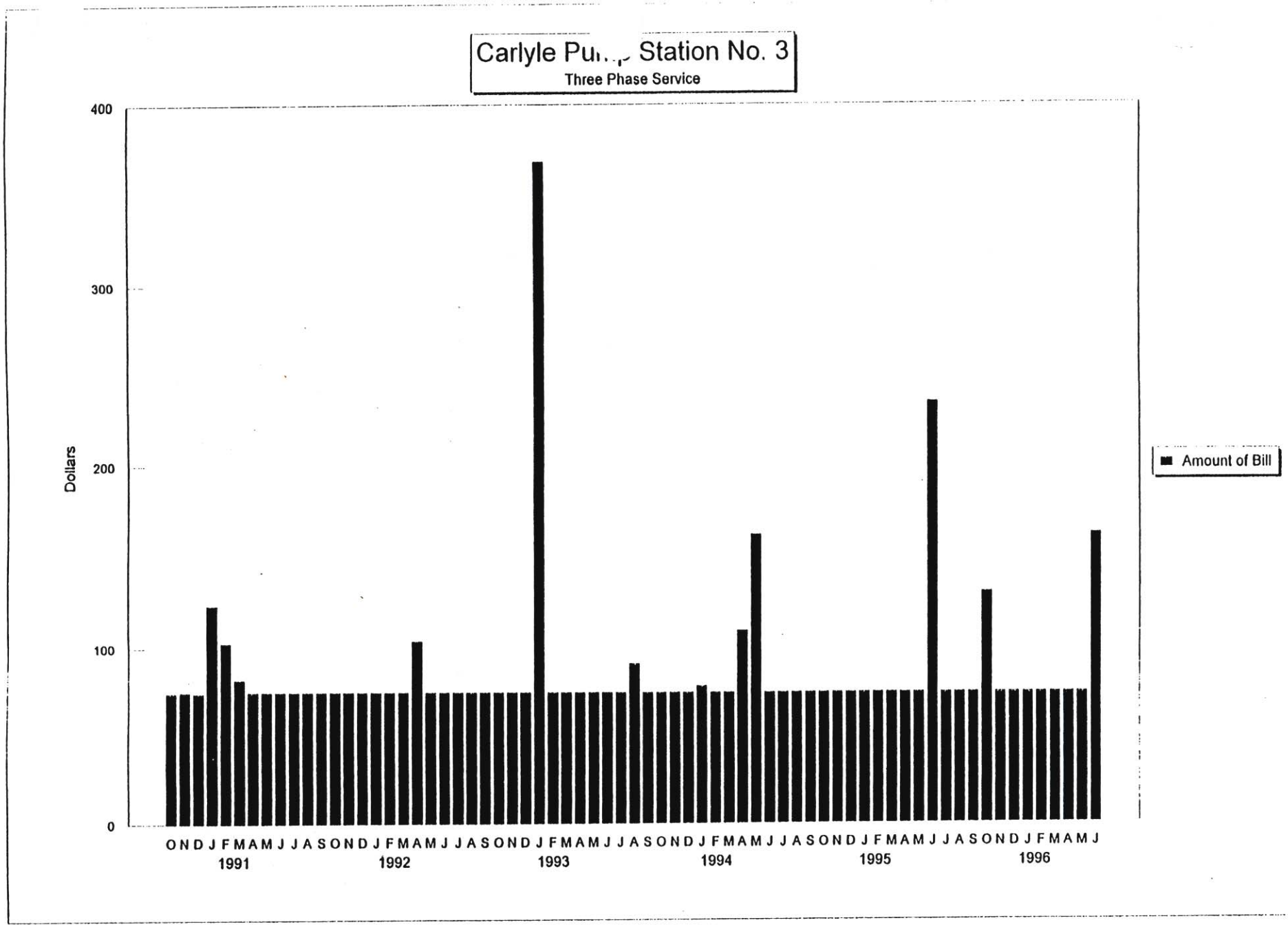
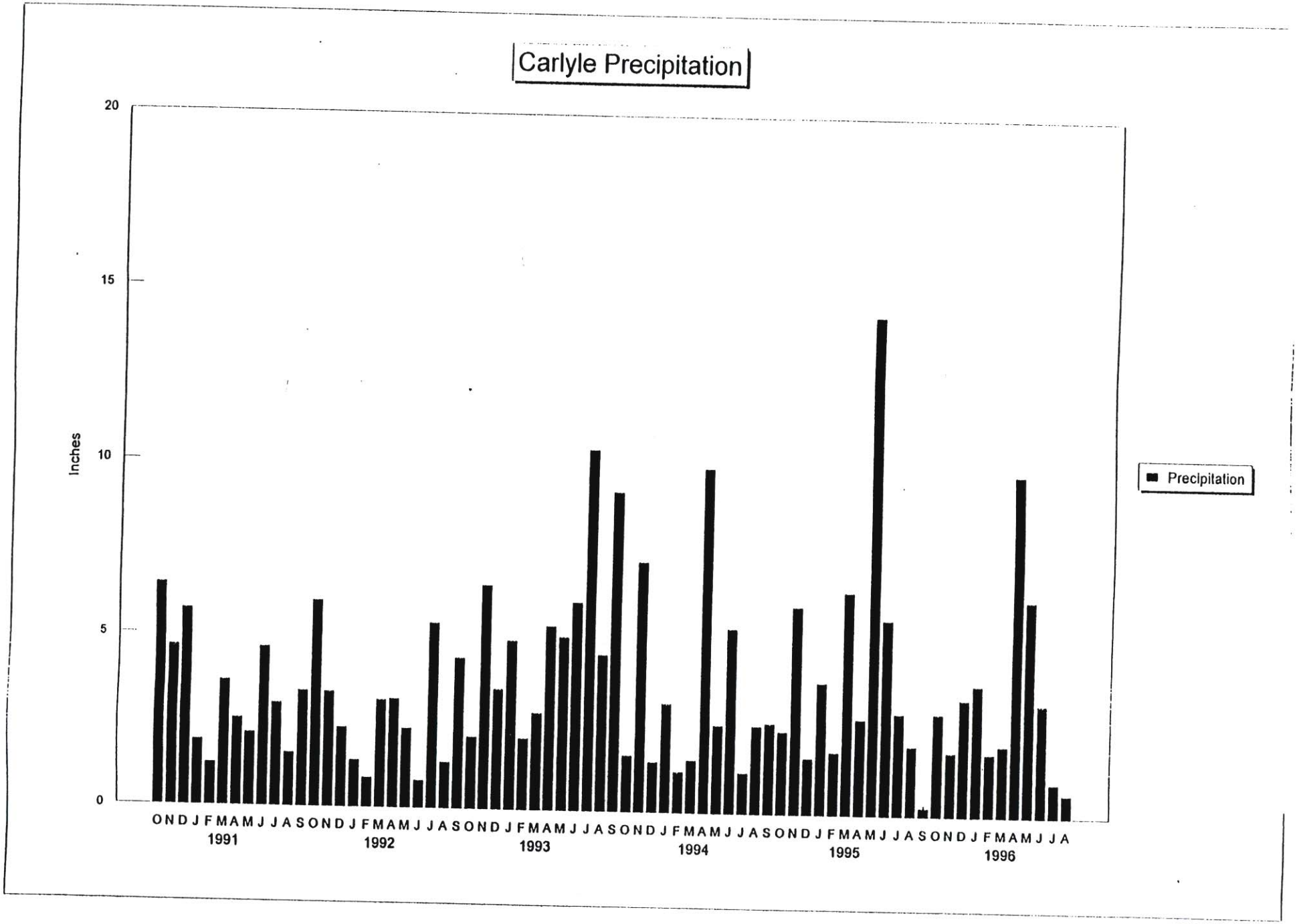

Carlyle -- Keyesport Pump Station
Three Phase Service
1500
1000
500
0
Dollars
Amount of Bill
O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J
1991
1992
1993
1994
1995
1996



10/18/96 CARPSTDY.WK·



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