FLOOD CONTROL PLANNING STUDY

ON

CHIGGER AND COWARTS CREEKS

IN AND FOR

THE CITY OF FRIENDSWOOD, TEXAS

AND

THE TEXAS DEPARTMENT OF WATER RESOURCES

AUGUST 1985

PREPARED BY COENCO, INC. CONSULTING ENGINEERS P.O. BOX 1388 ALVIN, TEXAS 77512

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I. INTRODUCTION

A. Authorization

This report was prepared in accordance with the contract between the City of Friendswood, Texas and COENCO, Inc., Consulting Engineers and dated October 17, 1983. That contract was in accordance with a contract and agreement made between the Texas Department of Water Resources and the City of Friendswood, Texas. This project is authorized under Chapter 355 of the Texas Water Code.

B. Purpose

The purpose for the undertaking of this project is a joint effort between the Texas Department of Water Resources and the City of Friendswood to conduct Flood Control Planning Studies for Chigger and Cowarts Creeks in the City of Friendswood, said creeks being in the Clear Creek watershed. As defined in Chapter 355 of the Texas Water Code, flood control planning is a developing of mechanisms to provide the most cost effective flood protection by means of structual and non-structual measures to abate flood hazard. In the past 10 years, and more particularly since July of 1979, floods and flooding have resulted in millions of dollars of damages to homes and property in the City of Friendswood. The need then is an overall plan to abate these flood hazards and thereby reduce the millions of dollars of damages in homes and other property in the City of Friendswood.

C. Project Scope

The scope of the project services was defined in the contract between the Texas Department of Water Resources and the City of Friendswood, and subsequently in the contract between the City of Friendswood and COENCO, Inc., and is as follows:

- Establish formal and direct liaison with appropriate project directors of the U.S. Army Corps of Engineers and U.S. Soil Conservation Service for the purpose of coordinating the work of this planning study and to acquire available data pertinent to this study planning effort.
- Conduct on the ground field surveys of Chigger and Cowarts Creeks within the City of Friendswood.
- 3. Using existing stream bed and bank elevations and projected flood water surface elevation profiles, develop proposed channelizations for Cowarts and Chigger Creeks within the City of Friendswood.
- 4. Develop flood control channel preliminary designs for containing one or more low frequency flood events on each of Chigger and Cowarts Creeks in the City of Friendswood.

- 5. All design flood events shall be compatible with flood designs developed by the U.S. Army Corps of Engineers Study of the Clear Creek Watershed reported in May 1982.
- 6. Identify and consider flood control alternatives in addition to stream channelization. These alternatives should include flood water retention or detention basins and non-structural flood control measures.
- 7. Specifications will be made for the engineering design and cost estimates for the potential flood control measures based upon current prices.
- Compute estimates of the flood protection benefits that may be expected from the various flood protection alternatives evaluated.
- 9. Submit a final report which shall include as a minimum, detailed survey results, preliminary design and cost of flood control structures, estimates of flood protection benefits, and specifications of further work needed to complete and implement the flood control plan for Chigger and Cowarts Creeks in the City of Friendswood.

II. THE PROBLEM

A. Urbanization

Urban hydrology has been defined as interdisciplinary science of water and its interrelationships with urban man. It is a relatively young science and the bulk of its knowledge has accumulated since the early 1960's. L. B. Leopold in his "Hydrology for Urban Land Planning- a Guide Book on the Hydrologic Effects of Urban Land Use" says of all the land use changes effecting the hydrology of an area, urbanization is by far the most forceful. In 1970, 73.5% of the population of the United States lived in an urbanized area (U.S. Department of Commerce 1972). Each year urban expansion claims another 420,070 acres (U.S. Department of State 1971). Many studies have shown that urbanization causes an increase in flooding and drastic changes in water quality. Larger floods increase the risk of property damage and/ or injury to residents.

Before urbanization of the area became so intense, vegetation as well as small depressions detained significant quanities of water, actually storing the moisture and delaying its flow and allowing some rain water to reevaporate into the atmosphere. This surface storage, or detention in its natural state, increased the amount of infiltration in an area. Rain falling on a natural area of forest and meadows is intercepted by the leaves and branches of trees and smaller plants.

When the vegetation cover becomes saturated, the subsequent rain water begins to drip on to the ground penetrating the soil. Runoff may be defined as stream flow, or the sum of surface runoff and subsurface runoff. Surface runoff equals precipitation minus the sum of surface storage and infiltration. In other words, when the surface storage and soil becomes saturated, infiltration ceases and subsequent rainfall becomes surface runoff.

Urbanization begins with the occupancy of rural lands by small, concentrated communities with close grouping of homes, schools, churches and commercial facilities. Further growth comes along and results in large residential subdivisions, additional schools, shopping centers and an enlarged network of streets and sidewalks. Then the central business districts evolve containing large stores and offices and often cultural and civic centers. The process continues until homes, apartment complexes, commercial and industrial buildings, streets, parking lots, and sidewalks occupy all or most of the former rural land area. As the land surface is developed for urban use, a region is transformed from the natural state to a totally manmade state. New structures add large amounts of impervious areas to the watershed, which in general increase slopes and considerably diminish the water storage capability. All of this increases the runoff rate and the runoff amount.

Drainage in most urban areas is facilitated by storm sewers. In one study it was shown that improvements of the drainage system may reduce

lagtime to 1/8 of that of natural channels. This lagtime reduction, combined with an increased storm runoff resulting from impervious surfaces, increases the flood peaks by a factor that ranges from 2 to nearly 8.

B. Planning Lagtime

In addition to the urbanization, the lag in proper planning to compensate for urbanization is also part of the problem. In man's haste to build communities, homes, shopping centers and other parts of urbanization he fails to properly plan for the increased runoff of the storm waters. With long range foresight, cities, planning commisions, and drainage districts could control the increased runoff rate of storm waters with the proper type of planning. This does not necessarily mean just widening, deepening and straightening out the creek and drainage channels to take more runoff from the urbanization. Various other methods will be discussed in a later section of this report.

Major rainfall events have occurred in the watershed of this planning study over the past 50 or so years. In July of 1979, tropical storm Claudette deposited in excess of 26 to 28 inches of rain in parts of this watershed resulting in flood damages estimated to be many millions of dollars. In September of that same year another storm classified as probably a 100 year frequency storm brought even more flooding to the area. In 1981 another major storm again flooded many of

the homes in the Friendswood area. Very little has been accomplished in the past years in the way of flood prevention planning or actual construction due to the lack of funds to provide the planning. These storms and the increased flooding alerted the citizens to the fact that they needed something done to prevent further flooding and destruction of property.

III. LOCATION AND DESCRIPTION

In Galveston County, Friendswood has 4 major creeks in the watershed. The largest of these is Clear Creek, and studies by the U.S. Army Corps of Engineers and others have been made on Clear Creek. Mary's Creek has had engineering studies and engineering design and construction of the major portion of it in Friendswood. The two larger remaining creeks are Cowarts Creek and Chigger Creek. Cowarts Creek, Chigger Creek, and Mary's Creek all empty into Clear Creek in the Friendswood area. Approximately 35,800 linear feet of Chigger Creek exist in the City of Friendswood. Across the county line in Brazoria County approximately 22,200 linear feet of Chigger Creek exist. This means that 61.7% of the length of Chigger Creek is in Friendswood with the remainder in Brazoria County. The area in Friendswood drained by Chigger Creek is 5,252 acres with a total drainage area including the Brazoria County area of approximately 8,176 acres. This situation is reversed for Cowarts Creek as 20,100 linear feet of Cowarts Creek exist in the City of Friendswood, but 41,700 linear feet exist in Brazoria County. The total area in Friendswood drained by Cowarts Creek is approximately 1900 acres with an additional 10,230 acres in Brazoria County making a total drainage area for Cowarts Creek of Both of these creeks together drain approximately 12.130 acres. 20,300 acres. Due to the fact that these creeks enter Clear Creek in Friendswood, their size and the quantity of water carried is the largest in their lower reaches in the City of Friendswood. The

topography varies from an elevation of approximately 8 to 10 feet to approximately 40 feet. This area is in the very most north end of Galveston County and joins Brazoria County on the west and Harris County on the north and northeast.

For over 15 years the U.S. Corps of Engineers have been making studies on Clear Creek, and periodically revising those studies. In 1984 and 1985 Bernard Johnson Engineers made a study on a portion of Clear Creek for some modifications in the total study, mostly due to an additional outlet at Clear Lake. The results of these studies and their corresponding backwater profile elevations have been used and coordinated in this study of Cowarts and Chigger Creeks.

The soil characteristics in the watershed studied are comprised of clays, silts and some localized sandy pockets. The clays and silts have high shrink-swell protential, low bearing capacity, high moisture content and low permeability. The climate in the area studied has historical weather records obtained from the Alvin weather station of average temperatures ranging from 54°F. to 80°F. and above in the summer. The average annual precipitation in this watershed is approximately 47 to 48 inches.

IV. EXISTING CONDITIONS

A. General

In the early stage of a Flood Control Planning Study, the existing conditions of the streams under study and their watershed are investigated and established. Some type of overall topographical maps of the entire watershed must be used in order to delineate the actual watershed of any particular creek or stream at any particular point. Obtaining such data in the initial phase of the planning study provides a basis for comparison between the existing conditions and the area after improved conditions are established. These can then be compared as to the cost benefit ratio for the proposed flood control improvements. It is important in this phase to obtain good data and accurate data if the study or analysis is to be very conclusive.

B. Field Surveys

1. Horizontal

Field surveys were performed on the ground along Chigger Creek and Cowarts Creek in order to locate horizontally the existing stream bed and banks and all objects or structures that might have an influence on the flow of the water or the widening, realignment, or deepening of the creek itself.

All bridge structures were carefully measured and located accurately, including the piers, abutments and other portions that would influence the flow of the water going through or over the structure. All fences up and down the streams were located and any houses or other buildings that were within a distance considered important in the final analysis of the relocation of the creek. All pipe lines were located and identified.

2. Vertical

Vertical control was then established from known bench marks in the area. These bench marks had been updated so that the elevation used was on the latest adjusted datum. From these known elevations at these bench marks, temporary bench marks were established up the length of Chigger Creek and Cowarts Creek. Bench mark loops were run on these and closed out to assure that they were accurate. Then from these temporary bench marks, elevations were taken where needed on the creek flow line of the bridges, on the elevations of the roadway and the bottoms of the girders of the bridges and all other needed elevations. Cross sections of the creek and out each side from the centerline were run to a point where an elevation was obtained that matched the elevation given on FEMA maps in the Friendswood City Public Works Department for 100 year flood elevations. These cross sections were taken at

intervals of from 200 to 500 feet as the need existed. These were then plotted up in the office to be used in modeling the existing conditions of the two creeks.

C. Hydrology

1. Computer Model

The Chigger Creek and Cowarts Creek watersheds were modeled utilizing the Hydropac computer program by Holguin & Associates, Inc. and authored by Jefferson A. Rampy. This computer package will generate runoff hydrographs using a number of methods. The one chosen for this study was the Soil Conservation Service (SCS) method which had been taken from the SCS National Engineering Handbook, Section 4, Chapter 16 and SCS Technical Release 55. This was chosen because the program had the proper modifications and assumptions to use the soil-cover-complex method described in NEH-4 to compute runoff from urban areas. The variables used in this method apply to runoff from both agriculture and urban watersheds, which this study encompasses. With the proper experience in the selection of some of the variables used, excellent results are obtained.

2. Basic Parameters

Some of the parameters needed in modeling this watershed for this program are the time of concentration, the precipitation, and of course the acreage encompossed. In this particular method curve numbers must be selected for the area. These curve numbers can be modified or be a composite, because of the different land use and the different hydrologic soil groups based on the slope of the land, the type of cover, and other factors of experience in the area. Further in this report is an exhibit entitled "Overall Plan of Chigger and Cowarts Creeks". This plan shows the watershed areas of both Chigger Creek and Cowarts Creek and denotes points along each creek where flows have been calculated. Along Chigger Creek these are denoted with a capital J and followed by a number such as J-20 or J-14, etc. On Cowarts Creek these are denoted by a capital C and followed by a number such as C-26 or C-25, etc. The time of concentration was calculated for each point. The precipitation used in this method was taken from TP 40 and was the 24 hour precipitation given for the various 4 storms modeled. These 4 storms were the 10 year, 25 year, 50 year and 100 year.

3. Computation of Flows

Using the method described in the previous paragraphs with the parameters as discussed, the computation of the various

flows at the different points on Chigger and Cowarts Creeks was accomplished. The watershed of Chigger Creek in Friendswood encompasses 8.2 square miles of a total watershed of Chigger Creek of 12.78 square miles. The watershed of Cowarts Creek in Friendswood is 2.97 square miles out of a total watershed in Friendswood and Brazoria County for Cowarts Creek of 18.95 square miles. The flows were computed and are given in Table 1 further in this report. The precipitation used for a 10 year storm was 8.6 inches, and for a 25 year storm was 10.0 inches, and for a 50 year storm was 11.6 inches, and for a 100 year storm was 13.2 inches. As stated previously these were obtained from the National Weather Bureau Techinical Paper 40.

D. Hydraulics

1. Computer Model

The computer model used for this portion of the study is by Coherent Systems 2200 WSP2 (Water Surface Profile 2) computer program. The original WSP2 program was developed by the Engineering Division of the U.S.D. Soil Conservation Service (SCS). That particular version is explained fully in SCS Technical Release No. 61. Another version, the Lisle version, was developed by the Lisle, Illinois office of the

SCS. Coherent Systems 2200 WSP2 is based on the Lisle version and is considered to produce more accurate results. It allows actual measured data to be input for each reach of a river or stream. This program can compute water surface profiles and open channels, and can also estimate head losses at restrictive sections, including roadways with either bridge openings or culverts.

2. Input Data

The input data required to run the water surface profiles using this computer program is the starting conditions, namely a discharge relationship at the starting section. Also needed are channel lengths, flood lengths and drainage areas. Cross section profiles are needed at valleys and roads with Manning's 'n' value changes along any given profile. Road data needed is the type of road opening, either culvert or bridge. Also the skew angle which is the angle of flow in degrees with the perpendicular to the centerline of the roadway. Likewise the girder points and the type of culvert or bridge. The flow data needed for this is obtained from the previous discussion on hydrology and the computation of flows obtained there. The starting water surface elevations where Chigger Creek and Cowarts Creek enter Clear Creek were obtained from the U.S. Corps of Engineers Study. The cross sections and measurements of

bridges and structures were obtained as discussed previously by on the ground field surveys. Roughness coefficients (Mannings 'n') for Chigger and Cowarts Creek were estimated by inspection of the area and experience from previous work. Values used varied from 0.04 upwards to 0.09.

3. Water Surface Profiles

Using the computer program described and the input data, the water surface profiles were computed for a 10 year frequency, a 25 year frequency, a 50 year frequency and a 100 year frequency storm for both Chigger Creek and Cowarts Creek. Copies of these computer runs are enclosed as a part of this report. Table 2 of this report gives the elevations obtained from these water surface profile runs for Chigger Creek for a 100 year flood at various locations up Chigger Creek. Table 3 gives the same information for Cowarts Creek.

V. PROPOSED IMPROVEMENTS

A. General

The Clear Creek Drainage District, which controls drainage in new subdivision developed in the City of Friendswood, requires that all new subdivisions have detention systems, so that their runoff from the development after improvements are in and houses are built will not be any faster from a 25 year storm than the runoff from that same area of land in the undeveloped state. The Brazoria County Drainage District No. 4 controls the drainage for any new developments that can be built on the upper reaches of Chigger and Cowarts Creeks. This drainage district is now requiring that all new developments from 5 acres and up have detention systems built in that will not allow the developed runoff to be any faster from a 100 year storm than the undeveloped area would generate from that same storm. Therefor, in evaluating the improvements for Chigger and Cowarts Creek, it is not deemed necessary to provide for new developments in the future and additional runoff from these new developments. Therefor, the proposed improvements of this study are for what is now developed and no additional capacity is anticipated beyond what is needed at this time.

B. Preliminary Designs

1. Realignment of Channels

can be seen from the plan and profiles incorporated with this As study, Chigger and Cowarts Creek wind around and have many oxbows in their alignment. Therefor one of the first proposed improvements is to realign the channels and cut out unnecessary bends and oxbows in these channels. This proposed new alignment or realignment is shown on the enclosed plan and profiles of these two creeks. The existing length of Chigger Creek in Friendswood is some 35,863 feet. The proposed length with the realignment of the channel is 31,060 feet, or a reduction in channel length of 4,803 feet. The existing length of Cowarts Creek in the City of Friendswood is 20,090 feet. The proposed channel length of Cowarts Creek in Friendswood is 16,111 feet, or a reduction in channel length of 3,979 feet. Without any further improvements, the realignment of these channels and the reduction in their length would mean a better grade for the creeks and a smoother flow which would result in more flow being able to be carried in the same size channel. The citizens living along these creeks do not particularly care for the realignment of the creeks in their property, but as many of them have been flooded in the past, most of them are working with the Clear Creek Drainage District in an effort to reduce the flooding and are thereby inclined to give right-of-way for widening and realignment as needed in order to reduce the flooding conditions.

2. Sizing Channels

The channels as they exist are very much undersized to carry the existing flow that comes down these creeks in times of severe floods. Therefor the second proposed improvement would be to enlarge the channels and to correct the grade of the flow line of The channels can be deepened somewhat due to the the channels. realignment and still maintain a good grade. The field surveys showed that the channels as they exist have a flow line that is not consistant and goes up and down, and in some cases has a reverse grade. Working with the water surface profiles and the quantity of water that these creeks need to carry in a 100 year storm, the channels have been sized accordingly. The bottoms vary according to the location in each creek and how much flow would occur at that point. Further in this report some typical channel sections are shown. As these indicate the proposed channel would be trapezoidal shaped with 3 to 1 side slopes. The 100 year storm frequency is the one required for federal insurance. Therefor in order to obtain proper insurance in this area the proposed channels have been sized to carry the 100 flood water.

3. Bridges

As shown in the computer printouts, the bridges were analyzed in running the water surface profiles. In most cases the bridges can carry the flow of water with some dredging out of the channel beneath the bridge and concrete lining along and underneath the bridges. This lining is proposed to go only on the sides and

not the bottom of the creek channel. This lining would extend out and rap around the side slopes just outside of the bridge itself. With this type of improvement, the bridges would carry the 100 year flow. Several of these bridges have been recently built and designed so that they would carry the flow before this study was made. Two of these are the bridge over Cowarts Creek at Sunset and the bridge over Chigger Creek at Greenbriar.

C. Alternatives

1. Upstream Detention

In this study, detention near the county line either in Friendswood or in Brazoria County was considered. As an example, detention was considered on Chigger Creek just across the county line in Brazoria County. Various sized detention reservoirs were studied, and in order to reduce the channel of Chigger Creek appreciably, the detention computed to be approximately 735 acre feet needed. At the position mentioned in Brazoria County, the depth of Chigger Creek would allow this detention reservoir to be approximately 7-1/2 to 8 feet deep. This then means that in order to have the 735 acre feet, there would need to be purchased a 100 acre tract to build this detention reservoir. When all costs were in including the cost of the land for the detention reservoir and balanced against the savings in the construction of the channel down stream and the acquisition of land for said channel,

the upstream detention did not prove to be cost effective. Land in that area was found to cost approximately \$6,000 to \$7,000 per acre. This would mean the cost of the land alone would range between \$600,000 and \$700,000. The only cost saving downstream due to this would be the actual cost of excavation for the larger channel against the cost of excavation for the smaller channel. The drainage district is working very well with downstream property owners to acquire the additional land for larger channelization without cost. If this were not true and the land cost of the additional width of the channel all the way below the detention reservoir had to be added, then this method would prove a Without the land cost below, the cost effective alternative. savings in the excavation of the smaller channel would be approximately 60 to 70 percent of the cost of the land for the detention reservoir.

2. Small Dispersed Detention

Another alternative instead of large detention reservoirs would be small dispersed detention throughout the watershed area. This again would mean the acquisition of small tracts at various locations on tributaries into Chigger Creek and Cowarts Creek. The cost of this land acquisition proves prohibitive at this time. If done in subdivisions as a part of the required drainage improvements, this is a very viable alternative. As stated previously in this report, this is being done both in Friendswood and

in the Brazoria County Drainage District No. 4 area. This keeps the flow from increasing due to development, but does not correct the drainage problem as it exists, which is too much flow for the size of the channels at this time.

3. Roof Top Storage

As the open area is developed, there are many houses in the subdivisions, buildings in office complexes and industrial parks and other structures where storage of storm water can be held on properly designed roofs. This is an additional alternative for future drainage, but proves non-cost effective to try to install that type of storage on existing roofs and structures.

4. Porous Pavement

There are a number of types of porous pavement that can be used for parking lots and for streets. Some of these are asphaltic and some are concrete. Porous pavement usually works well in an area where the soil is more porous beneath it than in the area of study in this case. In this area studied, the soil is more of the clay and gumbo type which is very tight and does not allow much infiltration into it after the initial wetting from the rain. Therefor porous pavements do not work nearly as well in this area as they would in some other localities.

5. Parking Lot Detention

Parking lot detention or parking lot storage is another measure that can be used in subdivisions, office complexes, industrial parks or commercial and industrial parcels. A certain amount of storage of the storm water can be detained in properly designed parking areas. This is an economical solution for the storage for detention of storm water as the land is still being put to some use other than just for detention of storm waters. This again is an alternative for a preventative measure for future development.

6. Swales

An alternative to curbs and gutters is grassed depressions with a subsurface drain or swales to carry the water along side of paved streets and roads rather than putting the water in curbs and gutters and then into storm sewers. The curbs and gutters in storm sewers do not allow for much infiltration or detention, whereas the grassed depressions or swales will slow the flow of the water and allow for more infiltration and more evaporation. The swales in place of curbs and gutters generally increase the amount of right-of-way needed for a street in order to get the proper drainage. In many cases this is advisable and will work quite well and as stated, decrease the flow and slow down the flow so that the time of concentration is lengthened and thereby in

effect, the flow into the creeks is slowed down. This is another alternative that can be used in future subdivisions and building of streets, but would be expensive to attempt to change any existing street with curbs and gutters.

7. Dutch Drains

Dutch drains are simply gravel filled ditches that may have an optional drainage pipe in the bottom. This type of a drainage ditch could replace the grassed swale or the curb and gutter. It would not take as much right-of-way as the grass swale and would carry more water for the amount of land that it required. The result would be reducing the volume of storm runoff and thereby reducing flood peaks and increasing ground infiltration.

8. Parks and Recreation Areas

A final type of alternative studied was the use of parks and recreational areas in low lying land that could be within the 100 year flood plain and its uses would be restricted. Parks create little runoff of their own, but provide excellent storage potential. Using parks as storage areas can reduce the total urban system cost by combining capital requirements and maintenance requirements into multiple-purpose facilities. Storage can also be combined with recreation areas. Open space areas can be utilized for the temporary detention of the storm runoff with a minimum

effect on their primary function. Recreational areas, such as soccer or football fields, generally have a substantial area of grass cover which often has a good infiltration rate. Storm runoff from such fields is generally minimal. This is a highly recommended alternative, as more parks and recreational areas are needed and this would serve both purposes exceptionally well.

VI. CONCLUSIONS

This report indicates the following conclusions:

- A. The difference in the acreage that is under the 100 year flood in its existing condition and the acreage that is in the 100 year flood after the improvements are made is a total of approximately 847 acres. This land should be considered as reclaimed land and the value increased.
- B. As shown in Tables 2 and 3, the construction of the proposed improvements will result in lowering the 100 year flood from approximately 2 feet in some cases to a maximum in excess of 7 feet. This is contingent upon the construction of the proposed improvements in the Bernard Johnson Flood Study of a portion of Clear Creek.
- C. The estimated construction cost of all the proposed improvements in this study is \$2,229,417. The increased value of the acreage removed from the 100 year flood plain is approximately \$12,705,000. This would indicate a net benefit of \$10,475,583. The Federal Emergency Management Agency reports show that claims of damage in the Friendswood area from 1978 through 1984 amounted to \$31,028,532. There appears no accurate way to determine how much of the 1979 claims of \$29,511,041 were due to the July flood that year that was termed a 500 year flood. It is considered a good estimate that at least 70% were probably due to the 500 year flood and the remainder would have been

flooded without the July flood. Therefor, this still leaves \$10,370,803 in damages over these years. The proposed construction improvements should alleviate approximately 40% of the homes damaged due to 100 year floods or less. Forty percent of the damages for those years amounts to \$4,148,321. If this is added to the increased land value for reclaimed 100 year flood plain as stated previously, the total net benefit would be \$14,623,904. It should be remembered that this benefit is predicated on the 10 year frequency channel improvement on Clear Creek with its resulting lowering of the water surface profile of Clear Creek.

VII. RECOMMENDATIONS

- It is recommended that the preliminary designs noted in this report, A. namely the realignment of the channels and the increased size of the channels with the bridge repairs be constructed. There are several locations where pipe culverts need to be enlarged. On Chigger Creek, the culvert at St. Cloud needs an additional 6' pipe. Just upstream a long 5' diameter pipe exists under part of the golf course. An additional 5.5' diameter pipe needs to be installed. On Cowarts Creek between Greenbriar Drive and Baker Road there is an oil trap built right into the creek. This trap is causing about a 2.5' difference in water surface elevation just for a 25 year frequency storm. In other words it is causing the water surface upstream of it to be about 2.5 feet higher for a 25 year frequency flood than it should. It is recommended that this structure be removed. The water flows over it from less than a 10 year storm and would wash over any oil trapped, thereby defeating its purpose. As shown previously the above proposed improvements have a very good cost benefit ratio.
- B. It is further recommended that the Planning Commission of Friendswood and the Clear Creek Drainage District continue to require some type of detention in most new developments of 5 acres and above, unless it can be clearly shown by engineering drainage analysis that the development as proposed will not adversely affect any downstream area. This does not mean simply subdivisions but developments of commercial areas

also. The required detention can be of the detention pond, the detention in swales, the detention by dutch drains, the detention by the use in parks and recreation areas, roof top storage, or parking lot detention. The goal would be that no increase in runoff would come from developed areas more then what comes from them in the undeveloped state for a minimum of a 25 year storm, and preferably a 100 year storm.

PRELIMINARY CONSTRUCTION COST ESTIMATE (100 Year Channel)

1.	Channel Excavation: 1,020,078 C.Y. @ \$1.50	= \$	1,530,117
2.	Pipeline Lowering: 16 Ea. @ \$30,000	-	480,000
3.	Concrete Slope Paving under Bridges: 1,660 S.Y. @ \$45	=	74,700
4.	Clearing & Grubbing: Lump Sum	=	44,600
5.	Miscellaneous	=	100,000
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	TOTAL ESTIMATED PRELIMINARY COST	\$	2,229,417

SECTION NO.	APPROX. LOCATION	DRAINAGE AREA IN ACRES TO THIS POINT	100 YR. TOTAL FLOW, CFS
	County Line	596	519
J-4B	In Sunmeadow	825	684
J-9		2,924	2,336
J-10		3,438	2,690
J-11		3,793	2,870
J-12		4,017	2,952
J-13		4,304	3,068
J-14	Greenbriar Bridge	4,575	3,177
J-15	F.M. 528 Bridge	4,705	3,204
J-16	Upstream of Tributary	4,740	3,220
J-17	Tributary Only	1,733	1,658
J-18	Downstream of Tributary	6,473	4,401
J-19	F.M. 518 Bridge	6,640	4,397
J-20	Oak St. Bridge	6,746	4,400
J-21	At Tributary	7,640	4,942
J-22		7,849	4,986
J-23	At Clear Creek	8,176	5,094
C-20	County Line	10,231	6,225
C-21	Greenbriar Dr.	10,862	6,367
C-22	Sunset Bridge	11,127	6,475
C-23		11,300	6,468
C-24		11,571	6,559
C- 25	Castlewood Bridge	11,711	6,582
C-26	Winding Way	11,866	6,626
C-27	At Clear Creek	12,129	6,557

 TABLE 1

 CHIGGER AND COWARTS CREEKS

 100 YEAR FLOW

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TABLE 2CHIGGER CREEK100 YEAR FLOOD ELEVATIONS

OLD STATION	LOCATION	EXISTING CONDITIONS	IMPROVED CONDITIONS
26 + 50	Approx5 Mile Upstream from Clear Ck.	17.3	12.6
52 + 43	Approx. 1.0 Miles Upstream	17.7	12.9
60 + 89	At Oak St. Bridge Downstream	17.9	13.0
79 + 40	At F.M. 518 Bridge Downstream	18.9	13.9
104 + 91	Approx. 2.0 Miles Upstream	20.4	14.8
126+ 49	At F.M. 528 Bridge Downstream	21.0	15.1
142+ 56	Just Downstream of Greenbriar Bridge	23.4	16.6
16 1+ 9 0	3.07 Miles Upstream	25.5	18.1
181+ 41	3.4 Miles Upstream	27.0	19.2
213+ 56	4.04 Miles Upstream	29.7	22.8
230+ 34	4.36 Miles Upstream	30.9	25.0
261+ 77	4.96 Miles Upstream	33.1	29.2
271+ 70	5.15 Miles Upstream	33.9	30.3
278+ 24	5.28 Miles Upstream	34.2	31.0
284+ 70	5.40 Miles Upstream	34.3	31.5
288+ 80	5.48 Miles Upstream	34.6	31.7
293 + 48	5.57 Miles Upstream	34.9	32.1
298+ 63	5.66 Miles Upstream	35.0	32.4
305+ 12	5.79 Miles Upstream	35.1	32.5
309+ 72	5.87 Miles Upstream	35.1	32.5
315+ 68	5.99 Miles Upstream	35.2	32.6
320+ 12	6.07 Miles Upstream	35.4	32.7

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TABLE 2 (CONT'D.) CHIGGER CREEK 100 YEAR FLOOD ELEVATIONS

OLD		EXISTING	IMPROVED
STATION	LOCATION	CONDITIONS	CONDITIONS
323+ 18	At St. Cloud Culvert	35.48	34.37
325+ 51	6.17 Miles Upstream	35.5	34.4
328+ 04	6.22 Miles Upstream	35.5	34.4
330+ 77	6.27 Miles Upstream	35.5	34.5
336+ 44	6.38 Miles Upstream	35.6	34.6
341+ 55	6.48 Miles Upstream	35.9	34.7
348+ 45	6.61 Miles Upstream	36.4	34.8
352+ 46	6.68 Miles Upstream	36.6	34.9
358+ 63	6.80 Miles Upstream (Near County Line)	36.8	35.0

OLD STATION	LOCATION	EXISTING CONDITIONS	IMPROVED CONDITIONS
9 + 20	C-27	22.0	18.2
15 + 50		22.1	18.2
19 + 20		22.2	18.2
23 + 70		22.3	18.3
29 + 10		22.4	18.4
34 + 15		22.5	18.4
35 + 20	F.M. 518 Bridge	22.63	18.38
36 + 70		22.7	18.4
41 + 42		22.9	18.5
46 + 40		22.9	18.5
51 + 32		23.1	18.6
56 + 57		23.3	18.7
66 + 25		23.6	18.8
73 + 60		23.9	18.8
76 + 40	Castlewood Bridge	24.54	20.04
77 + 80		24.5	20.1
99 + 00	C-24	24.8	20.6
113+ 90	C-23	25.3	21.3
123+ 87		25.5	21.6
125+ 15	Sunset Bridge	25.89	22.25
137+ 90		27.3	22.9
146+ 65		28.2	23.7
153+ 67	C-21 Greenbriar	29.0	24.2

TABLE 3COWARTS CREEK100 YEAR FLOOD ELEVATIONS

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TABLE 3 (CONT'D)COWARTS CREEK100 YEAR FLOOD ELEVATIONS

OLD STATION	LOCATION	EXISTING CONDITIONS	IMPROVED CONDITIONS
159+ 20		29.8	24.7
168+ 65		30.1	25.5
169 + 05	Oil Trap	29.96	26.77
181+ 40		31.3	27.6
192+ 15		32.5	28.5
194+ 65	Baker Road Bridge	33.05	29.87
200+ 90	C-20	33.4	30.2

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COHERENT SYSTEMS, INC. 2200 WSP2, RELEASE 7.0 BASED ON LISLE, ILLINDIS VERSION

			80/80	LIST OF I	NPUT DATA	
1	WSP2					
2	TITLE	FL000 C	ONTROL PLA	NNING STUD	Y	
3	TITLE		R CREEK			
4	COMMENT	(EX	ISTING CON			
5	DISCHARGE	-1-0	10	25	50	100
6	STARTE	541	13.9	15.3	16.2	17.1
7	OUTPUT	PS				
8	REACH	541	1	00	00	00
9	FLOW-FRED	541	5094	4131	3218	2453
10	REACH	B10	1	269	269	269
11	FLOW-FREQ	810	5090	4130	3217	2452
12	REACH	1061	1	251	251	251
13	FLOW-FREQ	1061	5088	4129	3216	2451
14	REACH	1398	1	337	337	337
15	FLOW-FREQ	1398	4955	4017	3129	2384
16	REACH	1568	1	170	170	170
17	FLOW-FREQ	1568	4920	3989	3106	2367
18	REACH	1840	1	272	272	272
19	FLOW-FREQ	1840	4886	3960	3084	2350
20	REACH	2049	1	209	209	209
21	FLOW-FREQ	2049	4851	3932	3062	2333
22	REACH	2347	1	298	298	298
23	FLOW-FREQ	2347	4817	3903	3040	2315
24	REACH	2650	1	303	303	303
25	FLOW-FREQ	2650	4782	3875	3017	2298
26	REACH	2981	1	331	331	331
27	FLOW-FREQ	2981	47 47	3847	2995	2281
28	REACH	3268	1	287	287	287
29	FLOW-FREQ	3268	4712	3818	2973	2264
30	REACH	3483	1	215	215	215
31	FLOW-FREQ	3483	4678	3790	2950	2247
32	REACH	3887	1	404	404	404
33	FLOW-FRED	3697	4511	3653	2843	2164
34	REACH	4550	1	663	663	663
35	FLOW-FRED	4550	4497	3642	2834	2157
36	REACH	4731	1	181	181	181
37	FLOW-FREQ	4731	4483	3630	2826	2150
38	REACH	4953	1	222	222	222
39	FLOW-FREQ	4953	4469	3619	2817	2143
40	REACH	5243	1	290	290	290
41	FLOW-FREQ	5243	4456	3608	2808	2137
42	REACH	5642	1	399	399	399
43	FLOW-FREQ	5642	4442	3596	2799	2130
44	REACH	5881	1	239	239	239
_45	FLOW-FRED	5881	4428	3585	2790	2123

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PAGE 1 XEQ 09/24/84 REV 03/11/74

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	COHERENT SYSTEMS, 2200 WSP2, RELEASE BASED ON LISLE, IL	3.0	FLI	OOD CONTROL HIGGER CREE	PLANNING {	STUDY		PAGE 2 XEQ 09/24/84 REV 03/11/74		
		80/80	ITST OF IN	UT DATA						
. .	46 REACH 47 FLOW-FRED 48 SEGMENT 49 NVALUE	6103 1 6103 4414 541 1 0-09	222 3574 N	222 2781 751	222 2116		··· ···			
	50 SEGMENT 51 NVALUE	541 2 0.05	C	791						
	52 SEGMENT 53 NVALUE 54 SECTION	541 3 0.09 541	N	1300						
•	55 56 57	0 18.4 300 21.9 600 14.8	100 400 609	20.6 20.9 14.2	200 500 645	21.7 17.9 11.0			,	
	58 59 60	678 7.8 751 1.4 771 -5.1	700 753 780	6.0 -0.4 -2.4	737 760 790	2.0 -3.3 -1.1				•
	61 62 63	791 1.6 900 2.4 1040 10.0	800 960 1086	1.9 4.9 10.7	886 1000 1100	1-4 8-2 10-3				
	64 65 ENDTABLE 66 SEGMENT	1143 9.9 810 1	1200 N	5-7 949	1300	8.8				
	67 NVALUE 68 SEGMENT 69 NVALUE	0-09 810 2 0-05	C	996						
	70 SEGMENT 71 NVALUE 72 SECTION	810 3 0.09 810	N	1500						
	73 74 75 76	0 22-1 300 22-8 600 19-3 820 13-4	100 400 700 842	22-7 22-2 16-8 11-7	200 500 800 859	22-8 21-1 13-7 8-6				
	77 78 79 80	873 6-8 949 1-6 965 -2-9 994 -1-3	900 951 974 996	5.0 0.2 -5.7 1.3	928 955 980 1000	2•6 -0•4 -5•8 2•2				
• .	81 82 83 84	1010 3.1 1087 2.6 1119 3.7 1251 10.0	1039 1097 1163 1281	1-6 2-6 6-2 9-7	1075 1100 1200 1293	1.6 3.2 8.2 10.6 11.3				
	85 84 87 ENDTABLE	1300 10-5 1400 11-1	1336 1452	10-5 8-7 958	1371 1500	11-3 7-2				
	88 SEGMENT 89 NVALUE 90 SEGMENT	1061 1 0-09 1061 2	N C	005	 .				. #	

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		2200 1	ENT SYSTEMS, #SP2, RELEASE ON LISLE, IL	3-0	RSION		DOD CONTROL HIGGER CREE		STUDY			PAGE 3 XEQ 09/24/84 REV 03/11/74	· · · · · ·	
					80/80	LIST OF IN	PUT DATA							
		91 92	SEGMENT	0.05	3		1700				· •···•		··· · ·	
		93	NVALUE	0-09	-									
		94	SECTION	1061										
		: 95		0	23-4	100	22.8	200	22+5					
		96		300	21.9	400	20.1	500	18-5					
		97		600	16-6	656	15.3	700	11.4					
		98		757	11-3	800	8.7	819	7-2					
• .		99 100		895 959	2.2 -0.4	900 967	1-9 -4-6	958 977	1-9 -5-3					
		101		737 986	-4.5	707 994	-0.6	995	1.8					
		102		1000	2.2	1058	3.4	1067	4.7					
		103		1100	6.2	1200	9.9	1247	11.3					
		104		1300	11.0	1400	11.7	1500	10.9					
		105		1600	10-4	1700	9.9							:
		106	ENDTABLE											
		107	SEGMENT	1398	1	N	856							
		108	NVALUE	0.09	_									
		109	SEGMENT	1398	2	C	876							
		110	NVALUE	0.05	3	N	1700							
		111	SEGMENT NVALUE	1398 0.09	3	n	1700							
		112	SECTION	1398										
		. 114	3661104	0	23.3	100	22.9	200	22.4					
		115		300	21-6	400	20.1	500	18.5					
	-	116		600	16.5	611	16-0	700	12-4					
		117		752	11-6	800	8-3	622	6.6					
		118		844	3.0	856	1-8	857	-0.7					
	•	119		865	-3.1	875	-4.2	885	-3-8				•	
		120		895	-0.8 3.1	896 953	2.4 1.7	900 100 0	2.2 1.3	•				
		121		922 1028	1.7	1100	5-4	1200	10.7					
		123		1300	12-3	1400	13.7	1500	14-1					
		124		1600	14.7	1700	14-5							
		125	ENDTABLE											
۰.		126	SEGMENT	1568	1	N	656							
		127	NVALUE	0.09	-									
		128	SEGMENT	1568	2	C	695							
		129 130	NVALUE SEGMENT	0.05 1568	3	N	1300							
		130	NVALUE	0.09	3	14	1300							
		132	SECTION	1568										
		133	2601404	0	18-7	100	17.3	200	16.5					
		134		300	15.9	400	14-5	478	13-6					
		135		500	13.4	529	9.3	656	1.9					

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	•	2200 W	INT SYSTEMS, ISP2, RELEASE ON LISLE, IL	E 3.0	RSION	CH	OD CONTROL HIGGER CREE	K			PAGE 4 XEQ 09/24/84 REV 03/11/74		
					80/80 L	.IST OF INF	PUT DATA			****			
		136		657	-0.8	665	-4-3	675	-4-1		 		
		137		685 700	-2-8	694 710	0.5	695 747	2-2 2.7				
		138 139		700	2.6 2.1	800	3.7 2.3	849	5.5				
		140		862	7.5	900	2.3 9.1	954	12.5				
		141		1000	12.8	1100	14-0	1200	14-5				
		142		1300	14-8								
		143	ENDTABLE										
· .		144	SEGMENT	1840	1	N	862						
		145	NVALUE SEGMENT	0-09 1840	2	С	892						
		147	NVALUE	0.05	-	•	0/2						
		148	SEGMENT	1840	3	N	1300						
		149	NVALUE	0.09									\$
· ·		150	SECTION	1840	10.4	100		200	17.5				÷.
		151 152		0 300	18.4 15.5	100 392	17-6 14-1	200 400	12-8				
	•	152		500	12.7	548	10.8	600	10.6				
		154		700	7-2	767	3.3	800	2.4				
		155		862	2.8	863	-0-9	875	-4-9				
		156		885	-2.9	891	-0.9	872	2-3				
		157		900	2.6	936	6-9	968 1100	9.9				
		158 159		1000 1200	11.2 14.7	1065 1300	13.7 14.6	1100	14-5				
		160	ENDTABLE	*200	1447	1000	14.0						
		161	SEGMENT	2049	1	N	759						
		162	NVALUE	0.09	_	_							
		163	SEGMENT	2049	2	C	794						
		164	NVALUE	0.05 2049	3	N	1400						
		165 166	SEGMENT NVALUE	0.09	3	14	1400						
		167	SECTION	2049									
		168		0	15.6	100	13-6	200	14.2				
		169		300	13-9	400	13-8	411	12-8				
		170		500	13.7	600 759	13-0	66 4 740	9.6 -0.9				
• .		171 172		700 765	7.4 -2.9	759 775	2.5 -4.1	760 785	-0.9				
		172		793	-1.1	794	2.5	800	3.3				
		174		822	1.7	853	2.7	900	5-4				
		175		958	9-0	1000	10.8	1060	13-4				
		176		1100	14-1	1200	15-4	1300	17.0				
		177		1400	17.9								
		178 179	ENDTABLE SEGMENT	2347	1	м	562						
		180	NVALUE	0.09	*	м	394						
		1 100	RAMEOF						-		1	-	

$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		2200 WSP	I SYSTEMS, 2, RELEASE LISLE, IL	INC. 3.0	RSION		IOD CONTROL NIGGER CREE	PLANNING K	STUDY		XEQ	5 9/24/84 93/11/74		
182 NAULUE 0.03 184 SECHEN 2347 3 N 1300 184 SECHEN 0.07 20.1 200 19.4 185 SECTION 0 20.4 100 20.1 200 19.4 187 300 18.5 400 17.3 408 16.1 187 384 5.3 531 7.1 500 0.4 199 564 1.0 522 2.0 540 4.2 199 584 5.3 551 7.4 600 4.6 191 542 571 7.0 600 3.0 192 539 10.2 1200 14.1 1200 15.3 193 500 1 N 444 1200 15.3 199 500 2 C 474 1200 15.3 199 500 2 C 474 1200 15.3 199 500 2 C 474 1200 17.4						IST OF INF								
183 SECHEN 21.47 3 N 1300 184 NAULUE 0.00 20.47 500 10.4 10.4 185 SECTION 23.47 500 10.4 10.4 10.4 189 0 20.4 400 11.7 500 0.4 189 504 1.0 52.2 2.0 54.0 4.0 190 504 5.0 50.1 7.2 50.2 1.7 10.4 4.0 190 53.4 5.0 10.5 511 7.0 400 4.6 190 52.4 1.0.4 53.1 7.0 400 4.6 190 52.4 1.0.2 12.4 53.0 1.2 1.2 1.2 1.2 190 SECHENT 2.00 1.4 1.00 1.4 1.00 1.4 190 SECHENT 2.00 1.4 1.00 1.4 1.1 190 SECHENT <t< th=""><th></th><th></th><th></th><th></th><th>2</th><th><u>C</u></th><th>591</th><th></th><th></th><th> </th><th></th><th></th><th> </th><th></th></t<>					2	<u>C</u>	591			 			 	
134 NUALLE 0-07 135 SECTIO 0 20.4 100 27.3 400 16.1 186 0 16.3 400 17.3 400 16.1 187 300 16.4 400 17.3 400 16.1 188 654 14.0 402 2.0 540 16.1 189 564 16.0 422 2.0 540 16.1 190 564 16.2 551 7.0 400 4.6 191 568 10.5 557 7.0 400 4.6 192 500 10.5 557 7.0 400 4.6 194 700 1.2 100 14.1 1200 15.3 194 700 12.4 16.2 100 14.1 17.7 196 SECRENT 2505 2 C 495 -4.1 197 MacLue 0.00 14.1 17.7 1.00 200 SECRENT 2505 2 C					7	м	1700							
186 SECTION 2347 186 0 20.4 100 20.1 200 19.4 187 300 18.5 400 17.3 408 16.1 188 452 14.0 470 11.7 500 0.4 189 502 14.0 528 2.0 540 4.0 190 548 5.8 557 7.2 560 1.7 1100 191 548 5.8 571 7.0 3.00 3.0 193 624 4.4 648 4.2 700 3.0 194 730 2.7 800 3.7 700 3.0 195 1000 11.1 1200 15.3 1.0 1.1 196 SECHENT 2450 2.0 7.0 1300 17.4 203 NMALUE 0.09 -0 1.00 1.4 1.7 203 NMALUE 0.09 2.1 100 14.1 1.7 204 SECTION 2450					-		1300							
184 0 20.4 100 20.1 200 19.4 187 300 18.5 44.0 470 11.7 500 0.4 189 566 1.40 470 11.7 500 0.4 190 566 1.40 528 2.0 540 4.6 191 548 5.7 7.4 560 1.7 192 590 10.5 557 7.4 640 4.6 193 6.24 4.4 648 4.2 700 3.0 194 730 2.9 600 3.7 900 7.3 195 1000 11.2 1100 14.1 1200 15.3 15.3 196 EKD ADL 0.05 1 N 464 17.4 1200 15.4 197 EKD ADL 0.09 1 N 1100 17.4 100 201 WALUE 0.05 1 100 17.7 10.4 17.7 201 WALUE 0.05 15.7														
189 452 14.0 47.0 11.7 500 0.4 189 56 1.0 528 2.0 540 4.6 190 548 5.8 551 7.2 552 9.7 191 568 10.5 571 7.0 0.0 4.6 192 590 10.5 571 7.0 0.0 4.6 193 224 4.6 668 4.2 700 3.0 193 1000 11.2 1100 14.4 1200 15.3 1.0 193 1000 11.2 1100 14.4 1200 17.4 1200 193 1000 11.2 1100 14.4 1200 17.4 1200 17.4 193 12450 1 N 464 4.6 4.6 17.7 1200 16.4 17.7 204 52(TIM 26.5 2 N 1100 17.4 130 14.4 14.6 204 52(TIM 26.5 3 N 1100 <td></td> <td></td> <td></td> <td></td> <td>20-4</td> <td>100</td> <td>20-1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>					20-4	100	20-1							
199 506 1.0 528 2.0 540 4.6 199 548 5.8 5.2 5.2 542 9.7 191 568 12.9 575 13.4 585 11.9 192 570 10.5 591 7.0 400 6.4 193 624 4.6 668 4.2 700 3.0 194 730 2.9 800 3.9 900 7.3 194 730 2.9 800 1.9 900 7.3 195 1000 11.2 1100 14.1 1200 15.3 1 199 SECHENT 2450 2 C 495 - - 201 NALUE 0.08 - 100 17.4 100 17.4 203 SECHENT 2450 3 N 1100 17.7 204 SECTION 0 20.1 100 19.0 144 17.7 204 SECTION 200 15.7 300 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>														
190 548 5.9 561 7.2 562 9.7 191 568 12.9 575 13.4 551 11.9 192 590 10.5 591 7.0 600 4.6 193 624 4.6 668 4.2 700 3.0 194 730 2.9 800 3.9 900 7.3 194 1245 16.2 1255 16.7 1300 17.4 196 ENOTABLE 18.2 1255 16.7 1300 17.4 198 SECRENT 2650 2 C 475 - 201 MAULE 0.09 - - - - 203 SECRENT 2650 2 C 475 - - 204 520 20.1 100 19.0 164 17.7 - 205 206 15.7 300 9.0 433 1.6														
191 568 12.9 575 13.4 585 11.9 193 624 4.6 668 4.2 700 3.0 193 624 4.6 668 4.2 700 3.0 195 1000 11.2 1100 14.1 1200 15.3 5.3 195 1000 11.2 1100 14.1 1200 15.3 5.3 197 ENOTABLE 725 16.4 7.0 300 17.4 7.4 198 SCHENT 2450 1 N 464 7.4 7.4 200 SECHENT 2450 2 C 495 7.4 7.4 201 NALUE 0.05 - - - - - 203 SECHENT 2450 2.0 1.10 144 17.7 205 SECTION 260 2.0 1.5.7 300 9.0 433 1.9 206 200 15.7 300 9.0 434 -1.3 1.9														
• 192 500 10.5 591 7.0 400 4.4 193 62.4 4.6 648 4.2 700 3.0 194 730 2.9 800 3.9 900 7.3 194 1200 11.2 1100 14.1 1200 15.3 3.0 196 1245 16.2 1255 16.7 1300 17.4 198 SEGMENT 260 2 C 495	·													
193 624 4.4 6.68 4.2 700 3.0 194 730 2.9 600 3.9 900 7.3 195 1000 11.2 1100 14.1 1200 15.3 196 1245 16.2 1255 16.7 1300 17.4 199 NUALUE 0.09 1 N 464 17.9 200 55.6 1 N 464 17.9 201 NUALUE 0.09 1 100 17.4 202 556CHT 2650 2 C 475 1.00 203 820CHT 2650 3 N 1100 1.01 203 820CHT 2650 20 1.7 300 464 2.4 4.54 -1.3 204 520 201 17.7 304 4.64 2.6 -1.3 209 475 2.4 500 2.9 508 3.4 211 73.3 464 2.6 4.54 -1.3														
194 730 2.9 800 3.9 900 7.3 195 1000 11.2 1100 14.1 1200 15.3 196 1285 16.2 1255 16.7 1300 17.4 197 Exontable 2450 1 N 464 17.4 199 SECHENT 2450 2 C 495 17.4 200 SECHENT 2650 2 C 495 17.7 201 NVALUE 0.05 - - - - 203 SECHENT 2650 3 N 1100 - - 203 NOALUE 0.050 - - - - - 204 SECTION 2650 0 15.7 300 9.0 433 1.6 207 442 3.0 464 2.4 455 -1.1 - - 208 477 -3.1 460 6.7 700 10.7 - - - 211														
194124514-2125516.7130017.4197ENDTABLE0.491N464198SECHENT2502C495200SECHENT2503N1100201NWALUE0.051N1100202SECHENT2553N1100203NWALUE0.05110019.0144204SECTION2650020.110019.0205020.110019.04331.620620015.73009.04331.62074423.04642.6465-1.1208477-3.3484-4.3494-1.32094752.45002.95083.42105333.1610017.321173711.680013.0700213ENDTABLE1N667214SECHENT29811N215NVALUE0.0911.00216SECHENT29813N217NVALUE0.0919.220018.2219NVALUE0.9929.410.019.2221020.010019.220018.22235646.26004.75603.42246672.460014.7<								900	7-3					_
197 ENDTAGLE 198 SEGMENT 2650 1 N 464 199 NUALUE 0.09 . . 495 200 SEGMENT 2650 2 C 495 201 NUALUE 0.05 . . . 202 SECMENT 2650 3 N 1100 203 NUALUE 0.09 . . . 204 SECTION 2650 3 N 1100 204 SECTION 260 . . . 206 0 20.1 100 19.0 433 1.8 207 442 3.0 444 2.4 465 -1.1 208 477 -3.3 484 -4.3 474 -1.3 209 475 2.4 500 2.9 508 3.4 210 533 3.1 600 4.7 700 10.7 214 SEGMENT 2981 1 N 667 .		195		1000	11.2		14-1							1°
198 SECNENT 2450 1 N 464 199 NVALUE 0.09 - 495 201 NVALUE 0.05 - 100 203 SECHENT 2630 3 N 1100 203 NVALUE 0.09 - - - 204 SECTENN 260 100 19.0 164 17.7 206 200 15.7 300 9.0 433 1.8 207 422 3.0 464 2.6 465 -1.1 208 200 15.7 300 2.9 508 3.4 209 495 2.4 500 2.9 508 3.4 210 533 3.1 600 13.0 700 16.7 211 733 3.1 600 17.3 91.0 16.7 212 100 16.3 100 17.3 91.0 16.7 214 SECRENT 291 2 6 673 - <td< td=""><td></td><td></td><td>_</td><td>1245</td><td>16-2</td><td>1255</td><td>16-7</td><td>1300</td><td>17.4</td><td></td><td></td><td></td><td></td><td></td></td<>			_	1245	16-2	1255	16-7	1300	17.4					
199 NVALUE 0.09 200 SECMENT 265 2 C 495 201 NVALUE 0.05														
200 SECHENT 2450 2 C 495 201 NVALUE 0.09 203 NVALUE 0.09 204 SECTION 260 205 0 20.1 100 19.0 164 17.7 204 SECTION 260 205 0 20.1 100 19.0 164 17.7 206 200 15.7 300 9.0 433 1.8 207 442 3.0 464 2.6 465 -1.1 208 477 -3.3 460 6.7 700 10.7 210 533 8.0 4.7 700 10.7 211 737 11.6 800 13.0 900 15.0 212 1000 16.3 1100 17.3 1.4 213 NVALUE 0.0 17.3 1.6 467 214 SECHENT 2981 3 N 1100 213 NVALUE 0.0 17.3 1.10 17.3 214 SECHENT 2981 3					1	N	404							
201 NVALUE 0.05 202 SECHENT 2650 3 N 1100 203 NVALUE 0.09 - - - 204 SECTION 2650 - - - - 205 0 20.1 100 19.0 164 17.7 206 200 15.7 300 9.0 433 1.8 206 200 15.7 304 9.0 -1.3 - 208 477 -3.3 484 -4.3 494 -1.3 209 495 2.4 500 2.9 508 3.4 210 533 3.1 600 6.7 700 10.7 211 737 11.4 800 13.0 900 15.0 212 1000 16.3 1100 17.3 14 560 214 560 Hert 298 2 678 - - 214 560 Hert 2981 3 N 1100 - <tr< td=""><td></td><td></td><td></td><td></td><td>2</td><td>c</td><td>495</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr<>					2	c	495							
202 SECMENT 2650 3 N 1100 203 NVALUE 0.09 - - - 204 SECTION 2650 - - - 205 0 20.1 100 19.0 164 17.7 206 207 442 3.0 9.0 433 1.8 207 442 3.0 464 2.6 455 -1.1 208 477 -3.3 484 -4.3 494 -1.3 209 475 2.4 500 2.9 508 3.4 210 533 3.1 600 6.7 700 10.7 211 737 1400 17.3 - - - 213 ENTALE - - 647 - - 214 SEGMENT 2981 1 N 467 - 215 NVALUE 0.09 - - - - 216 SEGMENT 2981 N 1100 -					÷	2	1/0							
203 NVALUE 0.09 204 SECTION 2650 205 0 20.1 100 19.0 144 17.7 206 200 15.7 300 9.0 433 1.8 207 442 3.0 464 2.6 465 -1.1 208 477 -3.3 484 -4.3 494 -1.3 209 495 2.4 500 2.9 508 3.4 210 533 3.1 600 6.7 700 10.7 211 737 11.6 800 13.0 900 15.0 212 1000 16.3 1100 17.3 1.4 213 ENDTABLE 2.1 N 667 2.1 214 SECRENT 2981 2 C 693 - 217 NVALUE 0.09 - - - 218 SECRENT 2981 3 N 1100 219 NVALUE 0.09 - - <					3	N	1100							
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		203	NVALUE											
206 200 15.7 300 9.0 433 1.8 207 442 3.0 464 2.6 465 -1.1 208 477 -3.3 484 -4.3 494 -1.3 209 495 2.4 500 2.9 508 3.4 210 533 3.1 600 6.7 700 10.7 211 737 11.6 800 13.0 900 15.0 212 1000 16.3 1100 17.3 15.0 213 ENDTABLE			SECTION											
$\begin{array}{cccccccccccccccccccccccccccccccccccc$														
$\begin{array}{cccccccccccccccccccccccccccccccccccc$, •													
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$ \begin{array}{cccccccccccccccccccccccccccccccccccc$														
211 737 11.6 800 13.0 900 15.0 212 1000 16.3 1100 17.3 14.3 100 213 ENDTABLE 213 SEGMENT 2981 1 N 667 215 NVALUE 0.09 216 SEGMENT 2981 2 C 693 217 NVALUE 0.05 - - - - - 218 SEGMENT 2981 3 N 1100 - - 219 NVALUE 0.09 - - - - - 220 SECTION 2981 3 N 1100 - - 220 SECTION 2981 - - - - - 221 0 10.0 19.2 200 18.2 - - - 222 300 15.0 400 10.7 500 8-4 - - 223 564 6.2 600 4.7 626 3.6									10-7					
213 ENDTABLE 214 SEGNENT 2981 1 N 667 215 NVALUE 0.09 - - - 216 SEGMENT 2981 2 C 693 217 NVALUE 0.05 - - 218 SEGMENT 2981 3 N 1100 219 NVALUE 0.09 - - - 220 SECTION 2981 - - - 221 0 20.0 100 19.2 200 18.2 221 0 20.0 10.0 10.7 500 B-4 222 300 15.0 400 10.7 500 B-4 223 564 6.2 600 4.7 626 3.6 224 667 2.6 668 -2.2 678 -4.4				737				900	15.0					
214 SEGMENT 2981 1 N 667 215 NVALUE 0.09 - 693 216 SEGMENT 2981 2 C 693 217 NVALUE 0.05 - - 218 SEGMENT 2981 3 N 1100 219 NVALUE 0.09 - - 220 SECTION 2981 - - 220 SECTION 2981 - - 221 0 10.0 19.2 200 18.2 222 300 15.0 400 10.7 500 B.4 223 564 6.2 600 4.7 626 3.6 224 667 2.6 668 -2.2 678 -4.4				1000	16.3	1100	17.3							
215 NVALUE 0.09 216 SEGMENT 2981 2 C 693 217 NVALUE 0.05				2001		N								
216 SEGMENT 2981 2 C 693 217 NVALUE 0-05 - 218 SEGMENT 2981 3 N 1100 219 NVALUE 0-07 - - 220 SECTION 2981 - - 221 0 200 100 19-2 200 18-2 222 300 15-0 400 10-7 500 B-6 223 564 6-2 600 4-7 626 3-6 224 667 2-6 668 -2-2 678 -4-4	·				+	П	00/							
217 NVALUE 0.05 218 SEGMENT 29B1 3 N 1100 219 NVALUE 0.09 .00 .00 220 SECTION 2981 .00 .00 221 0 20.0 100 19.2 200 18.2 221 0 15.0 400 10.7 500 B.6 223 564 6.2 600 4.7 626 3.6 224 667 2.6 668 -2.2 678 -4.4					2	C	693							
219 NVALUE 0.09 220 SECTION 2981 221 0 20.0 100 19.2 200 18.2 222 300 15.0 400 10.7 500 B.4 223 564 6.2 600 4.7 626 3.6 224 667 2.6 668 -2.2 678 -4.4	· .	217	NVALUE	0.05										
220 SECTION 2981 221 0 20.0 100 19-2 200 18-2 222 300 15.0 400 10.7 500 B-6 223 564 6-2 600 4-7 626 3.6 224 667 2-6 668 -2-2 678 -4-4	а. С				3	N	1100							
221 0 20.0 100 19.2 200 18.2 222 300 15.0 400 10.7 500 B.6 223 564 6.2 600 4.7 626 3.6 224 667 2.6 668 -2.2 678 -4.4														
222 300 15.0 400 10.7 500 B.6 223 564 6.2 600 4.7 626 3.6 224 667 2.6 668 -2.2 678 -4.4			SECTION		20.0	100	10.2	200	18.7					
223 564 6-2 600 4-7 626 3-6 224 667 2-6 668 -2-2 678 -4-4		221												
224 667 2.6 668 -2.2 678 -4.4														
						668		678						
			=			692	-0.4	693	2.2					
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		COHERE	NT SYSTEMS,	INC.		FLOO	DO CONTROL	PLANNING	STUDY		PAGE 6	
		2200 W BASED	SP2, RELEASE ON LISLE, IL	3-0 LINDIS VER	SION	CHI	IGGER CREEK				XEQ 09/24/84 REV 03/11/74	
	•	c										
	•	226		700 800	2.7 9.1	744 900 -	4.2 14.9	765 1000 ⁻	6-6 17-1	· · · · · · · · ·		
		228	ENDTABLE	1100	19-1							
		230	SEGMENT NVALUE	3268 0-09	1	N	772					
		231	SEGHENT	3268	2	С	791					
		233	NVALUE	0.05	-		1000					
		234 235	SEGMENT NVALUE	3268 0+09	3	N	1200					
		236	SECTION	3268								
		237		0	19-5	100	18.7	200	17.9			
		238 239		300 600	16.8 7.6	400 700	15.4 4.7	500 745	13.9 3.9			
		240		753	3.1	772	2-5	774	-0.3			
	· ·	241		778	-3.5	781	-4-6	789	-1.3			•
		242		791	2.4	800	3-3	804	3-4			
	,	243		830	9.5	900	11.0	1000	13.9			
		244 245	ENDTABLE	1100	16.8	1128	18.2	1200	19.3			
		243	SEGMENT	3483	1	N	670					
		247	NVALUE	0.09	-							
		248	SEGMENT	3483	2	C	693					
		249	NVALUE	0.05	-		1100					
		250 251	SECMENT NVALUE	3483 0.09	3	N	1100					
		252	SECTION	3483								
		253		0	20-3	100	19-3	200	18.4			
		254		300	17-4	400	16-0	500	14-6			
		255		663	3.4	670	3.3	672	-2.5			
		256 257		680 693	-3.9 2.2	687 700	-3.9 3.3	692 761	-2-6 3-2			
		258		800	4.8	838	3.3 6.9	900	11.6			
		259		961	14-5	1000	15-8	1100	17.6			
		260 261	ENDTABLE SEGMENT	3887	1	N	872					
	• .	262 263	NVALUE	0.09 3687	2	c	893					
		264	NVALUE	0.05								
		265	SEGMENT NVALUE	3887 0.09	3	N	1200					
		267	SECTION	3887								
		268		0	19.6	100	19-0	200	18.3			.,
		269		300	17.5	400	16-6	453	14.2			
		270		500	13-1	521	11.0	534	9-6			

DTABLE GMENT ALUE GMENT ALUE GMENT ALUE CTION	569 615 838 873 885 900 1000 1100 4550 0.09 4550 0.05 4550		IST OF INP 573 700 863 877 892 927 1046 1200 N	UT DATA 8.0 4.9 3.4 -2.3 -1.6 3.9 15.8 19.0 672	600 800 872 880 893 957	6.3 5.2 3.6 -2.9 3.2 4.2 16.9		-
GMENT ALUE GMENT ALUE GMENT ALUE	569 615 838 873 885 900 1000 1100 4550 0.09 4550 0.05 4550	9.2 4.9 5.0 0.1 -3.4 4.0 12.4 17.4	573 700 863 877 892 927 1046 1200	8.0 4.9 3.4 -2.3 -1.6 3.9 15.8 19.0	600 800 872 880 893 957	5.2 3.6 -2.9 3.2 4.2		~
GMENT ALUE GMENT ALUE GMENT ALUE	615 838 873 885 900 1000 1100 4550 0.09 4550 0.05 4550	4.9 5.0 0.1 -3.4 4.0 12.4 17.4	700 863 877 892 927 1046 1200	4.9 3.4 -2.3 -1.6 3.9 15.8 19.0	800 872 880 893 957	5.2 3.6 -2.9 3.2 4.2		
GMENT ALUE GMENT ALUE GMENT ALUE	838 873 885 900 1000 1100 4550 0.09 4550 0.05 4550	5.0 0.1 -3.4 4.0 12.4 17.4	863 877 892 927 1046 1200	3.4 -2.3 -1.6 3.9 15.8 19.0	872 880 893 957	3-6 -2.9 3-2 4-2		
GMENT ALUE GMENT ALUE GMENT ALUE	873 885 900 1000 1100 4550 0.09 4550 0.05 4550	0.1 -3.4 4.0 12.4 17.4	877 892 927 1046 1200	-2.3 -1.6 3.9 15.8 19.0	880 893 957	-2.9 3.2 4.2		
GMENT ALUE GMENT ALUE GMENT ALUE	885 900 1000 1100 4550 0.09 4550 0.05 4550	-3.4 4.0 12.4 17.4	892 927 1046 1200	-1.6 3.9 15.8 19.0	893 957	3.2 4.2		
GMENT ALUE GMENT ALUE GMENT ALUE	900 1000 1100 4550 0.09 4550 0.05 4550	4-0 12-4 17-4 1	927 1046 1200	3.9 15-8 19-0	957	4.2		
GMENT ALUE GMENT ALUE GMENT ALUE	1000 1100 4550 0.09 4550 0.05 4550	12.4 17.4 1	1046 1200	15-8 19-0				
GMENT ALUE GMENT ALUE GMENT ALUE	1100 4550 0.09 4550 0.05 4550	17-4 1	1200	19-0	1007	10.7		
GMENT ALUE GMENT ALUE GMENT ALUE	4550 0.09 4550 0.05 4550	1						
GMENT ALUE GMENT ALUE GMENT ALUE	0.09 4550 0.05 4550		N	672				
ALUE GMENT ALUE GMENT ALUE	0.09 4550 0.05 4550		a					
GMENT ALUE GMENT ALUE	4550 0.05 4550	2		07.2				
ALUE GMENT ALUE	0.05 4550	4	С	693				
GMENT ALUE	4550		6	67.3				
ALUE		3	N	1000				
	^ ^0	3	Л	1000				
CITON	0.09 4550							
		20.6	100	20.3	200	19-0		
	0	17-6	300	15.2	372	10.2		
	290 400	8-4	460	5.8	500	5.5		
	519	4.9	600	5.5	610	7.3		
			657	5.7	672	4-5		
	642	6-5	676	0.4	682	-2.6		
	673	1.8		0.0	693	5.1		
	687 700	-1.8 5.4	692 709	5-8	716	6.7		
	700	9-1	770	11.7	800	14.5		
	848	1/ • 1	700	10.4	1000	2013		
	4771			477				
		L	л	6/3				
		2	~	404				
		2	L.	074				
		7	ы	1700		(
		3	п	1300				
CITON		19.7	100	10.1	200	18.4		
			1104	10.3	ALVW	****		
	DTABLE MENT ALUE MENT SLUE MENT SLUE TION	848 DTABLE SMENT 4731 SUE 0-09 SMENT 4731 SLUE 0-05 SMENT 4731 SLUE 0-09	848 17-1 DTABLE	848 17.1 900 DTABLE	B48 17-1 900 18-4 DTABLE	B48 17-1 900 18-4 1000 DTABLE	B48 17.1 900 18.4 1000 20.3 DTABLE	B48 17-1 900 18-4 1000 20-3 DTABLE HENT 4731 1 N 673 ALUE 0.09

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			2200	NT SYSTEMS, ISP2, RELEASE ON LISLE, IL	3.0	RSION	FLO	DOD CONTROL IIGGER CREE	PLANNING K	STUDY	PAGE 8 XEQ 09/24/84 REV 03/11/74
						80/80 L	IST OF IN	UT DATA			
			316 317	ENDTABLE SEGMENT	4953	1	 N	771		· · · · · · · · · · ·	
			318	NVALUE	0-09						
			319 320	SEGMENT NVALUE	4953 0-05	2	C	790			
			320	SEGMENT	4953	3	N	1400			
			322	NVALUE SECTION	0-09 4953						
			323 324	SECTION	4755	19-2	100	18-5	200	17.7	
•			325		300	16-8	400	14-6	500	13.9	
	•		326 327		510 600	13.5 7.7	544 622	10-8 6-3	571 700	9.5 5.4	
			328		726	4-6	771	1-7	772	-0.5	
			329		777	-2.5	781	-2.2	784	-2-2	
	•		330		789 837	-0.9 5.2	790 869	2.5 8.6	800 900	4.0 10.5	
			331 332		933	12.3	990	14.8	1000	15-4	
			333		1065	16-4	1100	16.5	1200	16.5	
			334		1300	17.8	1400	17.6			
			335	ENDTABLE SEGMENT	5243	1	N	823			
			337	NVALUE	0-09						
			338 339	SEGMENT NVALUE	5243 0-05	2	C	859			
		. •	340 341	SEGMENT NVALUE	5243 0.09	3	N	1400			
			342	SECTION	5243 0	20.2	100	19.9	200	18.5	
		•	344		300	18.5	400	17.7	500	16.7	
			345		600 758	16.1	700 800	13.7 5.3	723 815	12-2 3-1	
			346 347		758 823	8.3 1.7	824	-0.1	830	-0.9	
			348		840	-1-3	851	-1.0	858	-1.1	
			349 350		859 1000	2.1 7.0	900 1077	4-2 13-6	788 1100	3.8 14.5	
	• .		351		1200	16.5	1300	18-8	1400	19.7	
			352	ENDTABLE		. ·	N	0/ +			
			353 354	SEGMENT NVALUE	5642 0.09	1	N	964			
			355	SEGMENT	5642	2	C	980			
			356	NVALUE	0.05						
			357 358	SEGMENT NVALUE	5642 0.09	3	N	1400			
			359	SECTION	5642						
			360		0	20.0	100	19.7	200	18.9	

			00/00	tot or the	-		
·				IST OF INP 400			17-0
			- 18+2	400	17.5	300	15-5
2		600	16.9 12.0	700 869	12-2	708 900	5.6
3		800	12.0	807	7.4	900	
4		948	4.2	964 971 980 1094	3.0	900 965 975	-0-1
5		967	-1.9	9/1	-1.8	9/5	-1-1
6		979	-0.2	980	3.6 9.2	1000	4-5
7		1068	5.8	1094			9-1
8		1140	12.9 19.7	1200	15-4	1300	18-1
9		1400	19.7				
	ENDTABLE				330		
	SEGMENT		1	N	779		
	NVALUE	0.09		-			
3		5881	2	C	795		
	NVALUE	0.05	_				
	SEGMENT	5881	3	N	1300		
	NVALUE	0.09					
	SECTION	5881					
8		0	20.1		19-8		19.2
9		300	18.4	400	17.8	500	17-4
0		600	16-1	679	13.7	700	11-1
1		751	6.1 -2.8	779	4-3	780	-1.8
2		783		786	13-7 4-3 -2-4	790	-1-6
3		794	-0.8 5.6	795	3.2	800	3.8
4		819	5.6	900	0-0	800 1000	11.7
5		1100	16.8	1200	18.2	1300	19-2
6 I	ENDTABLE						
7 :	SEGMENT	6103	1	N	869		
8 (NVALUE	0.09					
9	SEGMENT	6103	2	C	887		
Ó i	SEGMENT NVALUE	0.05	-				
	SEGMENT	6103	3	N	1300		
	NVALUE	6103 0.09	-				
3	SECTION	6103					
4		0	20.2	100	19-9	200	18.9
s		300	18.4	400	16.7	500	16-1
6		525	15.8	600	12-1	651	8-8
7		678	6.7	700	6.4	800	6.5
, 8		858	4.6	869	2.9	870	0.2
9		873	-0.7	877	2.9 -1.5	881	-0-8
y 0		886	-0.7 -0.2	887	4.6	900	5-1
1		905	5.1	984	10.4	1000	10-4
2		1100	12-1	1200	15.4	1300	
-		1100	12.1	1200	13.4	1944	40-7
3	ENDTABLE COMPUTE	541	6103	541			
4 (341	0103	371			

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COHERENT SYSTEMS, INC. 2200 WSP2, RELEASE 3.0 Based on Lisle, Illindis Version

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FLOOD CONTROL PLANNING STUDY CHIGGER CREEK

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COMPUTE

-----STARTING DATA FROM GIVEN ELEVATION---

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DHERENT SYSTEM 200 WSP2, RELE ASED ON LISLE,	ASE 3.0	VERSION		CONTROL PLA GER CREEK	ANNING STUDY		- • •		GE 10 09/24/84 V 03/11/74	
RATING TABL	E FOR SECT	ION 541	DA=	1.0						
NO.		AREA	CFS	DAMAGE	ACRES FLOODED CHANNEL	NON-DAM	CSM	CRIT. ELEV	FRICTION	
DANK FULL	5-0 1-4	0.0 171-5	0.0 839.2	0.00	0.00	0.00				
ZERO DAMG	8.8	2194-6	1794-6	0.00	0.00	0.00				
1 -	13.9	5373.7	2453-0	0.00	0.00	0.00	10-00	2.5	0-00004	
2	15.3	6356-4	3218.0	0.00	0.00	0.00	25.00	2.9	0-00004	
3	16.2	7011.9	4131-0	0.00	0.00	0.00	50.00	3.3	0.00005	
4	17.1	7694-2	5094-0	0.00	0.00	0.00	100.00	3-8	0.00006	
	****	******	**********	*PROFILE NO	1 EXCEEDS	SURVEY DATA	*******	.**************	£*##	
SEGNENT TAB	LE FOR SEC	TION 541								
				SEG NO						
CSM		TOTAL	1	2	3					
			N	C	N					
1 DISCHA	RGE CFS	2453.	300.	721	. 1432					
2453. VELOCI	TY FPS	0.67	0-34	1-08	9 0.3	7				
2 DISCHA	RGE CFS	3218-	391.	857 -	• 1970	•				
3218- VELOCI		0-71	0.35	1.19	7 0.4	3				
3 DISCHA	RGE CFS	4131-	500-	1042.	2589	•				
4131 • VELOCI	TY FPS	0.82	0.39	1.38	3 0.5	2				
	00F 0F0			4000	7740					

0.60

3248.

238998. 317780. 373226. 431790.

1222.

1-54

121363.

138876.

150633. 162765.

624.

0.43

50164. 63302.

72057. 82915.

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5094.

0.91

410525-

519958.

\$95917. 677470.

4 DISCHARGE CFS 5094. VELOCITY FPS

1 ELEV

2 ELEV 3 ELEV 4 ELEV

13.9 KD 15.3 KD 16.2 KD 17.1 KD

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	2200 WSP2, RELEASE Based on LISLE, II		VERSION		CONTROL FLAN SER CREEK	INING STUDY		· · · •	XE	GE 11 D 09/24/84 V 03/11/74		
	RATING TABLE F	FOR SECT	ION 810	DA=	1.0							
	NQ.	ELEV	AREA			RES FLOODED			CRIT	FRICTION	atus a	
					DAMAGE	CHANNEL 1	NON-DAM		ELEV	SLOPE		
	0	5.7	0.0	0.0								
	BANK FULL	1.3	199-3	883.3	0-00	0.00	0.00					
	ZERO DAMG	7.2	1427.0	1617.4	0.00	0.00	1.66					
	1	13.9	5034-6	2452-0	0-29	0-00	4.07	10.00	2.3	0-00004		
	2	15.3	6056-1	3217-0	0-29	0-00	4.35	25-00	2.8	0-00004		
	3	16-2 17-1	6751.7 7474.4	4130.0 5090.0	0.29 0.29	0.00	4.53 4.73	50.00 100.00	3.4 3.8	0.00005		
	•							*************				
_												
. 8	SEGMENT TABLE	FOR SEC	TTON 810									
	SCORENT INDEE				SEG NO							
	CSM		TOTAL	1	2	3						
				N	С	Ň						
	1 DISCHARGE	E CFS	2452.	322.	934.	1196-						
	2452. VELOCITY		0-78	0.34	1.18	0.36						
	2 DISCHARGE		3217.	416.	1100.	1700.			•			
	3217. VELOCITY	FPS	Q-82	0.35	1.28	0-42						
	1 3 DISCHARGE	E CFS	4130-	547.	1325.	2259-						
	4130- VELOCITY	FPS	0-93	0-39	1.47	0.51						
	4 DISCHARGE		5090-	693.	1540.	2857 •						
		FPS	1.02	0.43	1-63	0-58						
	5090. VELOCITY					1001/7		,				
		7 КD	388344-	51098.	148084-	189163.						
•	1 ELEV 13-9	9 KD 3 KD	388344- 493958-	51098. 63900.	148084 <i>-</i> 169177.	260881-						
	1 ELEV 13-9 2 ELEV 15-3											

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2200	RENT SYS WSP2, R D ON LIS	ELEASE 3	3.0	VERSION		CONTROL PLA SER CREEK	ANNING STUDY			XEC	E 12 09/24/84 03/11/74	
1	RATING T		R SECT ELEV	ION 1061 AREA	DA= CFS	1.0 / DAMAGE	ACRES FLOODED CHANNEL		CSH	CRIT	FRICTION SLOPE	
	0)	5-2	0.0	0.0					• –		
-	ANK FULL		1.8	199-3	905-4	0.00	0.00	0.01				
	ERO DAMO		9.9	2300-1	1738-4	0.00	0.00	2.52				
; -	1		13.9	5757-2	2451.0	0.21	0.00	5.71	10.00	1.6	0-00004	
	2		15.3	7211.6	3216-0	0-21	0.00	5.86	25.00	3.2	0-00004	
	3		16.2	8181-8	4129.0	0-21	0.00	6-04	50.00	3.7	0-00005	
1	4		17-1	9172-5	5088.0	0-21	0.00	6.29	100.00	4+1	0.00005	
į				*******					A************	*********	***	
:	SEGMENT	TABLE FO	DR SEÇ	TION 1061								
1						SEG NO	-					
	CSM			TOTAL	1	2	3					
:					NN	C	N					
1	DIS	CHARGE (CFS	2451.	736-	775	940).				
2	451. VEL	OCITY FR	°S	0.74	0.38	1.20) 0.3	0				
· 2	2 DIS	CHARGE (CFS	3216-	935.	856-	. 1426					
3	3216. VEL	OCITY FR	PS S	0.71	0.40	1.22	2 0.3	4				
3	S DIS	CHARGE (CFS	4129.	1161.	1006-	. 1962	-				
4	129. VEL	OCITY F	PS	0.77	0.44	1.37						
4	DIS	SCHARGE (CFS	5088-	1383.	1152.	2553	i.				
5	6088. VEL	OCITY F	PS	0-83	0.47	1-50) 0.4	7				
1	ELEV	13.9	ĸŋ	372959.	112471.	119162.	141326					
	ELEV	15.3		505794.	147436.	135491						
3		16.2		598090-	168829.	146480	-					
	ELEV	17.1		696760-	187488-	157812						
			112	0,0,001	107400-	13/012	. 31/101					

PAGE 13 COHERENT SYSTEMS, INC. FLOOD CONTROL PLANNING STUDY 2200 WSP2, RELEASE 3.0 CHIGGER CREEK XEQ 09/24/84 BASED ON LISLE, ILLINOIS VERSION REV 03/11/74 RATING TABLE FOR SECTION 1398 DA= 1.0 NO. ELEV AREA CFS ACRES FLOODED------CRIT --------CSM FRICTION DAMAGE CHANNEL NGN-DAM ELEV SLOPE 0 4-1 0.0 0-0 BANK FULL 1.8 215.2 788.7 0.00 0.00 0.46 13.9 4745.9 2384.0 0.00 0.00 5-92 2.5 0-00005 1 10.00 ZERO DAMG 14.5 5283-6 2684-3 0.00 0.00 6-71 2 15.3 6107.3 3129.0 0.31 0.00 7.91 25.00 3.0 0-00006 3 16.2 7091.8 4017.0 0.31 0.00 8-19 50.00 3.3 0.00007 4 17.2 8102-0 4955-0 0.31 0.00 8.45 100.00 3.7 0-00007 SEGMENT TABLE FOR SECTION 1398 SEG NO TOTAL 2 3 CSM 1 C N N DISCHARGE CFS 2384. 249. 880. 1256+ 1 2384. VELOCITY FPS 0-85 0.31 1.31 0.38 3129. 1669. 2 DISCHARGE CFS 397. 1063-3129. VELOCITY FPS 0.91 0.36 1 - 46 0-39 3 DISCHARGE CFS 4017-530. 1214-2274 -4017. VELOCITY FPS 0.45 0.96 0-40 1-59 2934. DISCHARGE CFS 4955. 667. 1354-4 4955. VELOCITY FPS 0.99 0.43 1-69 0-51 1 ELEV 13.9 KD 327860-34113-121013. 172733. 2 ELEV 15-3 KD 407023. 51611. 138340. 217073. 492225-150046. 277343. 3 ELEV 16-2 KD 64816-

348884.

590509.

4 ELEV

17-2 KD

79501 -

162124.

HERENT SYSTEMS 00 WSP2, RELEA SED ON LISLE,	SE 3.0	VERSION) CONTROL PL Iger Creek	ANNING STUDY				GE 14 2 09/24/84 2 03/11/74
RATING TABLE	FOR SECT	ION 1568	DA=	1.0					
NO.	ELEV	AREA	CFS		ACRES FLOODE	D	CSN	CRIT	FRICTION
				DAMAGE	CHANNEL	NON-DAM		ELEV	SLOPE
0	4.2	0-0	0.0						
BANK FULL	1.9	179-8	804-5	0.00	0.00	0.01			
1	13-9	4069-1	2367-0	0.00	0.00	2.38	10-00	3-1	0.00006
ZERO DAMG	14.8	4777.6	2819-2	0.00	0.00	3-14			
2	15-3	5235.9	3106-0	0.15	0.00	3-60	25.00	3.7	0-00008
3	16.3	6170-5	3989-0	0.15	0.00	4-03	50.00	4.0	0-00009
	17.2	7182.4	4920-0	0.15	0.00	4-41	100-00	4.4	0-00010

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÷	SEGMENT TABLE FOR SEC	TION 1568				
				SEG NO		
;	CSM	TUTAL	1	2	3	
;			N	C	N	
-	1 DISCHARGE CFS	2367.	477.	941.	949.	***************************************
	2367. VELOCITY FPS	0.97	0-41	1 - 45	0-42	
	2 DISCHARGE CFS	3106.	632.	1191-	1283.	
	3106. VELOCITY FPS	1-10	0-42	1.69	0.43	
1	3 DISCHARGE CFS	3989 -	785.	1382.	1822 -	
1	3989. VELOCITY FPS	1-18	0.42	1.87	0.51	
-	4 DISCHARGE CFS	4920-	995.	1542-	2382 •	
	4920. VELOCITY FPS	1-21	0.43	1.99	0.58	
ĺ	1 ELEV 13.9 KD	295545.	59609.	117473.	118464-	
ţ.,	2 ELEV 15-3 KD	350249.	71354.	134420.	144476-	
1	3 ELEV 16-3 KD	418146.	82595.	145884 -	189667 -	
1	4 ELEV 17-2 KD	499507 .	100475.	157710.	241322.	

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220	HERENT SYSTEM DO WSP2, RELE DED ON LISLE,	ASE 3.0	VERSION) CONTROL P GER CREEK	LANNING STUDI		· · · · ·		E 15 2 09/24/84 / 03/11/74	
	RATING TABL	E FOR SECTI	ION 1840	DA=	1.0						
;	NO.	ELEV	AREA	CFS		-ACRES FLOODE		CSM	CRIT	FRICTION	
1 .					- DAMAGE	CHANNEL	NON-DAM · ·		····· ELEV	SLOPE	
	0	4.8	0.0	0.0							
1	BANK FULL	2.3	152.6	896-9	0-00	0-00	0.00				
	1	14-0	3900-9	2350.0	0.00	0-00	4.78	10.00	3-6	0-00009	
	ZERO DAMG	14-6	4347-8	2681-4	0.00	0.00	5-60				
1	2	15.4	5083-4	3084-0	0.17	0.00	5-98	25.00	4-0	0.00009	
	3	16-3	6002-0	3960-0	0-19	0-00	6.30	50.00	4-5	0.00010	
i	4	17+2	6970.2	4886-0	0.19	0.00	6.59	100-00	4.9	0-00011	

SEGMENT TABLE FOR SECTION 1840

				SEG NO		
	CSM	TOTAL	1	2	3	
1			N	С	н	
,	1 DISCHARGE CFS	2350.	1236-	824.	290.	
	2350- VELOCITY FPS	1.05	0-48	1-64	0.35	
1	2 DISCHARGE CFS	3084.	1712.	939.	432.	
	3084- VELOCITY FPS	1.05	0.52	1.72	0.35	
	3 DISCHARGE CFS	3960-	2191-	1086.	684.	
	3960. VELOCITY FPS	1.10	0-57	1-90	0-42	
	4 DISCHARGE CFS	4886 -	2698-	1202-	986.	
1	4886. VELOCITY FPS	1.13	0-62	2.01	0-50	
	1 ELEV 14.0 KD	243934.	127553.	86075-	30305-	
1	2 ELEV 15.4 KD	319508-	178173-	98452-	42884 •	
Į.	3 ELEV 16.3 KD	388017.	214914-	106850-	66252.	
1	4 ELEV 17.2 KD	466590.	258019.	115475.	93096.	

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	COHERENT SYSTEMS	. TNC.		F1 000		ANNING STUDY			PA	SE 16		
	2200 WSP2, RELEA				GER CREEK					09/24/84		
	BASED ON LISLE,		VERSION							03/11/74		
	: :											
	RATING TABLE	FOR SECT	ION 2049	DA=	1.0							
	NO.	ELEV	AREA	CFS		ACRES FLOODE	D	CSH	CRIT	FRICTION		
					DAMAGE	CHANNEL	NON-DAM		ELEV	SLOPE		
	0	4.0	0.0	0.0			A 10				1	
	BANK FULL	2-5 14-0	197.3 3524.7	851.6 2333.0	0-00 0-00	0-00 0-00	0-18 4-29	10-00	3.2	0.00010	Y	
	2	15.4	5029.8	3062-0	0.00	0-00	5.51	25-00	3.8	0-00010		
	ZERO DAMG	15.6	5280-6	3264-5	0.00	0-00	5.63					
	. 3	16.3	6158.5	3932-0	0.17	0.00	5-85	50.00	4-4	0.00011		
	4	17.2	7297-0	4851-0	0.17	0-00	6-14	100-00	4-9	0.00011		
		*****	**********	**********	*PROFILE NO	3 EXCEEDS	SURVET DATA	**************	***********	***		
•												
	SEGNENT TABL	E FOR SEC	TION 2049									
	1				SEG N							e
	CSH		TOTAL	1 N	2 C	3 N						•
					*********						-	
	1 DISCHAR		2333.	315-	1008							
	2333. VELOCIT		1.20	0.29	1.7							
	2 DISCHAR 3062- VELOCIT		3062- 1-18	673. 0.33	1153							
	3 DISCHAR		3932.	1120.	1291							
	3932- VELOCIT		1.21	0.41	1-95							
	4 DISCHAR		4851.	1604-	1427							
	4851. VELOCIT	Y FPS	1.18	0.47	2.0	5 0-	58					
	1 ELEV 14	-0 KD	234566-	31689.	101365	. 10151	3.					
		4 KD	307052.	66656 -	116067							
•		-3 KD	378182.	104548.	126056	- 14757	9.					
	4 ELEV 17	.2 KD	470577.	159343.	136348-	- 17488	5.					

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•	COHERENT SYSTEMS 2200 WSP2, RELEA BASED ON LISLE,	SE 3.0	VERSION	FL000 Chig	CONTROL PLAN Ger Creek	NING STUDY		•	XE	GE 17 Q 09/24/84 V 03/11/74			
	RATING TABLE NO- O BANK FULL	FOR SECT ELEV 0-4 7-0	IDN 2347 AREA 0.0 1058.1	DA= CFS 0.0 1121.8		RES FLOODED- CHANNEL 0.00	 NON-DAM 2+55	C\$M	CRIT ELEV	FRICTION SLOPE			
	1 2 3 4	14-0 15-4 16-3 17-3	4541.8 5550.2 6292.5 7075.5	2315-0 3040-0 3903-0 4817-0	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	4-32 5-11 5-57 5-90	10-00 25-00 50-00 100-00	4.7 5.0 5.3 5.6	0.00007 0.00008 0.00010 0.00011	ŝ		
•	SEGMENT TABL	E FOR SEC			SEG NO	_							
	CSM		TOTAL	1 N	2 C	3 N							
	1 DISCHAR 2315- VELOCIT 2 DISCHAR	Y FPS	2315- 0-51 3040-	503. 0.55 621.	21. 0.37 53.	1792- 0-50 2367-						-	
	3040- VELOCIT 3 DISCHAR 3703- VELOCIT	Y FPS GE CFS	0.55 3903. 0.62	0-57 776- 0-63	0-55 87- 0-71	0.54 3040. 0.62							
	4 DISCHAR 4817. VELDCIT	GE CFS	4817 - 0 - 68	944. 0-68	125. 0.84	3747 - 0 - 68							
	2 ELEV 15	-0 KĐ -4 KĐ -3 KD	274488• 342687• 399773•	59742. 70106. 79560.	2209. 5748. 8750.	212536- 266832- 311463-							

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	•		2200 WSP2,	STEMS, INC. RELEASE 3.0 SLE, ILLINDIS	VERSION		CONTROL PL	ANNING STUDI	(* *		XE	GE 18 G 09/24/84 V 03/11/74	· · ·	
			RATING	TABLE FOR SECT	TION 2650	DA=	1.0							
· ·)	IO. ELEV	AREA	CFS	DAMAGE	ACRES FLOOD	DDAM	CSM	CRIT	FRICTION SLOPE		
			1	0 4.2	0.0	0.0								
			BANK FUL	L 2.4	162-1	839-8	0-00	0.00	0.16					
			{	1 14.0	4010-8	2298.0	0-00	0.00	4-15	10.00	3.7	0.00007		
			1	2 15-4	4963-2	3017-0	0.00	0.00	4-87	25.00	4-1	0.00007		
			r.	3 16.4	5686.8	3875.0	0.00	0.00	5.52	50.00	4-6	0.00009		
•				4 17-3	6482.0	4782-0	0.00	0-00	6.03	100-00	5-0	0.00010		
			SEGMENT	TABLE FOR SEC	CTION 2650									
			1				SEG N	10						
			CSM		TOTAL	1	2	3					•	
						N 	C	N				******		5
				SCHARGE CFS	2298.	848.	726		24.				1	
		-		LOCITY FPS	0.88	0.50	1-4		40					
				SCHARGE CFS	3017. 0.93	1135-	840 1-5		43					
				LOCITY FPS SCHARGE CFS	3875.	0.56 1472-	1-5							
				LOCITY FPS	1.04	0-64	1.7		48					
				SCHARGE CFS	4782.	1787 •	1200							
				LOCITY FPS	1.12	0.70	1.5		54					
			1											
			1 ELEV	14-0 KD	278024.	102567-	87964							
	_		2 ELEV	15-4 KD	352907 -	132808.	100747							
	,		3 ELEV	16-4 KD	406705-	154502-	109498							
			4 ELEV	17-3 KD	469925-	176110.	118452	2. 17536	-3-					
			1											

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	COHERENT SYSTEMS	, INC.		FLOOD	CONTROL PL	ANNING STUDY		-	PA	GE 19	
	2200 WSP2, RELEA				GER CREEK					0 09/24/84	
	BASED ON LISLE,	ILLINOIS	VERSION						RE	V 03/11/74	
	RATING TABLE	FOR SECT	ION 2981	DA⇒	1.0						
	NO.	ELEV	AREA	CFS		ACRES FLOODE	0	CSM	CRIT	FRICTION	
	1				DAMAGE	CHANNEL	NON-DAM		ELEV	SLOPE	
	. Q	4.3	0.0	0.0							
	BANK FULL	2.2	125-8	815.5	0.00	0-00	0.03				
	1	14.1	3614-6	2281.0	0.00	0.00	4-10	10.00	4-2	0.00009	
	2	15.5	4460-2	2995.0	0.00	0.00	4+67	25.00	4.7	0.00009	
	3	16-4	5086-7	3847.0	0-00	0.00	5-21	50.00	5.2	0.00011	
	4	17.3	5784.1	4747.0	0.00	0.00	5.76	100-00	5.7	0-00013	
								<u>'</u>			
	SEGMENT TABL	E FOR SEC	TION 2981								
					SEG N	ם					
	CSM		TOTAL	1	2	3					
	!			N	C	N					
•	1 DISCHAR	GE CES	2281	1013.	677	. 59	1.				
	2281. VELOCIT		0.96	0.50	1.5						
	2 DISCHAR	GE CFS	2995.	1415-	795	. 78	5.				
	2995. VELOCIT	Y FPS	1-00	0-56	1-6	90.	54				
	3 DISCHAR		3847.	1881-	963						
	3847. VELOCIT		1-12	0.65	1-9						
	4 DISCHAR		4747.	2380-	1115						
	4747. VELOCIT	Y FPS	1-21	0.72	2.1	50.	63				
	1 ELEV 14	•1 KD	243121.	107686.	72452	- 6298	3.				
			311607 -	146990.	82955						
, •	2 ELEV 15	•5 KD	31100/*								
, * •					90194						
, *	3 ELEV 16	•5 KD •4 KD •3 KD	359626. 414072.	175657.207323.		• 9377	5.				

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	COHERENT SYSTEMS 2200 WSP2, RELEA BASED ON LISLE,	SE 3.0	VERSION		GER CREEK	ANNING STUDY			XE	GE 20 Q 09/24/84 V 03/11/74	x	
	RATING TABLE NO.	FOR SEC	TION 3268 AREA	DA= CFS		ACRES FLOODED-		CSM .	CRIT	FRICTION	··· 🛪	
	0	4.5	0.0	0.0	DAMAGE	CHANNEL	NON-DAM		ELEV	SLOPE	1	
1	BANK FULL	2.4	86.0	847.5	0.00	0.00	0.03				•	
	1	14-1	2780.0	2264.0	0.00	0.00	3.36	10.00	5-1	0.00018		
;	2	15-5	3617-5	2973-0	0-00	0-00	4-26	25.00	5-6	0-00019		
:	3	16-5 17-4	4267.2 5038.5	3818-0 4712-0	0.00	0-00 0-00	4.90 5.57	50.00 100.00	6-1 6-6	0.00022 0.00024		
1	SEGMENT TABL	.E FOR SE	CTION 3268									
į					SEG NO	3						
:	CSM		TOTAL	1 N	2 C	3 N						
ł	1 DISCHAR		2264.	1192.	660.						:	
1	2264. VELOCIT 2 DISCHAR		1.29 2973.	0.71 1537.	2.14 772							
i	2973. VELOCIT		1.32	0.71	2.31							
ł	3 DISCHAR		3819.	1962-	915.							
	3818. VELOCIT	Y FPS	1-43	0-77	2.59	0.68						
	4 DISCHAR		4712.	2409.	1026.							
4	4712. VELOCIT	Y FPS	1.48	0-80	2.77	0-76	ı -					
	1 ELEV 14	-1 KD	168250.	88861 -	49354-	30036-						
1		-5 KD	217230.	112529.	56727.	47974.						
	3 ELEV 16	-5 KD	257970.	132622-	61863.	63484-						

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	COHERENT SYSTEMS, 2200 WSP2, RELEASE BASED ON LISLE, IL	3-0		CONTROL PLA	NNING STUDY	• • • • •		XE	GE 21 1 09/24/84 J 03/11/74	
·	RATING TABLE F	OR SECTION 3483 ELEV AREA	DA= CFS	1.0	CRES FLOODED		CSM	CRIT	FRICTION	
	0	3.8 0.0	_	DAMAGE	CHANNEL	NON-DAM	Lan -	ELEV	SLOPE	
	BANK FULL	2.2 119-0 14-1 3134-0	5 760-1	0-00	0.00	0.01	10.00	4.3	0.00010	
	23	15.5 3837.3 16-5 4439.0	3 2950.0 3790.0	0.00	0-00 0-00	2-66 3-22	25.00 50.00	4-8 5-3	0-00012 0-00016	
	· 4	17-4 5109-5	6 4678-0	0.00	0-00	3.77	100-00	5.7	0-00018	
P	SEGMENT TABLE	FOR SECTION 348	5	SEG NO						
	CSN	TOTA	NL 1 N	2 C	3 N					
. •	1 DISCHARGE			 642. 1.63						
•	2 DISCHARGE 2950, VELOCITY	CFS 2950	. 629.	793-	1529	•				
	3 DISCHARGE 3790- VELOCITY	CFS 3790 FPS 1-2). 850. 28 0.58	978. 2.18	1962	7				
	4 DISCHARGE 4678. VELOCITY			1143. 2.44						
	1 ELEV 14.1 2 ELEV 15-5			63277. 72224.						
	3 ELEV 16-5 4 ELEV 17-4			78468. 84807.						
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	x.											
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•	COHERENT SYSTEMS 2200 WSP2, RELEA BASED ON LISLE,	SE 3.0	VERSION		CONTROL PLAN GER CREEK	NING STUDY			XE	GE 22 Q 07/24/84 V 03/11/74		
	RATING TABLE	E FOR SECT:	ION 3887	DA=	1-0							
•		ELEV	AREA	CFS	AC	RES FLOODED- CHANNEL	NON-DAN		 CRIT	FRICTION SLOPE	 	
	BANK FULL	3.3 3.2	0-0 111-4	0.0 813.2	0.00	0.00	0-05					
	DHAK FOLL	14.2	4271-8	2164-0	0.00	0.00	4-81	10.00	5.0	0.00005		
	2	15.6 16.5	5066.1 5662.4	2843.0 3653.0	0-00 0-00	0-00 0-00	5.20 5.88	25.00 50.00	5.5 5.8	0.00006 0.00007		
	, 3 , 4	17.5	6328.0	4511.0	0.00	0.00	7.27	100.00	6.0	0.00010		
	÷ }											
	SEGMENT TABL	E FOR SEC	TION 3887		SEG NO							
, -	CSH		TOTAL	1	2	3						
	}			N	C	К			 			
	1 DISCHAR		2164-	1384.	377.	403						
4	2164. VELOCIT 2 DISCHAR		0.62 2843.	0-46 1861-	1.11 453.	0.43 529						
	2 DISCHAR 2843. VELOCIT		2843.	0-52	1.23	0.47						
	3 DISCHAR	GE CFS	3653.	2398.	570.	685	•					
	3653. VELOCIT		0.79	0.60	1-46	0.53						
	4 DISCHAR 4511. VELOCIT		4511. 0.92	2924. 0.65	724. 1.77	863- 0-59						
	1 ELEV 14	-2 KD	302144.	193036-	52832-	56275						
1 · •		-6 KD	379937.	248498-	60760.	70679						
,		5-5 KD 7-5 KD	425536. 448867.	279355. 290959.	66355. 72055.	79826- 85853-						
•			1100074	2141414	. 2000-							
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	COHERENT SYSTEM 2200 WSP2, RELE BASED ON LISLE,	ASE 3-0	VERSION	FLOOD Chig	CONTROL PLAN Ger Creek	INING STUDY	•			XE	GE 23 Q 09/24/84 V 03/11/74	
•	RATING TABL			DA=	1.0						• ••••	
• ••• • •• •	NO-	ELEV	AREA	CFS	AC	RES FLOODED CHANNEL	NON-DAM	CSM	,	CRIT ELEV	FRICTION SLOPE	 -
	0 BANK FULL	2.5 4.5	0.0 107.7	0.0 910-1	0.00	0-00	0.02					
	1	14-2	3261-6	2157.0	0-00	0.00	7.03	10.00		6.5	0.00010	
	2	15-6	3975-8	2834.0	0.00	0.00	7-64	25.00		6-8	0-00010	
	4	16-6 17-6	4495-9 5042-1	3642-0 4497-0	0-00 0-00	0-00	7.97 8.77	50-00 100-00	:	7.1 7.4	0.00012 0.00014	
	SEGMENT TAB	LE FOR SEC	TIDN 4550		SEG NO							
. 6	CSH		TOTAL	1 N	2 C	3 N						
· ·	1 DISCHA	 RGE CFS	2157.	1463.	 459.	235						:
	2157. VELOCI		0.85	0.60	1-47	0-4	7					
	2 DISCHA 2834. VELOCI	RGE CFS	2834. 0.90	1968. 0.66	536. 1.57	330						
		RGE CFS	3642.	2560.	638.	0.5 445						
	3642 VELOCI	TY FPS	1-00	0.77	1.76	0.5	6					
		RGE CFS	4497 -	3167.	755-	575						
	4497 VELOCI	TY FPS	1.11	0.85	1-98	0.6	0					
	1 ELEV 1	4-2 KD	214907.	145751.	45748-	23407	•					
		5.6 KD	281148.	195193.	53257 -	32699						
		6.6 KD 7.6 KD	333777. 381458.	234486 - 268697 -	58632. 64143.	40658 48618						

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	COHERENT SYSTEMS	S, INC.	•	FLOOD	CONTROL P	LANNING STUD'	Y .		PA	GE 24	
	2200 WSP2, RELEA BASED ON LISLE,		VERSION	CHIG	GER CREEK					09/24/84 03/11/74	
	RATING TABLE			DA⇒	1.0						
	NO-	ELEV	AREA	CFS		-ACRES FLOOD		··· CS#· ····		FRICTION	
	0	3.3	0.0	0-0	DAMAGE	CHANNEL	NON-DAM		ELEV	SLOPE	
	BANK FULL	2.6	103-8	731.2	0.00	0.00	0.00				
	1	14-2	2578-8	2150-0	0.00	0.00	1-76	10-00	5-5	0.00015	
	2	15.7	3264-5	2826.0	0.00	0.00	2.10	25.00	5-9	0.00016	
	3	16.6	3813-8	3630-0	0.00	0.00	2.49	50-00	6.4	0.00017	
	4	17.6	4416-7	4483.0	0.00	0.00	3.07	100-00	6-8	0.00023	
	SEGMENT TABL		TTON 4731								
	aconciat thos	LE FOR GEG	1104 47.91		SEG I	NO.					
	CSM		TOTAL	1	2	3					
				Ň	Ē	Ň					
	1 DISCHAR	GE CFS	2150.	209.	68						
•	2150- VELOCIT		1.26	0.43	1-5		•72		~		
	2 DISCHAR		2826-	357.	79						
	2826. VELOCI		1.27	0.48	2.		-78				
	3 DISCHAR		3630.	522.	96:						
	3630. VELOCII		1-43	0.53	2.4		- 88				
	4 DISCHAF 4483- VELOCII		4483- 1-58	704. 0.56	114		•96				
	1 ELEV 14	1.2 KD	172597.	16445.	5534:	2. 1008:	10-				
		-7 KD	224449.	27841.	6345			•			
		5-6 KD	261174-	37323.	6926						

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COHERENT SYSTEMS, INC. FLOOD CONTROL PLANNING STUDY PAGE 25 2200 WSP2, RELEASE 3.0 CHICCER CREEK XEQ 09/24/84 BASED ON LISLE, ILLINOIS VERSION REV 03/11/74 RATING TABLE FOR SECTION 4953 1.0 DA= ND. ELEV AREA CFS ACRES FLOODED-----CSM CRIT FRICTION DAHAGE NON-DAM CHANNEL ELEV SLOPE 0 2.4 0.0 0.0 0.00 BANK FULL 1.7 62.2 536.5 0.00 0.00 2143.0 1 14-3 3216-3 0.00 0.00 2-62 10.00 5-1 0-00011 2 15.7 4078-1 2817.0 0.00 0.00 3.31 25.00 5.7 0.00012 3 16.7 4866-9 3619.0 0.00 0.00 4.42 50.00 6-1 0.00015 17-6 5810-6 4469-0 0.00 0.00 5-41 100.00 0.00017 6.6 4 SEGMENT TABLE FOR SECTION 4953 SEG NO CSM TOTAL 2 3 1 C N N DISCHARGE CFS 2143. 1099. 520. 524. 2143. VELOCITY FPS 0.98 1.73 0.53 0.57 DISCHARGE CFS 2817-1462-623. 732. 2 2817. VELOCITY FPS 1.90 0.57 1.03 0.57 **OISCHARGE CFS** 3619. 1990-769. 860-3 3619. VELOCITY FPS 2.22 1.18 0.68 0.54 DISCHARGE CFS 4469. 2457. 887. 1126. 4 4469. VELOCITY FPS 1-25 0.72 2.43 0.56 1 ELEV 14-3 KD 202076. 103629. 49008. 49439. 2 ELEV 15.7 KD 255687. 132716. 56544. 66427. 3 ELEV 16.7 KD 291001. 159692. 61985-69324. 4 ELEV 17.6 KD

67552.

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COHERENT SYSTE 2200 WSP2, REL BASED ON LISLE	EASE 3.0	VERSION		CONTROL PLA SER CREEK	NNING STUDY			XE	GE 26 2 09/24/84 7 03/11/74
RATING TAE	LE FOR SECT	ION 5243	DA=	1-0					
NO.	ELEV	AREA	CFS	DAMAGE	ACRES FLOODED	NON-DAM	CSM	CRIT	FRICTION
0	1.2	0.0	0.0						
BANK FULL	1.7	93.9	411.0	0.00	0.00	0-00			
1 1	14-3	3073-1	2137.0	0.00	0.00	2.55	10.00	4.4	0.00008
2	15.7	3773.3	2808-0	0.00	0.00	3-48	25-00	4.7	0-00010
3	16.7	4380-1	3608-0	0.00	0.00	4 - 47	50.00	5-1	0.00012
4	17-7	5150-8	4456.0	0.00	0-00	5-46	100.00	5-4	0-00014
SEGMENT TA	BLE FOR SEC	TION 5243			,				
SEGMENT TA CSM	BLE FOR SEC	TION 5243 Total	1 N	SEG NO 2 C) 3 N				
CSH		TOTAL		2 C	3 N				
CSH 1 DISCH	ARGE CFS	TOTAL 2137.	315-	2 C 826	3 N 996				
CSH 1 DISCH 2137. VELOC	ARGE CFS ITY FPS	TOTAL 2137. 1.03	315- 0-42	2 C 826- 1-51	3 N 996 0+5	6			
CSH 1 DISCH 2137. VELOC 2 DISCH	ARGE CFS ITY FPS ARGE CFS	TOTAL 2137. 1.03 2808.	315- 0-42 446-	2 C 826- 1-51 1063-	3 N 996 0-5 1299	6 •			
CSH 1 DISCH 2137. VELOC 2 DISCH 2808. VELOC	ARGE CFS ITY FPS ARGE CFS	TOTAL 2137. 1.03	315- 0-42	2 C 826- 1-51	3 N 994 0+54 1299 3 0+64	6 0			
CSH 1 DISCH 2137. VELOC 2 DISCH 2808. VELOC	ARGE CFS ITY FPS ARGE CFS ITY FPS ARGE CFS	TOTAL 2137. 1.03 2808. 1.18	315. 0.42 446. 0.44	2 C 824- 1-51 1063- 1-78	3 N 996 0-5 1299 3 0-6 1697	6 • 0 •			
CSH 1 DISCH 2137. VELOC 2 DISCH 2808. VELOC 3 DISCH 3608. VELOC	ARGE CFS ITY FPS ARGE CFS ITY FPS ARGE CFS	TOTAL 2137. 1.03 2808. 1.18 3608.	315- 0-42 446- 0-44 573-	2 C 824- 1-51 1063- 1-76 1338-	3 N 996 0.5, 1299 3 0.6 1697 0.6	6 • • •			
CSH 1 DISCH 2137. VELOC 2 DISCH 2808. VELOC 3 DISCH 3608. VELOC	ARGE CFS ITY FPS ARGE CFS ITY FPS ARGE CFS ITY FPS ARGE CFS	TOTAL 2137. 1.03 2808. 1.18 3608. 1.38	315- 0-42 446- 0-44 573- 0-46	2 C 1-51 1063- 1.76 1338- 2-11	3 N 996 0-5: 1299 3 0-6: 1697 0-6: 2110	6 0 8 -			
CSH 1 DISCH 2137. VELOC 2 DISCH 2808. VELOC 3 DISCH 3608. VELOC 4 DISCH 4456. VELOC	ARGE CFS ITY FPS ARGE CFS ITY FPS ARGE CFS ITY FPS ARGE CFS	TOTAL 2137. 1.03 2808. 1.18 3608. 1.38 4456.	315. 0.42 446. 0.44 573. 0.46 780.	2 C 826- 1-51 1063- 1-76 1338- 2-11 1566-	3 N 996 0.55 1299 0.6 1697 0.6 2110 0.7	6 0 8 - 4			
CSH 1 DISCH 2137. VELOC 2 DISCH 2808. VELOC 3 DISCH 3608. VELOC 4 DISCH 4456. VELOC 1 ELEV	ARGE CFS ITY FPS ARGE CFS ITY FPS ARGE CFS ITY FPS ARGE CFS ITY FPS	TOTAL 2137. 1.03 2808. 1.18 3608. 1.38 4456. 1.50	315. 0.42 446. 0.44 573. 0.46 780. 0.48	2 C 8264 1-51 1063 1-76 1338 2-11 1566 2-34	3 N 994 0.5, 1299 3 0.4 1497 0.4 2110 0.7 113337	6 0 8 - 4			
CSH 1 DISCH 2137. VELOC 2 DISCH 2808. VELOC 3 DISCH 3608. VELOC 4 DISCH 4456. VELOC 1 ELEV 2 ELEV	ARGE CFS ITY FPS ARGE CFS ITY FPS ARGE CFS ITY FPS ARGE CFS ITY FPS 14.3 KD	TOTAL 2137. 1.03 2808. 1.18 3608. 1.38 4456. 1.50 243103.	315. 0.42 446. 0.44 573. 0.46 780. 0.48 35784.	2 C 824- 1-51 1063- 1-76 1338- 2-11 1566- 2-34 93981-	3 N 996 0.5 1299 3 0.6 1697 0.6 2110 2110 0.7 113337 133165	6 0 8 - 4			

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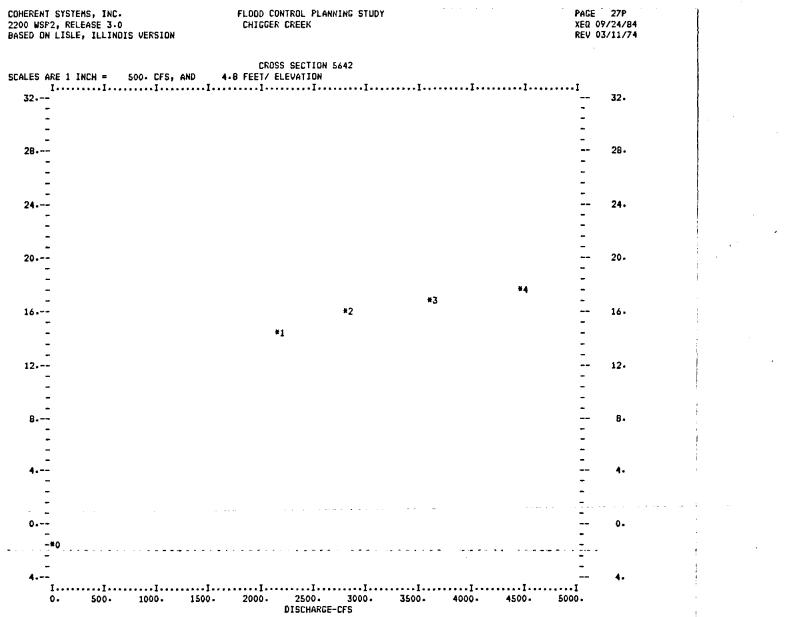
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 	COHERENT SYSTEMS, INC.	FLOOD CONTROL P		PAGE 27	
	2200 WSP2, RELEASE 3.0 BASED ON LISLE, ILLINDIS VERSION	CHIGGER CREEK	CHARING STUDY	REV 03/11/74	
	RATING TABLE FOR SECTION 5642 ND. ELEV AREA 0 1.8 0.0 BANK FULL 3.0 63.1 1 14.4 2720.6 2 15.8 3416.0	DA= 1.0 CFS DAMAGE 0.0 641-8 0.00 2130.0 0.00 2799.0 0.00	-ACRES FLODDED CHANNEL NDN-DAM 0.00 0.01 0.00 3.86 0.00 4.84	CSM CRIT FRICTION ELEV SLOPE 10.00 5.9 0.00016 25.00 6.3 0.00017	•
•	3 16.8 4046.1 4 17.8 400.0 SEGMENT TABLE FOR SECTION 5642	3596-0 0.00 4442-0 0-00 SEG 1	0-00 6-31 0-00 8-37	50.00 6.7 0.00022 100.00 7.0 0.00027	
	CSM TOTAL	1 2 N C	3 N	·	ţ.
	1 DISCHARGE CFS 2130. 2130. VELOCITY FPS 1.05 2 DISCHARGE CFS 2799. 2799. VELOCITY FPS 1.12 3 DISCHARGE CFS 3596. 3596. VELOCITY FPS 1.28 4 DISCHARGE CFS 4442. 4442. VELOCITY FPS 1.41	832- 453 0-66 1-1 1117- 555 0-68 2-1 1401- 684 0-70 2-1 1676- 822 0-68 2-1	86 0.70 1. 1130. 06 0.75 6. 1509. 42 0.85 5. 1942.		
	1 ELEV 14.4 KD 168802. 2 ELEV 15.8 KD 212562. 3 ELEV 16.8 KD 242207. 4 ELEV 17.8 KD 272359.	65848. 3615 84847- 4196 94552. 4626 102548- 5064	8- 85747- 4- 101391-		

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	COHERENT SYSTEMS	, INC.	•	FLOOD	CONTROL PL	ANNING STUDY			PA	GE 28	
	2200 WSP2, RELEA			CHIG	GER CREEK					09/24/84	
•	DASED ON LISLE,	ILLINGIS	VERSION						RE	03/11/74	
	RATING TABLE NO.	ELEV	ION 5881 AREA	DA= CFS	1-0	ACRES FLODDED)	CSM	CRIT	FRICTION	
··· ··· · · · · · ·	• · · ••• ••• •				DAMAGE	CHANNEL	NON-DAM		ELEV	SLOPE	
	0 BANK FULL	2.7	0.0 76.7	0-0 740-4	0.00	0.00	0.01				
	1	14.4	2433-2	2123.0	0.00	0.00	2-09	10-00	6.5	0.00020	
	2	15.8	3059.7	2790.0	0.00	0.00	2.56	25.00	6-9	0.00020	
	3	16-9	3571-4	3585.0	0.00	0.00	3-01	50.00	7.3	0-00024	
	4	17.9	4263-4	4428.0	0-00	0.00	4-24	100.00	7.7	0.00030	
	SEGMENT TABL	E FOR SEC	TION 5881			-					
. •	CSM		TOTAL		SEG N	0 3					
	Lon		TUTHE	1 N	ć	S N					
	1 DISCHAR	GE CES	2123.	410.	506	. 1207	· / .				
	2123. VELOCIT		1.17	0-67	1-9						
	2 DISCHAR	CE CFS	2790.	535-	594	- 1661	•				
	2790. VELOCIT		1.22	0.65	2.1						
	3 DISCHAR		3585.	688.	713						
	3585. VELOCIT 4 DISCHAR		1.35 4428.	0.67 873.	2 - 4: 864						
	4428. VELOCIT		1.50	0.45	2.7						
	1 ELEV 14	-4 KD	150874.	29137 -	36127	. 85610).				
		-8 KD	194927.	37393.	41688						
·	3 ELEV 16	•9 KD	230247.	44210.	45823	. 140214	-				
,	4 ELEV 17	•9 KD	256207.	50496-	50040	 155670) -				

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HERENT SYSTEM 00 WSP2, RELE SED ON LISLE,	ASE 3.0	VERSION		CONTROL PLI GER CREEK	ANNING STUDY	. <u>.</u>		XE	GE 29 D 09/24/84 V 03/11/74	
RATING TABL	E FOR SECT	ION 6103	DA=	1.0						· ·
NO.	ELEV	AREA	CFS		ACRES FLOODE	D	CSH	CRIT	FRICTION	
				DAMAGE	CHANNEL	NON-DAM		ELEV	SLOPE	
0	1-4	0.0	0.0							
BANK FULL	2.9	61-2	584-1	0.00	0.00	0.00				
1	14.4	3487.0	2116-0	0-00	0.00	3-06	10.00	6.7	0.00011	
2	15.9	4445-8	2781.0	0-00	0.00	3.65	25.00	7.0	0-00011	
3	16.9	5221-4	3574.0	0.00	0.00	4.26	50.00	7.3	0.00013	
4	17.9	6125-3	4414-0	0.00	0-00	4.71	100.00	7.6	0-00013	•
CSM		TOTAL	N	2 C	3 N					
	RGE CFS	2116-	1200.	407						
2116 VELOCI		0-83	0-59	1-53						
	RGE CFS	2781.	1509.	477						
2781. VELOCI		0.85	0.59	1-62						
	RGE CFS	3574.	1852.	581						
3574. VELOCI		0-94	0-63	1.84						
	RGE CFS	4414.	2285.	652						
4414. VELOCI	IY FPS	0.97	0-66	1.97	7 0	63				
	4.4 KD	206040.	117017.	39821						
	5.9 KD	269475.	146839.	46404						
	6.9 KD	314619.	163054.	51349						
4 ELEV 12	7.9 KD	380912.	197208-	56403.	12730	1.				

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COHERENT SYSTEMS, INC.FLOOD CONTROL PLANNING STUDYPAGE 302200 WSP2, RELEASE 3.0CHIGGER CREEKXEQ 09/24/84BASED ON LISLE, ILLINOIS VERSIONREV 03/11/74

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COHERENT SYSTEMS, INC. 2200 WSP2, RELEASE 3.0 BASED ON LISLE, ILLINDIS VERSION

PAGE 1 XEQ 09/24/84 REV 03/11/74

------ 80/80 LIST OF INPUT DATA

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COHERENT SYSTEMS, INC. 2200 WSP2, RELEASE 3.0 BASED ON LISLE, ILLINOIS VERSION ------ 80/80 LIST DF INPUT DATA

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				TOI DE TUE	OI DAIN	
1	WSP2					• •
2	TITLE		ITROL PLANN	IING STUDY		
3	TITLE	CHIGGER C				
4	COMMENT	(EXISTI	NG CONDITI			
5	DISCHARGE	-1-0	10	25	50	100
6	STARTE	6089	14-4	15.9	16.9	17.9
7	OUTPUT	S				
8	REACH	6089	1	00	00	00
9	FLOW-FREQ	6089	4414	3574	2781	2116
10	REACH	6330	1	241	241	241
11	FLOW-FRED	6330	4402	3564	2774	2111
12	ROAD	DAK	2.7	65	65	65
13	REACH	6460	1	65	65	65
14	FLOW-FREQ	6460	4400	3563	2772	2109
15	REACH	6577	1	117	117	117
16	FLOW-FREQ	6577	4400	3563	2772	2108
17	REACH	6858	1	281	281	281
18	FLOW-FRED	6858	4400	3563	2772	2108
19	REACH	7066	1	208	208	208
20	FLOW-FREQ	7066	4399	3563	2769	2103
21	REACH	7298	1	232	232	232
22	FLOW-FREQ	7298	4399	3563	2769	2103
23	REACH	7729	1	431	431	431
24	FLOW-FRED	7729	4399	3563	2769	2103
25	REACH	7940	1	211	211	211
26	FLOW-FREQ	7940	4397	3563	2766	2096
27	ROAD	F-M-518	2.7	102	102	102
28	REACH	8299	1	257	257	257
29	FLOW-FREG	8299	4397	3563	2766	2096
30	REACH	8556	1	257	257	257
31	FLOW-FREQ	8556	4397	3563	2766	2096
32	REACH	8858	1	302	302	302 2096
33	FLOW-FREQ	8858	4397	3543 399	2766 399	399
34	REACH	9257 9257	1 4397	3563	2766	2096
35	FLOW-FRED REACH	7257 9594	1 1	337	337	337
36 37	FLOW-FRED	7574 9594	4397	3563	2766	2096
	REACH	737 1 9973	4377	379	379	379
38		9973	4397	3563	2766	2096
39	FLOW-FREQ			268	268	268
40	REACH	10241 10241	1 4397	3563	208	2096
41	FLOW~FREQ	10241 MANISON	437/ 2-8	3503 59	2700 59	59
42 43	ROAD	10491	2-8	191	57 191	191
	REACH FLOW-FREQ	10471	4397	3563	2766	2096
44	REACH			258	258	258
_45		10749	. 1	£30	438	

PAGE 1 XEQ 05/29/85 REV 03/11/74

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	NSP2, RELEASE ON LISLE, IL		RSION	CHI	GGER CREEK		
	-						
					UT DATA	2096	
16	FLOW-FREQ	10749	4397	3563	2766		
17	REACH	11147	1	398	398	398	
18	FLOW-FREQ	11147	4400	3555	2762	2100	
19	REACH	11758	1	611	611	611 1539	
50	FLOW-FREQ	11758	3220	2607	2026 360	360	
51	REACH	12118	1	360		\$ 1539	
2	FLOW-FRED	12118	3220	2607	2026		
53	REACH	12430	1	312 2607	312 2026	312 1539	
54	FLOW-FREQ	12430	3220	2607		219	
55	REACH	12649	1	219	219		
56	FLOW-FRED	12649	3220	2607	2026	1539	
57	SEGMENT	6089	1	N	869		
58	NVALUE	0-09	•	~	003		
59	SEGMENT	6089	2	C	887		
50	NVALUE	0.05	-		1700		
51	SEGMENT	6089	3	И	1300		
52	NVALUE	0.09					
53	SECTION	6089					
54		0	20-2	100	19.9	200	18-9
55		300	18-4	400	16.7	500	16-1
56		525	15-8	600	12-1	651 800	8.8
57		678	6.7	700	6-4	800	6.5
58		858	4.6	869	2.9	870 881	0.2
59		873	-0.7	877	-1-5		-0-8
70		886	-0.2	887	4-6	900	5-1
71		905	5-1	984	10-4	1000	10-4
72		1100	12-1	1200	15-4	1300	18-9
73	ENDTABLE						
74	SEGMENT	6330	1	N	200		
75	NVALUE	0-07	_	-			
76	SEGMENT	6330	2	C	284.5		
77	NVALUE	0-04	_				
78	SEGMENT	6330	3	N	485		
79	NVALUE	0.07					
30	SECTION	6330	70.0	100	20.3	200	19.9
31		0 201	20-8 16-85	203.5		200	14-4
32		210.5	12.84	203.5	15-87 10-9	218	8.3
33				226-5	1V*7 E 0	230.5	5.3
34	•	222	6.8		5-9 2-6	230.5	0.3
35		235 246.5	3-8	239.5 251.5	2-8 0-9	253-5	3-8
36		246.5	0.2	251.5	7.6	268-5	10-0
37		259	1.9	284.5	13.4	208-3	14-9
38			11.9	283.5	16-9	284-5	19.0
39		280	16.3			209.3	17.1
70 了		385	20.0	. 485	21-1		

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COHERENT SYSTEMS, INC.

PAGE 2 XEQ 05/29/85 REV 03/11/74

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FLOOD CONTROL PLANNING STUDY

2200 UBP27. RELEASE 3.0 KEB 05/29/95 PASED 0H LISLS, JULINOIS VERSION			CONER	ENT SYSTEMS,	TNC	•	FLD	00 CONTROL		. אמוודא	· - ·	PAGE 3	
91 END TABLE 73 92 97 0 AK A 1 3 93 91ER 9.05 1.2 2.4 2.4 2.4 2.4 94 UIRDE 1.5 1.5 0.6 0.8 2.4 95 200 20.81 20.81 20.81 20.81 96 EMOTABLE 7 20.51 19.4 20.3 20.41 97 SECTION 0 20.1 19.4 20.3 16.4 99 200 14.9 20.1 12.4 20.3 16.4 99 200 14.9 20.1 12.4 20.3 16.4 101 202 21.1 21.4 22.4 21.3 16.1 102 23.1 5.1 23.4 23.9 1.8 103 22.4 5.1 23.4 23.9 1.8 103 22.5 13.4 27.8 20.9 11.0 104 22.9 16.3 28.4 19.5 28.4 19.5 105		•	2200	WSP2, RELEASE	3.0	SION						XEQ 05/29/85 REV 03/11/74	
93 PIER 9-05 1.2 2.44 2.44 10.05 1.2 94 GIRDER 19.75 19.55 00 0.8 2.4 96 EMDTAGLE 20.81 20.81 20.81 20.81 97 SECTIUN 0AK 20.8 20.15 12.4 20.35 16.4 97 200 20.8 20.15 19.4 20.35 16.4 10.15 101 207 14.2 20.5 19.4 20.35 16.4 1.1 102 231 5.1 234.5 3.4 239 1.6 102 231 5.1 234.5 0.5 220.9 11.0 103 255 240.5 0.5 220.9 11.0 104 259 6.0 262.5 7.9 230.9 11.0 108 EKOTADEN 10.7 15.3 281.5 10.6 1.0 110 MVALUE 0.07 1.5 244.5 20.91 14.5 111 SECOTION 0 21.4						80/80 L	IST OF INP	UT DATA					
94 GLRDEK 19-75 19-75 20-81 95 20-81 20-81 96 EMUTADLE 97 SECTION 0AK 97 SECTION 0AK 20-81 20-81 98 0 20-81 10-0 20-35 14-0 100 207 14-2 210-5 12-8 213 11-1 101 214 8-3 222 4-7 226 5-9 102 231 5-1 234-5 0-2 251-5 1-2 103 242-5 0.5 240-5 0-2 251-5 1-2 104 259 4-0 220-5 7-5 249 11-5 105 273-5 13-6 274-5 15-3 281-5 20-91 106 204 18-3 204-5 12-5 284-5 20-91 106 EEORENT 440 2 2 20-1 11-5 113 SECORENT 640 3 N 486- 14-1 114 VANULUE<		.	92	ENDTABLE BPR					··· •	4 A.		• • • • • • • • •	
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96 ENDTABLE 97 SECTION OAK 20.8 200 20.8 201 18.4 203.5 16.0 98 00 207 14.2 210.5 12.8 203.5 16.0 100 207 14.2 210.5 12.8 21.3 11.1 102 231 5.1 234.5 34.4 239 1.8 102 231 5.1 234.5 1.4 239 1.2 103 242.5 0.5 246.5 0.2 251.5 1.2 104 259 6.0 264.5 1.5 284.5 20.81 104 204 18.3 284.5 19.55 284.5 20.81 109 EEOTEATI 440 1 N 200 10.4 110 MVALUE 0.07 21 1.4 20.4 1.4 20.5 111 SECTENT 6440 2 21 21.5 1.4		•	· 94	GIRDER					2.6				
97 SECTION 0AK 98 0 20-8 100 20-3 200 20-81 99 200 19-88 201 18-4 203.5 16-0 100 207 14-2 210.5 12-8 213 11-1 101 218 8-3 222 6-7 226 5-9 103 242-5 0-5 246-5 0-2 251.5 1-8 104 273-5 13.6 274.5 0-5 284.5 1-0 105 273-5 13.6 274.5 1-5 284.5 20-81 106 273-5 13.6 27 15.5 284.5 20-81 107 385 20-0 485 21-1 1-0 108 ENOTABLE 1 N 20-1 1 10-5 110 NVALUE 0.0 2 2 2 1 111 NVALUE 0.0 2 2 2 2 112 NVALUE 0.0 2 1 1.6<				ENDTABLE	200	20.01	204.3	20.01					
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106 284 18-3 284-5 19-55 284-5 20-81 107 385 20-0 485 21-1 2 2 108 ENDTABLE					259								
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108 ENDTAGLE 109 SECMENT 6460 1 N 200 110 NVALUE 0.07									204-3	20.01			
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115 SECTION 6460 116 0 21-1 100 20-6 200 20-1 117 201 17-9 203 16-4 205 15-4 118 207 14-0 211 11-6 215 9-8 119 219-5 7-5 221 6-6 226 5-8 120 231 4-8 234 3-0 236 1-2 121 236-5 1.0 242-5 0-7 249 1-1 122 251-5 1-5 255 4-7 257 6-9 123 259 7-3 261 8-1 266 10-4 124 270 12-0 274-5 13-8 278-5 15-6 125 282 16-7 284-5 17-5 286 19-5 126 386 20-0 486 21-4 19-5 126 16-7 1 N 676 19-5 127 ENDTABLE 1 N 674 14-7						3	N	486					
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127 ENDTABLE 128 SEGMENT 6577 1 N 676 129 NVALUE 0.09									286	19.2			
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129 NVALUE 0.09			128	SEGMENT		1	N	676					
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130 SEGMENT 6577 2 C 691 131 NVALUE 0.05						2	C	671					
131 NVALUE 0-05 132 SECHENT 6577 3 N 1100						3	N	1100					
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134 SECTION 6577			134		6577								
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136 300 18-7 400 17.9 500 15.0 138 650 4.0 670 4.0 674 4.8 138 650 4.0 677 -0.4 680 -1.4 140 777 -0.4 680 -1.4 683 -1.4 141 700 5.7 712 4.1 974 9.4 142 700 5.7 712 4.1 974 9.4 143 700 17.3 1000 19.5 1100 19.7 144 ENOTABLE		:				TOT DE TH									
137 573 10-6 600 8-18 7.7 138 650 6.0 6.70 4.8 4.8 139 677 -0-4 600 -1.4 683 -1.6 140 687 -1.1 800 17.4 5.4 142 700 5.7 712 6.1 790 9.7 144 FOTABLE 790 17.3 1000 19.5 1100 19.7 144 SECRENT 6858 1 M 378 77 74 144 FOTABLE 0.69 7.7 100 19.5 1100 19.7 147 SECRENT 6858 1 M 378 74 74 148 FOTABLE 0.69 70.7 100 19.8 200 18.3 153 MALE 0.69 73 340 15.5 350 11.7 154 351 7.0 30 15.4 35.9 11.7 154 550 7.9 20.8 10.7									15.0						
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144 ENDTABLE 145 SECNENT 608 1 N 378 146 NVALUE 0.09 2 73 395 148 NVALUE 0.05 395 305 148 NVALUE 0.05 395 305 150 NVALUE 0.05 900 305 151 SECITUN 686 3 N 900 152 0 16.7 300 15.5 350 16.7 154 370 1.0 19.8 200 18.3 1.4 154 370 1.0 19.4 5.0 1.1 306 5.7 154 370 5.7 410 6.5 4.2 6.7 5.4 155 400 5.7 410 6.5 4.2 6.7 157 800 19.5 900 20.8 5.7 355 5.7 158 500 FMT 4000 19.5 900 20.8 5.7 5.7 5.7 158 500 FMT 4000		. 142		800	9-0	818	8-4	850	17.3						
145 SECNENT 6058 2 C 378 147 SECNENT 6058 2 C 375 148 NUALUE 0.05				900	17+3	1000	19-5	1100	19-9						
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149 SECKENT 6659 3 N 900 151 SECTION 6659 - - 18.3 152 00 16.7 340 15.8 350 11.7 154 361 7.0 379 5.1 379 5.4 155 379 2.0 384 0.7 386 0.7 156 379 2.0 384 0.7 386 0.7 156 379 2.0 384 0.7 386 0.7 157 400 5.7 410 6.5 462 6.7 159 800 19.5 900 20.8 - - 160 ENDTABLE 1 N 470 - - 161 SECMENT 7066 2 C 490 - - 164 NVALUE 0.05 - - - - - 164 NVALUE 0.07 19.1 200 16-8 - - 164 NVALUE </td <td></td> <td></td> <td></td> <td></td> <td>2</td> <td>C</td> <td>395</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>					2	C	395								
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154 361 7.0 370 5.1 378 5.4 155 379 2.0 384 0.7 386 0.7 156 390 1.3 394 1.7 395 5.2 157 400 5.7 410 6.5 462 6.7 158 500 9.4 600 14.6 700 16.9 159 800 19.5 900 20.8 16.9 160 ENDTABLE 7064 1 N 470 - 163 SEGMENT 7066 2 C 490 - 164 SEGMENT 7066 2 C 490 - 164 SEGMENT 7066 3 N 800 - 164 NVALUE 0.09 12.4 358 6.3 167 SECTION 706 12.4 358 6.3 167 315 6.8 400 6.4 470 5.6 171 471 0.5 475 0.3															
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