Water regulatory permit application for the Crandon Project proposed mine site and treated wastewater discharge pipeline: 93C049. 1996

Foth and Van Dyke and Associates, Inc.
Green Bay, Wisconsin: Foth and Van Dyke, 1996

Crandon Mining Company

7 N. BROWN ST., 3RD FLOOR
RHINELANDER, WI 54501-3161

June 20, 1996

Mr. Bill Tans
Wisconsin Department of Natural Resources
Bureau of Environmental Analysis and Review
P.O. Box 7921
Madison, WI 53707-7921

Mr. David Ballman, Ecologist
U.S. Army Corps of Engineers
St. Paul District
190 Fifth Street East
St. Paul, MN 55101

Dear Mr. Tans and Mr. Ballman:

Re: Crandon Project - Water Regulatory Permit Application for the Proposed Mine Site and Treated Wastewater Discharge Pipeline

Crandon Mining Company (CMC) is pleased to file the enclosed document titled *Water Regulatory Permit Application for the Proposed Mine Site and Treated Wastewater Discharge Pipeline* for its Crandon Project. The required fee of $400 has been issued to the Wisconsin Department of Natural Resources by CMC under a separate cover letter. This application encompasses the following permit and approval requests:

	Permit	Fee
A)	Mine Site Construction Activities	$300

1) Site grading that would result in topsoil disturbances of more than 10,000 square feet to the banks of navigable waterways as covered by Chapter 30.19(1)(c), Wis. Stats.

2) General culvert installations in navigable waterways and intermittent streams as covered by Chapters 30.12(3)(a)(3) and 30.123, Wis. Stats.

3) The construction of two bridges over Swamp Creek as covered by Chapters 30.12(3)(a)(3), 30.123, and 30.20, Wis. Stats.

4) Riprap placement at the Skunk Lake mitigation outfall structure as covered by Chapter 30.12(3)(a)(3), Wis. Stats.

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B) Treated Wastewater Discharge Pipeline Construction Activities $100

1) Pipeline construction grading activities that would result in topsoil disturbances of more than 10,000 square feet to the banks of navigable waterways as covered by Chapter 30.19(1)(c), Wis. Stats.

This joint state/federal water regulatory permit application has been prepared on behalf of CMC by Foth & Van Dyke and Associates Inc. As noted on the attached distribution list, CMC has distributed the document to appropriate state and federal agencies, to local officials, and to various interested parties. It is our understanding that the Wisconsin Department of Natural Resources and the U.S. Army Corps of Engineers will be responsible for distribution of the document to their appropriate staff members.

This application for Chapter 30, Wis. Stats., permits has been submitted as one document to facilitate a complete presentation of required information for water regulatory approvals for the mine site and treated wastewater discharge pipeline. If you or your staff have any questions regarding the *Water Regulatory Permit Application for the Proposed Mine Site and Treated Wastewater Discharge Pipeline*, please contact me at (715) 365-1450.

Sincerely,

D. E. Moe

Don Moe
Technical/Permitting Manager
Crandon Mining Company

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June 20, 1996

Water Regulatory Permit Application for the Crandon Project Proposed Mine Site and Treated Wastewater Discharge Pipeline

93C049

Prepared for
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7 North Brown Street, 3rd Floor
Rhinelander, Wisconsin 54501-3161

Prepared by
Foth & Van Dyke and Associates Inc.

June 1996

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2737 S. Ridge Road, P.O. Box 19012, Green Bay, Wisconsin 54307-9012, 414/497-2500, FAX: 414/497-8516

Crandon Mining Company
Water Regulatory Permit Application for the Crandon Project
Proposed Mine Site and Treated Wastewater Discharge Pipeline

Executive Summary

Introduction

With this document Crandon Mining Company (CMC) has applied for the necessary permits from the Wisconsin Department of Natural Resources for activities associated with the construction of stream crossings, the installation of culverts and grading in or around navigable waterways for its proposed mine site and treated wastewater discharge pipeline. The document describes CMC's construction plans and the methods that will be used to keep environmental impacts to a minimum in these areas.

Construction Activities Near Navigable Water Resources

Construction activities in the area of navigable waterways requiring water regulatory permits include grading, bridge and culvert installation, and placement of riprap at the outfall for the water-level mitigation structure on Skunk Lake.

Environmental Protection

The bridge and culvert stream crossings have been designed to allow the free flow of water so that upstream drainage problems will not occur even when waterways are under flood conditions.

During all construction near waterways, CMC will use appropriate practices designed to control dust and prevent runoff and erosion. Depending upon the area involved, these practices would include one or more of the following techniques:

- Diversion dikes, silt fencing, ditches and/or settling basins to collect runoff from disturbed areas.
- Riprap to protect slopes.
- Stockpiling of topsoil for use in reclaiming graded slopes.
- Mulching and replanting slopes as soon as possible after earth work; applying jute or paper matting to steep slopes where needed to enhance seed germination.
- Watering exposed soil as needed for dust control.

The above techniques are common construction practices that have been successfully applied for years to control erosion, restore construction areas and protect navigable waterways.

Crandon Mining Company
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Appendices

1 Introduction

Crandon Mining Company (CMC) is proposing to develop an underground zinc-copper mine in Forest County, Wisconsin. Pursuant to Chapter NR 132.05, Wis. Admin. Code, CMC submitted a Notice of Intent to Collect Data and Detailed Scope of Study (NOI/SOS) for the Crandon Project to the Wisconsin Department of Natural Resources (WDNR) on February 15, 1994. As part of further development of this project, numerous federal, state and local environmental, construction, building and safety permits and approvals need to be obtained. This submittal constitutes the Water Regulatory Permit Application (WRPA) for the proposed Crandon Project mine site and treated wastewater discharge pipeline.

The WRPA has been prepared in accordance with applicable portions of Chapter 30, Wis. Stats. The WRPA outlines the construction and operation of structures (such as bridges and culverts) and construction activities adjacent to navigable waters. The material presented in this report is indicative of the type and size of water regulatory facilities to be constructed and operated as part of the Crandon Project. During final design it is likely that some modification in the engineering and operational details of the facilities and systems will occur.

A number of parallel applications have been submitted to the WDNR and United States Army Corps of Engineers (USCOE) in support of the Crandon Project permitting process. The major documents and permit applications are listed below:

- Environmental Impact Report (EIR)
- Environmental Impact Report Supplement: Wisconsin River Discharge Pipeline
- Air Pollution Control Permit Application
- Water Regulatory Permit Application for the Wetland Compensation Site
- Water Regulatory Permit under Section 404 of the Federal Clean Water Act
- Notice of Intent for Storm Water Discharges Associated with Construction Activities Under a General WPDES Permit
- Mine Permit Application (MPA)
- Tailings Management Area (TMA) Feasibility Report/Plan of Operations
- Wisconsin Pollutant Discharge Elimination System (WPDES) Permit Application
- Preliminary Engineering Report for Wastewater Treatment Facilities
- High Capacity Well Permit Application

An attempt has been made during the preparation of the above documents to avoid excessive duplication. The WRPA is intended to be self-contained; but, some cross-referencing to the other documents is necessary. Therefore, this permit application refers to information provided in the above documents whenever possible.

Erosion control features to be used during project construction are detailed in the project's Mine Permit Application (Foth & Van Dyke, 1995a). The MPA also presents surface water control structure design for the plant site and tailings management area (TMA). Additional detail regarding TMA design and construction can be found in the project's Tailings Management Area Feasibility Report/Plan of Operation (Foth & Van Dyke, 1995b). The WRPA is based on engineering and other environmental studies as they relate to the design, operation, closure and post-operational care and maintenance of the Crandon Project facilities. Additional information including the EIR, were also used as a basis for this permit application.

The WRPA is organized into four sections. The first section is this Introduction. Section 2 contains a brief description of the main elements of the Crandon Project. Section 3 contains detailed information concerning project features requiring water regulatory permits. Section 4 contains a list of references. Completed permit application forms are included in Appendix A. Supporting information, including calculations and details, are provided in the remaining Appendices B through E.

2 General Project Description

The main elements of the Crandon Project consist of an underground mine; ore concentrating facilities; water treatment facilities; a tailings management area; a water discharge pipeline and ancillary facilities such as an access road, a railroad spur line, and service and support facilities. An extensive description of the project is included in the Mine Permit Application. Following is a brief overview describing the entire project. The overview discusses the location of the mining facilities, the geology of the ore body, the mining process and the major project components which will be developed to operate and reclaim the proposed project in a manner which protects public health, safety, and the environment. The relative location of the project is shown on Figure 2-1.

The anticipated rate of production, project life and projected employment requirements for the project are shown in Table 2-1. As with any industrial operation, the life of the facility could change based on economic conditions.

Table 2-1

Anticipated Production and Operation Data

Daily Ore Production	5,500 tons
Annual Ore Production	2,000,000 tons
Total Ore Production	55,000,000 tons
Total Estimated Project Life	35 years
Preproduction	3 years
Mining	28 years
Reclamation	4 years
Production Schedule	7 days/week
Employment (estimates)	
Construction (Peak)	750
Operations	402-526

Prepared by: PAE
Checked by: JWS

Within this section there are numerous references to the "project area", "mine site", "plant site" and the "tailings management area". These terms have specific meanings as follows.

- Project Area - The project area is defined by the boundaries delineated on Figure 2-2.

- Mine Site - The mine site is defined by the limits of disturbance of project facilities within the project area.

- Plant Site - The plant site is generally defined as the area within the mine site that includes all mining, processing, concentrating, water treatment, administrative, and storage facilities; portions of the railroad spur in the vicinity of the plant site; portions of the access road in the vicinity of the plant site; ventilation raises; and the project's water supply well and its accompanying pipeline corridor. The plant site also includes all surface water runoff and storage basins constructed in its vicinity.

- Tailings Management Area (TMA) - The "TMA" is defined as the area within the "mine site" that includes the project's four tailings cells and berms, the reclaim pond, the tailings and reclaim water pipeline and access road corridors, and contiguous borrow and storage areas. The TMA also includes all surface water drainage facilities constructed in its vicinity.

Two additional areas located outside of the project area include the narrow corridor from the intersection of the site access road and State Trunk Highway (STH) 55 to the Wisconsin River in which the project's treated water discharge line is to be located, and the project's wetland mitigation site located off-site in Shawano and Oconto Counties. Design information for the discharge pipeline to the Wisconsin River is included as part of the water treatment system engineering report prepared pursuant to Wisconsin Administrative Codes. Design information relative to the wetland mitigation site is included as part of the Federal Clean Water Act Section 404 permit application. For completeness the description of the environmental aspects associated with these areas are included in the project's EIR.

The boundaries of the project area, plant site and TMA are shown on Figure 2-2. The plant site and the TMA are approximately 128 acres and 355 acres in size, respectively. The total area of disturbance, including the access road and railroad spur, is approximately 550 acres.

2.1 Site Location

The Crandon ore body is located in Forest County, Wisconsin. The civil land survey location is Section 25, Township 35 North, Range 12 East, Town of Nashville, and Section 30, Township 35 North, Range 13 East, Town of Lincoln. The project area is located five miles south of the City of Crandon and two miles east of STH 55 and the Mole Lake Indian Reservation. The plant site is approximately one-quarter mile north of Little Sand Lake and one mile south of Swamp Creek. The primary mine surface facilities, e.g., plant site, will be located north of the ore body. The proposed plant site layout is shown in Figure 2-3. Access to the plant site will be along a new access road from STH 55 northwest of the site. A railroad spur line serving the site will be connected northeasterly to the existing Wisconsin Central Limited Railroad. The project's TMA will be located approximately one mile southeast of the plant site.

The project area shown in Figure 2-2 includes those portions of property which CMC has purchased, leased, optioned for purchase or obtained by easements for use in the development of the plant site, TMA, access roads, railroad spur line and buffer areas.

2.2 Geology

The Crandon deposit is composed of two distinct mineralization types, zinc ore and copper ore. The minerals were deposited during the Precambrian era, about 900 to 2,500 million years ago. The deposit was formed at and just below the ocean floor by mineral bearing fluids of volcanic origin. Some of the material deposited by this volcanic system was sulfide minerals which accumulated in low spots on the ocean floor. Continued accumulation of other volcanic materials and sediments occurred which buried the sulfide deposit. Deep burial, 33,000 to 50,000 feet, resulted in lithification and metamorphism which hardened and solidified both the host rock and the sulfide deposit over time. Later, a mountain building phase occurred in the region, tilting the volcanic layers and the deposit to a near vertical position. Thereafter, the deposit may have been covered by younger sediments, however weathering and erosion have removed these later rocks. The more recent geological process which has affected the deposit is related to Pleistocene glaciation which left the bedrock buried under unconsolidated glacial overburden deposits.

The Crandon ore body is long and tabular with an approximate width of 100 feet, north-south, and a strike length of 4,900 feet, east-west. Based on the results of drilling, the ore body extends to an approximate depth of 2,200 feet. The interpreted geologic stratigraphy and ore body configuration are shown on Figures 2-4 and 2-5 respectively.

The bedrock in the hanging wall and in the footwall of the ore body consists of a series of fragmental volcanic rocks, fine tuffs (solidified volcanic ash), debris flow (ocean floor and volcanic-derived sediments), breccia (blocky, angular particles), lapilli tuffs (gravel sized volcanic material) and flows. Overlying the bedrock is a sequence of unconsolidated glacial sands, clays, and gravels. The rock in contact with the unconsolidated glacial overburden is weathered to varying degrees. The amount of weathering ranges from simple staining to extreme weathering near the surface which reduced the rock to a clay-like material called massive saprolite. The glacial overburden consists of interbedded and co-mingled glacial till, which is material deposited directly by the glacier, and glacial outwash deposited by streams emanating from the glacier. These glacial deposits are found in various thicknesses in the area ranging from 75 feet to over 250 feet thick.

2.3 Key Project Elements

2.3.1 Mine Development

Access to the mine will be through a main production/service shaft located north of the ore body. The first of two ventilation shafts will be located east of this main production shaft. Underground lateral development drifts will access the ore body from the main shaft at 300 foot vertical intervals. These level development drifts are designed to provide access to the ore body. The lateral extent of a mine level at a given point in time will depend upon the need for access to mining blocks, ore passes, and ventilation raises. A schematic longitudinal section showing a typical main level plan is shown on Figure 2-6.

An underground ramp will also connect mine levels to allow for movement of mobile equipment, supplies, and personnel throughout the mine. This centrally-located ramp is also shown schematically on Figure 2-6.

Mine development will be divided into the following phases:

1) Site preparation and the sinking of the main production shaft and the east ventilation shaft. This phase is expected to take 18 months to complete.

2) The development of the underground ore handling and crushing system, the development of the dewatering system, lateral development into the ore horizons and development of the initial mining blocks (stopes). An internal mobile equipment access ramp will connect the main production ore levels. This phase of mine development is also expected to take 18 months to complete.

As shown on Figure 2-6, mine development and production will begin in areas chosen to avoid weathered bedrock which are expected to be the primary conduits for water inflow into the mine workings.

2.3.1.1 Phase I Development

Phase I development primarily includes simultaneous construction of two vertical shafts in the hanging wall rocks. Each shaft will be concrete lined through the overburden and the weathered subcrop rock. Collar construction through the glacial overburden will include stabilization and hydraulic control by ground freezing or other suitable techniques, followed by the excavation and concrete lining of the shaft into bedrock. If required, inert grout will be pumped under pressure through holes in the collar into the rock and glacial formations to provide a watertight seal. When the collar section of the main shaft and east ventilation shaft are completed, a headframe structure will be erected over each shaft. Conventional shaft sinking by drilling and blasting techniques will then commence at the main shaft and the east shaft concurrently.

During shaft development, it is estimated that the drainage water from both shaft sinkings will be controlled to less than ten gallons per minute (gpm) by grouting. All shaft water will be pumped to the surface water storage ponds.

2.3.1.2 Phase II Development

Because the east shaft is smaller than the main shaft, it will be completed sooner. Upon its completion, horizontal level development will consist of driving a horizontal opening in the hanging wall rock to connect the east shaft to the main shaft (Figure 2-6). After the two shafts are connected, level development can commence to access the ore body.

The underground ore handling facilities will be constructed near the main production shaft during this period. These facilities will consist of: (a) coarse ore and waste rock storage bins, (b) crusher facilities, (c) ore handling systems, and (d) a loadout facility.

2.3.2 Mine Operations

Level development from the main production shaft to the stoping areas will be driven at 300-foot vertical intervals. The primary mining method will be blasthole open stoping with delayed backfill. However, other mechanized variations, such as sublevel mining or cut-and-fill stoping methods may also be used. Stopes (Figure 2-7) will average approximately 300 feet high by 75 feet long, and will vary with the width of the ore body. Ore will be drilled in a stoping block, then blasted and removed. Top hammer or down-the-hole drills will be used to drill approximately four to six inch diameter blastholes on approximately 12-foot by 12-foot center spacing for production stope blasting. Broken ore will be removed from the drawpoints at the bottom of each stope using mechanized mining equipment which will then transfer the ore to the crushing level below by means of ore pass raises. Primary crushed ore, at a top size of eight inches, will be conveyed to a skip loading pocket and hoisted to the surface.

A typical stope will contain approximately 250,000 tons of ore. At a 2,000,000-ton annual production rate, approximately eight stopes will be mined out each year, which exposes less than five percent of the footwall and hanging wall area of the ore body at any one time. Exact production parameters will be based on the grade of the ore in the mined stope; the mechanical characteristics of the rock in the stoping block; and the potential for inflow of water.

A permanent bridge, or crown pillar, of bedrock directly beneath the glacial overburden will be purposely excluded from mining activity. This bedrock barrier, averaging approximately 100 feet thick, along with the routine backfilling of mined-out stopes, will maintain surface stability and prevent subsidence.

In the uppermost mine levels where the ore and host rock may have been moderately weakened by surficial weathering, mechanized cut-and-fill mining may be employed. This method is commonly used by the industry and involves removal of horizontal lifts of ore of variable thicknesses. The void created by each horizontal mining pass is backfilled prior to mining the next upper lift. Less than 10 percent of the ore body may require use of this mining method.

The planned mining methods provide for backfilling all stopes following ore extraction. These practices, combined with the fact that five to 10 percent of the potentially minable ore will be left in place as pillars throughout the mine, will provide perpetual stability of the mine area bedrock and glacial overburden. Backfilling will also result in the reduction of pathways for water migration as mining progresses.

Mine backfilling will begin with the start of milling operations and after the first stope is depleted. The backfill will consist of mill tailings 10 to 15 micron or greater in size, supplemented with coarse waste rock retained underground. Uncemented tailings backfill will have a hydraulic conductivity on the order of 0.028 feet per day. The hydraulic conductivity of cemented tailings backfill will be lower. Backfill slurry containing approximately 60 to 70 percent solids will be pumped underground through boreholes fitted with distribution pipes. The backfilling operations will normally be conducted to coincide with the mining schedule.

Waste rock material from mine development will be used in the stope backfilling process and will be placed before or during the placement of hydraulic tailings fill. The hydraulically-placed fill will flow into and fill the voids between the rock fragments.

Cement will be added to the backfill when needed to provide stability so that the column of fill will stand unsupported and enable complete removal of the ore in the adjacent stope. Approximately one-third to one-half of the total backfill placed in the mine will contain cement.

2.3.3 Mine Dewatering and Groundwater Inflow Control

Groundwater inflow will vary during the different stages of mine construction and operation. The proposed mining plan for the Crandon Project avoids entry into weathered zones during the initial operations, therefore deferring maximum and steady state inflow rates. During the initial operations, groundwater inflow is expected to be minimal and localized, occurring through isolated bedrock fractures that have limited capacity to move water. During this period, exploration holes will be advanced into the weathered bedrock areas to dewater them. The water removed in this fashion will primarily be stored water which will be withdrawn at rates that can be effectively managed at the project's water treatment plant. A more detailed description of this process follows.

As mine development progresses upward from the original mining areas (Figure 2-6), diamond drilling techniques will be used to identify active underground water courses prior to advancing the mine face. Diamond drill holes will be used throughout the mine to drain stored water. Flows encountered on the uppermost active mine level will be captured by interceptor drill holes and contained to avoid contamination by mining operations on levels below and to reduce pumping head. A conceptual cross-section of the groundwater interceptor system showing the collection methodology is presented in Figure 2-8. Standard rock grouting techniques, typically using neat cement, may also be used for local inflow control during the early mine years to limit total mine pumpage.

Typically, groundwater interception holes will form conical fans in the weathered rock above the development openings, thus increasing the radius of the drains. As is common practice in other mines, the drill hole collars will be fitted with valves to allow controlled water removal.

Groundwater collected from exploration drilling or other drill holes placed specifically for inflow interception will be routed directly to a clean water sump and pump station near the main shaft in the upper mine level. The collected groundwater will typically be pumped to the water treatment plant on the surface. However, a portion of the water may be retained underground for distribution as mine utility water.

Groundwater seepage that is not captured by the interceptor system will infiltrate the mine workings and ultimately be recovered in the main sumps along with the mine potable, utility and backfill drainage water. Normal mine drainage collection will begin on each mine level where groundwater seepage, utility water and backfill drainage will be ditched to small local sumps excavated in the drift wall. Decant water from the local mine level sumps will be piped or drained through boreholes or ditched to the main mine sumps located adjacent to the production shaft at the lowest level.

The main mine sumps and pump station will generally be arranged as indicated on Figure 2-9. Sumps will consist of downgrade excavations in the wall rock adjacent to the pump station. These will function as pumping reservoirs with an outlet end bulkhead containing the pump suction pipes.

2.3.4 Ore Processing

Ore mined from the Crandon deposit will be physically concentrated at the plant site by adding water to the crushed ore and grinding it to the size of fine sand particles. After grinding, the ore slurry will be pumped to a series of flotation circuits where reagents are added for separating metallic minerals from the ground-up ore. During this process, minerals will be selectively "floated" to the top of the flotation cells and removed. The remaining material, which is called tailings, will be either used as backfill in the mine or hydraulically transported to the TMA. Different flotation circuits require different reagents to concentrate specific individual minerals. A schematic of the ore processing circuits is shown on Figure 2-10. Separate concentrates of zinc, copper and lead minerals will be recovered by the flotation process. The concentrate from these processes will be thickened and filtered to an eight to 10 percent moisture content.

The tailings will range in size from sand to very fine particles. The coarser tailings from the mineral separation circuits will be used to backfill the mined-out stopes. The finer fraction will be sent to the TMA.

In the TMA, the tailings will settle to the bottom of the lined basin. Excess water will then be pumped from the TMA basin to a reclaim pond for reuse in the ore processing facility. The ore concentration process, TMA, and reclaim pond are designed to operate as a closed circuit. The concentration process normally requires the continuous addition of "makeup" water. Water in this circuit will not require treatment because a discharge will not normally take place. The water treatment system will be designed to treat tailings pond waters for discharge, if necessary.

2.4 Infrastructure

Infrastructure features to support the mine and milling operations include a water treatment plant, ore and waste rock storage facilities, mining waste management facilities, access road, railroad spur line, electric power transmission lines, a natural gas pipeline, a treated water discharge pipeline, and ancillary buildings and storage facilities. A discussion of each follows.

2.4.1 Water Treatment

A water treatment plant will be constructed as part of the project facilities. It will treat mine water and, if needed, process water prior to discharge. Intercepted groundwater is expected to be representative of natural groundwater quality. If the monitoring of this groundwater indicates that the water quality is not suitable for direct discharge, it will be routed through the water treatment plant. Groundwater that bypasses the interceptor system and comes in contact with mining activities will be commingled with other mine drainage water, such as the water used to cool the drill bits while drilling the blast holes. All of these "contact waters" will be routed through the water treatment plant.

The water treatment plant will include a lime and sulfide precipitation system with filtration and pH adjustment. Treatment solids from this facility will be placed along with the ore processing tailings in the TMA. Mine water will be treated to meet WDNR Water Quality Standards before being discharged to the Wisconsin River via a discharge pipeline installed primarily along the U.S. Route 8 corridor (Figure 2-11).

The treatment system is designed with two holding ponds to retain the treated water so it can be sampled prior to discharge. This will ensure all water meets discharge standards, prior to discharge.

Sanitary water will also be generated at the facility. Sanitary water will be handled separately through a package sanitary water treatment plant. The treated effluent from this plant will be pumped to the TMA.

2.4.2 Mining Waste Management

Crandon Project mining wastes will include waste rock, tailings, refuse, water treatment plant solids, and laboratory wastes.

Over 50 percent of the waste rock generated by the project will be left in the mine to be used as backfill for mined-out stopes. Limited quantities of waste rock will be brought to the surface during preproduction and managed as discussed in Section 2.4.3 below. As discussed in Section 2.4.4 below, approximately 50 percent of the tailings generated by the project will be returned to the mine as backfill, with the remaining 50 percent placed in the TMA.

During the mining operations on-site laboratories will be used to conduct metallurgical testing for mining grade control and for production quality assurance testing related to milling operations. Wastes generated from the performance of these tests will be placed in the TMA. Approximately 900 cubic yards of general refuse such as office wastes will be generated at the facility each year during the 35 years of construction, operation and reclamation. The reclaimable portion of this waste will be recycled in accordance with state law. The remaining waste materials will be disposed of by a contractor in an approved off-site landfill.

Solids will be generated from the treatment of project generated waters. These solids will be placed in the TMA with the tailings.

2.4.3 Preproduction Ore/Waste Rock Storage Areas

Two storage areas will be located to the north of the main production shaft to store ore and waste rock hoisted to the surface during pre-production mine development. Prior to the commencement of underground crushing and the start of mill operations, approximately 1,050,000 tons of uncrushed ore and waste rock of a maximum size of 24-inches will be placed on the two separate areas. One storage facility which will be lined will be used to store approximately 350,000 tons of ore and about 100,000 tons of Type II waste rock. The remaining 600,000 tons of Type I waste rock will be deposited on an unlined area located east of the lined storage area. Type I waste rock is material that has a very low potential to leach, while Type II waste rock has a higher leaching potential. The lined area is designated as the preproduction ore storage area on Figure 2-3. The unlined area is referred to as the construction material storage area on the same figure. Both storage areas have been designed to accommodate the maximum potential amount of waste rock and ore hoisted from underground during the preproduction period and will occupy a total area of approximately 18 acres.

For the preproduction ore storage area a central ridge will divide the facility on its north-south axis. Each side of the lined pad will slope away from the center. The pad will be bounded by berms with runoff collection ditches which will route water to a lined water storage basin. The base of the pre-production ore storage area will consist of a compacted layer of existing soil overlain by a geomembrane liner. A till cushion will be placed over the geomembrane. Water from this area will be drained to a water storage basin. The location of the basin is sized to hold the volume of water from a 25-year, 24-hour storm event. Water from this basin will be either pumped to the TMA for use in ore processing or to the project's water treatment plant.

The base of the construction material storage area will consist of a compacted layer of existing on-site soil. The base will be sloped to drain toward another of the site's surface water runoff basins. Water from this runoff basin will be discharged to natural site drainage ways. Following commencement of mill operations, the ore stored in the preproduction storage area will be processed. Type II waste rock stored in this area will be hauled by truck to the TMA for disposal or for use as riprap for TMA internal sidewalls. Type I waste rock will be used as construction material.

2.4.4 Tailings Management Area

All tailings produced by ore processing that are not used for mine backfill, hoisted Type II waste rock, water treatment plant solids and the small amount of laboratory wastes will be placed in the TMA. The TMA has been designed to provide long-term, environmentally-safe containment. Tailings and treatment plant solids will be pumped to the TMA through a high density polyethylene (HDPE) pipeline. Waste rock will be transported to the TMA by truck.

As shown on Figures 2-12 and 2-13, the TMA will consist of four cells, each of which will be lined and include a leachate collection system. The four cells, referred to as TMA1 through TMA4 will each be constructed and operated in two stages. TMA1 and TMA2 are designed to contain the tailings from processing the zinc ore. TMA3 and TMA4 will be used for the copper ore tailings. The approximate capacities and site lives for each cell are shown in Table 2-2.

Table 2-2

Approximate Tailings Management Area Capacity

TMA Cell	Capacity (in millions of cubic yards)	Approximate Site Life (years)
TMA 1	4.0	6
TMA 2	7.8	10
TMA 3	3.9	6
TMA 4	4.8	6
Total	20.5	28

Prepared by: PAE
Checked by: JWS

TMA cell construction and operation will first involve constructing and filling Stage 1 of TMA1. As the tailings in Stage 1 approach the design elevation, Stage 2 of TMA1 will be built. When approximately one to two years of capacity remain in TMA1, construction of Stage 1 for TMA2 will begin. When TMA1 is full, tailings placement in TMA2 will start. After consolidation, reclamation of TMA1 will begin, while filling in TMA2 progresses. The same process will continue for TMA3 and TMA4.

The tailings slurry will be transported from the concentrator building to the TMA through an approximate 16-inch inside diameter HDPE aboveground pipeline. The location of the pipeline is shown on Figure 2-2. The pipeline will lie above ground in a lined ditch. A 22-foot wide access road will be located next to the pipeline for service and maintenance. Pumps used for pumping the tailings slurry in the pipe will be located in the concentrator building. The pipeline ditch will be sloped to lined sumps located at the plant site and approximately midway between the plant site and the TMA to collect tailings and water in the event of leakage or to provide storage if the pipe must be drained.

The tailings slurry will be deposited in the active TMA cell using spigots. The spigot discharge point(s) will be regularly moved around the inner perimeter of the active cell to facilitate even distribution of tailings and to keep the tailings saturated. The excess water that drains from the slurry after the tailings have settled will flow to an area in the center of the cell and will be pumped to the reclaim pond. Water in the reclaim pond will be retained for a short time and then pumped to the mill for reuse in the process circuit. The tailings operating system is designed to maximize tailings density.

The TMA cells have been designed to meet the standards contained in applicable state statues and administrative codes which are written to protect the public health and welfare. Key TMA design features include:

- An average 43-foot separation from the base of the TMA to groundwater.
- A minimum 1,250-foot separation from the nearest lake or stream.
- A composite liner consisting of a low-permeability soil member and a geomembrane liner.
- A leachate collection system over the bottom of each cell and partially up the interior sidewalls of each cell.
- A reclaimed final cover consisting of the following components from top to bottom.
    - topsoil
    - rooting layer
    - drainage layer
    - geomembrane liner
    - low permeability soil liner
    - grading layer
- Surface water control structures designed to accommodate a 100-year, 24-hour storm event.

2.4.5 Access Roads

A site access road will be constructed from STH 55 to the plant site. A second access road will be constructed from the plant site to the TMA. The site access road will be approximately three miles long and consist of bituminous concrete with gravel shoulders. The treated water discharge line will be buried in the right-of-way of the site access road. The TMA access road will be approximately one mile long and will be gravel-surfaced. Pipelines for tailings disposal and reclaim water will be sited adjacent to the TMA access road in a lined ditch.

2.4.6 Railroad Spur

A 2.7-mile railroad spur line will be constructed from the plant site to the Wisconsin Central Limited Railroad located to the northeast. The spur line will consist of a single track along most of its corridor. A side track will be located near the point where the spur line connects with the main railroad line. The sidetrack will be used for switching and rail car staging. The spur line will be used to bring cement, lime and other materials to the plant, and to ship concentrates to market. Concentrate will be shipped in enclosed cars or containers.

2.4.7 Utilities

Electrical service to the project site will be provided by Wisconsin Public Service Corporation (WPSC) by an electric transmission line constructed between an existing substation near Monico, Wisconsin, and a new substation to be located at the plant site. The substation near Monico will be upgraded by WPSC as part of the extension of electrical power for the project.

The WPSC area distribution system, which will likely be located near the south end of Lake Metonga, will supply natural gas for the project via a pipeline installed to the plant site. The pipeline route will follow existing county roads, cross Swamp Creek north of the plant site, and then follow the main plant access road into the site.

2.4.8 Other Facilities

In addition to the project elements discussed above other site facilities as listed below will be constructed and used as part of the project:

- Administrative offices
- Changehouse facilities
- Explosive storage areas
- Gate house
- Core logging and storage
- Covered storage area
- Truck weigh scale
- Fencing
- On-site roads
- Area lighting
- Surface maintenance shops
- Potable water supply and distribution system
- Fire protection systems
- Lubricant storage
- Bulk fuel storage
- Lay-down areas
- Railroad weigh scale
- Mobile equipment fuel station
- Parking areas
- Material storage areas

2.4.9 Surface Water Controls

Precipitation falling within the limits of the plant site will be collected and directed to one of a number of water storage basins. Contact runoff will be directed to the water treatment plant or to the TMA. Non-contact runoff will be directed to existing natural drainage features after passing through runoff basins. Precipitation falling within the TMA will co-mingle with process water and become part of the water used in the mill circuit. Some of the surface water drainage originating from outside the active mining area will be intercepted by a series of drainage swales and directed to existing natural drainage features.

2.4.10 Wetland Mitigation

Although mine facilities have been designed to minimize impacts on wetlands, as part of project construction activities, approximately 29.5 acres of wetlands will be either excavated or filled. To compensate, CMC will develop replacement wetlands on a site located in Shawano and Oconto Counties as shown in Figure 2-14. The selected site is in an area that was originally wetlands, but was converted to cropland. The establishment of the compensation site involves reconverting it from cropland back to wetlands.

2.4.11 Mine Reclamation

Topsoil will be salvaged and stored from all disturbed areas for use in reclamation activities. Reclamation of the mining site will occur on an ongoing basis during construction and operation, and as the final phase of the project. After mining, the area will be used for forestry and as open green space. During construction, disturbed soil areas will be revegetated on a continual basis such that wind and water erosion potential is significantly reduced. These areas will either be temporarily reclaimed or finally reclaimed depending upon their location relative to future construction activities.

Final reclamation of the plant site will begin after completion of mining. All open boreholes will be sealed in compliance with applicable regulations. Salvageable equipment from the mine will be brought to surface. Any equipment left underground will have potentially harmful fluids removed. The shafts to the mine will be sealed with reinforced concrete plugs. Surface facilities may be converted to other uses if possible. If other uses are not feasible, those facilities will be removed. The site area will be regraded and revegetated. Settling basins and ponds will be drained and the area reclaimed. Containment structures will be removed. Disturbed areas will be regraded and revegetated. The TMA will be reclaimed in phases during its lifetime. Final closure of the last cell of the TMA will occur late in the sequence of project reclamation.

The water treatment plant and associated pipelines will be removed after they are no longer required. Salvageable equipment will be transported off-site. Scrap and treatment solids will be placed in the TMA prior to closure of the final cell. Buried segments of pipelines will be purged and left in place. Above-grade pipelines will be removed. The water treatment plant area and pipeline routes will be graded and revegetated.

On-site roads, the plant site access road and the railroad spur line will be among the last items to be reclaimed. Reclamation of these features would be dependent upon the final site use. If no future use is anticipated, the construction materials will be removed. Bituminous pavement will be salvaged for use elsewhere, if possible, or placed in the TMA. Rail will be salvaged. The areas will be regraded and revegetated.

Utilities that service other customers along the route to the plant site will be left in place. The portion of the utilities that extend onto the plant site will be removed if above ground, or remain in service depending upon the final use of the site. Below ground piping will be flushed as required, capped and left in place, if no longer in service.

3 Chapter 30 Permit Structures and Activities

Project activities regulated by Chapter 30, Wis. Stats., are proposed for the Crandon Project mine site and the treated wastewater discharge pipeline. This section presents the information necessary to support the required permit applications. Included are appropriate permit application forms and supporting data for each regulated activity.

3.1 Mine Site

Water regulatory permit application forms for the mine site are provided in Appendix A-1. In order to comply with Chapter 30, Wis. Stats., requirements, the following mine site activities will require permitting:

- Site grading that would result in topsoil disturbances of more than 10,000 square feet to the banks of navigable waterways as covered by Chapter 30.19(1)(c), Wis. Stats.;

- General culvert installations in navigable waterways and intermittent streams as covered by Chapters 30.12(3)(a)(3) and 30.123, Wis. Stats.;

- The construction of two bridges over Swamp Creek as covered by Chapters 30.12(3)(a)(3), 30.123, and 30.20, Wis. Stats.; and

- Riprap placement at the Skunk Lake mitigation outfall structure as covered by Chapter 30.12(3)(a)(3), Wis. Stats.

The remainder of this section describes these proposed activities.

3.1.1 Site Grading

Permits are required under Chapter 30.19(1)(c), Wis. Stats., for construction activities involving the disturbance of more than 10,000 square feet of topsoil on the banks of navigable waterways. The construction activities at the mine site will result in the disturbance of approximately 550 acres. The area that falls within the bank of any navigable water body, however, is substantially less than the total disturbance area and is generally localized to the stream crossings discussed in Sections 3.1.2 and 3.1.3. Site grading activities will include:

- Plant Site Construction;
- TMA Construction;
- Access Road Construction;
- Railroad Spur Construction; and
- TMA Access Road/Pipeline Corridor.

Each activity is described below.

3.1.1.1 Plant Site Construction

Site grading in the area of the plant site will create a total of approximately 128 acres of surface disturbance including 0.28 acres of wetland disturbance. Procedures for erosion control and surface water management for plant site construction activities are described within Section 4.10 of the MPA (Foth & Van Dyke, 1995a).

3.1.1.2 TMA Construction

Site grading in the area of the TMA will create a total of approximately 355 acres of surface disturbance including 21.59 acres of wetland disturbance. Procedures for erosion control and surface water management for the TMA construction activities are described within the MPA and TMA reports (Foth & Van Dyke, 1995a and 1995b).

3.1.1.3 Access Road Construction

Construction of the project's access road will create approximately 35 acres of surface disturbance including five wetlands and stream crossings which will disturb 3.91 acres wetlands at the locations indicated on Figure 3-1. The disturbance will consist of stripping topsoil and removing hydric soils. Structural fill material will be placed to design elevations. Culverts will be installed for flow equalization as described in Section 3.1.2, below. A crossing will be constructed over Swamp Creek as presented in Section 3.1.3, below. Wetlands adjacent to the site access road and stream banks will be protected during construction activities using the erosion control methods described in Section 4.10 of the MPA (Foth & Van Dyke, 1995a).

3.1.1.4 Railroad Spur Construction

Construction of the project's railroad spur will create a total of approximately 18.1 acres of surface disturbance, including 3.05 acres of wetland disturbance at the locations indicated on Figure 3-2. In addition, Swamp Creek will also be crossed at the location indicated on Figure 3-2. The disturbance will consist of stripping topsoil and removing hydric soils. Structural fill material will be placed to design elevations. Culverts will be installed for flow equalization as described in Section 3.1.2, below. A crossing will be constructed over Swamp Creek as presented in Section 3.1.3, below. Wetlands adjacent to the railroad spur and stream banks will be protected during construction activities using the erosion control methods described in Section 4.10 of the MPA (Foth & Van Dyke, 1995a).

3.1.1.5 TMA Access Road/Pipeline Corridor Construction

Construction of the TMA access road will create a total of approximately 7.3 acres of surface disturbance including a wetlands crossing which will disturb 0.47 acres of wetlands. The crossing location is depicted on Figure 3-3. The disturbance will consist of stripping topsoil and removing hydric soils. Structural fill material will be placed to design elevations. A culvert will be installed for flow equalization as discussed in Section 3.1.2, below. Wetlands adjacent to the TMA access road construction area will be protected during construction activities using the erosion control methods described in Section 4.10 of the MPA (Foth & Van Dyke, 1995a).

3.1.2 Culvert Installations

Culverts which need to be placed to allow waterways to drain past the railroad spur and access road are addressed in this section.

3.1.2.1 Locations and Descriptions

Figures 3-1 and 3-3 depict culvert locations along the site access road and TMA access road/pipeline corridor, respectively. Figure 3-2 presents culvert locations along the proposed railroad spur. A total of seven culverts for intermittent streams or navigable streams have been identified as requiring Chapter 30 permits for their construction. Appendix B contains plan and profile information for the culvert locations. Table 3-1 summarizes types and locations of the proposed culverts.

Table 3-1

Proposed Culvert Locations

Culvert No.	Approximate Station	Approximate State Plane Coordinates: Northing	Approximate State Plane Coordinates: Easting	Description
1	1,100[1]	126,012	2,274,171	24" RCP-Plant site access road, intermittent stream and wetland crossing
2	1,352[1]	126,043	2,275,043	24" RCP-Plant site access road, intermittent stream and wetland crossing
3	1,701[1]	125,699	2,276,128	24" RCP-Plant site access road, wetland crossing
4	2,535[1]	123,151	2,276,459	24" RCP-Plant site access road, intermittent stream and wetland crossing
5	511+80[2]	125,493	2,283,372	8-foot by 3-foot box culvert-Railroad spur, navigable streams
6	509+70[2]	125,555	2,284,075	27" RCP-Railroad spur, intermittent stream and wetland crossing
7	18+00[2]	116,451	2,279,490	24" RCP-TMA access road, wetland crossing

[1]Meters
[2]Feet
RCP = Reinforced Concrete Pipe

Prepared by: MRS
Checked by: PAE

3.1.2.2 Hydraulic Design Considerations

The mine site culverts have been sited and designed to minimize drainage effects along project construction features (access road, railroad spur, TMA access road/pipeline corridor) and to comply with Chapter 30, Wis. Stats., requirements. Culvert Nos. 3 and 7 will be installed for flow equalization in wetland crossings. Culvert Nos. 1, 2, 4, and 6 will be constructed at Swamp

Creek tributary crossings along the plant site access road and railroad spur. Each of these latter culverts have been designed to pass the 25-year flow without backwater overtopping the constructed feature; reaching the level of the facility subgrade; or causing significant floodwater damage. As a navigable stream crossing for a tributary to Swamp Creek, culvert No. 5 has been designed to pass the 100-year flow without increasing the existing backwater depth under flood conditions. Culvert sizing calculations are contained in Appendix C.

3.1.2.3 Hydrology and Hydraulic Analyses

The Soil Conservation Service hydrologic computer program TR-20 was used to determine flood flows for all proposed culvert placements at stream crossings (i.e., culvert Nos. 1, 2, 4, 5, and 6). The calculated flood flows from the TR-20 program were used as input to the Army Corps of Engineers HEC-2 computer model to size culvert No. 5. Culvert No. 5 was designed to pass the 100-year flow. An 8-foot by 3-foot box culvert will maintain the existing tributary flow depth of 2.80 feet caused by the 100-year flow of 38 cfs. Results from the computer analysis is provided in Appendix C.

The hydraulic analysis for the remaining four culverts included evaluation with Federal Highway Administration culvert nomographs (included in Appendix C). The proposed culverts are sized to pass the 25-year flow without backwater overtopping the facility drainage ditch divides, reaching the level of the facility subgrade, or causing significant flood water damage.

3.1.2.4 General Mine Site Construction Procedures

Construction will be performed in conformance with the requirements of Chapter 30, Wis. Stats., so that environmental impacts will be minimized. Initially, clearing and grubbing of the right-of-way will be conducted. Merchantable timber will be salvaged and hauled off site by a contractor. Stumps and brush will be chipped, mulched, and stockpiled for land reclamation. Salvageable topsoil will be stockpiled for revegetation of the graded slopes.

Erosion control measures as described in Section 4.10 of the MPA (Foth & Van Dyke, 1995a) will be used to minimize siltation of wetlands and tributaries. A system of diversion dikes, silt fencing, ditches, and/or settling basins will be constructed during the clearing and grubbing operation to collect disturbed area runoff. Riprap will be used to protect slopes from erosion. Exposed slopes will be revegetated and mulched as soon as possible after grading. Temporary vegetation will be used to provide interim stability to slopes when weather conditions or construction delays preclude immediate establishment of permanent vegetation. Jute or other erosion matting will be used on steep slopes, where applicable, to enhance seed germination. Dust control will be provided by spraying open working areas with water on an as-needed basis. Most fill material required for drainage facilities will come from on-site excavation elsewhere in the project area. Riprap and aggregate will be hauled to the site from local sources. Construction will be accomplished using typical earth moving equipment.

3.1.2.5 Construction Procedures for Culverts

The design of the culverts is in accordance with the State of Wisconsin, Department of Transportation Standard Specifications for Bridge and Highway Construction (WisDOT, 1990). Construction details concerning approaches to facilities, rights-of-way, cut and fill slope intercepts and sections are included in Appendix B.

Wetlands crossed will be excavated and organic peat material will be replaced with granular material sized with less than 15% passing number 200 mesh with the total portion passing a number 4 mesh. Material removed from the wetlands will be used as topsoil in upland areas. Hydrostatic relief vents constructed of riprap will be laid directly over the granular material on the downstream side of the fill. Culverts will provide hydraulic communication in wetlands crossed so water availability is not adversely affected. Erosion control procedures consistent with those outlined in Section 4.10 of the MPA (Foth & Van Dyke, 1995a) will be used.

3.1.3 Swamp Creek Crossings

3.1.3.1 Locations

Two crossings over Swamp Creek will be constructed at the locations indicated on Figures 3-1 and 3-2. Crossing No. 1 is the access road bridge at approximate state plane coordinates 122,140 N and 2,276,450 E. Crossing No. 2 is the railroad spur bridge at approximate state plane coordinates 124,260 N and 2,282,525 E. CMC has developed two alternative types of crossing designs for each location: a multiple-box culvert or full-span bridge crossing. As part of the final design, CMC will select the crossing type to be installed.

Crossing No. 1 would consist of either four 10-feet by 8-feet box culverts constructed as shown in Figure 3-4 or a 126-foot full-span bridge constructed as shown in Appendix D. Crossing No. 2 will consist of either four 16-feet by 8-feet culverts constructed as shown in Figure 3-5 or a 63-foot full-span crossing constructed as shown in Appendix D.

3.1.3.2 Hydraulic Design Considerations

Both crossing alternatives are designed to minimize effects to existing stream flows at the crossing locations and to comply with Chapter 30, Wis. Stats., requirements. The 100-year flood standard was used to size drainage structures for streams considered navigable by the State of Wisconsin. Swamp Creek is considered navigable at these locations under applicable federal and state law definitions.

Bridge hydraulic design criteria has been established to avoid increasing the backwater elevation resulting from a 100-year flood 0.01 feet or more at the CMC property line. All crossings were sized so that the increase in backwater resulting from a 100-year flood was less than 0.01 feet. For both proposed crossing No. 1 (access road bridge) alternatives the design criteria is satisfied and there will be no increase in backwater off the CMC property from the calculated 100-year flood flow of 1,010 cfs after the structure is in place. For both proposed crossing No. 2 (railroad spur bridge) alternatives the design criteria is also satisfied and there will be no increase in backwater from the calculated 100-year flow of 890 cfs after that structure is in place.

3.1.3.3 Hydrology and Hydraulic Analyses

The Soil Conservation Service hydrologic computer program TR-20 was used to determine flood flows. The calculated flood flows were used as input to the Army Corps of Engineers HEC-2 computer model to size the necessary drainage structures. The technical memorandum contained in Appendix E presents the hydrology and hydraulic analysis for the access road and railroad spur bridge structures. As shown in the technical memorandum, no backwater easements are required for the proposed bridge locations.

3.1.3.4 General Crossing Construction Procedures

The design of the two crossings are in accordance with the State of Wisconsin, Department of Transportation Standard Specifications for Bridge and Highway Construction (WisDOT, 1990). Construction details concerning approaches to facilities, rights of way, cut and fill slope intercepts and sections are included in Appendix D. Construction methods described in Section 3.1.2.4 will be used for both crossing locations.

Erosion control measures will be used to minimize siltation of Swamp Creek. A system of diversion dikes, silt fencing, ditches, and settling basins will be constructed during the clearing and grubbing operation to collect disturbed area runoff. Riprap will be used to protect slopes from erosion. Exposed slopes will be revegetated and mulched as soon as possible after grading.

3.1.3.5 Additional Construction Procedures Relating to Box Culverts

The box culvert alternative for the two crossings, if chosen, will be constructed using the procedures outlined in Section 3.1.2.4, General Mine Site Construction Procedures, and in Section 3.1.3.4, General Crossing Construction Procedures, and as outlined below for construction activities within the channel of Swamp Creek. Additionally, the box culvert alternative will require a permit issued under Chapter 30.20, Wis. Stats., to remove streambed material to allow subgrade preparation and box culvert construction within the stream channel.

In order to install the box culverts, sheet piling using the erosion control procedure outlined in Section 4.10 of the MPA (Foth & Van Dyke, 1995a) will be used to isolate portions of the stream and allow construction to proceed. The Swamp Creek channel will be temporarily reduced at the crossing locations to allow the staged preparation of the subgrade of the box culverts, the construction of the box culverts in the flow line and the placement of riprap downstream of the bridge to prevent scouring. Following the completion of each stage of the box culverts' installation, the stream channel will be returned to its original size.

Immediately prior to box culvert construction, past surveys of mussels and dragonfly populations in the construction area will be updated. Since Swamp Creek has been identified as a trout stream, box culvert construction installation will not occur during the time period from September 15 to May 1 of any year to protect trout eggs.

3.1.4 Riprap Placement for Skunk Lake Outfall

The outfall structure proposed to be constructed at Skunk Lake is shown in plan view and detail on Figures 3-6 and 3-7, respectively. The discharge structure is located at approximate state plane coordinates 117,330 N and 2,280,360 E. Riprap will extend from the outfall into the lake to allow discharge of water to be added to the lake without eroding the shoreline or lakebed.

The outfall structure construction will be performed so that environmental impacts will be minimized. The general construction procedures outlined in Section 3.1.2.4 will be utilized during construction of the outfall. A backhoe will be used to dig the trench for the four-inch diameter pipe to the outfall. The discharge pipe will be placed on a six-inch compacted sand base with the remainder of the trench backfill consisting of acceptable compacted on-site material.

A concrete headwall will be constructed at the terminal point of the outfall pipe approximately ten feet from Skunk Lake. A riprapped drainage channel will be constructed from the headwall structure to Skunk Lake. The riprap will extend ten feet beyond the Skunk Lake ordinary high water mark at elevation 1598.09 MSL. The proposed outfall will not materially affect navigation. The proposed outfall structure will protect the lake bank and bed from erosion.

3.2 Treated Wastewater Discharge Pipeline Route

3.2.1 Pipeline Route Description

As shown on Figure 2-11, beginning at the intersection of the site access road and STH 55, the pipeline is proposed to be routed along and buried within the right-of-way (ROW) of federal, state, county and locally designated public roads (with the exception of a short segment along the Wisconsin River, where the pipeline will parallel the river on Wisconsin Public Service Corporation (WPSC) property from Hat Rapids Road north to the Hat Rapids Dam). Specifically, the proposed pipeline route begins at the CMC project site wastewater treatment facility and follows the proposed plant site access road to STH 55. The route then follows STH 55 north to County Trunk Highway (CTH) S, continuing north to U.S. Route (USR) 8. The proposed route follows USR 8 to Rhinelander where it heads south along STH 17 to Hat Rapids Road. The route follows Hat Rapids Road to the Wisconsin River, turns north and proceeds to the Hat Rapids Dam. The total length of the proposed pipeline is approximately 38.3 miles. The Hat Rapids Dam is owned and operated by WPSC.

Where the pipeline crosses streams, CMC will use proven directional drilling methods to place the pipe several feet below the stream bed without disturbing the stream or stream bed as shown in Figure 3-8. At a minimum, the pipeline will be installed beneath the Wolf River, Gliske Creek, Mud Creek, Monico Creek, Venus Creek, Neptune Creek, the Pelican and North Branch Pelican Rivers, George Creek, and one unnamed creek. A number of additional small, unnamed, intermittent streams and drainage ways will also be crossed. No disturbance is proposed for any stream with a defined bed and banks. The pipeline will be routed under such streams through directional boring. As a result, no Chapter 30.20 permits for stream bed disturbances will be required for the pipeline route. Prior to construction a walkover survey with WDNR and CMC representatives will be preformed to clarify stream crossings and establish which locations will require directional drilling.

A permit for grading more than 10,000 square feet in the bank of any navigable water body is being sought for pipeline construction under Chapter 30.19(1)(c), Wis. Stats. The completed permit application appears in Appendix A-2. Because the proposed activity is not located on CMC-owned property, authorization letters for grading activities associated with pipeline construction have been requested and will be included as an addendum to this application upon receipt from property owners.

3.2.2 Pipeline Construction Procedures

The proposed project will require general site grading as part of pipeline construction for the pipeline route shown in Figure 2-11. The 38.3 mile pipeline will disturb an approximate 20-foot wide corridor along the entire route. The disturbance area within the banks of the navigable water bodies along the pipeline route is expected to be in excess of 10,000 square feet.

Construction will be performed so that environmental impacts will be minimized and will be in accordance with the requirements of Chapter 30, Wis. Stats. Initially, clearing and grubbing of the pipeline route will be conducted. Stumps and brush will be chipped, mulched, and stockpiled for use in reclamation of the disturbed area. Salvageable topsoil will be stockpiled for revegetation of the graded slopes. Excess fill material resulting from pipeline installation in wetland areas will be hauled off site for disposal.

Table 3-2 provides specific information regarding the location of the proposed pipeline. As shown in Table 3-2, the pipeline will be routed on the west side of STH 55 and CTH S; to the north of USR 8 from CTH S to CTH V along an existing snowmobile trail; to the south of USR 8 between CTH V and River Bend Road; to the north of the Rhinelander Beltline; to the west of STH 17; and to the south of Hat Rapids Road. Per discussions with the Wisconsin Department of Transportation (WisDOT), the pipeline will be placed 25 feet from the edge of pavement along STH 55, STH 17 and all of USR 8, with the exception of the portion along the snowmobile trail. The pipeline will be installed along the centerline of the snowmobile trail. At the recommendation of the Forest County Highway Commission, the pipeline will be installed below the west top-of-ditch line (this varies but averages approximately 25 feet from the edge of pavement) on CTH S. Due to the narrow ROW, the pipeline will be installed below the edge of pavement on Hat Rapids Road. At the Wisconsin River, the pipeline will parallel the river on the east bank north to the Hat Rapids Dam on property owned by WPSC.

Table 3-2

Pipeline Location Data[1]

Segment	Length (miles)	ROW Ownership	ROW Width[2] (feet)	Side of Road	Distance from Edge of Pavement (feet)
STH 55	2.5	WisDOT	33-125	West	25
CTH S	2.0	Forest Co.	40-85	West	≈25
Snowmobile Trail	9.6	WisDOT	125-200	North	NA[3]
USR 8 from CTH V to River Bend Road	9.4	WisDOT	41-230	South	25
Rhinelander Beltline	5.8	WisDOT	100-150	North	25
STH 17	4.2	WisDOT	100-150	West	25
Hat Rapids Road	1.7	Crescent Township	66[4]	South	0

[1]Does not include the 3.1 mile portion of the pipeline corridor along the CMC site access road.
[2]Width of ROW on indicated side of road. Width is from roadway centerline.
[3]The pipeline will be placed beneath the centerline of the snowmobile trail.
[4]Total ROW width on both sides of roadway.

Prepared by: RFS
Checked by: JWS

Figures 3-9 through 3-15 are typical cross-sections showing the location of the pipeline in reference to public roadway centerlines at a minimum depth of cover over the pipeline of 4.5 feet. Where the pipeline crosses or is embedded below roadways (Figure 3-16), the depth of cover over the pipeline will be a minimum of seven feet. Where the pipeline distance is farther than the slope-intercept distance (i.e., the intersection of roadway sideslopes with undisturbed ground), the pipeline will be in undisturbed ROW. For the most part, the pipeline will be within the roadway slope-intercept and, therefore, within previously disturbed ROW.

All site grading activities will be done in a manner to prevent erosion and protect streams and wetlands from sedimentation. The procedures as outlined in Section 3.1.2.4, General Mine Site Construction Procedures, will be used for discharge pipeline construction near navigable waters. These measures are also described in Section 4.10 of the MPA (Foth & Van Dyke, 1995a).

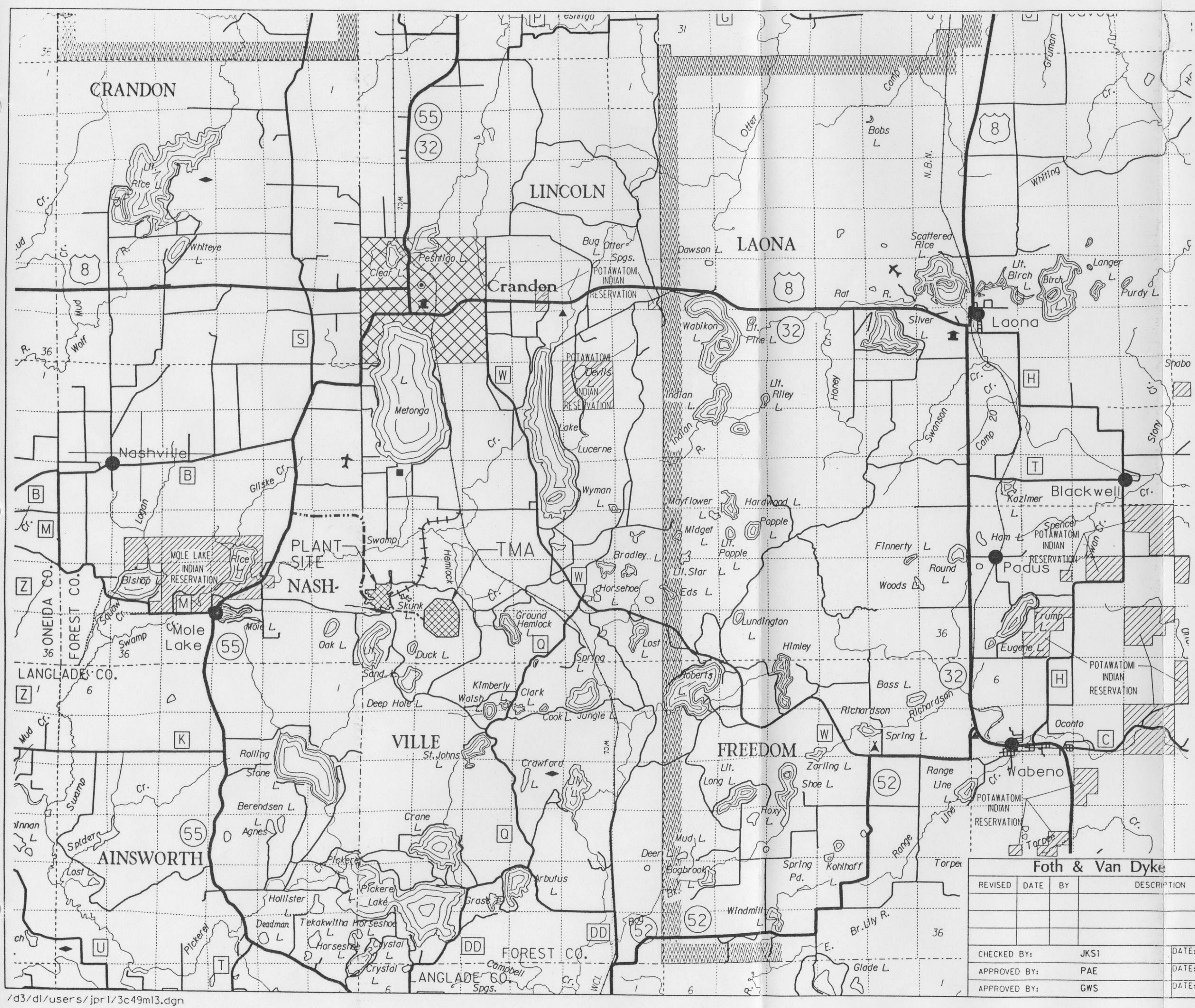
4 References

Foth & Van Dyke, May 1995a. *Mine Permit Application*.

Foth & Van Dyke, May 1995b. *Tailings Management Area Feasibility Report/Plan of Operation*.

Wisconsin Department of Transportation, April 1990. Standard Specifications for Road and Bridge Construction.

FIGURES FOR WATER REGULATORY PERMIT APPLICATION



LEGEND

- U.S. OR STATE HWY
- COUNTY TRUNK ROAD
- TOWN ROAD
- COUNTY BOUNDARY
- CIVIL TOWN BOUNDARY
- SECTION LINE
- (8) U.S. HWY NO.
- (47) STATE HWY NO.
- [W] COUNTY HIGHWAY LETTER
- NATIONAL & STATE FOREST BOUNDARY
- CORPORATE LIMITS
- UNINCORPORATED VILLAGE
- ORE BODY
- PROPOSED ACCESS ROAD
- PROPOSED TMA ACCESS ROAD AND TAILINGS PIPELINE ROUTE
- PROPOSED RAILROAD SPUR
- PROPOSED FACILITIES

N

NOTES:

1. BASE MAP DERIVED FROM COUNTY MAPS PREPARED BY THE WISCONSIN DEPARTMENT OF TRANSPORTATION.
2. ORE BODY OUTLINE IS REPRESENTATIVE OF THE SUBCROP AT THE BASE OF THE OVERBURDEN.
3. ADDITIONAL POTAWATOMI LANDS LOCATED TO THE EAST OF MAP COVERAGE.

Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	JKS1	DATE: MAY '95
APPROVED BY:	PAE	DATE: MAY '95
APPROVED BY:	GWS	DATE: MAY '95

Crandon Mining Company

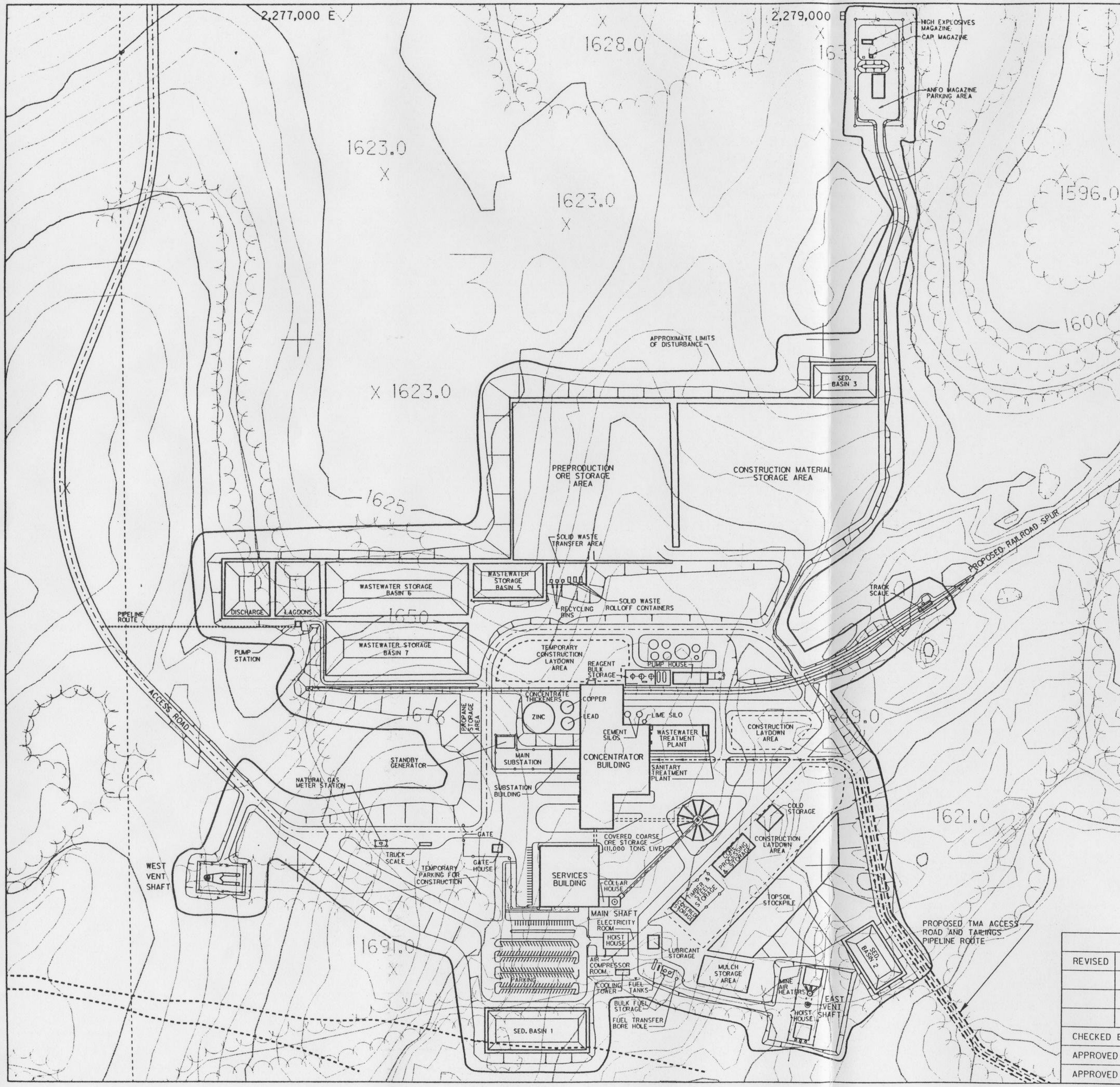
FIGURE 2-1
SITE LOCATION

Scale: 0 5000' 10,000' Date: MAY, 1995

Prepared By: Foth & Van Dyke By: BSH

93C049

2,270,000 E
2,275,000 E
2,280,000 E
2,285,000 E
125,000 N
120,000 N
115,000 N
110,000 N
KEITH SIDING RD
WISCONSIN CENTRAL LIMITED RAILROAD
SHERMAN LN
CREEK
SWAMP
OUTLET
HEMLOCK
PROJECT AREA BOUNDARY
PROPOSED RAILROAD SPUR
PROPOSED ACCESS ROAD
PLANT SITE
SKUNK LAKE
RECLAIM POND
TMA BORROW SITE
TMA
TMA ACCESS ROAD AND TAILINGS PIPELINE ROUTE
OAK LAKE
LITTLE SAND LAKE
DUCK LAKE
DEEP HOLE LAKE
RD
N
LEGEND
LAKES
STREAMS
EXISTING ROAD
1675 EXISTING CONTOUR
1692.0 EXISTING SPOT ELEVATION
SECTION LINE
ORE BODY
PROPOSED ACCESS ROAD
PROPOSED TMA ACCESS ROAD AND TAILINGS PIPELINE ROUTE
PROPOSED RAILROAD SPUR
PROPOSED FACILITIES
NOTES:
1. TOPOGRAPHIC BASE MAP DIGITIZED FROM 1" = 1000' SCALE, 5' CONTOUR INTERVAL MAP PREPARED BY AERO-METRIC ENGINEERING, INC., SHEBOYGAN, WISCONSIN. DATE OF PHOTOGRAPHY APRIL 28, 1976.
2. HORIZONTAL DATUM BASED ON WISCONSIN STATE PLANE COORDINATE SYSTEM - NORTH ZONE.
3. VERTICAL DATUM BASED ON MEAN SEA LEVEL DATUM. CONTOUR INTERVAL IS 25 FEET.
4. COUNTY AND TOWNSHIP LINES DIGITIZED FROM 7.5' SERIES USGS MAPS.
5. ORE BODY OUTLINE IS REPRESENTATIVE OF THE SUBCROP AT THE BASE OF THE OVERBURDEN.
Foth & Van Dyke
REVISED DATE BY DESCRIPTION
CHECKED BY: JKSI DATE: MAY '95
APPROVED BY: PAE DATE: MAY '95
APPROVED BY: GWS DATE: MAY '95
Crandon Mining Company
FIGURE 2-2
PROJECT AREA
Scale: 0 1000' 2000'
Date: MAY, 1995
Prepared By: Foth & Van Dyke
By: JRB
93C049
/d3/d1/users/iow/3c49m3.dan



N

LEGEND

LAKES

STREAMS

EXISTING ROAD

—1675— EXISTING CONTOUR

x1692.0 SPOT ELEVATION

SECTION LINE

ORE BODY

NOTES:

1. TOPOGRAPHIC BASE MAP DIGITIZED FROM 1″=1000′ SCALE, 5′ CONTOUR INTERVAL MAP PREPARED BY AERO-METRIC ENGINEERING, INC., SHEBOYGAN, WISCONSIN. DATE OF PHOTOGRAPHY APRIL 28, 1976.
2. HORIZONTAL DATUM BASED ON WISCONSIN STATE PLANE COORDINATE SYSTEM - NORTH ZONE.
3. VERTICAL DATUM BASED ON MEAN SEA LEVEL DATUM. CONTOUR INTERVAL IS FIVE FEET.
4. COUNTY AND TOWNSHIP LINES DIGITIZED FROM 7.5′ SERIES USGS MAPS.

SCALE

0 200′ 400′

TYPICAL REPRESENTATION: REFINEMENTS MAY BE MADE PRIOR TO CONSTRUCTION.

Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	JKSI	DATE: MAY.'95
APPROVED BY:	PAE	DATE: MAY.'95
APPROVED BY:	JWS	DATE: MAY.'95

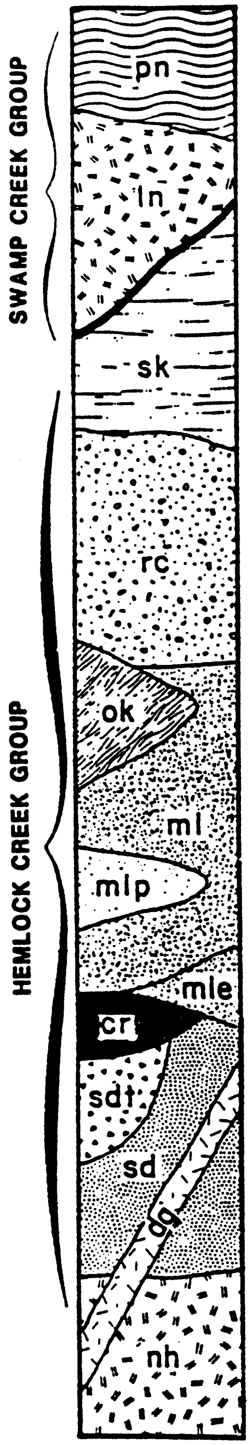
Crandon Mining Company

FIGURE 2-3

PLANT SITE LAYOUT

Scale: SEE BAR SCALE		Date: MAY, 1995	
Prepared By: Foth & Van Dyke			By: JRB2

93C049



PINE FORMATION (pn)
Cherty tuff and argillite.

LINCOLN FORMATION (ln)
Quartz porphyritic rhyolite flows with minor interflow tuff, chert and argillite.

SKUNK LAKE FORMATION (sk)
Predominantly fine to coarse ash chert tuff, some cherty and very minor argillite.

RICE LAKE FORMATION (rc)
Volcanic debris flows (blocky chloritic and minor siliceous lapilli and breccia size debris) and eutaxitic ash flows, some chert.

OAK LAKE FORMATION (ok)
Sequence of cherty tuff and sericitic tuff.

MOLE LAKE FORMATION (ml)
Predominantly mafic ash tuff.

PROSPECT MEMBER (mlp)
Volcanic debris flow consisting of siliceous, lapilli size debris.

EAGLE MEMBER (mle)
Volcanic greywacke.

CRANDON FORMATION (cr)
Laminated, bedded & replacement sulfides (zinc ore) interbedded with pyritic argillite, pyritic felsic tuff and chert.

SAND LAKE FORMATION (sd)
Sequence of fine felsic tuffs and minor felsic debris & lava flows.

TOWNSHIP MEMBER (sdt)
Volcanic vent breccia affected by multiple stage hydrothermal alteration and sulfide enrichment.

NASHVILLE FORMATION (nh)
Feldspar porphyritic mafic flows.

DUCK LAKE GABBRO (dg)
Fresh, 2 pyroxene gabbro.
Cross cuts nh and sd.

Foth & Van Dyke			
REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	JKS1	DATE: APR.'95
APPROVED BY:	PAE	DATE: APR.'95
APPROVED BY:	GWS	DATE: APR.'95

Crandon Mining Company

FIGURE 2-4
STRATIGRAPHIC COLUMN

Scale: NOT TO SCALE		Date: MARCH, 1995	
Prepared By: Foth & Van Dyke		By: BSH	

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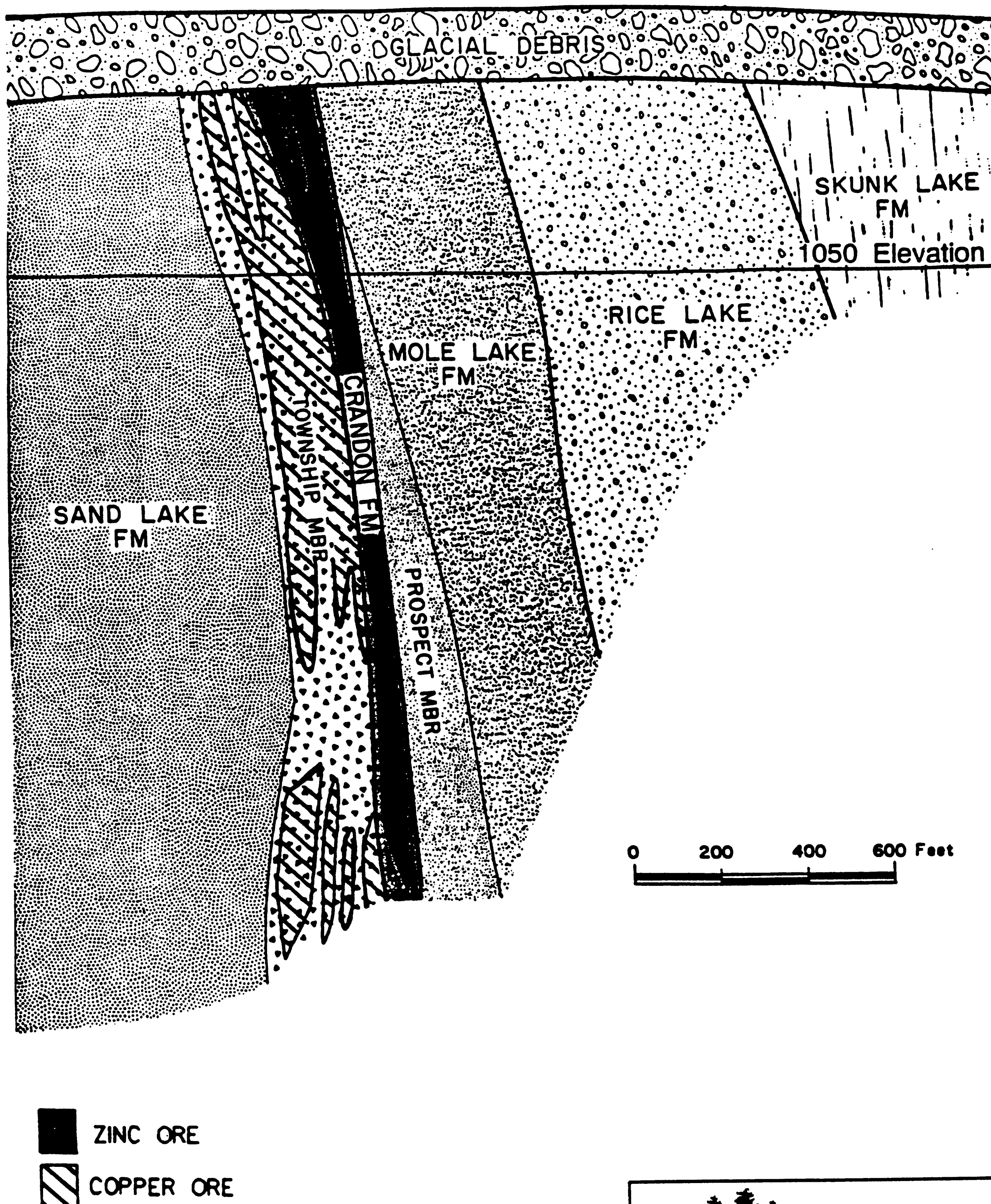
93C049

LOOKING WEST



Foth & Van Dyke			
REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	JKS1	DATE: APR.'95
APPROVED BY:	PAE	DATE: APR.'95
APPROVED BY:	GWS	DATE: APR.'95

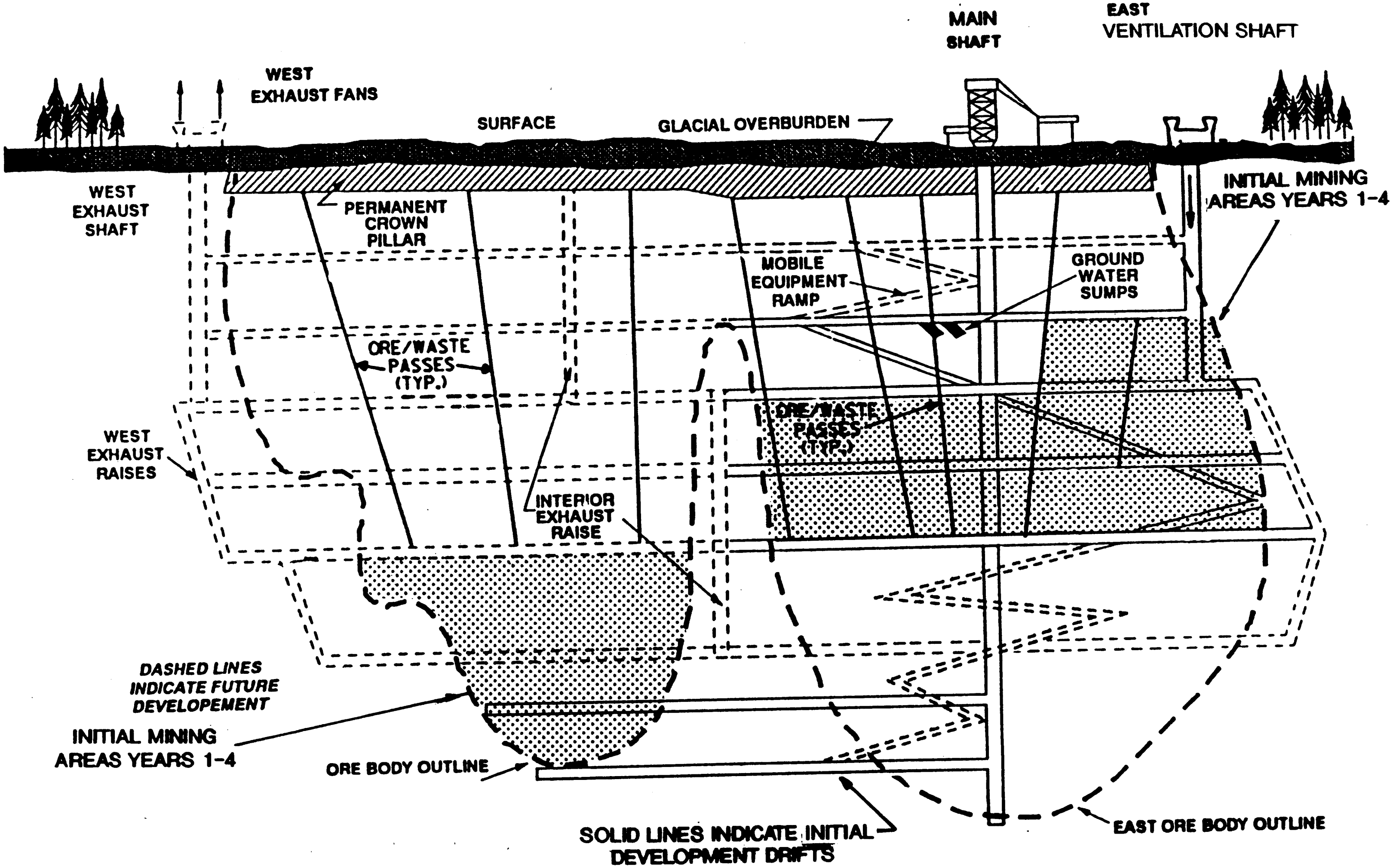
Crandon Mining Company

FIGURE 2-5
GENERALIZED GEOLOGIC
CROSS SECTION C-C'

Scale: AS SHOWN		Date: MARCH, 1995	
Prepared By: Foth & Van Dyke		By: BSH	

93C049

/d3/dl/users/jprl/3c49m5.dgn



Foth & Van Dyke			
REVISED	DATE	BY	DESCRIPTION

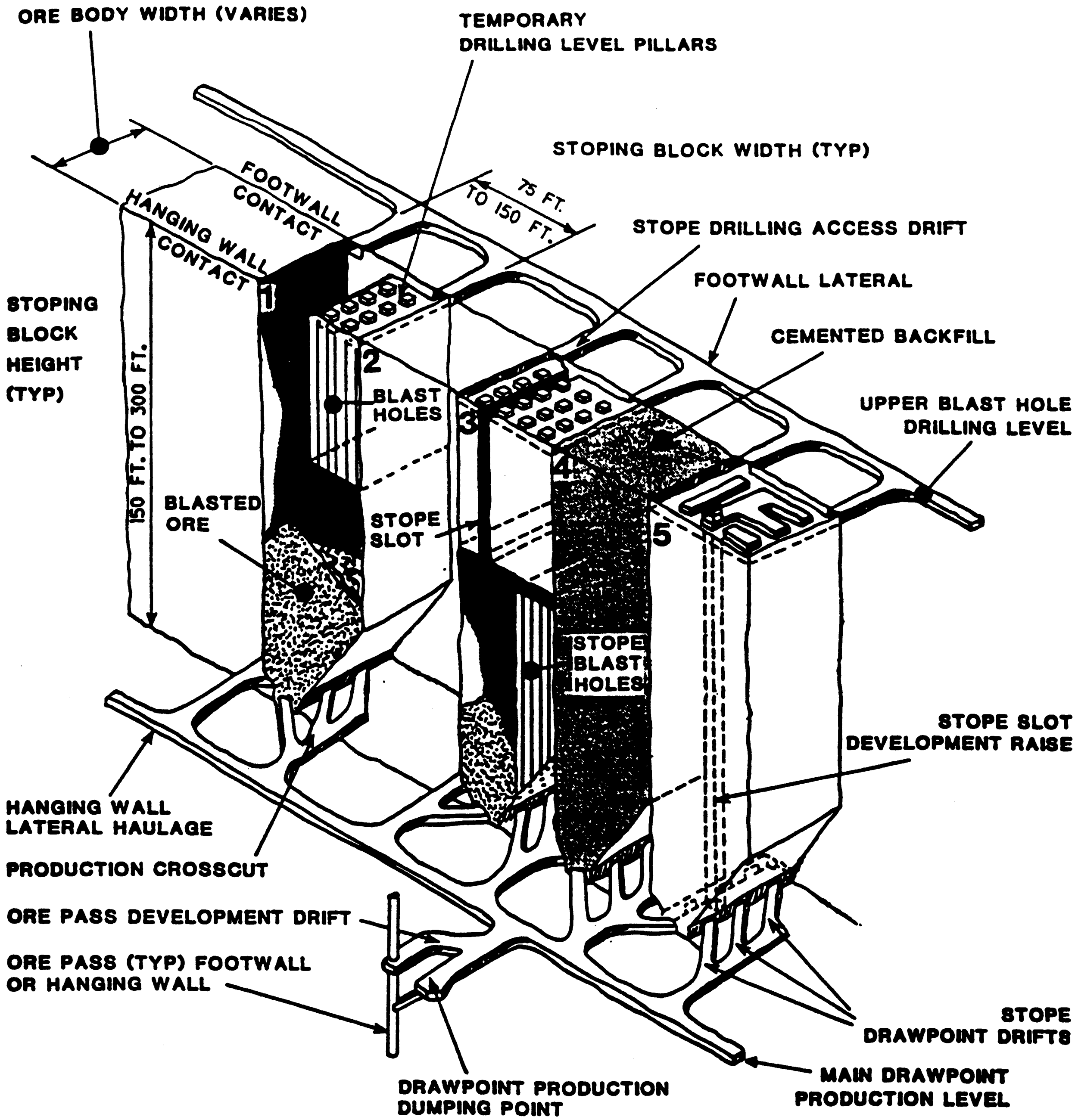
CHECKED BY:	JKSI	DATE: APR.'95
APPROVED BY:	PAE	DATE: APR.'95
APPROVED BY:	GWS	DATE: APR.'95

Crandon Mining Company

FIGURE 2-6

SCHEMATIC LONGITUDINAL SECTON
(LOOKING NORTH)

Scale: NOT TO SCALE	Date: MARCH, 1995
Prepared By: Foth & Van Dyke	By: BSH



STOPING BLOCK NO. 1–ACTIVE PRODUCTION–STOPE BLASTING NEARING COMPLETION

STOPING BLOCK NO. 2–ALTERNATE STOPING BLOCK/PILLAR–TO BE MINED AFTER BACKFILLING ADJACENT STOPES

STOPING BLOCK NO. 3–ACTIVE PRODUCTION–INITIAL STAGES OF STOPE BLASTING

STOPING BLOCK NO. 4–DEPLETED STOPE BLOCK–CEMENTED BACKFILL IN PLACE

STOPING BLOCK NO. 5–STOPE BLOCK PARTIALLY DEVELOPED

Foth & Van Dyke			
REVISED	DATE	BY	DESCRIPTION
CHECKED BY:	JKSI	DATE:	APR.'95
APPROVED BY:	PAE	DATE:	APR.'95
APPROVED BY:	GWS	DATE:	APR.'95

Crandon Mining Company

FIGURE 2-7

CONCEPTUAL STOPING SEQUENCE

Scale:	NOT TO SCALE	Date:	MARCH, 1995
Prepared By:	Foth & Van Dyke	By:	BSH

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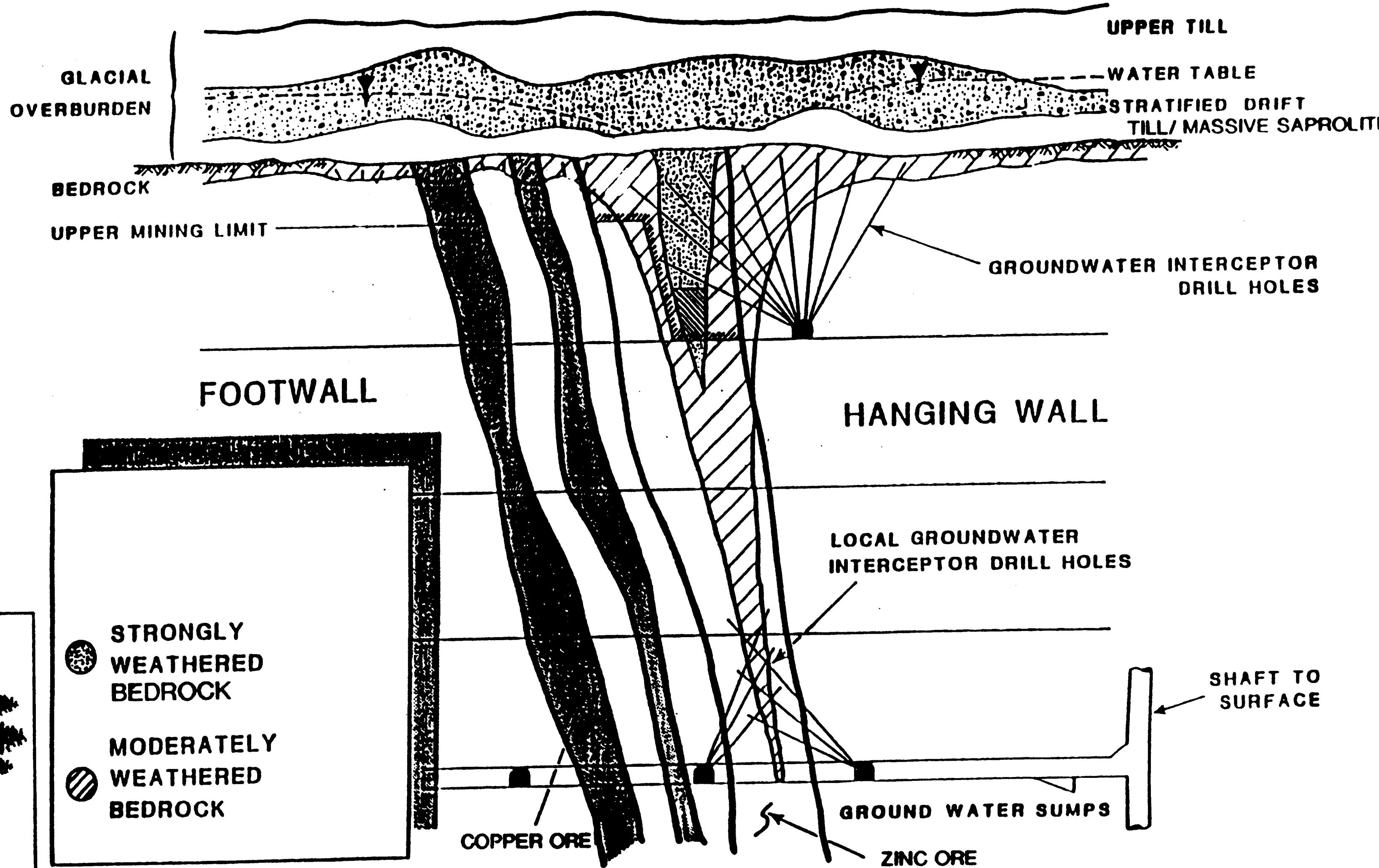
93C049



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Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY: JKSI DATE: APRIL '95

APPROVED BY: PAE DATE: APRIL '95

APPROVED BY: GWS DATE: APRIL '95

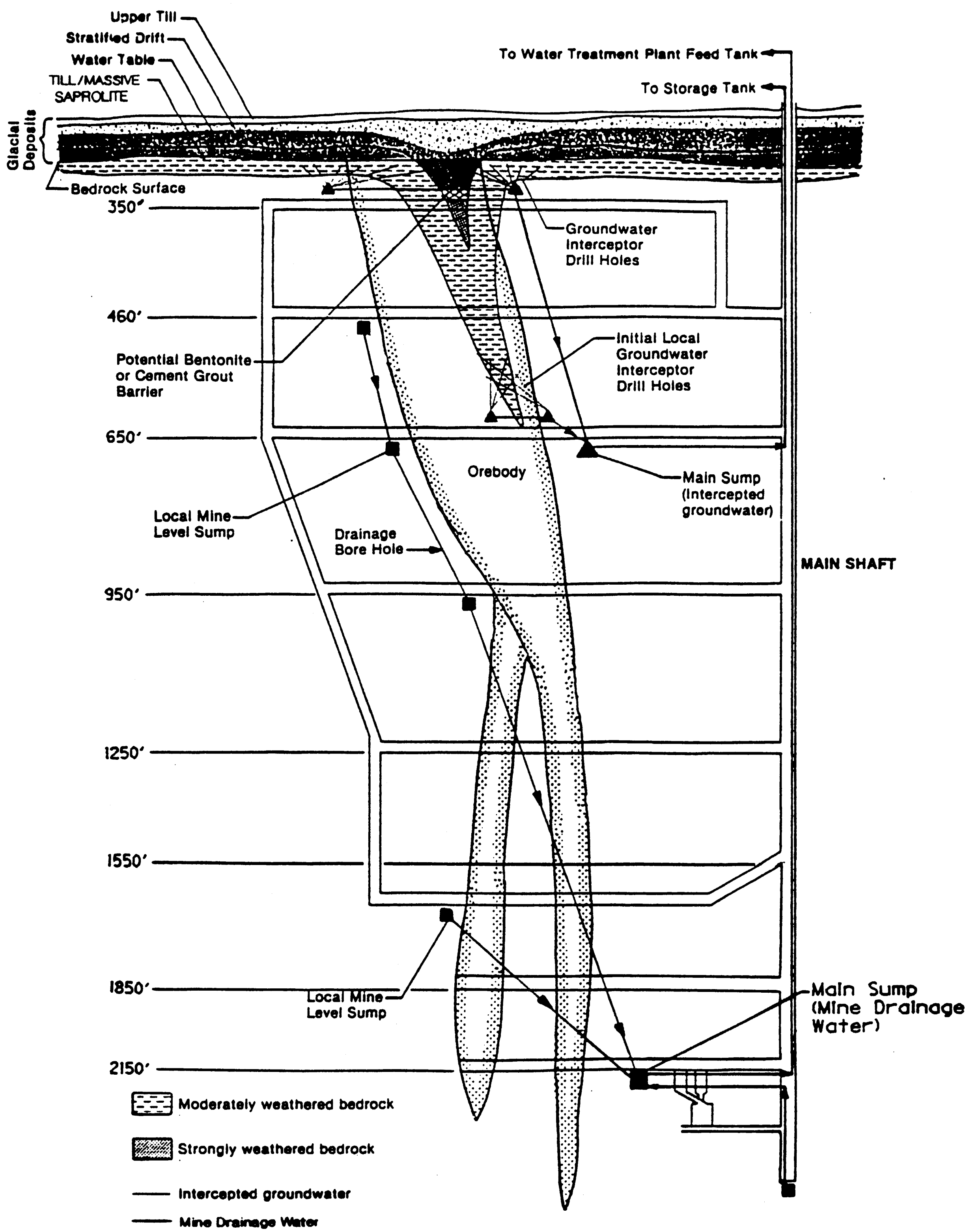
Crandon Mining Company

FIGURE 2-8
GROUNDWATER INTERCEPTOR SYSTEM
(CONCEPTUAL CROSS SECTION)

Scale: AS SHOWN Date: MARCH, 1995

Prepared By: Foth & Van Dyke By: BSH

93C049



Foth & Van Dyke			
REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	JKSI	DATE: APR.'95
APPROVED BY:	PAE	DATE: APR.'95
APPROVED BY:	GWS	DATE: APR.'95

Crandon Mining Company

FIGURE 2-9

MINE DRAINAGE SCHEMATIC

Scale: NOT TO SCALE		Date: MARCH, 1995	
Prepared By: Foth & Van Dyke		By: BSH	

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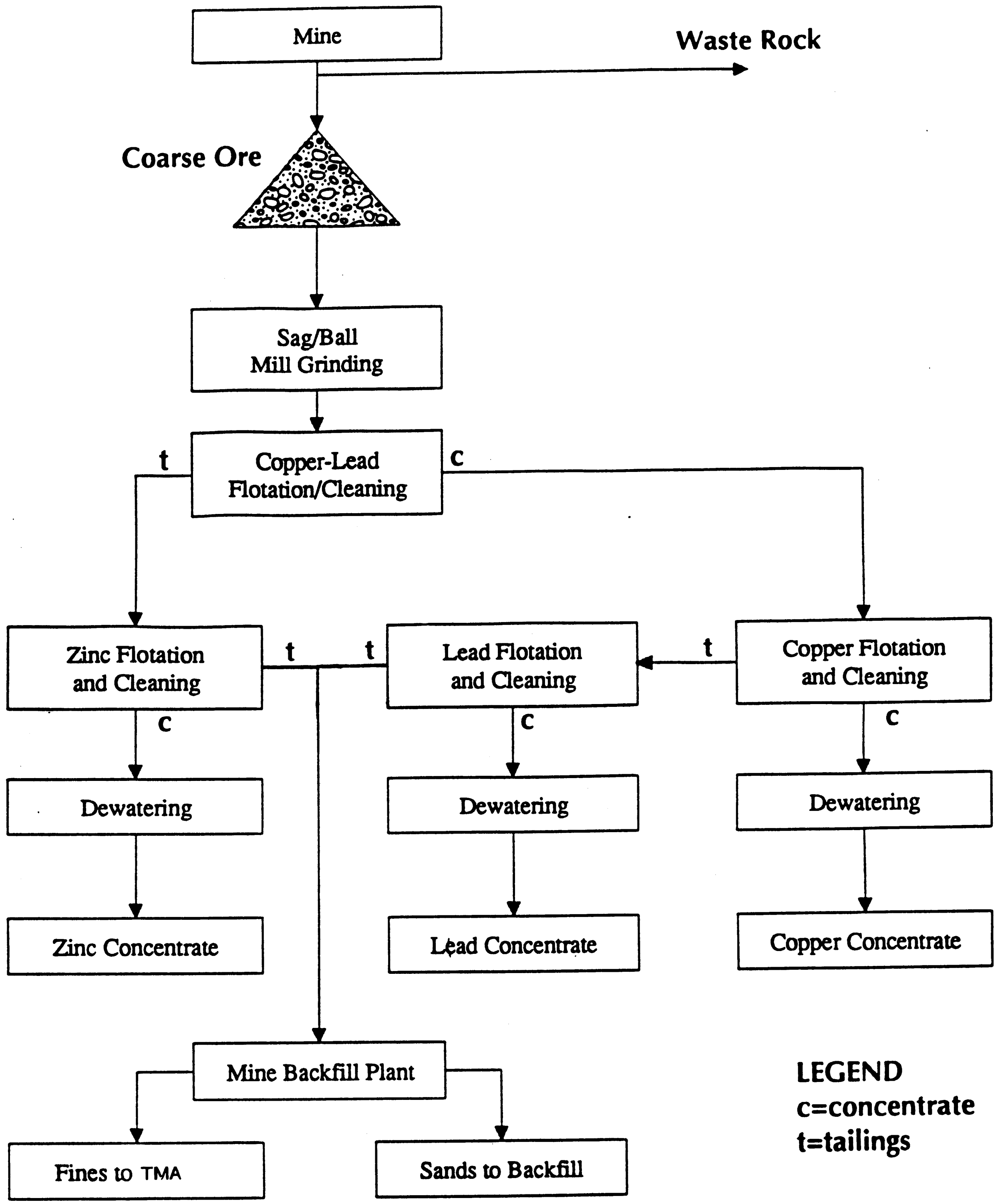

Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	JKSI	DATE: APR.'95
APPROVED BY:	PAE	DATE: APR.'95
APPROVED BY:	GWS	DATE: APR.'95

Crandon Mining Company

FIGURE 2-10

CONCENTRATOR PROCESS FLOWSHEET

Scale: NOT TO SCALE		Date: MARCH, 1995	
Prepared By: Foth & Van Dyke		By: BSH	

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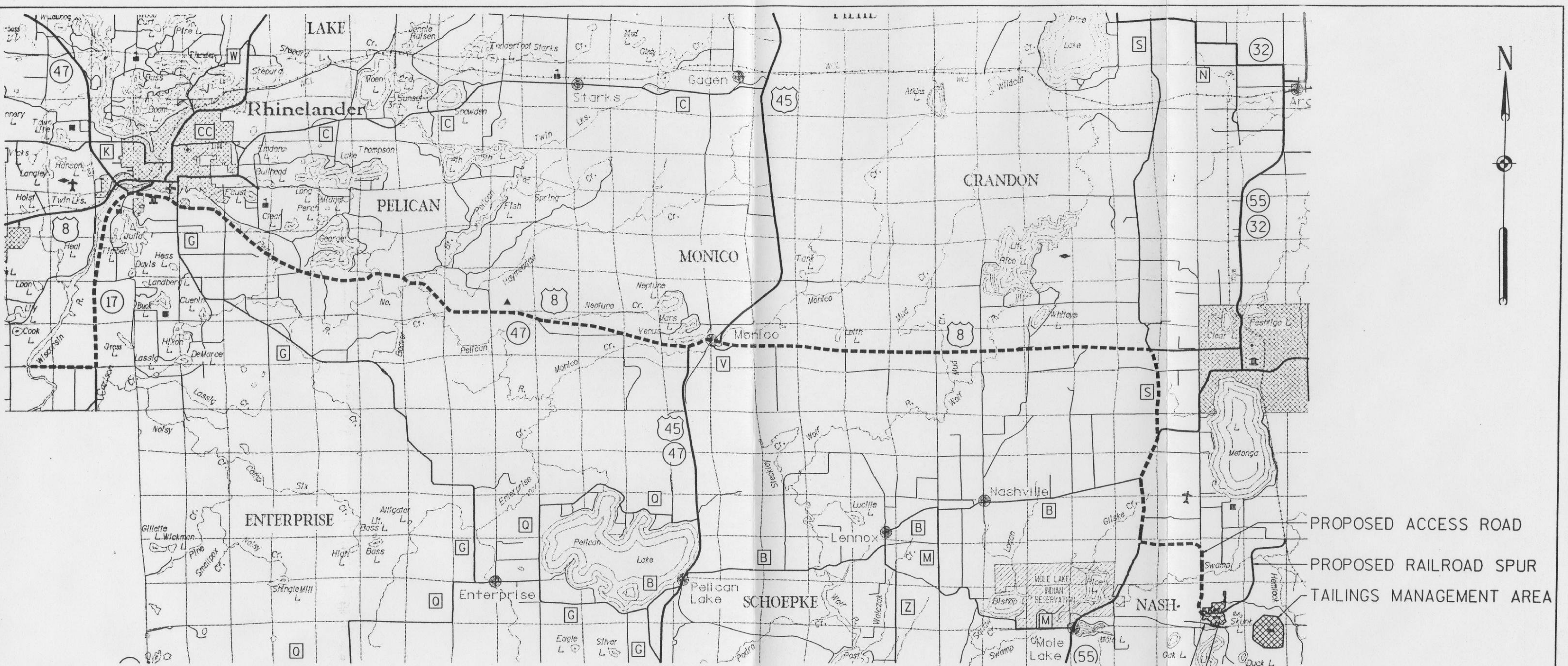

LEGEND

- U.S. OR STATE HWY
- COUNTY TRUNK ROAD
- TOWN ROAD
- SECTION LINE
- (8) U.S. HWY NO.
- (47) STATE HWY NO.
- [W] COUNTY HIGHWAY LETTER
- PROPOSED WASTEWATER PIPELINE

NOTES:

1. BASE MAP DERIVED FROM COUNTY MAPS PREPARED BY THE WISCONSIN DEPARTMENT OF TRANSPORTATION.
2. ORE BODY OUTLINE IS REPRESENTATIVE OF THE SUBCROP AT THE BASE OF THE OVERBURDEN.

TYPICAL REPRESENTATION: REFINEMENTS MAY BE MADE PRIOR TO CONSTRUCTION.

Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	JKS1	DATE: MAY.'95
APPROVED BY:	PAE	DATE: MAY.'95
APPROVED BY:	GWS	DATE: MAY.'95

Crandon Mining Company

FIGURE 2-11

PROPOSED PIPELINE ROUTE FOR WISCONSIN RIVER DISCHARGE

Scale: 0 6000' 12,000' Date: MAY, 1995

Prepared By: Foth & Van Dyke By: GAM

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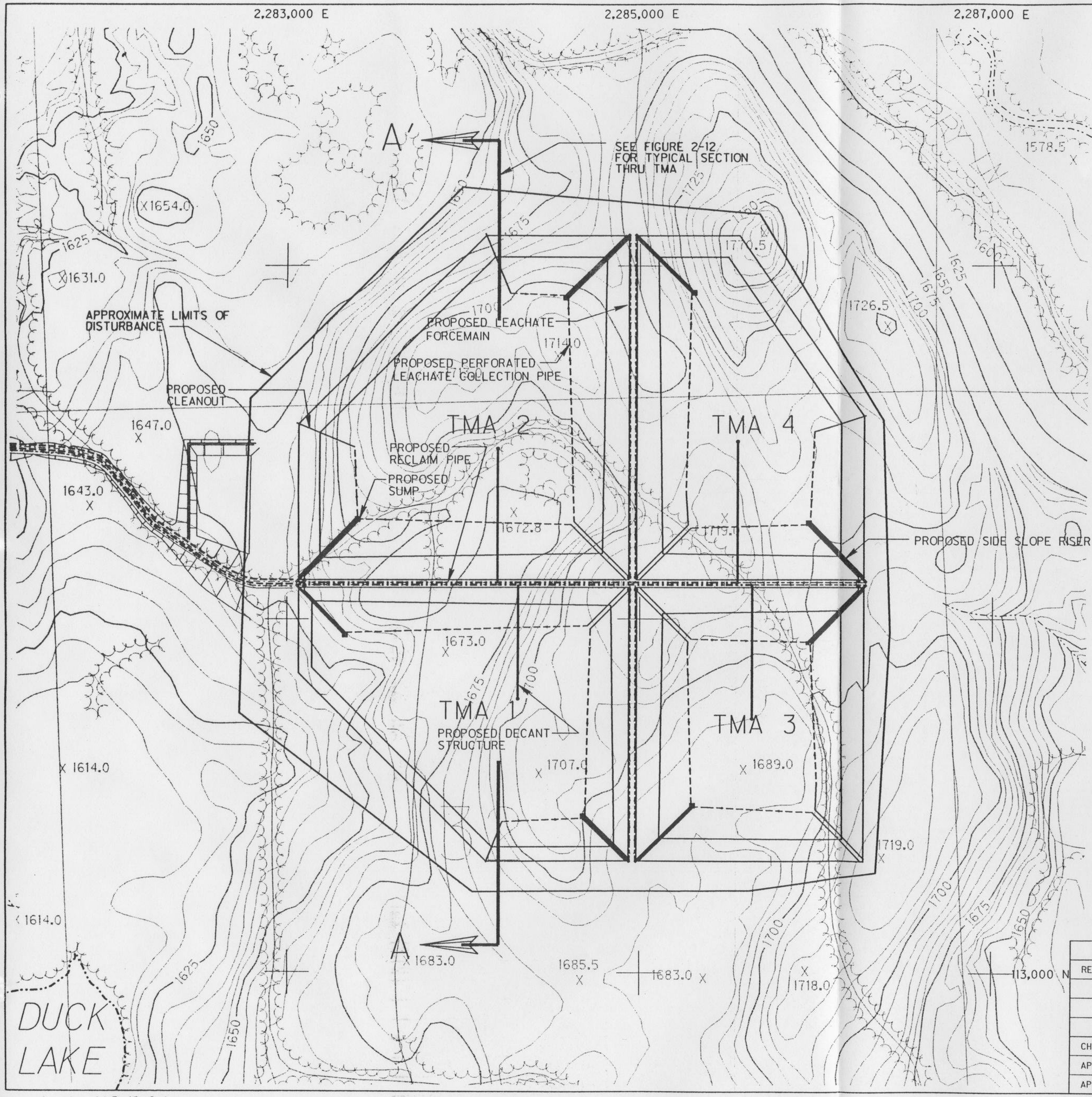
93C049



LEGEND

- LAKES
- STREAMS
- EXISTING ROAD
- —1675— EXISTING CONTOUR
- X 1692.0 SPOT ELEVATION
- SECTION LINE
- (TMA) APPROXIMATE LIMITS OF DISTURBANCE

N

NOTES:

1. TOPOGRAPHIC BASE MAP DIGITIZED FROM 1"=1000' SCALE, 5' CONTOUR INTERVAL MAP PREPARED BY AERO-METRIC ENGINEERING, INC., SHEBOYGAN, WISCONSIN. DATE OF PHOTOGRAPHY APRIL 28, 1976.
2. HORIZONTAL DATUM BASED ON WISCONSIN STATE PLANE COORDINATE SYSTEM - NORTH ZONE.
3. VERTICAL DATUM BASED ON MEAN SEA LEVEL DATUM. CONTOUR INTERVAL IS FIVE FEET.
4. COUNTY AND TOWNSHIP LINES DIGITIZED FROM 7.5' SERIES USGS MAPS.

SCALE
0 300' 600'

TYPICAL REPRESENTATION: REFINEMENTS MAY BE MADE PRIOR TO CONSTRUCTION.

Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

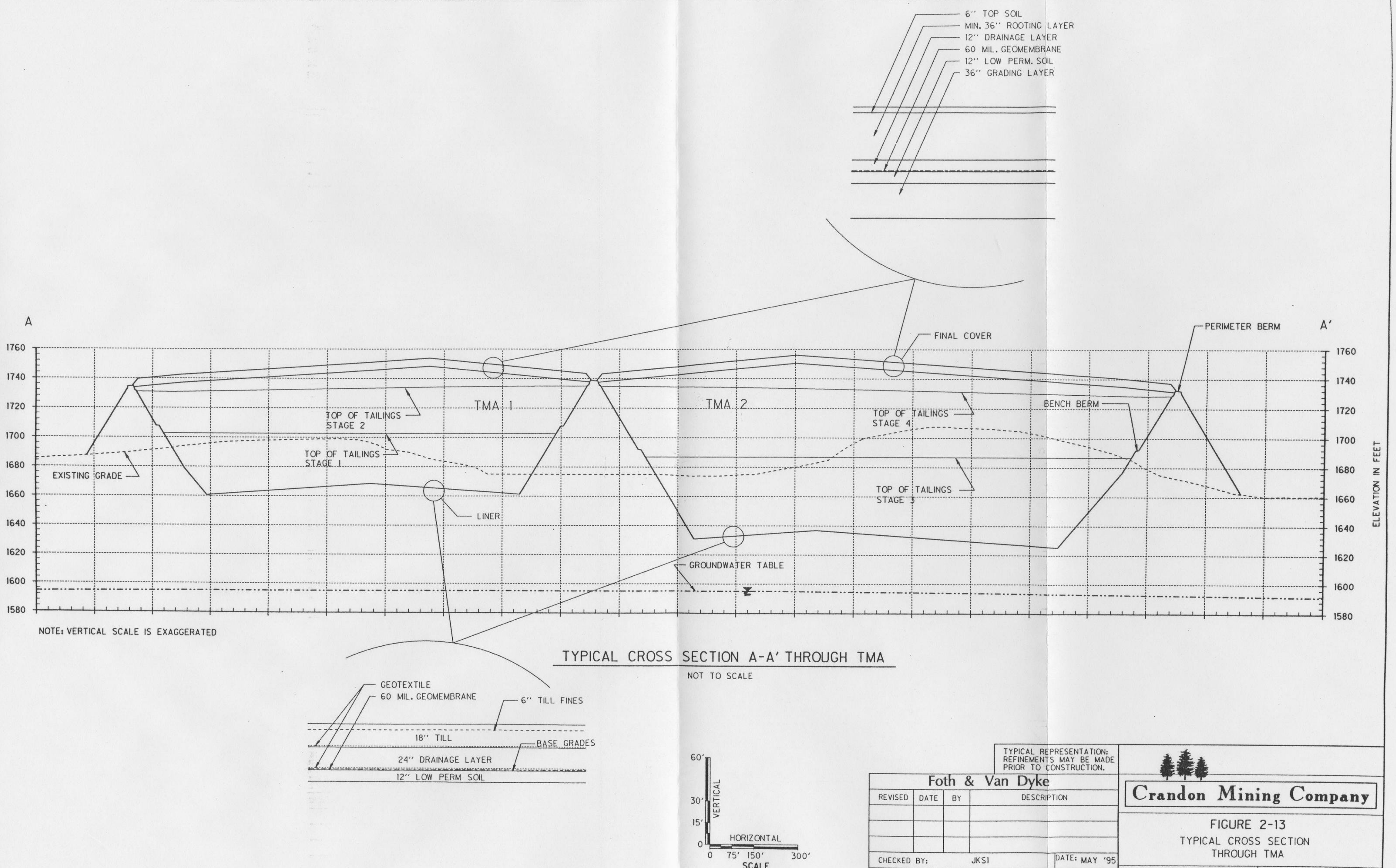
CHECKED BY:	JKS1	DATE:	MAY.'95
APPROVED BY:	PAE	DATE:	MAY.'95
APPROVED BY:	GWS	DATE:	MAY.'95

Crandon Mining Company

FIGURE 2-12
PROPOSED TMA LAYOUT

Scale:	AS SHOWN	Date:	MAY, 1995
Prepared By:	Foth & Van Dyke	By:	MRS

93C049



TYPICAL CROSS SECTION A-A' THROUGH TMA

NOT TO SCALE

TYPICAL REPRESENTATION: REFINEMENTS MAY BE MADE PRIOR TO CONSTRUCTION.

Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	JKSI	DATE: MAY '95
APPROVED BY:	PAE	DATE: MAY '95
APPROVED BY:	GWS	DATE: MAY '95

Crandon Mining Company

FIGURE 2-13
TYPICAL CROSS SECTION THROUGH TMA

Scale: AS SHOWN		Date:	MAY, 1995
Prepared By:	Foth & Van Dyke	By:	MRS

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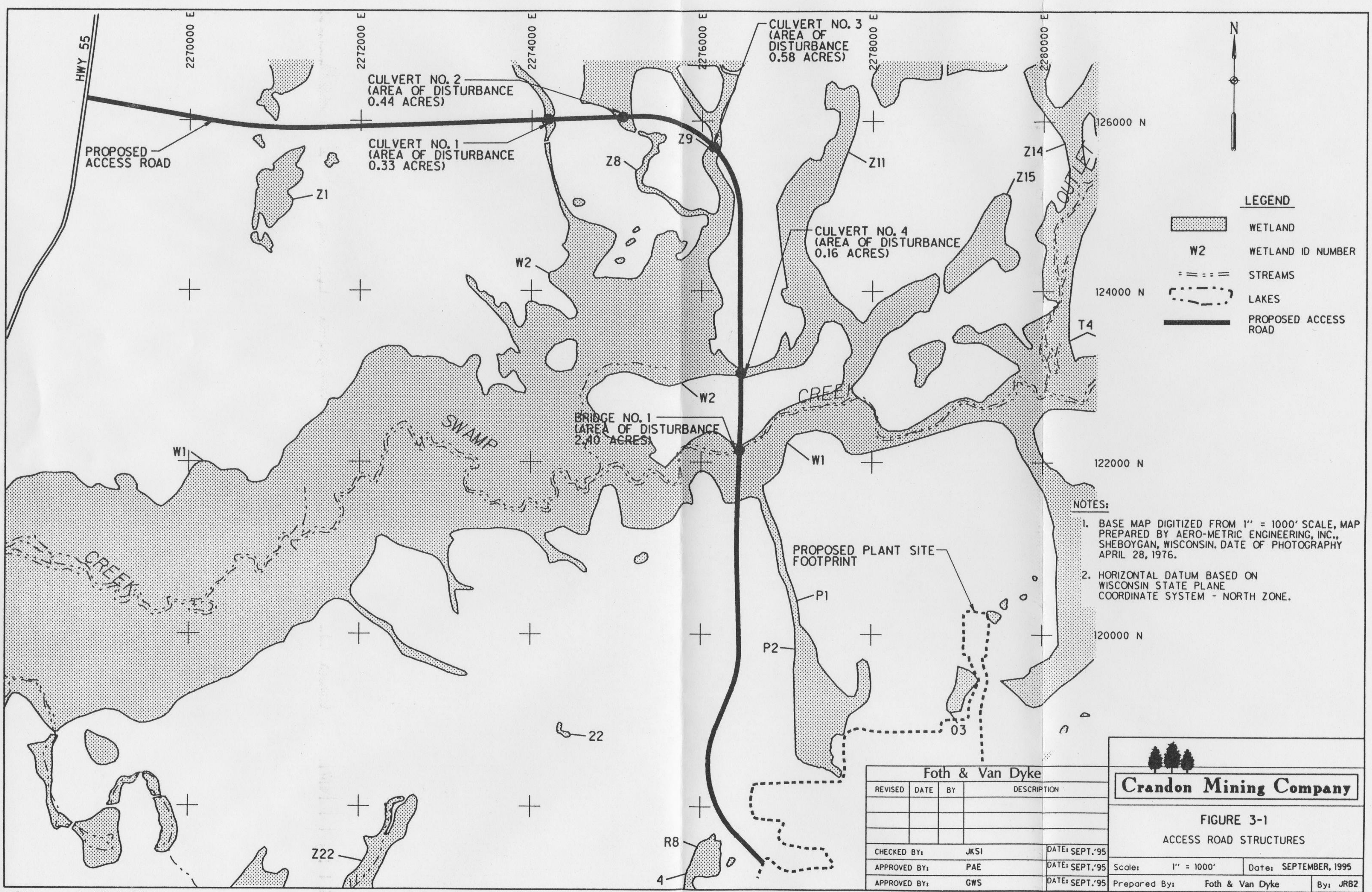

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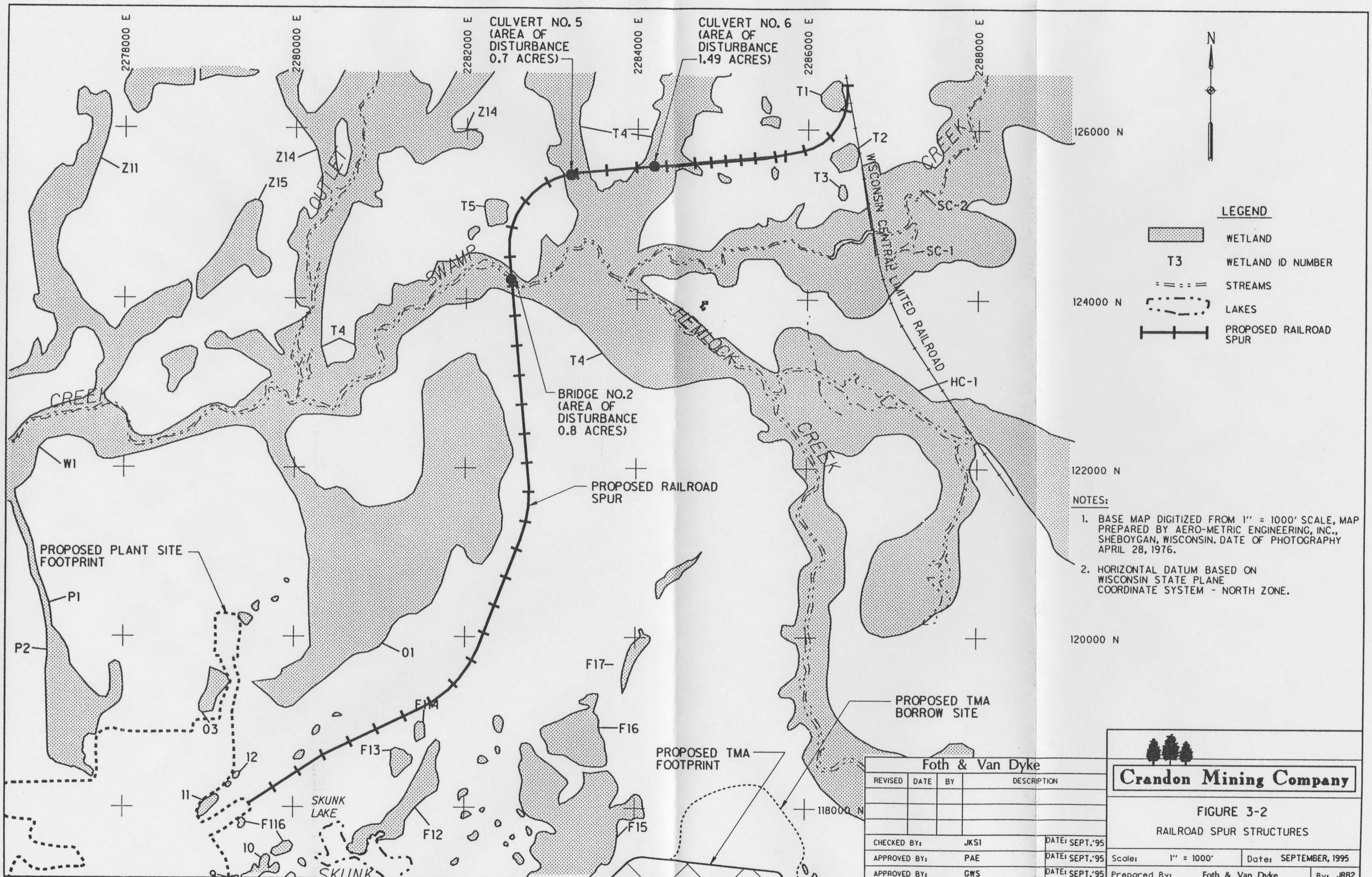

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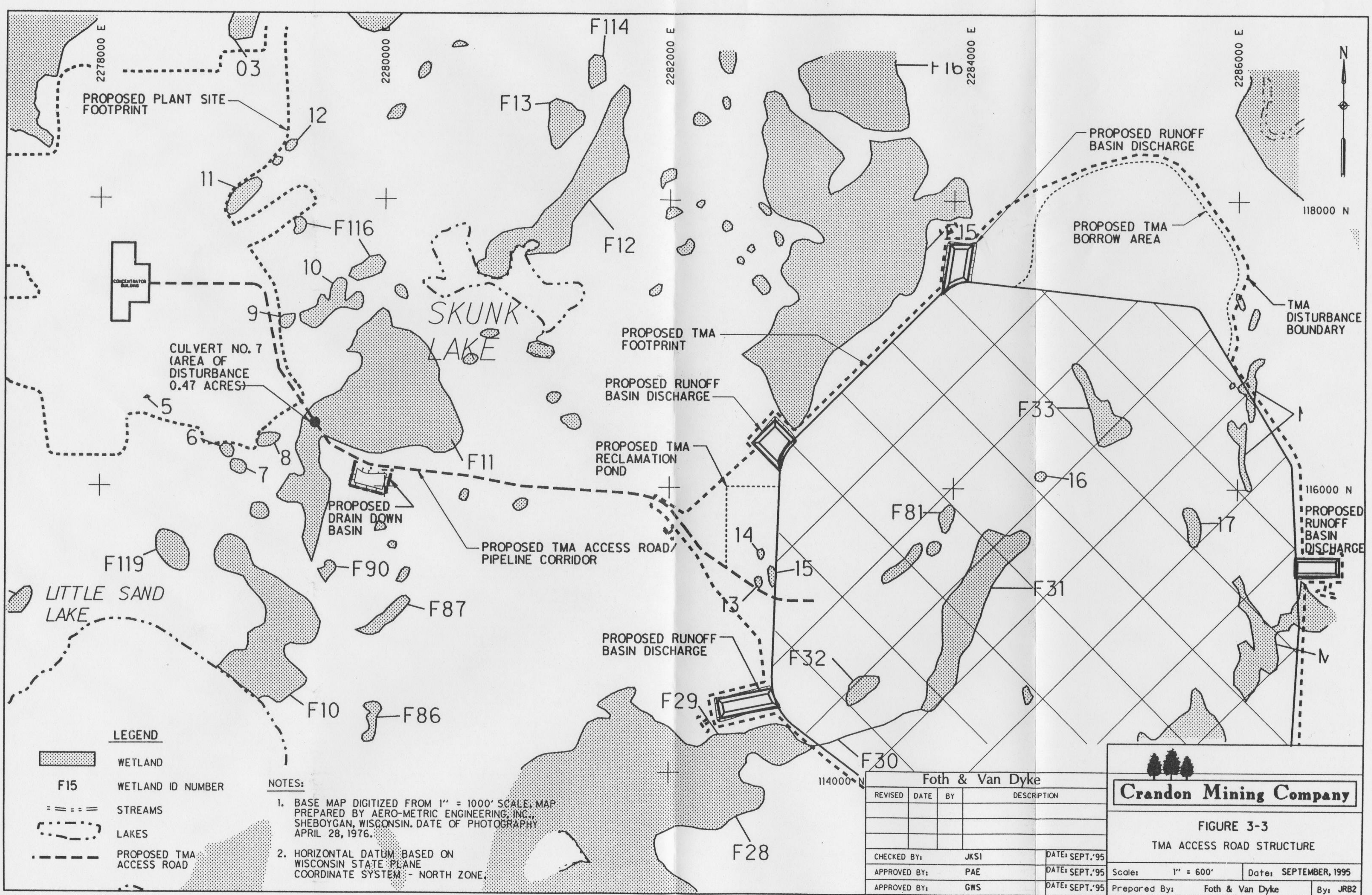

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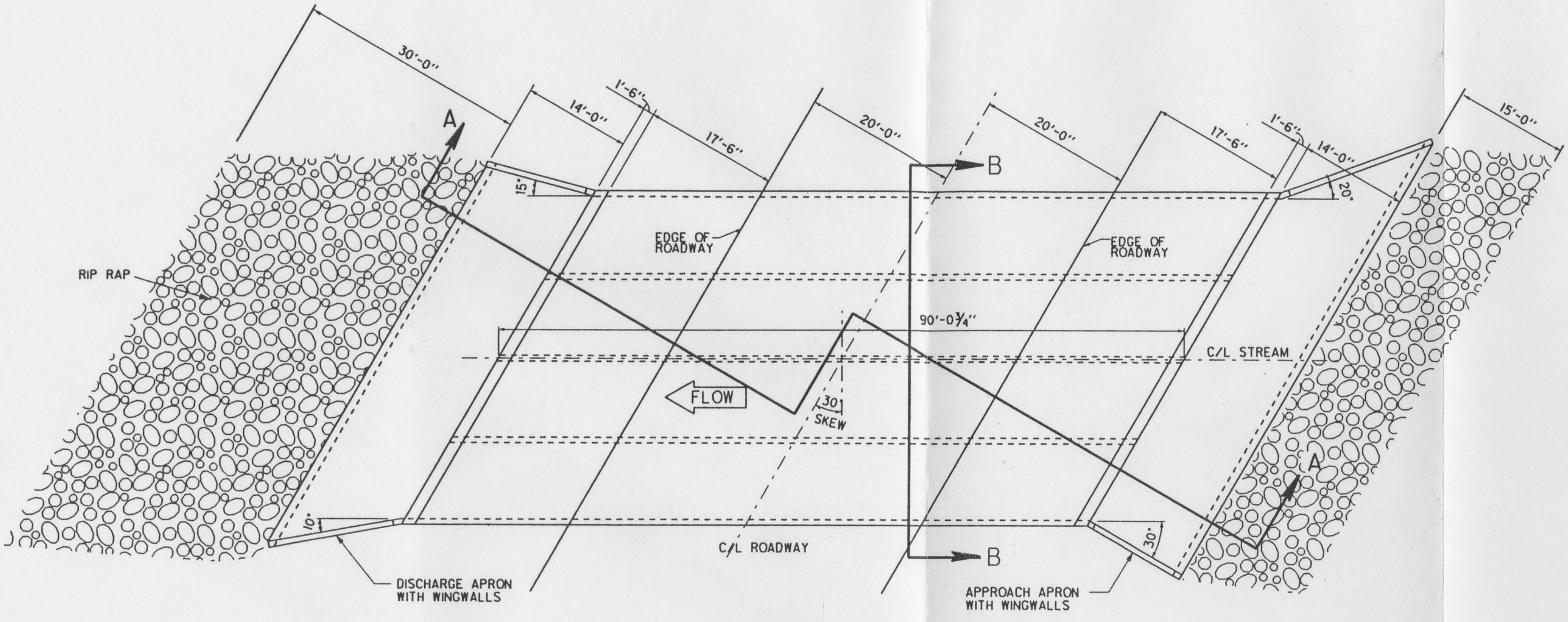
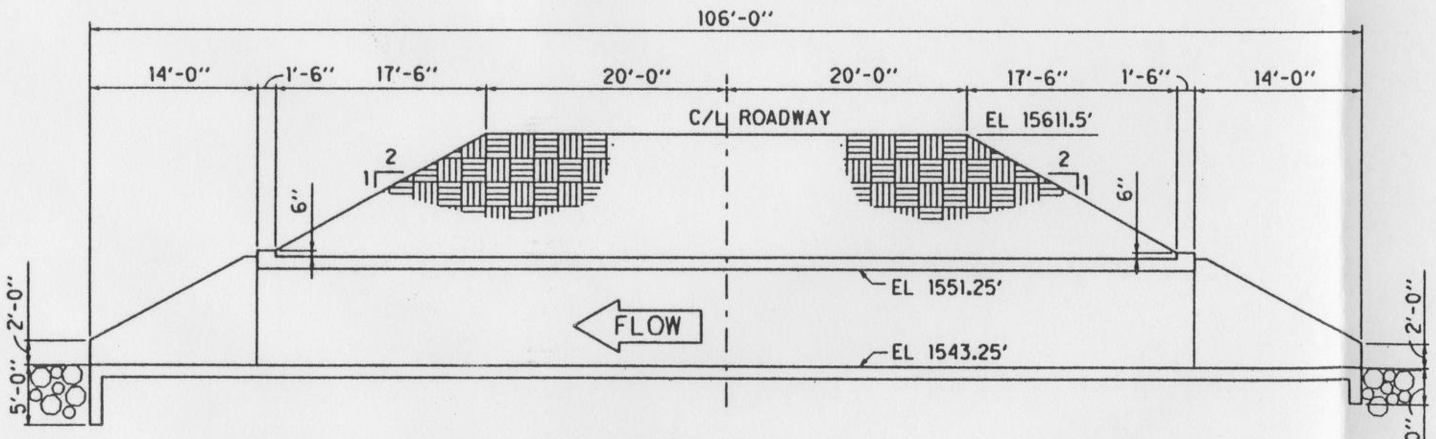
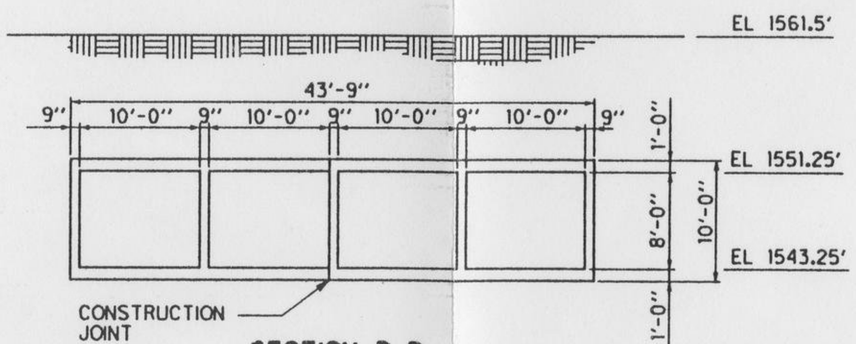


PLAN



SECTION A-A



SECTION B-B

TYPICAL REPRESENTATION: REFINEMENTS MAY BE MADE PRIOR TO CONSTRUCTION

Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	JKSI	DATE:	SEPT.'95
APPROVED BY:	PAE	DATE:	SEPT.'95
APPROVED BY:	GWS	DATE:	SEPT.'95

Crandon Mining Company

FIGURE 3-4
BOX CULVERT PLAN & SECTIONS
ACCESS ROAD CROSSING OVER SWAMP CREEK

Scale: N.T.S.		Date: SEPTEMBER, 1995	
Prepared By:	Foth & Van Dyke		By: DLD

93C049

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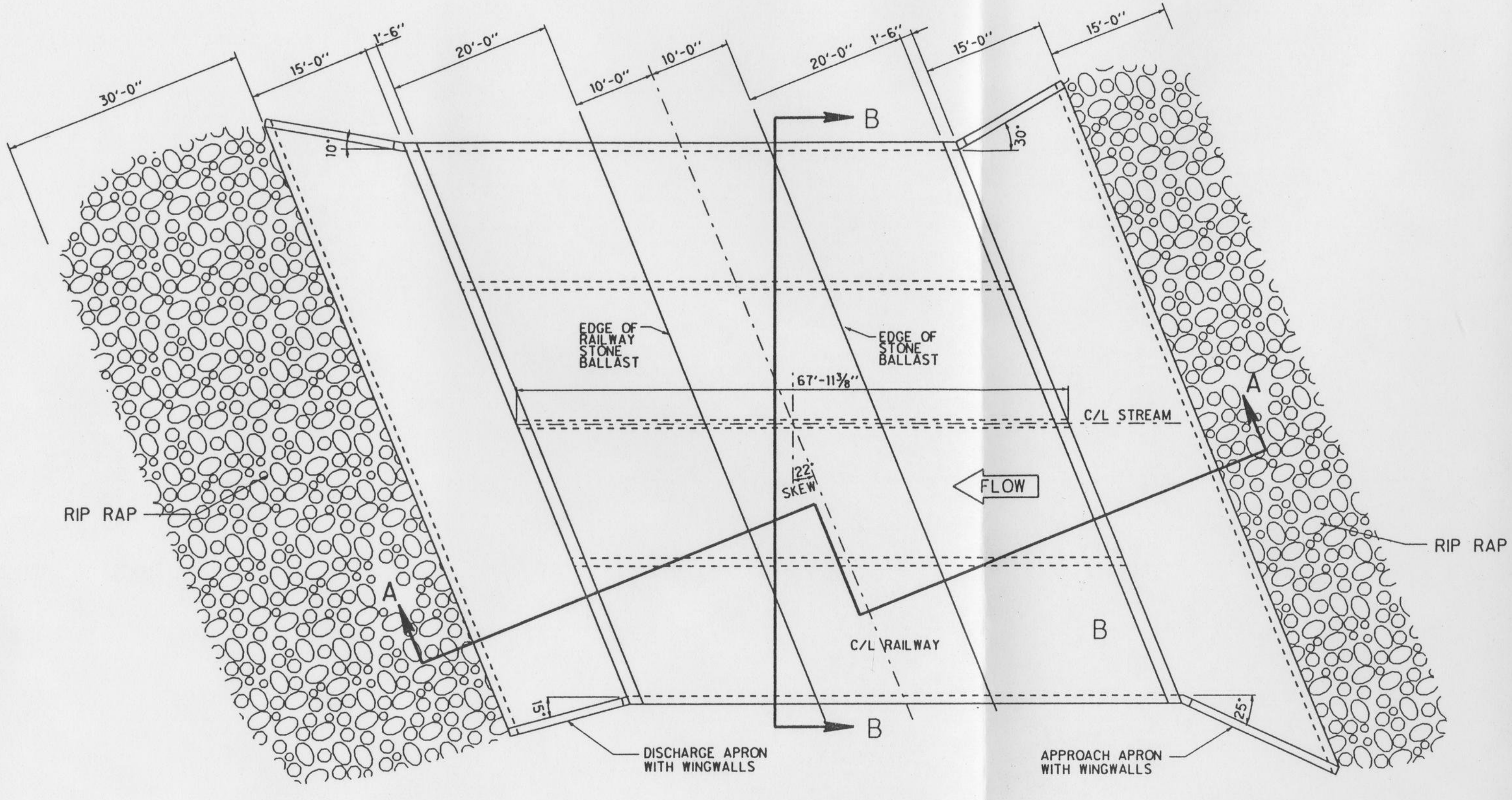
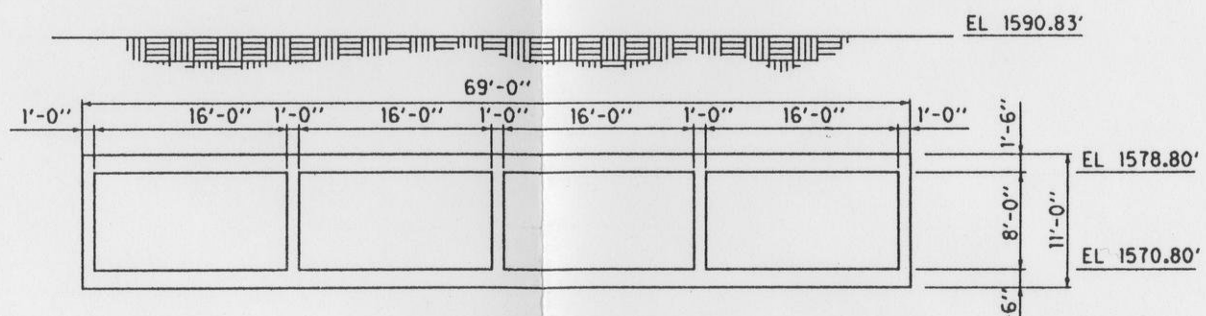
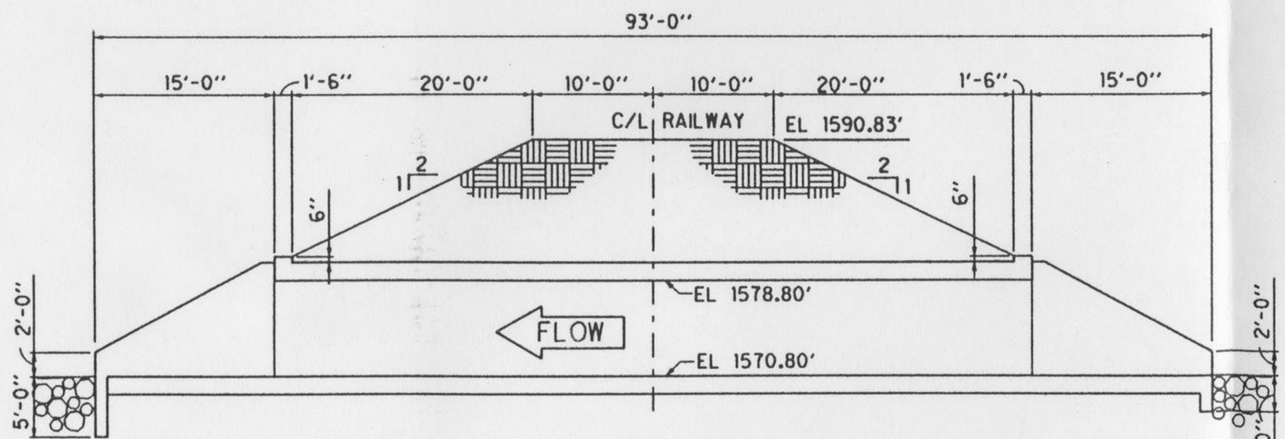


PLAN



SECTION B-B



SECTION A-A

TYPICAL REPRESENTATION: REFINEMENTS MAY BE MADE PRIOR TO CONSTRUCTION

Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	JKSI	DATE: SEPT.'95
APPROVED BY:	PAE	DATE: SEPT.'95
APPROVED BY:	GWS	DATE: SEPT.'95

Crandon Mining Company

FIGURE 3-5

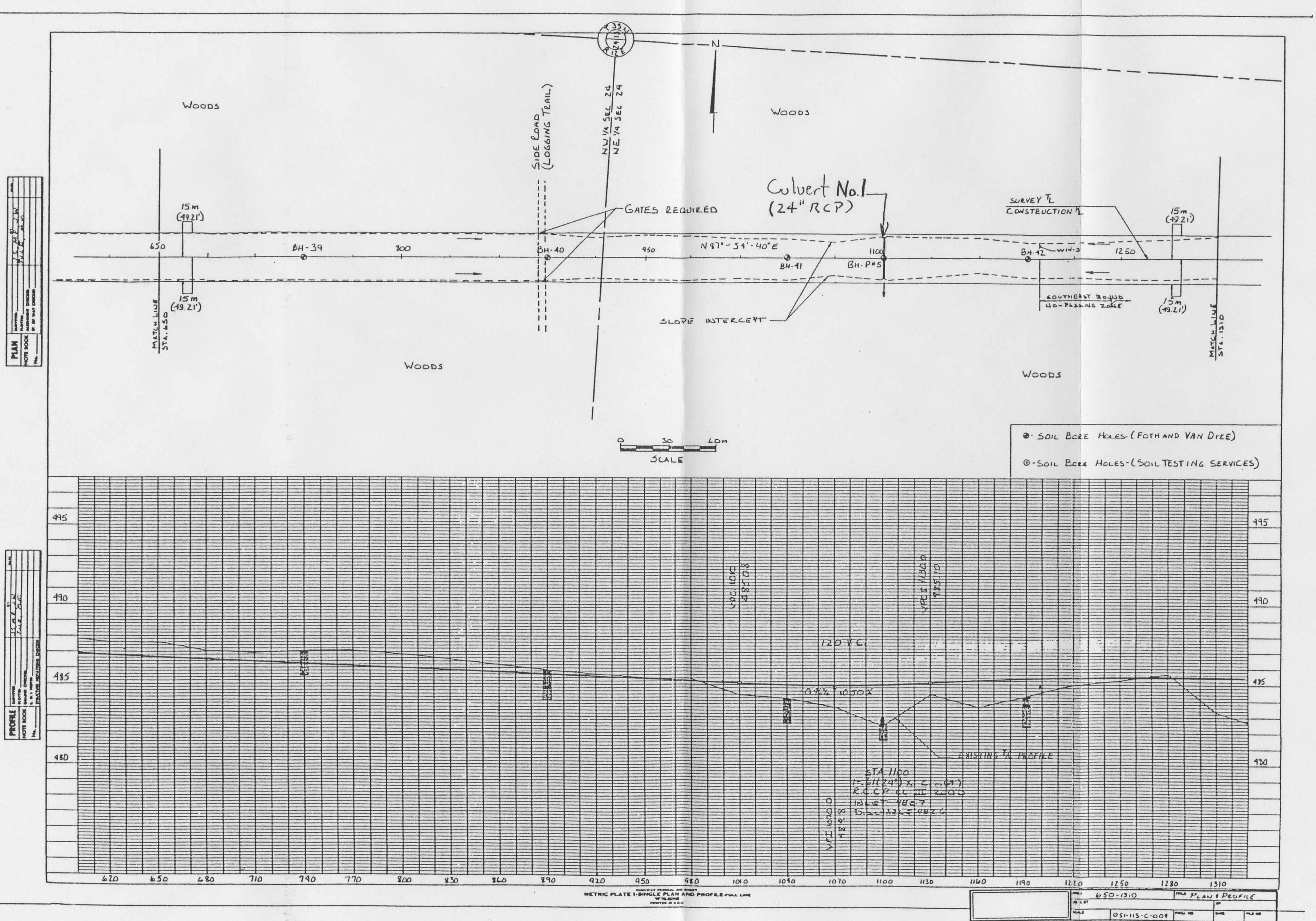
BOX CULVERT PLAN & SECTIONS
RAILROAD SPUR CROSSING OVER SWAMP CREEK

Scale: N.T.S. | Date: SEPTEMBER, 1995

Prepared By: Foth & Van Dyke | By: DLD

/d3/dl/users/jprl/3c49brg2.dgn

93C049


WOODS
WOODS
WOODS
WOODS
SIDE ROAD (LOGGING TRAIL)
NW 1/4 SEC 24
NE 1/4 SEC 24
GATES REQUIRED
Culvert No.1
(24" RCP)
SURVEY ℄
CONSTRUCTION ℄
15m (49.21')
650
BH-39
800
BH-40
950
N87°-54'-40"E
BH-41
1100
BH-P#5
BH-42
1250
SOUTHEAST BOUND NO-PASSING ZONE
SLOPE INTERCEPT
MATCH LINE STA. 650
MATCH LINE STA. 1310
SCALE
0 30 60M
SOIL BORE HOLES-(FOTH AND VAN DYKE)
SOIL BORE HOLES-(SOIL TESTING SERVICES)
PLAN
PROFILE
495
490
485
480
120 V.C.
EXISTING ℄ PROFILE
STA 1100
620 650 680 710 740 770 800 830 860 890 920 950 980 1010 1040 1070 1100 1130 1160 1190 1220 1250 1280 1310
METRIC PLATE 1-SINGLE PLAN AND PROFILE FULL LINE
650-1310
PLAN & PROFILE
051-115-C-009

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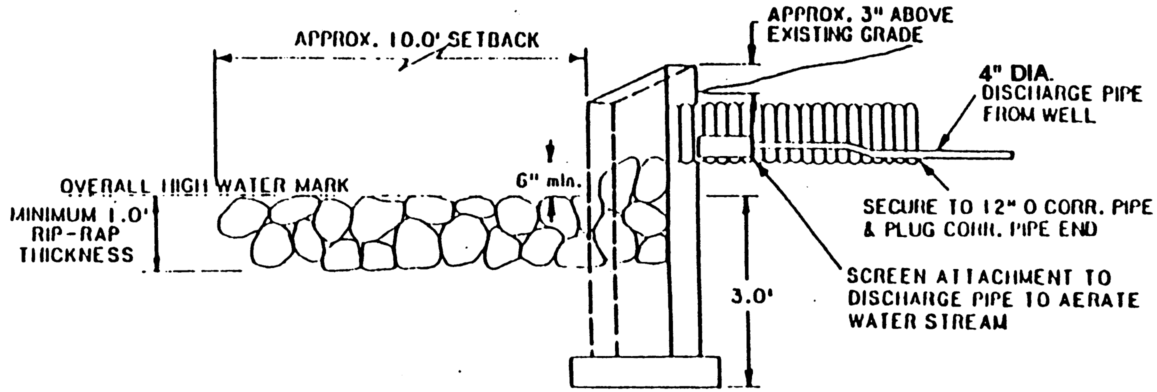
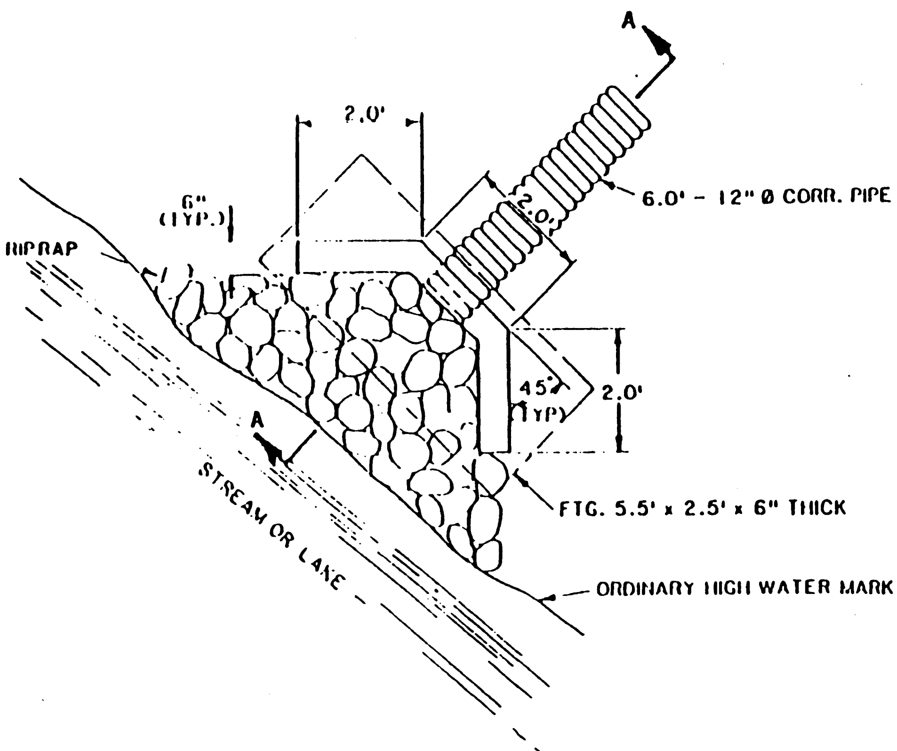


SECTION A-A
TYPICAL DISCHARGE HEADWALL



TYPICAL DISCHARGE HEADWALL

Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

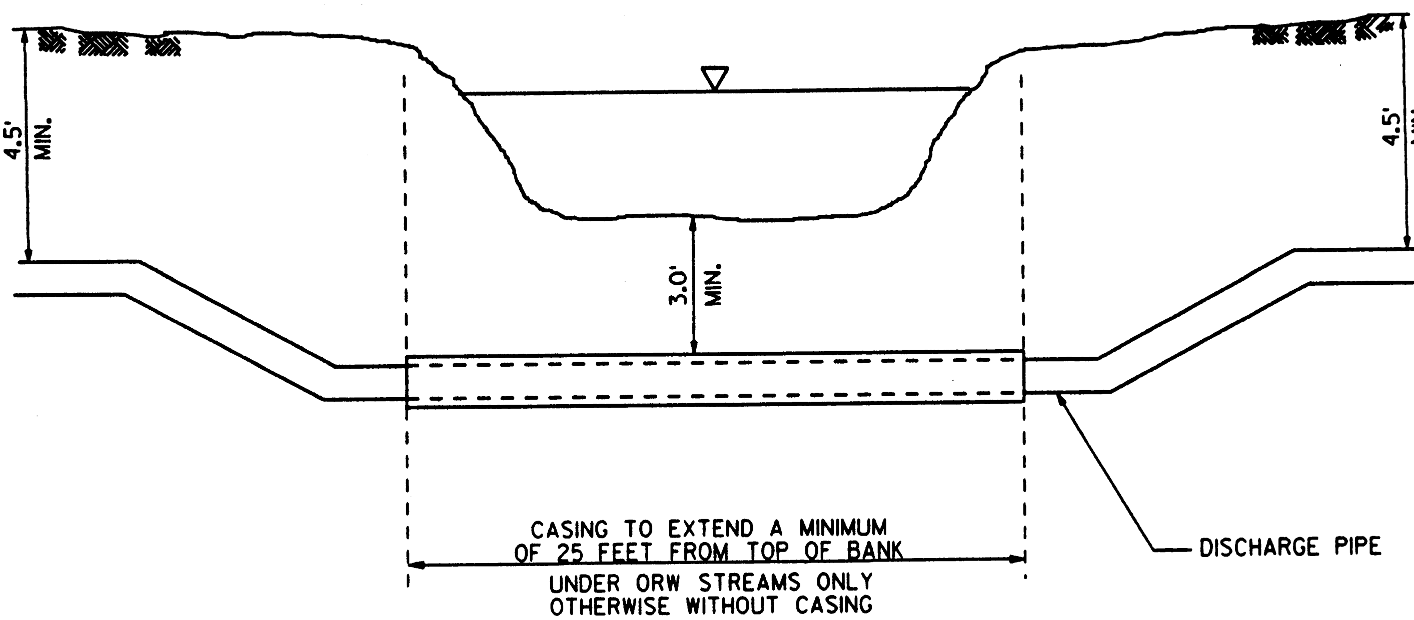
CHECKED BY:	JKS1	DATE: SEPT.'95
APPROVED BY:	PAE	DATE: SEPT.'95
APPROVED BY:	GWS	DATE: SEPT.'95

Crandon Mining Company

FIGURE 3-7
SKUNK LAKE MITIGATION
DISCHARGE STRUCTURE

Scale: N.T.S.		Date: SEPTEMBER, 1995	
Prepared By:	Foth & Van Dyke	By: BSH	

93C049



Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY: PMP1		DATE: NOV. '95
APPROVED BY: GEV		DATE: NOV. '95
APPROVED BY: GWS		DATE: NOV. '95

Crandon Mining Company

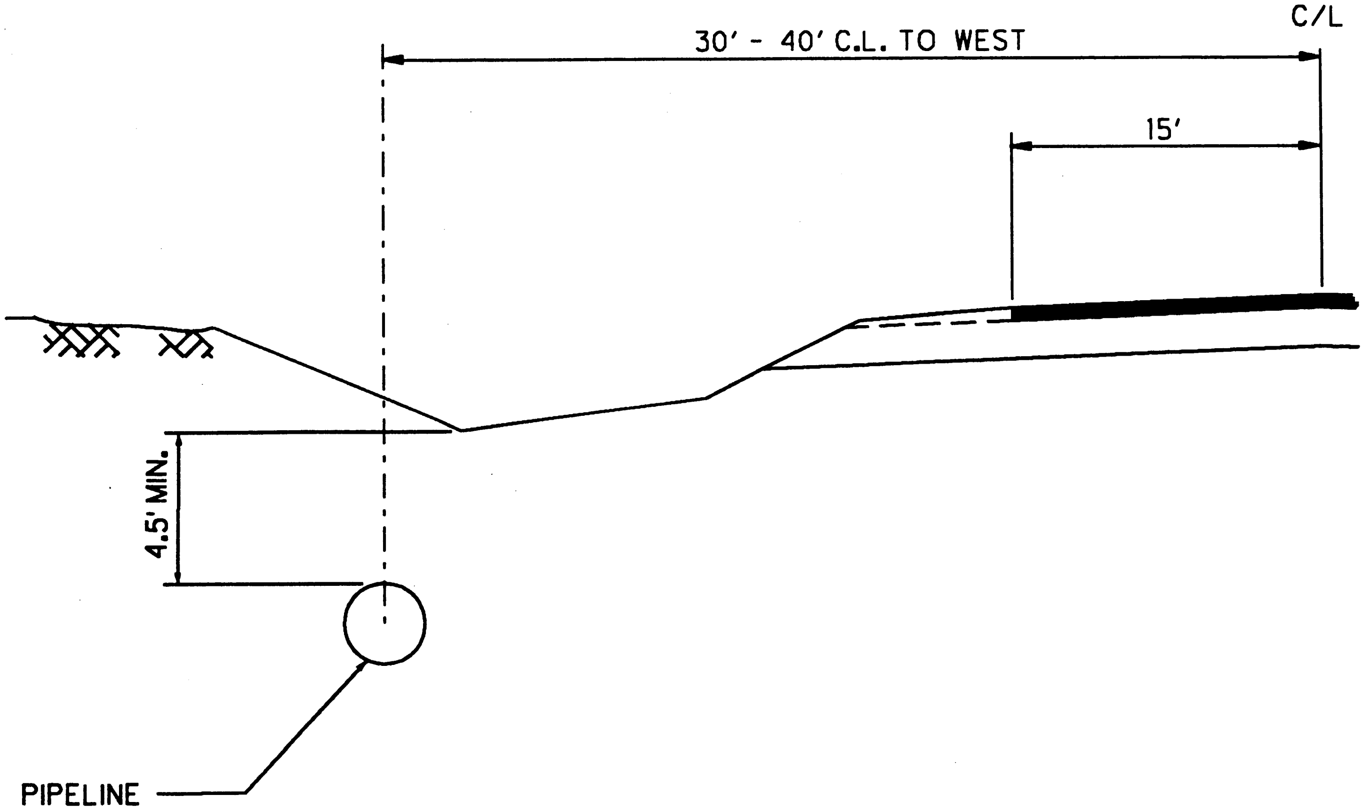
FIGURE 3-8

TYPICAL RIVER/STREAM CROSSING

Scale: NOT TO SCALE	Date: NOVEMBER, 1995	
Prepared By: Foth & Van Dyke		By: SMM1

93C049

c:\cadwork\4c65dt10.dgn



Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	PMP1	DATE: NOV. '95
APPROVED BY:	GEV	DATE: NOV. '95
APPROVED BY:	GWS	DATE: NOV. '95

Crandon Mining Company

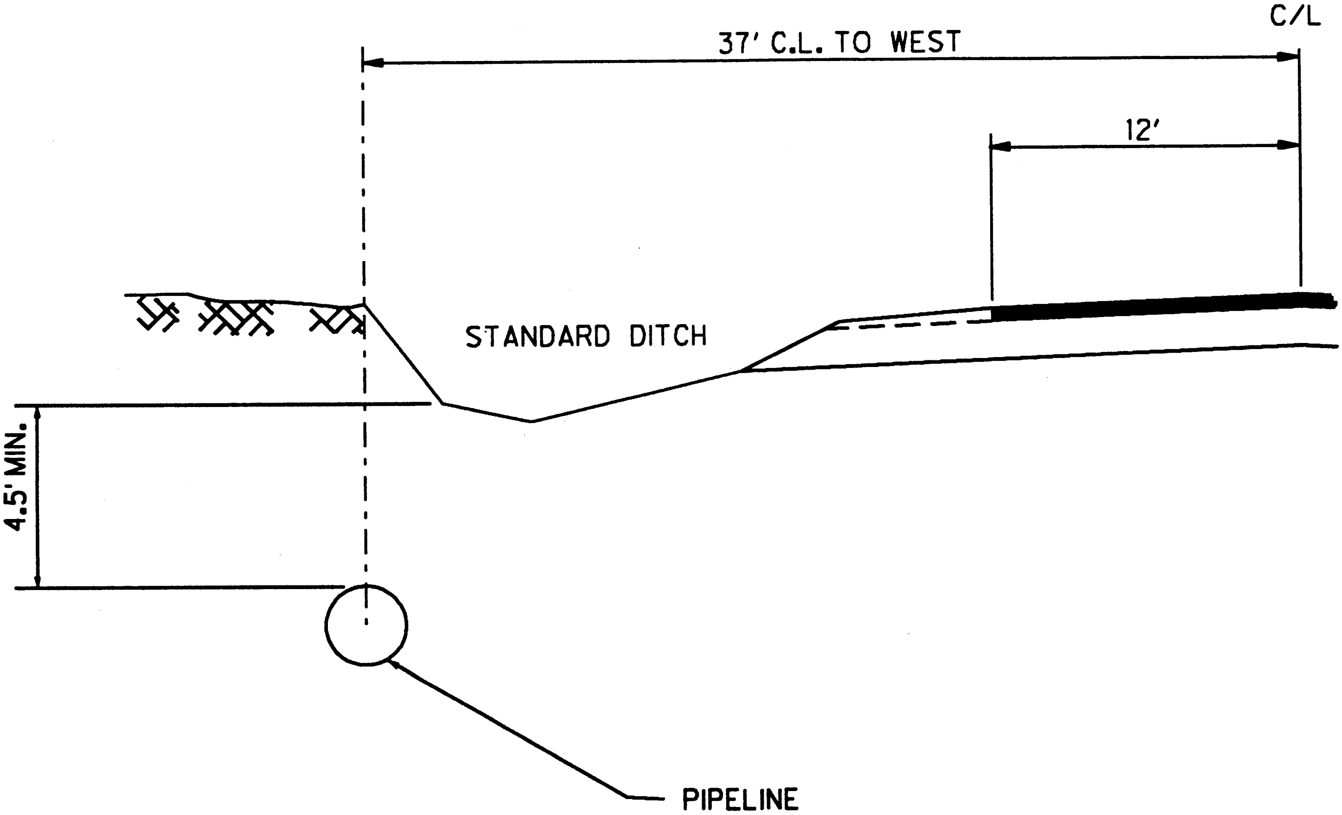
FIGURE 3-9

TYPICAL SECTION FOR STH 55
MOLE LAKE TO CTH S

Scale: NOT TO SCALE		Date: NOVEMBER, 1995	
Prepared By: Foth & Van Dyke			By: SMM1

/d3/d1/users/jow/4c65det7.dgn

93C049



Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY: PMP1	DATE: NOV. '95	
APPROVED BY: GEV	DATE: NOV. '95	
APPROVED BY: GWS	DATE: NOV. '95	

Crandon Mining Company

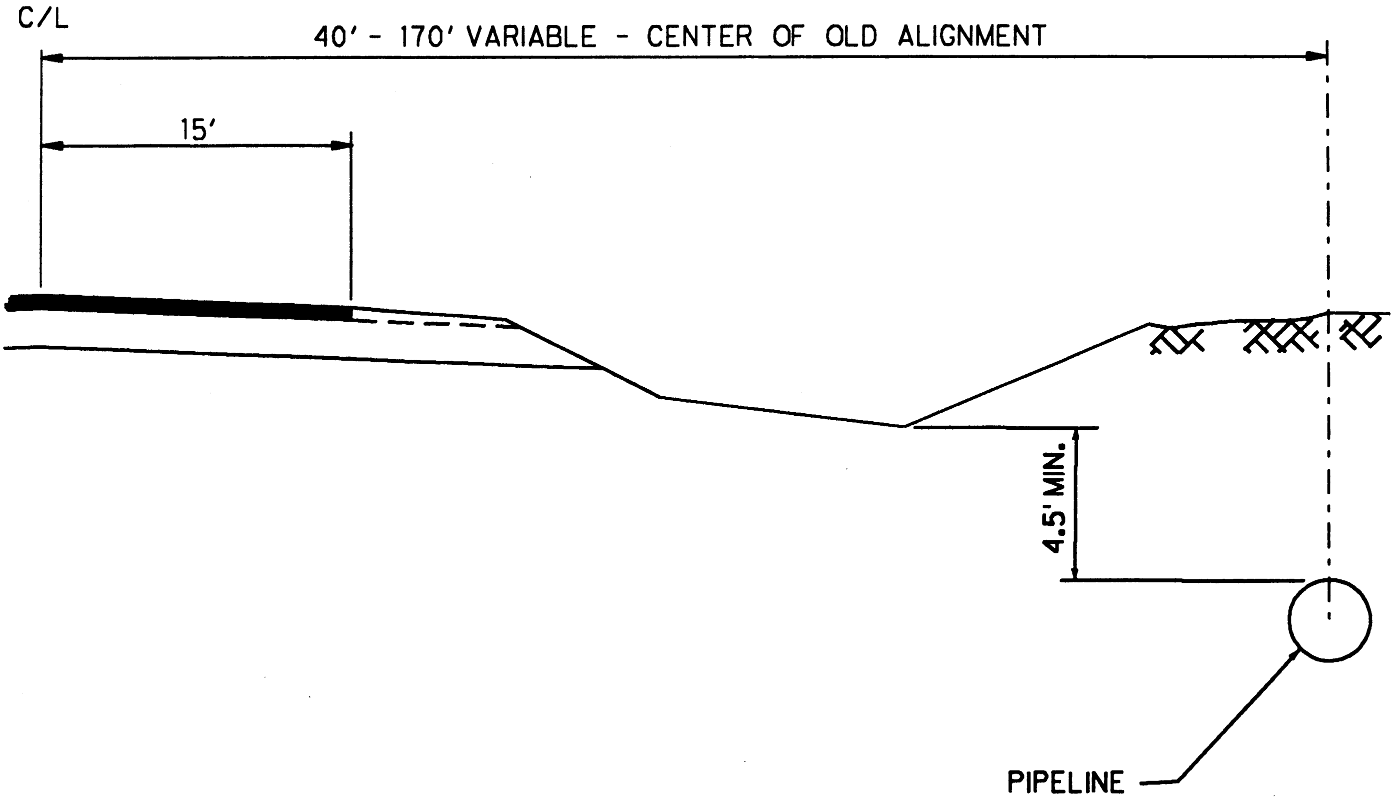
FIGURE 3-10

TYPICAL SECTION FOR CTH S
STH 55 TO USR 8

Scale: NOT TO SCALE	Date: NOVEMBER, 1995	
Prepared By: Foth & Van Dyke		By: SMM1

/d3/d1/users/jow/4c65det9.dgn

93C049



Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	PMPI	DATE: NOV. '95
APPROVED BY:	GEV	DATE: NOV. '95
APPROVED BY:	GWS	DATE: NOV. '95

Crandon Mining Company

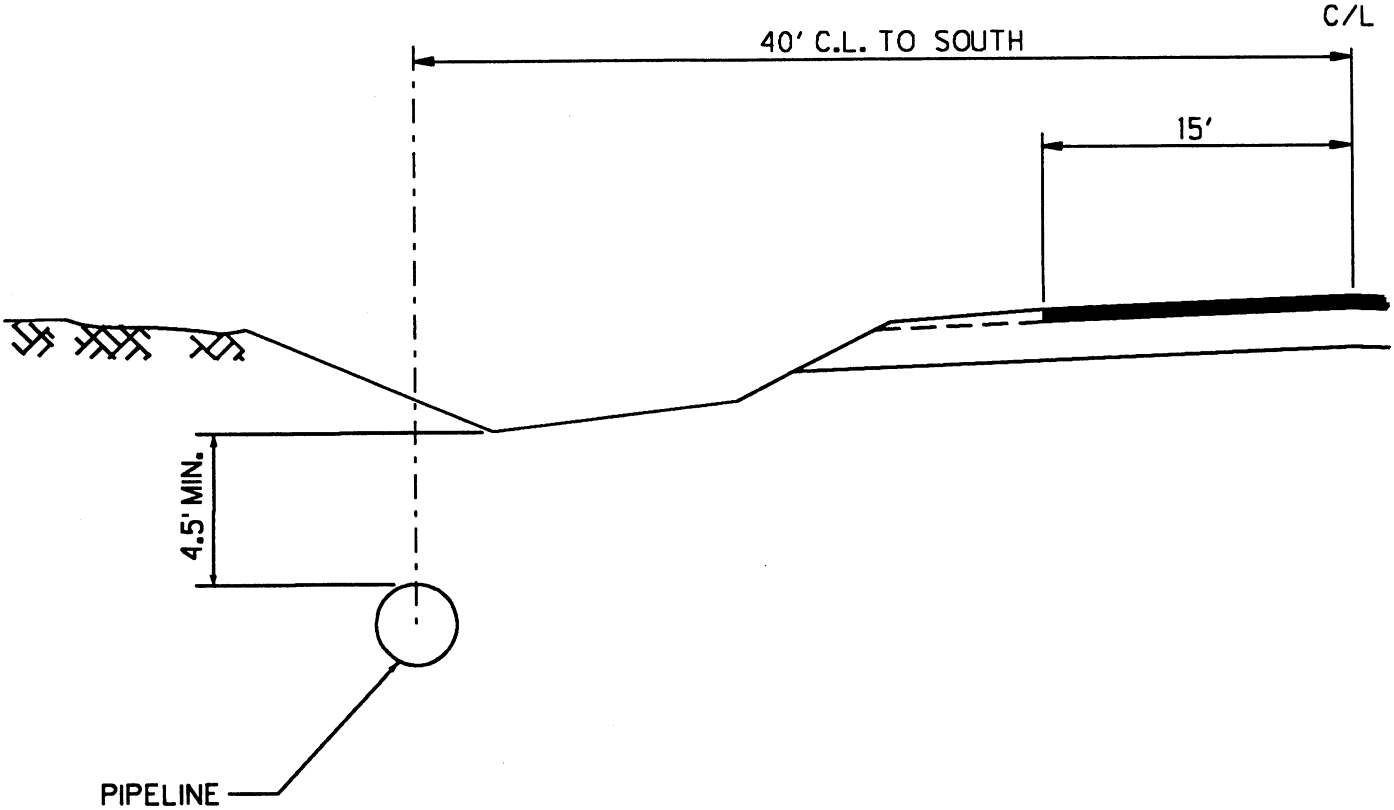
FIGURE 3-11

TYPICAL SECTION FOR USR 8
CTH S TO CTH V

Scale:	NOT TO SCALE	Date:	NOVEMBER, 1995
Prepared By:	Foth & Van Dyke	By:	SMMI

/d3/d1/users/jow/4c65det6.dgn

93C049



Foth & Van Dyke			
REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	PMP1	DATE: NOV. '95
APPROVED BY:	GEV	DATE: NOV. '95
APPROVED BY:	GWS	DATE: NOV. '95

Crandon Mining Company

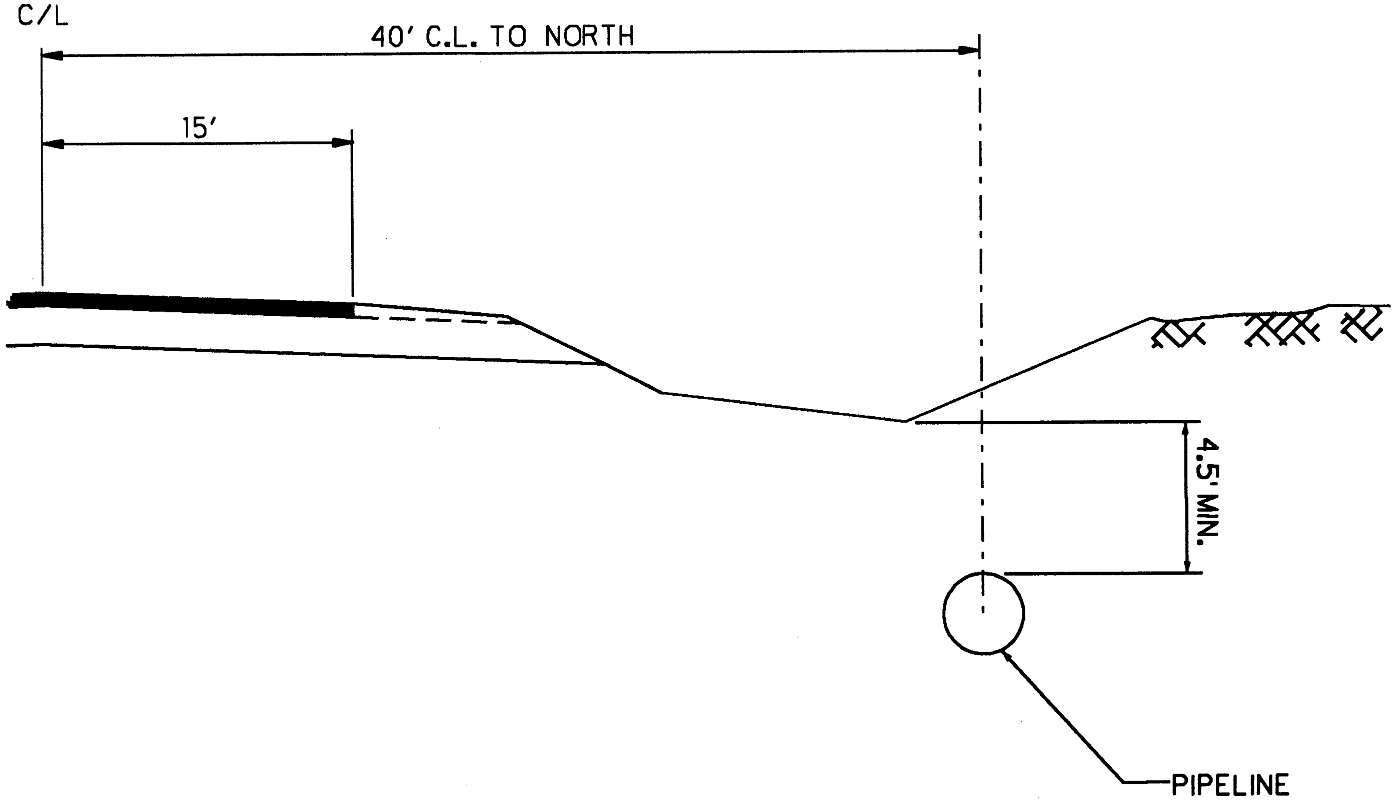
FIGURE 3-12

TYPICAL SECTION FOR USR 8
MONICO TO LAKE GEORGE

Scale: NOT TO SCALE		Date: NOVEMBER, 1995	
Prepared By: Foth & Van Dyke			By: SMM1

/d3/dl/users/jow/4c65det5.dgn

93C049



Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY: PMP1	DATE: NOV. '95	
APPROVED BY: GEV	DATE: NOV. '95	
APPROVED BY: GWS	DATE: NOV. '95	

Crandon Mining Company

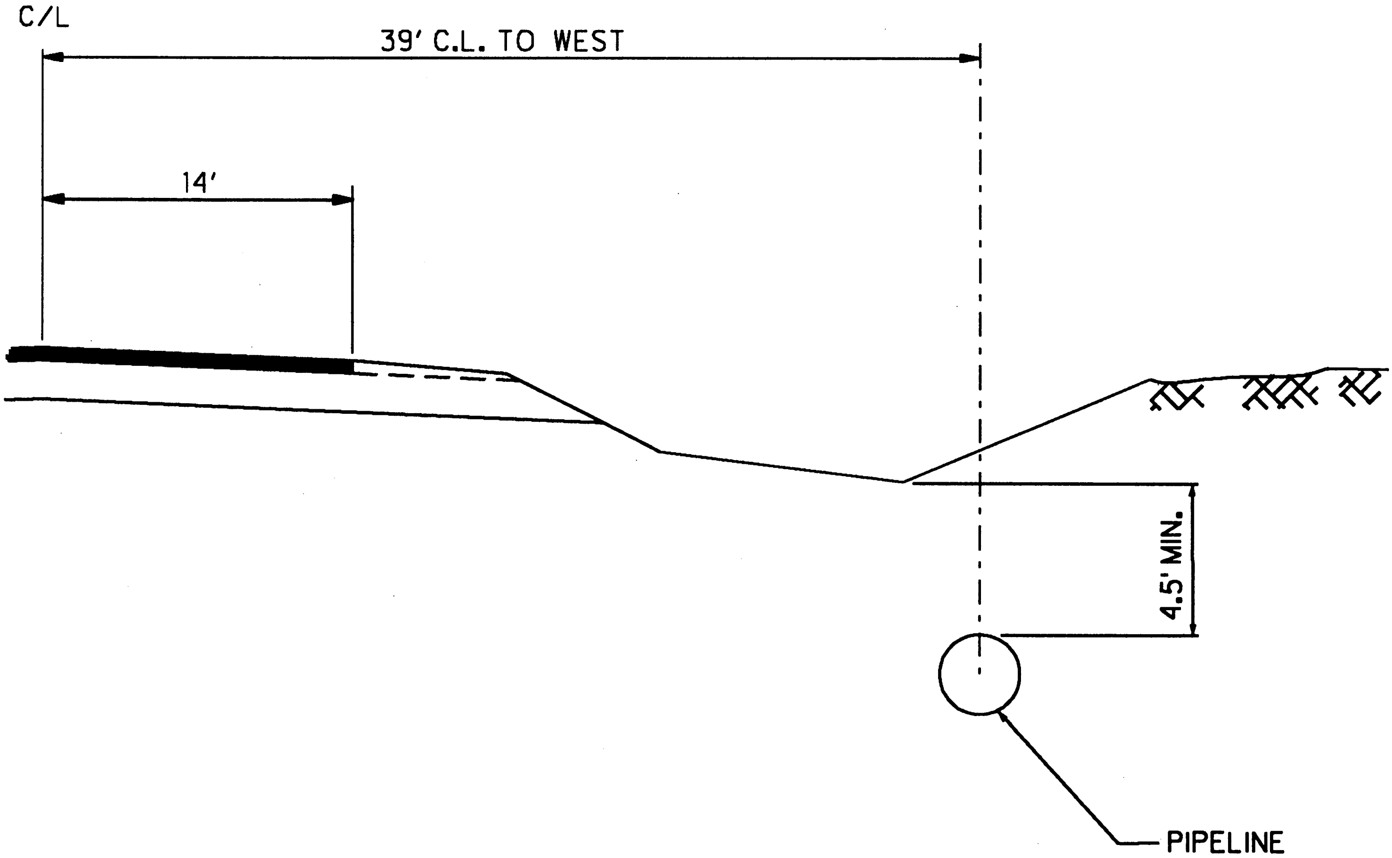
FIGURE 3-13

TYPICAL SECTION FOR USR 8
LAKE GEORGE TO STH 17

Scale: NOT TO SCALE	Date: NOVEMBER, 1995
Prepared By: Foth & Van Dyke	By: SMM1

/d3/d1/users/jow/4c65det4.dgn

93C049



Foth & Van Dyke			
REVISED	DATE	BY	DESCRIPTION

CHECKED BY: PMP1	DATE: NOV. '95	
APPROVED BY: GEV	DATE: NOV. '95	
APPROVED BY: GWS	DATE: NOV. '95	

Crandon Mining Company

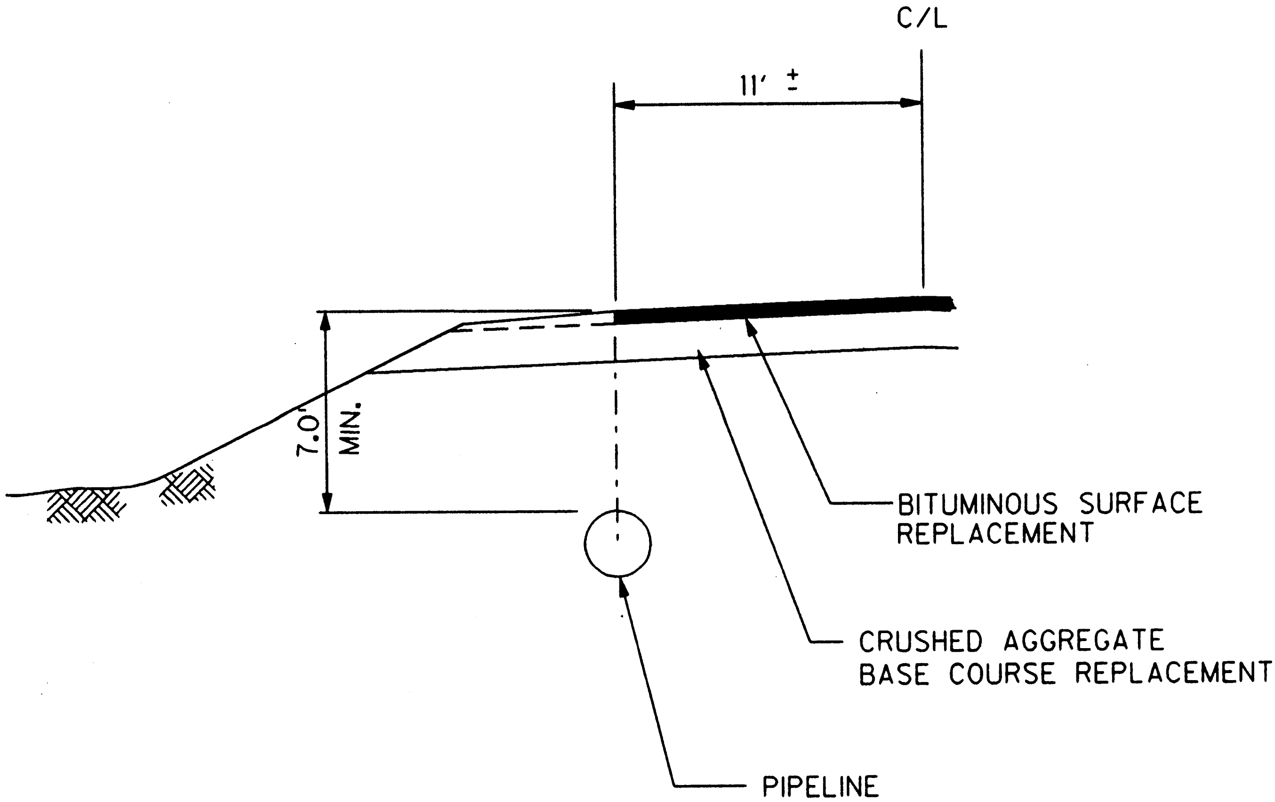
FIGURE 3-14

TYPICAL SECTION FOR STH 17
USR 8 TO HAT RAPIDS ROAD

Scale: NOT TO SCALE	Date: NOVEMBER, 1995	
Prepared By: Foth & Van Dyke		By: SMM1

/d3/d1/users/jow/4c65det8.dgn

93C049



Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	PMPI	DATE: NOV. '95
APPROVED BY:	GEV	DATE: NOV. '95
APPROVED BY:	GWS	DATE: NOV. '95

Crandon Mining Company

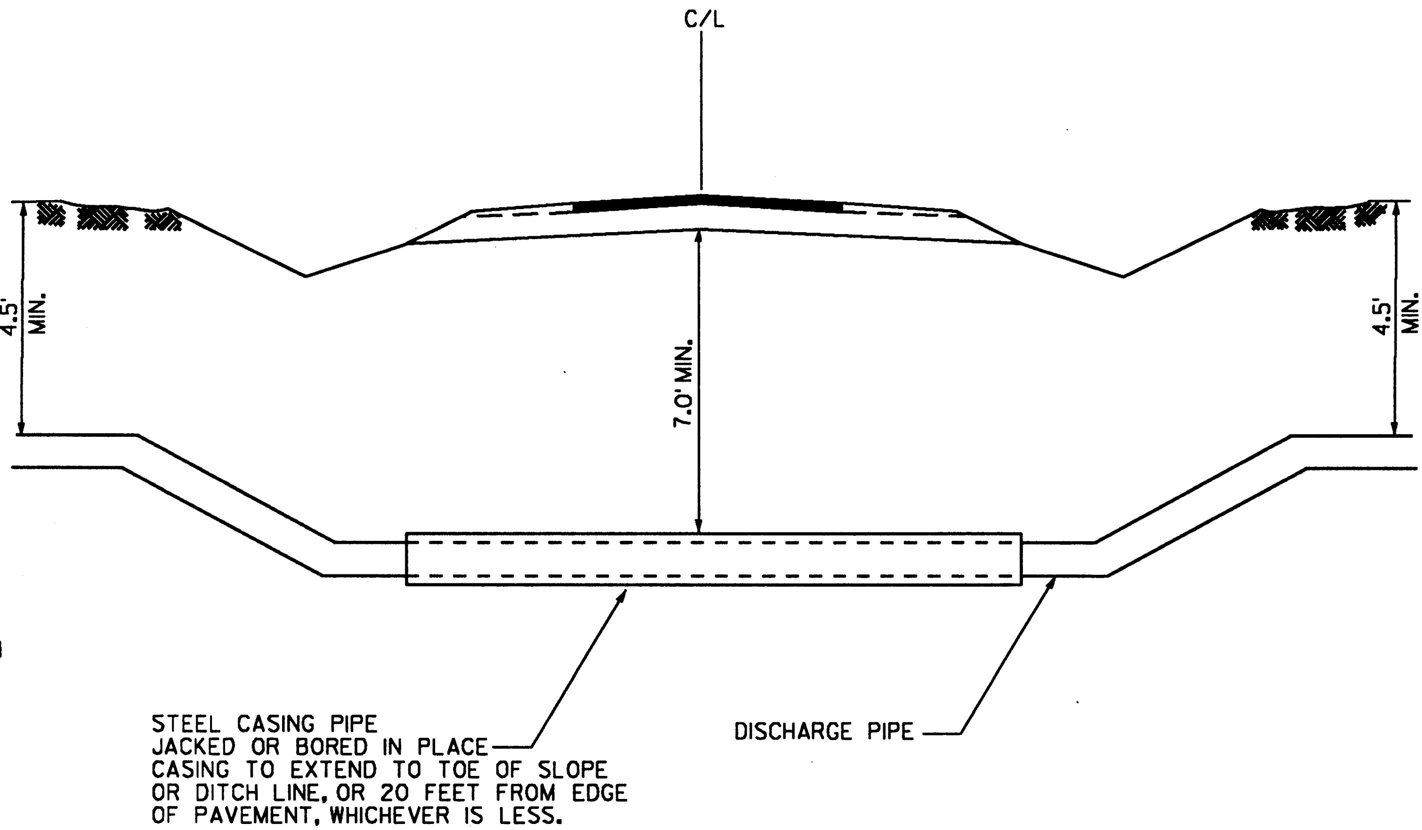
FIGURE 3-15

TYPICAL SECTION FOR HAT RAPIDS ROAD
STH 17 TO WISCONSIN RIVER

Scale: NOT TO SCALE	Date: NOVEMBER, 1995
Prepared By: Foth & Van Dyke	By: SMMI

c:\cadwork\4c65det2.dgn

93C049



NOTE: THIS DETAIL PERTAINS TO STATE, COUNTY AND TOWN ROADS.

Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	PMP1	DATE: NOV. '95
APPROVED BY:	GEV	DATE: NOV. '95
APPROVED BY:	GWS	DATE: NOV. '95

Crandon Mining Company

FIGURE 3-16

TYPICAL SIDE ROAD BORING & JACK

Scale: NOT TO SCALE		Date: NOVEMBER, 1995	
Prepared By: Foth & Van Dyke			By: SMM1

/d3/d1/users/jow/4c65det3.dgn

93C049

Appendix A

Water Regulatory Permit Application Forms

Appendix A-1 **Mine Site Permit Application**
(Form 3500-53)
(Form 3500-53A)

Appendix A-2 **Treated Wastewater Discharge Pipeline Route Permit Application**
(Form 3500-53)
(Form 3500-53A)

Appendix A-1

Mine Site Permit Application

Mine Site

State of Wisconsin
Department of Natural Resources
(Return to appropriate
DNR District/Area Office)

U.S. Army Corps of Engineer
St. Paul District
190 Fifth Street East
St. Paul, MN 55101-1638

STATE/FEDERAL APPLICATION
FOR WATER REGULATORY
PERMITS AND APPROVALS
Form 3500-53 Rev. 9-89

PLEASE COMPLETE BOTH PAGES 1 & 2 OF THIS APPLICATION. PRINT OR TYPE. Use of this form is required by the Department for any application filed pursuant to Chapter 30, Wis. Stats. The Department will not consider your application unless you complete and submit this application form.

1. Applicant (Individual or corporate name)
Crandon Mining Company
Address
7 North Brown Street, 3rd Floor
City, State, Zip Code
Rhinelander, Wisconsin 54501-3161
Telephone No. (Include area code)
(715) 365-1450

2. Agent/Contractor (firm name)
Foth & Van Dyke
Address
2737 S. Ridge Road
City, State, Zip Code
Green Bay, Wisconsin 54307-9012
Telephone No. (Include area code)
(414) 497-2500

3. If applicant is not the fee title owner of the property where the proposed activity will be conducted, provide name and address of owner and include letter of authorization from owner. Owner must be the applicant or coapplicant for structure, diversion and channel change activites. A purchaser under a land contract is not considered a riparian owner until property transfer has occurred.

Owner's Name	Address	City, State, Zip Code
Applicant is the Owner		

4. Is the applicant a business? [x] Yes [ ] No

If YES, is the permit or approval you are applying for necessary for you to conduct this business in the State of Wisconsin? [x] Yes [ ] No
If YES, please explain why (attach addition sheets if necessary):

See Section 2 - General Project Description

5. Project Location
Address 2 miles east of STH 55 , 5 miles S. of Crandon(see Section 2)
Village/City/Town Town of Lincoln (L) and Town of Nashville (N)
Waterway Swamp Creek and Pickeral Creek watersheds, various wetlands (see Section 3) **County** Forest
Govt. Lot ____ **OR** ____ **1/4,** ____ **1/4, of Section** 25(L)& 30(N)
Township 35 **North, Range** 12(L) & 13(N) **(East)(West)**

6. Adjoining Riparian (Neighboring Waterfront Property Owner) Information

Name of Riparian #1	Address	City, State, Zip Code
Not applicable as CMC controls land interests for adjoining properties (see Figure 2-2 of MPA)		
Name of Riparian #2	**Address**	**City, State, Zip Code**

7. Project Information (Attach additional sheets if necessary)
(a) Describe proposed activity (include how this project will be constructed)
Mine development (See Sections 2 and 3 of this submittal)
(b) Purpose, need and intended use of project
Drainage structures for mine facilities (see Section 2 & 3 of this submittal)
(c) I have applied for or received permits from the following agencies: (Check x)

[x] Municipal [x] County [x] Wis. DNR [x] Corps of Engineers

(d) Date activity will begin if permit is issued : 1997 **; be completed:** 2032.
(e) Is any portion of the requested project now complete?

[ ] Yes [x] No **If yes, identify the completed portion on the enclosed drawings an indicated here the date activity was completed:**

I hereby certify that the information contained herein is true and accurate. I also certify that I am entitled to apply for a permit, or that I am the duly authorized representative or agent of an applicant who is entitled to apply for a permit. Any inaccurate information submitted may result in permit revocation, the imposition of a forfeiture(s) and requirement of restoration.

Signature of Applicant or Duly Authorized Agent [signature] **Date Signed** 6/20/96

LEAVE BLANK - FOR RECEIVING AGENCY USE ONLY

Corps of Engineers Process No.	Wisconsin DNR File No.	
Received By	**Date Received**	**Date Application Was Complete**

State of Wisconsin
Department of Natural Resources

FEE FOR WATER REGULATION PERMITS, APPROVALS, DETERMINATIONS, AND HEARINGS
Form 3500-53A Rev. 07-95

PLEASE SEE OTHER SIDE OF THIS FORM FOR APPLICABLE FEE

State law requires that we charge a fee for processing your request to make changes to surface waters and for wetland water quality certification determinations. Each application or request requires the correct permit fee in order for review to begin. **If your project includes several regulated activities you must include payment for the single most costly activity.** If you have questions regarding the appropriate fee, please contact your district or area Water Management Specialist. Fees will be refunded only if the refund is requested before we determine that the application is complete.

Personally identifiable information on this form is not intended to be used for any other purpose.

TO BE COMPLETED BY APPLICANT:

Permit/Approval Applied for with highest fee (see listing on other side)	Amount enclosed
Navigable waters greater than 35 feet wide	$300

[signature] — Signature of Applicant

6/20/96 — Date Signed

LEAVE BLANK - DEPARTMENT OF NATURAL RESOURCES USE ONLY

Fee Received $________ Check Money Order

Received by ____________________

EFFECTIVE DATE: July 29, 1995

Appendix A-2

Treated Wastewater Discharge Pipeline Route Permit Application

State of Wisconsin
Department of Natural Resources
(Return to appropriate DNR District/Area Office)

U.S. Army Corps of Engineer
St. Paul District
190 Fifth Street East
St. Paul, MN 55101-1638

STATE/FEDERAL APPLICATION FOR WATER REGULATORY PERMITS AND APPROVALS
Form 3500-53 Rev. 9-89

PLEASE COMPLETE BOTH PAGES 1 & 2 OF THIS APPLICATION. PRINT OR TYPE. Use of this form is required by the Department for any application filed pursuant to Chapter 30, Wis. Stats. The Department will not consider your application unless you complete and submit this application form.

1. Applicant (Individual or corporate name)	2. Agent/Contractor (firm name)
Crandon Mining Company	Foth & Van Dyke
Address	**Address**
7 North Brown Street, 3rd Floor	2737 S. Ridge Road
City, State, Zip Code	**City, State, Zip Code**
Rhinelander, Wisconsin 54501-3161	Green Bay, Wisconsin 54307-9012
Telephone No. (Include area code)	**Telephone No. (Include area code)**
(715) 365-1450	(414) 497-2500

3. If applicant is not the fee title owner of the property where the proposed activity will be conducted, provide name and address of owner and include letter of authorization from owner. Owner must be the applicant or coapplicant for structure, diversion and channel change activites. A purchaser under a land contract is not considered a riparian owner until property transfer has occurred.

Owner's Name	Address	City, State, Zip Code
See Section 3.2		

4. Is the applicant a business? [x] Yes [ ] No

If YES, is the permit or approval you are applying for necessary for you to conduct this business in the State of Wisconsin? [x] Yes [ ] No

If YES, please explain why (attach addition sheets if necessary):

See Section 3.2 - Treated Wastewater Discharge Pipeline Route

5. Project Location

Address See Section 3.2

Village/City/Town See Section 3.2

Waterway various watersheds and wetlands (see Section 3.2)

County Forest & Oneida

Govt. Lot ______ **OR** ______ **1/4,** ______ **1/4, of Section** ______

Township ______ **North, Range** ______ **(East)(West)**

6. Adjoining Riparian (Neighboring Waterfront Property Owner) Information

Name of Riparian #1	Address	City, State, Zip Code
Various Public roadway owners as outlined in Section 3.2 and Table 2-2 of the MPA		
Name of Riparian #2	**Address**	**City, State, Zip Code**

7. Project Information (Attach additional sheets if necessary)

(a) Describe proposed activity (include how this project will be constructed)
Treated wastewater discharge pipeline installation

(b) Purpose, need and intended use of project
Treated wastewater discharge pipeline installation for mine water

(c) I have applied for or received permits from the following agencies: (Check x)

[x] Municipal [x] County [x] Wis. DNR [x] Corps of Engineers

(d) Date activity will begin if permit is issued : 1997 **; be completed:** 2002.

(e) Is any portion of the requested project now complete?

[ ] Yes [x] No

If yes, identify the completed portion on the enclosed drawings an indicated here the date activity was completed:

I hereby certify that the information contained herein is true and accurate. I also certify that I am entitled to apply for a permit, or that I am the duly authorized representative or agent of an applicant who is entitled to apply for a permit. Any inaccurate information submitted may result in permit revocation, the imposition of a forfeiture(s) and requirement of restoration.

Signature of Applicant or Duly Authorized Agent	Date Signed
[signature]	6/20/96

LEAVE BLANK - FOR RECEIVING AGENCY USE ONLY

Corps of Engineers Process No.	Wisconsin DNR File No.	
Received By	**Date Received**	**Date Application Was Complete**

State of Wisconsin
Department of Natural Resources

FEE FOR WATER REGULATION PERMITS, APPROVALS, DETERMINATIONS, AND HEARINGS
Form 3500-53A Rev. 07-95

PLEASE SEE OTHER SIDE OF THIS FORM FOR APPLICABLE FEE

State law requires that we charge a fee for processing your request to make changes to surface waters and for wetland water quality certification determinations. Each application or request requires the correct permit fee in order for review to begin. **If your project includes several regulated activities you must include payment for the single most costly activity.** If you have questions regarding the appropriate fee, please contact your district or area Water Management Specialist. Fees will be refunded only if the refund is requested before we determine that the application is complete.

Personally identifiable information on this form is not intended to be used for any other purpose.

TO BE COMPLETED BY APPLICANT:

Grading more than 10,000 square feet	$100
Permit/Approval Applied for with highest fee (see listing on other side)	Amount enclosed

[signature]	6/20/96
Signature of Applicant	Date Signed

LEAVE BLANK - DEPARTMENT OF NATURAL RESOURCES USE ONLY

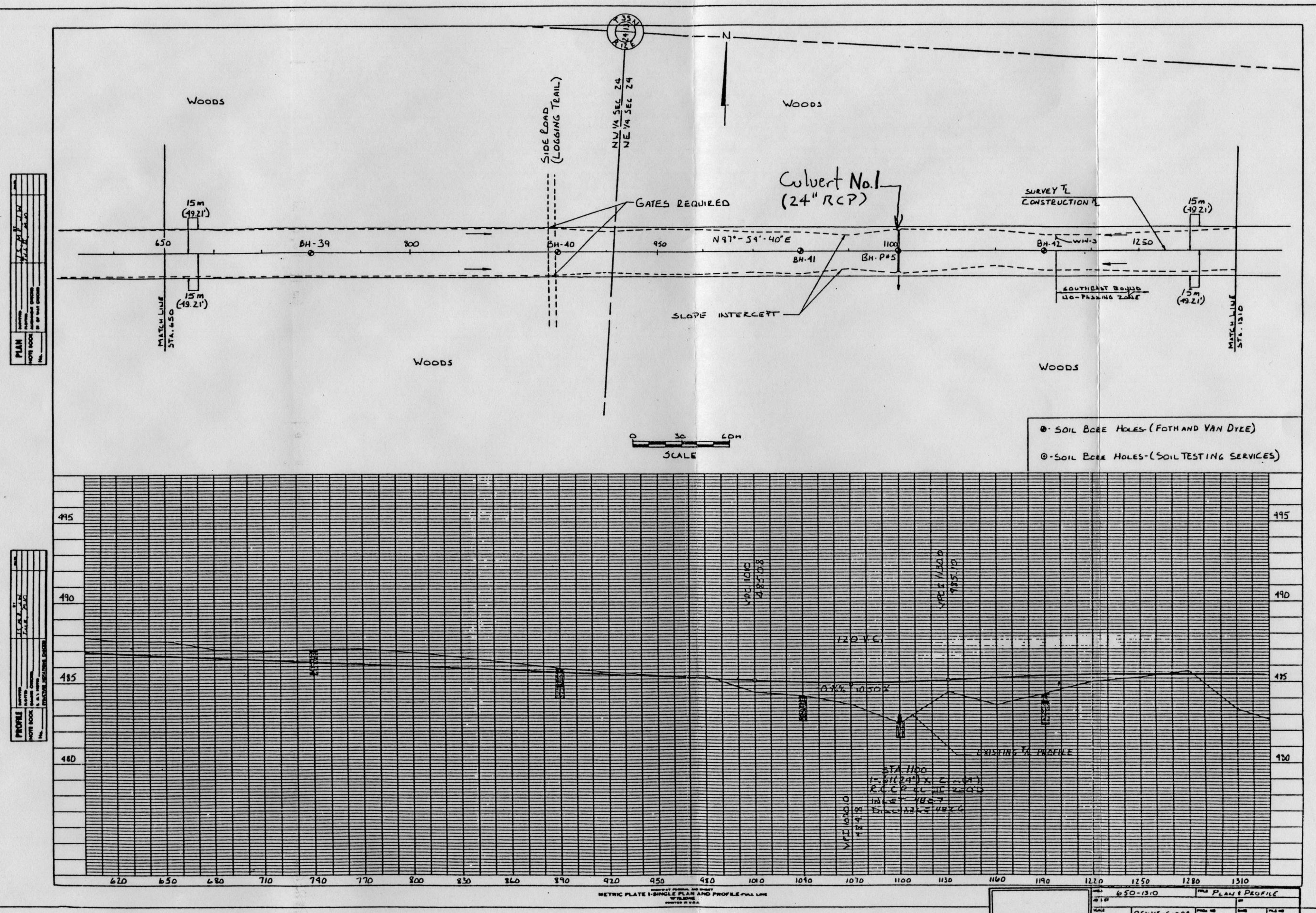
Fee Received $________ Check Money Order

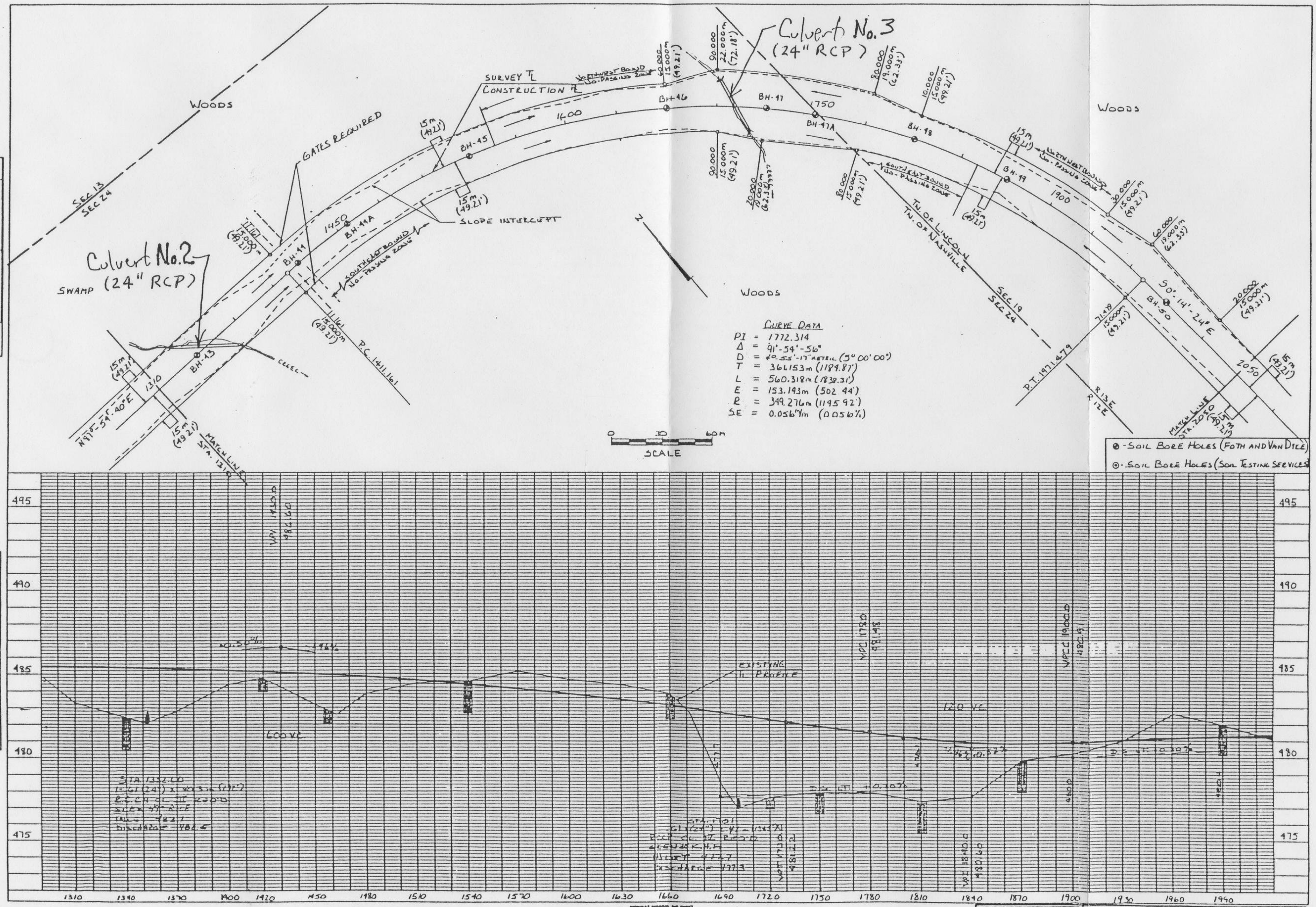
Received by ________________

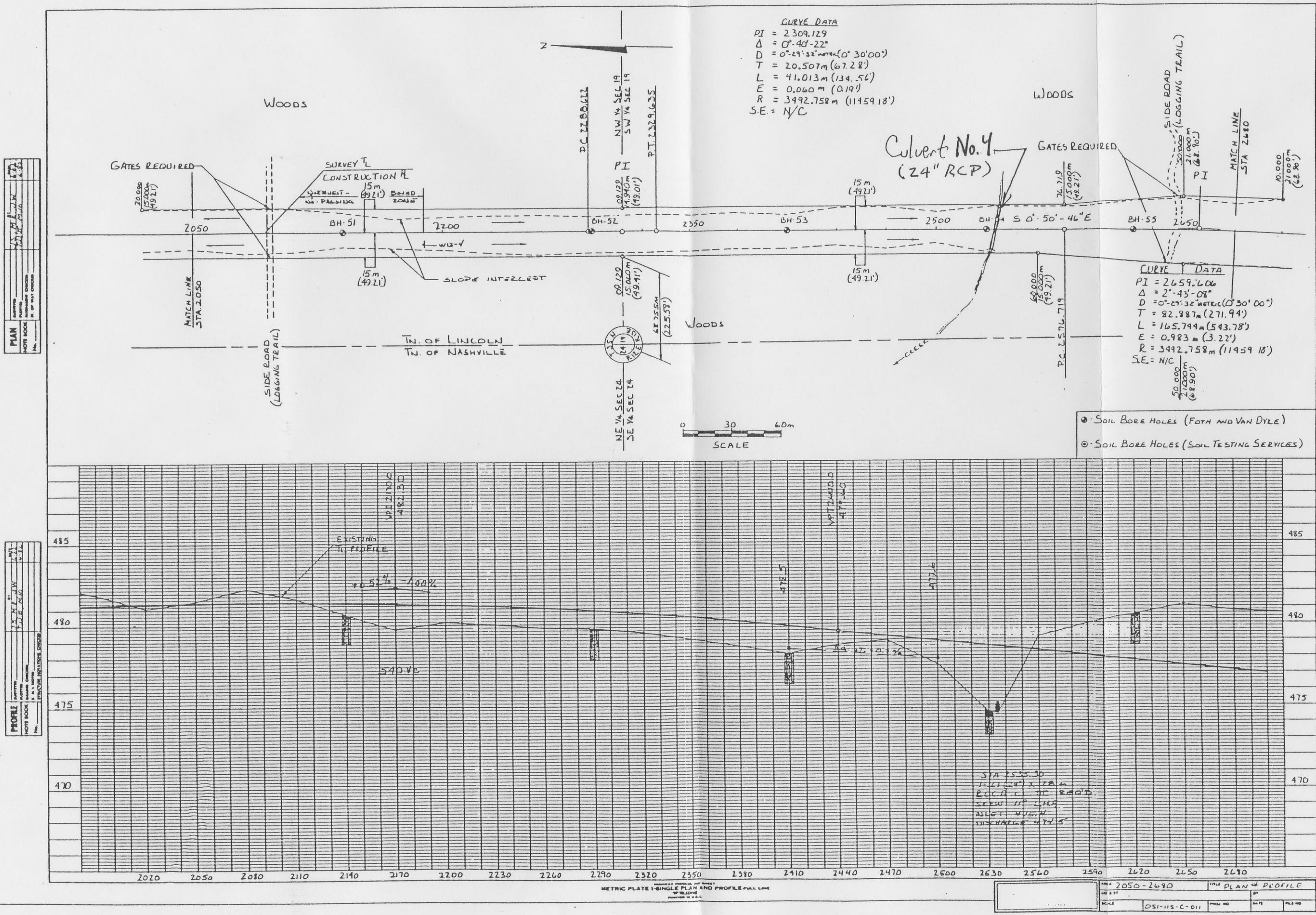
EFFECTIVE DATE: July 29, 1995

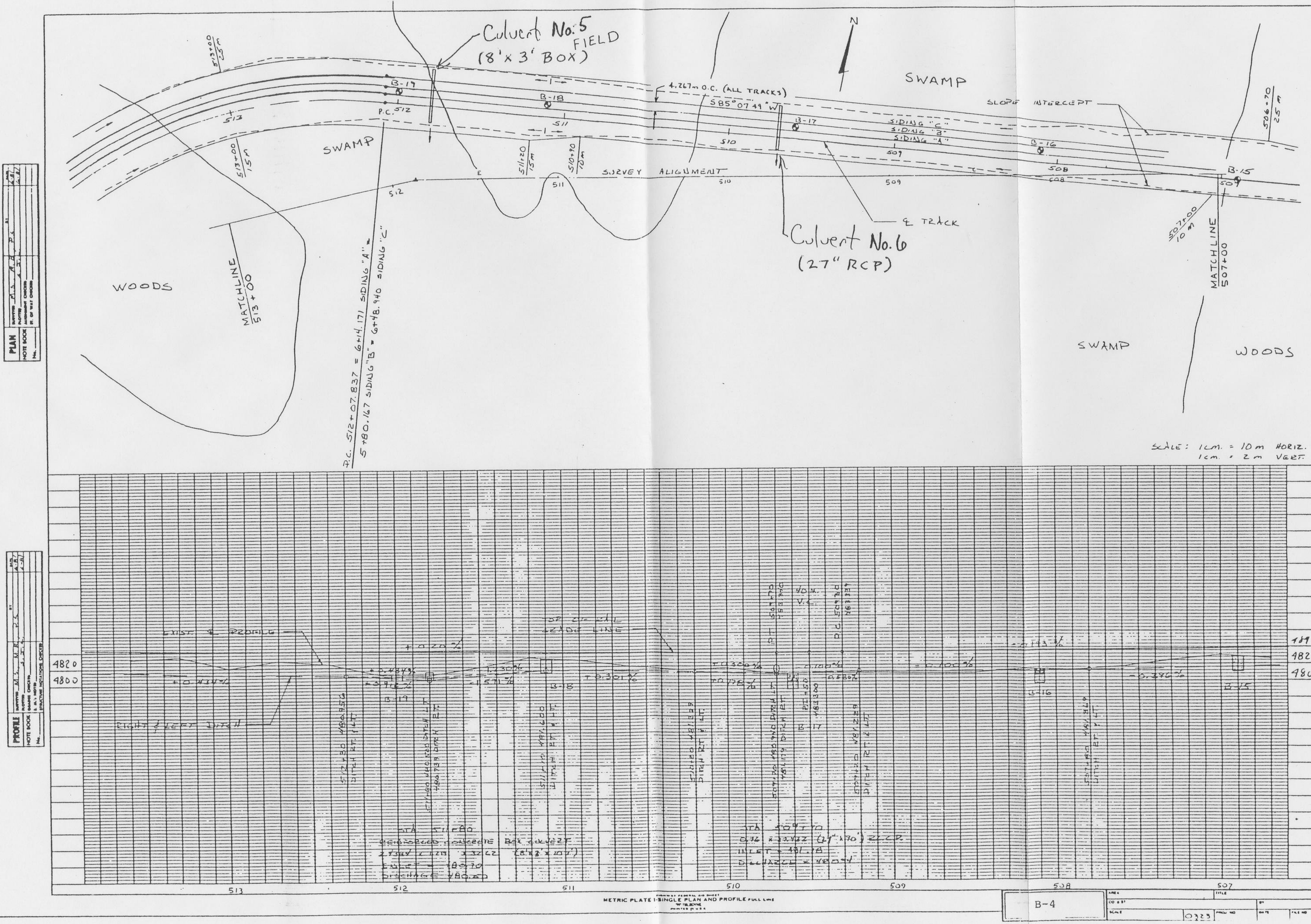
Appendix B

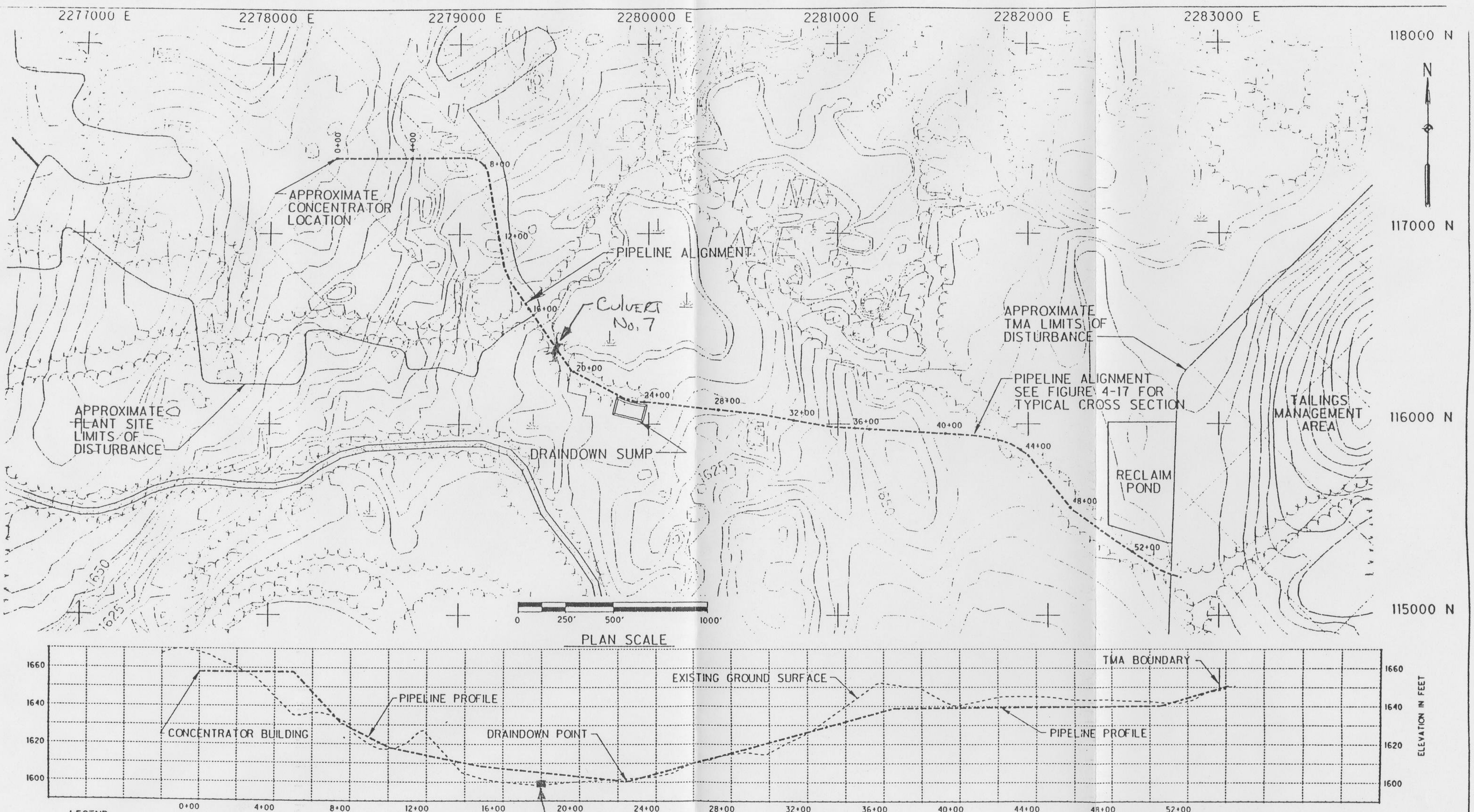
Culvert Locations - Plan & Profile


WOODS
WOODS
WOODS
WOODS
SIDE ROAD (LOGGING TRAIL)
NW 1/4 SEC 24
NE 1/4 SEC 24
T 33 N
R 12 E
N
Culvert No.1
(24" RCP)
GATES REQUIRED
SURVEY ℄
CONSTRUCTION ℄
15m (49.21')
N 87°-54'-40" E
BH-39
BH-40
BH-41
BH-42
BH-P#5
650
800
950
1100
1250
MATCH LINE STA. 650
MATCH LINE STA. 1310
SLOPE INTERCEPT
SOUTHEAST BOUND NO-PASSING ZONE
SCALE
0 30 60M
SOIL BORE HOLES-(FOTH AND VAN DYKE)
SOIL BORE HOLES-(SOIL TESTING SERVICES)
PLAN
PROFILE
NOTE BOOK
495
490
485
480
VPC 1010
485.08
VPI 1130.0
485.10
120 V.C.
EXISTING ℄ PROFILE
STA 1100
R.C.C.P.
INLET 485.7
620 650 680 710 740 770 800 830 860 890 920 950 980 1010 1040 1070 1100 1130 1160 1190 1220 1250 1280 1310
METRIC PLATE 1-SINGLE PLAN AND PROFILE-FULL LINE
650-1310
PLAN & PROFILE
051-115-C-009


Culvert No.3
(24" RCP)
Culvert No.2
(24" RCP)
SURVEY ℄
CONSTRUCTION ℄
WOODS
SWAMP
GATES REQUIRED
SLOPE INTERCEPT
SEC 13
SEC 24
SEC 19
SEC 24
TN. OF LINCOLN
TN. OF NASHVILLE
P.C. 1411.161
P.T. 1971.479
N 41°-54'-40" E
S 0°-14'-24" E
MATCH LINE STA. 1310
MATCH LINE STA. 2050
BH-43
BH-44
BH-44A
BH-45
BH-46
BH-47
BH-47A
BH-48
BH-49
BH-50
CURVE DATA
PI = 1772.314
Δ = 91°-54'-56"
T = 361.153m (1184.87')
L = 560.318m (1838.31')
E = 153.193m (502.44')
R = 349.276m (1145.92')
SE = 0.056 m/m (0.056%)
SCALE
⊗ - SOIL BORE HOLES (FOTH AND VAN DYKE)
⊙ - SOIL BORE HOLES (SOIL TESTING SERVICES)
EXISTING ℄ PROFILE
METRIC PLATE 1-SINGLE PLAN AND PROFILE FULL LINE
1310-2050
PLAN & PROFILE
051-115-C-010


CURVE DATA
PI = 2309.129
Δ = 0°-40'-22"
D = 0°-29'-32" METRIC (0° 30'00")
T = 20.507m (67.28')
L = 41.013m (134.56')
E = 0.060 m (0.19')
R = 3992.758m (11459.18')
S.E. = N/C
WOODS
Culvert No. 4
(24" RCP)
GATES REQUIRED
SURVEY
CONSTRUCTION
SLOPE INTERCEPT
MATCH LINE STA. 2050
SIDE ROAD (LOGGING TRAIL)
MATCH LINE STA 2680
BH-51
BH-52
BH-53
BH-55
S 0°-50'-46"E
CURVE DATA
PI = 2659.606
Δ = 2°-43'-08"
D = 0°-29'-32" METRIC (0°30'00")
T = 82.887m (271.94')
L = 165.799m (543.78')
E = 0.983 m (3.22')
R = 3992.758m (11959.18')
S.E. = N/C
TN. OF LINCOLN
TN. OF NASHVILLE
NW ¼ SEC 19
SW ¼ SEC 19
NE ¼ SEC 24
SE ¼ SEC 24
SCALE
Soil Bore Holes (Foth and Van Dyke)
Soil Bore Holes (Soil Testing Services)
PLAN
PROFILE
EXISTING TL PROFILE
485
480
475
470
2020 2050 2080 2110 2140 2170 2200 2230 2260 2290 2320 2350 2380 2410 2440 2470 2500 2530 2560 2590 2620 2650 2680
METRIC PLATE 1-SINGLE PLAN AND PROFILE-FULL LINE
2050-2680
PLAN & PROFILE
051-115-C-011


Culvert No. 5
(8' x 3' BOX)
FIELD
N
SWAMP
B-19
B-18
B-17
B-16
B-15
P.C. 512
4.267 m O.C. (ALL TRACKS)
S85°07'49"W
SIDING "C"
SIDING "B"
SIDING "A"
SLOPE INTERCEPT
SURVEY ALIGNMENT
513+00 15 m
511+20 15 m
510+90 10 m
507+00 10 m
506+70 25 m
Culvert No. 6
(27" RCP)
℄ TRACK
WOODS
MATCHLINE 513+00
MATCHLINE 507+00
P.C. 512+07.837 = 6+14.171 SIDING "A" = 5+80.167 SIDING "B" = 6+48.940 SIDING "C"
SWAMP
WOODS
SCALE: 1 cm. = 10 m HORIZ.
1 cm. = 2 m VERT.
PLAN
NOTE BOOK
PROFILE
EXIST. ℄ PROFILE
RIGHT & LEFT DITCH
GRADE LINE
4820
4800
482.0
480.0
513
512
511
510
509
508
507
B-4
METRIC PLATE 1-SINGLE PLAN AND PROFILE FULL LINE
0323



LEGEND

EXISTING GRADE

EXISTING SPOT ELEVATION

PAVED ROAD

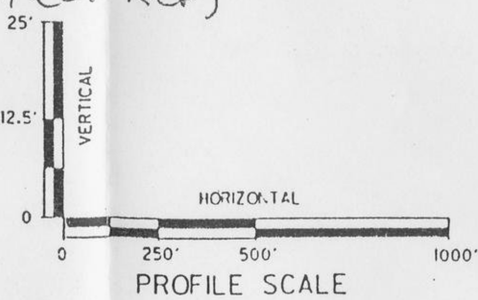
UNPAVED ROAD/TRAIL

TREES/BRUSH

WETLAND

NOTES:

1. TOPOGRAPHIC BASE MAP DIGITIZED FROM 1" = 1000' SCALE. 5' CONTOUR INTERVAL MAP PREPARED BY AERO-METRIC ENGINEERING, INC., SHEBOYGAN, WISCONSIN. DATE OF PHOTOGRAPHY APRIL 28, 1976.
2. HORIZONTAL DATUM BASED ON WISCONSIN STATE PLANE COORDINATE SYSTEM - NORTH ZONE.
3. VERTICAL DATUM BASED ON MEAN SEA LEVEL DATUM. CONTOUR INTERVAL IS FIVE FEET.
4. COUNTY AND TOWNSHIP LINES DIGITIZED FROM 7.5' SERIES USGS MAPS.



TYPICAL REPRESENTATION: REFINEMENTS MAY BE MADE PRIOR TO CONSTRUCTION.

Foth & Van Dyke

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	JKS1	DATE:	MAY'95
APPROVED BY:	JBH	DATE:	MAY'95
APPROVED BY:	PAE	DATE:	MAY'95

Crandon Mining Company

TAILINGS AND RETURN WATER PIPELINES PLAN AND PROFILE

Scale: AS SHOWN		Date: MAY, 1995	
Prepared By: Foth & Van Dyke		By: GAM	

93C049

c:\cadwork\4c56f5.3a

Appendix C

Culvert Sizing Computations and Computer Flood Analysis for Culvert No. 5

Foth & Van Dyke
Memorandum

September 7, 1995

TO: Jerry Sevick

FR: Mike Liebman MDL
Steve Birr SRB

RE: Crandon Project - Mine Site Proposed Culvert Sizing

Sizing for the seven proposed mine site culvert locations is based on the 25-year/24-hour flow. These flows were developed with the USGS SCS hydrologic forecasting model TR-20. The TR-20 forecasts are contained in an August 16, 1995 technical memorandum titled, "Crandon Project - Mine Site Access Road/Railroad Spur Hydrologic/Hydraulic Analyses". Culvert nomographs were used to size culverts No. 1 through No. 4 and No. 6. These nomographs are included with this memorandum. Culvert No. 5 was sized based on the 100-year flow as shown in this Appendix. Culvert No. 7 is sized to allow the equalization of water levels on both sides of the haul road. This area is a depression and there is no flow pattern. A 24-inch RCP will allow for adequate handling of hydrology in the area.

The following table lists culvert numbers with respective design features:

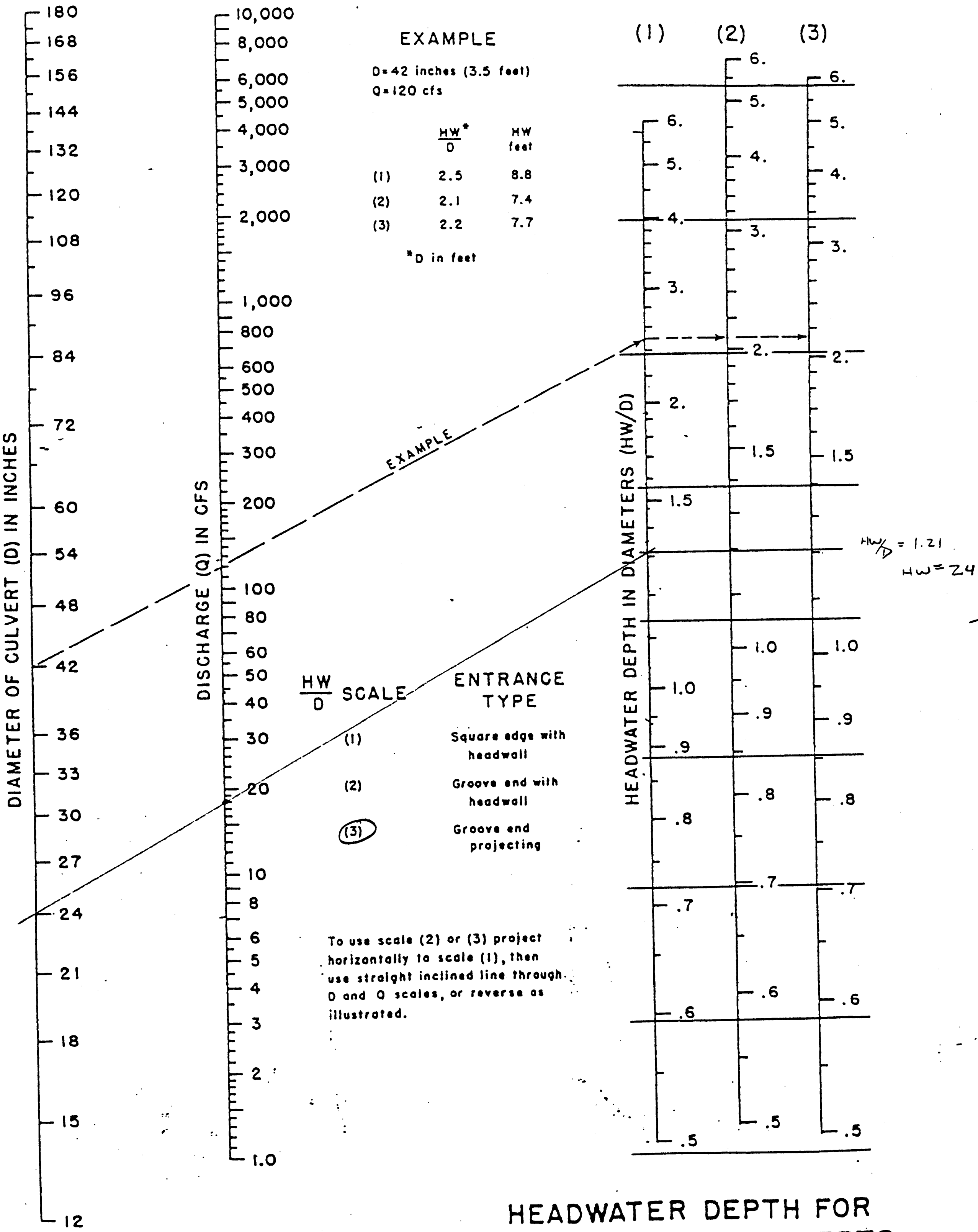
Culvert No.	Station	Q_{25} (cfs)	HW (ft)	Available HW (ft)	Culvert Size
1	1100	18	2.4	2.5	24" RCP
2	1352.6	17	2.3	3.3	24" RCP
3	1701	30	4.2	5.6	24" RCP
4	2535	17	2.3	4.0	24" RCP
6	509 + 70	19	2.3	3.1	27" RCP

SRB:lrm

Culvert No. 1

Q_{25} = 18 cfs

CHART 2



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 2&3
REVISED MAY 1964

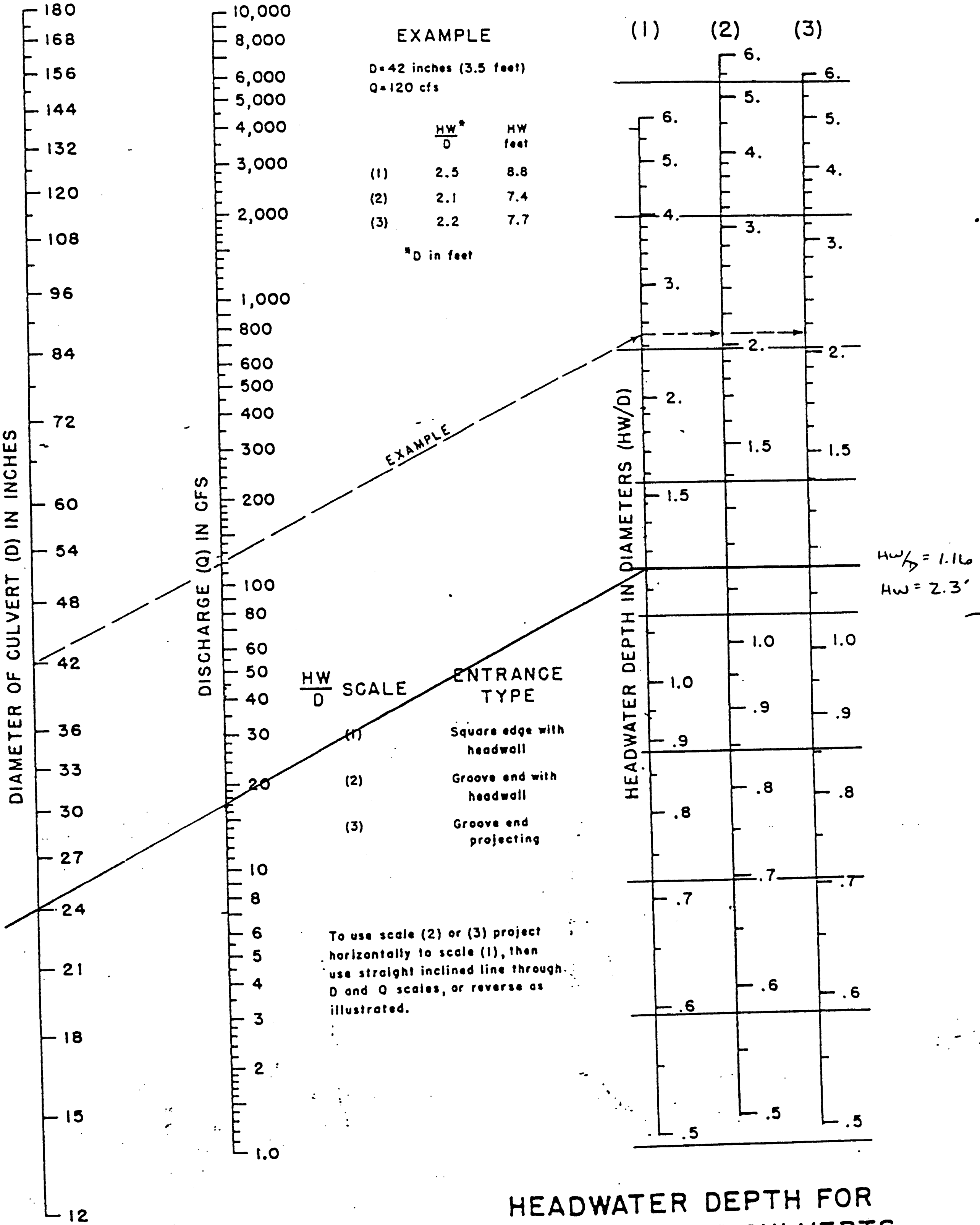
BUREAU OF PUBLIC ROADS JAN. 1963

5-22

Culvert No. 2

$Q_{25} = 17$ cfs

CHART 2



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

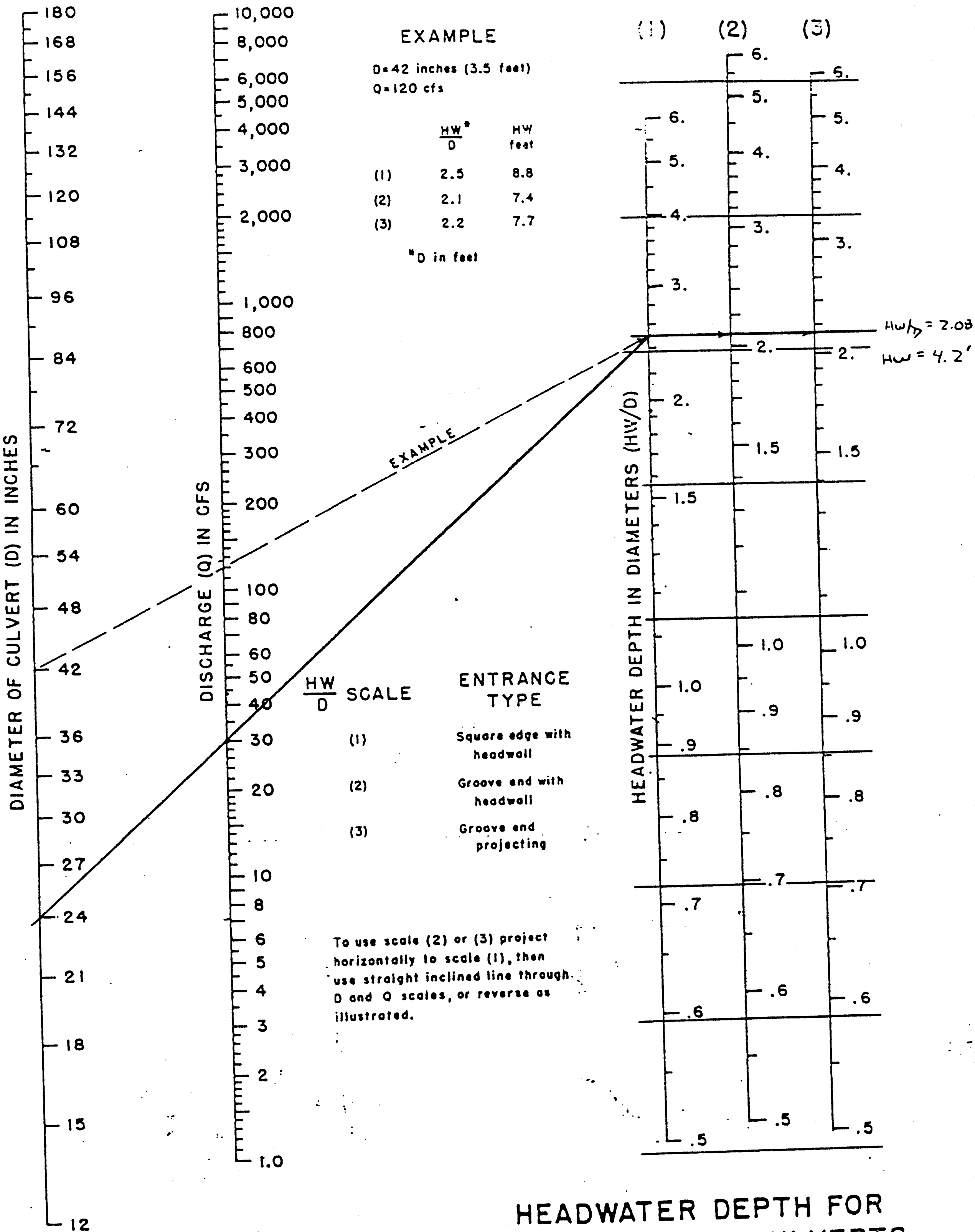
HEADWATER SCALES 2&3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

Culvert No. 3

Q_{25} = 30 cfs

CHART 2



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

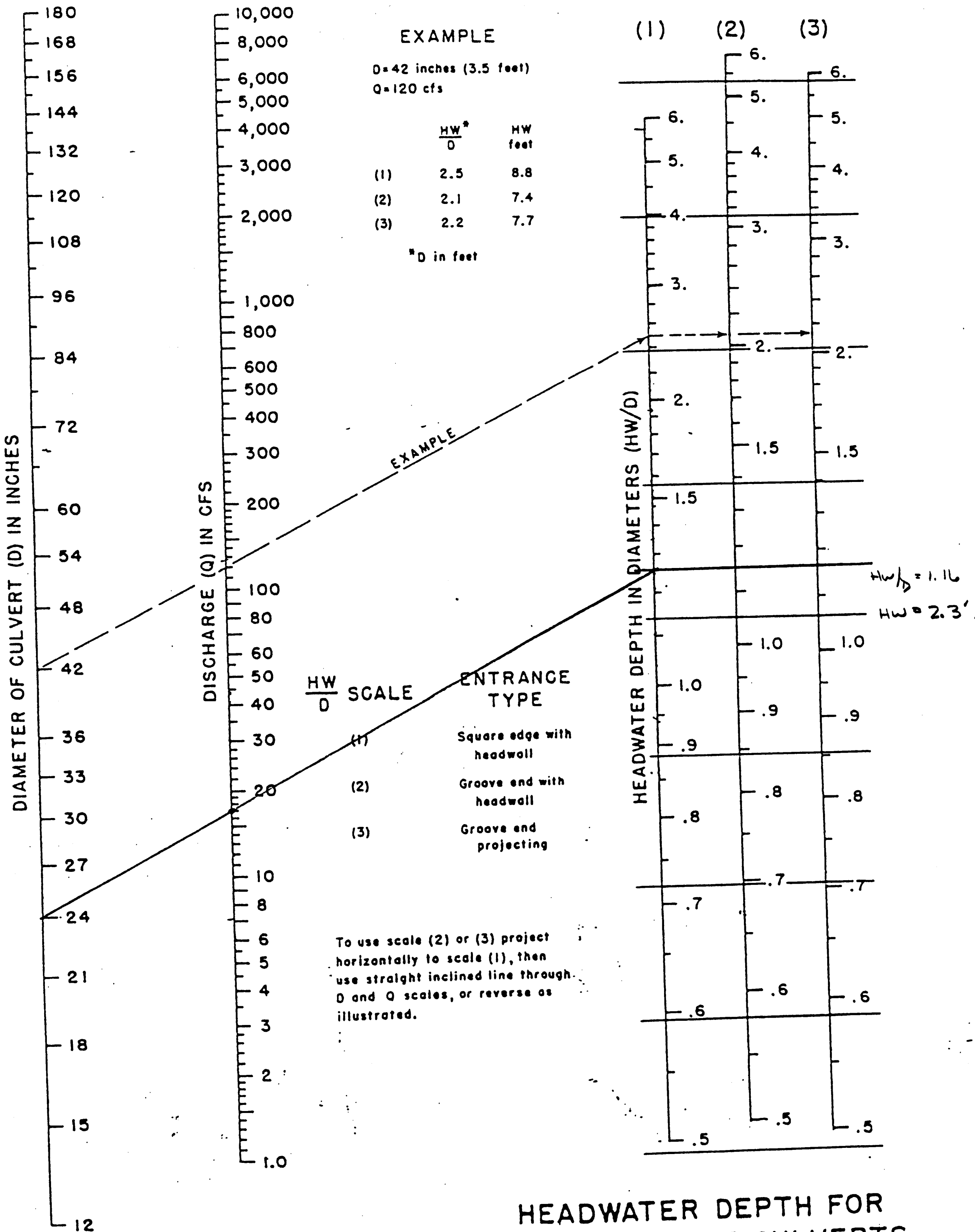
HEADWATER SCALES 2&3 REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

Culvert No. 4

Q_{25} = 17 cfs

CHART 2



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

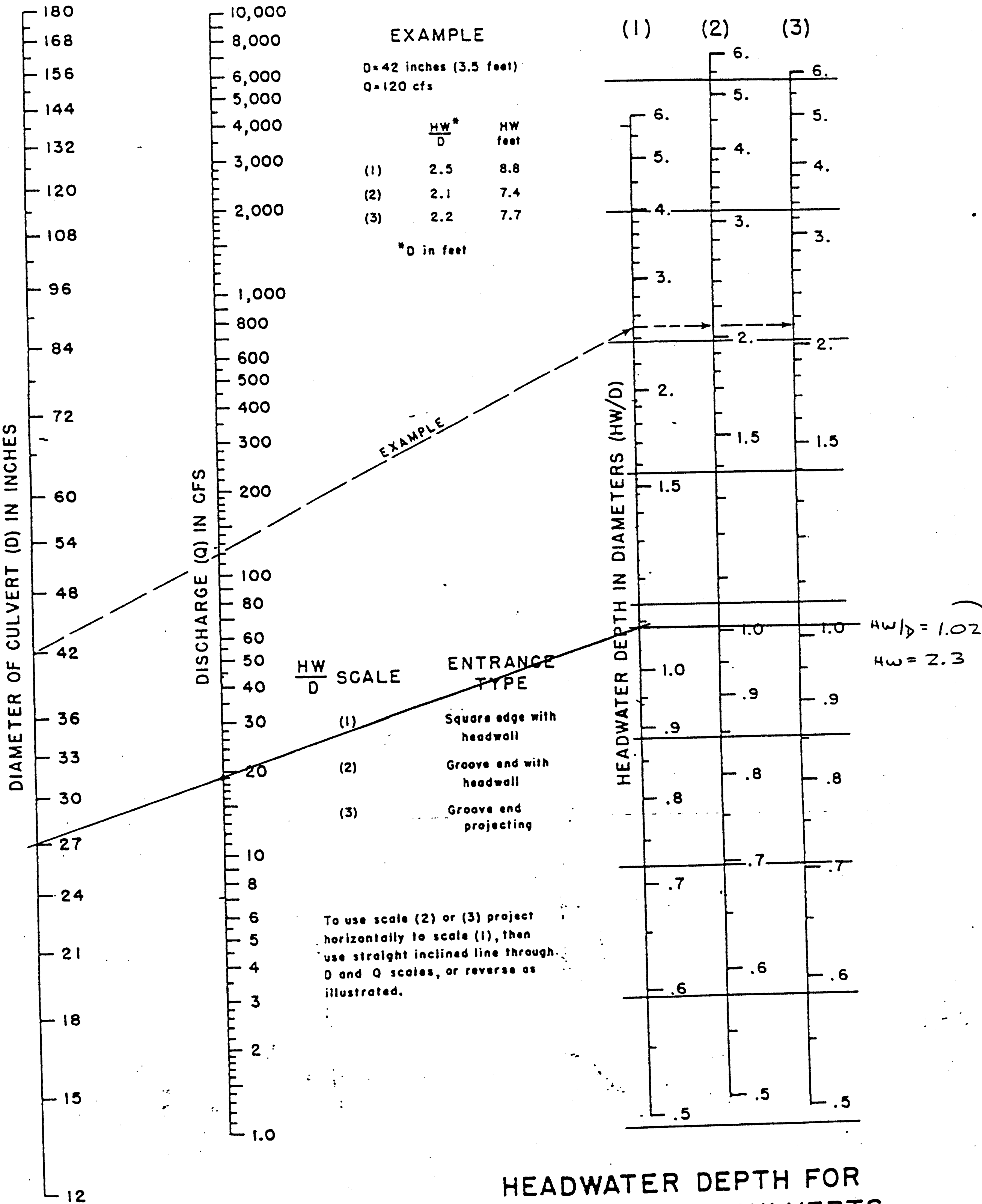
HEADWATER SCALES 2&3 REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

Culvert No. 6

Q_{25} = 19 cfs

CHART 2



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 2&3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

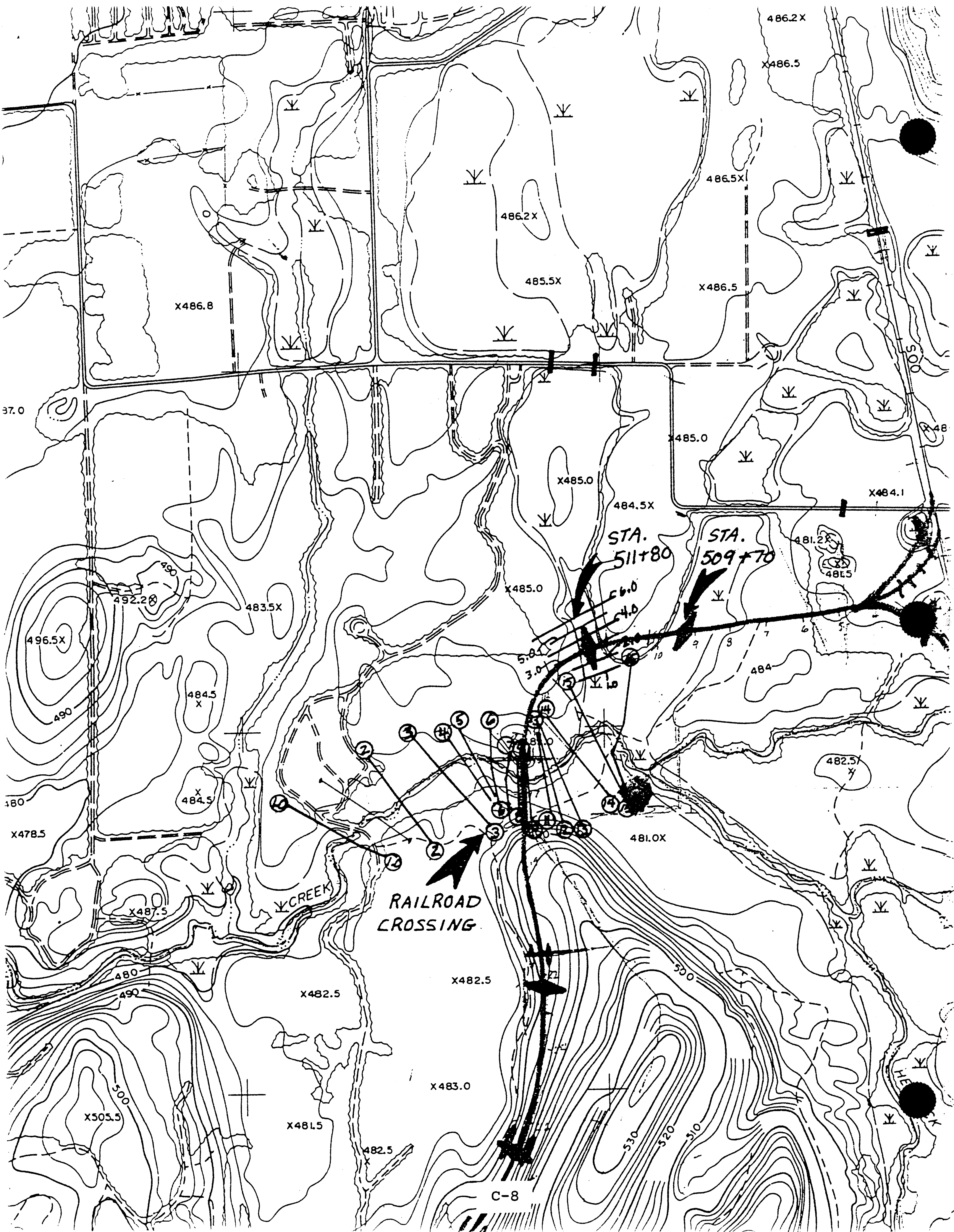
CRANDON MINING COMPANY

CULVERT NO. 5 TRIBUTARY CROSSING

FOTH AND VAN DYKE: 93C049.29

WATER SURFACE ELEVATIONS: 100 YEAR STORM EVENT

SECTION NO.	EXISTING	PROPOSED 8'X3' BOX	DIFFERENCE
1.00	481.07	481.07	0.00
2.00	481.08	481.08	0.00
3.00	481.10	481.11	0.01
4.00	481.13	481.16	0.03
5.00	481.23	481.24	0.01
6.00	481.39	481.39	0.00



STA. 511+80
STA. 509+70
RAILROAD CROSSING
CREEK
486.2X
X486.5
486.5X
486.2X
485.5X
X486.5
X486.8
X485.0
X485.0
484.5X
X484.1
481.2X
481.5
X485.0
492.2
496.5X
483.5X
484.5 X
484
482.5
481.0X
X484.5
X478.5
X487.5
X482.5
X482.5
X483.0
X505.5
X481.5
482.5 X
490
480
500
530
520
510
6.0
4.0
5.0
3.0
2.0
1.0

```
*  HEC-2 WATER SURFACE PROFILES                *
*                                              *
*  Version   4.6.2;  May 1991                  *
*                                              *
*  RUN DATE    23AUG95    TIME   09:13:38      *
************************************************
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*  U.S. ARMY CORPS OF ENGINEERS          *
*  HYDROLOGIC ENGINEERING CENTER         *
*  609 SECOND STREET, SUITE D            *
*  DAVIS, CALIFORNIA 95616-4687          *
*          (916) 756-1104                *
******************************************
```

```
X     X  XXXXXXX   XXXXX           XXXXX
X     X  X        X     X         X     X
X     X  X        X                     X
XXXXXXX  XXXX     X         XXXXX   XXXXX
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX           XXXXXXX
```

1

23AUG95   09:13:38   PAGE   1

THIS RUN EXECUTED 23AUG95   09:13:38

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*****************************************
HEC-2 WATER SURFACE PROFILES

Version   4.6.2;  May 1991
*****************************************
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```
T1    WATER SURFACE PROFILE:  100-YEAR FLOW          FILE: CMCTRIB
T2    RAILROAD DRAINAGE                              AUGUST,1981
T3    TRIBUTARY AT STATION 512 - EXISTING CONDITIONS F&VD: MDL
```

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	0	0	0	.0	1.	.0	1.	481.07	0

NC	.15	.15	.14	.1	.3	0	0	0	0	0
X1	1.	7.	71.	73.7	0	0	0	0	0	0
GR	482.	0	480.265	70.	480.045	71.	479.845	72.35	480.235	73.7
GR	482.	130.	483.	180.	0	0	0	0	0	0
X1	2.	8.	90.	92.7	40.	40.	40.	0	0	0
GR	482.7	0	480.55	89.5	480.285	90.	480.085	91.4	480.475	92.7
GR	481.4	100.	482.	130.	484.	200.	0	0	0	0
X1	3.	10.	82.	85.5	30.	30.	30.	0	0	0
GR	484.	0	482.	48.	481.	65.	480.665	82.	480.265	82.5
GR	480.47	85.	480.685	85.5	481.	110.	482.	120.	484.	190.
X1	4.	12.	120.	124.5	30.	30.	30.	0	0	0

GR	480.86	120.	480.495	120.5	480.58	124.	480.9	124.5	481.145	140.
GR	482.	150.	484.	200.	0	0	0	0	0	0

X1	5.	12.	126.	128.2	30.	30.	30.	0	0	0
GR	484.3	0	484.	65.	481.985	100.	481.235	109.	480.94	126.
GR	480.75	126.2	480.625	128.	480.935	128.2	481.395	150.	481.475	193.
GR	483.01	210.	484.5	220.	0	0	0	0	0	0

X1	6.	10.	125.	127.2	30.	30.	30.	0	0	0
GR	484.3	0	482.	100.	481.4	110.	481.09	125.	480.92	125.3
GR	480.8	127.1	481.07	127.2	481.6	150.	482.	170.	484.	190.

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1
0

CCHV= .100 CEHV= .300
*SECNO 1.000

1.000	1.23	481.07	.00	481.07	481.07	.00	.00	.00	480.05
1.0	.5	.2	.4	14.0	2.9	11.1	.0	.0	480.23
.00	.03	.06	.03	.150	.140	.150	.000	479.85	37.52
.000074	0.	0.	0.	0	0	0	.00	62.81	100.34

*SECNO 2.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .31

2.000	.99	481.08	.00	.00	481.08	.00	.01	.00	480.29
1.0	.5	.4	.1	6.0	2.3	1.4	.8	1.9	480.48
.09	.08	.18	.08	.150	.140	.150	.000	480.08	67.73
.000797	40.	40.	40.	0	0	0	.00	29.69	97.42

*SECNO 3.000

3.000	.83	481.10	.00	.00	481.10	.00	.02	.00	480.67
1.0	.3	.3	.4	4.4	2.4	6.1	1.1	3.0	480.68
.19	.07	.13	.06	.150	.140	.150	.000	480.27	63.48
.000617	30.	30.	30.	0	0	0	.00	47.42	110.90

*SECNO 4.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .52

4.000	.63	481.13	.00	.00	481.13	.00	.03	.00	480.86
1.0	.3	.6	.1	3.3	2.5	1.6	1.4	4.3	480.90
.24	.10	.22	.07	.150	.140	.150	.000	480.49	99.76
.002304	30.	30.	30.	1	0	0	.00	38.94	138.70

*SECNO 5.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .64

5.000	.61	481.23	.00	.00	481.23	.00	.10	.00	480.94
1.0	.3	.4	.3	2.4	1.1	2.1	1.6	5.4	480.93
.28	.14	.32	.14	.150	.140	.150	.000	480.63	109.22
.005645	30.	30.	30.	2	0	0	.00	33.01	142.23

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 6.000

6.000	.59	481.39	.00	.00	481.39	.00	.16	.00	481.09
1.0	.3	.3	.3	2.3	1.1	2.4	1.8	6.3	481.07
.32	.14	.30	.14	.150	.140	.150	.000	480.80	109.99
.005002	30.	30.	30.	1	0	0	.00	31.45	141.43

1
PROFILE FOR STREAM IBUTARY AT STATION 512 -

PLOTTED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA

```
ELEVATION  480.     480.     481.     481.     482.     482.     483.     483.     484.     484.
    SECNO  CUMDIS
     1.00     0.  I   L   R .        .   E   .        . M   .        .        .        .        .
              5.  CI   L  R .        .   E   .        .   M .        .        .        .        .
             10.  CI   L   R.        .   E   .        .     M.        .        .        .        .
             15.  C I   L   R        .   E   .        .      M.        .        .        .        .
             20.  C I   L   R        .   E   .        .       M        .        .        .        .
             25.  C  I   L .R        .   E   .        .       . M      .        .        .        .
             30.  C   I   L .R       .   E   .        .       .   M    .        .        .        .
             35.  C   I   L . R      .   E   .        .       .    M   .        .        .        .
     2.00    40.  C    I   L.  R     .   E   .        .       .      M .        .        .        .
             45.  C    I    L  R     .   E   .        .       .        .M       .        .        .
             50.  C     I   .L  R    .   E   .        .       .        .    M   .        .        .
             55.  C      I  .  L R   .   E   .        .       .        .        M        .        .
             60.  C      I  .   LR   .   E   .        .       .        .        .   M    .        .
             65.  C       I .    LR  .   E   .        .       .        .        .       M.        .
     3.00    70.  C       I .      L .   E   .        .       .        .        .        . M      .
             75.  C        I.      L .   E   .        .       .        .        .        . M      .
             80.  C         I       L .  E   .        .       .        .        .        . M      .
             85.  C         .I      LR.  E   .        .       .        .        .        . M      .
             90.  C         .I       LR  WE  .        .       .        .        .        . M      .
             95.  C         . I      L   WE  .        .       .        .        .        . M      .
     4.00   100.  C         .  I     LR  WE  .        .       .        .        .        . M      .
            105.  C         .  I    .L    E  .        .       .        .        .        .  M     .
```

```
        115.  C        .  I     .L     E .        .        .        .        .        .    M    .        .
        120.  C        .   I    .L     E .        .        .        .        .        .     M   .        .
        125.  C        .   I    . L    E .        .        .        .        .        .      M  .        .
  5.00  130.  C        .    I   . L     E.        .        .        .        .        .       M.        .
        135.  C        .    I   . L     E .       .        .        .        .        .      M  .        .
        140.  C        .     I  .  L     E.       .        .        .        .        .     M   .        .
        145.  C        .     I  .  L     E.       .        .        .        .        .    M    .        .
        150.  C        .      I .  L     E        .        .        .        .        .   M     .        .
        155.  C        .       I.  L      EW      .        .        .        .        .  M      .        .
  6.00  160.  C        .       I.    L   .E       .        .        .        .        . M       .        .
1
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THIS RUN EXECUTED 23AUG95 09:13:38

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HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991

****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

IBUTARY AT STATION 512 -

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	1.000	.00	.00	.00	479.85	1.00	481.07	.00	481.07	.74	.06	28.02	1.16
*	2.000	40.00	.00	.00	480.08	1.00	481.08	.00	481.08	7.97	.18	9.71	.35
	3.000	30.00	.00	.00	480.27	1.00	481.10	.00	481.10	6.17	.13	12.90	.40
*	4.000	30.00	.00	.00	480.49	1.00	481.13	.00	481.13	23.04	.22	7.37	.21
*	5.000	30.00	.00	.00	480.63	1.00	481.23	.00	481.23	56.45	.32	5.67	.13
	6.000	30.00	.00	.00	480.80	1.00	481.39	.00	481.39	50.02	.30	5.83	.14

1

IBUTARY AT STATION 512 -

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	1.000	1.00	481.07	.00	.00	.00	62.81	.00
*	2.000	1.00	481.08	.00	.01	.00	29.69	40.00
	3.000	1.00	481.10	.00	.02	.00	47.42	30.00

*	4.000	1.00	481.13	.00	.03	.00	38.94	30.00
*	5.000	1.00	481.23	.00	.10	.00	33.01	30.00
	6.000	1.00	481.39	.00	.16	.00	31.45	30.00

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 2.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 4.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 5.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

```
*************************************************          ****************************************
*  HEC-2 WATER SURFACE PROFILES                 *          *  U.S. ARMY CORPS OF ENGINEERS         *
*                                               *          *  HYDROLOGIC ENGINEERING CENTER        *
*  Version    4.6.2;  May 1991                  *          *  609 SECOND STREET, SUITE D           *
*                                               *          *  DAVIS, CALIFORNIA 95616-4687         *
*  RUN DATE    23AUG95     TIME    12:14:06     *          *       (916) 756-1104                  *
*************************************************          ****************************************
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```
X     X  XXXXXXX   XXXXX            XXXXX
X     X  X        X     X          X     X
X     X  X        X                      X
XXXXXXX  XXXX     X          XXXXX  XXXXX
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX           XXXXXXX
```


THIS RUN EXECUTED 23AUG95   12:14:06

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****************************************
HEC-2 WATER SURFACE PROFILES

Version    4.6.2;  May 1991
****************************************
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T1 WATER SURFACE PROFILE: 100-YEAR FLOW   FILE: CMCTRIBP
T2 RAILROAD DRAINAGE   AUGUST,1981
T3 TRIBUTARY AT STATION 512 - PROPOSED CONDITIONS   F&VD: MDL
(8'x3' Box)

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	0	0	0	.0	1.	.0	1.	481.07	0

NC	.15	.15	.14	.1	.3	0	0	0	0	0
X1	1.	7.	71.	73.7	0	0	0	0	0	0
X3				50.0		83.0				
GR	482.	0	480.265	70.	480.045	71.	479.845	72.35	480.235	73.7
GR	482.	130.	483.	180.	0	0	0	0	0	0
X1	2.	8.	90.	92.7	40.	40.	40.	0	0	0
X3				83.0		94.0				
GR	482.7	0	480.55	89.5	480.285	90.	480.085	91.4	480.475	92.7
GR	481.4	100.	482.	130.	484.	200.	0	0	0	0
X1	3.0	11.	81.28	83.72	16.	16.	16.	0	0	0

X3	10.0	0	0	0	0	0	0.0	482.07	482.06	0
GR	484.	0	482.	48.	481.	65.	480.26	81.28	480.26	83.62
GR	480.26	83.72	480.47	85.0	480.69	85.5	481.	110.	482.	120.
GR	484.0	190.0								
NC	.013	.013	.013	.3	.5					
X1	3.4	6.0	81.28	83.72	2.0	2.0	2.0			
X3	10.0							482.07	482.06	
BT	6.0	0.0	482.50	482.50	81.28	482.07	480.26	81.29	482.07	481.17
BT	83.71	482.06	481.17	83.72	482.06	480.26	190.0	481.50	481.5	0.0
GR	482.5	0.0	480.26	81.28	480.26	81.29	480.26	83.71	480.26	83.72
GR	481.50	190.0								
X1	3.6				25.0	25.0	25.0			
X2							1.0			
X3	10.0							482.07	482.06	

1 PAGE 2

23AUG95 12:14:06

NC	.15	.15	.14	.1	.3					
X1	3.8	11.0	81.28	83.72	2.0	2.0	2.0			
X3	10.0							482.07	482.06	
GR	484.0	0.0	482.0	48.0	481.0	65.0	480.26	81.28	480.26	83.62
GR	480.26	83.72	480.47	85.0	480.69	85.5	481.0	110.0	482.0	120.0
GR	484.0	190.0								
X1	4.	12.	120.	124.5	15.	15.	15.	0	0	0
X3				101.0		134.0				
GR	484.2	0	482.	60.	481.69	90.	480.995	102.	480.97	111.
GR	480.86	120.	480.495	120.5	480.58	124.	480.9	124.5	481.145	140.
GR	482.	150.	484.	200.	0	0	0	0	0	0
X1	5.	12.	126.	128.2	30.	30.	30.	0	0	0
GR	484.3	0	484.	65.	481.985	100.	481.235	109.	480.94	126.
GR	480.75	126.2	480.625	128.	480.935	128.2	481.395	150.	481.475	193.
GR	483.01	210.	484.5	220.	0	0	0	0	0	0
X1	6.	10.	125.	127.2	30.	30.	30.	0	0	0
GR	484.3	0	482.	100.	481.4	110.	481.09	125.	480.92	125.3
GR	480.8	127.1	481.07	127.2	481.6	150.	482.	170.	484.	190.

1 PAGE 3

23AUG95 12:14:06

								OLOSS	L-BANK ELEV
						HV	HL	TWA	R-BANK ELEV
SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	AROB	VOL	ELMIN	SSTA
Q	QLOB	QCH	QROB	ALOB	ACH	XNR	WTN	TOPWID	ENDST
TIME	VLOB	VCH	VROB	XNL	XNCH	ICONT	CORAR		
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC				

*PROF 1

0

CCHV= .100 CEHV= .300

*SECNO 1.000

3470 ENCROACHMENT STATIONS= 50.0 83.0 TYPE= 1 TARGET= 33.000

1.000	1.23	481.07	.00	481.07	481.07	.00	.00	.00	480.05
1.0	.5	.2	.3	12.1	2.9	6.4	.0	.0	480.23
.00	.04	.07	.05	.150	.140	.150	.000	479.85	50.00
.000084	0.	0.	0.	0	0	0	.00	33.00	83.00

*SECNO 2.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .27

3470 ENCROACHMENT STATIONS= 83.0 94.0 TYPE= 1 TARGET= 11.000

2.000	.99	481.08	.00	.00	481.08	.00	.01	.00	480.29
1.0	.4	.5	.1	3.2	2.3	.7	.6	.9	480.48
.06	.13	.22	.12	.150	.140	.150	.000	480.08	83.00
.001192	40.	40.	40.	0	0	0	.00	11.00	94.00

*SECNO 3.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .45

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 482.07 ELREA= 482.06

3.000	.85	481.11	.00	.00	481.12	.01	.04	.00	480.26
1.0	.0	1.0	.0	.0	2.0	.0	.6	1.0	480.26
.07	.00	.49	.00	.000	.140	.000	.000	480.26	81.28
.005957	16.	16.	16.	1	0	0	.00	2.44	83.72

CCHV= .300 CEHV= .500

*SECNO 3.400

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 11.12

1 PAGE 4

23AUG95 12:14:06

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3370 NORMAL BRIDGE, NRD= 6 MIN ELTRD= 481.50 MAX ELLC= 481.17

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 482.07 ELREA= 482.06

3.400	.85	481.11	.00	.00	481.12	.01	.00	.00	480.26
1.0	.0	1.0	.0	.0	2.1	.0	.6	1.0	480.26
.07	.00	.48	.00	.000	.013	.000	.000	480.26	81.28
.000048	2.	2.	2.	0	0	0	-31.22	2.44	83.72

*SECNO 3.600

3370 NORMAL BRIDGE, NRD= 6 MIN ELTRD= 481.50 MAX ELLC= 481.17

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 482.07 ELREA= 482.06

3.600	.85	481.11	.00	.00	481.12	.01	.00	.00	480.26
1.0	.0	1.0	.0	.0	2.1	.0	.7	1.1	480.26
.09	.00	.48	.00	.000	.013	.000	.000	480.26	81.28
.000049	25.	25.	25.	2	0	0	-30.83	2.44	83.72

CCHV= .100 CEHV= .300
*SECNO 3.800

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .09

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 482.07 ELREA= 482.06

3.800	.85	481.11	.00	.00	481.12	.01	.00	.00	480.26
1.0	.0	1.0	.0	.0	2.1	.0	.7	1.1	480.26
.09	.00	.48	.00	.000	.140	.000	.000	480.26	81.28
.005694	2.	2.	2.	0	0	0	.00	2.44	83.72

*SECNO 4.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.92

1 PAGE 5
23AUG95 12:14:06

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3470 ENCROACHMENT STATIONS= 101.0 134.0 TYPE= 1 TARGET= 33.000

4.000	.67	481.16	.00	.00	481.16	.00	.04	.00	480.86
1.0	.4	.5	.1	3.9	2.6	1.7	.8	1.3	480.90
.12	.09	.19	.08	.150	.140	.150	.000	480.49	101.00
.001548	15.	15.	15.	1	0	0	.00	33.00	134.00

*SECNO 5.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .55

```
    5.000      .61    481.24     .00      .00    481.24      .00      .08      .00   480.94
      1.0       .3       .4       .3      2.5       1.2      2.2      1.0      2.3   480.93
      .16      .14      .31      .14     .150      .140     .150     .000   480.63   108.97
  .005169      30.      30.      30.        2         0        0      .00    33.55   142.53


*SECNO 6.000
    6.000      .59    481.39     .00      .00    481.39      .00      .15      .00   481.09
      1.0       .3       .3       .3      2.3       1.1      2.3      1.1      3.3   481.07
      .20      .14      .31      .14     .150      .140     .150     .000   480.80   110.00
  .005068      30.      30.      30.        1         0        0      .00    31.39   141.39
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1
PROFILE FOR STREAM IBUTARY AT STATION 512 -

PLOTTED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA

```
ELEVATION  480.      480.      481.      481.      482.      482.      483.      483.      484.      484.
    SECNO  CUMDIS

     1.00      0.  I   L   R .          .   E    .         .         .         .  M      .         .         .         .
               2.  I   L   R .          .   E    .         .         .         .   M     .         .         .         .
               4.  CI   L  R .          .   E    .         .         .         .    M    .         .         .         .
               6.  CI   L  R .          .   E    .         .         .         .     M   .         .         .         .
               8.  CI   L   R.          .   E    .         .         .         .      M  .         .         .         .
              10.  CI   L   R.          .   E    .         .         .         .       M .         .         .         .
              12.  CI    L  R.          .   E    .         .         .         .        M.         .         .         .
              14.  C I   L  R.          .   E    .         .         .         .         M         .         .         .
              16.  C I   L   R          .   E    .         .         .         .         .M        .         .         .
              18.  C I   L   R          .   E    .         .         .         .         . M       .         .         .
              20.  C I   L   R          .   E    .         .         .         .         .  M      .         .         .
              22.   C  I   L R          .   E    .         .         .         .         .   M     .         .         .
              24.   C  I   L .R         .   E    .         .         .         .         .    M    .         .         .
              26.   C  I   L .R         .   E    .         .         .         .         .     M   .         .         .
              28.   C  I   L .R         .   E    .         .         .         .         .      M  .         .         .
              30.   C   I   L .R        .   E    .         .         .         .         .       M .         .         .
              32.   C   I   L . R       .   E    .         .         .         .         .        M.         .         .
              34.   C   I   L . R       .   E    .         .         .         .         .         M         .         .
              36.   C   I   L . R       .   E    .         .         .         .         .         .M        .         .
              38.   C   I    L. R       .   E    .         .         .         .         .         . M       .         .
     2.00     40.   C    I  L.  R       .   E    .         .         .         .         .         .  M      .         .
              42.   C    I  L. R        .   E    .         .         .         .         .         .  M      .         .
              44.   C     I L. R        .   E    .         .         .         .         .         .  M      .         .
              46.   C     I L.R         .   E    .         .         .         .         .         .  M      .         .
              48.   C     I L.R         .   E    .         .         .         .         .         .  M      .         .
              50.   C      I LR         .   E    .         .         .         .         .         .  M      .         .
              52.   C      ILR.         .   E    .         .         .         .         .         .  M      .         .
              54.   C       IR.         .   E    .         .         .         .         .         .  M      .         .
     3.00     56.   C       I .         .   E    .         .         .         .         .         .         .         .
     3.40     58.   C       I .         .   E    . M       .         .         .         .         .         .         .
              60.   C       I .         .   E    . M       .         .         .         .         .         .         .
              62.   C       I .         .   E    . M       .         .         .         .         .         .         .
              64.   C       I .         .   E    . M       .         .         .         .         .         .         .
              66.   C       I .         .   E    . M       .         .         .         .         .         .         .
              68.   C       I .         .   E    . M       .         .         .         .         .         .         .
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              70.  C       I .         .    E    .  M      .         .         .         .         .         .         .
              72.  C       I .         .    E    .  M      .         .         .         .         .         .         .
              74.  C       I .         .    E    .  M      .         .         .         .         .         .         .
              76.  C       I .         .    E    .  M      .         .         .         .         .         .         .
              78.  C       I .         .    E    .  M      .         .         .         .         .         .         .
              80.  C       I .         .    E    .  M      .         .         .         .         .         .         .
              82.  C       I .         .    E    .  M      .         .         .         .         .         .         .
  3.60        84.  C       I .         .    E    .  M      .         .         .         .         .         .         .
  3.80        86.  C       I .         .    E    .         .         .         .         .         .  M      .         .
              88.  C        IL         .    WE   .         .         .         .         .         .  M      .         .
              90.  C         I L       .     E   .         .         .         .         .         .  M      .         .
              92.  C         I  L      .     E   .         .         .         .         .         .  M      .         .
              94.  C         .I   L    .     E   .         .         .         .         .         .  M      .         .
              96.  C         .I    LR  .     E   .         .         .         .         .         .  M      .         .
              98.  C         . I     LR.     E   .         .         .         .         .         .  M      .         .
  4.00       100.  C          .  I     LR    E   .         .         .         .         .         .  M      .         .
             102.  C          .  I     LR    E   .         .         .         .         .         .  M      .         .
             104.  C          .  I      .L     E .         .         .         .         .         .   M     .         .
             106.  C          .  I      .L     E .         .         .         .         .         .   M     .         .
             108.  C          .   I     .L     E .         .         .         .         .         .    M    .         .
             110.  C          .   I     .L     E .         .         .         .         .         .    M    .         .
             112.  C          .   I     .L     E .         .         .         .         .         .    M    .         .
             114.  C          .   I     .L     E .         .         .         .         .         .     M   .         .
             116.  C          .   I     .L     E .         .         .         .         .         .     M   .         .
             118.  C          .    I    .L     E .         .         .         .         .         .      M  .         .
             120.  C          .    I    .L     E .         .         .         .         .         .      M  .         .
             122.  C          .    I    .LR    E .         .         .         .         .         .      M  .         .
             124.  C          .    I    . L     E .        .         .         .         .         .       M .         .
             126.  C          .    I    . L     E .        .         .         .         .         .       M .         .
             128.  C          .      I  . L     E .        .         .         .         .         .        M.         .
  5.00       130.  C          .      I  . L     E .        .         .         .         .         .        M.         .
             132.  C          .      I  . L     E .        .         .         .         .         .        M.         .
             134.  C          .      I  . L     E .        .         .         .         .         .       M .         .
             136.  C          .      I  . RL    EW.        .         .         .         .         .       M .         .
             138.  C          .       I  . RL    E.        .         .         .         .         .      M  .         .
             140.  C          .       I  .  L    E.        .         .         .         .         .      M  .         .
             142.  C          .       I  .  L    E.        .         .         .         .         .      M  .         .
             144.  C          .       I  .  L    E.        .         .         .         .         .     M   .         .
             146.  C          .        I .  L      E       .         .         .         .         .     M   .         .
             148.  C          .        I .  RL     E       .         .         .         .         .    M    .         .
             150.  C          .        I .   L     E       .         .         .         .         .    M    .         .
             152.  C          .        I .   L     E       .         .         .         .         .    M    .         .
             154.  C          .        I .   L     E       .         .         .         .         .   M     .         .
             156.  C          .         I.   L    .E       .         .         .         .         .   M     .         .
             158.  C          .         I.   RL   .E       .         .         .         .         .  M      .         .
  6.00       160.  C          .         I.    L   .E       .         .         .         .         .  M      .         .
```


THIS RUN EXECUTED 23AUG95   12:14:06

****

HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991

****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

IBUTARY AT STATION 512 -

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	1.000	.00	.00	.00	479.85	1.00	481.07	.00	481.07	.84	.07	21.38	1.09
*	2.000	40.00	.00	.00	480.08	1.00	481.08	.00	481.08	11.92	.22	6.17	.29
*	3.000	16.00	.00	.00	480.26	1.00	481.11	.00	481.12	59.57	.49	2.04	.13
*	3.400	2.00	481.50	481.17	480.26	1.00	481.11	.00	481.12	.48	.48	2.08	1.44
	3.600	25.00	481.50	481.17	480.26	1.00	481.11	.00	481.12	.49	.48	2.07	1.43
*	3.800	2.00	.00	.00	480.26	1.00	481.11	.00	481.12	56.94	.48	2.07	.13
*	4.000	15.00	.00	.00	480.49	1.00	481.16	.00	481.16	15.48	.19	8.23	.25
*	5.000	30.00	.00	.00	480.63	1.00	481.24	.00	481.24	51.69	.31	5.87	.14
	6.000	30.00	.00	.00	480.80	1.00	481.39	.00	481.39	50.68	.31	5.80	.14

IBUTARY AT STATION 512 -

SUMMARY PRINTOUT TABLE 150

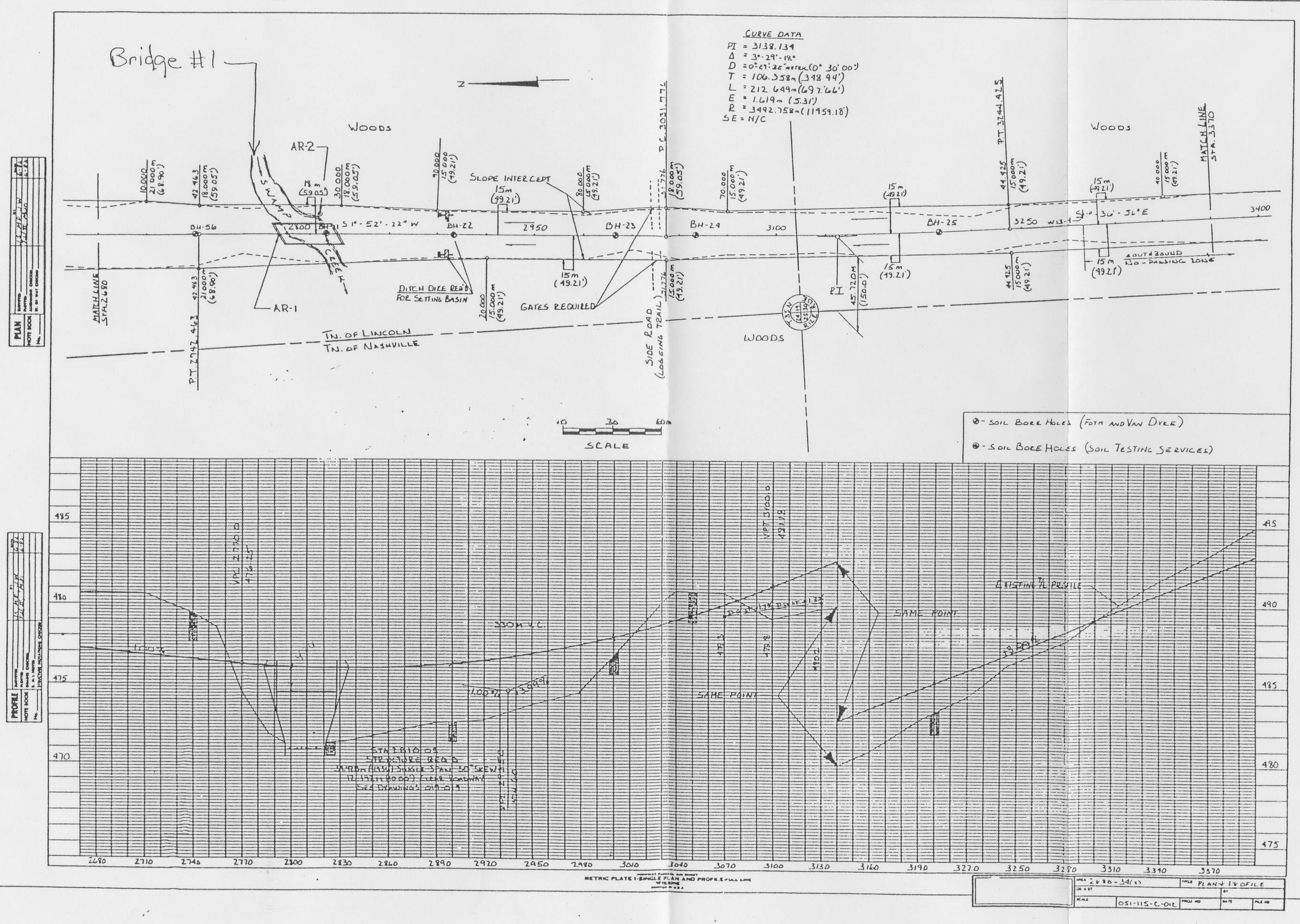
	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	1.000	1.00	481.07	.00	.00	.00	33.00	.00
*	2.000	1.00	481.08	.00	.01	.00	11.00	40.00
*	3.000	1.00	481.11	.00	.03	.00	2.44	16.00
*	3.400	1.00	481.11	.00	.00	.00	2.44	2.00
	3.600	1.00	481.11	.00	.00	.00	2.44	25.00
*	3.800	1.00	481.11	.00	.00	.00	2.44	2.00
*	4.000	1.00	481.16	.00	.05	.00	33.00	15.00
*	5.000	1.00	481.24	.00	.08	.00	33.55	30.00
	6.000	1.00	481.39	.00	.15	.00	31.39	30.00

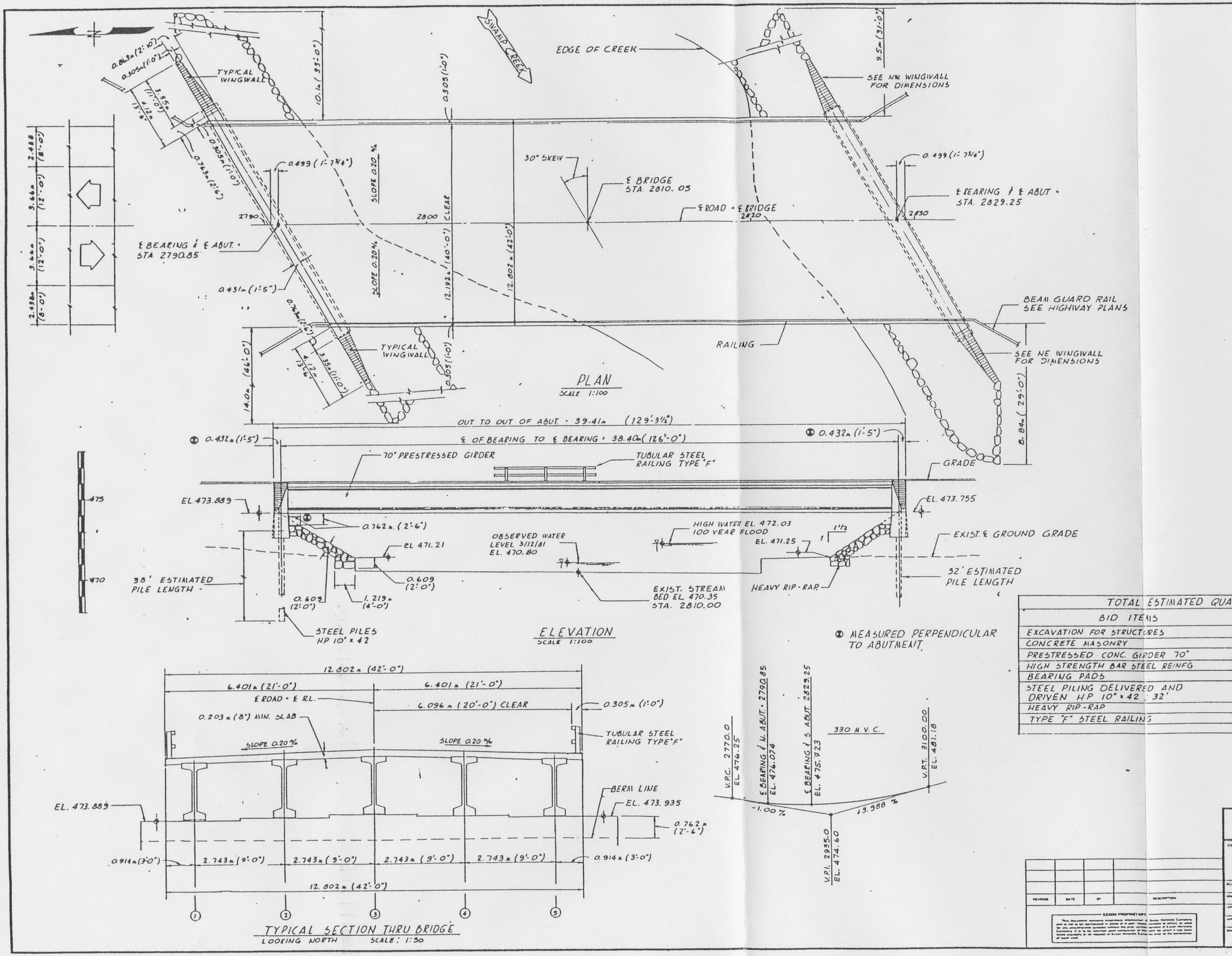
SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO=	2.000	PROFILE=	1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=	3.000	PROFILE=	1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=	3.400	PROFILE=	1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=	3.800	PROFILE=	1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=	4.000	PROFILE=	1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=	5.000	PROFILE=	1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

Appendix D

Bridge Construction Details


Bridge #1
CURVE DATA
PI = 3138.134
Δ = 3°-29'-19"
T = 106.358m (348.94')
L = 212.649m (697.66')
E = 1.619m (5.31')
R = 3492.758m (11459.18')
SE = N/C
WOODS
AR-2
AR-1
SWAMP
CREEK
SLOPE INTERCEPT
BH-56
BH-22
BH-23
BH-24
BH-25
S 1° - 52' - 22" W
DITCH DIKE REQ'D FOR SETTING BASIN
GATES REQUIRED
MATCH LINE STA. 2680
MATCH LINE STA. 3370
TN. OF LINCOLN
TN. OF NASHVILLE
SIDE ROAD (LOGGING TRAIL)
SOUTHBOUND NO-PASSING ZONE
SCALE
SOIL BORE HOLES (FOTH AND VAN DYKE)
SOIL BORE HOLES (SOIL TESTING SERVICES)
PLAN
PROFILE
330M V.C.
SAME POINT
EXISTING ℄ PROFILE
STRUCTURE REQ'D
SEE DRAWINGS
METRIC PLATE 1-SINGLE PLAN AND PROFILE-FULL LINE
PLAN + PROFILE
051-115-C-012



TOTAL ESTIMATED QUANTITIES					
BID ITEMS	UNIT	N. ABUT.	S ABUT.	SUPER	TOTAL
EXCAVATION FOR STRUCTURES	L.S				
CONCRETE MASONRY	C.M.(C.Y.)	42.8(56)	42.8(56)	161.5(211)	246.9(323)
PRESTRESSED CONC. GIRDER 70"	L.M.(L.F.)	—	—	1935(635)	1935(635)
HIGH STRENGTH BAR STEEL REINFG.	L.B.S.	(BY FINAL DESIGN)			
BEARING PADS	L.S.				
STEEL PILING DELIVERED AND DRIVEN HP 10" x 42 : 32'	L.M.(L.F.)	115.8(380)	97.5(320)	—	213.3(700)
HEAVY RIP-RAP	C.M.(C.Y.)			—	206.4 (270)
TYPE "F" STEEL RAILING	L.M.(L.F.)	—	—	78.6 (258)	78.6 (258)

CRANDON PROJECT

SWAMP CREEK BRIDGE #1 - GENERAL PLAN

SCALE AS SHOWN | STATE WISCONSIN | COUNTY FOREST

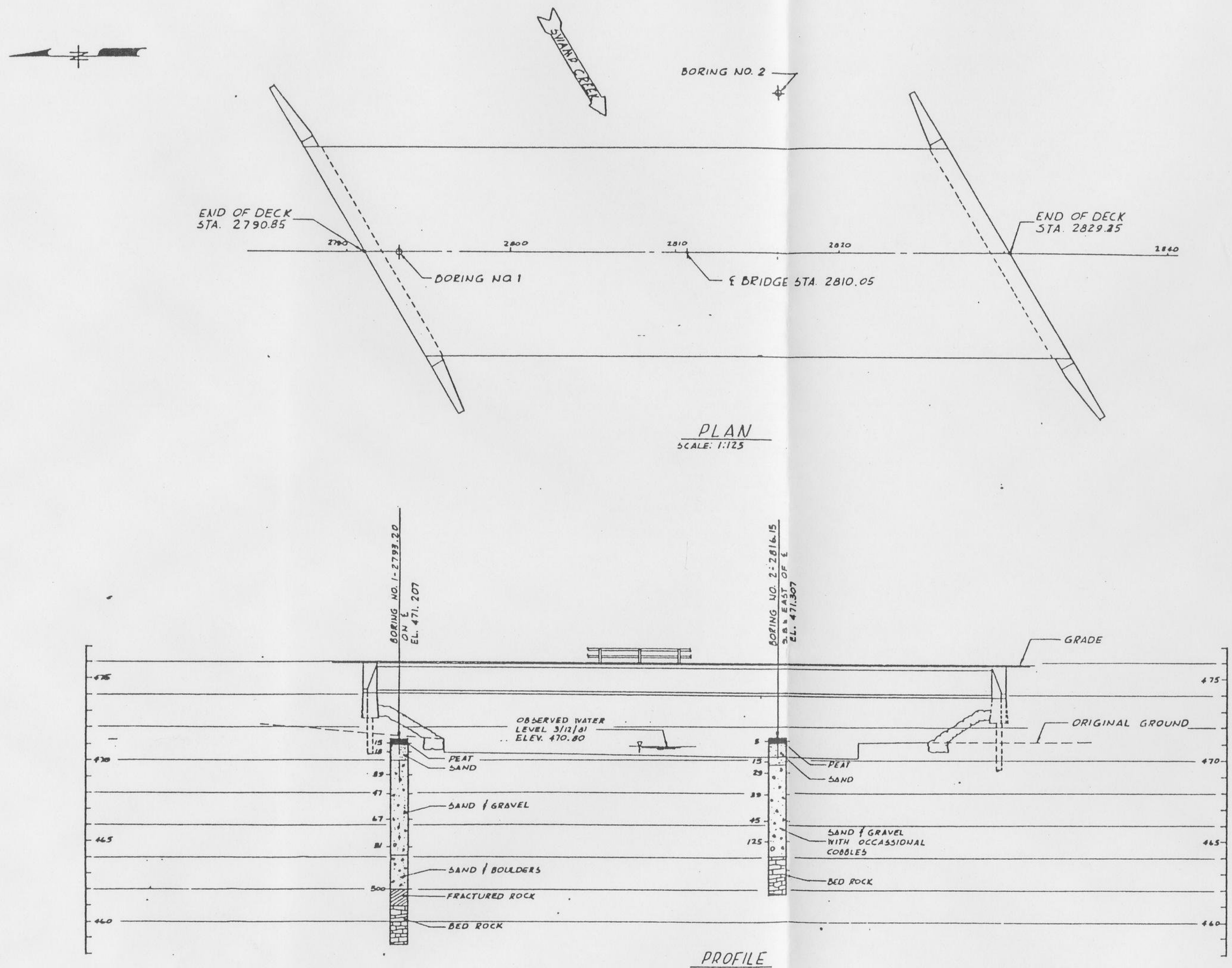
DRAWN BY W.L.Y. | DATE 7/82 | CHECKED BY J.C.L. | 8-2-82

APPROVED BY P.R.W. | 8-6-82 | APPROVED BY K.A.E. | 8-6-82

T.J.J. | 8-6-82

DRAWING NO. 051-115-C-017

EXXON PROPRIETARY



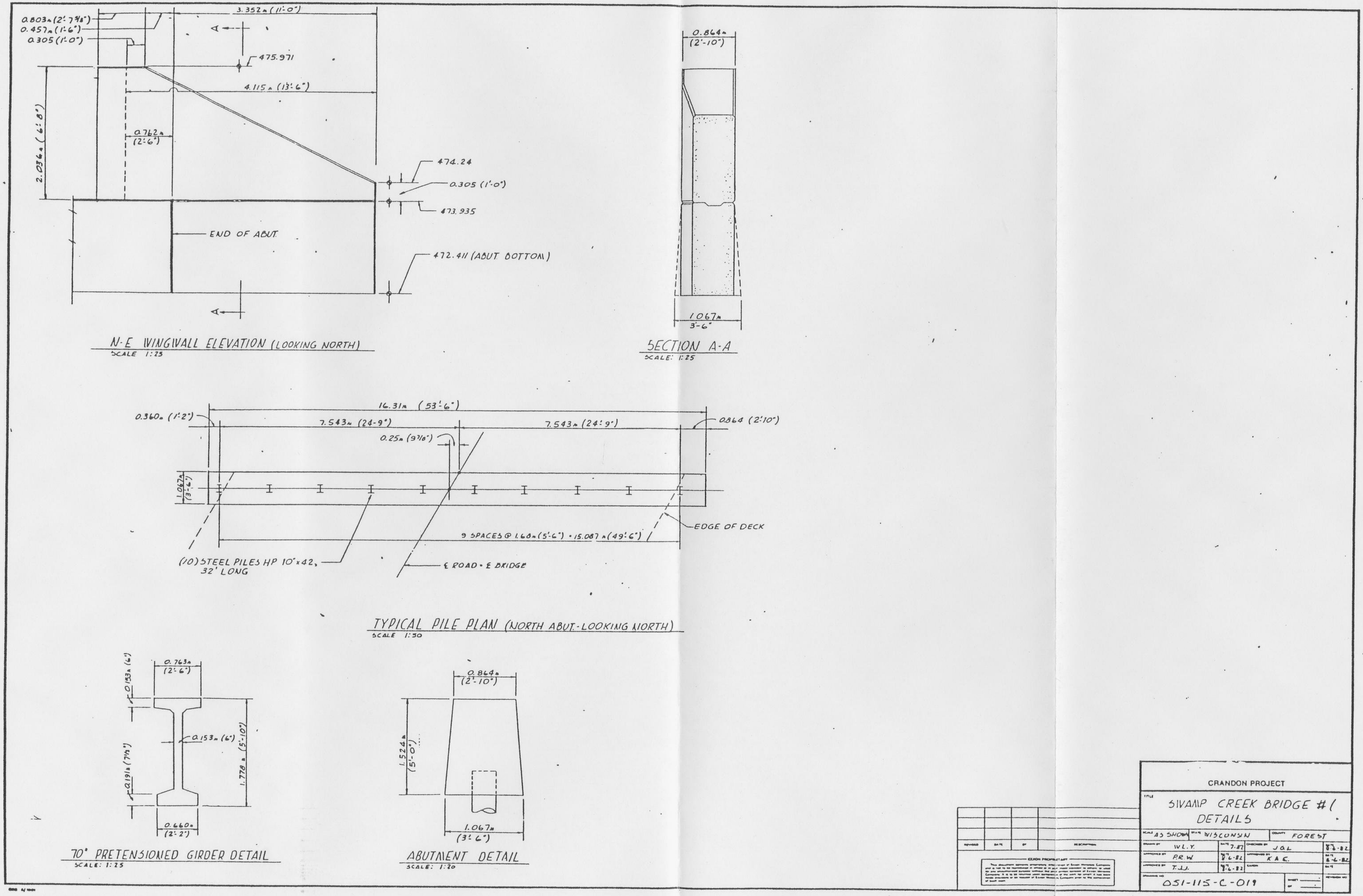
CRANDON PROJECT

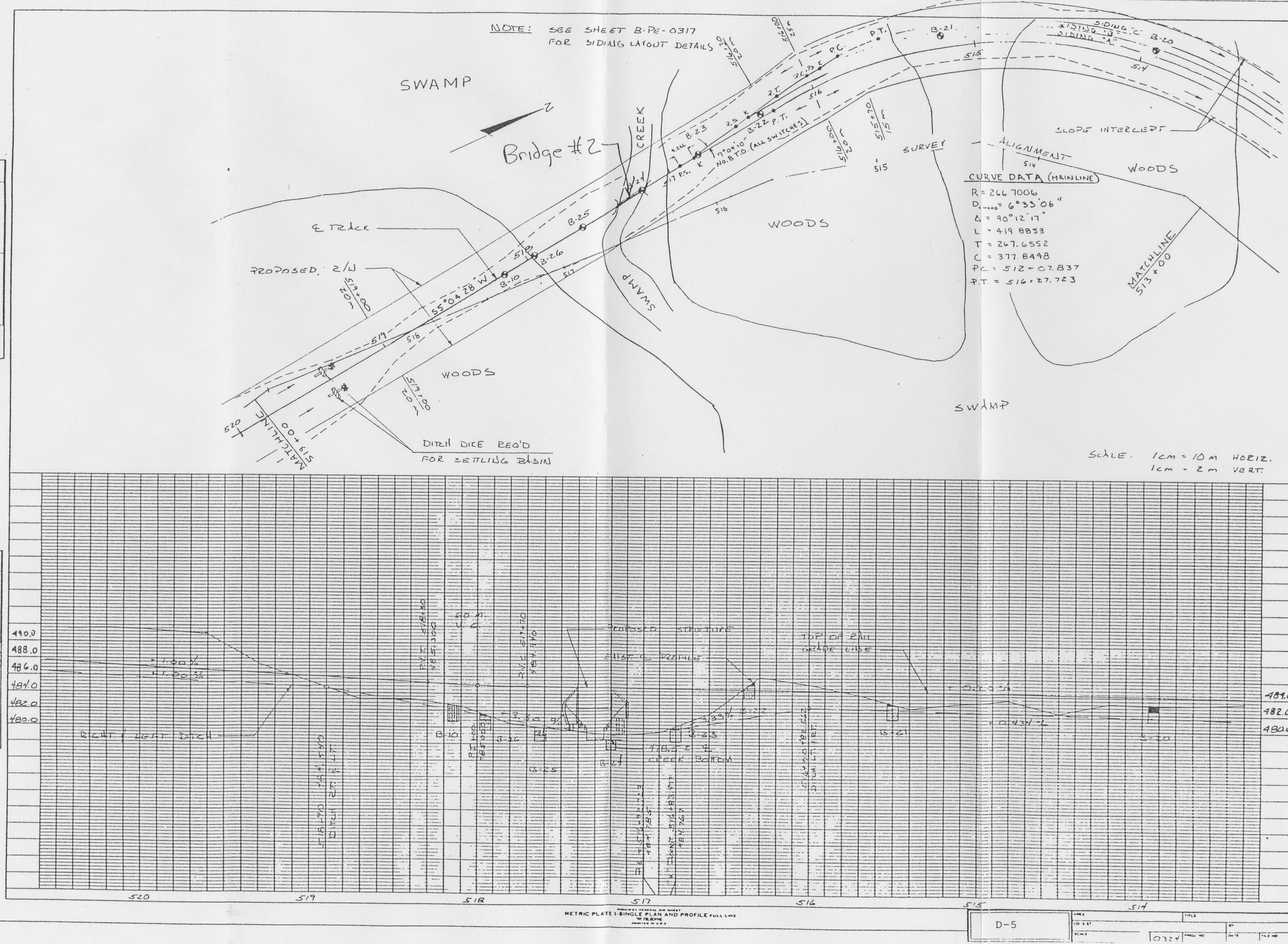
SWAMP CREEK BRIDGE #1
SUBSURFACE EXPLORATION

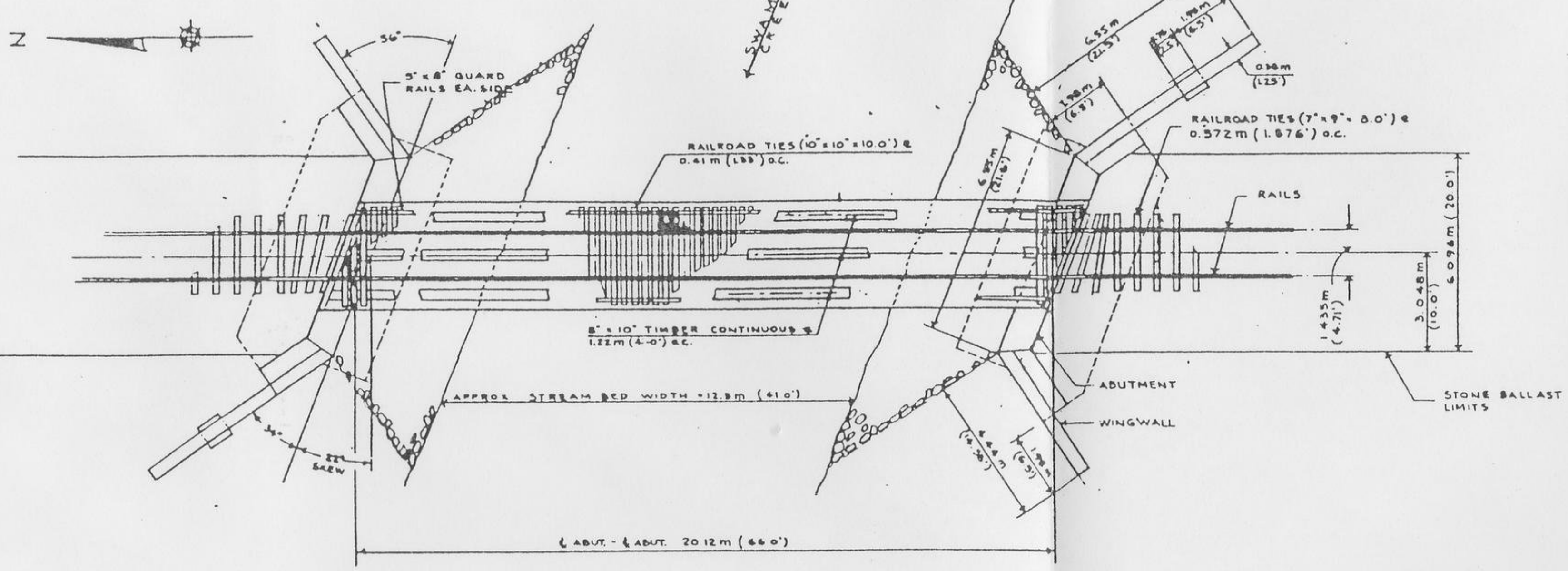
SCALE 1:125	STATE WISCONSIN	COUNTY FOREST
DRAWN BY W.L.Y.	CHECKED BY J.C.L.	
APPROVED BY D.R.W.	APPROVED BY K.A.E.	
APPROVED BY T.J.J.		

051-115-C-018

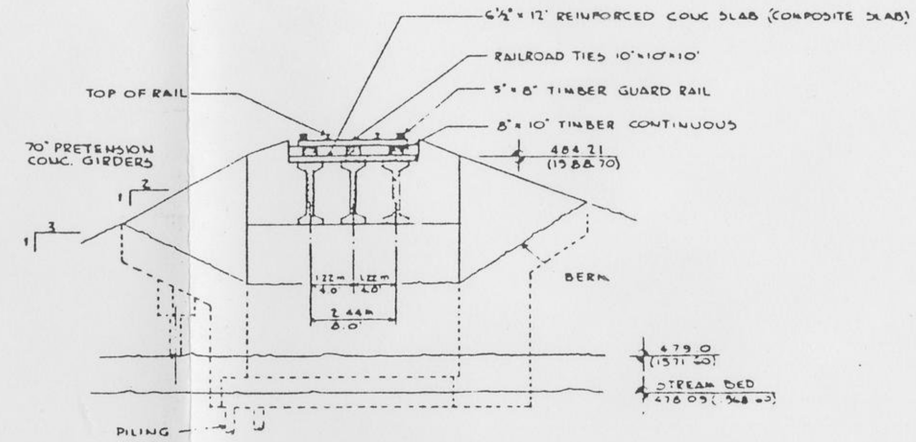
EXXON PROPRIETARY


N-E WINGWALL ELEVATION (LOOKING NORTH)
SCALE 1:25
3.352m (11'-0")
0.803m (2'-7 5/8")
0.457m (1'-6")
0.305 (1'-0")
475.971
4.115m (13'-6")
0.762m (2'-6")
2.036m (6'-8")
474.24
0.305 (1'-0")
473.935
END OF ABUT.
472.411 (ABUT BOTTOM)
SECTION A-A
SCALE: 1:25
0.864m (2'-10")
1.067m 3'-6"
TYPICAL PILE PLAN (NORTH ABUT.-LOOKING NORTH)
SCALE 1:50
16.31m (53'-6")
0.360m (1'-2")
7.543m (24'-9")
7.543m (24'-9")
0.864 (2'-10")
0.25m (9 7/8")
1.067m (3'-6")
9 SPACES @ 1.68m (5'-6") = 15.087m (49'-6")
EDGE OF DECK
(10) STEEL PILES HP 10"x42, 32' LONG
℄ ROAD = ℄ BRIDGE
70" PRETENSIONED GIRDER DETAIL
SCALE: 1:25
0.763m (2'-6")
0.153m (6")
0.153m (6")
0.191m (7 1/2")
1.778m (5'-10")
0.660m (2'-2")
ABUTMENT DETAIL
SCALE: 1:20
0.864m (2'-10")
1.524m (5'-0")
1.067m (3'-6")
CRANDON PROJECT
SWAMP CREEK BRIDGE #1
DETAILS
AS SHOWN
WISCONSIN
FOREST
W.L.Y.
J.G.L.
P.R.W.
K.A.C.
T.J.J.
051-115-C-019

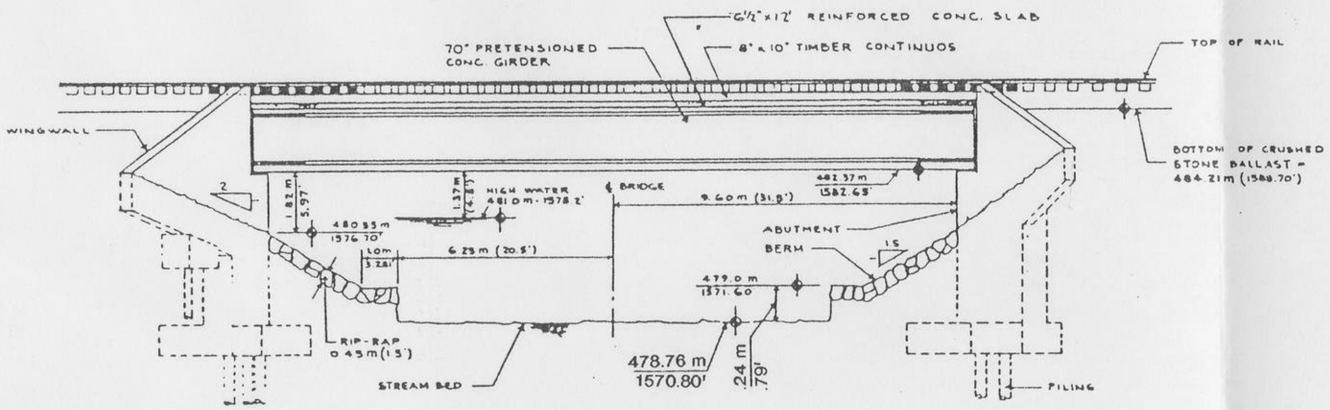

NOTE: SEE SHEET B-PE-0317
FOR SIDING LAYOUT DETAILS
SWAMP
Bridge #2
CREEK
WOODS
SWAMP
SURVEY ALIGNMENT
SLOPE INTERCEPT
SIDING "C"
SIDING "B"
SIDING "A"
CURVE DATA (MAINLINE)
R = 266.7006
D = 6°33'06"
Δ = 90°12'17"
L = 419.8853
T = 267.6552
C = 377.8448
P.C. = 512+07.837
P.T. = 516+27.723
MATCHLINE 513+00
MATCHLINE 519+00
℄ TRACK
PROPOSED R/W
55°04'28" W
DITCH DIKE REQ'D
FOR SETTLING BASIN
SCALE: 1cm = 10 m HORIZ.
1cm = 2 m VERT.
PROPOSED STRUCTURE
TOP OF RAIL
GRADE LINE
RIGHT & LEFT DITCH
CREEK BOTTOM
490.0
488.0
486.0
484.0
482.0
480.0
520
519
518
517
516
515
514
PLAN
PROFILE
METRIC PLATE 1-SINGLE PLAN AND PROFILE
D-5
0324



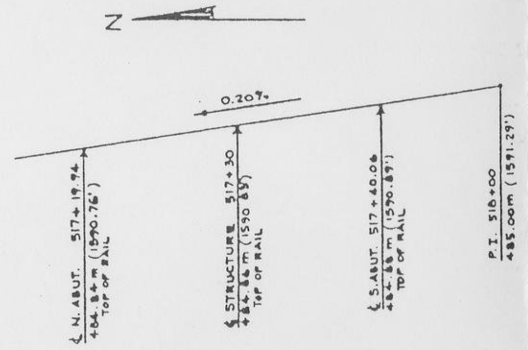
PLAN
1:100
1 CM = 1 METER



TYPICAL SECTION
1:100
1 CM = 1 METER



ELEVATION
1:100
1 CM = 1 METER

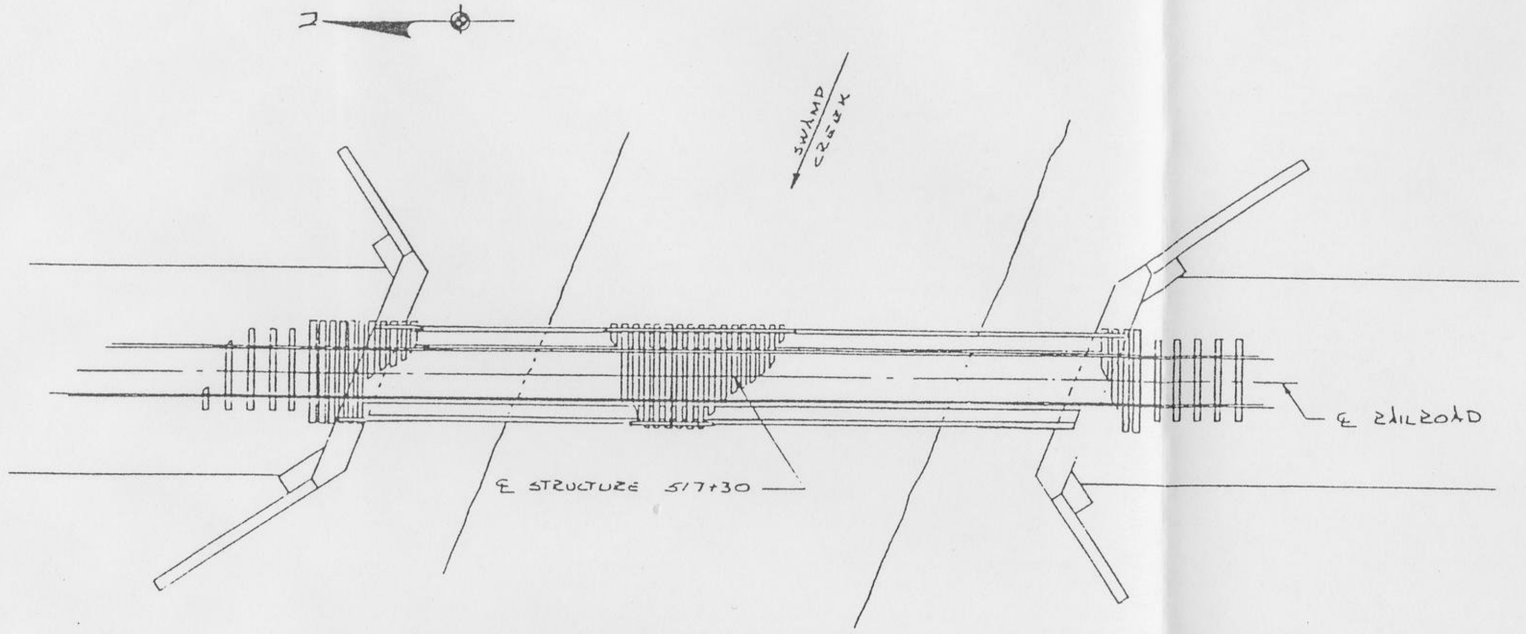


PROFILE GRADE LINE

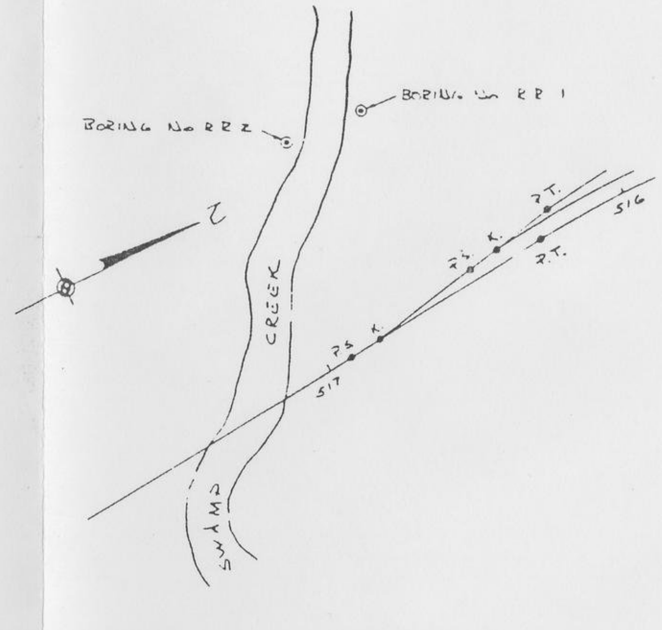
CRANDON PROJECT	
TITLE	GENERAL PLAN · SWAMP CREEK BRIDGE #2
SCALE AS SHOWN	STATE WISCONSIN · COUNTY FOREST
DRAWN BY H.W.	DATE 11-81 · CHECKED BY W.L.F., K.A.G. · DATE 12-81
APPROVED BY K.A.E.	DATE 12-81
DRAWING NO.	B-PE-0331

REVISION	DATE	BY	DESCRIPTION

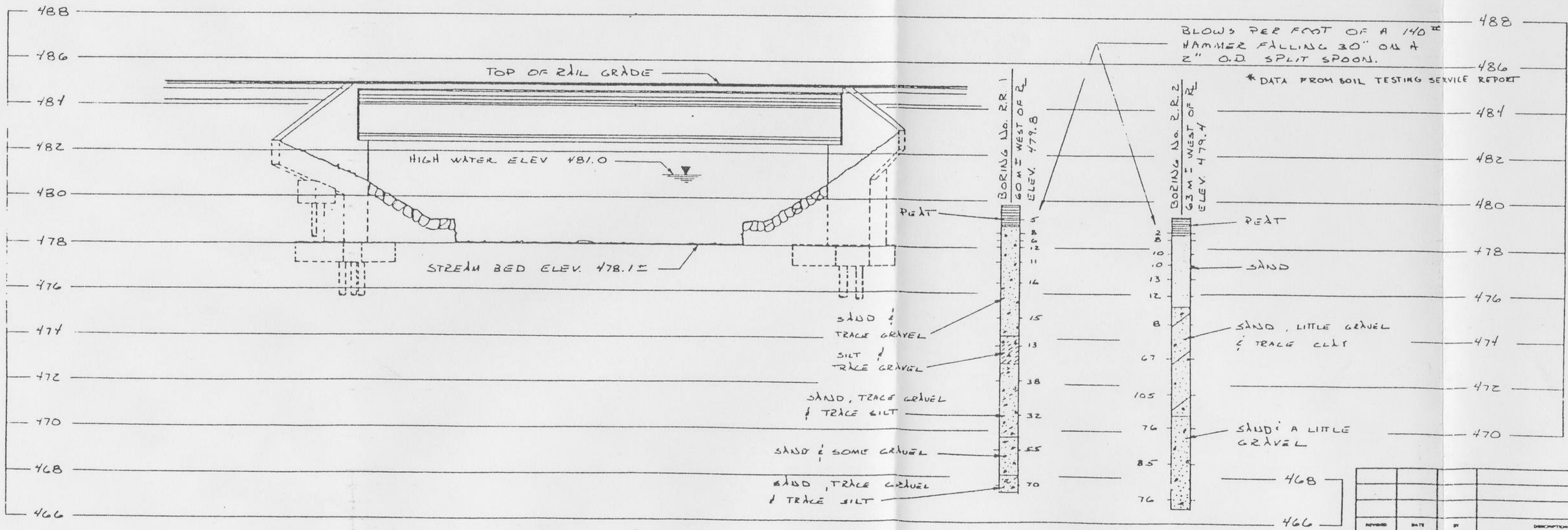
EXXON PROPRIETARY



PLAN
1:100
1 CM = 1 METER



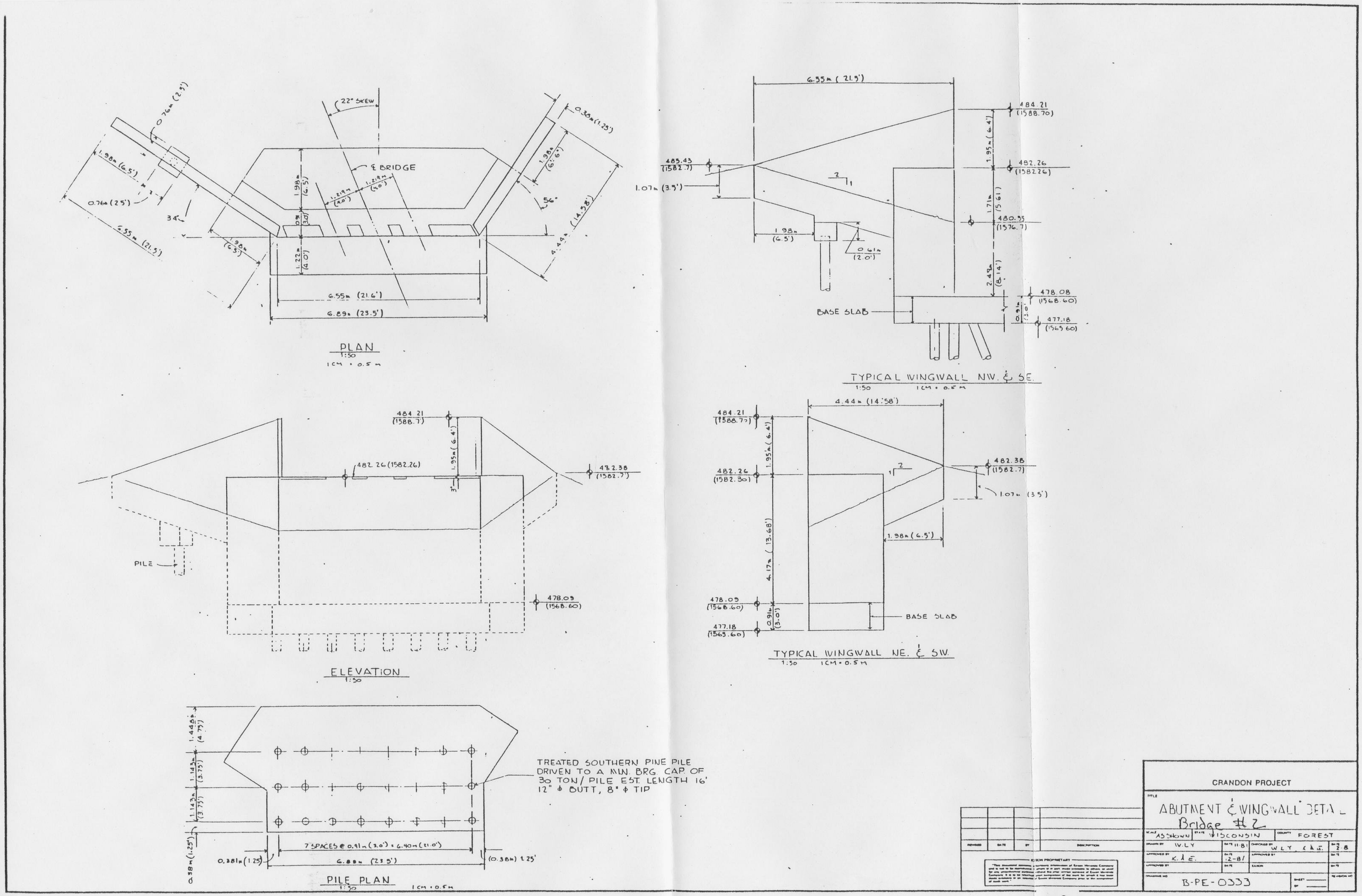
LOCATION MAP
1:1000
1 CM = 10 METER

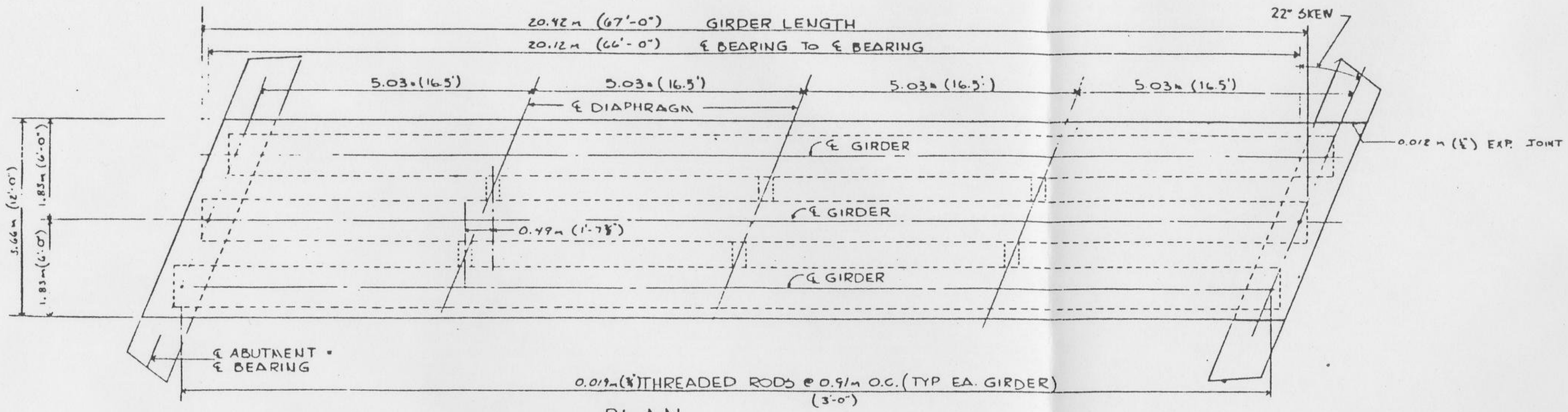


PROFILE
1:100
1 CM = 1 METER

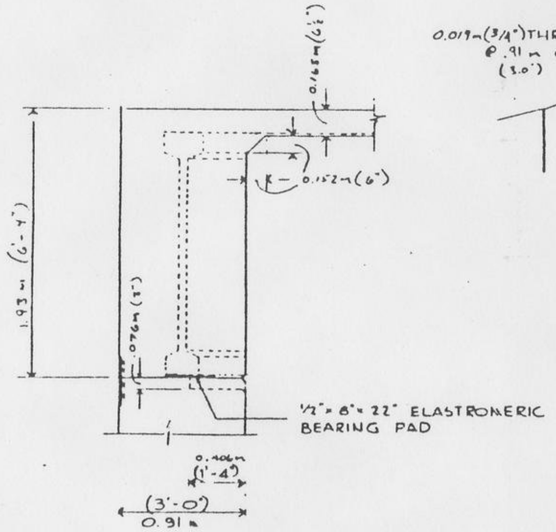
CRANDON PROJECT

TITLE	SWAMP CREEK BRIDGE #2 SUBSURFACE EXPLORATION
SCALE	AS SHOWN
STATE	WISCONSIN
COUNTY	FOREST
DRAWN BY	M.J.O.
DATE	1-81
APPROVED BY	K.A.G.
DATE	2-81
DRAWING NO	B-PE-0332

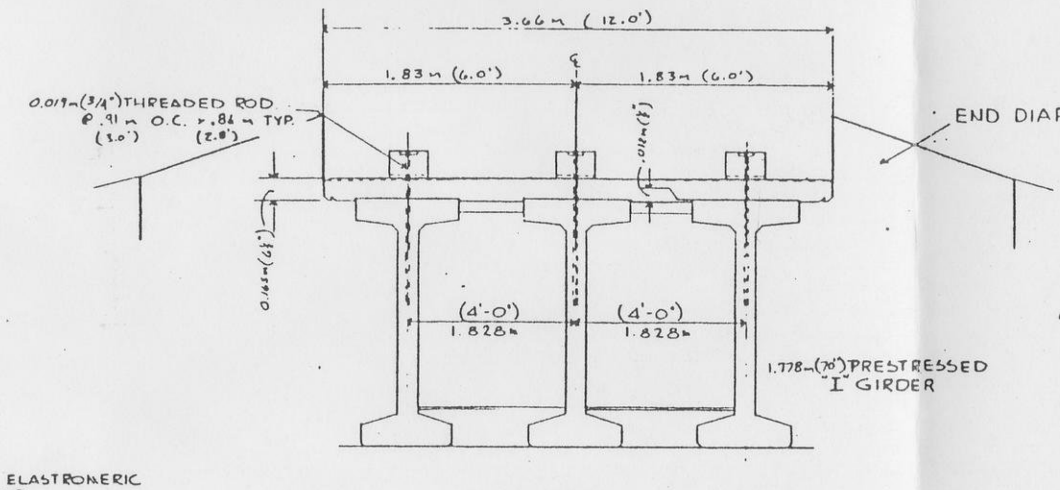

PLAN
1:50
1CM = 0.5 m
22° SKEW
℄ BRIDGE
ELEVATION
1:50
PILE
484.21 (1588.7)
482.26 (1582.26)
482.38 (1582.7)
478.09 (1568.60)
PILE PLAN
1:50
1CM = 0.5M
TREATED SOUTHERN PINE PILE
DRIVEN TO A MIN. BRG. CAP. OF
30 TON/ PILE EST. LENGTH 16'
12" ϕ BUTT, 8" ϕ TIP
7 SPACES @ 0.91m (3.0') = 6.40m (21.0')
6.88m (23.5')
TYPICAL WINGWALL NW. & SE.
1:50
1CM = 0.5M
BASE SLAB
TYPICAL WINGWALL NE. & SW.
1:50
1CM = 0.5M
CRANDON PROJECT
ABUTMENT & WINGWALL DETAIL
Bridge #2
AS SHOWN
WISCONSIN
FOREST
W.L.Y
11-81
W.L.Y, K.A.E.
K.A.E.
12-81
B-PE-0333



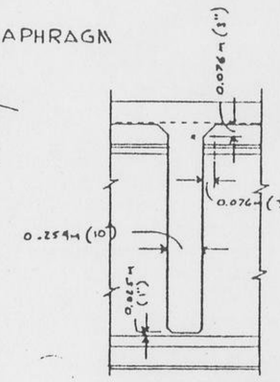
PLAN
1:90



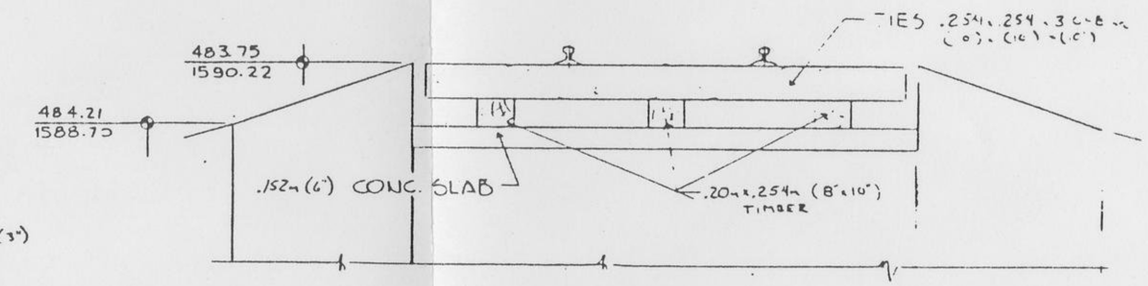
SECTION AT ABUTMENT
1:25 1CM = 0.25M

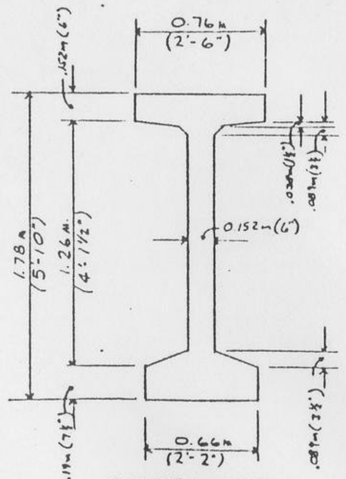


SECTION THRU GIRDERS
1:25 1CM = 0.25M



DIAPHRAGM DETAIL (6 REQ'D.)
1:25 1CM = 0.25M



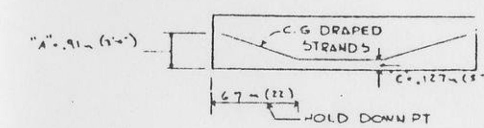


GIRDER DETAIL
1:20 1CM = 0.2M

NOTES:

(1) LIVE LOAD COOPER E-80

(2) 38 - ½" ⌀ 7 WIRE STRANDS REQD PRESTRESSED FORCE = 1099.5 KIPS. WITH 8 STRANDS DRAPED AS SHOWN:



(3) DEFLECTION DATA

PRESTRESS	.032m (1¼")
DEAD LOAD	.006m (¼")
RESIDUAL	.025m (1")
LIVE LOAD	.013m (½")

CRANDON PROJECT

SUPERSTRUCTURE PLAN
Bridge #2

SCALE AS SHOWN	STATE WISCONSIN	COUNTY FOREST
DRAWN BY W L Y	DATE 11-81	CHECKED BY W L Y, K & E
APPROVED BY K & E	DATE 12-81	
DRAWING NO B-PE-0334		

Appendix E

Computer Flood Analysis - Bridge Construction

Foth & Van Dyke
Memorandum

August 16, 1995

TO: Jerry Sevick

CC: Don Moe, Crandon Mining Company
Master File

FR: Mike Liebman MDL
Steve Birr SRB

RE: Crandon Project - Mine Site Access Road/Railroad Spur Hydrologic/Hydraulic Analyses

Introduction

This memorandum contains hydrologic/hydraulic analyses pertaining to the Crandon Project access road and railroad spur crossings over Swamp Creek for sizing and construction of bridge structures. The effects of two different types of structures at each location, in terms of floodplain modifications and associated regulatory requirements are addressed.

Hydrology

Because of the size of the basin tributary to the Swamp Creek crossings and the number of discharge points for which flood flows were required, the USGS SCS hydrologic forecasting model TR-20 was selected as the primary hydrology tool. With stream gage data available, this program's calibration ability made this the most desirable method of most accurately determining flood flows. It should be noted that the TR-20 modeling (Attachment 1) was completed in English units.

Calibration of the TR-20 was performed through many procedures. Because of the peak flow reduction potential of the two major lakes in the area, Lake Metonga and Lake Lucerne, stage/discharge/storage relationships were analyzed. Each lake's controlling outlet was surveyed and evaluated to find the stage/discharge relationships. Stage/storage relationships were estimated by planimetering areas corresponding to incremental increases in depth and converting this data to volume in acre-feet. These relationships allowed TR-20 to route the incoming hydrographs through the lakes while allowing for the peak reducing and lagging effects of the lakes. Other calibrating procedures used were: analysis of stream gage data to identify large increases in flow related to large storm events; analysis of climatological data by obtaining hourly precipitation data and comparing with stream gage records; and comparing actual storm simulations with the stream gage records by modifying basin characteristics. Once the basin characteristics are so modified, the design storm may be modeled with confidence.

The 100-year event was then run to determine the flood flows at the two locations. As a final check, the Conger Method was used to determine regional flood flows at the Swamp Creek crossings. Comparison of the two methods was favorable with the Conger results being somewhat conservative. This can be expected because of the standard error of estimate which is added into the initial results.

TR-20 developed flow estimates based on a watershed area of approximately 47 square miles. For the access road crossing, flow was estimated at 25.32 cubic meters per second (890 cfs) for a 100-year storm event. For the railroad spur crossing, flow was estimated at 28.6 cubic meters per second (1010 cfs) for a 100-year storm event. Attachment 1 to this memo contains pertinent information relating to the TR-20 analysis.

Hydraulics

The hydraulics for the evaluation were conducted using the U.S. Army Corps of Engineers computer backwater program HEC-2. Detailed field survey data was used to develop cross sections for use in the HEC-2 programs which are included as Attachment 2 for the access road crossing and Attachment 3 for the railroad spur crossing. Cross section locations for both crossing locations are detailed on Figure 1.

At each crossing location, several bridge configurations were tried to determine the hydraulic capacity required to cause no increase in backwater through upstream surveyed cross sections. Existing conditions were finalized and used to gage the various structure results.

Referring to Table 1 of this memorandum, it was found that four (4) 10-foot by 8-foot box culverts or a 126-foot span bridge would adequately pass the 100-year flows at the access road crossing. A net backwater increase does occur at section 8.50, which would require backwater easements through this area if owned by a different riparian. As the adjacent lands along this reach are under CMC ownership, such minor backwater increases are acceptable.

Table 2 lists existing condition 100-year storm event water surface elevations for the railroad spur crossing. It was found that four (4) 16-foot by 8-foot box culverts or a 63-foot span railroad bridge would adequately pass the 100-year flows. For the box culverts, a net increase in flood backwater elevations occurred at cross sections 9.0, 12.0 and 15.0. For the span railroad bridge, a net increase in flood backwater elevations occurred at cross sections 12.0 and 15.0. These regional flood elevation increases would require backwater easements through this area if owned by a different riparian. Again, under CMC ownership, such minor backwater increases are acceptable.

Summary

As the HEC-2 results in Attachment 2 and Attachment 3 indicate, the proposed structures at the access road and railroad spur crossings cause only minor flood backwaters, which will dissipate before leaving CMC property.

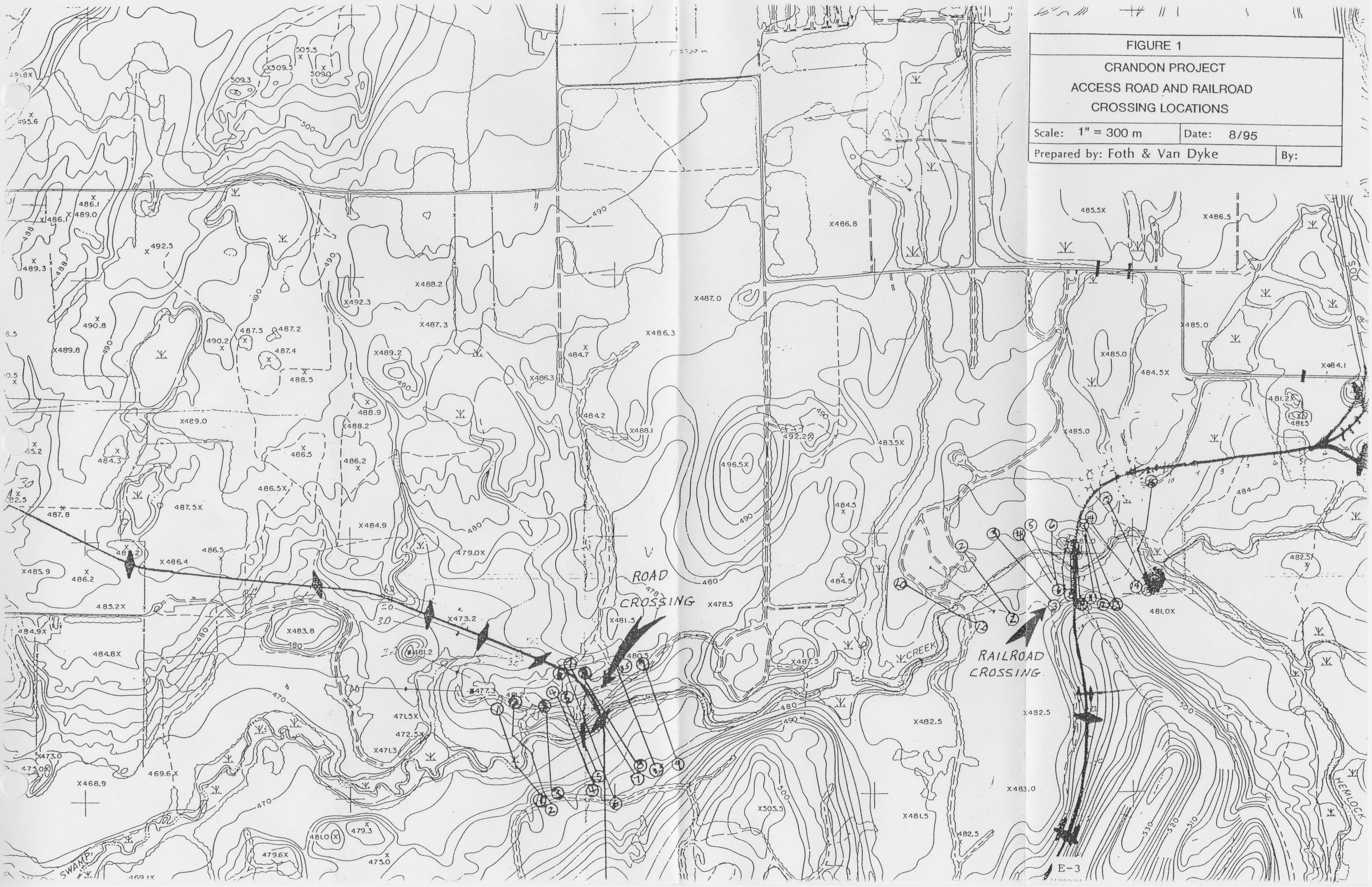


FIGURE 1

CRANDON PROJECT
ACCESS ROAD AND RAILROAD
CROSSING LOCATIONS

Scale: 1" = 300 m	Date: 8/95
Prepared by: Foth & Van Dyke	By:

TABLE 1

CRANDON MINING COMPANY

ACCESS ROAD CROSSING WATER SURFACE ELEVATIONS

100-YEAR/24-HOUR STORM EVENT

FOTH AND VAN DYKE: 93C049.29

SECTION NO.	EXISTING	PROPOSED BOX CULVERTS (4: 10 FT. X 8 FT.)	PROPOSED SPAN BRIDGE (126 FT. SPAN)
1.00	470.85	470.85	470.85
2.00	471.16	471.16	471.16
3.00	471.43	471.43	471.43
4.00	471.71	471.71	471.71
5.00	471.88	471.86	471.88
5.50	471.96	471.95	471.95
6.00	472.09	472.03	472.01
7.00	472.32	472.31	472.30
8.00	472.43	472.42	472.41
8.50	472.98	472.99	472.99
9.00	473.57	473.57	473.57
Filenames:	"cmcroad"	"cmcrdp"	"cmcrdspn"

NOTE: ELEVATIONS AND DIMENSIONS IN METERS UNLESS SPECIFIED

TABLE 2

CRANDON MINING COMPANY

RAILROAD CROSSING WATER SURFACE ELEVATIONS

100-YEAR/24-HOUR STORM EVENT

FOTH AND VAN DYKE: 93C049.29

SECTION NO.	EXISTING	PROPOSED BOX CULVERTS (4: 16 FT. X 8 FT.)	PROPOSED SPAN BRIDGE (62 FT. SPAN)
1.00	480.99	480.99	480.99
1.50	481.02	481.02	481.02
1.60	481.02	481.02	481.02
1.70	481.02	481.02	481.02
1.80	481.02	481.02	481.02
1.90	481.01	481.01	481.01
2.00	481.11	481.11	481.11
3.00	481.13	481.13	481.13
4.00	481.14	481.14	481.14
5.00	481.15	481.15	481.15
6.00	481.16	481.16	481.16
7.00	481.16	481.16	481.16
8.00	481.18	481.18	481.18
9.00	481.18	481.19	481.18
9.30	481.19	481.19	481.19
10.00	481.20	481.19	481.19
11.00	481.22	481.22	481.22
12.00	481.22	481.23	481.23
13.00	481.23	481.23	481.23
14.00	481.24	481.24	481.24
15.00	481.24	481.25	481.25
16.00	481.25	481.25	481.25
Filename:	"cmcrre"	"cmcrrsc"	"cmcrrsp2"

NOTE: ELEVATIONS AND DIMENSIONS IN METERS UNLESS SPECIFIED

Attachment 1

TR-20 Hydrology

"TRX"

```
 1.000 JOB       TR20         ,      NOPRINT
 2.000                               EXXON DRAINAGE... FOTH & VAN DYKE: MDL-MAR. 1981
 3.000  5 RAINFL 1                   0.5
 3.050  8              0.0           .008      .017      .026      .035
 3.100  8              .045          .055      .065      .076      .087
 3.150  8              .099          .112      .125      .140      .156
 3.200  8              .174          .194      .219      .254      .303
 3.250  8              .515          .583      .624      .654      .682
 3.300  8              .705          .727      .748      .767      .784
 3.350  8              .800          .816      .830      .844      .857
 3.400  8              .870          .882      .893      .905      .916
 3.450  8              .926          .936      .946      .955      .965
 3.500  8              .974          .983      .992      1.00      1.00
 3.550  9 ENDTBL
 3.600  5 RAINFL 2                   0.02
 3.650  8              0.0           .008      .0162     .0246     .0333
 3.700  8              .0425         .0524     .0630     .0743     .0863
 3.750  8              .0990         .1124     .1265     .142      .160
 3.800  8              .18           .205      .255      .345      .437
 3.850  8              .530          .603      .633      .660      .684
 3.900  8              .705          .724      .742      .759      .775
 3.950  8              .790          .8043     .8180     .8312     .8439
 4.000  8              .8561         .8678     .8790     .8898     .9002
 4.050  8              .9103         .9201     .9297     .9391     .9483
 4.100  8              .9573         .966      .9747     .9832     .9916
 4.150  8              1.0           1.0       1.0       1.0       1.0
 4.200  9 ENDTBL
 6.000  5 RAINFL 3                   0.5
 7.000  8              0.0           .10       .25       .45       .60
 8.000  8              .70           .80       .80       .81       .95
 9.000  8              1.06          1.14      1.20      1.25      1.30
10.000  9 ENDTBL
11.000  5 RAINFL 4                   0.5
12.000  8              0.0           .04       .09       .13       .17
13.000  8              .20           .25       .29       .34       .34
14.000  8              .34           .34       .35       .35       .35
15.000  8              .35           .35       .35       .35       .35
16.000  8              .36           .36       .36       .36       .36
17.000  8              .36           .36       .38       .44       .45
18.000  8              .47           .52       .55       .57       .60
19.000  8              .64           .68       .68       .69       .73
20.000  8              .77           .79       .80       .80       .80
21.000  8              .85           .90       .93       .96       .98
22.000  8              1.00          1.04      1.08      1.11      1.14
23.000  8              1.18          1.23      1.26      1.30      1.31
24.000  9 ENDTBL
25.000  5 RAINFL 5                   0.5
26.000  8              0.0           0.02      .05       .55       1.00
27.000  8              1.40          1.75      1.83      1.90      1.95
28.000  8              2.00          2.00      2.0       2.0       2.0
29.000  8              2.0           2.0       2.15      2.30      2.45
30.000  8              2.6           2.65      2.7       2.73      2.76
31.000  8              2.76          2.77      2.77      2.78      2.78
32.000  8              2.78          2.78      2.78      2.78      2.81
33.000  8              2.85          2.85      2.85      2.85      2.85
34.000  9 ENDTBL
35.000  5 RAINFL 6                   0.5
36.000  8              0.0           .03       .07       .08       .09
37.000  8              .14           .22       .27       .34       .42
38.000  8              .51           .61       .73       .79       .86
```

```
  90.000  6 RUNOFF 1 040        6   1.66         75.         5.6
  91.000  6 ADDHYD 4 040    5 6 7                                         1
  92.000  6 ADDHYD 4 040    4 7 5                                         1
  93.000  6 REACH  3 050    5   6   7000.        0.41

 39.000  8             .92        .98         1.01        1.04         1.13
 42.000  9 ENDTBL
 43.000  3 STRUCT       01
 44.000  8                       1644.       0.0         0.0
 44.500  8                        1644.1      1.0          2.
 45.000  8                        1644.5     6.0        524.
 46.000  8                        1645.0    10.       1060.
 47.000  8                       1645.5      13.         1610.
 48.000  8                       1646.0      15.         2170.
 49.000  8                        1647.      19.       3320.
 50.000  8                        1650.        50.        7000.
 51.000  9 ENDTBL
 52.000  3 STRUCT       02                                                         METONGA
 53.000  8                        1599.0     0.0         0.0
 54.000  8                        1599.2     6.0         400.
 55.000  8                        1599.5     23.4        1020.
 56.000  8                        1599.8      47.3       1645.
 57.000  8                        1600.       65.9       2060.
 58.000  8                        1601.       185.       4200.
 59.000  8                        1602.        3500.      6350.
 60.000  8                        1605.      30000.     12800.
 61.000  9 ENDTBL
 62.000  6 RUNOFF 1 010        5   2.06         70.           12.5
 63.000  6 RUNOFF 1 010        6   2.37         75.        11.6
 64.000  6 ADDHYD 4 010    5 6 7
 65.000  6 REACH  3    01 7    5   10.          .99
 66.000  6 RUNOFF 1    01      7   7.92         82.         13.5
 67.000  6 ADDHYD 4    01 5 7 6                                      1
 68.000  6 RESVOR 2    01 6    7   1644.
 69.000  6 REACH  3 030    7   5   21000.       .47
 69.500  6 RUNOFF 1 030        6   3.19         74.           13.6
 70.000  6 ADDHYD 4 030    5 6 4
 71.000  6 RUNOFF 1 015        7   1.43         74.         8.5
 72.000  6 REACH  3 025    7   5   4000.         0.22
 73.000  6 RUNOFF 1 025        6   2.99         75.         21.7
 74.000  6 ADDHYD 4 025    5 6 7
 75.000  6 REACH  3 030    7   5  10000.        0.16
 76.000  6 RUNOFF 1 030        7   4.75         73.         6.5
 77.000  6 ADDHYD 4 030    5 7 6                                     1
 78.000  6 ADDHYD 4 030    4 6 7                                     1
 78.100  6 RUNOFF 1 030        5      0.44      75.        13.9      1          1
 78.150  6 ADDHYD 4 030    5 7 6
 78.200  6 RUNOFF 1 030        5       .26      77.        11.6      1          1
 78.250  6 ADDHYD 4 030    5 6 4
 78.300  6 RUNOFF 1 083        5      .04       74.        0.69      1          1
 78.350  6 REACH  3 030    5   6     3500.      0.45
 78.400  6 RUNOFF 1 030        7      0.10      74.        1.2       1          1
 78.450  6 ADDHYD 4 030    7 6 5                                     1          1
 78.500  6 ADDHYD 4 030    5 4 7                                     1          1
 79.000  6 REACH  3 040    7   5   6000.        .16
 80.000  6 RUNOFF 1 040        6   0.77         72.         4.9
 81.000  6 ADDHYD 4 040    5 6 4                                     1
 82.000  6 RUNOFF 1 034        5   5.77        85.          18.6
 83.000  6 RUNOFF 1 034        6   1.18         87.         0.8
 84.000  6 ADDHYD 4 034    5 6 7
 85.000  6 REACH  3    02 7    5   10.          .99
 86.000  6 RUNOFF 1    02      7   5.50         95.         5.6
 87.000  6 ADDHYD 4    02 5 7 6                                      1
 88.000  6 RESVOR 2    02 6    7   1599.                             1
 89.000  6 REACH  3 040    7   5   9000.        0.47
```

```
 90.000  6 RUNOFF 1 040        6   1.66        75.        5.6
 91.000  6 ADDHYD 4 040   5 6 7                                      1
 92.000  6 ADDHYD 4 040   4 7 5                                      1
 93.000  6 REACH  3 050   5    6   7000.       0.41
 94.000  6 RUNOFF 1 050        5   0.77        69.         3.0
 95.000  6 ADDHYD 4 050   5 6 4                                      1         1
 96.000  6 RUNOFF 1 045        5   0.37        69.        7.4        1         1
 97.000  6 RUNOFF 1 045        6   0.61        76.        6.5        1         1
 98.000  6 ADDHYD 4 045   5 6 7
 99.000  6 RUNOFF 1 045        5   0.22        69.        4.4        1         1
104.000  6 ADDHYD 4 050   7 4 6                                                1         1
105.000  6 REACH  3 060   6    5   11000.       0.30                           1         1
105.500  6 RUNOFF 1 055        6    0.54       57.        2.6                            1
105.600  6 REACH  3 060   6    7    5000.       0.34
105.800  6 ADDHYD 4 060   5 7 6
106.000  6 RUNOFF 1 060        5   1.86         76.        3.0
107.000  6 ADDHYD 4 060   5 6 7                                                1
108.000  6 REACH  3 070   7    5   4200.        .16
109.000  6 RUNOFF 1 070        6   1.88         72.        21.0
110.000  6 ADDHYD 4 070   5 6 7                                                1
111.000  6 REACH  3 100   7    6   10.          1.00
112.000    ENDATA
114.000  7 INCREM 6               0.5
115.000  7 COMPUT 7 010  100   0.0         5.0       1.0       1 2        1    Q100 - 24
116.000    ENDCMP 1
117.000  7 COMPUT 7 010  100   0.0         3.9       6.0       2 2        2    Q100 - 6
118.000    ENDCMP 1
119.000  7 COMPUT 7 010  100   0.0         3.6       1.0       1 2        3    Q10 - 24
120.000    ENDCMP 1
121.000  7 COMPUT 7 010  100   0.0         3.06      6.0       2 2        4    Q25 - 6  *
122.000    ENDCMP 1
123.000  7 COMPUT 7 010  100   0.0         4.4       12.0      2 2        5    Q100 - 12
124.000    ENDCMP 1
125.000  7 COMPUT 7 010  100   0.0         4.0       1.0       2'2        6    Q25 - 24
126.000    ENDCMP 1
127.000  7 COMPUT 7 010  100   0.0         4.4       1.0       1 2        7    Q50 - 24
127.500    ENDCMP 1
128.000    ENDJOB 2
--EOF HIT AFTER 128.
*END

!SET F:5/TRX!IN

!TR20:LN.
```

E-9

1 2 3 4 5 6 7 8

MAXIMUM CPU TIME (IN MINUTES) FOR THIS RUN

72

EXXON DRAINAGE... FOTH & VAN DYKE: MDL-MAR

TR-20 HYDROLOGY

PROGRAM DATE - FEB. 14, 1974 S/360

PASS= 1

EXECUTIVE CONTROL CARD OPERATION INCREM, MAIN TIME INCREMENT= .50
EXECUTIVE CONTROL CARD OPERATION COMPUT, FROM XSECTN/STRUCT 10/ 0 TO XSECTN/STRUCT 100/ 0
STARTING TIME= .00 RAIN DEPTH= 5.00 RAIN DURATION= 1.00 RAIN TABLE NO.= 1 SOIL CONDITION= 2
ALTERNATE NO.= 0 STORM NO.= 1

ENDCMP

PASS= 2

EXECUTIVE CONTROL CARD OPERATION COMPUT, FROM XSECTN/STRUCT 10/ 0 TO XSECTN/STRUCT 100/ 0
STARTING TIME= .00 RAIN DEPTH= 3.90 RAIN DURATION= 6.00 RAIN TABLE NO.= 2 SOIL CONDITION= 2
ALTERNATE NO.= 0 STORM NO.= 2

ENDCMP

PASS= 3

EXECUTIVE CONTROL CARD OPERATION COMPUT, FROM XSECTN/STRUCT 10/ 0 TO XSECTN/STRUCT 100/ 0
STARTING TIME= .00 RAIN DEPTH= 3.60 RAIN DURATION= 1.00 RAIN TABLE NO.= 1 SOIL CONDITION= 2
ALTERNATE NO.= 0 STORM NO.= 3

ENDCMP

PASS= 4

EXECUTIVE CONTROL CARD OPERATION COMPUT, FROM XSECTN/STRUCT 10/ 0 TO XSECTN/STRUCT 100/ 0
STARTING TIME= .00 RAIN DEPTH= 4.40 RAIN DURATION= 12.00 RAIN TABLE NO.= 2 SOIL CONDITION= 2
ALTERNATE NO.= 0 STORM NO.= 5

ENDCMP

PASS= 5

EXECUTIVE CONTROL CARD OPERATION COMPUT, FROM XSECTN/STRUCT 10/ 0 TO XSECTN/STRUCT 100/ 0
STARTING TIME= .00 RAIN DEPTH= 4.00 RAIN DURATION= 1.00 RAIN TABLE NO.= 1 SOIL CONDITION= 2
ALTERNATE NO.= 0 STORM NO.= 6

ENDCMP

PASS= 6

EXECUTIVE CONTROL CARD OPERATION COMPUT, FROM XSECTN/STRUCT 10/ 0 TO XSECTN/STRUCT 100/ 0
STARTING TIME= .00 RAIN DEPTH= 4.40 RAIN DURATION= 1.00 RAIN TABLE NO.= 1 SOIL CONDITION= 2
ALTERNATE NO.= 0 STORM NO.= 7

ENDCMP

SUMMARY TABLE 1

ALT	STORM	ID	DA SQ-MI.	RAIN TBLE	AMC	DELTA-T HRS.	TZERO HRS.	PRECIP IN.	PRECIP DURATION	PEAK-Q CFS	PEAK-TIME	PEAK-ELEV	RUNOFF IN.	CSM
X-80	1	30	.44	1	2	.50	.00	5.00	24.00	39.63	21.48	.00	2.44	90.08

X-81	1	30	.26	1	2	.50	.00	5.00	24.00	26.95	19.42	.00	2.62	103.65	
X-83	1	83	.04	1	2	.50	.00	5.00	24.00	16.85	10.40	.00	2.35	421.13	
X-82	1	30	.10	1	2	.50	.00	5.00	24.00	36.41	10.68	.00	2.37	364.08	
82+83	1	30	.14	1	2	.50	.00	5.00	24.00	48.06	10.73	.00	2.37	343.30	
RR	1	30	25.55	1	2	.50	.00	5.00	24.00	830.42	16.33	.00	1.32	32.50	Q_{100} 24-HOUR
RD.	1	50	41.20	1	2	.50	.00	5.00	24.00	964.02	24.99	.00	1.32	23.40	
(STA. 2005) X-14	1	45	.37	1	2	.50	.00	5.00	24.00	35.94	16.29	.00	1.95	97.14	
(2236) X-15	1	45	.61	1	2	.50	.00	5.00	24.00	87.17	14.64	.00	2.53	142.90	
(2540) X-16	1	45	.22	1	2	.50	.00	5.00	24.00	28.50	13.56	.00	1.95	129.57	
14+15+16	1	45	1.20	1	2	.50	.00	5.00	24.00	146.58	14.65	.00	2.25	122.15	
14+15+16+17	1	50	1.49	1	2	.50	.00	5.00	24.00	186.28	14.62	.00	2.27	125.02	
BELOW RD.	1	50	42.69	1	2	.50	.00	5.00	24.00	1044.56	24.48	.00	1.35	24.47	
(310) X-18.5	1	55	.54	1	2	.50	.00	5.00	24.00	76.87	10.54	.00	1.10	142.35	
	2	30	.44	2	2	.50	.00	3.90	6.00	33.77	11.98	.00	1.59	76.74	
	2	30	.26	2	2	.50	.00	3.90	6.00	26.38	10.15	.00	1.73	101.47	
	2	83	.04	2	2	.50	.00	3.90	6.00	18.68	3.01	.00	1.51	466.99	
	2	30	.10	2	2	.50	.00	3.90	6.00	35.79	3.33	.00	1.51	357.94	
	2	30	.14	2	2	.50	.00	3.90	6.00	48.37	3.44	.00	1.51	345.52	
	2	30	25.55	2	2	.50	.00	3.90	6.00	853.71	8.07	.00	.87	33.41	
	2	50	41.20	2	2	.50	.00	3.90	6.00	702.11	13.69	.00	.88	17.04	Q_{100} 6-HOUR
	2	45	.37	2	2	.50	.00	3.90	6.00	36.54	8.03	.00	1.20	98.75	
	2	45	.61	2	2	.50	.00	3.90	6.00	94.11	7.51	.00	1.66	154.29	
	2	45	.22	2	2	.50	.00	3.90	6.00	30.81	6.42	.00	1.20	140.06	
	2	45	1.20	2	2	.50	.00	3.90	6.00	157.68	7.37	.00	1.43	131.40	
	2	50	1.49	2	2	.50	.00	3.90	6.00	200.78	7.29	.00	1.45	134.75	
	2	50	42.69	2	2	.50	.00	3.90	6.00	776.17	9.42	.00	.90	18.18	
	2	55	.54	2	2	.50	.00	3.90	6.00	75.37	3.16	.00	.56	139.57	
	3	30	.44	1	2	.50	.00	3.60	24.00	21.92	21.62	.00	1.37	49.81	
	3	30	.26	1	2	.50	.00	3.60	24.00	15.29	19.85	.00	1.50	58.80	
	3	83	.04	1	2	.50	.00	3.60	24.00	8.65	10.46	.00	1.30	216.32	
	3	30	.10	1	2	.50	.00	3.60	24.00	18.19	10.73	.00	1.31	181.93	
	3	30	.14	1	2	.50	.00	3.60	24.00	23.28	10.83	.00	1.31	166.31	
	3	30	25.55	1	2	.50	.00	3.60	24.00	451.69	20.98	.00	.75	17.68	
	3	50	41.20	1	2	.50	.00	3.60	24.00	535.12	25.46	.00	.74	12.99	
	3	45	.37	1	2	.50	.00	3.60	24.00	17.62	16.54	.00	1.01	47.63	Q_{10} 24-HOUR
	3	45	.61	1	2	.50	.00	3.60	24.00	46.77	15.30	.00	1.44	76.68	
	3	45	.22	1	2	.50	.00	3.60	24.00	13.29	13.86	.00	1.01	60.39	
	3	45	1.20	1	2	.50	.00	3.60	24.00	75.40	15.32	.00	1.23	62.84	
	3	50	1.49	1	2	.50	.00	3.60	24.00	95.98	15.06	.00	1.24	64.41	
	3	50	42.69	1	2	.50	.00	3.60	24.00	582.17	24.90	.00	.76	13.64	
	3	55	.54	1	2	.50	.00	3.60	24.00	17.61	10.76	.00	.45	32.61	
	5	30	.44	2	2	.50	.00	4.40	12.00	38.00	14.70	.00	1.97	86.35	
	5	30	.26	2	2	.50	.00	4.40	12.00	28.62	13.95	.00	2.13	110.09	
	5	83	.04	2	2	.50	.00	4.40	12.00	16.90	5.17	.00	1.88	422.61	
	5	30	.10	2	2	.50	.00	4.40	12.00	34.94	5.57	.00	1.89	349.36	
	5	30	.14	2	2	.50	.00	4.40	12.00	46.85	5.62	.00	1.89	334.63	
	5	30	25.55	2	2	.50	.00	4.40	12.00	874.60	11.48	.00	1.07	34.23	Q_{100} 12-HOUR
	5	50	41.20	2	2	.50	.00	4.40	12.00	854.15	16.68	.00	1.08	20.73	
	5	45	.37	2	2	.50	.00	4.40	12.00	37.27	11.32	.00	1.53	100.72	
	5	45	.61	2	2	.50	.00	4.40	12.00	90.97	10.01	.00	2.04	149.13	
	5	45	.22	2	2	.50	.00	4.40	12.00	28.38	8.58	.00	1.53	129.01	
	5	45	1.20	2	2	.50	.00	4.40	12.00	152.15	10.01	.00	1.79	126.79	
	5	50	1.49	2	2	.50	.00	4.40	12.00	191.57	9.89	.00	1.81	128.57	
	5	50	42.69	2	2	.50	.00	4.40	12.00	940.57	14.91	.00	1.10	22.03	
	5	55	.54	2	2	.50	.00	4.40	12.00	66.56	5.44	.00	.79	123.27	
	6	30	.44	1	2	.50	.00	4.00	24.00	26.75	21.57	.00	1.66	60.79	
	6	30	.26	1	2	.50	.00	4.00	24.00	18.49	19.78	.00	1.81	71.12	
	6	83	.04	1	2	.50	.00	4.00	24.00	10.87	10.44	.00	1.59	271.70	
	6	30	.10	1	2	.50	.00	4.00	24.00	23.10	10.71	.00	1.60	231.00	
	6	30	.14	1	2	.50	.00	4.00	24.00	29.45	10.78	.00	1.60	210.33	
	6	30	25.55	1	2	.50	.00	4.00	24.00	550.71	18.67	.00	.90	21.55	
	6	50	41.20	1	2	.50	.00	4.00	24.00	651.85	25.30	.00	.90	15.82	Q_{25} 24-HOUR
	6	45	.37	1	2	.50	.00	4.00	24.00	22.47	16.45	.00	1.26	60.74	
	[illegible]	45	.61	1	2	.50	.00	4.00	24.00	57.71	[illegible]	.00	1.74	94.61	
	[illegible]	45	.22	1	2	.50,	.00	4.00	24.00	17.30	[illegible]	.00	1.26	78.64	
	[illegible]	45	1.20	1	2	.50	.00	4.00	24.00	93.94	[illegible]	.00	1.50	78.28	
	6	50	1.49	1	2	.50	.00	4.00	24.00	119.99	14.99	.00	1.52	80.53	

2	2	.50	.00	4.40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	2	.50	.00	4.40	12.00	152.15	10.01	.00	1.79	126.79
2	2	.50	.00	4.40	12.00	191.57	9.89	.00	1.81	128.57
2	2	.50	.00	4.40	12.00	940.57	14.91	.00	1.10	22.03
2	2	.50	.00	4.40	12.00	66.56	5.44	.00	.79	123.27
1	2	.50	.00	4.00	24.00	26.75	21.57	.00	1.66	60.79
1	2	.50	.00	4.00	24.00	18.49	19.78	.00	1.81	71.12
1	2	.50	.00	4.00	24.00	10.87	10.44	.00	1.59	271.70
1	2	.50	.00	4.00	24.00	23.10	10.71	.00	1.60	231.00
1	2	.50	.00	4.00	24.00	29.45	10.78	.00	1.60	210.33

Q25 24-HOUR

1	2	.50	.00	4.00	24.00	550.71	18.67	.00	.90	21.55	
1	2	.50	.00	4.00	24.00	651.85	25.30	.00	.90	15.82	
1	2	.50	.00	4.00	24.00	22.47	16.45	.00	1.26	60.74	
1	2	.50	.00	4.00	24.00	57.71	14.73	.00	1.74	94.61	
1	2	.50	.00	4.00	24.00	17.30	13.71	.00	1.26	78.64	
1	2	.50	.00	4.00	24.00	93.94	15.06	.00	1.50	78.28	
1	2	.50	.00	4.00	24.00	119.99	14.89	.00	1.52	80.53	
1	2	.50	.00	4.00	24.00	708.16	24.77	.00	.92	16.59	
1	2	.50	.00	4.00	24.00	32.86	10.66	.00	.62	60.85	
1	2	.50	.00	4.40	24.00	31.78	21.53	.00	1.97	72.24	X-80
1	2	.50	.00	4.40	24.00	21.78	19.66	.00	2.13	83.76	X-81
1	2	.50	.00	4.40	24.00	13.19	10.42	.00	1.88	329.82	X-83
1	2	.50	.00	4.40	24.00	28.27	10.69	.00	1.90	282.67	X-82
1	2	.50	.00	4.40	24.00	37.29	10.75	.00	1.90	266.35	82+83
1	2	.50	.00	4.40	24.00	656.60	18.53	.00	1.07	25.70	RR
1	2	.50	.00	4.40	24.00	773.71	25.16	.00	1.06	18.78	RD.
1	2	.50	.00	4.40	24.00	27.65	15.38	.00	1.53	74.74	X-14 (STA. 2005)
1	2	.50	.00	4.40	24.00	69.19	14.69	.00	2.05	113.43	X-15 (STA. 2236)
1	2	.50	.00	4.40	24.00	21.59	13.64	.00	1.53	98.13	X-16 (STA. 2540)
1	2	.50	.00	4.40	24.00	114.45	14.73	.00	1.79	95.38	14+15+16
1	2	.50	.00	4.40	24.00	145.66	14.74	.00	1.81	97.76	14+15+16+17
1	2	.50	.00	4.40	24.00	839.52	24.64	.00	1.09	19.67	BELOW RD.
1	2	.50	.00	4.40	24.00	48.96	10.61	.00	.80	90.67	X-18.5 (STA. 310)

Q50 24-HOUR

DISCHARGE,CFS

Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10

35.31 CFS = CMS

ND OF JOB.

FROM CALIBRATION ANALYSIS, A 45 CFS± D/S AND 20 CFS ± U/S FACTOR SHOULD BE ADDED TO SWAMP CREEK TO ACCOUNT FOR BASE FLOW.

Attachment 2

HEC-2 Modeling for Access Road Crossing

```
*  HEC-2 WATER SURFACE PROFILES               *
*                                             *
*  Version   4.6.2;  May 1991                 *
*                                             *
*  RUN DATE    21AUG95    TIME   09:13:07     *
***********************************************
```

```
*  U.S. ARMY CORPS OF ENGINEERS         *
*  HYDROLOGIC ENGINEERING CENTER        *
*  609 SECOND STREET, SUITE D           *
*  DAVIS, CALIFORNIA 95616-4687         *
*          (916) 756-1104               *
*****************************************
```

```
X     X  XXXXXXX   XXXXX           XXXXX
X     X  X        X     X         X     X
X     X  X        X                     X
XXXXXXX  XXXX     X         XXXXX  XXXXX
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX          XXXXXXX
```


THIS RUN EXECUTED 21AUG95   09:13:07

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*****************************************
HEC-2 WATER SURFACE PROFILES

Version   4.6.2;  May 1991
*****************************************
```

T1	WATER SURFACE PROFILE: 100-YEAR FLOW	FILE: CMCROAD
T2	DRAINAGE	APRIL, 1981
T3	SWAMP CREEK-EXISTING CONDITIONS	F&VD: MDL

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	0	0	0	.005	1.	0	29.	471.	0

NC	.105	.105	.05	0	0	0	0	0	0	0
X1	1.	13.	118.	130.3	0	0	0	0	0	0
GR	480.	0	474.	50.	472.	82.	470.35	118.	470.28	120.
GR	470.34	124.	470.04	124.3	469.3	127.9	469.53	130.	470.3	130.3
GR	470.5	210.	472.	250.	474.	350.	0	0	0	0
X1	2.	11.	193.	209.	60.	70.	120.	0	0	0
GR	480.	0	474.	38.	472.	84.	470.7	150.	470.5	192.
GR	470.	193.	469.92	208.	470.4	209.	472.	250.	474.	288.
GR	480.	350.	0	0	0	0	0	0	0	0
X1	3.	13.	200.	216.	90.	140.	120.	0	0	0
GR	480.	0	474.	38.	472.	110.	471.	185.	470.51	200.
GR	470.3	201.64	470.28	206.77	470.31	210.5	470.51	216.	471.	230.
GR	472.	262.	476.	280.	480.	320.	0	0	0	0

X1	4.	13.	180.	191.	120.	100.	100.	0	0	0
GR	480.	0	476.	30.	474.	80.	472.	168.	471.13	180.
GR	470.09	181.	470.15	186.	470.43	190.	471.2	191.	472.	210.
GR	474.	235.	476.	258.	480.	300.	0	0	0	0

X1	5.	12.	208.	229.	20.	20.	20.	0	0	0
GR	480.	0	476.	40.	474.	105.	472.	190.	471.5	208.
GR	471.73	209.	470.48	221.	470.36	228.	471.31	229.	471.92	238.
GR	472.	240.	480.	300.	0	0	0	0	0	0

ADD SECTION

X1	5.5				20.0	20.0	20.0		.2	

X1	6.	10.	265.	281.	20.	20.	20.	0	0	0
GR	480.	0	476.	91.	474.	168.	472.	253.	471.13	265.
GR	470.8	267.	470.78	280.	471.34	281.	472.	291.	480.	334.

X1	7.	12.	239.	252.	80.	55.	70.	0	0	0
GR	480.	0	478.	18.	474.	140.	472.	226.	471.53	239.
GR	471.05	241.	470.97	246.	471.05	251.	471.54	252.	472.	253.
GR	474.	275.	480.	295.	0	0	0	0	0	0

X1	8.	11.	268.	280.	20.	20.	20.	0	0	0
GR	480.	0	474.	160.	472.	256.	471.58	268.	471.02	271.
GR	471.02	274.	471.58	279.	471.8	280.	472.	288.	474.	303.
GR	480.	317.	0	0	0	0	0	0	0	0

X1	8.5				100.	105.	102.		0.6	

X1	9.	13.	235.	246.	100.	105.	102.	0	0	0
GR	480.	0	478.	20.	476.	142.	474.	210.	472.89	235.
GR	472.25	236.	472.26	240.	472.2	245.	472.86	246.	474.	295.
GR	476.	313.	478.	350.	480.	363.	0	0	0	0

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

*SECNO 1.000

1.000	1.55	470.85	.00	471.00	470.89	.04	.00	.00	470.35

.00	.27	1.26	.39	.105	.050	.105	.000	469.30	107.12
.005016	0.	0.	0.	0	0	6	.00	112.17	219.29

*SECNO 2.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.54

2.000	1.24	471.16	.00	.00	471.19	.04	.30	.00	470.00
29.0	8.0	19.3	1.7	29.4	18.9	7.3	4.3	7.8	470.40
.04	.27	1.02	.23	.105	.050	.105	.000	469.92	126.98
.002108	60.	120.	70.	2	0	0	.00	101.33	228.31

*SECNO 3.000

3.000	1.15	471.43	.00	.00	471.47	.05	.28	.00	470.51
29.0	5.2	19.6	4.2	16.9	17.3	12.3	9.9	18.1	470.51
.07	.31	1.13	.34	.105	.050	.105	.000	470.28	152.96
.002876	90.	120.	140.	2	0	0	.00	90.71	243.67

*SECNO 4.000

4.000	1.62	471.71	.00	.00	471.86	.15	.39	.00	471.13
29.0	.7	27.5	.8	2.3	15.6	3.0	13.5	24.7	471.20
.09	.30	1.76	.28	.105	.050	.105	.000	470.09	172.07
.005331	120.	100.	100.	1	0	0	.00	30.91	202.99

*SECNO 5.000

5.000	1.52	471.88	.00	.00	471.96	.09	.10	.00	471.50
29.0	.5	27.8	.7	2.6	20.8	2.4	14.0	25.5	471.31
.09	.21	1.34	.28	.105	.050	.105	.000	470.36	194.42
.004677	20.	20.	20.	2	0	0	.00	42.94	237.37

*SECNO 5.500

5.500	1.40	471.96	.00	.00	472.08	.12	.11	.00	471.70
29.0	.3	28.3	.5	1.3	18.5	1.6	14.4	26.3	471.51
.10	.21	1.53	.30	.105	.050	.105	.000	470.56	198.29
.007097	20.	20.	20.	1	0	0	.00	37.49	235.78

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 6.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.53

6.000	1.31	472.09	.00	.00	472.17	.07	.09	.00	471.13
29.0	2.1	25.7	1.2	6.4	20.1	4.2	15.0	27.1	471.34
.10	.33	1.27	.29	.105	.050	.105	.000	470.78	249.33
.003036	20.	20.	20.	1	0	0	.00	42.13	291.46

7.000	1.35	472.32	.00	.00	472.43	.11	.26	.00	471.53
29.0	3.6	25.1	.3	9.4	16.2	1.1	17.0	30.2	471.54
.12	.38	1.55	.30	.105	.050	.105	.000	470.97	212.22
.004568	80.	70.	55.	2	0	0	.00	44.30	256.52

*SECNO 8.000

8.000	1.41	472.43	.00	.00	472.52	.10	.10	.00	471.58
29.0	4.9	22.1	2.0	12.0	14.0	4.9	17.6	31.2	471.80
.12	.41	1.58	.42	.105	.050	.105	.000	471.02	235.59
.005167	20.	20.	20.	2	0	0	.00	55.60	291.19

*SECNO 8.500

8.500	1.36	472.98	.00	.00	473.10	.11	.57	.00	472.18
29.0	4.6	22.5	1.9	10.6	13.4	4.4	20.6	36.7	472.40
.14	.43	1.68	.43	.105	.050	.105	.000	471.62	237.66
.006109	100.	102.	105.	2	0	0	.00	53.20	290.87

*SECNO 9.000

9.000	1.37	473.57	.00	.00	473.69	.12	.59	.00	472.89
29.0	1.7	23.6	3.7	5.0	13.9	10.5	23.6	42.3	472.86
.16	.34	1.70	.35	.105	.050	.105	.000	472.20	219.93
.005544	100.	102.	105.	0	0	0	.00	56.11	276.05

1

PROFILE FOR STREAM AMP CREEK-EXISTING CONDI

PLOTTED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA

```
ELEVATION 469.      471.      473.      475.      477.      479.      481.      483.      485.      487.
    SECNO CUMDIS

   1.00      0.  I    L  E .         .   M     .         .         .         .         .         .         .         .
            10.  I    L  E .         .     M   .         .         .         .         .         .         .         .
            20.  CI   L  E .         .        M.         .         .         .         .         .         .         .
            30.  CI   L  E .         .         .M        .         .         .         .         .         .         .
            40.  CI   L  E .         .         .   M     .         .         .         .         .         .         .
            50.  CI   L  WE.         .         .     M   .         .         .         .         .         .         .
            60.  C I LR   E.         .         .        M.         .         .         .         .         .         .
            70.  C I LR   E.         .         .         .M        .         .         .         .         .         .
            80.  C I LR   E.         .         .         .   M     .         .         .         .         .         .
            90.  C I LR   E.         .         .         .     M   .         .         .         .         .         .
           100.  C  ILR   E.         .         .         .        M.         .         .         .         .         .
           110.  C  ILR   E.         .         .         .         .M        .         .         .         .         .
   2.00    120.  C  IL R  E.         .         .         .         .   M     .         .         .         .         .
           130.  C  IL R  WE         .         .         .         .   M     .         .         .         .         .
           140.  C  IL R  WE         .         .         .         .   M     .         .         .         .         .
           150.  C   I R   E         .         .         .         .   M     .         .         .         .         .
           160.  C   I R   E         .         .         .         .   M     .         .         .         .         .
           170.  C   ILR   E         .         .         .         .   M     .         .         .         .         .
           180.  C   ILR   E         .         .         .         .   M     .         .         .         .         .
           190.  C   ILR   E         .         .         .         .   M     .         .         .         .         .
           200.  C   ILR   E         .         .         .         .   M     .         .         .         .         .
           210.  C   ILR   WE        .         .         .         .   M     .         .         .         .         .
           220.  C    IL   WE        .         .         .         .   M     .         .         .         .         .
```

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3.00   240.  C    IL   .E        .        .        .        .  M  .        .        .        .        .
       250.  C    IL   .E        .        .        .        .  M  .        .        .        .        .
       260.  C    I L  .E        .        .        .        .  M  .        .        .        .        .
       270.  C    I L  .E        .        .        .        .  M  .        .        .        .        .
       280.  C    I L  .WE       .        .        .        .  M  .        .        .        .        .
       290.  C   I   L .WE       .        .        .        .  M  .        .        .        .        .
       300.  C   I   L .WE       .        .        .        .  M  .        .        .        .        .
       310.  C   I   L . E       .        .        .        .  M  .        .        .        .        .
       320.  C   I    L. E       .        .        .        .  M  .        .        .        .        .
       330.  C   I    L. WE      .        .        .        .  M  .        .        .        .        .
4.00   340.  C   I    LR WE      .        .        .        .  M  .        .        .        .        .
       350.  C    I    L WE      .        .        .        .  M  .        .        .        .        .
5.00   360.  C    I    RL E      .        .        .        .  M  .        .        .        .        .
       370.  C     I    .RLWE    .        .        .        .  M  .        .        .        .        .
5.50   380.  C     I    .RLWE    .        .        .        .   M .        .        .        .        .
       390.  C      I  .L   E    .        .        .        .  M  .        .        .        .        .
6.00   400.  C      I LR    E    .        .        .        .  M  .        .        .        .        .
       410.  C       ILR    WE   .        .        .        .  M  .        .        .        .        .
       420.  C       I L    WE   .        .        .        .  M  .        .        .        .        .
       430.  C       I LR   WE   .        .        .        .  M  .        .        .        .        .
       440.  C       I LR    E   .        .        .        .  M  .        .        .        .        .
       450.  C       I .L    E   .        .        .        .  M  .        .        .        .        .
       460.  C       I .L    E   .        .        .        .  M  .        .        .        .        .
7.00   470.  C       I .L    WE  .        .        .        .  M  .        .        .        .        .
       480.  C       I .LR  WE   .        .        .        .  M  .        .        .        .        .
8.00   490.  C        I.L R  E   .        .        .        .  M  .        .        .        .        .
       500.  C        I. LR  E   .        .        .        .  M  .        .        .        .        .
       510.  C        I. LR  WE  .        .        .        .  M  .        .        .        .        .
       520.  C        I. LR  WE  .        .        .        .  M  .        .        .        .        .
       530.  C         I  LR  E  .        .        .        .   M .        .        .        .        .
       540.  C         I  LR  WE .        .        .        .   M .        .        .        .        .
       550.  C         I  LR  WE .        .        .        .   M .        .        .        .        .
       560.  C         .I L R  E .        .        .        .    M.        .        .        .        .
       570.  C         .I  LR  E .        .        .        .    M.        .        .        .        .
       580.  C         .I  LR  WE.        .        .        .    M.        .        .        .        .
       590.  C         . I LR  WE.        .        .        .    M.        .        .        .        .
8.50   600.  C         . I L R WE.        .        .        .     M.       .        .        .        .
       610.  C         . I  LR  E.        .        .        .    M.        .        .        .        .
       620.  C         . I  LR  WE        .        .        .    M.        .        .        .        .
       630.  C         . I  LR  WE        .        .        .    M.        .        .        .        .
       640.  C         .  I  L   E        .        .        .   M .        .        .        .        .
       650.  C         .  I  LR  E        .        .        .   M .        .        .        .        .
       660.  C         .  I  LR  WE       .        .        .   M .        .        .        .        .
       670.  C         .   I  L  WE       .        .        .  M  .        .        .        .        .
       680.  C         .   I  L  .E       .        .        .  M  .        .        .        .        .
       690.  C         .   I   L .WE      .        .        .  M  .        .        .        .        .
9.00   700.  C         .    I  L .WE      .        .        .  M  .        .        .        .        .
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THIS RUN EXECUTED 21AUG95   09:13:07

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HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991

****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

AMP CREEK-EXISTING CONDI

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	1.000	.00	.00	.00	469.30	29.00	470.85	.00	470.89	50.16	1.26	51.03	4.09
*	2.000	120.00	.00	.00	469.92	29.00	471.16	.00	471.19	21.08	1.02	55.54	6.32
	3.000	120.00	.00	.00	470.28	29.00	471.43	.00	471.47	28.76	1.13	46.58	5.41
	4.000	100.00	.00	.00	470.09	29.00	471.71	.00	471.86	53.31	1.76	20.87	3.97
	5.000	20.00	.00	.00	470.36	29.00	471.88	.00	471.96	46.77	1.34	25.70	4.24
	5.500	20.00	.00	.00	470.56	29.00	471.96	.00	472.08	70.97	1.53	21.38	3.44
*	6.000	20.00	.00	.00	470.78	29.00	472.09	.00	472.17	30.36	1.27	30.72	5.26
	7.000	70.00	.00	.00	470.97	29.00	472.32	.00	472.43	45.68	1.55	26.73	4.29
	8.000	20.00	.00	.00	471.02	29.00	472.43	.00	472.52	51.67	1.58	30.80	4.03
	8.500	102.00	.00	.00	471.62	29.00	472.98	.00	473.10	61.09	1.68	28.44	3.71
	9.000	102.00	.00	.00	472.20	29.00	473.57	.00	473.69	55.44	1.70	29.42	3.89

AMP CREEK-EXISTING CONDI

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	1.000	29.00	470.85	.00	.00	-.15	112.17	.00
*	2.000	29.00	471.16	.00	.31	.00	101.33	120.00
	3.000	29.00	471.43	.00	.27	.00	90.71	120.00
	4.000	29.00	471.71	.00	.29	.00	30.91	100.00
	5.000	29.00	471.88	.00	.16	.00	42.94	20.00
	5.500	29.00	471.96	.00	.09	.00	37.49	20.00
*	6.000	29.00	472.09	.00	.13	.00	42.13	20.00
	7.000	29.00	472.32	.00	.23	.00	44.30	70.00
	8.000	29.00	472.43	.00	.11	.00	55.60	20.00
	8.500	29.00	472.98	.00	.56	.00	53.20	102.00
	9.000	29.00	473.57	.00	.59	.00	56.11	102.00

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 2.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 6.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

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*  HEC-2 WATER SURFACE PROFILES                  *
*                                                *
*  Version   4.6.2;  May 1991                    *
*                                                *
*  RUN DATE    21AUG95     TIME    09:16:07      *
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*  U.S. ARMY CORPS OF ENGINEERS          *
*  HYDROLOGIC ENGINEERING CENTER         *
*  609 SECOND STREET, SUITE D            *
*  DAVIS, CALIFORNIA 95616-4687          *
*          (916) 756-1104                *
******************************************
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X     X  XXXXXXX   XXXXX           XXXXX
X     X  X        X     X         X     X
X     X  X        X                     X
XXXXXXX  XXXX     X         XXXXX  XXXXX
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX          XXXXXXX
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THIS RUN EXECUTED 21AUG95 09:16:07

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****************************************
HEC-2 WATER SURFACE PROFILES

Version   4.6.2;  May 1991
****************************************
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T1 WATER SURFACE PROFILE: 100-YEAR FLOW FILE: CMCROADP

T2 EXXON DRAINAGE APRIL, 1981;8/95

T3 SWAMP CREEK-PROPOSED CONDITIONS (BOX CULVERTS) F&VD: MDL;SRB

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	0	0	0	.005	1.	0	29.	471.	0

NC	.105	.105	.05	0	0	0	0	0	0	0
X1	1.	13.	118.	130.3	0	0	0	0	0	0
GR	480.	0	474.	50.	472.	82.	470.35	118.	470.28	120.
GR	470.34	124.	470.04	124.3	469.3	127.9	469.53	130.	470.3	130.3
GR	470.5	210.	472.	250.	474.	350.	0	0	0	0
X1	2.	11.	193.	209.	60.	70.	120.	0	0	0
GR	480.	0	474.	38.	472.	84.	470.7	150.	470.5	192.
GR	470.	193.	469.92	208.	470.4	209.	472.	250.	474.	288.
GR	480.	350.	0	0	0	0	0	0	0	0
X1	3.	13.	200.	216.	90.	140.	120.	0	0	0
GR	480.	0	474.	38.	472.	110.	471.	185.	470.51	200.
GR	470.3	201.64	470.28	206.77	470.31	210.5	470.51	216.	471.	230.
GR	472.	262.	476.	280.	480.	320.	0	0	0	0

X1	4.	13.	180.	191.	120.	100.	100.	0	0	0
GR	480.	0	476.	30.	474.	80.	472.	168.	471.13	180.
GR	470.09	181.	470.15	186.	470.43	190.	471.2	191.	472.	210.
GR	474.	235.	476.	258.	480.	300.	0	0	0	0

NC				.3	.5					

X1	5.	25.	216.	229.5	20.	20.	20.	0	0	0
X3				216.0	480.0	229.5	480.0			
GR	480.	0	476.	40.	474.	105.	472.	190.	471.5	208.
GR	471.70	216.	470.36	216.01	470.36	219.06	470.36	219.07	470.36	219.37
GR	470.36	219.38	470.36	222.43	470.36	222.44	470.36	222.74	470.36	222.75
GR	470.36	225.8	470.36	225.81	470.36	226.11	470.36	226.41	470.36	229.46
GR	470.36	229.47	471.3	229.5	471.9	238.0	472.0	240.0	480.0	300.0

4: 10 FT. X 8 FT. BOX CULVERTS

SC	4.013	0.40	2.60	100	2.44	3.048	6.096	8.1	470.36	470.36
X1	5.5	0	0	0	20.	20.	20.	0	0	0
X2	0	0	2.0	472.8	475.92	0	0	0	0	0
X3	0	0	0	216.0	475.92	229.5	475.92	0	0	0

X1	6.	10.	265.	281.	20.	20.	20.	0	0	0
GR	480.	0	476.	91.	474.	168.	472.	253.	471.13	265.
GR	470.8	267.	470.78	280.	471.34	281.	472.	291.	480.	334.

NC				.1	.3					

X1	7.	12.	239.	252.	80.	55.	70.	0	0	0
GR	480.	0	478.	18.	474.	140.	472.	226.	471.53	239.
GR	471.05	241.	470.97	246.	471.05	251.	471.54	252.	472.	253.
GR	474.	275.	480.	295.	0	0	0	0	0	0

X1	8.	11.	268.	280.	20.	20.	20.	0	0	0
GR	480.	0	474.	160.	472.	256.	471.58	268.	471.02	271.
GR	471.02	274.	471.58	279.	471.8	280.	472.	288.	474.	303.
GR	480.	317.	0	0	0	0	0	0	0	0

X1	8.5				100.	105.	102.		0.6	

X1	9.	13.	235.	246.	100.	105.	102.	0	0	0
GR	480.	0	478.	20.	476.	142.	474.	210.	472.89	235.
GR	472.25	236.	472.26	240.	472.2	245.	472.86	246.	474.	295.
GR	476.	313.	478.	350.	480.	363.	0	0	0	0

Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

*SECNO 1.000

1.000	1.55	470.85	.00	471.00	470.89	.04	.00	.00	470.35
29.0	.7	13.8	14.5	2.7	11.0	37.4	.0	.0	470.30
.00	.27	1.26	.39	.105	.050	.105	.000	469.30	107.12
.005016	0.	0.	0.	0	0	6	.00	112.17	219.29

*SECNO 2.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.54

2.000	1.24	471.16	.00	.00	471.19	.04	.30	.00	470.00
29.0	8.0	19.3	1.7	29.4	18.9	7.3	4.3	7.8	470.40
.04	.27	1.02	.23	.105	.050	.105	.000	469.92	126.98
.002108	60.	120.	70.	2	0	0	.00	101.33	228.31

*SECNO 3.000

3.000	1.15	471.43	.00	.00	471.47	.05	.28	.00	470.51
29.0	5.2	19.6	4.2	16.9	17.3	12.3	9.9	18.1	470.51
.07	.31	1.13	.34	.105	.050	.105	.000	470.28	152.96
.002876	90.	120.	140.	2	0	0	.00	90.71	243.67

*SECNO 4.000

4.000	1.62	471.71	.00	.00	471.86	.15	.39	.00	471.13
29.0	.7	27.5	.8	2.3	15.6	3.0	13.5	24.7	471.20
.09	.30	1.76	.28	.105	.050	.105	.000	470.09	172.07
.005331	120.	100.	100.	1	0	0	.00	30.91	202.99

CCHV= .300 CEHV= .500

*SECNO 5.000

3470 ENCROACHMENT STATIONS= 216.0 229.5 TYPE= 1 TARGET= 13.500

ELENCL= 480.00 ELENCR= 480.00

5.000	1.50	471.86	.00	.00	471.97	.10	.09	.01	471.70
29.0	.0	29.0	.0	.0	20.3	.0	13.9	25.2	480.00
.09	.00	1.43	.00	.000	.050	.000	.000	470.36	216.00
.003867	20.	20.	20.	2	0	0	.00	13.50	229.50

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

SPECIAL CULVERT

```
    4          .013      .40      2.60    100.00     2.44      3.05      6.10      8         1        470.36    470.36

CHART  8 - BOX CULVERT WITH FLARED WINGWALLS; NO INLET TOP EDGE BEVEL
SCALE  1 - WINGWALLS FLARED 30 TO 75 DEGREES

*SECNO 5.500

SPECIAL CULVERT OUTLET CONTROL
EGIC =    471.680  EGOC =    472.046  PCWSE=    471.864  ELTRD=    475.920

SPECIAL CULVERT

     EGIC      EGOC       H4     QWEIR     QCULV      VCH     ACULV     ELTRD    WEIRLN
    471.68    472.05      .08        0.       29.    1.349     29.7    475.92        0.



3470 ENCROACHMENT STATIONS=      216.0      229.5  TYPE=       1  TARGET=       13.500
 ELENCL=    475.92  ELENCR=    475.92
     5.500      1.59    471.95      .00       .00    472.05       .09       .08       .00    471.70
      29.0        .0      29.0       .0        .0      21.5        .0      14.3      25.4    475.92
       .10       .00      1.35      .00      .000      .050      .000      .000    470.36    216.00
   .003238       20.       20.      20.         2         0         0       .00     13.50    229.50


*SECNO 6.000
     6.000      1.25    472.03      .00       .00    472.12       .09       .07       .00    471.13
      29.0       1.9      26.1      1.0       5.5      19.1       3.5      14.8      26.0    471.34
       .10       .34      1.36      .29      .105      .050      .105      .000    470.78    251.97
   .003714       20.       20.      20.         0         0         0       .00     39.16    291.13


CCHV=      .100 CEHV=      .300
*SECNO 7.000
     7.000      1.34    472.31      .00       .00    472.42       .11       .29       .01    471.53
      29.0       3.5      25.2       .3       9.1      16.0       1.1      16.8      29.0    471.54
       .12       .38      1.57      .30      .105      .050      .105      .000    470.97    212.69
   .004736       80.       70.      55.         2         0         0       .00     43.71    256.40


*SECNO 8.000
     8.000      1.40    472.42      .00       .00    472.52       .10       .10       .00    471.58
      29.0       4.9      22.1      2.0      11.8      13.9       4.8      17.3      29.9    471.80
       .12       .41      1.59      .42      .105      .050      .105      .000    471.02    235.83
   .005267       20.       20.      20.         2         0         0       .00     55.32    291.15


1                                                                                                    PAGE    5
    21AUG95     09:16:07


     SECNO     DEPTH     CWSEL     CRIWS     WSELK       EG        HV        HL     OLOSS    L-BANK ELEV
     Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA      R-BANK ELEV
     TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN    SSTA
     SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID   ENDST


*SECNO 8.500
     8.500      1.37    472.99      .00       .00    473.10       .11       .58       .00    472.18
      29.0       4.6      22.5      1.9      10.6      13.4       4.4      20.3      35.4    472.40
       .14       .43      1.68      .43      .105      .050      .105      .000    471.62    237.68
   .006119      100.      102.     105.         1         0         0       .00     53.18    290.86
```

```
*SECNO 9.000
     9.000      1.37    473.57       .00       .00    473.68       .12       .58       .00    472.89
      29.0       1.8      23.4       3.8       5.2      14.0      10.9      23.3      41.1    472.86
       .16       .34      1.67       .35      .105      .050      .105      .000    472.20    219.66
   .005310      100.      102.      105.         0         0         0       .00     56.90    276.56
```

```
1
 PROFILE FOR STREAM  AMP CREEK-PROPOSED CONDI



 PLOTTED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA


ELEVATION   469.      471.      473.      475.      477.      479.      481.      483.      485.      487.
    SECNO   CUMDIS

    1.00       0.  I    L  E .         .   M     .         .         .         .         .         .         .         .
              10.  I    L  E .         .     M   .         .         .         .         .         .         .         .
              20. CI    L  E .         .        M.         .         .         .         .         .         .         .
              30. CI    L  E .         .         .M        .         .         .         .         .         .         .
              40. CI    L  E .         .         .   M     .         .         .         .         .         .         .
              50. CI    L  WE.         .         .    M    .         .         .         .         .         .         .
              60. C I LR    E.         .         .        M.         .         .         .         .         .         .
              70. C I LR    E.         .         .         .M        .         .         .         .         .         .
              80. C I LR    E.         .         .         .   M     .         .         .         .         .         .
              90. C I LR    E.         .         .         .     M   .         .         .         .         .         .
             100. C  ILR    E.         .         .         .        M.         .         .         .         .         .
             110. C  ILR    E.         .         .         .         .M        .         .         .         .         .
    2.00     120. C  IL R   E.         .         .         .         .   M     .         .         .         .         .
             130. C  IL R   WE         .         .         .         .   M     .         .         .         .         .
             140. C  IL R   WE         .         .         .         .   M     .         .         .         .         .
             150. C    I R   E         .         .         .         .   M     .         .         .         .         .
             160. C    I R   E         .         .         .         .   M     .         .         .         .         .
             170. C    ILR   E         .         .         .         .   M     .         .         .         .         .
             180. C    ILR   E         .         .         .         .   M     .         .         .         .         .
             190. C    ILR   E         .         .         .         .   M     .         .         .         .         .
             200. C    ILR   E         .         .         .         .   M     .         .         .         .         .
             210. C    ILR   WE        .         .         .         .   M     .         .         .         .         .
             220. C     IL   WE        .         .         .         .   M     .         .         .         .         .
             230. C     IL   .E        .         .         .         .   M     .         .         .         .         .
    3.00     240. C     IL   .E        .         .         .         .   M     .         .         .         .         .
             250. C     IL   .E        .         .         .         .   M     .         .         .         .         .
             260. C     I L  .E        .         .         .         .   M     .         .         .         .         .
             270. C     I L  .E        .         .         .         .   M     .         .         .         .         .
             280. C     I L  .WE       .         .         .         .   M     .         .         .         .         .
             290. C    I   L .WE       .         .         .         .   M     .         .         .         .         .
             300. C    I   L .WE       .         .         .         .   M     .         .         .         .         .
             310. C    I   L . E       .         .         .         .   M     .         .         .         .         .
             320. C    I    L. E       .         .         .         .   M     .         .         .         .         .
             330. C    I    L. WE      .         .         .         .   M     .         .         .         .         .
    4.00     340. C    I    LR WE      .         .         .         .   M     .         .         .         .         .
             350. C     I    .LWE      .         . R       .         .   M     .         .         .         .         .
    5.00     360. C     I    . LE      .         .         .         .   R     .         .         .         .         .
             370. C     I    . LWE     .         .         .  R      .   M     .         .         .         .         .
    5.50     380. C     I    . LWE     .         .  R      .         .   M     .         .         .         .         .
             390. C      I   .L WE     . R       .         .         .   M     .         .         .         .         .
    6.00     400. C       I LR   E     .         .         .         .   M     .         .         .         .         .
             410. C        ILR   E     .         .         .         .   M     .         .
```

```
        430.  C        I LR  WE   .        .        .        .  M    .        .        .        .        .
        440.  C        I LR  WE   .        .        .        .  M    .        .        .        .        .
        450.  C        I .L   E   .        .        .        .  M    .        .        .        .        .
        460.  C        I .L   E   .        .        .        .  M    .        .        .        .        .
  7.00  470.  C        I .L   WE  .        .        .        .  M    .        .        .        .        .
        480.  C        I .LR  WE  .        .        .        .  M    .        .        .        .        .
  8.00  490.  C         I.L R  E  .        .        .        .  M    .        .        .        .        .
        500.  C         I. LR  E  .        .        .        .  M    .        .        .        .        .
        510.  C         I. LR  WE .        .        .        .  M    .        .        .        .        .
        520.  C         I. LR  WE .        .        .        .  M    .        .        .        .        .
        530.  C          I  LR  E .        .        .        .   M   .        .        .        .        .
        540.  C          I  LR  WE.        .        .        .   M   .        .        .        .        .
        550.  C          I  LR  WE.        .        .        .   M   .        .        .        .        .
        560.  C          .I L R  E.        .        .        .    M  .        .        .        .        .
        570.  C          .I  LR  E.        .        .        .    M  .        .        .        .        .
        580.  C          .I  LR  WE.       .        .        .    M  .        .        .        .        .
        590.  C          . I LR  WE.       .        .        .    M  .        .        .        .        .
  8.50  600.  C          . I L R WE.       .        .        .     M .        .        .        .        .
        610.  C          . I  LR  E.       .        .        .    M  .        .        .        .        .
        620.  C          . I  LR  WE       .        .        .    M  .        .        .        .        .
        630.  C          . I  LR  WE       .        .        .    M  .        .        .        .        .
        640.  C           .  I  L   E      .        .        .   M   .        .        .        .        .
        650.  C           .  I  LR  E      .        .        .   M   .        .        .        .        .
        660.  C           .  I  LR  WE     .        .        .   M   .        .        .        .        .
        670.  C           .   I  L  WE     .        .        .  M    .        .        .        .        .
        680.  C           .   I  L  .E     .        .        .  M    .        .        .        .        .
        690.  C           .   I   L .WE    .        .        .  M    .        .        .        .        .
  9.00  700.  C           .    I  L .WE    .        .        .  M    .        .        .        .        .
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21AUG95 09:16:07

THIS RUN EXECUTED 21AUG95 09:16:08

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HEC-2 WATER SURFACE PROFILES

Version  4.6.2;  May 1991
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

AMP CREEK-PROPOSED CONDI

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	1.000	.00	.00	.00	469.30	29.00	470.85	.00	470.89	50.16	1.26	51.03	4.09
*	2.000	120.00	.00	.00	469.92	29.00	471.16	.00	471.19	21.08	1.02	55.54	6.32
	3.000	120.00	.00	.00	470.28	29.00	471.43	.00	471.47	28.76	1.13	46.58	5.41
	4.000	100.00	.00	.00	470.09	29.00	471.71	.00	471.86	53.31	1.76	20.87	3.97
	5.000	20.00	.00	.00	470.36	29.00	471.86	.00	471.97	38.67	1.43	20.29	4.66

6.000	20.00	.00	.00	470.78	29.00	472.03	.00	472.12	37.14	1.36	28.19	4.76
7.000	70.00	.00	.00	470.97	29.00	472.31	.00	472.42	47.36	1.57	26.25	4.21
8.000	20.00	.00	.00	471.02	29.00	472.42	.00	472.52	52.67	1.59	30.52	4.0[illegible]
8.500	102.00	.00	.00	471.62	29.00	472.99	.00	473.10	61.19	1.68	28.42	3.71
9.000	102.00	.00	.00	472.20	29.00	473.57	.00	473.68	53.10	1.67	30.10	3.98

AMP CREEK-PROPOSED CONDI

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	1.000	29.00	470.85	.00	.00	-.15	112.17	.00
*	2.000	29.00	471.16	.00	.31	.00	101.33	120.00
	3.000	29.00	471.43	.00	.27	.00	90.71	120.00
	4.000	29.00	471.71	.00	.29	.00	30.91	100.00
	5.000	29.00	471.86	.00	.15	.00	13.50	20.00
	5.500	29.00	471.95	.00	.09	.00	13.50	20.00
	6.000	29.00	472.03	.00	.08	.00	39.16	20.00
	7.000	29.00	472.31	.00	.28	.00	43.71	70.00
	8.000	29.00	472.42	.00	.11	.00	55.32	20.00
	8.500	29.00	472.99	.00	.57	.00	53.18	102.00
	9.000	29.00	473.57	.00	.58	.00	56.90	102.00

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 2.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

```
*  HEC-2 WATER SURFACE PROFILES                  *
*                                                *
*  Version    4.6.2;  May 1991                   *
*                                                *
*  RUN DATE    21AUG95    TIME    09:14:09       *
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*  U.S. ARMY CORPS OF ENGINEERS         *
*  HYDROLOGIC ENGINEERING CENTER        *
*  609 SECOND STREET, SUITE D           *
*  DAVIS, CALIFORNIA 95616-4687         *
*         (916) 756-1104                *
*****************************************
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X     X XXXXXXX  XXXXX           XXXXX
X     X X       X     X         X     X
X     X X       X                     X
XXXXXXX XXXX    X          XXXXX  XXXXX
X     X X       X                X
X     X X       X     X          X
X     X XXXXXXX  XXXXX           XXXXXXX
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THIS RUN EXECUTED 21AUG95 09:14:09

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*****************************************
HEC-2 WATER SURFACE PROFILES

Version    4.6.2;  May 1991
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T1 WATER SURFACE PROFILE: 100-YEAR FLOW — FILE: CMCRDSPN
T2 EXXON DRAINAGE — APRIL, 1981;8/95
T3 SWAMP CREEK-PROPOSED CONDITIONS (SPAN BRIDGE) — F&VD: MDL;SRB

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	0	0	0	.005	1.	0	29.	471.	0

NC	.105	.105	.05	0	0	0	0	0	0	0
X1	1.	13.	118.	130.3	0	0	0	0	0	0
GR	480.	0	474.	50.	472.	82.	470.35	118.	470.28	120.
GR	470.34	124.	470.04	124.3	469.3	127.9	469.53	130.	470.3	130.3
GR	470.5	210.	472.	250.	474.	350.	0	0	0	0
X1	2.	11.	193.	209.	60.	70.	120.	0	0	0
GR	480.	0	474.	38.	472.	84.	470.7	150.	470.5	192.
GR	470.	193.	469.92	208.	470.4	209.	472.	250.	474.	288.
GR	480.	350.	0	0	0	0	0	0	0	0
X1	3.	13.	200.	216.	90.	140.	120.	0	0	0
GR	480.	0	474.	38.	472.	110.	471.	185.	470.51	200.
GR	470.3	201.64	470.28	206.77	470.31	210.5	470.51	216.	471.	230.
GR	472.	262.	476.	280.	480.	320.	0	0	0	0

X1	4.	13.	180.	191.	120.	100.	100.	0	0	0
GR	480.	0	476.	30.	474.	80.	472.	163.	471.13	180.
GR	470.09	181.	470.15	186.	470.43	190.	471.2	191.	472.	210.
GR	474.	235.	476.	258.	480.	300.	0	0	0	0
NC				.3	.5					
X1	5.	23.	216.	229.5	20.	20.	20.	0	0	0
X3	–			203.54		241.94				
GR	475.92	0	475.92	40.	474.	105.	472.	190.	471.5	203.53
GR	471.5	203.54	471.5	208	471.70	216	470.36	216.01	470.36	219.06
GR	470.36	219.37	470.36	222.43	470.36	222.74	470.36	222.8	470.36	226.11
GR	470.36	226.41	470.36	229.46	471.3	229.5	471.9	238.0	472.0	240.0
GR	472.4	241.94	472.4	241.95	480.0	300.0				

X1	5.1				2.	2.	2.			
X3				203.54		241.94				
	1.25	1.60	2.70	38.4	84.7	470.36	470.36			
X1	5.4	0	0	0	16.	16.	16.	0	0	0
	0	0	1.0	472.8	475.92	0	0	0	0	0
X3	0	0	0	203.54	475.92	241.94	475.92	0	0	0
BT	-9	0	475.92	475.92	40	475.92	475.92	105	475.92	474
BT		190	475.92	472	203.53	475.92	471.5	203.54	475.92	472.8
BT		241.94	475.92	472.8	241.95	475.92	472.4	300	480	480
X1	5.5				2.	2.	2.			
X3				201		244.5				
X1	6.	10.	265.	281.	20.	20.	20.	0	0	0
GR	480.	0	476.	91.	474.	168.	472.	253.	471.13	265.
GR	470.8	267.	470.78	280.	471.34	281.	472.	291.	480.	334.
NC				.1	.3					
X1	7.	12.	239.	252.	80.	55.	70.	0	0	0
GR	480.	0	478.	18.	474.	140.	472.	226.	471.53	239.
GR	471.05	241.	470.97	246.	471.05	251.	471.54	252.	472.	253.
GR	474.	275.	480.	295.	0	0	0	0	0	0
X1	8.	11.	268.	280.	20.	20.	20.	0	0	0
GR	480.	0	474.	160.	472.	256.	471.58	268.	471.02	271.
GR	471.02	274.	471.58	279.	471.8	280.	472.	288.	474.	303.
GR	480.	317.	0	0	0	0	0	0	0	0
X1	8.5				100.	105.	102.		0.6	
X1	9.	13.	235.	246.	100.	105.	102.	0	0	0
GR	480.	0	478.	20.	476.	142.	474.	210.	472.89	235.
GR	472.25	236.	472.26	240.	472.2	245.	472.86	246.	474.	295.

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

*SECNO 1.000

1.000	1.55	470.85	.00	471.00	470.89	.04	.00	.00	470.35
29.0	.7	13.8	14.5	2.7	11.0	37.4	.0	.0	470.30
.00	.27	1.26	.39	.105	.050	.105	.000	469.30	107.12
.005016	0.	0.	0.	0	0	6	.00	112.17	219.29

*SECNO 2.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.54

2.000	1.24	471.16	.00	.00	471.19	.04	.30	.00	470.00
29.0	8.0	19.3	1.7	29.4	18.9	7.3	4.3	7.8	470.40
.04	.27	1.02	.23	.105	.050	.105	.000	469.92	126.98
.002108	60.	120.	70.	2	0	0	.00	101.33	228.31

*SECNO 3.000

3.000	1.15	471.43	.00	.00	471.47	.05	.28	.00	470.51
29.0	5.2	19.6	4.2	16.9	17.3	12.3	9.9	18.1	470.51
.07	.31	1.13	.34	.105	.050	.105	.000	470.28	152.96
.002876	90.	120.	140.	2	0	0	.00	90.71	243.67

*SECNO 4.000

4.000	1.62	471.71	.00	.00	471.86	.15	.39	.00	471.13
29.0	.7	27.5	.8	2.3	15.6	3.0	13.5	24.7	471.20
.09	.30	1.76	.28	.105	.050	.105	.000	470.09	172.07
.005331	120.	100.	100.	1	0	0	.00	30.91	202.99

CCHV= .300 CEHV= .500

*SECNO 5.000

3470 ENCROACHMENT STATIONS= 203.5 241.9 TYPE= 1 TARGET= 38.400

5.000	1.52	471.88	.00	.00	471.96	.09	.08	.02	471.70
29.0	1.0	27.5	.6	3.9	20.5	2.4	14.0	25.4	471.30
.09	.24	1.34	.23	.105	.050	.105	.000	470.36	203.54
.003180	20.	20.	20.	2	0	0	.00	34.14	237.68

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21AUG95 09:14:09 PAGE 4

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV

SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 5.100

3470 ENCROACHMENT STATIONS= 203.5 241.9 TYPE= 1 TARGET= 38.400

5.100	1.52	471.88	.00	.00	471.97	.09	.01	.00	471.70
29.0	1.0	27.4	.6	4.0	20.6	2.4	14.0	25.4	471.30
.09	.25	1.33	.23	.105	.050	.105	.000	470.36	203.54
.003116	2.	2.	2.	0	0	0	.00	34.25	237.79

*SECNO 5.400

3370 NORMAL BRIDGE, NRD= 9 MIN ELTRD= 475.92 MAX ELLC= ********

3470 ENCROACHMENT STATIONS= 203.5 241.9 TYPE= 1 TARGET= 38.400

ELENCL= 475.92 ELENCR= 475.92

5.400	1.58	471.94	.00	.00	472.02	.08	.05	.00	471.70
29.0	1.2	27.2	.7	4.6	21.2	2.9	14.5	26.0	471.30
.10	.25	1.28	.24	.105	.050	.105	.000	470.36	203.54
.002738	16.	16.	16.	0	0	0	.00	35.16	238.70

*SECNO 5.500

3470 ENCROACHMENT STATIONS= 201.0 244.5 TYPE= 1 TARGET= 43.500

5.500	1.59	471.95	.00	.00	472.03	.07	.01	.00	471.70
29.0	1.5	26.8	.7	5.8	21.4	3.0	14.5	26.1	471.30
.10	.26	1.25	.24	.105	.050	.105	.000	470.36	201.00
.002601	2.	2.	2.	0	0	0	.00	37.95	238.95

*SECNO 6.000

6.000	1.23	472.01	.00	.00	472.10	.09	.06	.01	471.13
29.0	1.8	26.2	1.0	5.3	18.8	3.4	15.1	26.8	471.34
.10	.35	1.39	.29	.105	.050	.105	.000	470.78	252.76
.003952	20.	20.	20.	0	0	0	.00	38.27	291.03

CCHV= .100 CEHV= .300

*SECNO 7.000

7.000	1.33	472.30	.00	.00	472.41	.11	.31	.01	471.53
29.0	3.4	25.3	.3	8.9	15.9	1.0	17.0	29.8	471.54
.12	.38	1.59	.30	.105	.050	.105	.000	470.97	213.06
.004875	80.	70.	55.	2	0	0	.00	43.25	256.31

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 8.000

8.000	1.39	472.41	.00	.00	472.52	.10	.10	.00	471.58
29.0	4.8	22.2	2.0	11.6	13.8	4.8	17.6	30.8	471.80

.005376	20.	20.	20.	2	0	0	.00	55.03	291.11

*SECNO 8.500

8.500	1.37	472.99	.00	.00	473.10	.11	.58	.00	472.18
29.0	4.6	22.5	1.9	10.7	13.5	4.4	20.6	36.2	472.40
.14	.43	1.67	.43	.105	.050	.105	.000	471.62	237.59
.006075	100.	102.	105.	1	0	0	.00	53.28	290.88

*SECNO 9.000

9.000	1.37	473.57	.00	.00	473.68	.12	.58	.00	472.89
29.0	1.8	23.5	3.8	5.2	14.0	10.8	23.6	41.9	472.86
.16	.34	1.68	.35	.105	.050	.105	.000	472.20	219.72
.005359	100.	102.	105.	1	0	0	.00	56.73	276.45

1

PROFILE FOR STREAM AMP CREEK-PROPOSED CONDI

PLOTTED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA

```
ELEVATION    469.      471.      473.      475.      477.      479.      481.      483.      485.      487.
    SECNO   CUMDIS

      1.00     0.  I    L  E .         .   M     .         .         .         .         .         .         .         .
              10.  I    L  E .         .     M   .         .         .         .         .         .         .         .
              20.  CI   L  E .         .        M.         .         .         .         .         .         .         .
              30.  CI   L  E .         .         .M        .         .         .         .         .         .         .
              40.  CI   L  E .         .         .   M     .         .         .         .         .         .         .
              50.  CI   L  WE.         .         .     M   .         .         .         .         .         .         .
              60.  C I LR   E.         .         .        M.         .         .         .         .         .         .
              70.  C I LR   E.         .         .         .M        .         .         .         .         .         .
              80.  C I LR   E.         .         .         .   M     .         .         .         .         .         .
              90.  C I LR   E.         .         .         .     M   .         .         .         .         .         .
             100.  C  ILR   E.         .         .         .        M.         .         .         .         .         .
             110.  C  ILR   E.         .         .         .         .M        .         .         .         .         .
      2.00   120.  C  IL R  E.         .         .         .         .   M     .         .         .         .         .
             130.  C  IL R WE          .         .         .         .   M     .         .         .         .         .
             140.  C  IL R WE          .         .         .         .   M     .         .         .         .         .
             150.  C   I R   E         .         .         .         .   M     .         .         .         .         .
             160.  C   I R   E         .         .         .         .   M     .         .         .         .         .
             170.  C   ILR   E         .         .         .         .   M     .         .         .         .         .
             180.  C   ILR   E         .         .         .         .   M     .         .         .         .         .
             190.  C   ILR   E         .         .         .         .   M     .         .         .         .         .
             200.  C   ILR   E         .         .         .         .   M     .         .         .         .         .
             210.  C   ILR  WE         .         .         .         .   M     .         .         .         .         .
             220.  C     IL  WE        .         .         .         .   M     .         .         .         .         .
             230.  C     IL  .E        .         .         .         .   M     .         .         .         .         .
      3.00   240.  C     IL  .E        .         .         .         .   M     .         .         .         .         .
             250.  C     IL  .E        .         .         .         .   M     .         .         .         .         .
             260.  C     I L .E        .         .         .         .   M     .         .         .         .         .
             270.  C     I L .E        .         .         .         .   M     .         .         .         .         .
             280.  C     I L .WE       .         .         .         .   M     .         .         .         .         .
             290.  C    I  L .WE       .         .         .         .   M     .         .         .         .         .
             300.  C    I  L .WE       .         .         .         .   M     .         .         .         .         .
             310.  C    I  L . E       .         .         .         .   M     .         .         .         .         .
             320.  C    I   L. E       .         .         .         .   M     .         .         .         .         .
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 4.00  340.  C   I    LR WE      .        .        .        . M    .        .        .        .        .
       350.  C    I    RLWE      .        .        .        . M    .        .        .        .        .
 5.00  360.  C    I    R LE      .        .        .        . M    .        .        .        .        .
 5.10  370.  C    I    R LE      .        .        .        . M    .        .        .        .        .
 5.40  380.  C    I    R LWE     .        .        .        . M    .        .        .        .        .
 5.50  390.  C    I    R LWE     .        .        .        . M    .        .        .        .        .
 6.00  400.  C      I LR   E     .        .        .        . M    .        .        .        .        .
       410.  C       ILR   E     .        .        .        . M    .        .        .        .        .
       420.  C       I L   E     .        .        .        . M    .        .        .        .        .
       430.  C       I LR  WE    .        .        .        . M    .        .        .        .        .
       440.  C       I LR  WE    .        .        .        . M    .        .        .        .        .
       450.  C       I .L   E    .        .        .        . M    .        .        .        .        .
       460.  C       I .L   E    .        .        .        . M    .        .        .        .        .
 7.00  470.  C       I .L   WE   .        .        .        . M    .        .        .        .        .
       480.  C       I .LR  WE   .        .        .        . M    .        .        .        .        .
 8.00  490.  C        I.L R  E   .        .        .        . M    .        .        .        .        .
       500.  C        I. LR  E   .        .        .        . M    .        .        .        .        .
       510.  C        I. LR  WE  .        .        .        . M    .        .        .        .        .
       520.  C        I. LR  WE  .        .        .        . M    .        .        .        .        .
       530.  C         I  LR  E  .        .        .        .  M   .        .        .        .        .
       540.  C         I  LR  WE .        .        .        .  M   .        .        .        .        .
       550.  C         I  LR  WE .        .        .        .  M   .        .        .        .        .
       560.  C         .I L R  E .        .        .        .   M  .        .        .        .        .
       570.  C         .I  LR  E .        .        .        .   M  .        .        .        .        .
       580.  C         .I  LR  WE.        .        .        .   M  .        .        .        .        .
       590.  C         . I LR  WE.        .        .        .   M  .        .        .        .        .
 8.50  600.  C         . I L R WE.        .        .        .    M .        .        .        .        .
       610.  C         . I  LR  E.        .        .        .   M  .        .        .        .        .
       620.  C         . I  LR  WE        .        .        .   M  .        .        .        .        .
       630.  C         . I  LR  WE        .        .        .   M  .        .        .        .        .
       640.  C         .  I  L   E        .        .        .  M   .        .        .        .        .
       650.  C         .  I  LR  E        .        .        .  M   .        .        .        .        .
       660.  C         .  I  LR  WE       .        .        .  M   .        .        .        .        .
       670.  C         .   I  L  WE       .        .        . M    .        .        .        .        .
       680.  C         .   I  L  .E       .        .        . M    .        .        .        .        .
       690.  C         .   I   L .WE      .        .        . M    .        .        .        .        .
 9.00  700.  C         .    I  L .WE      .        .        . M    .        .        .        .        .
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1

THIS RUN EXECUTED 21AUG95 09:14:09

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*****************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
*****************************************
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

AMP CREEK-PROPOSED CONDI

SUMMARY PRINTOUT TABLE 150

SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
1.000	.00	.00	.00	469.30	29.00	470.85	.00	470.89	50.16	1.26	51.03	4.09

*	2.000	120.00	.00	.00	469.92	29.00	471.16	.00	471.19	21.08	1.02	55.54	6.32
	3.000	120.00	.00	.00	470.28	29.00	471.43	.00	471.47	28.76	1.13	46.58	5.41
	4.000	100.00	.00	.00	470.09	29.00	471.71	.00	471.86	53.31	1.76	20.87	3.97
	5.000	20.00	.00	.00	470.36	29.00	471.88	.00	471.96	31.80	1.34	26.72	5.14
	5.100	2.00	.00	.00	470.36	29.00	471.88	.00	471.97	31.16	1.33	26.99	5.20
	5.400	16.00	475.92	-999999.00	470.36	29.00	471.94	.00	472.02	27.38	1.28	28.72	5.54
	5.500	2.00	.00	.00	470.36	29.00	471.95	.00	472.03	26.01	1.25	30.18	5.69
	6.000	20.00	.00	.00	470.78	29.00	472.01	.00	472.10	39.52	1.39	27.47	4.61
	7.000	70.00	.00	.00	470.97	29.00	472.30	.00	472.41	48.75	1.59	25.88	4.15
	8.000	20.00	.00	.00	471.02	29.00	472.41	.00	472.52	53.76	1.60	30.22	3.96
	8.500	102.00	.00	.00	471.62	29.00	472.99	.00	473.10	60.75	1.67	28.52	3.72
	9.000	102.00	.00	.00	472.20	29.00	473.57	.00	473.68	53.59	1.68	29.95	3.96

1

AMP CREEK-PROPOSED CONDI

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	1.000	29.00	470.85	.00	.00	-.15	112.17	.00
*	2.000	29.00	471.16	.00	.31	.00	101.33	120.00
	3.000	29.00	471.43	.00	.27	.00	90.71	120.00
	4.000	29.00	471.71	.00	.29	.00	30.91	100.00
	5.000	29.00	471.88	.00	.16	.00	34.14	20.00
	5.100	29.00	471.88	.00	.01	.00	34.25	2.00
	5.400	29.00	471.94	.00	.06	.00	35.16	16.00
	5.500	29.00	471.95	.00	.01	.00	37.95	2.00
	6.000	29.00	472.01	.00	.06	.00	38.27	20.00
	7.000	29.00	472.30	.00	.29	.00	43.25	70.00
	8.000	29.00	472.41	.00	.11	.00	55.03	20.00
	8.500	29.00	472.99	.00	.57	.00	53.28	102.00
	9.000	29.00	473.57	.00	.58	.00	56.73	102.00

1

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO=   2.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

Attachment 3

HEC-2 Modeling for Railroad Spur Crossing

```
*  HEC-2 WATER SURFACE PROFILES                *        *  U.S. ARMY CORPS OF ENGINEERS          *
*                                              *        *  HYDROLOGIC ENGINEERING CENTER         *
*  Version   4.6.2;  May 1991                  *        *  609 SECOND STREET, SUITE D            *
*                                              *        *  DAVIS, CALIFORNIA 95616-4687          *
*  RUN DATE    21AUG95     TIME    08:13:12    *        *          (916) 756-1104                *
************************************************        ******************************************
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```
X     X  XXXXXXX   XXXXX             XXXXX
X     X  X         X     X          X     X
X     X  X         X                      X
XXXXXXX  XXXX      X          XXXXX   XXXXX
X     X  X         X                X
X     X  X         X     X          X
X     X  XXXXXXX   XXXXX            XXXXXXX
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THIS RUN EXECUTED 21AUG95   08:13:12

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****************************************
HEC-2 WATER SURFACE PROFILES

Version   4.6.2;  May 1991
****************************************
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T1    WATER SURFACE PROFILE:  100-YEAR FLOW    FILE: "CMCRRE"      **********
T2    RAILROAD DRAINAGE                        AUGUST, 1981:8/95   * METRIC *
T3    SWAMP CREEK - EXISTING CONDITIONS        F&VD: MDL/SRB       **********
```

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	0	0	0	.001500	1.0	0	25.	480.69	0

NC	.150	.150	.065	.100	.300	0	0	0	0	0
X1	1.0	10.0	100.0	109.7	0	0	0	0	0	0
GR	482.2	0	482.	50.	481.	100.	478.58	101.	478.44	104.
GR	478.59	105.2	478.61	108.7	479.8	109.7	481.	160.	482.	200.
NC	.024	.024	.024	.3	.5	0	0	0	0	0
X1	1.5	20.	103.05	106.	20	20	20	0	0	0
X3	10.	0	0	0	0	0	0	479.5	479.78	0
GR	482.2	0	482.04	50.	481.04	100.	478.62	101.	478.9	103.05
GR	478.8	103.07	478.64	103.14	478.54	103.24	478.47	103.36	478.45	103.5
GR	478.6	106.	478.61	106.19	478.7	106.36	478.84	106.5	479.01	106.59
GR	479.2	106.62	478.65	108.7	479.84	109.7	481.04	160.	482.04	200.
X1	1.6	31.	103.05	106.	2.	2.	2.	0	0	0
BT	31.	0	482.24	482.24	50.	482.04	482.04	100.	481.04	481.04

BT	479.5	479.16	103.24	479.5	479.26	103.36	479.5	479.33	103.5	479.5
BT	479.3	103.64	479.5	479.33	103.76	479.5	479.26	103.86	479.5	479.16
BT	103.93	479.5	479.04	103.95	479.5	478.9	104.	479.5	479.2	105.2
BT	479.8	479.2	105.38	479.83	479.2	105.41	479.83	479.39	105.5	479.83
BT	479.6	105.64	479.82	479.7	105.81	479.82	479.79	106.	479.83	479.82
BT	106.19	479.8	479.79	106.36	479.79	479.7	106.5	479.79	479.56	106.59
BT	479.8	479.39	106.62	479.78	479.2	108.7	479.7	479.7	109.7	479.84
BT	479.84	200.	482.04	482.04	0	0	0	0	0	0
GR	482.24	0	482.04	50.	481.04	100.	479.5	101.	478.9	103.05
GR	478.8	103.07	478.64	103.14	478.54	103.24	478.47	103.36	478.45	103.5
GR	478.5	103.64	478.54	103.76	478.64	103.86	478.76	103.93	478.9	103.95
GR	479.2	104.	479.2	105.2	479.2	105.38	479.01	105.41	478.84	105.5
GR	478.7	105.64	478.61	105.81	478.58	106.	478.61	106.19	478.7	106.36
GR	478.8	106.5	479.01	106.59	479.2	106.62	479.7	108.7	479.84	109.7
GR	482.04	200.	0	0	0	0	0	0	0	0

X1	1.7	0	0	0	10.	10.	10.	0	0	0
X2	0	0	0	0	0	0	1.	0	0	0
X1	1.8	20.	103.05	106.	2.	2.	2.	0	.04	0
X3	10.0	0	0	0	0	0	0	479.50	479.78	0
GR	482.2	0	482.04	50.	481.04	100.	478.62	101.	478.9	103.05
GR	478.8	103.07	478.64	103.14	478.54	103.24	478.47	103.36	478.45	103.5
GR	478.6	106.	478.61	106.19	478.7	106.36	478.84	106.5	479.01	106.59
GR	479.2	106.62	478.65	108.7	479.84	109.7	481.04	160.	482.04	200.
NC	.150	.150	.065	.100	.300	0	0	0	0	0
X1	1.9	0	0	0	50.	50.	50.	0	.100	0
X1	2.	10.	137.	155.	70.	100.	95.	0	0	0
GR	482.2	0	482.	66.	479.15	130.	479.	137.	478.85	138.
GR	478.68	154.	479.	155.	479.3	165.	480.	210.	482.1	300.
X1	3.	10.	191.	209.	140.	140.	140.	0	0	0
GR	484.	0	482.	95.	479.36	180.	479.21	191.	479.07	191.5
GR	478.88	200.	478.875	208.5	479.215	209.	479.555	223.	482.	320.
X1	4.	12.	143.	157.	60.	70.	68.	0	0	0
GR	484.	0	482.	80.	480.	100.	479.32	130.	479.3	143.
GR	479.2	143.5	478.635	148.5	479.11	156.5	479.32	157.	479.31	169.
GR	480.	177.	482.	212.	0	0	0	0	0	0
X1	5.	11.	144.	146.6	22.	27.	22.	0	0	0
GR	484.	0	482.	90.	480.	120.	479.405	130.	479.405	144.
GR	478.69	144.3	478.69	146.3	479.385	146.6	479.385	155.	480.	170.
GR	482.	230.	0	0	0	0	0	0	0	0
NH	5.	.150	107.	.045	114.	.150	131.	.045	142.	.150
NH	210.	0	0	0	0	0	0	0	0	0
X1	6.	18.	107.	142.	40.	48.	45.	0	0	0

GR	478.84	109.5	479.22	113.5	479.38	114.	479.375	122.	479.35	131.
GR	479.05	131.5	478.75	136.5	478.97	141.5	479.375	142.	479.89	167.
GR	480.	173.	482.	179.	484.	210.	0	0	0	0
NC	.15	.15	.065	0	0	0	0	0	0	0
X1	7.	11.	102.	115.5	40.	55.	50.	0	0	0
GR	484.	0	482.	40.	479.96	78.	479.3	102.	479.04	102.5
GR	478.66	110.5	479.	115.	479.325	115.5	479.93	125.	482.	140.
GR	488.	165.	0	0	0	0	0	0	0	0

X1	8.	10.	71.00	80.00	40.	35.	38.	0	0	0
GR	484.	0	482.	30.	480.61	50.	479.37	71.00	478.95	71.50
GR	478.69	75.5	479.185	79.50	479.41	80.00	479.6	90.	482.	112.
X1	9.	10.	100.0	113.00	7.	7.	7.	0	0	0
GR	484.00	0	482.00	58.0	481.00	75.0	479.3	100.00	479.07	101.00
GR	478.76	107.00	478.805	112.00	479.395	113.	481.00	135.00	488.00	190.

ADD SECTION

X1	9.3				16	16	16		.03	
X1	10.	12.	102.	117.	7.	7.	7.	0	0	0
GR	484.	0	482.	52.	481.	65.	479.845	80.	479.305	102.
GR	478.99	102.50	478.81	110.5	479.215	116.50	479.37	117.	479.575	147.
GR	482.	155.	486.	170.	0	0	0	0	0	0
X1	11.	10.	127.	134.5	54.	50.	54.	0	0	0
GR	484.	0	482.	30.	479.59	100.	479.34	127.	479.15	127.5
GR	478.62	130.5	478.97	134.	480.18	134.5	481.	200.	482.	244.
NH	5.	.15	114.	.045	122.	.15	136.	.045	144.	.15
NH	250.	0	0	0	0	0	0	0	0	0
X1	12.	17.	114.	145.	15.	10.	12.	0	0	0
GR	484.	0	482.	22.	479.67	100.	479.345	114.	479.115	114.5
GR	479.05	119.	479.26	122.	479.445	122.5	479.36	130.	479.335	136.
GR	479.19	137.	478.935	140.	479.09	144.	479.29	145.	480.18	170.
GR	481.	195.	482.	250.	0	0	0	0	0	0
NC	.15	.15	.065	.1	.3	0	0	0	0	0
X1	13.	9.	170.	180.	32.	22.	25.	0	0	0
GR	482.	0	479.795	148.	479.52	170.	479.2	170.5	478.74	175.5
GR	479.25	179.5	479.46	180.	479.81	203.5	482.	300.	0	0
X1	14.	10.	166.	175.	63.	48.	50.	0	0	0
GR	480.8	0	479.84	140.	479.345	166.	479.05	166.5	478.65	170.5
GR	479.13	174.5	479.405	175.	479.645	201.	481.	255.	482.	310.
X1	15.	10.	206.	214.	75.	90.	90.	0	0	0

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GR  479.25    213.5  479.525     214.    479.75     244.     482.     320.     483.     355.

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X1     16.      10.     173.     188.      75.     135.     120.        0        0        0
GR   480.8        0  479.775     150.   479.505     173.  479.180    173.5  479.135    180.5
GR  479.16    187.5    479.4     188.    479.94     218.     482.     405.     484.     500.


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   21AUG95     08:13:12                                                                   PAGE   5

      SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
      Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
      TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
      SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

*PROF 1

CCHV=      .100 CEHV=      .300
*SECNO 1.000
      1.000      2.55    480.99       .00    480.69    481.03       .03       .00       .00    481.00
       25.0        .0      19.5       5.5        .0      21.8      29.9        .0        .0    479.80
        .00       .00       .89       .18      .000      .065      .150      .000    478.44    100.00
    .001505        0.        0.        0.         0         0         6       .00     59.79    159.79


CCHV=      .300 CEHV=      .500
*SECNO 1.500

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  3.45

      1.500      2.57    481.02       .00       .00    481.04       .02       .01       .00    478.90
       25.0       4.1       6.0      14.9       5.8       7.4      37.0       1.0       1.2    478.60
        .01       .70       .82       .40      .024      .024      .024      .000    478.45    100.01
    .000127       20.       20.       20.         0         0         0       .00     59.37    159.37


*SECNO 1.600

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =    .65


3370 NORMAL BRIDGE, NRD=  31 MIN ELTRD=   479.50 MAX ELLC=   479.82

      1.600      2.57    481.02       .00       .00    481.04       .02       .00       .00    478.90
       25.0       3.3       3.0      18.7       3.9       5.2      34.0       1.1       1.3    478.58
        .01       .85       .57       .55      .024      .024      .024      .000    478.45    100.01
    .000304        2.        2.        2.         0         0         0     -2.36     58.22    158.23


*SECNO 1.700

3370 NORMAL BRIDGE, NRD=  31 MIN ELTRD=   479.50 MAX ELLC=   479.82

      1.700      2.57    481.02       .00       .00    481.04       .02       .00       .00    478.90
```

.02	.85	.57	.55	.024	.024	.024	.000	478.45	100.01
.000304	10.	10.	10.	0	0	0	-2.36	58.23	158.24

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 1.800

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.47

1.800	2.53	481.02	.00	.00	481.04	.02	.00	.00	478.94
25.0	4.2	6.2	14.7	5.7	7.2	34.9	1.6	2.0	478.64
.02	.73	.85	.42	.024	.024	.024	.000	478.49	100.02
.000141	2.	2.	2.	0	0	0	.00	57.63	157.65

CCHV= .100 CEHV= .300
*SECNO 1.900

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .18

1.900	2.42	481.01	.00	.00	481.08	.07	.02	.01	479.04
25.0	3.3	11.4	10.3	5.4	6.9	29.2	3.9	4.8	478.74
.03	.61	1.65	.35	.150	.065	.150	.000	478.59	100.07
.004157	50.	50.	50.	2	0	0	.00	52.76	152.83

*SECNO 2.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 6.34

2.000	2.43	481.11	.00	.00	481.11	.00	.03	.01	479.00
25.0	4.4	11.5	9.0	57.4	42.0	111.8	15.4	15.1	479.00
.18	.08	.27	.08	.150	.065	.150	.000	478.68	85.97
.000103	70.	95.	100.	2	0	0	.00	171.65	257.61

*SECNO 3.000

3.000	2.25	481.13	.00	.00	481.13	.00	.02	.00	479.21
25.0	6.3	12.5	6.3	70.6	39.5	73.5	43.1	38.5	479.21
.38	.09	.32	.09	.150	.065	.150	.000	478.88	123.09
.000149	140.	140.	140.	2	0	0	.00	162.30	285.39

*SECNO 4.000

4.000	2.50	481.14	.00	.00	481.14	.00	.01	.00	479.30
25.0	8.9	11.1	5.1	74.5	31.1	45.0	54.0	47.3	479.32
.46	.12	.36	.11	.150	.065	.150	.000	478.64	88.64
.000186	60.	68.	70.	0	0	0	.00	108.24	196.88

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 5.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .52

5.000	2.46	481.15	.00	.00	481.15	.00	.01	.00	479.40
25.0	10.5	3.6	10.9	48.5	6.2	56.1	57.1	49.9	479.39
.48	.22	.58	.19	.150	.065	.150	.000	478.69	102.86
.000681	22.	22.	27.	0	0	0	.00	101.41	204.27

1490 NH CARD USED
*SECNO 6.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.46

6.000	2.41	481.16	.00	.00	481.16	.00	.01	.00	479.32
25.0	1.9	18.8	4.3	25.4	70.1	47.6	62.8	54.3	479.38
.54	.07	.27	.09	.150	.062	.150	.000	478.75	78.93
.000113	40.	45.	48.	0	0	0	.00	97.57	176.49

*SECNO 7.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .59

7.000	2.50	481.16	.00	.00	481.17	.01	.01	.00	479.30
25.0	7.1	15.0	2.9	50.6	31.1	20.2	68.7	58.5	479.33
.58	.14	.48	.14	.150	.065	.150	.000	478.66	55.47
.000330	40.	50.	55.	1	0	0	.00	78.51	133.98

*SECNO 8.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .68

8.000	2.49	481.18	.00	.00	481.19	.01	.02	.00	479.37
25.0	5.1	14.0	5.9	27.1	20.3	28.0	72.1	61.2	479.41
.60	.19	.69	.21	.150	.065	.150	.000	478.69	41.93
.000711	40.	38.	35.	0	0	0	.00	62.47	104.40

*SECNO 9.000

9.000	2.42	481.18	.00	.00	481.19	.01	.00	.00	479.30
25.0	4.0	17.8	3.2	26.0	29.6	21.7	72.6	61.6	479.39
.61	.15	.60	.15	.150	.065	.150	.000	478.76	71.96
.000517	7.	7.	7.	0	0	0	.00	64.45	136.41

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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 9.300

9.300	2.40	481.19	.00	.00	481.20	.01	.01	.00	479.33
25.0	3.9	17.9	3.2	25.5	29.4	21.3	73.8	62.6	479.42
.61	.15	.61	.15	.150	.065	.150	.000	478.79	72.27
.000537	16.	16.	16.	0	0	0	.00	63.99	136.26

*SECNO 10.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.65

10.000	2.39	481.20	.00	.00	481.21	.00	.00	.00	479.30
25.0	5.5	12.2	7.3	47.4	33.4	55.9	74.6	63.2	479.37
.62	.12	.37	.13	.150	.065	.150	.000	478.81	62.49
.000197	7.	7.	7.	0	0	0	.00	89.84	152.34

*SECNO 11.000

11.000	2.60	481.22	.00	.00	481.22	.00	.01	.00	479.34
25.0	13.0	8.2	3.9	86.1	17.3	42.4	82.0	69.6	480.18
.68	.15	.47	.09	.150	.065	.150	.000	478.62	52.61
.000358	54.	54.	50.	0	0	0	.00	157.14	209.75

1490 NH CARD USED

*SECNO 12.000

1530 MANNINGS N VALUES FOR CHANNEL COMPOSITED

12.000	2.29	481.22	.00	.00	481.22	.00	.00	.00	479.35
25.0	6.3	13.2	5.5	64.1	61.9	54.1	84.1	71.6	479.29
.70	.10	.21	.10	.150	.103	.150	.000	478.93	48.15
.000192	15.	12.	10.	0	0	0	.00	158.90	207.04

CCHV= .100 CEHV= .300

*SECNO 13.000

13.000	2.49	481.23	.00	.00	481.23	.00	.01	.00	479.52
25.0	9.3	7.8	7.9	103.6	22.1	81.8	89.3	76.7	479.46
.75	.09	.35	.10	.150	.065	.150	.000	478.74	51.73
.000187	32.	25.	22.	0	0	0	.00	214.31	266.04

*SECNO 14.000

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3280 CROSS SECTION 14.00 EXTENDED .44 METERS

14.000	2.59	481.24	.00	.00	481.24	.00	.01	.00	479.35
25.0	12.0	5.6	7.4	171.1	20.9	95.4	103.3	90.4	479.40
.88	.07	.27	.08	.150	.065	.150	.000	478.65	.00
.000100	63.	50.	48.	0	0	0	.00	268.01	268.01

*SECNO 15.000

15.000	2.70	481.24	.00	.00	481.24	.00	.01	.00	479.43
25.0	14.7	4.3	5.9	224.3	18.2	86.2	128.1	112.9	479.52
1.11	.07	.24	.07	.150	.065	.150	.000	478.55	.00
.000083	75.	90.	90.	0	0	0	.00	294.58	294.58

*SECNO 16.000

3280 CROSS SECTION 16.00 EXTENDED .45 METERS

16.000	2.12	481.25	.00	.00	481.25	.00	.01	.00	479.51
25.0	11.1	6.8	7.1	182.0	31.4	125.8	160.6	144.0	479.40
1.39	.06	.22	.06	.150	.065	.150	.000	479.14	.00
.000075	75.	120.	135.	0	0	0	.00	337.21	337.21

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PROFILE FOR STREAM AMP CREEK - EXISTING CON

PLOTTED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA

```
ELEVATION   478.      479.      479.      480.      480.      481.      481.      482.      482.      483.
    SECNO   CUMDIS

     1.00      0. I          .         .      R  .         .         .WE       .         .M        .         .         .
               5. I          .         .R        .         .L        .WE       .         .M        .         .         .
              10. I          .    R    .         L         .         .WE       .         . M       .         .         .
              15. I         R.         L         .         .         . E       .         . M       .         .         .
     1.50     20. I   R     L.         .         .         .         . E       .         . M       .         .         .
     1.60     25. I   R     L.         .         .         .         . E       .         . M       .         .         .
              30. I   R     L.         .         .         .         . E       .         . M       .         .         .
     1.70     35. I   R     L.         .         .         .         . E       .         . M       .         .         .
     1.80     40. CI   R     L         .         .         .         . E       .         .  M      .         .         .
              45. CI   R     L         .         .         .         . E       .         .  M      .         .         .
              50. CI   R     L         .         .         .         . E       .         .  M      .         .         .
              55. C I  R     .L        .         .         .         . E       .         .  M      .         .         .
              60. C I  R     .L        .         .         .         . E       .         .   M     .         .         .
              65. C I  R     .L        .         .         .         .WE       .         .   M     .         .         .
              70. C I  R     .L        .         .         .         .WE       .         .   M     .         .         .
              75. C I  R     .L        .         .         .         .W E      .         .   M     .         .         .
              80. C  I  R    . L       .         .         .         .W E      .         .   M     .         .         .
     1.90     85. C  I  R    . L       .         .         .         .W E      .         .    M    .         .         .
              90. C  I  R    . L       .         .         .         . WE      .         .    M    .         .         .
              95. C  I   R   . L       .         .         .         . WE      .         .    M    .         .         .
             100. C  I   R   . L       .         .         .         . WE      .         .    M    .         .         .
             105. C  I   R   . L       .         .         .         . WE      .         .   M     .         .         .
             110. C  I   R   . L       .         .         .         . WE      .         .   M     .         .         .
             115. C   I   R  . L       .         .         .         . WE      .         .   M     .         .         .
             120. C   I   R  . L       .         .         .         . WE      .         .   M     .         .         .
             125. C   I   R  . L       .         .         .         . WE      .         .   M     .         .         .
             130. C   I   R  . L       .         .         .         . WE      .         .   M     .         .         .
             135. C   I     R. L       .         .         .         . WE      .         .   M     .         .         .
             140. C   I     R. L       .         .         .         .  E      .         .   M     .         .         .
             145. C   I     R.L        .         .         .         .  E      .         .   M     .         .         .
             150. C   I      RL        .         .         .         .  E      .         .   M     .         .         .
             155. C   I      RL        .         .         .         .  E      .         .   M     .         .         .
             160. C   I      RL        .         .         .         .  E      .         .   M     .         .         .
             165. C    I     RL        .         .         .         .  E      .         .  M      .         .         .
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       175.  C    I    .L         .         .         .         .  E      .         .  M      .         .         .
2.00   180.  C    I    .L         .         .         .         .  E      .         .  M      .         .         .
       185.  C    I    .L         .         .         .         .  E      .         .  M      .         .         .
       190.  C    I    .L         .         .         .         .  E      .         .  M      .         .         .
       195.  C    I    . L        .         .         .         .  E      .         .  M      .         .         .
       200.  C    I    . L        .         .         .         .  E      .         .  M      .         .         .
       205.  C     I   . L        .         .         .         .  E      .         .  M      .         .         .
       210.  C     I   . L        .         .         .         .  E      .         .  M      .         .         .
       215.  C     I   . L        .         .         .         .  E      .         .  M      .         .         .
       220.  C     I   . L        .         .         .         .   E     .         .  M      .         .         .
       225.  C     I   .  L       .         .         .         .   E     .         .  M      .         .         .
       230.  C     I   .  L       .         .         .         .   E     .         . M       .         .         .
       235.  C     I   .  L       .         .         .         .   E     .         . M       .         .         .
       240.  C      I  .  L       .         .         .         .   E     .         . M       .         .         .
       245.  C      I  .  L       .         .         .         .   E     .         . M       .         .         .
       250.  C      I  .  L       .         .         .         .   E     .         . M       .         .         .
       255.  C      I  .  L       .         .         .         .   E     .         . M       .         .         .
       260.  C      I  .   L      .         .         .         .   E     .         . M       .         .         .
       265.  C      I  .   L      .         .         .         .   E     .         . M       .         .         .
       270.  C      I  .   L      .         .         .         .   E     .         . M       .         .         .
       275.  C       I .   L      .         .         .         .   E     .         . M       .         .         .
       280.  C       I .   L      .         .         .         .   E     .         . M       .         .         .
       285.  C       I .   L      .         .         .         .   E     .         . M       .         .         .
       290.  C       I .   L      .         .         .         .   E     .         . M       .         .         .
       295.  C       I .    L     .         .         .         .   E     .         . M       .         .         .
       300.  C       I .    L     .         .         .         .   E     .         .M        .         .         .
       305.  C       I .    L     .         .         .         .   E     .         .M        .         .         .
       310.  C        I.    L     .         .         .         .   E     .         .M        .         .         .
       315.  C        I.    L     .         .         .         .   E     .         .M        .         .         .
3.00   320.  C        I.    L     .         .         .         .   E     .         .M        .         .         .
       325.  C       I .     L    .         .         .         .   E     .         .M        .         .         .
       330.  C       I .     L    .         .         .         .   E     .         .M        .         .         .
       335.  C       I .     L    .         .         .         .   E     .         .M        .         .         .
       340.  C      I  .     L    .         .         .         .   E     .         .M        .         .         .
       345.  C      I  .     L    .         .         .         .   E     .         .M        .         .         .
       350.  C      I  .     L    .         .         .         .   E     .         .M        .         .         .
       355.  C     I   .     LR   .         .         .         .   E     .         .M        .         .         .
       360.  C     I   .     LR   .         .         .         .   E     .         .M        .         .         .
       365.  C     I   .      L   .         .         .         .   E     .         .M        .         .         .
       370.  C    I    .      L   .         .         .         .   E     .         .M        .         .         .
       375.  C    I    .      L   .         .         .         .   E     .         .M        .         .         .
       380.  C    I    .      L   .         .         .         .   E     .         .M        .         .         .
       385.  C   I     .      LR  .         .         .         .   E     .         .M        .         .         .
4.00   390.  C   I     .      LR  .         .         .         .   E     .         .M        .         .         .
       395.  C   I     .       L  .         .         .         .   E     .         .M        .         .         .
       400.  C   I     .       L  .         .         .         .   E     .         .M        .         .         .
       405.  C    I    .         L.         .         .         .   E     .         .M        .         .         .
5.00   410.  C    I    .         L.         .         .         .   E     .         .M        .         .         .
       415.  C    I    .         L.         .         .         .   E     .         .     M   .         .         .
       420.  C    I    .         L.         .         .         .   E     .         .         M         .         .
       425.  C    I    .         L.         .         .         .   E     .         .         .    M    .         .
       430.  C     I   .        LR.         .         .         .   E     .         .         .        M.         .
       435.  C     I   .        LR.         .         .         .   E     .         .         .         .  M      .
       440.  C     I   .        LR.         .         .         .   E     .         .         .         .       M .
       445.  C     I   .        LR.         .         .         .   E     .         .         .         .         M
       450.  C     I   .        LR.         .         .         .   E     .         .         .         .         M
6.00   455.  C     I   .        LR.         .         .         .   E     .         .         .         .         M
       460.  C     I   .        LR.         .         .         .   E     .         .         .         .         M
       465.  C     I   .        LR.         .         .         .   E     .         .         .         .         M
       470.  C     I   .       LR .         .         .         .   E     .         .         .         .         M
       475.  C    I    .       LR .         .         .         .   E     .         .         .         .         M
       480.  C    I    .       LR .         .         .         .    E    .         .         .         .         M
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        490.  C    I    .      LR .         .         .         .    E    .         .         .         .         M
        495.  C    I    .      LR .         .         .         .    E    .         .         .         .         M
        500.  C    I    .      LR .         .         .         .    E    .         .         .         .         M
7.00    505.  C   I     .      LR .         .         .         .    E    .         .         .         .         M
        510.  C   I     .      LR .         .         .         .    E    .         .         .         .         M
        515.  C    I    .       L .         .         .         .    E    .         .         .         .         M
        520.  C    I    .       L .         .         .         .    E    .         .         .         .    M    .
        525.  C    I    .       LR.         .         .         .    E    .         .         .         M         .
        530.  C    I    .       LR.         .         .         .    E    .         .         .    M    .         .
        535.  C    I    .       LR.         .         .         .    E    .         .         M         .         .
        540.  C    I    .       LR.         .         .         .    E    .         .   M     .         .         .
8.00    545.  C    I    .        L.         .         .         .    E    .         .M        .         .         .
9.00    550.  C      I  .      L R.         .         .         .    E    .         .         .         .         M
        555.  C       I .      L R.         .         .         .    E    .         .         .         .         M
        560.  C       I .       LR.         .         .         .    E    .         .         .         .         M
9.30    565.  C       I .       L R         .         .         .    E    .         .         .         .         M
        570.  C       I .      L R.         .         .         .    E    .         .         .         .         M
10.00   575.  C       I .      L R.         .         .         .    E    .         .         .         .         M
        580.  C       I .      L  R         .         .         .    E    .         .         .         .         M
        585.  C       I .      L  . R       .         .         .    E    .         .         .         .         M
        590.  C      I  .      L  .  R      .         .         .    E    .         .         .         .         M
        595.  C      I  .      L  .    R    .         .         .    E    .         .         .         .      M  .
        600.  C      I  .       L .     R   .         .         .    E    .         .         .         .  M      .
        605.  C     I   .       L .       R .         .         .   WE    .         .         .        M.         .
        610.  C     I   .       L .        R.         .         .   WE    .         .         .    M    .         .
        615.  C     I   .       L .         .R        .         .   WE    .         .       . M         .         .
        620.  C   I     .       L .         . R       .         .   WE    .         .     M .         .         .
        625.  C   I     .       L .         .   R     .         .     E   .         .   M     .         .         .
11.00   630.  C   I     .       L .         .    R    .         .     E   .         .M        .         .         .
        635.  C      I  .       L .       R .         .         .     E   .         .M        .         .         .
12.00   640.  C         I      RL .         .         .         .     E   .         .M        .         .         .
        645.  C        I.       RL.         .         .         .     E   .         .M        .         .         .
        650.  C       I .       R L         .         .         .     E   .         .M        .         .         .
        655.  C       I .        RL         .         .         .     E   .         .M        .         .         .
        660.  C      I  .         RL        .         .         .     E   .         .M        .         .         .
13.00   665.  C     I   .         R L       .         .         .     E   .         .M        .         .         .
        670.  C     I   .         RL        .         .         .     E   .        M.         .         .         .
        675.  C     I   .         RL        .         .         .     E   .     M   .         .         .         .
        680.  C    I    .         RL        .         .         .     E   .   M     .         .         .         .
        685.  C    I    .          L        .         .         .     E   . M       .         .         .         .
        690.  C    I    .          L        .         .         .     E  M.         .         .         .         .
        695.  C    I    .          L        .         .         .     EM  .         .         .         .         .
        700.  C    I    .          LR       .         .         .   M E   .         .         .         .         .
        705.  C    I    .        L.         .         .         . M   E   .         .         .         .         .
        710.  C    I    .        L.         .         .         M     E   .         .         .         .         .
14.00   715.  C    I    .       LR.         .         .      M  .     E   .         .         .         .         .
        720.  C    I    .       LR.         .         .      M  .     E   .         .         .         .         .
        725.  C    I    .       LR.         .         .      M  .     E   .         .         .         .         .
        730.  C    I    .       L R         .         .      M  .     E   .         .         .         .         .
        735.  C    I    .         LR        .         .      M  .     E   .         .         .         .         .
        740.  C    I    .         LR        .         .      M  .     E   .         .         .         .         .
        745.  C    I    .         LR        .         .      M  .     E   .         .         .         .         .
        750.  C   I     .         LR        .         .      M  .     E   .         .         .         .         .
        755.  C   I     .         LR        .         .      M  .     E   .         .         .         .         .
        760.  C   I     .         LR        .         .      M  .     E   .         .         .         .         .
        765.  C   I     .        L.R        .         .      M  .     E   .         .         .         .         .
        770.  C   I     .        L.R        .         .      M  .     E   .         .         .         .         .
        775.  C   I     .        L.R        .         .      M  .     E   .         .         .         .         .
        780.  C   I     .        L.R        .         .      M  .     E   .         .         .         .         .
        785.  C   I     .        L.R        .         .      M  .     E   .         .         .         .         .
        790.  C   I     .          LR       .         .      M  .     E   .         .         .         .         .
        795.  C  I      .          LR       .         .      M  .     E   .         .         .         .         .
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 15.00  805.  C I       .       L R        .         .       M  .    E  .        .        .        .        .
        810.  C  I      .       LR         .         .       M  .    E  .        .        .        .        .
        815.  C  I      .       LR         .         .       M  .    E  .        .        .        .        .
        820.  C   I     .       LR         .         .       M  .    E  .        .        .        .        .
        825.  C   I     .       LR         .         .       M  .    E  .        .        .        .        .
        830.  C    I    .       LR         .         .       M  .    E  .        .        .        .        .
        835.  C    I    .       LR         .         .       M  .    E  .        .        .        .        .
        840.  C     I   .       LR         .         .       M  .    E  .        .        .        .        .
        845.  C     I   .       LR         .         .       M  .    E  .        .        .        .        .
        850.  C      I  .       LR         .         .       M  .    E  .        .        .        .        .
        855.  C      I  .       LR         .         .       M  .    E  .        .        .        .        .
        860.  C       I .       RL         .         .       M  .    E  .        .        .        .        .
        865.  C       I .       RL         .         .       M  .    E  .        .        .        .        .
        870.  C        I.       RL         .         .       M  .    E  .        .        .        .        .
        875.  C        I.       RL         .         .       M  .    E  .        .        .        .        .
        880.  C         I       RL         .         .       M  .    E  .        .        .        .        .
        885.  C         I       RL         .         .       M  .    E  .        .        .        .        .
        890.  C         .I      RL         .         .       M  .    E  .        .        .        .        .
        895.  C         .I      RL         .         .       M  .    E  .        .        .        .        .
        900.  C         . I     RL         .         .       M  .    E  .        .        .        .        .
        905.  C         . I     RL         .         .       M  .    E  .        .        .        .        .
        910.  C         .  I   R.L         .         .       M  .    E  .        .        .        .        .
        915.  C         .  I   R.L         .         .       M  .    E  .        .        .        .        .
        920.  C         .   I  R.L         .         .       M  .    E  .        .        .        .        .
 16.00  925.  C         .   I  R.L         .         .       M  .    E  .        .        .        .        .
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THIS RUN EXECUTED 21AUG95 08:13:14

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HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991

****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

AMP CREEK - EXISTING CON

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	1.000	.00	.00	.00	478.44	25.00	480.99	.00	481.03	15.05	.89	51.74	6.45
*	1.500	20.00	.00	.00	478.45	25.00	481.02	.00	481.04	1.27	.82	50.21	22.21
*	1.600	2.00	479.50	479.82	478.45	25.00	481.02	.00	481.04	3.04	.57	43.02	14.34
	1.700	10.00	479.50	479.82	478.45	25.00	481.02	.00	481.04	3.04	.57	43.04	14.35
*	1.800	2.00	.00	.00	478.49	25.00	481.02	.00	481.04	1.41	.85	47.81	21.03
*	1.900	50.00	.00	.00	478.59	25.00	481.01	.00	481.08	41.57	1.65	41.45	3.88
*	2.000	95.00	.00	.00	478.68	25.00	481.11	.00	481.11	1.03	.27	211.22	24.58

3.000	140.00	.00	.00	478.88	25.00	481.13	.00	481.13	1.49	.32	183.47	20.45
4.000	68.00	.00	.00	478.64	25.00	481.14	.00	481.14	1.86	.36	150.58	18.31
* 5.000	22.00	.00	.00	478.69	25.00	481.15	.00	481.15	6.81	.58	110.76	9.58
* 6.000	45.00	.00	.00	478.75	25.00	481.16	.00	481.16	1.13	.27	143.20	23.53
* 7.000	50.00	.00	.00	478.66	25.00	481.16	.00	481.17	3.30	.48	101.87	13.77
* 8.000	38.00	.00	.00	478.69	25.00	481.18	.00	481.19	7.11	.69	75.31	9.38
9.000	7.00	.00	.00	478.76	25.00	481.18	.00	481.19	5.17	.60	77.35	10.99
9.300	16.00	.00	.00	478.79	25.00	481.19	.00	481.20	5.37	.61	76.18	10.79
* 10.000	7.00	.00	.00	478.81	25.00	481.20	.00	481.21	1.97	.37	136.70	17.81
11.000	54.00	.00	.00	478.62	25.00	481.22	.00	481.22	3.58	.47	145.84	13.21

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SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
12.000	12.00	.00	.00	478.93	25.00	481.22	.00	481.22	1.92	.21	180.13	18.05
13.000	25.00	.00	.00	478.74	25.00	481.23	.00	481.23	1.87	.35	207.57	18.26
14.000	50.00	.00	.00	478.65	25.00	481.24	.00	481.24	1.00	.27	287.42	24.97
15.000	90.00	.00	.00	478.55	25.00	481.24	.00	481.24	.83	.24	328.62	27.42
16.000	120.00	.00	.00	479.14	25.00	481.25	.00	481.25	.75	.22	339.07	28.89

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AMP CREEK - EXISTING CON

SUMMARY PRINTOUT TABLE 150

SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
1.000	25.00	480.99	.00	.00	.30	59.79	.00
* 1.500	25.00	481.02	.00	.03	.00	59.37	20.00
* 1.600	25.00	481.02	.00	.00	.00	58.22	2.00
1.700	25.00	481.02	.00	.00	.00	58.23	10.00
* 1.800	25.00	481.02	.00	.00	.00	57.63	2.00
* 1.900	25.00	481.01	.00	-.01	.00	52.76	50.00
* 2.000	25.00	481.11	.00	.10	.00	171.65	95.00
3.000	25.00	481.13	.00	.02	.00	162.30	140.00

	4.000	25.00	481.14	.00	.01	.00	108.24	68.00
*	5.000	25.00	481.15	.00	.01	.00	101.41	22.00
*	6.000	25.00	481.16	.00	.01	.00	97.57	45.00
*	7.000	25.00	481.16	.00	.01	.00	78.51	50.00
*	8.000	25.00	481.18	.00	.01	.00	62.47	38.00
	9.000	25.00	481.18	.00	.01	.00	64.45	7.00
	9.300	25.00	481.19	.00	.01	.00	63.99	16.00
*	10.000	25.00	481.20	.00	.01	.00	89.84	7.00
	11.000	25.00	481.22	.00	.01	.00	157.14	54.00
	12.000	25.00	481.22	.00	.01	.00	158.90	12.00
	13.000	25.00	481.23	.00	.00	.00	214.31	25.00
	14.000	25.00	481.24	.00	.01	.00	268.01	50.00
	15.000	25.00	481.24	.00	.01	.00	294.58	90.00
	16.000	25.00	481.25	.00	.01	.00	337.21	120.00

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 1.500 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1.600 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1.800 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1.900 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 2.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 5.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 6.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 7.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 8.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 10.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

* HEC-2 WATER SURFACE PROFILES *
*
* Version 4.6.2; May 1991 *
*
* RUN DATE 21AUG95 TIME 08:16:28 *
****

* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET, SUITE D *
* DAVIS, CALIFORNIA 95616-4687 *
* (916) 756-1104 *
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X      X  XXXXXXX   XXXXX              XXXXX
X      X  X        X     X            X     X
X      X  X        X                        X
XXXXXXX   XXXX     X          XXXXX    XXXXX
X      X  X        X                  X
X      X  X        X     X            X
X      X  XXXXXXX   XXXXX             XXXXXXX
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21AUG95 08:16:28 PAGE 1

THIS RUN EXECUTED 21AUG95 08:16:28

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HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
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T1 WATER SURFACE PROFILE: 100-YEAR FLOW FILE: "CMCRRSC" **********
T2 RAILROAD DRAINAGE AUGUST,1981;1995 * METRIC *
T3 SWAMP CREEK - PROPOSED CONDITIONS (CULVERTS) F&VD: MDL;SRB **********

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	0	0	0	.001500	1.0	0	25.	480.69	0

NC	.150	.150	.065	.100	.300	0	0	0	0	0
X1	1.0	10.0	100.0	109.7	0	0	0	0	0	0
GR	482.2	0	482.	50.	481.	100.	478.58	101.	478.44	104.
GR	478.59	105.2	478.61	108.7	479.8	109.7	481.	160.	482.	200.
NC	.024	.024	.024	.3	.5	0	0	0	0	0
X1	1.5	20.	103.05	106.	20	20	20	0	0	0
X3	10.	0	0	0	0	0	0	479.5	479.78	0
GR	482.2	0	482.04	50.	481.04	100.	478.62	101.	478.9	103.05
GR	478.8	103.07	478.64	103.14	478.54	103.24	478.47	103.36	478.45	103.5
GR	478.6	106.	478.61	106.19	478.7	106.36	478.84	106.5	479.01	106.59
GR	479.2	106.62	478.65	108.7	479.84	109.7	481.04	160.	482.04	200.
X1	1.6	31.	103.05	106.	2.	2.	2.	0	0	0
BT	31.	0	482.24	482.24	50.	482.04	482.04	100.	481.04	481.04

BT	479.5	479.16	103.24	479.5	479.26	103.36	479.5	479.33	103.5	479.5
BT	479.3	103.64	479.5	479.33	103.76	479.5	479.26	103.86	479.5	479.16
BT	103.93	479.5	479.04	103.95	479.5	478.9	104.	479.5	479.2	105.2
BT	479.8	479.2	105.38	479.83	479.2	105.41	479.83	479.39	105.5	479.83
BT	479.6	105.64	479.82	479.7	105.81	479.82	479.79	106.	479.83	479.82
BT	106.19	479.8	479.79	106.36	479.79	479.7	106.5	479.79	479.56	106.59
BT	479.8	479.39	106.62	479.78	479.2	108.7	479.7	479.7	109.7	479.84
BT	479.84	200.	482.04	482.04	0	0	0	0	0	0
GR	482.24	0	482.04	50.	481.04	100.	479.5	101.	478.9	103.05
GR	478.8	103.07	478.64	103.14	478.54	103.24	478.47	103.36	478.45	103.5
GR	478.5	103.64	478.54	103.76	478.64	103.86	478.76	103.93	478.9	103.95
GR	479.2	104.	479.2	105.2	479.2	105.38	479.01	105.41	478.84	105.5
GR	478.7	105.64	478.61	105.81	478.58	106.	478.61	106.19	478.7	106.36
GR	478.8	106.5	479.01	106.59	479.2	106.62	479.7	108.7	479.84	109.7
GR	482.04	200.	0	0	0	0	0	0	0	0

X1	1.7	0	0	0	10.	10.	10.	0	0	0
X2	0	0	0	0	0	0	1.	0	0	0
X1	1.8	20.	103.05	106.	2.	2.	2.	0	.04	0
X3	10.	0	0	0	0	0	0	479.5	479.78	0
GR	482.2	0	482.04	50.	481.04	100.	478.62	101.	478.9	103.05
GR	478.8	103.07	478.64	103.14	478.54	103.24	478.47	103.36	478.45	103.5
GR	478.6	106.	478.61	106.19	478.7	106.36	478.84	106.5	479.01	106.59
GR	479.2	106.62	478.65	108.7	479.84	109.7	481.04	160.	482.04	200.
NC	.150	.150	.065	.100	.300	0	0	0	0	0
X1	1.9	0	0	0	50.	50.	50.	0	.100	0
X1	2.	10.	137.	155.	70.	100.	95.	0	0	0
GR	482.2	0	482.	66.	479.15	130.	479.	137.	478.85	138.
GR	478.68	154.	479.	155.	479.3	165.	480.	210.	482.1	300.
X1	3.	10.	191.	209.	140.	140.	140.	0	0	0
GR	484.	0	482.	95.	479.36	180.	479.21	191.	479.07	191.5
GR	478.88	200.	478.875	208.5	479.215	209.	479.555	223.	482.	320.
X1	4.	12.	143.	157.	60.	70.	68.	0	0	0
GR	484.	0	482.	80.	480.	100.	479.32	130.	479.3	143.
GR	479.2	143.5	478.635	148.5	479.11	156.5	479.32	157.	479.31	169.
GR	480.	177.	482.	212.	0	0	0	0	0	0
X1	5.	11.	144.	146.6	22.	27.	22.	0	0	0
GR	484.	0	482.	90.	480.	120.	479.405	130.	479.405	144.
GR	478.69	144.3	478.69	146.3	479.385	146.6	479.385	155.	480.	170.
GR	482.	230.	0	0	0	0	0	0	0	0
NH	5.	.150	107.	.045	114.	.150	131.	.045	142.	.150
NH	210.	0	0	0	0	0	0	0	0	0
X1	6.	18.	107.	142.	40.	48.	45.	0	0	0

GR	478.84	109.5	479.22	113.5	479.38	114.	479.375	122.	479.35	131.
GR	479.05	131.5	478.75	136.5	478.97	141.5	479.375	142.	479.89	167.
GR	480.	173.	482.	179.	484.	210.	0	0	0	0
NC	.15	.15	.065	0	0	0	0	0	0	0
X1	7.	11.	102.	115.5	40.	55.	50.	0	0	0
X3				85		135				
GR	484.	0	482.	40.	479.96	78.	479.3	102.	479.04	102.5
GR	478.66	110.5	479.	115.	479.325	115.5	479.93	125.	482.	140.
GR	488.	165.	0	0	0	0	0	0	0	0

X1	8.	10.	71.	80.	40.	35.	38.	0	0	0
X3				60		90				
GR	484.	0	482.	30.	480.61	50.	479.37	71.	478.95	71.5
GR	478.69	75.5	479.185	79.5	479.41	80.	479.6	90.	482.	112.
NC	.012	.012	.012	.3	.5					
X1	9.	10.	100.27	120.74	7.	7.	7.	0	0	0
X3				100		121				
X4	1	478.76	120.74							
GR	484.	0	482.	58.	481.	75.	479.3	100.	478.76	100.27
GR	478.76	103.22	478.76	110.77	478.76	113.72	481.	135.	488.	190.

ADD SECTION
4: 8 FT. X 16 FT. BOX CULVERTS

SC	4.012	0.4	2.60	100	2.44	4.88	12.2	8.1	478.79	478.76
X1	9.30				16	16	16		.03	
X2			2.0	481.2	483.0					
X3				99		122				
NC	.15	.15	.065	.1	.3					
X1	10.	12.	102.	117.	7.	7.	7.	0	0	0
X3				91.0		129.0				
GR	484.	0	482.	52.	481.	65.	479.845	80.	479.305	102.
GR	478.99	102.5	478.81	110.5	479.215	116.5	479.37	117.	479.575	147.
GR	482.	155.	486.	170.	0	0	0	0	0	0
X1	11.	10.	127.	134.5	54.	50.	54.	0	0	0
GR	484.	0	482.	30.	479.59	100.	479.34	127.	479.15	127.5
GR	478.62	130.5	478.97	134.	480.18	134.5	481.	200.	482.	244.
NH	5.	.15	114.	.045	122.	.15	136.	.045	144.	.15
NH	250.	0	0	0	0	0	0	0	0	0
X1	12.	17.	114.	145.	15.	10.	12.	0	0	0
GR	484.	0	482.	22.	479.67	100.	479.345	114.	479.115	114.5
GR	479.05	119.	479.26	122.	479.445	122.5	479.36	130.	479.335	136.
GR	479.19	137.	478.935	140.	479.09	144.	479.29	145.	480.18	170.
GR	481.	195.	482.	250.	0	0	0	0	0	0
NC	.15	.15	.065	.1	.3	0	0	0	0	0

GR	482.	0	479.795	148.	479.52	170.	479.2	170.5	478.74	175.5
GR	479.25	179.5	479.46	180.	479.81	203.5	482.	300.	0	0

X1	14.	10.	166.	175.	63.	48.	50.	0	0	0
GR	480.8	0	479.84	140.	479.345	166.	479.05	166.5	478.65	170.5
GR	479.13	174.5	479.405	175.	479.645	201.	481.	255.	482.	310.

X1	15.	10.	206.	214.	75.	90.	90.	0	0	0
GR	480.8	0	479.69	180.	479.435	206.	479.31	206.5	478.545	210.5
GR	479.25	213.5	479.525	214.	479.75	244.	482.	320.	483.	355.

X1	16.	10.	173.	188.	75.	135.	120.	0	0	0
GR	480.8	0	479.775	150.	479.505	173.	479.180	173.5	479.135	180.5
GR	479.16	187.5	479.4	188.	479.94	218.	482.	405.	484.	500.

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CCHV= .100 CEHV= .300
*SECNO 1.000

1.000	2.55	480.99	.00	480.69	481.03	.03	.00	.00	481.00
25.0	.0	19.5	5.5	.0	21.8	29.9	.0	.0	479.80
.00	.00	.89	.18	.000	.065	.150	.000	478.44	100.00
.001505	0.	0.	0.	0	0	6	.00	59.79	159.79

CCHV= .300 CEHV= .500
*SECNO 1.500

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 3.45

1.500	2.57	481.02	.00	.00	481.04	.02	.01	.00	478.90
25.0	4.1	6.0	14.9	5.8	7.4	37.0	1.0	1.2	478.60
.01	.70	.82	.40	.024	.024	.024	.000	478.45	100.01
.000127	20.	20.	20.	0	0	0	.00	59.37	159.37

*SECNO 1.600

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .65

3370 NORMAL BRIDGE, NRD= 31 MIN ELTRD= 479.50 MAX ELLC= 479.82

25.0	3.3	3.0	18.7	3.9	5.2	34.0	1.1	1.3	478.58
.01	.85	.57	.55	.024	.024	.024	.000	478.45	100.01
.000304	2.	2.	2.	0	0	0	-2.36	58.22	158.23

*SECNO 1.700

3370 NORMAL BRIDGE, NRD= 31 MIN ELTRD= 479.50 MAX ELLC= 479.82

1.700	2.57	481.02	.00	.00	481.04	.02	.00	.00	478.90
25.0	3.3	3.0	18.7	3.9	5.2	34.0	1.5	1.9	478.58
.02	.85	.57	.55	.024	.024	.024	.000	478.45	100.01
.000304	10.	10.	10.	0	0	0	-2.36	58.23	158.24

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 1.800

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.47

1.800	2.53	481.02	.00	.00	481.04	.02	.00	.00	478.94
25.0	4.2	6.2	14.7	5.7	7.2	34.9	1.6	2.0	478.64
.02	.73	.85	.42	.024	.024	.024	.000	478.49	100.02
.000141	2.	2.	2.	0	0	0	.00	57.63	157.65

CCHV= .100 CEHV= .300
*SECNO 1.900

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .18

1.900	2.42	481.01	.00	.00	481.08	.07	.02	.01	479.04
25.0	3.3	11.4	10.3	5.4	6.9	29.2	3.9	4.8	478.74
.03	.61	1.65	.35	.150	.065	.150	.000	478.59	100.07
.004157	50.	50.	50.	2	0	0	.00	52.76	152.83

*SECNO 2.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 6.34

2.000	2.43	481.11	.00	.00	481.11	.00	.03	.01	479.00
25.0	4.4	11.5	9.0	57.4	42.0	111.8	15.4	15.1	479.00
.18	.08	.27	.08	.150	.065	.150	.000	478.68	85.97
.000103	70.	95.	100.	2	0	0	.00	171.65	257.61

*SECNO 3.000

3.000	2.25	481.13	.00	.00	481.13	.00	.02	.00	479.21
25.0	6.3	12.5	6.3	70.6	39.5	73.5	43.1	38.5	479.21
.38	.09	.32	.09	.150	.065	.150	.000	478.88	123.09
.000149	140.	140.	140.	2	0	0	.00	162.30	285.39

*SECNO 4.000

4.000	2.50	481.14	.00	.00	481.14	.00	.01	.00	479.30
25.0	8.9	11.1	5.1	74.5	31.1	45.0	54.0	47.3	479.32
.46	.12	.36	.11	.150	.065	.150	.000	478.64	88.64
.000186	60.	68.	70.	0	0	0	.00	108.24	196.88

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 5.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .52

5.000	2.46	481.15	.00	.00	481.15	.00	.01	.00	479.40
25.0	10.5	3.6	10.9	48.5	6.2	56.1	57.1	49.9	479.39
.48	.22	.58	.19	.150	.065	.150	.000	478.69	102.86
.000681	22.	22.	27.	0	0	0	.00	101.41	204.27

1490 NH CARD USED
*SECNO 6.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.46

6.000	2.41	481.16	.00	.00	481.16	.00	.01	.00	479.32
25.0	1.9	18.8	4.3	25.4	70.1	47.6	62.8	54.3	479.38
.54	.07	.27	.09	.150	.062	.150	.000	478.75	78.93
.000113	40.	45.	48.	0	0	0	.00	97.57	176.49

*SECNO 7.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .52

3470 ENCROACHMENT STATIONS= 85.0 135.0 TYPE= 1 TARGET= 50.000

7.000	2.50	481.16	.00	.00	481.17	.01	.01	.00	479.30
25.0	5.0	16.8	3.2	27.8	31.1	20.2	68.2	57.9	479.33
.57	.18	.54	.16	.150	.065	.150	.000	478.66	85.00
.000415	40.	50.	55.	1	0	0	.00	48.98	133.98

*SECNO 8.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .65

3470 ENCROACHMENT STATIONS= 60.0 90.0 TYPE= 1 TARGET= 30.000

8.000	2.49	481.18	.00	.00	481.20	.02	.02	.00	479.37
25.0	4.1	16.5	4.4	16.2	20.3	16.7	70.7	59.4	479.41
.59	.25	.81	.27	.150	.065	.150	.000	478.69	60.00
.000977	40.	38.	35.	0	0	0	.00	30.00	90.00

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CCHV= .300 CEHV= .500
*SECNO 9.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 9.35

3470 ENCROACHMENT STATIONS= 100.0 121.0 TYPE= 1 TARGET= 21.000

9.000	2.43	481.19	.00	.00	481.20	.01	.00	.00	478.76
25.0	.1	24.9	.1	.6	49.5	.6	71.1	59.6	478.76
.59	.11	.50	.11	.012	.012	.012	.000	478.76	100.00
.000011	7.	7.	7.	0	0	0	.00	21.00	121.00

SPECIAL CULVERT

SC CUNO	CUNV	ENTLC	COFQ	RDLEN	RISE	SPAN	CULVLN	CHRT	SCL	ELCHU	ELCHD
4	.012	.40	2.60	100.00	2.44	4.88	12.20	8	1	478.79	478.76

CHART 8 - BOX CULVERT WITH FLARED WINGWALLS; NO INLET TOP EDGE BEVEL
SCALE 1 - WINGWALLS FLARED 30 TO 75 DEGREES

*SECNO 9.300

SPECIAL CULVERT OUTLET CONTROL
EGIC = 479.652 EGOC = 480.333 PCWSE= 481.189 ELTRD= 483.000

5150, EG OF 480.33 LESS THAN XEG OF 481.20
SPECIAL CULVERT

EGIC	EGOC	H4	QWEIR	QCULV	VCH	ACULV	ELTRD	WEIRLN
479.65	480.33	.00	0.	25.	.484	47.6	483.00	0.

3470 ENCROACHMENT STATIONS= 99.0 122.0 TYPE= 1 TARGET= 23.000

9.300	2.40	481.19	.00	.00	481.20	.01	.00	.00	478.79
25.0	.5	23.8	.7	2.4	49.2	2.9	71.9	59.9	478.79
.60	.22	.48	.24	.012	.012	.012	.000	478.79	99.00
.000010	16.	16.	16.	4	0	0	.00	23.00	122.00

CCHV= .100 CEHV= .300
*SECNO 10.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .16

1

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV

SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3470 ENCROACHMENT STATIONS= 91.0 129.0 TYPE= 1 TARGET= 38.000

10.000	2.38	481.19	.00	.00	481.20	.01	.00	.00	479.30
25.0	3.5	17.7	3.9	19.3	33.4	21.4	72.4	60.1	479.37
.61	.18	.53	.18	.150	.065	.150	.000	478.81	91.00
.000413	7.	7.	7.	0	0	0	.00	38.00	129.00

*SECNO 11.000

11.000	2.60	481.22	.00	.00	481.22	.00	.02	.00	479.34
25.0	13.0	8.2	3.8	85.3	17.2	41.7	78.2	65.2	480.18
.67	.15	.48	.09	.150	.065	.150	.000	478.62	52.91
.000368	54.	54.	50.	1	0	0	.00	156.39	209.30

1490 NH CARD USED
*SECNO 12.000
1530 MANNINGS N VALUES FOR CHANNEL COMPOSITED

12.000	2.29	481.23	.00	.00	481.23	.00	.00	.00	479.35
25.0	6.3	13.1	5.6	64.5	62.0	54.5	80.2	67.2	479.29
.69	.10	.21	.10	.150	.103	.150	.000	478.93	47.97
.000190	15.	12.	10.	0	0	0	.00	159.36	207.33

CCHV= .100 CEHV= .300
*SECNO 13.000

13.000	2.49	481.23	.00	.00	481.23	.00	.00	.00	479.52
25.0	9.3	7.8	7.9	104.1	22.1	82.2	85.5	72.3	479.46
.73	.09	.35	.10	.150	.065	.150	.000	478.74	51.46
.000186	32.	25.	22.	0	0	0	.00	214.76	266.22

*SECNO 14.000
3280 CROSS SECTION 14.00 EXTENDED .44 METERS

14.000	2.59	481.24	.00	.00	481.24	.00	.01	.00	479.35
25.0	12.1	5.6	7.4	171.7	21.0	95.8	99.5	86.0	479.40
.86	.07	.27	.08	.150	.065	.150	.000	478.65	.00
.000099	63.	50.	48.	0	0	0	.00	268.22	268.22

*SECNO 15.000
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3280 CROSS SECTION 15.00 EXTENDED .45 METERS

15.000	2.70	481.25	.00	.00	481.25	.00	.01	.00	479.43
25.0	14.8	4.3	5.9	225.0	18.2	86.5	124.4	108.5	479.52
1.10	.07	.24	.07	.150	.065	.150	.000	478.55	.00
.000082	75.	90.	90.	0	0	0	.00	294.71	294.71

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*SECNO 16.000
3280 CROSS SECTION     16.00 EXTENDED       .46 METERS

    16.000      2.12    481.25       .00       .00    481.26       .00       .01       .00    479.51
      25.0      11.1       6.8       7.1     182.6      31.4     126.3     157.0     139.7    479.40
      1.38       .06       .22       .06      .150      .065      .150      .000    479.14       .00
   .000074       75.      120.      135.         0         0         0       .00    337.53    337.53


1
PROFILE FOR STREAM  AMP CREEK - PROPOSED CON



PLOTTED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA



ELEVATION  478.      479.      479.      480.      480.      481.      481.      482.      482.      483.
    SECNO  CUMDIS

     1.00     0.  I          .         .    R  .         .        .WE        .        .M        .         .         .
              5.  I          .         .R      .         .L       .WE        .        .M        .         .         .
             10.  I          .    R    .       L         .        .WE        .        . M       .         .         .
             15.  I         R.         L       .         .        . E        .        . M       .         .         .
     1.50    20.  I  R      L.         .       .         .        . E        .        . M       .         .         .
     1.60    25.  I  R      L.         .       .         .        . E        .        . M       .         .         .
             30.  I  R      L.         .       .         .        . E        .        . M       .         .         .
     1.70    35.  I  R      L.         .       .         .        . E        .        . M       .         .         .
     1.80    40.  CI  R      L         .       .         .        . E        .        .  M      .         .         .
             45.  CI  R      L         .       .         .        . E        .        .  M      .         .         .
             50.  CI  R      L         .       .         .        . E        .        .  M      .         .         .
             55.  C I  R     .L        .       .         .        . E        .        .  M      .         .         .
             60.  C I  R     .L        .       .         .        . E        .        .   M     .         .         .
             65.  C I  R     .L        .       .         .        .WE        .        .   M     .         .         .
             70.  C I  R     .L        .       .         .        .WE        .        .   M     .         .         .
             75.  C I  R     .L        .       .         .        .W E       .        .   M     .         .         .
             80.  C  I  R    . L       .       .         .        .W E       .        .   M     .         .         .
     1.90    85.  C  I  R    . L       .       .         .        .W E       .        .    M    .         .         .
             90.  C  I  R    . L       .       .         .        . WE       .        .    M    .         .         .
             95.  C  I   R   . L       .       .         .        . WE       .        .    M    .         .         .
            100.  C  I   R   . L       .       .         .        . WE       .        .    M    .         .         .
            105.  C  I   R   . L       .       .         .        . WE       .        .   M     .         .         .
            110.  C  I   R   . L       .       .         .        . WE       .        .   M     .         .         .
            115.  C   I   R . L        .       .         .        . WE       .        .   M     .         .         .
            120.  C   I   R . L        .       .         .        . WE       .        .   M     .         .         .
            125.  C   I   R . L        .       .         .        . WE       .        .   M     .         .         .
            130.  C   I   R . L        .       .         .        . WE       .        .   M     .         .         .
            135.  C   I    R. L        .       .         .        . WE       .        .   M     .         .         .
            140.  C   I    R. L        .       .         .        .  E       .        .   M     .         .         .
            145.  C   I    R.L         .       .         .        .  E       .        .   M     .         .         .
            150.  C   I     RL         .       .         .        .  E       .        .   M     .         .         .
            155.  C   I     RL         .       .         .        .  E       .        .   M     .         .         .
            160.  C   I     RL         .       .         .        .  E       .        .   M     .         .         .
            165.  C    I    RL         .       .         .        .  E       .        . M       .         .         .
            170.  C    I    .L         .       .         .        .  E       .        . M       .         .         .
            175.  C    I    .L         .       .         .        .  E       .        . M       .         .         .
     2.00   180.  C    I    .L         .       .         .        .  E       .        . M       .         .         .
            185.  C    I    .L         .       .         .        .  E       .        . M       .         .         .
            190.  C    I    .L         .       .         .        .  E       .        . M       .         .         .
            195.  C    I    . L        .       .         .        .  E       .        . M       .         .         .
            200.  C    I    . L        .       .         .        .  E       .        . M       .         .         .
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        210.  C     I   . L        .          .          .         . E       .         . M         .          .          .
        215.  C     I   . L        .          .          .         . E       .         . M         .          .          .
        220.  C     I   . L        .          .          .         .  E      .         . M         .          .          .
        225.  C     I   .  L       .          .          .         .  E      .         . M         .          .          .
        230.  C     I   .  L       .          .          .         .  E      .         .M          .          .          .
        235.  C     I   .  L       .          .          .         .  E      .         .M          .          .          .
        240.  C      I  .  L       .          .          .         .  E      .         .M          .          .          .
        245.  C      I  .  L       .          .          .         .  E      .         .M          .          .          .
        250.  C      I  .  L       .          .          .         .  E      .         .M          .          .          .
        255.  C      I  .  L       .          .          .         .  E      .         .M          .          .          .
        260.  C      I  .   L      .          .          .         .  E      .         .M          .          .          .
        265.  C      I  .   L      .          .          .         .  E      .         .M          .          .          .
        270.  C      I  .   L      .          .          .         .  E      .         .M          .          .          .
        275.  C       I .   L      .          .          .         .  E      .         .M          .          .          .
        280.  C       I .   L      .          .          .         .  E      .         .M          .          .          .
        285.  C       I .   L      .          .          .         .  E      .         .M          .          .          .
        290.  C       I .   L      .          .          .         .  E      .         .M          .          .          .
        295.  C       I .    L     .          .          .         .  E      .         .M          .          .          .
        300.  C       I .    L     .          .          .         .  E      .         .M          .          .          .
        305.  C       I .    L     .          .          .         .  E      .         .M          .          .          .
        310.  C        I.    L     .          .          .         .  E      .         .M          .          .          .
        315.  C        I.    L     .          .          .         .  E      .         .M          .          .          .
3.00    320.  C        I.    L     .          .          .         .  E      .         .M          .          .          .
        325.  C       I .     L    .          .          .         .  E      .         .M          .          .          .
        330.  C       I .     L    .          .          .         .  E      .         .M          .          .          .
        335.  C       I .     L    .          .          .         .  E      .         .M          .          .          .
        340.  C      I  .     L    .          .          .         .  E      .         .M          .          .          .
        345.  C      I  .     L    .          .          .         .  E      .         .M          .          .          .
        350.  C      I  .     L    .          .          .         .  E      .         .M          .          .          .
        355.  C     I   .     LR   .          .          .         .  E      .         .M          .          .          .
        360.  C     I   .     LR   .          .          .         .  E      .         .M          .          .          .
        365.  C     I   .      L   .          .          .         .  E      .         .M          .          .          .
        370.  C    I    .      L   .          .          .         .  E      .         .M          .          .          .
        375.  C    I    .      L   .          .          .         .  E      .         .M          .          .          .
        380.  C    I    .      L   .          .          .         .  E      .         .M          .          .          .
        385.  C   I     .      LR  .          .          .         .  E      .         .M          .          .          .
4.00    390.  C   I     .      LR  .          .          .         .  E      .         .M          .          .          .
        395.  C   I     .       L  .          .          .         .  E      .         .M          .          .          .
        400.  C   I     .       L  .          .          .         .  E      .         .M          .          .          .
        405.  C    I    .        L.           .          .         .  E      .         .M          .          .          .
5.00    410.  C    I    .        L.           .          .         .  E      .         .M          .          .          .
        415.  C    I    .        L.           .          .         .  E      .         .     M    .          .          .
        420.  C    I    .        L.           .          .         .  E      .         .          M          .          .
        425.  C    I    .        L.           .          .         .  E      .         .          .     M    .          .
        430.  C     I   .       LR.           .          .         .  E      .         .          .          M.         .
        435.  C     I   .       LR.           .          .         .  E      .         .          .          . M        .
        440.  C     I   .       LR.           .          .         .  E      .         .          .          .        M .
        445.  C     I   .       LR.           .          .         .  E      .         .          .          .          M
        450.  C     I   .       LR.           .          .         .  E      .         .          .          .          M
6.00    455.  C     I   .       LR.           .          .         .  E      .         .          .          .          M
        460.  C     I   .       LR.           .          .         .  E      .         .          .          .          M
        465.  C     I   .       LR.           .          .         .  E      .         .          .          .          M
        470.  C     I   .      LR .           .          .         .  E      .         .          .          .          M
        475.  C    I    .      LR .           .          .         .  E      .         .          .          .          M
        480.  C    I    .      LR .           .          .         .   E     .         .          .          .          M
        485.  C    I    .      LR .           .          .         .   E     .         .          .          .          M
        490.  C    I    .      LR .           .          .         .   E     .         .          .          .          M
        495.  C    I    .      LR .           .          .         .   E     .         .          .          .          M
        500.  C    I    .      LR .           .          .         .   E     .         .          .          .          M
7.00    505.  C   I     .      LR .           .          .         .   E     .         .          .          .          M
        510.  C   I     .      LR .           .          .         .   E     .         .          .          .          M
        515.  C   I     .       L .           .          .         .   E     .         .          .          .          M
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       525.  C    I     .       LR.         .         .         .   E     .         .         .         .         M
       530.  C    I     .       LR.         .         .         .   E     .         .         .         .         M
       535.  C    I     .       LR.         .         .         .   E     .         .         .         .     M   .
       540.  C    I     .       LR.         .         .         .   E     .         .         .M        .         .
8.00   545.  C    I     .        L.         .         .         .   E     .         .M        .         .         .
9.00   550.  C     I    .         .         .         .         .   E     .         .         .         .         M
       555.  C      I   .         .         .         .         .   E     .         .         .         .         M
       560.  C      I   .         .         .         .         .   E     .         .         .         .         M
9.30   565.  C      I   .         .         .         .         .   E     .         .         .         .         M
       570.  C      I   .   LR    .         .         .         .   E     .         .         .         .         M
10.00  575.  C      I   .      L R.         .         .         .   E     .         .         .         .         M
       580.  C      I   .      L  R         .         .         .   E     .         .         .         .         M
       585.  C      I   .      L  . R       .         .         .   E     .         .         .         .         M
       590.  C     I    .      L  .  R      .         .         .   E     .         .         .         .         M
       595.  C     I    .      L  .    R    .         .         .   E     .         .         .         .         M
       600.  C     I    .       L .     R   .         .         .   E     .         .         .         .         M
       605.  C    I     .       L .       R .         .         .   E     .         .         .         .         M
       610.  C    I     .       L .        R.         .         .   E     .         .         .         .        M.
       615.  C    I     .       L .         .R        .         .   E     .         .         .         . M       .
       620.  C   I      .       L .         . R       .         .   WE    .         .         .    M    .         .
       625.  C   I      .       L .         .   R     .         .   WE    .         .      M  .         .         .
11.00  630.  C   I      .       L .         .    R    .         .   WE    .         .M        .         .         .
       635.  C      I   .       L .      R  .         .         .   WE    .         .M        .         .         .
12.00  640.  C          I      RL .         .         .         .    E    .         .M        .         .         .
       645.  C         I.       RL.         .         .         .    E    .         .M        .         .         .
       650.  C        I .       R L         .         .         .    E    .         .M        .         .         .
       655.  C        I .        RL         .         .         .    E    .         .M        .         .         .
       660.  C       I  .         RL        .         .         .    E    .         .M        .         .         .
13.00  665.  C      I   .         R L       .         .         .    E    .         .M        .         .         .
       670.  C      I   .         RL        .         .         .    E    .        M.         .         .         .
       675.  C      I   .         RL        .         .         .    E    .     M   .         .         .         .
       680.  C     I    .         RL        .         .         .    E    .   M     .         .         .         .
       685.  C     I    .         L         .         .         .    E    . M       .         .         .         .
       690.  C     I    .         L         .         .         .    E   M.         .         .         .         .
       695.  C     I    .         L         .         .         .    EM   .         .         .         .         .
       700.  C     I    .        LR         .         .         .  M E    .         .         .         .         .
       705.  C     I    .        L.         .         .         . M  E    .         .         .         .         .
       710.  C    I     .        L.         .         .         M    E    .         .         .         .         .
14.00  715.  C    I     .       LR.         .         .      M  .    E    .         .         .         .         .
       720.  C    I     .       LR.         .         .      M  .    E    .         .         .         .         .
       725.  C    I     .       LR.         .         .      M  .    E    .         .         .         .         .
       730.  C    I     .       L R         .         .      M  .    E    .         .         .         .         .
       735.  C    I     .        LR         .         .      M  .    E    .         .         .         .         .
       740.  C    I     .        LR         .         .      M  .    E    .         .         .         .         .
       745.  C    I     .        LR         .         .      M  .    E    .         .         .         .         .
       750.  C   I      .        LR         .         .      M  .    E    .         .         .         .         .
       755.  C   I      .        LR         .         .      M  .    E    .         .         .         .         .
       760.  C   I      .        LR         .         .      M  .    E    .         .         .         .         .
       765.  C   I      .        L.R        .         .      M  .    E    .         .         .         .         .
       770.  C   I      .        L.R        .         .      M  .    E    .         .         .         .         .
       775.  C   I      .        L.R        .         .      M  .    E    .         .         .         .         .
       780.  C   I      .        L.R        .         .      M  .    E    .         .         .         .         .
       785.  C   I      .        L.R        .         .      M  .    E    .         .         .         .         .
       790.  C   I      .         LR        .         .      M  .    E    .         .         .         .         .
       795.  C I        .         LR        .         .      M  .    E    .         .         .         .         .
       800.  C I        .         LR        .         .      M  .    E    .         .         .         .         .
15.00  805.  C I        .         L R       .         .      M  .    E    .         .         .         .         .
       810.  C   I      .         LR        .         .      M  .    E    .         .         .         .         .
       815.  C   I      .         LR        .         .      M  .    E    .         .         .         .         .
       820.  C    I     .         LR        .         .      M  .    E    .         .         .         .         .
       825.  C    I     .         LR        .         .      M  .    E    .         .         .         .         .
       830.  C     I    .         LR        .         .      M  .    E    .         .         .         .         .
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      840.  C     I   .         LR         .         .     M  .     E  .         .         .         .         .
      845.  C     I   .         LR         .         .     M  .     E  .         .         .         .         .
      850.  C      I  .         LR         .         .     M  .     E  .         .         .         .         .
      855.  C      I  .         LR         .         .     M  .     E  .         .         .         .         .
      860.  C       I .         RL         .         .     M  .     E  .         .         .         .         .
      865.  C       I .         RL         .         .     M  .     E  .         .         .         .         .
      870.  C        I.         RL         .         .     M  .     E  .         .         .         .         .
      875.  C        I.         RL         .         .     M  .     E  .         .         .         .         .
      880.  C         I         RL         .         .     M  .     E  .         .         .         .         .
      885.  C         I         RL         .         .     M  .     E  .         .         .         .         .
      890.  C         .I        RL         .         .     M  .     E  .         .         .         .         .
      895.  C         .I        RL         .         .     M  .     E  .         .         .         .         .
      900.  C         . I       RL         .         .     M  .     E  .         .         .         .         .
      905.  C         . I       RL         .         .     M  .     E  .         .         .         .         .
      910.  C         .  I     R.L         .         .     M  .     E  .         .         .         .         .
      915.  C         .  I     R.L         .         .     M  .     E  .         .         .         .         .
      920.  C         .   I    R.L         .         .     M  .     E  .         .         .         .         .
16.00 925.  C         .   I    R.L         .         .     M  .     E  .         .         .         .         .
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THIS RUN EXECUTED 21AUG95 08:16:30

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HEC-2 WATER SURFACE PROFILES

Version   4.6.2;  May 1991
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

AMP CREEK - PROPOSED CON

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	1.000	.00	.00	.00	478.44	25.00	480.99	.00	481.03	15.05	.89	51.74	6.45
*	1.500	20.00	.00	.00	478.45	25.00	481.02	.00	481.04	1.27	.82	50.21	22.21
*	1.600	2.00	479.50	479.82	478.45	25.00	481.02	.00	481.04	3.04	.57	43.02	14.34
	1.700	10.00	479.50	479.82	478.45	25.00	481.02	.00	481.04	3.04	.57	43.04	14.35
*	1.800	2.00	.00	.00	478.49	25.00	481.02	.00	481.04	1.41	.85	47.81	21.03
*	1.900	50.00	.00	.00	478.59	25.00	481.01	.00	481.08	41.57	1.65	41.45	3.88
*	2.000	95.00	.00	.00	478.68	25.00	481.11	.00	481.11	1.03	.27	211.22	24.58
	3.000	140.00	.00	.00	478.88	25.00	481.13	.00	481.13	1.49	.32	183.47	20.45
	4.000	68.00	.00	.00	478.64	25.00	481.14	.00	481.14	1.86	.36	150.58	18.31
*	5.000	22.00	.00	.00	478.69	25.00	481.15	.00	481.15	6.81	.58	110.76	9.58

*	7.000	50.00	.00	.00	478.66	25.00	481.16	.00	481.17	4.15	.54	79.07	12.27
*	8.000	38.00	.00	.00	478.69	25.00	481.18	.00	481.20	9.77	.81	53.18	8.00
*	9.000	7.00	.00	.00	478.76	25.00	481.19	.00	481.20	.11	.50	50.75	74.81
	9.300	16.00	483.00	481.20	478.79	25.00	481.19	.00	481.20	.10	.48	54.46	77.22
*	10.000	7.00	.00	.00	478.81	25.00	481.19	.00	481.20	4.13	.53	73.98	12.31
	11.000	54.00	.00	.00	478.62	25.00	481.22	.00	481.22	3.68	.48	144.24	13.04

SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
12.000	12.00	.00	.00	478.93	25.00	481.23	.00	481.23	1.90	.21	180.96	18.15
13.000	25.00	.00	.00	478.74	25.00	481.23	.00	481.23	1.86	.35	208.44	18.36
14.000	50.00	.00	.00	478.65	25.00	481.24	.00	481.24	.99	.27	288.44	25.09
15.000	90.00	.00	.00	478.55	25.00	481.25	.00	481.25	.82	.24	329.71	27.55
16.000	120.00	.00	.00	479.14	25.00	481.25	.00	481.26	.74	.22	340.29	29.03

AMP CREEK - PROPOSED CON

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	1.000	25.00	480.99	.00	.00	.30	59.79	.00
*	1.500	25.00	481.02	.00	.03	.00	59.37	20.00
*	1.600	25.00	481.02	.00	.00	.00	58.22	2.00
	1.700	25.00	481.02	.00	.00	.00	58.23	10.00
*	1.800	25.00	481.02	.00	.00	.00	57.63	2.00
*	1.900	25.00	481.01	.00	-.01	.00	52.76	50.00
*	2.000	25.00	481.11	.00	.10	.00	171.65	95.00
	3.000	25.00	481.13	.00	.02	.00	162.30	140.00
	4.000	25.00	481.14	.00	.01	.00	108.24	68.00
*	5.000	25.00	481.15	.00	.01	.00	101.41	22.00
*	6.000	25.00	481.16	.00	.01	.00	97.57	45.00

*	8.000	25.00	481.18	.00	.01	.00	30.00	38.00
*	9.000	25.00	481.19	.00	.01	.00	21.00	7.00
	9.300	25.00	481.19	.00	.00	.00	23.00	16.00
*	10.000	25.00	481.19	.00	.00	.00	38.00	7.00
	11.000	25.00	481.22	.00	.03	.00	156.39	54.00
	12.000	25.00	481.23	.00	.01	.00	159.36	12.00
	13.000	25.00	481.23	.00	.00	.00	214.76	25.00
	14.000	25.00	481.24	.00	.01	.00	268.22	50.00
	15.000	25.00	481.25	.00	.01	.00	294.71	90.00
	16.000	25.00	481.25	.00	.01	.00	337.53	120.00

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 1.500 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1.600 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1.800 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1.900 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 2.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 5.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 6.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 7.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 8.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 9.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 10.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

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*  HEC-2 WATER SURFACE PROFILES                       *
*                                                     *
*  Version   4.6.2;  May 1991                         *
*                                                     *
*  RUN DATE    21AUG95    TIME    08:19:24            *
*******************************************************

                                                      *  U.S. ARMY CORPS OF ENGINEERS        *
                                                      *  HYDROLOGIC ENGINEERING CENTER       *
                                                      *  609 SECOND STREET, SUITE D          *
                                                      *  DAVIS, CALIFORNIA 95616-4687        *
                                                      *        (916) 756-1104                *
                                                      ****************************************
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X      X  XXXXXXX   XXXXX           XXXXX
X      X  X        X     X         X     X
X      X  X        X                     X
XXXXXXX   XXXX     X        XXXXX   XXXXX
X      X  X        X               X
X      X  X        X     X         X
X      X  XXXXXXX   XXXXX          XXXXXXX
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1
  21AUG95       08:19:24                                                       PAGE     1


                                                  THIS RUN EXECUTED 21AUG95     08:19:24

 ****************************************
 HEC-2 WATER SURFACE PROFILES

 Version    4.6.2;  May 1991
 ****************************************


T1    WATER SURFACE PROFILE:  100-YEAR FLOW    FILE: "CMCRRSP2" **********
T2    RAILROAD DRAINAGE                        AUGUST, 1995      * METRIC *
T3    SWAMP CREEK - PROPOSED CONDITIONS (SPAN) F&VD: SRB/MDL     **********


J1  ICHECK    INQ      NINV     IDIR     STRT      METRIC    HVINS    Q        WSEL     FQ

       0        0        0        0    .001500     1.0        0      25.     480.69      0


NC     .150     .150     .065     .100     .300        0        0        0        0        0

X1      1.0     10.0    100.0    109.7        0        0        0        0        0        0
GR    482.2        0     482.      50.     481.     100.   478.58     101.   478.44     104.
GR   478.59    105.2   478.61    108.7    479.8    109.7     481.     160.     482.     200.

NC     .024     .024     .024       .3       .5        0        0        0        0        0

X1      1.5      20.   103.05     106.       20       20       20        0        0        0
X3      10.        0        0        0        0        0        0    479.5   479.78        0
GR    482.2        0   482.04      50.   481.04     100.   478.62     101.    478.9   103.05
GR    478.8   103.07   478.64   103.14   478.54   103.24   478.47   103.36   478.45    103.5
GR    478.6     106.   478.61   106.19    478.7   106.36   478.84    106.5   479.01   106.59
GR    479.2   106.62   478.65    108.7   479.84    109.7   481.04     160.   482.04     200.


X1      1.6      31.   103.05     106.       2.       2.       2.        0        0        0
BT      31.        0   482.24   482.24      50.   482.04   482.04     100.   481.04   481.04
```

BT	479.5	479.16	103.24	479.5	479.26	103.36	479.5	479.33	103.5	479.5
BT	479.3	103.64	479.5	479.33	103.76	479.5	479.26	103.86	479.5	479.16
BT	103.93	479.5	479.04	103.95	479.5	478.9	104.	479.5	479.2	105.2
BT	479.8	479.2	105.38	479.83	479.2	105.41	479.83	479.39	105.5	479.83
BT	479.6	105.64	479.82	479.7	105.81	479.82	479.79	106.	479.83	479.82
BT	106.19	479.8	479.79	106.36	479.79	479.7	106.5	479.79	479.56	106.59
BT	479.8	479.39	106.62	479.78	479.2	108.7	479.7	479.7	109.7	479.84
BT	479.84	200.	482.04	482.04	0	0	0	0	0	0
GR	482.24	0	482.04	50.	481.04	100.	479.5	101.	478.9	103.05
GR	478.8	103.07	478.64	103.14	478.54	103.24	478.47	103.36	478.45	103.5
GR	478.5	103.64	478.54	103.76	478.64	103.86	478.76	103.93	478.9	103.95
GR	479.2	104.	479.2	105.2	479.2	105.38	479.01	105.41	478.84	105.5
GR	478.7	105.64	478.61	105.81	478.58	106.	478.61	106.19	478.7	106.36
GR	478.8	106.5	479.01	106.59	479.2	106.62	479.7	108.7	479.84	109.7
GR	482.04	200.	0	0	0	0	0	0	0	0

X1	1.7	0	0	0	10.	10.	10.	0	0	0
X2	0	0	0	0	0	0	1.	0	0	0

X1	1.8	20.	103.05	106.	2.	2.	2.	0	.04	0
X3	10.	0	0	0	0	0	0	479.5	479.78	0
GR	482.2	0	482.04	50.	481.04	100.	478.62	101.	478.9	103.05
GR	478.8	103.07	478.64	103.14	478.54	103.24	478.47	103.36	478.45	103.5
GR	478.6	106.	478.61	106.19	478.7	106.36	478.84	106.5	479.01	106.59
GR	479.2	106.62	478.65	108.7	479.84	109.7	481.04	160.	482.04	200.

NC	.150	.150	.065	.100	.300	0	0	0	0	0

X1	1.9	0	0	0	50.	50.	50.	0	.100	0

X1	2.	10.	137.	155.	70.	100.	95.	0	0	0
GR	482.2	0	482.	66.	479.15	130.	479.	137.	478.85	138.
GR	478.68	154.	479.	155.	479.3	165.	480.	210.	482.1	300.

X1	3.	10.	191.	209.	140.	140.	140.	0	0	0
GR	484.	0	482.	95.	479.36	180.	479.21	191.	479.07	191.5
GR	478.88	200.	478.875	208.5	479.215	209.	479.555	223.	482.	320.

X1	4.	12.	143.	157.	60.	70.	68.	0	0	0
GR	484.	0	482.	80.	480.	100.	479.32	130.	479.3	143.
GR	479.2	143.5	478.635	148.5	479.11	156.5	479.32	157.	479.31	169.
GR	480.	177.	482.	212.	0	0	0	0	0	0

X1	5.	11.	144.	146.6	22.	27.	22.	0	0	0
GR	484.	0	482.	90.	480.	120.	479.405	130.	479.405	144.
GR	478.69	144.3	478.69	146.3	479.385	146.6	479.385	155.	480.	170.
GR	482.	230.	0	0	0	0	0	0	0	0

NH	5.	.150	107.	.045	114.	.150	131.	.045	142.	.150
NH	210.	0	0	0	0	0	0	0	0	0

X1	6.	18.	107.	142.	40.	48.	45.	0	0	0

GR	484.	0	482.	65.	480.8	85.	479.32	107.	479.12	107.5
GR	478.84	109.5	479.22	113.5	479.38	114.	479.375	122.	479.35	131.
GR	479.05	131.5	478.75	136.5	478.97	141.5	479.375	142.	479.89	167.
GR	480.	173.	482.	179.	484.	210.	0	0	0	0
NC	.15	.15	.065	0	0	0	0	0	0	0

X1	7.	11.	102.	115.5	40.	55.	50.	0	0	0
X3				90.0		129.0				
GR	484.	0	482.	40.	479.96	78.	479.3	102.	479.04	102.5
GR	478.66	110.5	479.	115.	479.325	115.5	479.93	125.	482.	140.
GR	488.	165.	0	0	0	0	0	0	0	0
X1	8.	10.	69.15	81.85	40.	35.	38.	0	0	0
X3				63.0		86.0				
GR	484.	0	482.	30.	480.61	50.	479.00	69.15	478.69	69.25
GR	478.69	75.5	478.69	81.75	479.00	81.85	479.6	90.	482.	112.
NC	.024	.024	.024	.3	.5					
X1	9.	10.	97.70	117.10	7.	7.	7.	0	0	0
X3				97		118				
GR	484.83	0	480.35	97.7	480.35	97.8	479.0	100.11	478.76	101.11
GR	478.76	113.61	479.00	114.61	480.35	117.00	480.35	117.1	484.83	190.0
X1	9.1				2.0	2.0	2.0			
X3				97.8		117				
X1	9.2				12	12	12		.03	
X3				97.8		117				
BT	-10.0	0.0	484.83	484.83	97.7	484.83	480.35	97.8	484.83	482.37
BT		100.11	484.83	482.37	101.11	484.83	482.37	113.61	484.83	482.37
BT		114.61	484.83	482.37	117.0	484.83	482.37	117.1	484.83	480.35
BT		190	484.83	484.83						
X1	9.3	12.0	97.60	117.10	2.	2.	2.			
X3				98		118				
GR	484.0	0.0	482.0	58.0	481.0	75.0	479.30	97.6	479.07	101.0
GR	478.76	101.41	478.76	111.47	478.76	111.57	478.76	112.0	479.00	117.1
GR	481.0	135.0	488.0	190.0						
NC	.15	.15	.065	.1	.3					
X1	10.	12.	102.	117.	7.	7.	7.	0	0	0
X3				92		128				
X4	2	478.81	104.25	479.00	116.85					
GR	484.	0	482.	52.	481.	65.	479.845	80.	479.305	102.
GR	479.00	104.15	478.81	110.5	478.81	116.75	479.37	117.	479.575	147.
GR	482.	155.	486.	170.	0	0	0	0	0	0
X1	11.	10.	127.	134.5	54.	50.	54.	0	0	0
X3				61		198				
GR	484.	0	482.	30.	479.59	100.	479.34	127.	479.15	127.5
GR	478.62	130.5	478.97	134.	480.18	134.5	481.	200.	482.	244.

NH	5.	.15	114.	.045	122.	.15	136.	.045	144.	.15
NH	250.	0	0	0	0	0	0	0	0	0
X1	12.	17.	114.	145.	15.	10.	12.	0	0	0
GR	484.	0	482.	22.	479.67	100.	479.345	114.	479.115	114.5
GR	479.05	119.	479.26	122.	479.445	122.5	479.36	130.	479.335	136.
GR	479.19	137.	478.935	140.	479.09	144.	479.29	145.	480.18	170.
GR	481.	195.	482.	250.	0	0	0	0	0	0
NC	.15	.15	.065	.1	.3	0	0	0	0	0
X1	13.	9.	170.	180.	32.	22.	25.	0	0	0
GR	482.	0	479.795	148.	479.52	170.	479.2	170.5	478.74	175.5
GR	479.25	179.5	479.46	180.	479.81	203.5	482.	300.	0	0
X1	14.	10.	166.	175.	63.	48.	50.	0	0	0
GR	480.8	0	479.84	140.	479.345	166.	479.05	166.5	478.65	170.5
GR	479.13	174.5	479.405	175.	479.645	201.	481.	255.	482.	310.
X1	15.	10.	206.	214.	75.	90.	90.	0	0	0
GR	480.8	0	479.69	180.	479.435	206.	479.31	206.5	478.545	210.5
GR	479.25	213.5	479.525	214.	479.75	244.	482.	320.	483.	355.
X1	16.	10.	173.	188.	75.	135.	120.	0	0	0
GR	480.8	0	479.775	150.	479.505	173.	479.180	173.5	479.135	180.5
GR	479.16	187.5	479.4	188.	479.94	218.	482.	405.	484.	500.

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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CCHV= .100 CEHV= .300

*SECNO 1.000

1.000	2.55	480.99	.00	480.69	481.03	.03	.00	.00	481.00
25.0	.0	19.5	5.5	.0	21.8	29.9	.0	.0	479.80
.00	.00	.89	.18	.000	.065	.150	.000	478.44	100.00
.001505	0.	0.	0.	0	0	6	.00	59.79	159.79

CCHV= .300 CEHV= .500

*SECNO 1.500

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 3.45

1.500	2.57	481.02	.00	.00	481.04	.02	.01	.00	478.90

.01	.70	.82	.40	.024	.024	.024	.000	478.45	100.01
.000127	20.	20.	20.	0	0	0	.00	59.37	159.37

*SECNO 1.600

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .65

3370 NORMAL BRIDGE, NRD= 31 MIN ELTRD= 479.50 MAX ELLC= 479.82

1.600	2.57	481.02	.00	.00	481.04	.02	.00	.00	478.90
25.0	3.3	3.0	18.7	3.9	5.2	34.0	1.1	1.3	478.58
.01	.85	.57	.55	.024	.024	.024	.000	478.45	100.01
.000304	2.	2.	2.	0	0	0	-2.36	58.22	158.23

*SECNO 1.700

3370 NORMAL BRIDGE, NRD= 31 MIN ELTRD= 479.50 MAX ELLC= 479.82

1.700	2.57	481.02	.00	.00	481.04	.02	.00	.00	478.90
25.0	3.3	3.0	18.7	3.9	5.2	34.0	1.5	1.9	478.58
.02	.85	.57	.55	.024	.024	.024	.000	478.45	100.01
.000304	10.	10.	10.	0	0	0	-2.36	58.23	158.24

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 1.800

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.47

1.800	2.53	481.02	.00	.00	481.04	.02	.00	.00	478.94
25.0	4.2	6.2	14.7	5.7	7.2	34.9	1.6	2.0	478.64
.02	.73	.85	.42	.024	.024	.024	.000	478.49	100.02
.000141	2.	2.	2.	0	0	0	.00	57.63	157.65

CCHV= .100 CEHV= .300
*SECNO 1.900

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .18

1.900	2.42	481.01	.00	.00	481.08	.07	.02	.01	479.04
25.0	3.3	11.4	10.3	5.4	6.9	29.2	3.9	4.8	478.74
.03	.61	1.65	.35	.150	.065	.150	.000	478.59	100.07
.004157	50.	50.	50.	2	0	0	.00	52.76	152.83

*SECNO 2.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 6.34

25.0	4.4	11.5	9.0	57.4	42.0	111.8	15.4	15.1	479.00
.18	.08	.27	.08	.150	.065	.150	.000	478.68	85.97
.000103	70.	95.	100.	2	0	0	.00	171.65	257.61

*SECNO 3.000

3.000	2.25	481.13	.00	.00	481.13	.00	.02	.00	479.21
25.0	6.3	12.5	6.3	70.6	39.5	73.5	43.1	38.5	479.21
.38	.09	.32	.09	.150	.065	.150	.000	478.88	123.09
.000149	140.	140.	140.	2	0	0	.00	162.30	285.39

*SECNO 4.000

4.000	2.50	481.14	.00	.00	481.14	.00	.01	.00	479.30
25.0	8.9	11.1	5.1	74.5	31.1	45.0	54.0	47.3	479.32
.46	.12	.36	.11	.150	.065	.150	.000	478.64	88.64
.000186	60.	68.	70.	0	0	0	.00	108.24	196.88

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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 5.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .52

5.000	2.46	481.15	.00	.00	481.15	.00	.01	.00	479.40
25.0	10.5	3.6	10.9	48.5	6.2	56.1	57.1	49.9	479.39
.48	.22	.58	.19	.150	.065	.150	.000	478.69	102.86
.000681	22.	22.	27.	0	0	0	.00	101.41	204.27

1490 NH CARD USED
*SECNO 6.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.20

3470 ENCROACHMENT STATIONS= 105.0 165.0 TYPE= 1 TARGET= 60.000

6.000	2.41	481.16	.00	.00	481.16	.00	.01	.00	479.32
25.0	.3	21.1	3.7	3.6	70.1	35.7	62.0	53.5	479.38
.53	.08	.30	.10	.150	.062	.150	.000	478.75	105.00
.000141	40.	45.	48.	0	0	0	.00	60.00	165.00

*SECNO 7.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .55

3470 ENCROACHMENT STATIONS= 90.0 129.0 TYPE= 1 TARGET= 39.000

7.000	2.50	481.16	.00	.00	481.18	.01	.01	.00	479.30
25.0	3.9	17.8	3.3	20.5	31.1	18.5	66.6	56.0	479.33
.56	.19	.57	.18	.150	.065	.150	.000	478.66	90.00
.000465	40.	50.	55.	1	0	0	.00	39.00	129.00

*SECNO 8.000

3470 ENCROACHMENT STATIONS= 63.0 86.0 TYPE= 1 TARGET= 23.000

8.000	2.49	481.18	.00	.00	481.20	.02	.02	.00	479.00
25.0	2.5	20.9	1.7	11.8	31.5	8.4	68.9	57.2	479.00
.58	.21	.66	.20	.150	.065	.150	.000	478.69	63.00
.000576	40.	38.	35.	0	0	0	.00	23.00	86.00

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CCHV= .300 CEHV= .500
*SECNO 9.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.78

3470 ENCROACHMENT STATIONS= 97.0 118.0 TYPE= 1 TARGET= 21.000

9.000	2.42	481.18	.00	.00	481.20	.02	.00	.00	480.35
25.0	.1	24.7	.1	.6	42.1	.7	69.2	57.3	480.35
.58	.19	.59	.21	.024	.024	.024	.000	478.76	97.00
.000074	7.	7.	7.	0	0	0	.00	21.00	118.00

*SECNO 9.100

3470 ENCROACHMENT STATIONS= 97.8 117.0 TYPE= 1 TARGET= 19.200

9.100	2.42	481.18	.00	.00	481.20	.02	.00	.00	100000.00
25.0	.0	25.0	.0	.0	42.0	.0	69.3	57.4	100000.00
.58	.00	.60	.00	.000	.024	.000	.000	478.76	97.80
.000085	2.	2.	2.	0	0	0	.00	19.20	117.00

*SECNO 9.200

3370 NORMAL BRIDGE, NRD= 10 MIN ELTRD= 484.83 MAX ELLC= 482.37

3470 ENCROACHMENT STATIONS= 97.8 117.0 TYPE= 1 TARGET= 19.200

9.200	2.39	481.18	.00	.00	481.20	.02	.00	.00	100000.00
25.0	.0	25.0	.0	.0	41.4	.0	69.8	57.6	100000.00
.59	.00	.60	.00	.000	.024	.000	.000	478.79	97.80
.000088	12.	12.	12.	0	0	0	.00	19.20	117.00

*SECNO 9.300

3470 ENCROACHMENT STATIONS= 98.0 118.0 TYPE= 1 TARGET= 20.000

9.300	2.43	481.19	.00	.00	481.20	.02	.00	.00	100000.00
25.0	.0	24.5	.5	.0	44.4	1.9	69.9	57.7	479.00
.59	.00	.55	.25	.000	.024	.024	.000	478.76	98.00
.000065	2.	2.	2.	0	0	0	.00	20.00	118.00

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CCHV= .100 CEHV= .300
*SECNO 10.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .40

3470 ENCROACHMENT STATIONS= 92.0 128.0 TYPE= 1 TARGET= 36.000

10.000	2.38	481.19	.00	.00	481.20	.01	.00	.00	479.30
25.0	3.1	18.4	3.5	17.6	34.8	19.6	70.3	57.8	479.37
.59	.18	.53	.18	.150	.065	.150	.000	478.81	92.00
.000401	7.	7.	7.	0	0	0	.00	36.00	128.00

*SECNO 11.000

3470 ENCROACHMENT STATIONS= 61.0 198.0 TYPE= 1 TARGET= 137.000

11.000	2.60	481.22	.00	.00	481.22	.00	.02	.00	479.34
25.0	13.1	8.1	3.7	84.3	17.2	40.3	75.9	62.4	480.18
.65	.16	.47	.09	.150	.065	.150	.000	478.62	61.00
.000359	54.	54.	50.	1	0	0	.00	137.00	198.00

1490 NH CARD USED
*SECNO 12.000
1530 MANNINGS N VALUES FOR CHANNEL COMPOSITED

12.000	2.29	481.23	.00	.00	481.23	.00	.00	.00	479.35
25.0	6.3	13.1	5.6	64.5	62.0	54.5	78.0	64.2	479.29
.68	.10	.21	.10	.150	.103	.150	.000	478.93	47.96
.000190	15.	12.	10.	0	0	0	.00	159.38	207.35

CCHV= .100 CEHV= .300
*SECNO 13.000

13.000	2.49	481.23	.00	.00	481.23	.00	.00	.00	479.52
25.0	9.3	7.8	7.9	104.1	22.1	82.2	83.2	69.3	479.46
.72	.09	.35	.10	.150	.065	.150	.000	478.74	51.45
.000185	32.	25.	22.	0	0	0	.00	214.77	266.22

*SECNO 14.000
3280 CROSS SECTION 14.00 EXTENDED .44 METERS

14.000	2.59	481.24	.00	.00	481.24	.00	.01	.00	479.35
25.0	12.1	5.6	7.4	171.7	21.0	95.8	97.3	83.1	479.40
.85	.07	.27	.08	.150	.065	.150	.000	478.65	.00
.000099	63.	50.	48.	0	0	0	.00	268.24	268.24

Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 15.000
3280 CROSS SECTION 15.00 EXTENDED .45 METERS

15.000	2.70	481.25	.00	.00	481.25	.00	.01	.00	479.43
25.0	14.8	4.3	5.9	225.0	18.2	86.5	122.1	105.6	479.52
1.09	.07	.24	.07	.150	.065	.150	.000	478.55	.00
.000082	75.	90.	90.	0	0	0	.00	294.71	294.71

*SECNO 16.000
3280 CROSS SECTION 16.00 EXTENDED .46 METERS

16.000	2.12	481.25	.00	.00	481.26	.00	.01	.00	479.51
25.0	11.1	6.8	7.1	182.6	31.4	126.3	154.8	136.7	479.40
1.36	.06	.22	.06	.150	.065	.150	.000	479.14	.00
.000074	75.	120.	135.	0	0	0	.00	337.55	337.55

1
PROFILE FOR STREAM AMP CREEK - PROPOSED CON

PLOTTED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA

```
ELEVATION  478.      479.      479.      480.      480.      481.      481.      482.      482.      483.
   SECNO   CUMDIS

  1.00      0.  I         .         .    R  .         .         .WE       .         .M        .         .         .
            5.  I         .         .R        .         .L        .WE       .         .M        .         .         .
           10.  I         .    R    .         L         .         .WE       .         . M       .         .         .
           15.  I        R.         L         .         .         . E       .         . M       .         .         .
  1.50     20.  I  R     L.         .         .         .         . E       .         . M       .         .         .
  1.60     25.  I  R     L.         .         .         .         . E       .         . M       .         .         .
           30.  I  R     L.         .         .         .         . E       .         . M       .         .         .
  1.70     35.  I  R     L.         .         .         .         . E       .         . M       .         .         .
  1.80     40.  CI  R     L         .         .         .         . E       .         .  M      .         .         .
           45.  CI  R     L         .         .         .         . E       .         .  M      .         .         .
           50.  CI  R     L         .         .         .         . E       .         .  M      .         .         .
           55.  C I  R    .L        .         .         .         . E       .         .  M      .         .         .
           60.  C I  R    .L        .         .         .         . E       .         .   M     .         .         .
           65.  C I  R    .L        .         .         .         .WE       .         .   M     .         .         .
           70.  C I  R    .L        .         .         .         .WE       .         .   M     .         .         .
           75.  C I  R    .L        .         .         .         .W E      .         .   M     .         .         .
           80.  C  I  R   . L       .         .         .         .W E      .         .   M     .         .         .
  1.90     85.  C  I  R   . L       .         .         .         .W E      .         .    M    .         .         .
           90.  C  I  R   . L       .         .         .         . WE      .         .    M    .         .         .
           95.  C  I   R  . L       .         .         .         . WE      .         .    M    .         .         .
          100.  C  I   R  . L       .         .         .         . WE      .         .    M    .         .         .
          105.  C  I   R  . L       .         .         .         . WE      .         .   M     .         .         .
          110.  C  I   R  . L       .         .         .         . WE      .         .   M     .         .         .
          115.  C   I   R . L       .         .         .         . WE      .         .   M     .         .         .
          120.  C   I   R . L       .         .         .         . WE      .         .   M     .         .         .
          125.  C   I   R . L       .         .         .         . WE      .         .   M     .         .         .
          130.  C   I   R . L       .         .         .         . WE      .         .   M     .         .         .
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       140.   C   I    R. L       .         .         .         .  E      .         .   M     .         .         .
       145.   C   I    R.L        .         .         .         .  E      .         .   M     .         .         .
       150.   C   I     RL        .         .         .         .  E      .         .   M     .         .         .
       155.   C   I     RL        .         .         .         .  E      .         .   M     .         .         .
       160.   C   I     RL        .         .         .         .  E      .         .   M     .         .         .
       165.   C    I    RL        .         .         .         .  E      .         .  M      .         .         .
       170.   C    I    .L        .         .         .         .  E      .         .  M      .         .         .
       175.   C    I    .L        .         .         .         .  E      .         .  M      .         .         .
2.00   180.   C    I    .L        .         .         .         .  E      .         .  M      .         .         .
       185.   C    I    .L        .         .         .         .  E      .         .  M      .         .         .
       190.   C    I    .L        .         .         .         .  E      .         .  M      .         .         .
       195.   C    I    . L       .         .         .         .  E      .         .  M      .         .         .
       200.   C    I    . L       .         .         .         .  E      .         .  M      .         .         .
       205.   C     I   . L       .         .         .         .  E      .         .  M      .         .         .
       210.   C     I   . L       .         .         .         .  E      .         .  M      .         .         .
       215.   C     I   . L       .         .         .         .  E      .         .  M      .         .         .
       220.   C     I   . L       .         .         .         .   E     .         .  M      .         .         .
       225.   C     I   .  L      .         .         .         .   E     .         .  M      .         .         .
       230.   C     I   .  L      .         .         .         .   E     .         . M       .         .         .
       235.   C     I   .  L      .         .         .         .   E     .         . M       .         .         .
       240.   C      I  .  L      .         .         .         .   E     .         . M       .         .         .
       245.   C      I  .  L      .         .         .         .   E     .         . M       .         .         .
       250.   C      I  .  L      .         .         .         .   E     .         . M       .         .         .
       255.   C      I  .  L      .         .         .         .   E     .         . M       .         .         .
       260.   C      I  .   L     .         .         .         .   E     .         . M       .         .         .
       265.   C      I  .   L     .         .         .         .   E     .         . M       .         .         .
       270.   C      I  .   L     .         .         .         .   E     .         . M       .         .         .
       275.   C       I .   L     .         .         .         .   E     .         . M       .         .         .
       280.   C       I .   L     .         .         .         .   E     .         . M       .         .         .
       285.   C       I .   L     .         .         .         .   E     .         . M       .         .         .
       290.   C       I .   L     .         .         .         .   E     .         . M       .         .         .
       295.   C       I .    L    .         .         .         .   E     .         . M       .         .         .
       300.   C       I .    L    .         .         .         .   E     .         .M        .         .         .
       305.   C       I .    L    .         .         .         .   E     .         .M        .         .         .
       310.   C        I.    L    .         .         .         .   E     .         .M        .         .         .
       315.   C        I.    L    .         .         .         .   E     .         .M        .         .         .
3.00   320.   C        I.    L    .         .         .         .   E     .         .M        .         .         .
       325.   C       I .     L   .         .         .         .   E     .         .M        .         .         .
       330.   C       I .     L   .         .         .         .   E     .         .M        .         .         .
       335.   C       I .     L   .         .         .         .   E     .         .M        .         .         .
       340.   C      I  .     L   .         .         .         .   E     .         .M        .         .         .
       345.   C      I  .     L   .         .         .         .   E     .         .M        .         .         .
       350.   C      I  .     L   .         .         .         .   E     .         .M        .         .         .
       355.   C     I   .     LR  .         .         .         .   E     .         .M        .         .         .
       360.   C     I   .     LR  .         .         .         .   E     .         .M        .         .         .
       365.   C     I   .      L  .         .         .         .   E     .         .M        .         .         .
       370.   C    I    .      L  .         .         .         .   E     .         .M        .         .         .
       375.   C    I    .      L  .         .         .         .   E     .         .M        .         .         .
       380.   C    I    .      L  .         .         .         .   E     .         .M        .         .         .
       385.   C   I     .      LR .         .         .         .   E     .         .M        .         .         .
4.00   390.   C   I     .      LR .         .         .         .   E     .         .M        .         .         .
       395.   C   I     .       L .         .         .         .   E     .         .M        .         .         .
       400.   C   I     .       L .         .         .         .   E     .         .M        .         .         .
       405.   C    I    .        L.         .         .         .   E     .         .M        .         .         .
5.00   410.   C    I    .        L.         .         .         .   E     .         .M        .         .         .
       415.   C    I    .        L.         .         .         .   E     .         .     M   .         .         .
       420.   C    I    .        L.         .         .         .   E     .         .         M         .         .
       425.   C    I    .        L.         .         .         .   E     .         .         .    M    .         .
       430.   C     I   .       LR.         .         .         .   E     .         .         .        M.         .
       435.   C     I   .       LR.         .         .         .   E     .         .         .         .  M      .
       440.   C     I   .       LR.         .         .         .   E     .         .         .         .       M .
       445.   C     I   .       LR.         .         .         .   E     .         .         .         .         M
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6.00   455.   C     I   .       LR.         .         .         .   E     .         .         .         .         M
       460.   C     I   .       LR.         .         .         .   E     .         .         .         .         M
       465.   C     I   .       LR.         .         .         .   E     .         .         .         .         M
       470.   C     I   .      LR .         .         .         .  WE     .         .         .         .         M
       475.   C    I    .      LR .         .         .         .  WE     .         .         .         .         M
       480.   C    I    .      LR .         .         .         .    E    .         .         .         .         M
       485.   C    I    .      LR .         .         .         .    E    .         .         .         .         M
       490.   C    I    .      LR .         .         .         .    E    .         .         .         .         M
       495.   C    I    .      LR .         .         .         .    E    .         .         .         .         M
       500.   C    I    .      LR .         .         .         .    E    .         .         .         .         M
7.00   505.   C   I     .      LR .         .         .         .    E    .         .         .         .         M
       510.   C   I     .     LR  .         .         .         .    E    .         .         .         .         M
       515.   C    I    .     L   .         .         .         .    E    .         .         .         .         M
       520.   C    I    .    L    .         .         .         .    E    .         .         .         .         M
       525.   C    I    .   L     .         .         .         .    E    .         .         .         .         M
       530.   C    I    .  L      .         .         .         .    E    .         .         .         .         M
       535.   C    I    . LR      .         .         .         .    E    .         .         .         .     M   .
       540.   C    I    . L       .         .         .         .    E    .         .         .M        .         .
8.00   545.   C    I    .L        .         .         .         .    E    .         .M        .         .         .
9.00   550.   C     I   .         .         .       L .         .    E    .         .         .         .         M
9.10   555.   C     I   .         .         .         .         .    E    .         .         .         .         L
       560.   C      I  .         .         .         .         .    E    .         .         .         .         L
9.20   565.   C      I  .         .         .         .         .    E    .         .         .         .         L
9.30   570.   C     I   .R        .         .         .         .    E    .         .         .         .         L
10.00  575.   C      I  .      L R.         .         .         .    E    .         .         .         .         M
       580.   C      I  .      L  R         .         .         .    E    .         .         .         .         M
       585.   C      I  .      L  . R       .         .         .    E    .         .         .         .         M
       590.   C     I   .      L  .  R      .         .         .    E    .         .         .         .         M
       595.   C     I   .      L  .    R    .         .         .    E    .         .         .         .         M
       600.   C     I   .       L .     R   .         .         .    E    .         .         .         .         M
       605.   C    I    .       L .       R .         .         .    E    .         .         .         .         M
       610.   C    I    .       L .        R.         .         .    E    .         .         .         .        M.
       615.   C    I    .       L .         .R        .         .    E    .         .         .         . M       .
       620.   C   I     .       L .         . R       .         .   WE    .         .         .    M    .         .
       625.   C   I     .       L .         .   R     .         .   WE    .         .      M  .         .         .
11.00  630.   C   I     .       L .         .    R    .         .   WE    .         .M        .         .         .
       635.   C     I   .       L .      R  .         .         .   WE    .         .M        .         .         .
12.00  640.   C         I      RL .         .         .         .     E   .         .M        .         .         .
       645.   C        I.       RL.         .         .         .     E   .         .M        .         .         .
       650.   C       I .       R L         .         .         .     E   .         .M        .         .         .
       655.   C       I .        RL         .         .         .     E   .         .M        .         .         .
       660.   C      I  .         RL        .         .         .     E   .         .M        .         .         .
13.00  665.   C     I   .         R L       .         .         .     E   .         .M        .         .         .
       670.   C     I   .         RL        .         .         .     E   .        M.         .         .         .
       675.   C     I   .         RL        .         .         .     E   .     M   .         .         .         .
       680.   C    I    .         RL        .         .         .     E   .   M     .         .         .         .
       685.   C    I    .          L        .         .         .     E   . M       .         .         .         .
       690.   C    I    .          L        .         .         .     E  M.         .         .         .         .
       695.   C    I    .          L        .         .         .     EM  .         .         .         .         .
       700.   C    I    .        LR         .         .         .   M E   .         .         .         .         .
       705.   C    I    .        L.         .         .         . M   E   .         .         .         .         .
       710.   C   I     .        L.         .         .         M     E   .         .         .         .         .
14.00  715.   C   I     .       LR.         .         .      M  .     E   .         .         .         .         .
       720.   C   I     .       LR.         .         .      M  .     E   .         .         .         .         .
       725.   C   I     .       LR.         .         .      M  .     E   .         .         .         .         .
       730.   C   I     .       L R         .         .      M  .     E   .         .         .         .         .
       735.   C   I     .        LR         .         .      M  .     E   .         .         .         .         .
       740.   C   I     .        LR         .         .      M  .     E   .         .         .         .         .
       745.   C   I     .        LR         .         .      M  .     E   .         .         .         .         .
       750.   C  I      .        LR         .         .      M  .     E   .         .         .         .         .
       755.   C  I      .        LR         .         .      M  .     E   .         .         .         .         .
       760.   C  I      .        LR         .         .      M  .     E   .         .         .         .         .
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         770.  C  I      .        L.R        .        .      M .    E  .        .        .        .        .
         775.  C  I      .        L.R        .        .      M .    E  .        .        .        .        .
         780.  C  I      .        L.R        .        .      M .    E  .        .        .        .        .
         785.  C  I      .        L.R        .        .      M .    E  .        .        .        .        .
         790.  C  I      .         LR        .        .      M .    E  .        .        .        .        .
         795.  C I       .         LR        .        .      M .    E  .        .        .        .        .
         800.  C I       .         LR        .        .      M .    E  .        .        .        .        .
 15.00   805.  C I       .         L R       .        .      M .    E  .        .        .        .        .
         810.  C  I      .         LR        .        .      M .    E  .        .        .        .        .
         815.  C  I      .         LR        .        .      M .    E  .        .        .        .        .
         820.  C   I     .         LR        .        .      M .    E  .        .        .        .        .
         825.  C   I     .         LR        .        .      M .    E  .        .        .        .        .
         830.  C    I    .         LR        .        .      M .    E  .        .        .        .        .
         835.  C    I    .         LR        .        .      M .    E  .        .        .        .        .
         840.  C     I   .         LR        .        .      M .    E  .        .        .        .        .
         845.  C     I   .         LR        .        .      M .    E  .        .        .        .        .
         850.  C      I  .         LR        .        .      M .    E  .        .        .        .        .
         855.  C      I  .         LR        .        .      M .    E  .        .        .        .        .
         860.  C       I .         RL        .        .      M .    E  .        .        .        .        .
         865.  C       I .         RL        .        .      M .    E  .        .        .        .        .
         870.  C        I.         RL        .        .      M .    E  .        .        .        .        .
         875.  C        I.         RL        .        .      M .    E  .        .        .        .        .
         880.  C         I         RL        .        .      M .    E  .        .        .        .        .
         885.  C         I         RL        .        .      M .    E  .        .        .        .        .
         890.  C         .I        RL        .        .      M .    E  .        .        .        .        .
         895.  C         .I        RL        .        .      M .    E  .        .        .        .        .
         900.  C         . I       RL        .        .      M .    E  .        .        .        .        .
         905.  C         . I       RL        .        .      M .    E  .        .        .        .        .
         910.  C         .  I     R.L        .        .      M .    E  .        .        .        .        .
         915.  C         .  I     R.L        .        .      M .    E  .        .        .        .        .
         920.  C         .   I    R.L        .        .      M .    E  .        .        .        .        .
 16.00   925.  C         .   I    R.L        .        .      M .    E  .        .        .        .        .
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21AUG95 08:19:24 PAGE 11

THIS RUN EXECUTED 21AUG95 08:19:25

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

AMP CREEK - PROPOSED CON

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	1.000	.00	.00	.00	478.44	25.00	480.99	.00	481.03	15.05	.89	51.74	6.45
*	1.500	20.00	.00	.00	478.45	25.00	481.02	.00	481.04	1.27	.82	50.21	22.21
*	1.600	2.00	479.50	479.82	478.45	25.00	481.02	.00	481.04	3.04	.57	43.02	14.34

*	1.800	2.00	.00	.00	478.49	25.00	481.02	.00	481.04	1.41	.85	47.81	21.03
*	1.900	50.00	.00	.00	478.59	25.00	481.01	.00	481.08	41.57	1.65	41.45	3.88
*	2.000	95.00	.00	.00	478.68	25.00	481.11	.00	481.11	1.03	.27	211.22	24.58
	3.000	140.00	.00	.00	478.88	25.00	481.13	.00	481.13	1.49	.32	183.47	20.45
	4.000	68.00	.00	.00	478.64	25.00	481.14	.00	481.14	1.86	.36	150.58	18.31
*	5.000	22.00	.00	.00	478.69	25.00	481.15	.00	481.15	6.81	.58	110.76	9.58
*	6.000	45.00	.00	.00	478.75	25.00	481.16	.00	481.16	1.41	.30	109.41	21.04
*	7.000	50.00	.00	.00	478.66	25.00	481.16	.00	481.18	4.65	.57	70.08	11.60
	8.000	38.00	.00	.00	478.69	25.00	481.18	.00	481.20	5.76	.66	51.70	10.42
*	9.000	7.00	.00	.00	478.76	25.00	481.18	.00	481.20	.74	.59	43.42	28.97
	9.100	2.00	.00	.00	478.76	25.00	481.18	.00	481.20	.85	.60	41.96	27.19
	9.200	12.00	484.83	482.37	478.79	25.00	481.18	.00	481.20	.88	.60	41.39	26.62
	9.300	2.00	.00	.00	478.76	25.00	481.19	.00	481.20	.65	.55	46.27	30.90

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
*	10.000	7.00	.00	.00	478.81	25.00	481.19	.00	481.20	4.01	.53	72.01	12.48
	11.000	54.00	.00	.00	478.62	25.00	481.22	.00	481.22	3.59	.47	141.81	13.20
	12.000	12.00	.00	.00	478.93	25.00	481.23	.00	481.23	1.90	.21	181.00	18.16
	13.000	25.00	.00	.00	478.74	25.00	481.23	.00	481.23	1.85	.35	208.46	18.36
	14.000	50.00	.00	.00	478.65	25.00	481.24	.00	481.24	.99	.27	288.50	25.10
	15.000	90.00	.00	.00	478.55	25.00	481.25	.00	481.25	.82	.24	329.76	27.55
	16.000	120.00	.00	.00	479.14	25.00	481.25	.00	481.26	.74	.22	340.35	29.04

AMP CREEK - PROPOSED CON

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	1.000	25.00	480.99	.00	.00	.30	59.79	.00
*	1.500	25.00	481.02	.00	.03	.00	59.37	20.00

	1.700	25.00	481.02	.00	.00	.00	58.23	10.00
*	1.800	25.00	481.02	.00	.00	.00	57.63	2.00
*	1.900	25.00	481.01	.00	-.01	.00	52.76	50.00
*	2.000	25.00	481.11	.00	.10	.00	171.65	95.00
	3.000	25.00	481.13	.00	.02	.00	162.30	140.00
	4.000	25.00	481.14	.00	.01	.00	108.24	68.00
*	5.000	25.00	481.15	.00	.01	.00	101.41	22.00
*	6.000	25.00	481.16	.00	.01	.00	60.00	45.00
*	7.000	25.00	481.16	.00	.01	.00	39.00	50.00
	8.000	25.00	481.18	.00	.02	.00	23.00	38.00
*	9.000	25.00	481.18	.00	.00	.00	21.00	7.00
	9.100	25.00	481.18	.00	.00	.00	19.20	2.00
	9.200	25.00	481.18	.00	.00	.00	19.20	12.00
	9.300	25.00	481.19	.00	.00	.00	20.00	2.00
*	10.000	25.00	481.19	.00	.01	.00	36.00	7.00
	11.000	25.00	481.22	.00	.03	.00	137.00	54.00
	12.000	25.00	481.23	.00	.01	.00	159.38	12.00
	13.000	25.00	481.23	.00	.00	.00	214.77	25.00
	14.000	25.00	481.24	.00	.01	.00	268.24	50.00
	15.000	25.00	481.25	.00	.01	.00	294.71	90.00
	16.000	25.00	481.25	.00	.01	.00	337.55	120.00

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 1.500 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1.600 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1.800 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1.900 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 2.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

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WARNING SECNO=      6.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      7.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      9.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     10.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
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Nicolet Minerals Company

April 2, 1998

Mr. Dale J. Lang
Wisconsin Department of Natural Resources
107 Sutliff Avenue
P.O. Box 818
Rhinelander, WI 54501

Dear Mr. Lang:

Re: Crandon Project - Water Regulatory Permit Application - Addendum No. 1 Pertaining to the Little Sand Lake Outlet Weir on Creek 12-9

Attached is a revised technical memorandum dated March 26, 1998, prepared by Foth & Van Dyke addressing the design of the proposed Crandon Project Little Sand Lake flow monitoring station. This memorandum replaces the technical memorandum dated January 17, 1997, that was included as part of Nicolet Minerals Company's (NMC) January 17, 1997, Addendum No. 1 to the Water Regulatory Permit Application for the Proposed Mine Site and Treated Wastewater Discharge Pipeline. The revised memorandum addresses the items raised in your November 13, 1997, letter to Mr. Don Moe relating to this topic. The enclosed memorandum addresses the following:

- Construction options for the weir and a recommended installation method that will minimize disturbance while maintaining a stable structure.
- Soil testing is proposed to be completed at the time of final design prior to construction should the Crandon Project be permitted.
- Lowering of the proposed weir elevation.
- Information on planned beaver control.

The revised memorandum should be inserted into Addendum No. 1 according to the attached reference list. This list serves as a log and reference identifying changes made to the Water Regulatory Permit Application by NMC throughout the permitting process. If additional revisions are made, they will be added to the attached list in sequential order and the list will be forwarded with the changes.

If you or your staff have any questions regarding this addendum, please contact me at (715) 365-1450.

Sincerely,

D. E. Moe

Don Moe
Technical/Permitting Manager
Nicolet Minerals Company

DM:mld2
Attachment

Crandon Project Water Regulatory Permit Application for the Proposed Mine Site and Treated Wastewater Discharge Pipeline Log of Revisions and Additional Information

Entry Number	Date of Revision	Page(s)	Document Section Number	Description
1	4/2/98	1	Log of Updates	Insert after cover letter
2	4/2/98	1-5	Distribution List	Replace existing distribution list
3	4/2/98	1-5 plus Figures and Attachment	Addendum No. 1 Technical Memorandum	Replace memorandum dated January 17, 1997, with updated memorandum dated April 2, 1998

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3	Mr. David Ballman United States Corps of Engineers St. Paul District 190 Fifth Street East St. Paul, MN 55101
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1	Mr. Michael Cain Wisconsin Department of Natural Resources 101 South Webster Street Madison, WI 53707
3	Mr. Larry Lynch Wisconsin Department of Natural Resources Bureau of Waste Management 101 South Webster Street, 3rd Floor Madison, WI 53707
1	Mr. Christopher Carlson Wisconsin Department of Natural Resources Bureau of Waste Management 101 South Webster Street Madison, WI 53707
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1	Wisconsin Department of Revenue Mr. John Eldredge 125 South Webster Madison, WI 53707
1	Wisconsin Geological & Natural History Survey Mr. Tom Evans 3817 Mineral Point Road, Room 108 Madison, WI 53705

Crandon Mining Company

7 N. BROWN ST., 3RD FLOOR
RHINELANDER, WI 54501-3161

January 17, 1997

Mr. Bill Tans
Wisconsin Department of Natural Resources
Bureau of Integrated Science Services
101 South Webster Street
P.O. Box 7921
Madison, WI 53707-7921

Mr. David Ballman
U.S. Army Corps of Engineers
St. Paul District
190 Fifth Street East
St. Paul, MN 55101

Dear Mr. Tans and Mr. Ballman:

Re: Crandon Project - Addendum No. 1 to the Water Regulatory Permit Application for the Proposed Mine Site and Treated Wastewater Discharge Pipeline

With this letter Crandon Mining Company (CMC) is submitting Addendum No. 1 to its June 1996 Water Regulatory Permit Application for the Proposed Mine Site and Treated Wastewater Discharge Pipeline. The addendum consists of a Chapter 30 water regulatory permit application and supporting documentation for the planned Little Sand Lake outlet structure on Creek 12-9. The application has been prepared in response to a request by the Wisconsin Department of Natural Resources in a letter dated October 24, 1996. The required $100 fee for the permit application is enclosed with this letter.

The permit application and supporting memorandum have been prepared on behalf of CMC by Foth & Van Dyke and Associates, Inc. CMC has distributed the information to appropriate state and federal agencies, to local officials, and to various interested parties according to the current EIR distribution list. It is our understanding that the Wisconsin Department of Natural Resources (WDNR) and the U.S. Army Corps of Engineers (USCOE) will be responsible for distribution of the document to their appropriate staff members.

MLD2\93C049\GBAPP\42826.61\4000

If you or your staff have any questions regarding this addendum, please contact me at (715) 365-1450.

Sincerely,

D. E. Moe

Don Moe
Technical/Permitting Manager
Crandon Mining Company

DM:mld2

cc: Current *Water Regulatory Permit Application for the Proposed Mine Site and Treated Wastewater Discharge Pipeline* Distribution List

State of Wisconsin
Department of Natural Resources
(Return to appropriate
DNR District/Area Office)

U.S. Army Corps of Engineers
St. Paul District
190 Fifth Street East
St. Paul, MN 55101-1638

STATE/FEDERAL APPLICATION FOR WATER REGULATORY PERMITS AND APPROVALS
Form 3500-53 Rev. 9-89

PLEASE COMPLETE BOTH PAGES 1 & 2 OF THIS APPLICATION. PRINT OR TYPE. Use of this form is required by the Department for any application filed pursuant to Chapter 30, Wis. Stats. The Department will not consider your application unless you complete and submit this application form.

1. Applicant (Individual or corporate name)	2. Agent/Contractor (firm name)
Crandon Mining Company	Foth & Van Dyke
Address 7 North Brown Street, 3rd Floor	**Address** 2737 S. Ridge Road
City, State, Zip Code Rhinelander, Wisconsin 54501-3161	**City, State, Zip Code** Green Bay, Wisconsin 54307-9012
Telephone No. (Include area code) (715) 365-1450	**Telephone No. (Include area code)** (414) 497-2500

3. If applicant is not the fee title owner of the property where the proposed activity will be conducted, provide name and address of owner and include letter of authorization from owner. Owner must be the applicant or coapplicant for structure, diversion and channel change activities. A purchaser under a land contract is not considered a riparian owner until property transfer has occurred.

Owner's Name	Address	City, State, Zip Code

4. Is the applicant a business? [x] Yes [ ] No

If YES, is the permit or approval you are applying for necessary for you to conduct this business in the State of Wisconsin? [x] Yes [ ] No

If YES, please explain why (attach addition sheets if necessary):

Desired by the WDNR as part of the permitting process to allow this business to begin operations.

5. Project Location
Address Creek 12-9
Village/City/Town Town of Nashville
Waterway Creek 12-9, outlet from Little Sand Lake
County Forest
Govt. Lot ____ **OR** N W **1/4,** N W **1/4, of Section** 6
Township 34 **North, Range** 13E **(East)(West)**

6. Adjoining Riparian (Neighboring Waterfront Property Owner) Information

Name of Riparian #1	Address	City, State, Zip Code
Crandon Mining Company	7 North Brown Street, 3rd Floor	Rhinelander, WI 54501-3161
Name of Riparian #2	**Address**	**City, State, Zip Code**

7. Project Information (Attach additional sheets if necessary)

(a) Describe proposed activity (include how this project will be constructed)
Place heavy-duty plywood diversion and weir structure across stream and overbank area. Anchor to 4x4 posts and brace as needed. See accompanying figures.

(b) Purpose, need and intended use of project
A fixed stage/discharge relationship and flow monitoring facility is needed for the outlet from Little Sand Lake to obtain measurements of discharged flows.

(c) I have applied for or received permits from the following agencies: (Check x)

[x] Municipal [x] County [x] Wis. DNR [ ] Corps of Engineers

(d) Date activity will begin if permit is issued : at start of construction of proposed Crandon mine **; be completed:** at end or project reclamation

(e) Is any portion of the requested project now complete?

[ ] Yes [x] No **If yes, identify the completed portion on the enclosed drawings an indicated here the date activity was completed:**

I hereby certify that the information contained herein is true and accurate. I also certify that I am entitled to apply for a permit, or that I am the duly authorized representative or agent of an applicant who is entitled to apply for a permit. Any inaccurate information submitted may result in permit revocation, the imposition of a forfeiture(s) and requirement of restoration.

Signature of Applicant or Duly Authorized Agent [signature] **Date Signed** 1/20/97

LEAVE BLANK - FOR RECEIVING AGENCY USE ONLY

Corps of Engineers Process No.	Wisconsin DNR File No.	
Received By	**Date Received**	**Date Application Was Complete**

DRAWINGS OF PROPOSED ACTIVITY SHOULD BE PREPARED IN ACCORDANCE WITH SAMPLE DRAWING SHEET.

Location Sketch (indicate scale). Show route to project site; include nearest mainroad and crossroad.

N

See Accompanying Figures

Proposed Materials:

½" Marine Plywood

4"x4" Treated Posts

2"x4" Treated Bracing

Project Plans (Include top view and typical cross sections. Clearly identify features and dimensions or indicate scale.)
(Use additional sheets if necessary)

See Accompanying Figures

State of Wisconsin
Department of Natural Resources

FEE FOR WATER REGULATION PERMITS, APPROVALS, DETERMINATIONS, AND HEARINGS
Form 3500-53A Rev. 07-95

PLEASE SEE OTHER SIDE OF THIS FORM FOR APPLICABLE FEE

State law requires that we charge a fee for processing your request to make changes to surface waters and for wetland water quality certification determinations. Each application or request requires the correct fee in order for review to begin. **If your project includes several regulated activities you must include payment only for the most costly activity.** If you have questions regarding the appropriate fee, please contact your district or area Water Management Specialist.

Fees will be refunded only if the refund is requested before we determine that the application is complete.

Projects started or completed without obtaining the appropriate permits are subject to potential enforcement actions (e.g. monetary forfeitures, required abatement). Applications for permits or approvals submitted after work has been commenced or completed require twice the usual fee.

Personally identifiable information on this form is not intended to be used for any other purpose.

TO BE COMPLETED BY APPLICANT:

Structure on bed of stream or lake
Permit/Approval Applied for With Highest Fee (see listing on other side)

$100.00
Amount Enclosed

[signature]
Signature of Applicant

1/20/97
Date Signed

LEAVE BLANK - DEPARTMENT OF NATURAL RESOURCES USE ONLY		
Fee Received $______	Check	Money Order
Received by ______		

EFFECTIVE DATE: July 29, 1995

The list below shows the fee that will be charged for many of the permits, approvals, and determinations made by the Department of Natural Resources, Bureau of Water Regulation and Zoning. Please contact your district or area Water Management Specialist if your activity is not listed to determine the correct fee or if you have questions regarding which category best fits your project. Permit fees are not required for projects funded in whole or in part by any federal or state agency.

<u>The Following Projects Do Not Require Fees:</u>

Riprap Shore Protection
Fish Cribs and Similar Structures for Improving Fish Habitat
Nesting Platforms and Similar Structures for Improving Wildlife Habitat

<u>**These Activities Require a $30.00 Fee: ***</u>

NAVIGABLE WATERS/HARBORS/NAVIGATION
- Dry Hydrants
- Pilings
- Sand (Pea Gravel) Blanket
- Ford Stream Crossing
- Boat Ramp
- Permanent Boat Shelter
- Boathouse Repair Certification
- Ponds Not Connected to a Waterway/ Not Located in a Wetland

DAMS
- Dam Abandonment & Removal

* Note: The fee will be $100 for projects requiring individual wetland water quality certification

<u>**These Activities Require a $100.00 Fee:**</u>

NAVIGABLE WATERS/HARBORS/NAVIGATION
- Municipal Bulkhead Line Approval
- Structure on Bed of Stream/Lake
- Piers (which require permits)
- Bridge, Culvert (streams less than 35 ft. wide)
- Pond not Connected to a Waterway/ Located in a Wetland
- Pond Connected to a Waterway
- Grading more than 10,000 square ft.
- Channel Change
- Mechanical Dredging (less than 3,000 cubic yds.)

DAMS
- Dam Ownership Transfer
- Plan Approval for Dam on Non-navigable Stream Including:
  - -New Dam Construction
  - -Rebuilding an Existing Dam
  - -Altering an Existing Dam

WETLAND WATER QUALITY CERTIFICATION DETERMINATION
- Any Project Affecting Wetlands Requiring Individual Certification

<u>**These Activities Require a $300 Fee:**</u>

NAVIGABLE WATERS/HARBORS/NAVIGATION
- Bridge, Culvert (streams greater than 35 ft. wide)
- Diversion for Agricultural/Irrigation Purposes
- Non-Metallic Mining (e.g. gravel extraction)
- Municipal Waterway Enclosure
- Hydraulic Dredging
- Mechanical Dredging (3,000 cubic yds. or greater)

DAMS
- Petition to Establish Water Levels or Flows
- Permit/Plan Approval for Dam on Navigable Stream Including:
  - -Raising and Enlarging an Existing Dam
  - -New Dam Construction
  - -Rebuilding an Existing Dam
  - -Altering an Existing Dam

<u>Other Fee:</u>
Hearing Requested in Response to a Public Notice under Chapter 30 - 31, Wisconsin Statutes is $25.

Foth & Van Dyke
Memorandum

April 2, 1998

TO: Jerry Sevick

CC: Don Moe, Nicolet Minerals Company
Master File

FR: Michael Liebman, Foth & Van Dyke MDL
Steve Donohue, Foth & Van Dyke SVD

RE: Crandon Project - Little Sand Lake Flow Monitoring Installation

Background

Little Sand Lake, in southern Forest County, has been studied recently because of its proximity to the Nicolet Minerals Company's proposed mining operation. One area of interest is the stage/discharge relationship on the outlet of Little Sand Lake due to the diffuse nature of the outlet and downstream beaver activity. The Wisconsin Department of Natural Resources (WDNR) believes that in order to evaluate potential changes to the lake hydrology with the project's regional groundwater model, a more stable stage/discharge relationship is desirable. In a letter dated October 24, 1996, the WDNR requested that a fixed gaging station be constructed at the outlet to Little Sand Lake. By installing a control section (a weir or flume) in the outlet, a fixed stage/discharge relationship can be assumed for predicting future lake stage changes due to mining.

To address WDNR's request, on January 17, 1997, Nicolet Minerals Company (NMC) submitted to WDNR Addendum No. 1 to its June 1996 *Water Regulatory Permit Application for the Proposed Mine Site and Treated Wastewater Discharge Pipeline*. The addendum contained a technical memorandum dated January 17, 1997, prepared by Foth & Van Dyke addressing the design and installation of a gaging station at the Little Sand Lake outlet. The WDNR issued a letter on November 13, 1997, providing comments on the addendum. This technical memorandum is an update to the original memorandum dated January 17, 1997, and supersedes that document. This memorandum includes revisions made to address WDNR's November 13, 1997, comments on Addendum No. 1.

Monitoring Site Selection

Little Sand Lake outlets into a small stream known as Creek 12-9. The stream immediately adjacent to the lake is wide and very marshy, making it difficult to provide a suitable site for a flow monitoring installation. Within 100 yards downstream, however, the stream narrows and a suitable site for a flow monitoring installation is available. A field meeting on November 4, 1996 with WDNR and U.S. Army Corps of Engineers staff confirmed the potential suitability of this site for placement of a flow monitoring facility. Figure 1 shows the location of the proposed flow monitoring installation.

Control Structure Selection

In order to create a fixed stage/discharge relationship and monitor the flows discharging from Little Sand Lake, a control structure is required, with the majority of surface water flow leaving Little Sand Lake directed to it. For low flow conditions, most of the waters leaving the lake are contained within the banks of the outlet stream and a control structure across the stream will adequately measure flow. For high flow or flooding conditions, however, some waters may flow over the lowlands adjacent to the stream proper and could move downstream without measurement. To capture such flows, a small diversion structure is needed across the lowlands adjacent to the stream at the monitoring point. A shallow diversion wall can be constructed along the lowlands on both sides of the stream bank to divert the majority of overland flow into the flow monitoring control section in the stream.

The type of control structures available for an application such as creating a fixed stage/discharge relationship and monitoring discharge from Little Sand Lake include a flume or a weir. For this site, flumes were discounted because of the need to install them in a more permanent dam-like setting. With the natural conditions at this site, such an installation would be difficult and environmentally undesirable. So, although the flume has the advantage of working well in a low head condition as found in this case, installation difficulties make the use of a flume for a stage/discharge monitoring structure less acceptable.

With easier installation and more accurate overall measurement capabilities, a weir is recommended for the proposed monitoring installation. Various weir configurations were examined to determine the weir type and shape best fitted to create a fixed stage/discharge relationship and monitor the flows expected from Little Sand Lake. Because of the flatness of the stream slope and the associated lack of elevation change, or head, an important weir characteristic must be minimizing the depth of overflow. The hydraulic characteristics of the V-notch weir would not allow high flow measurement without excessive overflow head. As such, a V-notch weir would not be an acceptable flow monitoring device.

Trapezoidal and rectangular weirs (with and without end contractions) were also evaluated in terms of best meeting the needs for creating a stable stage/discharge relationship and flow monitoring application. In order to minimize the overflow head caused by the weir, a rectangular weir with end contractions is recommended. To best meet the existing lake level fluctuations and flow relationships, a compound weir consisting of a 4-ft wide rectangular weir inset into an 8-ft wide weir inset into a 16-ft wide weir is proposed for the monitoring structure. The 8-ft wide weir would be activated after head on the 4-ft wide weir exceeds ½-ft. The 16-ft wide weir would be activated after the head on the 8-ft weir exceeds ½-ft. This configuration allows the weir to accurately measure a wide range of flows. The inset 4-ft weir would measure flows ranging from low flows to nearly 5 cfs, while the 8-ft weir would measure total flow to over 17 cfs with 1 ft of total overflow head. With overflow heads as high as 1.5 ft, flows as high as 45 cfs could be measured. Attachment 1 summarizes the weir facility discharge rating equation based on basic weir equations. Figure 2 shows the configuration of the weir.

Any flow discharges larger than about 45 cfs would overtop the monitoring structure along its length making flow measurements difficult to achieve. Based on available monitoring records, the frequency of such large flows discharging from Little Sand Lake should be non-existent to very rare. These rare, infrequent flow events may produce large flows, but they are short-term and have little effect on the overall lake stage. As such, loss of precise measurement of the rare, extremely high flow discharge would be generally insignificant relative to the long-term stage/discharge relationship for Little Sand Lake. Figure 3 shows the flow and water elevation data for the Little Sand Lake outlet which falls well within the operating range of the 4-ft and 8-ft composite weir structure.

Although the 4-ft rectangular weir will provide a stable stage/discharge relationship and solid measurements for the normal ranges of flow expected from the lake, during periods of very high flow, the overflow head may become greater than 1.3 ft. In order to achieve maximum performance and accuracy from this weir structure, the height of the weir crest above the channel bottom should be at least two times the overflow height, or in this case 2.6 ft. For those high overflow head conditions, the approach velocities will become less uniform because the total depth in the stream at the site is only about 1.5 ft. Again, it is unlikely that the rare occurrence of such high flow events and the somewhat less accurate measurements derived from them, will have any significant affect on the overall stage/discharge analysis for the lake.

Permit Considerations

Over the past 10 to 15 years the lake stage has typically ranged from about 1,592 ft msl to about 1,593 ft msl. As requested by the WDNR, the public rights stages are closer to 1591 and 1591.5 ft msl. The elevation of the weir crest needs to be set at an elevation that does not significantly alter the historical levels or public rights stages. The crest elevation of the weir also needs to consider the ordinary high water mark (OHWM) as determined by the WDNR. The WDNR has determined that the OHWM for Little Sand Lake is 1591.96 ft msl. Given the above permit considerations and the need to meet design criteria to have a functioning flow monitoring structure, 1,591.5 ft msl was selected as the crest elevation of the weir.

The proposed structure is essentially a stream bank modification to achieve a more stable stage/discharge relationship and provide an accurate flow monitoring station. The proposed structure should not alter the overall hydrology of the lake. As such, the structure is believed to be governed under Chapter 30 permit requirements for installation of a gaging station.

Physical Installation

The location and general layout of the weir outlet monitoring installation is shown on Figure 2. Although the specific configuration of the composite weir must be adhered to for hydraulic purposes, the construction details for the installation may vary significantly. The construction variations relate to the general relationship where the more solid, sturdy and maintenance free the installation, the more impact the construction of the installation will have on the natural environment at the site. Conversely, the more sensitive the construction is to the local environment, the less durable the installation will be. For this reason, three construction alternatives are discussed for the proposed monitoring installation. NMC is proposing that final selection of the desired alternative be made at the time final design is completed, which is proposed to occur after the project is permitted. More detailed soils data are also proposed to be collected and provided at that time as well.

Option 1: Low Impact, Low Durability - This option would cause little impact to the environment at the site. For this installation, a wooden diversion and overflow structure is proposed. Marine grade plywood would be affixed to posts driven into the ground or stream bed. The posts could be wood, steel, or concrete. The structure must be set at least 1 ft below the ground surface to minimize seepage under the structure. Clay soils can be packed along the plywood/soil interface to further reduce seepage potential. Periodic bracing may be desirable to add needed stability to the structure. Figure 2 shows the proposed weir structure along with proposed crest elevations and other details pertinent to the design of the monitoring station.

Option 2: Moderate Impact, Moderate Durability - The second option would have the configuration of Option 1, but would be constructed more solidly. A thicker facing of plywood or metal sheeting would be used. A mechanical trencher or small backhoe would be utilized to create a narrow trench to more securely embed the face sheeting into the ground. Soil (material from trenching, sand bags and/or concrete block) would be placed along the bottom of the facing at the ground surface to solidify the base of the installation. Additional bracing and cable can further secure the weir.

Option 3: High Impact, High Durability - The third option would require even more disruption to the area than Option 2. Besides the movement of heavy equipment to this remote site as with Option 2, this alternative calls for construction of a driven sheet piling structure to which the weir proper would be firmly attached. The weir component would be bolted to the sheet piling, providing exact weir settings. The piling would be more difficult to remove after completion of the monitoring. Like Option 2, the overall configuration would mirror that of Option 1 in dimensions and elevations, as shown in Figure 2.

Additional features considered that will be added to the compound weir flow monitoring structure include the following:

- A permanent staff gauge affixed to a solid post approximately 3 ft upstream from the weir structure from which to read the overflow head overtopping the weir crest.

- A solid benchmark near the site whereby the staff gauge and weir crest elevation may be checked periodically and from which they may be reset if needed.

- Reduction in the water level below the weir structure will be critical so that the overflow has a non-submerged drop into the stream below. This will require lowering the downstream beaver dam spillway a minimum of 1 ft, with 2 ft being a preferred amount. By lowering the downstream beaver dam and setting the weir crest at the proper elevation, the fluctuations in Little Sand Lake will be similar to historical trends while maintaining the needed non-submerged flow regime at the structure.

- If desired, a continuous monitoring set-up can be included in the design. A bubble-tube can be permanently affixed to the staff gage post and run to a meter located in a locked vault on the adjacent overbank. The meter will require maintenance due to the necessity for battery powered operation.

The expected life of the of structure will be entirely dependent on maintenance. Spring ice-out, determined vandalism, or freeze/thaw cycles could cause some damage to the facility (particularly with Option 1). As such, regular monitoring of the installation should be maintained to detect problems before they become critical. Such monitoring should be made on a weekly basis with maintenance activities performed as needed. Expected maintenance may include resetting posts and panel segments, bracing panel segments against ice pressures, removing excessive ice build-ups, flushing or removing sediment accumulations, and maintaining proper levels in the downstream beaver dam. Less maintenance will be needed with Option 3.

Based on the available options for construction, NMC believes that, pending the results of soil testing to be completed at the time of final design, Option 2 is a feasible approach for providing a stable structure requiring moderate maintenance while minimizing construction disturbance. It is also anticipated that the structure will be installed in the winter when frozen conditions will facilitate access by trenching equipment.

Beaver Control

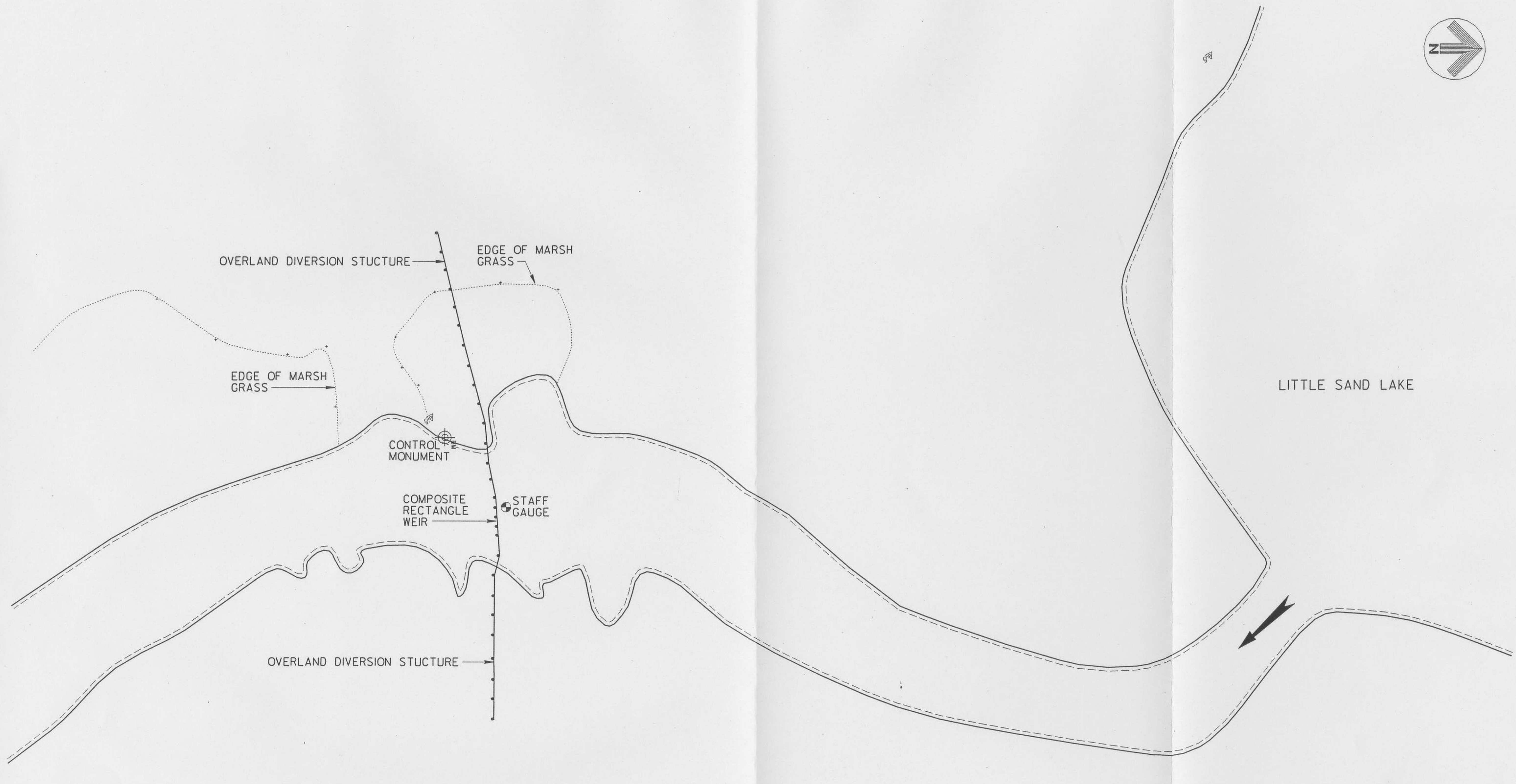
In order for the weir structure to properly function, downstream beaver dams need to be removed. Nicolet Minerals Company will work with the U.S. Department of Agriculture Animal Control Office in Rhinelander, Wisconsin, to implement a program to remove the dams and control the beaver population to keep Upper Creek 12-9 unobstructed.

Summary

With proper setting of the weir crest, a 4-ft by 8-ft by 16-ft composite rectangular weir structure will provide the full range of measuring capabilities required while causing minimal change in water surface fluctuations throughout the full range of flows expected from Little Sand Lake.

With this type of facility, a means of setting a stable stage/discharge relationship and collection of flow data on the Little Sand Lake discharge can be provided while minimizing environmental impact to the area at the outlet of the lake. While requiring more maintenance than other structures (cleaning the weir, checking crest elevation stability, etc.) the structure is capable of meeting the needs for creating a stable stage/discharge relationship and monitoring the surface water flow of the discharge from Little Sand Lake.

MDL:smh:mld2



0 40' 80'

BAR SCALE

Foth & Van Dyke			
REVISED	DATE	BY	DESCRIPTION
⚠	4/98	SVDI	CHANGED TITLE BLOCK
CHECKED BY:	JKSI	DATE: JAN. '97	
APPROVED BY:	MDL	DATE: JAN. '97	
APPROVED BY:	JWS	DATE: JAN. '97	

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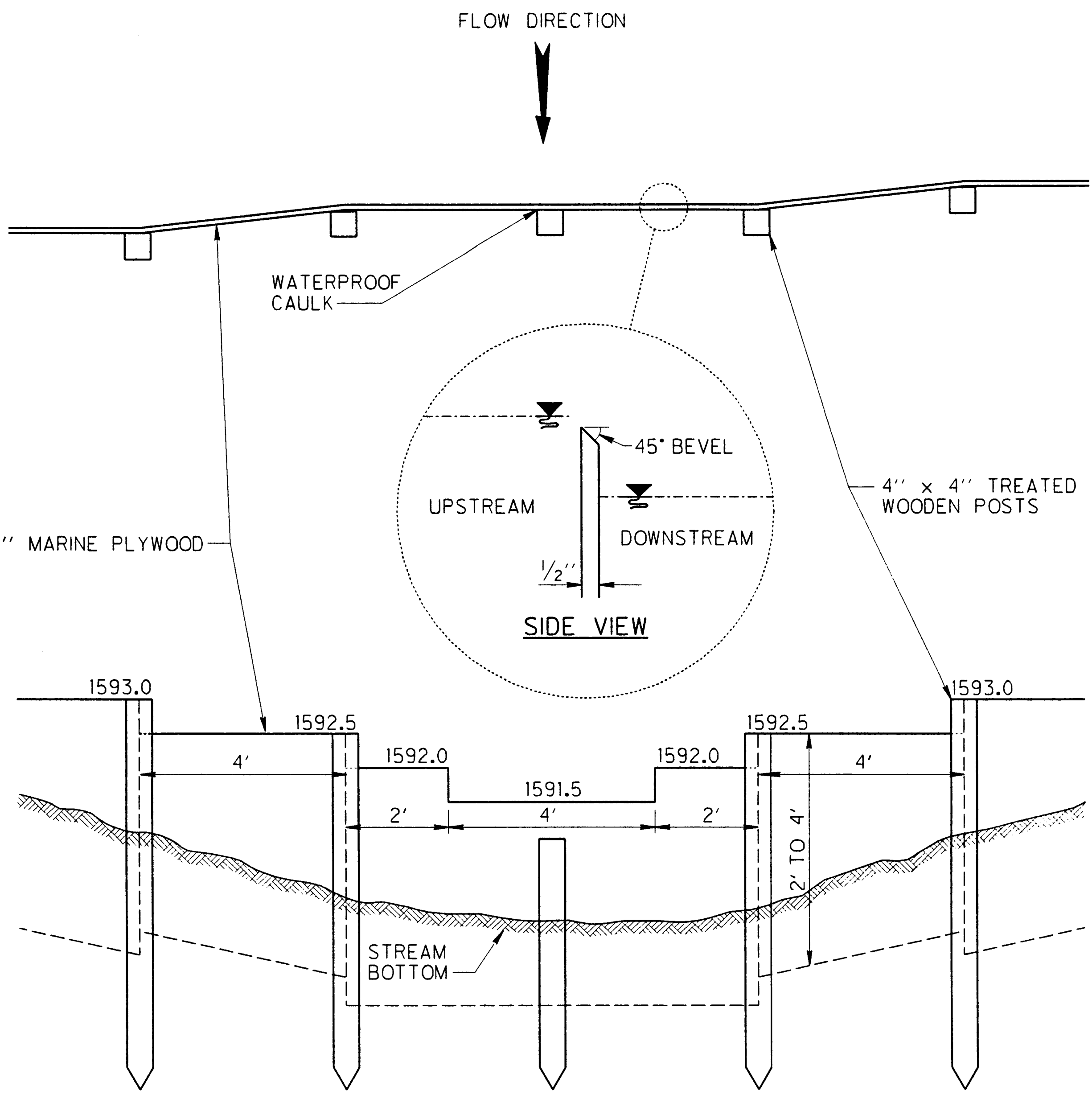
FIGURE 1

LITTLE SAND LAKE

WEIR OUTLET LOCATION DIAGRAM

Scale: SEE BAR SCALE	Date: 01/06/97	
Prepared By: Foth & Van Dyke	By: MDL	93C049



COMPOSITE RECTANGULAR WEIR

4' WEIR INSET INTO 8' WEIR INSET INTO 16' WEIR

Foth & Van Dyke				
REVISED	DATE	BY	DESCRIPTION	
CHECKED BY:		MDL		DATE: MAR. '98
APPROVED BY:		SVD1		DATE: MAR. '98
APPROVED BY:		GWS		DATE: MAR. '98

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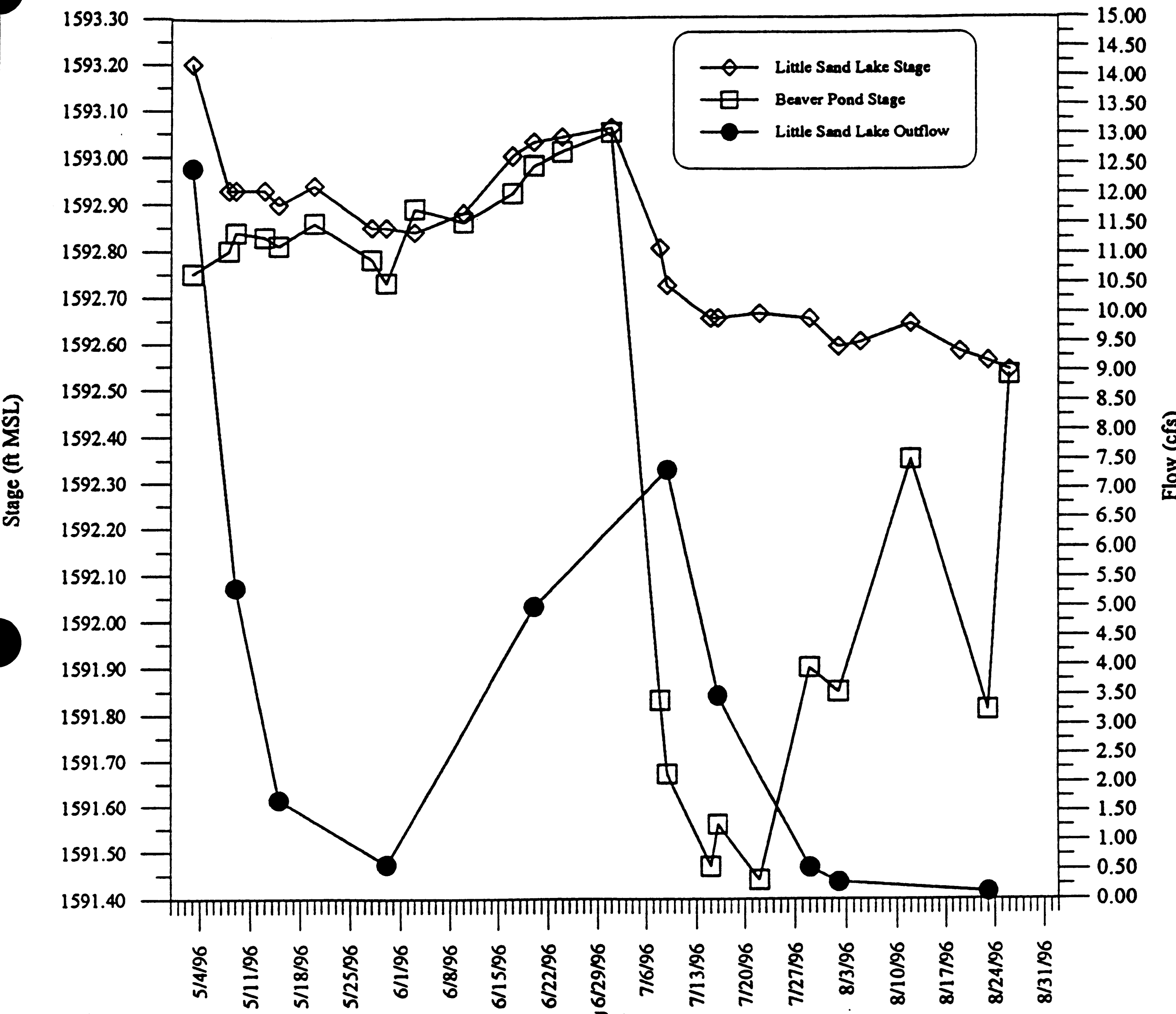
FIGURE 2

PROPOSED MONITORING INSTALLATION

Scale: NOT TO SCALE		Date: MARCH, 1998	
Prepared By: Foth & Van Dyke		By: JRB2	93C049

I:\93c049\3c49f222.dgn



j:scopes:93c049:svd1:st-flow:isl96b.grf,st-fle96.dat

Foth & Van Dyke			
REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	JKS1	DATE: SEPT.'96
APPROVED BY:	SVD1	DATE: SEPT.'96
APPROVED BY:	GWS	DATE: SEPT.'96

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FIGURE 3

1996 FLOW, LAKE STAGE AND BEAVER POND DATA FOR DUCK LAKE

Scale:	NTS	Date: SEPTEMBER, 1996	
Prepared By: Foth & Van Dyke		By:	93C049

I:\93c049\3c49f186.dgn

Attachment 1

Outlet Rating Equation for Proposed Monitoring Installation for Little Sand Lake Outlet

Outlet Rating Equation for Proposed Monitoring Installation for Little Sand Lake Outlet (see Figure 3)

Using weir equation[1,3]

$$Q = CLH^{1.5}$$

where:
- Q = flow discharge in cfs
- C = weir coefficient[2,3]
  = 3.25 (chosen within published ranges of coefficients to best match this condition)
- L = weir length, in feet
- H = head above crest, in feet

For the first stage: L=4 ft; crest elev.=1591.5, so H =lake stage-1591.5
=LS-1591.5

$$Q_1 = 3.25(4)H^{1.5} = 13(LS-1591.5)^{1.5}$$

For the second stage: L=4 ft; crest elev.=1592.0, H=LS-1592

$$Q_2 = 3.25(4)H^{1.5} = 13(LS-1592)^{1.5}$$

For the third stage: L=8 ft; crest elev.=1592.5, H=LS-1592.5

$$Q_3 = 3.25(8)H^{1.5} = 26(LS-1592.5)^{1.5}$$

Total flow in cubic feet per second (cfs), then, is:

$$Q = 13(LS-1591.5)^{1.5} + 13(LS-1592)^{1.5} + 26(LS-1592.5)^{1.5}$$

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[1]Chow, V.T. Open Channel Hydraulics, p. 362.

[2]Chow, V.T. Open Channel Hydraulics, p. 53, 362.

[3]Grant and Dawson. ISCO Open Channel Flow Measurement Handbook - Fourth Edition. p. 40.