Crandon Project: revised Wisconsin Pollutant Discharge Elimination System (WPDES) wastewater discharge permit application. 1985

Exxon Minerals Company
Rhinelander, Wisconsin: Exxon Minerals Company, 1985

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EIS-40/WPDES

CRANDON PROJECT

REVISED
WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTEWATER DISCHARGE PERMIT APPLICATION

(WPDES)

EXXON MINERALS COMPANY
RHINELANDER, WISCONSIN

DECEMBER 1985

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REVISED
WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTEWATER DISCHARGE PERMIT APPLICATION
(WPDES)

WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTEWATER DISCHARGE PERMIT APPLICATION
STANDARD FORM C
MANUFACTURING AND COMMERCIAL DISCHARGERS
FORM 3400—29
REV. 7-76

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
BOX 7921
MADISON, WISCONSIN 53707

FOR DEPT. USE

SECTION I. APPLICANT AND FACILITY DESCRIPTION

Unless otherwise specified on this form all items are to be completed. If an item is not applicable indicate 'NA.'

ADDITIONAL INSTRUCTIONS FOR SELECTED ITEMS APPEAR IN SEPARATE INSTRUCTION BOOKLET AS INDICATED. REFER TO BOOKLET BEFORE FILLING OUT THESE ITEMS.

Please Print or Type

1. **Legal Name of Applicant** (see instructions)	101	EXXON CORPORATION, c/o Exxon Minerals Company (EMC)
2. **Mailing Address of Applicant** (see instructions) Number & Street	102a	P. O. Box 813
City	102b	Rhinelander,
State	102c	Wisconsin
Zip Code	102d	54501
3. **Applicant's Authorized Agent** (see instructions) Name and Title	103a	D. B. Achttien, General Manager, Crandon Project EXXON MINERALS COMPANY, Attorney-in-Fact for Exxon Cor
Number & Street Address	103b	P. O. Box 813
City	103c	Rhinelander,
State	103d	Wisconsin
Zip Code	103e	54501
Telephone	103f	(715) 369-2800 (Area Code / Number)
4. **Previous Application** If a previous application for a National or Federal discharge permit has been made, give the date of application. Use numeric designation for date.	104	Original: 82 12 22 (YR MO DAY) Revision: 83 9 9 (YR MO DAY)

I certify that I am familiar with the information contained in this application and that to the best of my knowledge and belief such information is true, complete, and accurate.

D. B. Achttien Printed Name of Person Signing	102e	General Manager, Crandon Project Exxon Minerals Company Attorney-in-Fact for Exxon Corporation Title
D B Achttien Signature of Applicant or Authorized Agent	102f	January 16, 1986 Date Application Signed

Chapter 147.21(4), Wisconsin Statutes provides that: Any person who knowingly makes any false statement, representation or certification in this application shall upon conviction be punished by a fine of not more than $10,000 or by imprisonment for not more than 6 months or both.

FOR DEPT. USE

Received ____ ____ ____
YR MO DAY

This section contains 3 pages.

FOR DEPT. USE

5. **Facility/Activity (see instructions)** Give the name, ownership, and physical location of the plant or other operating facility where discharge(s) does or will occur.

Name	105a	Crandon Mine
Ownership (Public, Private or Both Public and Private)	105b	☐ PUB ☒ PRV ☐ BPP
Check block if Federal Facility and give GSA Inventory Control Number	105c	☐ FED
	105d	N/A
Location		
Street & Number	105e	Lincoln and Nashville Townships (See Figure 1)
City	105f	
County	105g	Forest
State	105h	Wisconsin

6. **Nature of Business** State the nature of the business conducted at the plant or operating facility.

106a Mining and milling of ore containing zinc, copper, and lead sulfide.

106b FOR DEPT. USE

7. **Facility Intake Water (see instructions)** Indicate water intake volume per day by sources. Estimate average volume per day in thousand gallons per day.

Municipal or private water system	107a	_____ thousand gallons per day
Surface water	107b	_____ thousand gallons per day
Groundwater	107c	_____ thousand gallons per day
Other*	107d	_____ thousand gallons per day
Total Item 7	107e	_____ thousand gallons per day

(Omitted in accordance with DNR instructions.)

*If there is intake water from 'other,' specify the source.

107f _____

8. **Facility Water Use** Estimate average volume per day in thousand gallons per day for the following types of water usage at the facility. (see instructions)

Noncontact cooling water	108a	960 thousand gallons per day	See additional information.
Boiler feed water	108b	0 thousand gallons per day	
Process water (including contact cooling water)	108c	8,865 thousand gallons per day	See additional information.
Sanitary water	108d	23.5 thousand gallons per day	See additional information.
Other*	108e	35 thousand gallons per day	See additional information.
Total Item 8	108f	8,924 thousand gallons per day	See additional information. (Excludes noncontact cooling water).

*If there are discharges to 'other,' specify.

108g Laboratory and shops, and potable water to mine.

If there is 'Sanitary' water use, give the number of people served.

108h 650 people served

FOR DEPT. USE

All Facility Discharges and other Losses; Number and Discharge (see instructions) Volume Specify the number of discharge points and the volume of water discharged or lost from the facility according to the categories below. Estimate average volume per day in thousand gallons per day.

		Number of Discharge Points		Total Volume Used or Discharged, Thousand Gal/Day	
Surface Water	109a1	7	109a2	1,714	See additional information.
Sanitary wastewater transport system	109b1	N/A	109b2	N/A	
Storm water transport s ;tem	109c1	30	109c2	--	See additional information.
Combined sanitary and storm water transport system	109d1	N/A	109d2	N/A	
Surface impoundment with no effluent	109e1	--	109e2	--	See additional information.
Underground percolation	109f1	N/A	109f2	N/A	
Well Injection	109g1	N/A	109g2	N/A	
Waste acceptance firm	109h1	N/A	109h2	N/A	
Evaporation	109i1	3	109i2	218	See additional information.
Consumption	109j1	1	109j2	27	See additional information.
Other*	109k1	0	109k2	309	See additional information.
Facility discharges and volume Total Item 9.	109l1	41	109l2	1,959	See additional information.
*If there are discharges to 'other,' specify.	109m1	Retained in tailings and backfilled sands.			

10. **Permits, Licenses and Applications**
List all existing, pending or denied permits, licenses and applications related to discharges from this facility (see instructions).

Issuing Dept.	For Dept. Use	Type of Permit or License	ID Number	Date Filed YR/MO/DA	Date Issued YR/MO/DA	Date Denied YR/MO/DA	Expiration Date YR/MO/DA
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
DNR		WPDES					
DNR		Water Regulatory		Not Filed			
COE		Sec. 404		Not Filed			

Maps and Drawings
Attach all required maps and drawings to the back of this application.(see instructions)

12. **Additional Information**

112 Item Number	Information
108a	Non-contact cooling water:
	Use — 10^3 Gal/Day — gpm
	Compressor cooling — 960 — 665
	NOTE: This water is not discharged; it is recycled through a cooling tower prior to reuse in the compressors.

Item 12. Additional Information (continued)

108c Typical water input to the mill, including recycle use is as follows:

Source	10^3 Gal/Day	gpm
Moisture in Ore	72	50
Recycle from Zinc Concentrate Thickener	533	370
Direct Recycle from Reclaim Pond	4,100	2,850
Treated Water Recycle	1,120	780
Direct Recycle from Tailing Thickener to Backfill Cyclones	3,040	2,110
Total	8,865	6,160

NOTE: The treated water recycle stream is composed of treated mine water and treated reclaim pond water flows. Water lost during the milling process is made up with treated mine water, thus eliminating the need for a continuous outside source of fresh water. Ground water resources may be used for laboratory and shop requirements (20 gpm), sanitary system (15 gpm), and potable water for the mine (5 gpm). Ground water may also be used as make-up to the mill in the event that process needs cannot be satisfied with recycle water.

108d The effluent from the sanitary waste treatment package plant is discharged at design flow rate of 15 gpm (23,500 gal/day). This is based on 35 gallons per day per person for an estimate of 650 people and 750 gallons per day of base flow (per code).

108e

Use	10^3 Gal/Day	gpm
Laboratory and Shops	29	20
Potable Water to Mine	6	5
Total	35	25

108f Total excludes non-contact cooling water; see note 108a.

108h 620 employees plus approximately 30 visitors represents maximum design flow base.

Item 12. Additional Information (continued)

109a The seven discharges to surface water include one discharge of 1,190 gpm of treated water to Swamp Creek (Discharge 001). This includes 350 gpm of treated intercepted ground water, 825 gpm of treated contaminated mine water, and 15 gpm of treated sanitary effluent.

The other six discharges are intermittent discharges to streams and springs described in Section II - Discharge 004 (1-6). Since these discharges will not be routine, they are listed in 109a in number but not in volume discharged.

109c Contaminated storm water runoff will be collected and sent to reclaim pond cell A and does not constitute a separate discharge from the facility. Uncontaminated storm water runoff will be collected and directed to sedimentation ponds. See Section II - Discharge number 002 and Section II - Discharge 003. Discharge 002 includes storm water runoff from the mine/mill site and the MWDF. Discharge 003 includes storm water runoff from access road and railroad. Also see Section 1, Figure 1.

109e Information on infiltration from tailings ponds is included in the NR 182.08 application. The application is supported by the Mine Waste Disposal Feasibility Report dated November, 1985.

Item 12. Additional Information (continued)

109i

Source	10^3 Gal/Day	gpm
Reclaim Pond	65	45
Tailings Ponds (T1, T2, T3 & T4)	151	105
Discharge Lagoons (2)	2	1
Total	218	151

NOTE: Value for evaporation from tailings ponds is for a situation where one pond is filled and another pond is starting to be used. Refer to letter from B. Hansen to S. Bangert (DNR) dated July 3, 1984.

109j Water retained with concentrate products is as follows:

Concentrate Product	10^3 Gal/Day	gpm
Lead	2	1
Zinc	22	15
Copper	3	2
Total	27	18

109k Water is retained in tailings and backfilled sands as follows:

	10^3 Gal/Day	gpm
Tailings	151	105
Backfilled Sands	158	110
Total	309	215

1091 There is a difference between water lost from the process circuit and water lost from the Project. All water losses have been addressed in Item 9. Those losses which are not discharged from the Project (i.e., water retained in tailings and backfilled sands) have been indicated by volume but with "zero" as the number of discharge points. The total volume discharged is the sum of only those points where there is a loss from the Project.

Item 12. Additional Information

WPDES Addendum: As requested in the October 28, 1983 letter from Michael D. Witt, Chief Industrial Wastewater Section, to Barry J. Hansen, the attached Tables 1 and 2 were reviewed and completed in accordance with the instructions given below:

For each outfall, review the attached Tables 1 and 2 and place an "X" adjacent to any of the pollutants which you know or have reason to believe may be present in the effluent. If their presence is due solely as a result of the intake water, write "intake" next to the pollutant. For any pollutant marked as being present, please provide a projected effluent concentration of that pollutant.

TABLE 1.

VOLATILE COMPOUNDS	
1V. Acrolein (107-02-8)	
2V. Acrylonitrile (107-13-1)	
3V. Benzene (71-43-2)	
5V. Bromoform (75-25-2)	
6V. Carbon Tetrachloride (56-23-5)	
7V. Chlorobenzene (108-90-7)	
8V. Chlorodibromomethane (124-48-1)	
9V. Chloroethane (75-00-3)	
10V. 2-Chloroethylvinyl Ether (110-75-8)	
11V. Chloroform (67-66-3)	
12V. Dichlorobromomethane (75-27-4)	
14V. 1,1-Dichloroethane (75-34-3)	
15V. 1,2-Dichloroethane (107-06-2)	
16V. 1,1-Dichloroethylene (75-35-4)	
17V. 1,2-Dichloropropane (78-87-5)	
18V. 1,3-Dichloropropylene (542-75-6)	
19V. Ethylbenzene (100-41-4)	
20V. Methyl Bromide (74-83-9)	
21V. Methyl Chloride (74-87-3)	
22V. Methylene Chloride (75-09-2)	
23V. 1,1,2,2-Tetrachloroethane (79-34-5)	
24V. Tetrachloroethylene (127-18-4)	
25V. Toluene (108-88-3)	
26V. 1,2-Trans-Dichloroethylene (156-60-5)	
27V. 1,1,1-Trichloroethane (71-55-6)	
28V. 1,1,2-Trichloroethane (79-00-5)	
29V. Trichloroethylene (79-01-6)	
31V. Vinyl Chloride (75-01-4)	

ACID COMPOUNDS	
1A. 2-Chlorophenol (95-57-8)	
2A. 2,4-Dichlorophenol (120-83-2)	
3A. 2,4-Dimethylphenol (105-67-9)	
4A. 4,6-Dinitro-O-Cresol (534-52-1)	
5A. 2,4-Dinitrophenol (51-28-5)	
6A. 2-Nitrophenol (88-75-5)	
7A. 4-Nitrophenol (100-02-7)	
8A. P-Chloro-M-Cresol (59-50-7)	
9A. Pentachlorophenol (87-86-5)	
10A. Phenol (108-95-2)	
11A. 2,4,6-Trichlorophenol (88-06-2)	

BASE/NEUTRAL COMPOUNDS	
1B. Acenaphthene (83-32-9)	
2B. Acenaphtylene (208-96-8)	
3B. Anthracene (120-12-7)	
4B. Benzidine (92-87-5)	
5B. Benzo *(a)* Anthracene (56-55-3)	
6B. Benzo *(a)* Pyrene (50-32-8)	
7B. 3,4-Benzofluoranthene (205-99-2)	
8B. Benzo *(ghi)* Perylene (191-24-2)	
9B. Benzo *(k)* Fluoranthene (207-08-9)	
10B. Bis *(2-Chloroethoxy)* Methane (111-91-1)	
11B. Bis *(2-Chloroethyl)* Ether (111-44-4)	
12B. Bis *(2-Chloroisopropyl)* Ether (39638-32-9)	
13B. Bis *(2-Ethylhexyl)* Phthalate (117-81-7)	
14B. 4-Bromophenyl Phenyl Ether (101-55-3)	
15B. Butyl Benzyl Phthalate (85-68-7)	
16B. 2-Chloronaphthalene (91-58-7)	
17B. 4-Chlorophenyl Phenyl Ether (7005-72-3)	

BASE/NEUTRAL COMPOUNDS	
18B. Chrysene (218-01-9)	
19B. Dibenzo *(a,h)* Anthracene (53-70-3)	
20B. 1,2-Dichlorobenzene (95-50-1)	
21B. 1,3-Dichlorobenzene (541-73-1)	
22B. 1,4-Dichlorobenzene (106-46-7)	
23B. 3,3'-Dichlorobenzidine (91-94-1)	
24B. Diethyl Phthalate (84-66-2)	
25B. Dimethyl Phthalate (131-11-3)	
26B. Di-N-Butyl Phthalate (84-74-2)	
27B. 2,4-Dinitrotoluene (121-14-2)	
28B. 2,6-Dinitrotoluene (606-20-2)	
29B. Di-N-Octyl Phthalate (117-84-0)	
30B. 1,2-Diphenylhydrazine *(as Azobenzene)* (122-66-7)	
31B. Fluoranthene (206-44-0)	
32B. Fluorene (86-73-7)	
33B. Hexachlorobenzene (118-71-1)	
34B. Hexachlorobutadiene (87-68-3)	
35B. Hexachlorocyclopentadiene (77-47-4)	
36B. Hexachloroethane (67-72-1)	
37B. Indeno *(1,2,3-cd)* Pyrene (193-39-5)	
38B. Isophorone (78-59-1)	
39B. Naphthalene (91-20-3)	
40B. Nitrobenzene (98-95-3)	
41B. N-Nitrosodimethylamine (62-75-9)	
42B. N-Nitrosodi-N-Propylamine (621-64-7)	
43B. N-Nitrosodiphenylamine (86-30-6)	
44B. Phenanthrene (85-01-8)	
45B. Pyrene (129-00-0)	
46B. 1,2,4-Trichlorobenzene (120-82-1)	

PESTICIDES	
1P. Aldrin (309-00-2)	
2P. α-BHC (319-84-6)	
3P. β-BHC (319-85-7)	
4P. γ-BHC (58-89-9)	
5P. δ-BHC (319-86-8)	
6P. Chlordane (57-74-9)	
7P. 4,4'-DDT (50-29-3)	
8P. 4,4'-DDE (72-55-9)	
9P. 4,4'-DDD (72-54-8)	
10P. Dieldrin (60-57-1)	
11P. α-Endosulfan (115-29-7)	
12P. β-Endosulfan (115-29-7)	
13P. Endosulfan Sulfate (1031-07-8)	
14P. Endrin (72-20-8)	
15P. Endrin Aldehyde (7421-93-4)	
16P. Heptachlor (76-44-8)	
17P. Heptachlor Epoxide (1024-57-3)	
18P. PCB-1242 (53469-21-9)	
19P. PCB-1254 (11097-69-1)	
20P. PCB-1221 (11104-28-2)	
21P. PCB-1232 (11141-16-5)	
22P. PCB-1248 (12672-29-6)	
23P. PCB-1260 (11096-82-5)	
24P. PCB-1016 (12674-11-2)	
25P. Toxaphene (8001-35-2)	

DIOXIN	
2,3,7,8-Tetrachlorodibenzo-P-Dioxin (1764-01-6)	

TABLE 2.

TOXIC POLLUTANT

Asbestos

HAZARDOUS SUBSTANCES

Acetaldehyde
Allyl alcohol
Allyl chloride
Amyl acetate
Aniline
Benzonitrile
Benzyl chloride
Butyl acetate
Butylamine
Captan
Carbaryl
Carbofuran
Carbon disulfide
Chlorpyrifos
Coumaphos
Cresol
Crotonaldehyde
Cyclohexane
2,4-D (2,4-Dichlorophenoxyacetic acid)
Diazinon
Dicamba
Dichlobenil
Dichlone
2,2-Dichloropropionic acid

HAZARDOUS SUBSTANCES

Dichlorvos
Diethyl amine
Dimethyl amine
Dintrobenzene
Diquat
Disulfoton
Diuron
Epichlorohydrin
Ethion
Ethylene diamine
Ethylene dibromide
Formaldehyde
Furfural
Guthion
Isoprene
Isopropanolamine
Kelthane
Kepone
Malathion
Mercaptodimethur
Methoxychlor
Methyl mercaptan
Methyl methacrylate
Methyl parathion
Mevinphos
Mexacarbate
Monoethyl amine
Monomethyl amine

HAZARDOUS SUBSTANCES

Naled
Napthenic acid
Nitrotoluene
Parathion
Phenolsulfonate
Phosgene
Propargite
Propylene oxide
Pyrethrins
Quinoline
Resorcinol
X Strontium Intake[1]
Strychnine
Styrene
2,4,5-T (2,4,5-Trichlorophenoxyacetic acid)
TDE (Tetrachlorodiphenyl ethane)
2,4,5-TP (2-(2,4,5-Trichlorophenoxy) propanoic acid)
Trichlorofon
Triethanolamine
Triethylamine
Trimethylamine
Uranium
Vanadium
Vinyl acetate
Xylene
Xylenol
Zirconium

NOTE: The previous tables were taken from the May 19, 1980 Federal Register.

If you have reason to believe that none of these pollutants will be present in the effluent as a result or your operations/manufacturing processes, place an "X" in the adjacent blank. ____

This Addendum must be signed by the official representative of the facility who is: the owner, the sole proprietor for a sole proprietorship, a general partner for a partnership, or an executive officer of at least the level of vice president for a corporation, having overall responsibility for the operation of the facility.

D. B. Achttien
Typed Name of Official Representative

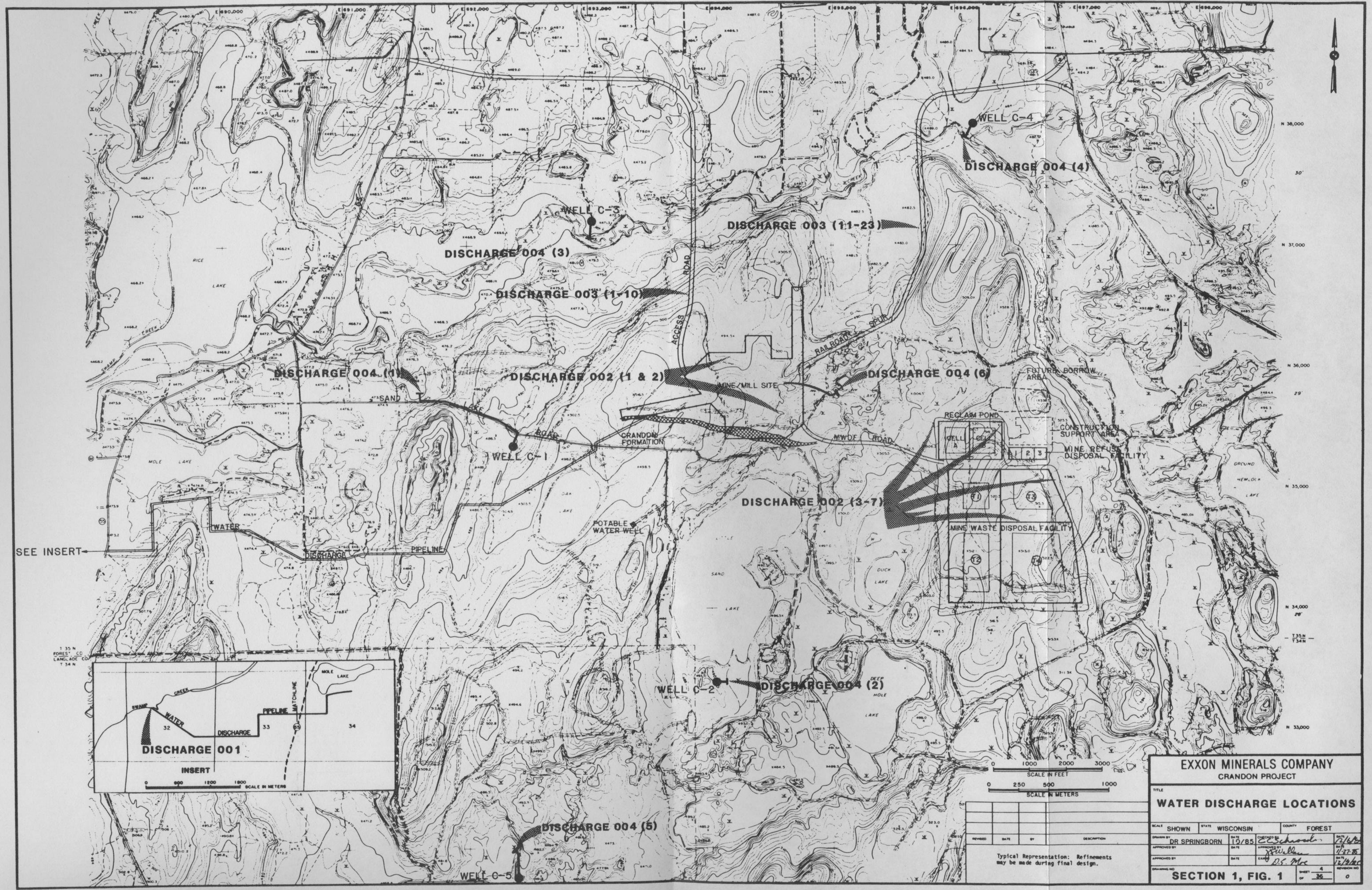
General Manager, Crandon Project
Title
Exxon Minerals Company,
Attorney-in-fact for Exxon Corp.

D. B. Achttien
Signature of Official Representative

January 16, 1986
Date Signed

Chpt. 147.21(4), Wisc. Stats., provides that: Any person who knowingly makes any false statement, representation or certification in this Addendum shall upon conviction be punished by a fine of not more than $10,000 or by imprisonment for not more than 6 months or both.

[1]Strontium was not analyzed in the ground water. We expect that it would be present in low concentrations (less than 1 mg/l) in ground water.


DISCHARGE 004 (4)
WELL C-4
WELL C-3
DISCHARGE 003 (11-23)
DISCHARGE 004 (3)
DISCHARGE 003 (1-10)
ACCESS ROAD
RAILROAD SPUR
DISCHARGE 004 (1)
DISCHARGE 002 (1 & 2)
MINE/MILL SITE
DISCHARGE 004 (6)
FUTURE BORROW AREA
RECLAIM POND
CELL A
CELL B
CONSTRUCTION SUPPORT AREA
MINE REFUSE DISPOSAL FACILITY
SAND LAKE ROAD
WELL C-1
CRANDON FORMATION
MWDF ROAD
DISCHARGE 002 (3-7)
MINE WASTE DISPOSAL FACILITY
RICE LAKE
MOLE LAKE
SWAMP CREEK
POTABLE WATER WELL
WATER DISCHARGE PIPELINE
SEE INSERT
DUCK LAKE
SAND LAKE
GROUND HEMLOCK LAKE
OAK LAKE
WELL C-2
DISCHARGE 004 (2)
DEEP HOLE LAKE
MOLE LAKE
SWAMP CREEK
WATER DISCHARGE
PIPELINE
MATCHLINE
DISCHARGE 001
INSERT
0 600 1200 1800 SCALE IN METERS
DISCHARGE 004 (5)
WELL C-5
0 1000 2000 3000 SCALE IN FEET
0 250 500 1000 SCALE IN METERS
Typical Representation: Refinements may be made during final design.
EXXON MINERALS COMPANY
CRANDON PROJECT
WATER DISCHARGE LOCATIONS
SCALE SHOWN STATE WISCONSIN COUNTY FOREST
DRAWN BY DR SPRINGBORN DATE 10/85
SECTION 1, FIG. 1
SHEET 4 OF 36
REVISION NO 0

STANDARD FORM C – MANUFACTURING AND COMMERCIAL DISCHARGERS

FOR DEPT. USE

SECTION II. BASIC DISCHARGE DESCRIPTION

Complete this section for each discharge indicated in Section I, Item 9, that is to surface waters. This includes discharges to municipal sewerage systems in which the wastewater does not go through a treatment works prior to being discharged to surface waters. Discharges to wells must be described where there are also discharges to surface waters from this facility. SEPARATE DESCRIPTIONS OF EACH DISCHARGE ARE REQUIRED EVEN IF SEVERAL DISCHARGES ORIGINATE IN THE SAME FACILITY. All values for an existing discharge should be representative of the twelve previous months of operation. If this is a proposed discharge, values should reflect best engineering estimates.

ADDITIONAL INSTRUCTIONS FOR SELECTED ITEMS APPEAR IN SEPARATE INSTRUCTION BOOKLET AS INDICATED. REFER TO BOOKLET BEFORE FILLING OUT THESE ITEMS.

1. Discharge Serial No. and Name		
a. **Discharge Serial No.** (see instructions)	201a	001
b. **Discharge Name** Give name of discharge, if any. (see instructions)	201b	Swamp Creek Outfall
c. **Previous Discharge Serial No.** If previous permit application was made for this discharge (see Item 4, Section I), provide previous discharge serial number.	201c	N/A
2. Discharge Operating Dates		
a. **Discharge Began Date** If the discharge described below is in operation, give the date (within best estimate) the discharge began.	202a	N/A YR MO
b. **Discharge to Begin Date** If the discharge has never occurred but is planned for some future date, give the date (within best estimate) the discharge will begin.	202b	1988 October YR MO
c. **Discharge to End Date** If discharge is scheduled to be discontinued within the next 5 years, give the date (within best estimate) the discharge will end.	202c	N/A YR MO
3. Engineering Report Available Check if an engineering report is available to reviewing agency upon request. (see instructions)	203	XX (See Additional Information)

4. Discharge Location Name the political boundaries within which the point of discharge is located.

			For Dept. Use	
State	204a	Wisconsin	204d	
County	204b	Forest	204e	
(if applicable) City or Town	204c	Nashville Township	204f	

5. Discharge Point Description Discharge is into (check one): (see instructions)

Stream (includes ditches, arroyos, and other intermittent watercourses)	205a	XX☒STR
Lake		☐LKE
Ocean		☐OCE
Municipal Sanitary Wastewater Transport System		☐MTS
Municipal Combined Sanitary and Storm Transport System		☐MCS

This section contains 9 pages.

DISCHARGE SERIAL NUMBER

001

FOR DEPT. USE

Municipal Storm Water Transport System		☐ STS
Well (Injection)		☐ WEL
Other		☐ OTH
If 'other' is checked, specify	205b	

6. **Discharge Point — Lat/Long** Give the precise location of the point of discharge to the nearest second.

Latitude	206a	45 DEG 28 MIN 24 SEC
Longitude	206b	89 DEG 1 MIN 17 SEC

7. **Discharge Receiving Water Name** Name the waterway at the point of discharge.(see instructions)

207a: Swamp Creek

If the discharge is through an outfall that extends beyond the shoreline or is below the mean low water line, complete Item 8.

207b:

For Dept. Use		
Major	Minor	Sub

207c

For Dept. Use: 303e

8. **Offshore Discharge**

a. **Discharge Distance from Shore** 208a: N/A feet

b. **Discharge Depth Below Water Surface** 208b: N/A feet

9. **Discharge Type and Occurrence**

a. **Type of Discharge** Check whether the discharge is continuous or intermittent. (see instructions) 209a:

☒ (con) Continuous

☐ (int) Intermittent

b. **Discharge Occurrence Days per Week** Enter the average number of days per week (during periods of discharge) this discharge occurs. 209b: __days per week

c. **Discharge Occurrence** —Months If this discharge normally operates (either intermittently, or continuously) on less than a year-around basis (excluding shutdowns for routine maintenance), check the months during the year when the discharge is operating. (see instructions) 209c: N/A

☐ JAN ☐ FEB ☐ MAR ☐ APR

☐ MAY ☐ JUN ☐ JUL ☐ AUG

☐ SEP ☐ OCT ☐ NOV ☐ DEC

Continuous, year-round discharge

Complete Items 10 and 11 if "intermittent" is checked in Item 9.a. Otherwise, proceed to Item 12.

10. **Intermittent Discharge Quantity** State the average volume per discharge occurrence in thousands of gallons. 210: N/A thousand gallons per discharge occurrence.

11. **Intermittent Discharge Duration and Frequency**

a. **Intermittent Discharge Duration Per Day** State the average number of hours per day the discharge is operating. 211a: N/A hours per day

b. **Intermittent Discharge Frequency** State the average number of discharge occurrences per day during days when discharging. 211b: N/A discharge occurrences per day

12. **Maximum Flow Period** Give the time period in which the maximum flow of this discharge occurs. 212: From ____ (month) to N/A (month) Continuous, year-round discharge

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13. Activity Description Give a narrative description of activity producing this discharge.(see instructions)

213a

This discharge will result from treated mine drainage from underground mining of zinc, copper, and lead sulfide ores. Surface milling of the ores will also occur; but no routine discharge is planned from this activity (see Item 15). Primary process operations will be ore grinding, concentration by flotation, and dewatering to produce three metal sulfide concentrates (zinc, copper and lead). Treated wastewater from sanitary facilities within the mine/mill complex will contribute to this discharge. The sanitary facilities will include toilet use, hand washing, and showering.

14. Activity Causing Discharge For each SIC Code which describes the activity causing this discharge, supply the type and maximum amount of either the raw material consumed (Item 14a) or the product produced (Item 14b) in the units specified in Table I of the Instruction Booklet. For SIC Codes not listed in Table I, use raw material or production units normally used for measuring production.(see instructions)

a. **Raw Materials**

214a

SIC Code (1)	Name (2)	Maximum Amount/Day (3)	Unit (See Table I) (4)	Shared Discharges (Serial Number) (5)
1021	Copper Ores	8,200*	STPD**	
1031	Lead and Zinc Ores	Design Capacity		

b. **Products**

214b

SIC Code (1)	Name (2)	Maximum Amount/Day (3)	Unit (See Table I) (4)	Shared Discharges (Serial Number) (5)
1021	Copper Concentrates	210	STPD**	
1031	Lead and Zinc Concentrates	1,536	STPD**	
	(Product exits	process as metal sulfide		concentrates).

*8,200 STPD is the design production rate of zinc, copper, and lead ore. Annual production expressed as daily average is 7,400 STPD.

**Short tons per day.

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15. Waste Abatement

a. Waste Abatement Practices Describe the waste abatement practices used on this discharge with a brief narrative. (see instructions)

21Sa

Narrative: The Crandon Project water can be classified into four general categories:

1. Mine Water
2. Process Water
3. Sanitary Water
4. Surface Drainage

(Continued on Page II-4a.)

b. Waste Abatement Codes Using the codes listed in Table II of the Instruction Booklet, describe the waste abatement processes for this discharge in the order in which they occur if possible.

21Sb

(1) PEQUAL,	(2) CPHADJ,	(3) PSEDIM,
(4) PMIXED,	(5) CNEUTR,	(6) --,
(7) PSCREE,	(8) PEQUAL,	(9) BACTIV,
(10) PSEDIM,	(11) CCLDIS,	(12) ____,
(13) ____,	(14) ____,	(15) ____,
(16) ____,	(17) ____,	(18) ____,
(19) ____,	(20) ____,	(21) ____,
(22) ____,	(23) ____,	(24) ____,
(25) ____.		

Abatement code numbers 1 through 5 refer to the treatment of mine water for discharge, while numbers 7 through 11 refer to the treatment of sanitary water for discharge.

Item 15. Waste Abatement (continued)

Item 215a. Mine Water (continued)

Mine water will generally consist of two separate streams pumped from the mine: 1) contaminated mine water, which is collected drainage from mine workings, and 2) intercepted ground water, which is ground water collected before it enters the mine workings. The intercepted ground water will be collected separately only if a sufficient flow exists to warrant it.

At projected average inflow rates, approximately 20 percent of the contaminated mine water will normally be treated for use as mill make-up water and will not be discharged. The remainder of the contaminated mine water will be treated to meet effluent standards and will be discharged. During mill shutdown periods, all the contaminated mine water will be appropriately treated and discharged. Intercepted ground water will normally be discharged or treated when necessary prior to discharge to meet effluent standards. However, intercepted ground water may also be used as mill make-up water.

Lime and sulfide precipitation followed by filtration will be used to treat excess water from the Crandon Project prior to discharge as required. Although the same processes will be used to treat either intercepted ground water or contaminated mine water, two separate treatment trains will be provided to allow operating flexibility. The only source of surface water discharge under normal conditions will be drainage water encountered during mining. No routine discharge of treated mill process water is proposed during normal operations.

Item 15. Waste Abatement (continued)

Item 215a. Mine Water (continued)

The treatment system for contaminated mine water consists of lime and sulfide precipitation using a neutralization mixer followed by a reactor/clarifier for removal of metal hydroxide and sulfide precipitates and other solids. The precipitates (sludges) will be removed from the clarifier and transported to the tailings pond along with the fine tailings. Clarifier overflow will be sent to a dual-media filter to remove residual solids. The pH of the filtrates will be adjusted as required using sulfuric acid.

A schematic diagram of the water treatment system is presented on Section II, Figure 001-1 along with the mill recycle water treatment circuit. This overall system will produce an effluent which meets the U.S. EPA New Source Performance Standards and the Wisconsin Department of Natural Resource's effluent standards for Swamp Creek.

Process Water

Process water consists of all water used in mill operations including rainfall collected in the reclaim ponds and tailings ponds. Process water consists of all streams shown on Section II, Figure 001-2 except those designated as "mine water" or "sanitary users." No plans exist for a routine discharge from the process water system. This system will be operated as a total recycle system. The only discharge of treated process water anticipated would be the net precipitation, or that volume of water from rainfall which is in excess of that needed

Item 15. Waste Abatement (continued)

Item 215a. Process Water (continued)

for make-up. There may be times when excess rainfall must be removed to lower the water level in the reclaim ponds. Any discharge during these times would be subject to treatment by softening, reverse osmosis, and evaporation.

Because the process water system is designed for total recycle, a build-up of dissolved solids will occur which must be reduced to control gypsum scaling in the mill. An advanced water treatment system will be used to control this build-up. The first part of this system is lime-soda softening and filtration (see Section II, Figure 001-1). Effluent from this system will be treated with reverse osmosis (RO). Evaporation of the RO brine will be accomplished in two steps. A vapor compression evaporator will recover most of the water as a clean condensate which will be combined with the RO permeate for recycle. The water remaining in the evaporator brine will be evaporated by a crystallizer. The solid product from the crystallizer, primarily sodium sulfate, may be a marketable by-product.

Sanitary Water

The sanitary wastewater collected from the mine/mill complex will be treated by an extended aeration activated sludge system. Extended aeration is a well established technology which is widely used for treatment of sanitary wastewater. The process uses biological matter

Item 15. Waste Abatement (continued)

Item 215a. Sanitary Water (continued)

(bacteria) suspended in water to degrade the organic wastes. The extended aeration system for this application will include a bar screen, grit chamber, flow equalization tank, aeration tank, final clarifier, chlorine contact tank, and sludge storage tank. The flow diagram for this system is presented in Figure 001-3.

The sanitary wastewater will pass through a small grit chamber and bar screen into a flow equalization chamber. Wastewater will then flow by means of an air lift system to the aeration chamber to be aerated/digested for a period of 30 to 40 hours. Effluent from the aeration chamber will overflow to the clarifier to settle out the biomass. Settled sludge in the clarifier will be pumped back to the aeration chamber or wasted to a sludge holding tank. Effluent from the clarifier will flow by gravity to a chlorine contact chamber for disinfection prior to discharge.

Surface Drainage

Surface drainage consists of runoff of precipitation falling on the Project site area. Precipitation falling on facility areas subject to contamination will be contained and will become part of the process water system. This is explained in detail in the Preliminary Water Treatment Engineering Report (CH_2M Hill, 1985). Uncontaminated surface water runoff which could pick up suspended solids will be controlled by erosion control facilities and treated in drainage (sedimentation) basins to remove solids. Erosion control facilities are addressed in Section II - Discharges 002 and 003.

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16. Wastewater Characteristics

Check the box beside each constituent which is present in the effluent (discharge water). This determination is to be based on actual analysis or best estimate.(see instructions)

Parameter 216	Present	Parameter 216	Present
Color 00080		Copper 01042	X
Ammonia 00610	X	Iron 01045	X
Organic nitrogen 00605	X	Lead 01051	X
Nitrate 00620	X	Magnesium 00927	X
Nitrite 00615		Manganese 01055	X
~~Phosphorus~~ Phosphate 00665	X	Mercury 71900	X
Sulfate 00945	X	Molybdenum 01062	
Sulfide 00745		Nickel 01067	
~~Sulfite~~ Thiosulfate 00740	X	Selenium 01147	X
Bromide 71870		Silver 01077	X
Chloride 00940	X	Potassium 00937	X
Cyanide 00720	X	Sodium 00929	X
Fluoride 00951	X	Thallium 01059	
Aluminum 01105	X	Titanium 01152	
Antimony 01097		Tin 01102	
Arsenic 01002	X	Zinc 01092	X
Beryllium 01012		Algicides* 74051	
Barium 01007	X	Chlorinated organic compounds* 74052	
Boron 01022		Pesticides* 74053	
Cadmium 01027	X	Oil and grease 00550	
Calcium 00916	X	Phenols 32730	
Cobalt 01037		Surfactants 38260	
Chromium 01034	X	Chlorine 50060	
Fecal coliform bacteria 74055	X	Radioactivity* 74050	

*Specify substances, compounds and/or elements in Item 26.

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17. Description of Intake and Discharge

For each of the parameters listed below, enter in the appropriate box the value or code letter answer called for.(see instructions)

In addition, enter the parameter name and code and all required values for any of the following parameters if they were checked in Item 16; ammonia, cyanide, aluminum, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, phenols, oil and grease, and chlorine (residual).

Parameter and Code 217a	Influent		Effluent					
	Untreated Intake Water (Daily Average) (1)	In-Plant Treated Intake Water (Daily Average) (2)	Daily Average (3)	Minimum Value Observed or Expected During Discharge Activity (4)	Maximum Value Observed or Expected During Discharge Activity (5)	Frequency of Analysis (6)	Number of Analyses (7)	Sample Type (8)
Flow* ~~Gallons per day~~ Million gallons ~~00056~~ 50050 per day	N/A(a)	N/A	1.71	N/A(b)	4.32	N/A	N/A	N/A
pH Units 00400	N/A	N/A	X	6	9	N/A	N/A	N/A
Temperature (winter) ° F 74028	N/A	N/A	<55	32	55	N/A	N/A	N/A
Temperature (summer) ° F 74027	N/A	N/A	<70	N/A	N/A	N/A	N/A	N/A
Biochemical Oxygen Demand (BOD 5-day) mg/l 00310	N/A	N/A	<20	N/A	N/A	N/A	N/A	N/A
Chemical Oxygen Demand (COD) mg/l 00340	N/A	N/A	5	N/A	N/A	N/A	N/A	N/A
Total Suspended (nonfilterable) Solids mg/l 00530	N/A	N/A	10	1	<30	N/A	N/A	N/A
Specific Conductance micromhos/cm at 25° C 00095	N/A	N/A	X	N/A	N/A	N/A	N/A	N/A
Settleable Matter (residue) ml/l 00545	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Other discharges sharing intake flow (serial numbers).(see instructions)

(a) Intake water values not required for mining operations.

(b) Data not applicable. Not in operation.

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17. (Cont'd.) See additional information.

Parameter and Code 217a	Influent		Effluent					
	Untreated Intake Water (Daily Average) (1)	In-Plant Treated Intake Water (Daily Average) (2)	Daily Average (3)	Minimum Value Observed or Expected During Discharge Activity (4)	Maximum Value Observed or Expected During Discharge Activity (5)	Frequency of Analysis (6)	Number of Analyses (7)	Sample Type (8)

18. **Plant Controls** Check if the following plant controls are available for this discharge. 218

Alternate power source for major pumping facility. ☒ APS

Alarm or emergency procedure for power or equipment failure ☒ ALM

Complete item 19 if discharge is from cooling and/or steam water generation and water treatment additives are used.

19. **Water Treatment Additives** If the discharge is treated with any conditioner, inhibitor, or algicide, answer the following:

a. Name of Material(s) 219a: Lime, sodium sulfide, sulfuric acid, polymers (flocculants), possibly ferric sulfate, and chlorine.

b. Name and address of manufacturer 219b: Vendors have not yet been identified. Vendor names and addresses will be provided to the DNR when they become available.

c. Quantity (pounds added per million gallons of water treated). 219c:

Lime: 800-950 pounds
Sulfuric Acid: 450-550 pounds
Sodium Sulfide: 8-12 pounds
Chlorine: 20-200 pounds

Note: Chlorine used for sanitary waste treatment. Others used for treating mine water.

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d. Chemical composition of these additives (see instructions). 219d

Lime - CaO, Sulfuric Acid - H_2SO_4, Sodium Sulfide - $Na_2S \cdot 9H_2O$, Ferric Sulfate - $Fe_2(SO_4)_3$; exact polymers have not yet been determined but will probably be polyacrylamides. Chlorine - Cl_2.

Complete items 20-25 if there is a thermal discharge (e.g., associated with a steam and/or power generation plant, steel mill, petroleum refinery, or any other manufacturing process) and the total discharge flow is 10 million gallons per day or more. (see instructions)

20. Thermal Discharge Source Check the appropriate item(s) indicating the source of the discharge. (see instructions) 220

Boiler Blowdown	☐ BLBD
Boiler Chemical Cleaning	☐ BCCL
Ash Pond Overflow	☐ APOF N/A
Boiler Water Treatment — Evaporator Blowdown	☐ EPBD
Oil or Coal Fired Plants — Effluent from Air Pollution Control Devices	☐ OCFP
Condense Cooling Water	☐ COND
Cooling Tower Blowdown	☐ CTBD N/A
Manufacturing Process	☐ MFPR
Other	☐ OTHR

21. Discharge/Receiving Water Temperature Difference

Give the maximum temperature difference between the discharge and receiving waters for summer and winter operating conditions. (see instructions)

Summer 221a: -15 °F.

Winter 221b: +20 °F.

22. Discharge Temperature, Rate of Change Per Hour 222

N/A °F./hour

Give the maximum possible rate of temperature change per hour of discharge under operating conditions. (see instructions)

23. Water Temperature, Percentile Report (Frequency of Occurrence)

N/A

In the table below, enter the temperature which is exceeded 10% of the year, 5% of the year, 1% of the year and not at all (maximum yearly temperature). (see instructions)

Frequency of occurrence

		10%	5%	1%	Maximum
a. Intake Water Temperature (Subject to natural changes)	223a	°F	°F	°F	°F
b. Discharge Water Temperature	223b	°F	°F	°F	°F

24. Water Intake Velocity (see instructions) 224: N/A feet/sec.

25. Retention Time Give the length of time, in minutes, from start of water temperature rise to discharge of cooling water. (see instructions) 225: N/A minutes

Item 26. Additional Information

Item 17. (continued) The water treatment system and overall water balance during mature operation are shown in Item 15, Section II, Figures 001-1 and 001-2, respectively. As mentioned in Item 15, mill make-up water will come from mine drainage water. Mine drainage water, as shown in Item 15, Section II, Figure 001-1, will consist of two components: 1) contaminated mine water composed of ground water seepage into the active mine workings plus seepage from backfill sands; and 2) if a sufficient flow exists, ground water will be intercepted before it reaches and becomes contaminated by the mine workings. It is planned that intercepted ground water will be kept separate from the contaminated mine water in the treatment plant and be treated if needed before being discharged along with treated contaminated mine water. Depending on water quality and quantity of the mill influent streams, it is possible that intercepted ground water and contaminated mine water could be mixed prior to treatment for discharge.

The contaminated mine water will become the source of make-up to the mill circuit at a rate of approximately 190 gpm, with the balance being treated prior to discharge. The make-up water will be combined with approximately one-fifth of the recycle water and treated for use in the mill. No routine discharge of treated process water is planned. However, discharge of treated process water may be required periodically to remove excess water from the recycle circuit as

Item 26. Additional Information (continued)

Item 17. (continued) explained in Item 15, Page II-4b. Treated process water quality will meet all water quality standards prior to discharge.

The intercepted ground water is expected to be similar to the regional ground water quality. The intercepted ground water may also have to be treated by lime or soda ash and sulfide precipitation to meet effluent standards. The capability to either treat the intercepted ground water or bypass the treatment circuit will be incorporated into the system. The intercepted ground water (untreated or treated, if required) will then be combined with the treated contaminated mine water prior to discharge as shown in Item 15, Section II, Figure 001-1.

The treated sanitary wastewater will be combined with the treated mine water after the treated mine water leaves the discharge lagoons. The combined stream will then be discharged to Swamp Creek. The projected composition of the combined effluent stream is shown in Item 17, Page II-6, and in Table 1. Because of the large difference in flow rates between these two streams (treated mine water at 1,175 gpm and treated sanitary water at 15 gpm), the effect of combining the two streams is negligible. The composition of the combined streams is essentially the same as the treated mine water alone. Information of the estimated composition of the treated sanitary effluent alone is presented in detail in "Facilities Plan for

Item 26. Additional Information (continued)

Item 17. (continued)

TABLE 1

PROJECTED CONCENTRATION OF COMBINED EFFLUENT STREAMS

PARAMETER AND CODE		EFFLUENT (mg/1) DAILY(1,2) AVERAGE	MINIMUM VALUE EXPECTED	MAXIMUM VALUE EXPECTED
Cyanide	00720	0.006	<0.006	<0.096
Fluoride	00951	2	1	<12.5
Arsenic	01002	0.05	0.025	<1.48
Barium	01007	0.03	0.016	<2
Cadmium	01027	0.0006	0.00028	<0.074
Chromium III	01034	0.06	0.03	<11.1
Chromium VI		0.012	<0.012	<0.059
Copper	01042	0.01	0.005	<0.025
Iron	01054	0.4	0.2	--
Lead	01051	0.04	0.02	<0.6
Mercury	71900	0.00017	<0.00017	<0.002
Selenium	01147	0.06	0.027	<1.0
Silver	01077	0.003	0.0017	<0.007
Zinc	01092	0.06	0.032	<0.44
TDS		700	<700	<1055

(1) Monthly average of daily values.

(2) Some concentrations are flow dependent. Presented here for 1175 gpm.

Item 26. Additional Information (continued)

Item 17. Exxon Minerals Company Mine/Mill Complex Sanitary Wastewater (continued) Crandon, Wisconsin" (CH_2M Hill, 1985).

The DNR effluent limitations vary with the effluent flow rate. The following formula is used to calculate the effluent limitation for the regulated species.

$$C_E = \frac{Q_M C_M - Q_S C_S}{Q_E}$$

where: C_E = effluent concentration
C_M = chronic criterion concentration
C_S = background stream concentration levels in Swamp Creek
Q_E = effluent flow
Q_S = upstream flow in Swamp Creek (1/4 $Q_{7,10}$)
Q_M = mixing zone flow ($Q_E + Q_S$)

The effluent limitation for discharge flow rates into Swamp Creek of 2000 and 3000 gpm are presented in Table 2.

The projected average, minimum, and maximum concentration of the regulated species contained in the effluent to Swamp Creek are presented in Table 1. The daily average effluent concentrations represent the expected monthly average of the daily values. These values are estimated based on: 1) the water treatment testing on synthetic mine water using the proposed water treatment methods, 2) the results of water model projections of the water treatment system

Item 26. Additional Information (continued)

Item 17. (continued)

TABLE 2

PROJECTED WDNR EFFLUENT LIMITATIONS

PARAMETER (mg/l except for pH)	DAILY MAXIMUM[a]	MONTHLY AVERAGE AT EFFLUENT LOW RATE <2000 gpm	MONTHLY AVERAGE AT EFFLUENT LOW RATE 2000-3000 gpm
Toxic Pollutants			
Arsenic	1.48	0.55	0.45
Cadmium	0.074	0.00107	0.00092
Chromium (VI)	0.059	0.016	0.014
Chromium (III)	11.1	0.2	0.17
Copper	0.025	0.02	0.017
Cyanide	0.096	0.012	0.012
Lead	0.6[g]	0.076	0.065
Mercury	0.002	0.0002	0.0002
Selenium	1.0	0.14	0.12
Silver	0.007	h	h
Zinc	0.44	0.12	0.10
Conventional Pollutants			
BOD - summer		20[b]	15[b]
- winter		40[b]	30[b]
Total Suspended Solids	30[c]	20[c]	20[c]
pH	6 - 9[d]		
Nonconventional Pollutants			
Barium		9.2	7.8
Fluoride		12.5	10.6
Iron		1.6	1.4
Total Dissolved Solids[e]	1055[f]		

(a) Developed from acute toxicity data (except for total suspended solids).
(b) BOD limits are applied as weekly rather than monthly averages.
(c) Categorical limits based on New Source Performance Standards (NSPS).
(d) pH is in standard units.
(e) Chlorides and sulfates are regulated as part of the TDS limit.
(f) 1055 mg/l is the daily maximum value for TDS when effluent flow rate ≤2000 gpm, and 915 mg/l is the daily maximum value when effluent flow rate is between 2000 and 3000 gpm.
(g) Based on NSPS categorical standards, which are more stringent than the maximum value derived from acute toxicity data.
(h) No monthly average is established.

Note: Effluent limitations and calculation methods were provided to EMC from the DNR in letters from B. J. Baker to B. J. Hansen, April 5, 1984 and October 3, 1984.

Item 26. Additional Information (continued)

Item 17. (continued) effluent concentrations, and 3) conservative estimates of the differences that may occur between pilot plant/laboratory conditions and actual daily plant operations. Based on these conservative calculations, all chemical parameters will be below the DNR effluent limitations.

The concentrations described as minimum values expected in Table 1 are based on the water model projections of the effluent composition for normal operating conditions and hand calculations for parameters not calculated by the model. The water model was developed by CH_2M Hill and is described in their "Phase III Water Management Study," 1982. The results of water model projections for the water treatment plant effluent composition under various conditions are presented in "Water Model Projections of Effluent Composition from the Water Treatment Facility," 1985 by Exxon Minerals Company.

The concentrations described as the maximum value expected in Table 1 are based on the DNR's daily maximum effluent concentrations. These values are appropriate since the effluent concentrations could approach these values on a short-term basis due to a temporary upset at the water treatment facility. However, these values would not be exceeded, even on a short-term basis, as the discharge lagoons would allow for recycle of water that contained parameters that exceeded the DNR's daily maximum values.

Item 26. Additional Information (continued)

Item 17. (continued) There may be a small difference in the discharge water quality between summer and winter. This is due only to a slight change in the water quality of backfill drainage which becomes part of the contaminated mine water. Since backfill drainage is only a small part of the contaminated mine water, the difference in the quality of the effluent between summer and winter is not appreciable. Thiosulfate may be present at a somewhat higher concentration in the effluent in the winter than in the summer. The average thiosulfate concentration may range from 20 to 60 mg/l over the year.

Following treatment, the excess water will pass into two discharge lagoons arranged in series. Each lagoon has a 24-hour capacity at average flow. An 8-hour composite water sample will be analyzed at the end of each shift with emphasis on the most critical elements (mercury, cadmium, zinc, and others) based on operational experience. In the event of an unexpected mill upset or effluent excursion, the system will allow isolation and recycle of effluent to the water treatment facility when necessary. The design of these lagoons is presented in Section II, Figure 001-4 and discussed in the Preliminary Water Treatment Engineering Report (CH_2M Hill, 1985).

The minimum discharge will occur during early mill operation. It occurs at this time because the mine inflow is projected to build slowly to the steady state flow rates. Under low flow conditions

Item 26. Additional Information (continued)

Item 17. (continued) intercepted ground water will not be recovered as a separate stream. Shown below is the calculation of the discharge flow for 300 gpm of mine seepage.

Source	Flows contributing to Discharge gains/(losses) (gpm)
Ground water seepage into mine	300
Tool water (not supplied from ground water seepage)	150
Backfill drainage	160
Potable	5
Hoisted with ore	(50)
Mill make-up	(190)
Water contained in water treatment sludge	(10)
Treated for discharge	365

During the development period prior to mill operation it is projected that discharge will not be routinely required as the water from mine development will be stored in the reclaim pond and used in mill start up.

The maximum water discharge of 3,000 gpm is an estimate. Discharge at this rate assumes maximum mine flows occur simultaneously with maximum seepage from backfill sands. These unlikely events are combined with the assumption that the mill is not operating and mill circuit water being discharged after treatment to reduce reclaim pond water level. It is very unlikely that this discharge flow would be realized on a long-term basis. Although this maximum discharge is conceivable, the

Item 26. Additional Information (continued)

Item 17. (continued) water quality would meet the discharge effluent standards for Swamp Creek below Rice Lake.

An estimate of the make-up of the maximum water discharge value is presented below:

Source	Flow (gpm)	
Intercepted Ground Water	1,200	
Contaminated Mine Water	1,360	(includes 160 gpm backfill sand seepage)
Treated Reclaim Pond Recycle Flow	440	
Total	3,000	

During development of the Crandon Project water management system, an evaluation was made by Exxon Minerals Company to determine if water management practices and water treatment requirements during mill start-up were greatly different than those for normal or mature operation of the Project. The results of this work and other subsequent Project engineering studies lead to the conclusion that water management practices and water treatment requirements, particularly for water discharge, will be nearly the same during mill start-up and mature operations.

However, there may be some differences in the quality of the mine water between early and mature operations. During early operations mine

Item 26. Additional Information (continued)

Item 17. (continued) backfill drainage will make up a larger portion of the total mine water flow than during mature operation due to the projected slow build-up of mine water inflow to the steady state flow rate. However, the higher quality of water contained in the backfill during early operation will tend to offset the effect of the increased fraction of backfill drainage during this period.

During start-up, water flows between the mill, tailings pond, and reclaim ponds will be gradually increasing until the design capacity of the mill is reached. Treatment of recycle water will be started when the concentration of soluble metals in the recycle water becomes detrimental to the mill process, or when it is determined that gypsum scaling may become a problem in the mill.

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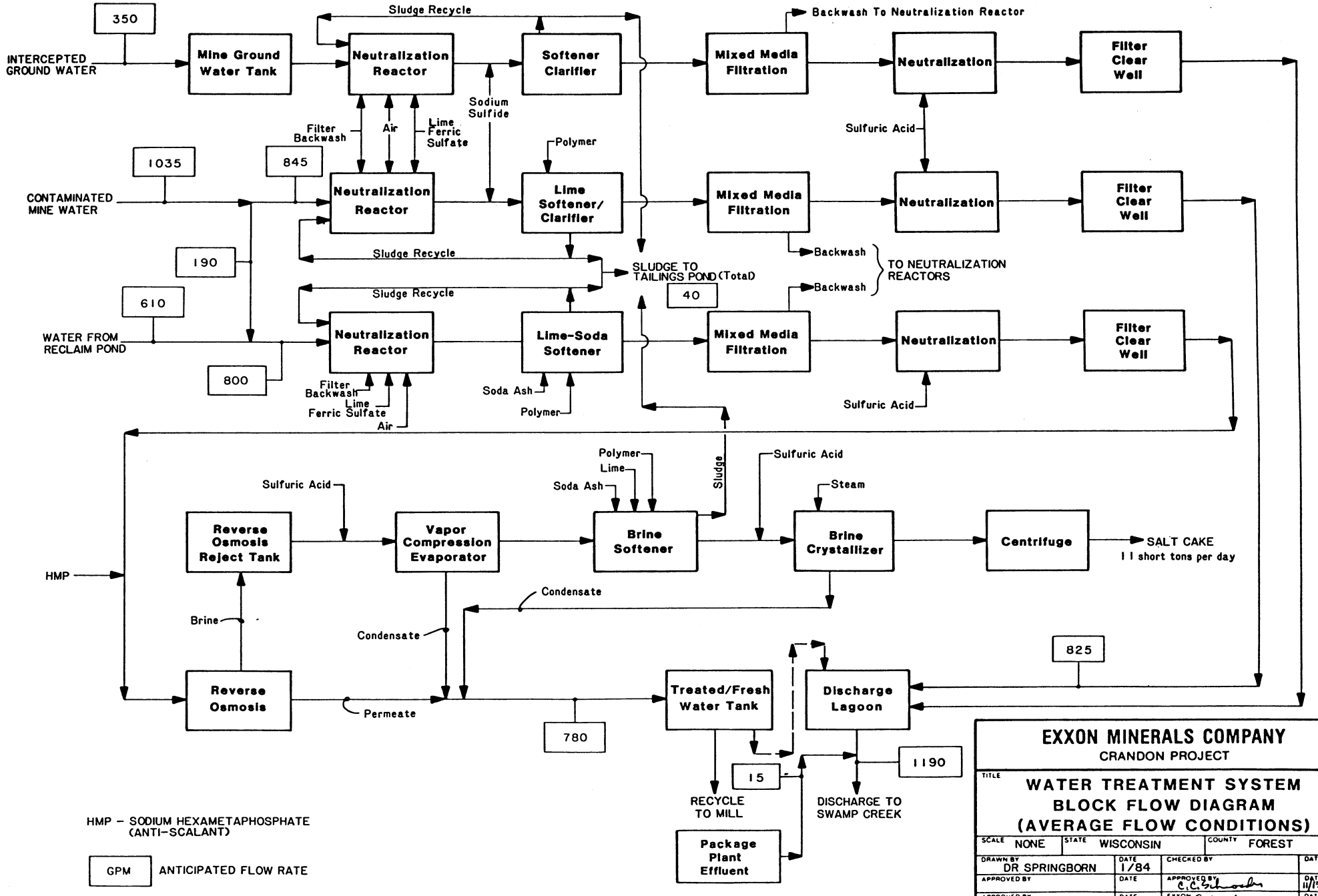
26. Additional Information

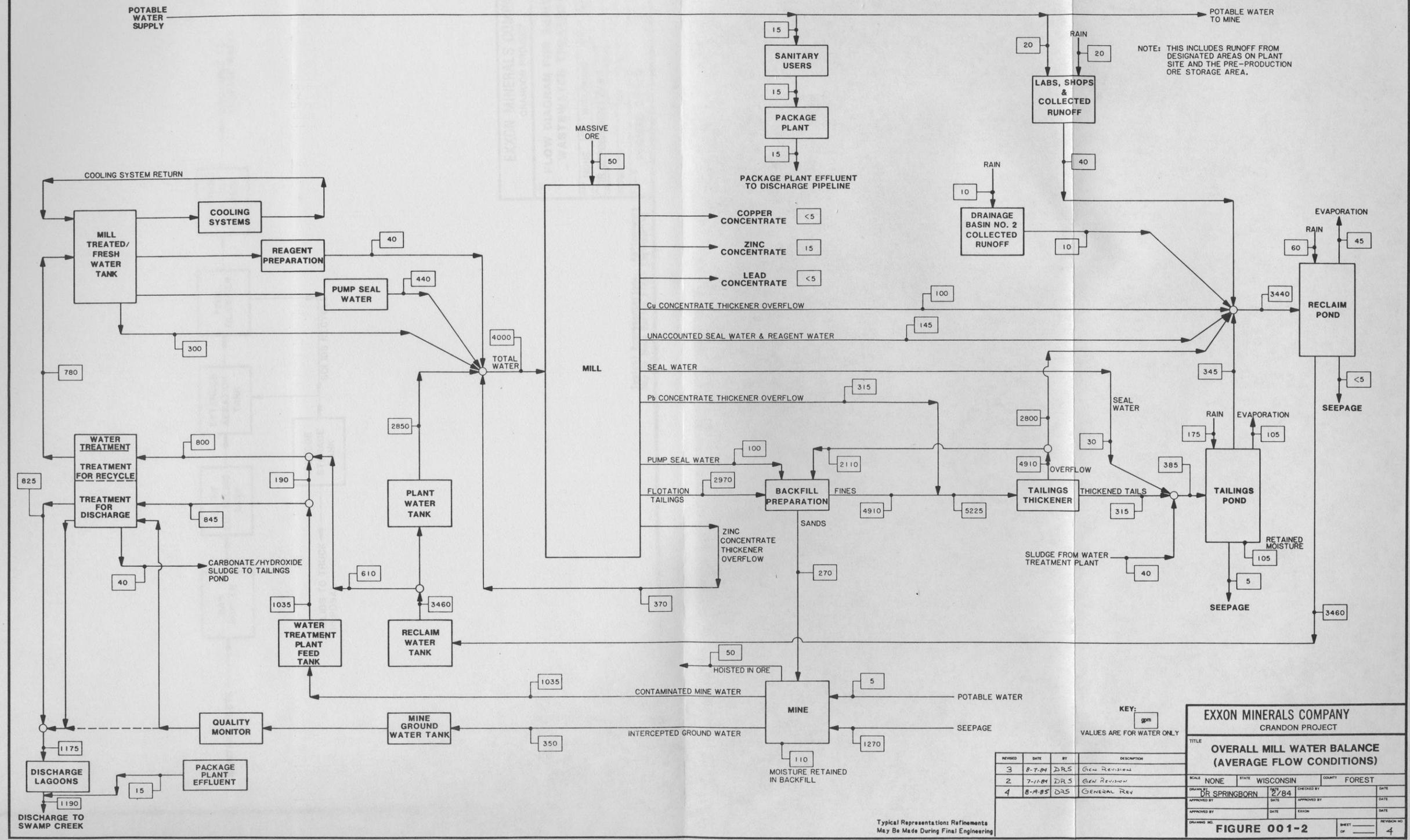
Item	Information
203	"Water Treatment Facility - Engineering Report"
	CH2M Hill November 1985), submitted as preliminary engineering
	report for water treatment facility.
	"Facilities Plan for Exxon Minerals Company Mine/Mill Complex
	Sanitary Waste Water Crandon, Wisconsin" (CH2M Hill, October 1985).



EXXON MINERALS COMPANY
CRANDON PROJECT

TITLE
WATER TREATMENT SYSTEM BLOCK FLOW DIAGRAM (AVERAGE FLOW CONDITIONS)

SCALE NONE	STATE WISCONSIN		COUNTY FOREST		
DRAWN BY DR SPRINGBORN	DATE 1/84	CHECKED BY	DATE		
APPROVED BY	DATE	APPROVED BY C.C. Schmaltz	DATE 11/15/85		
APPROVED BY	DATE	EXXON D.E. Moe	DATE 11-7-85		
DRAWING NO FIGURE 001-1		SHEET ___ OF ___	REVISION NO 2		



REVISED	DATE	BY	DESCRIPTION
3	8-7-84	DRS	GEN REVISION
2	7-11-84	DRS	GEN REVISION
4	8-19-85	DRS	GENERAL REV

Typical Representation: Refinements May Be Made During Final Engineering

EXXON MINERALS COMPANY
CRANDON PROJECT

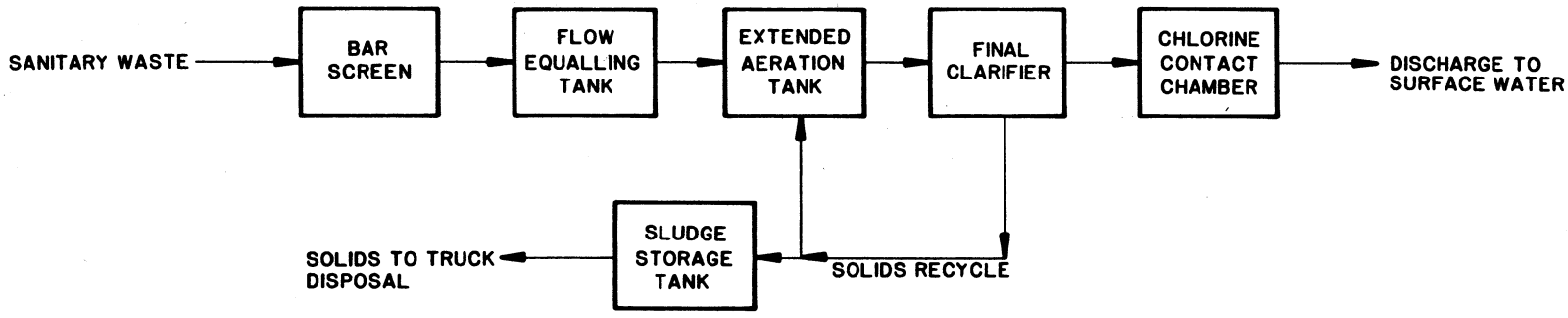
TITLE
OVERALL MILL WATER BALANCE (AVERAGE FLOW CONDITIONS)

SCALE	STATE	COUNTY
NONE	WISCONSIN	FOREST

DRAWN BY	DATE	CHECKED BY	DATE
DR SPRINGBORN	2/84		
APPROVED BY	DATE	APPROVED BY	DATE
APPROVED BY	DATE	EXXON	DATE

DRAWING NO. **FIGURE 001-2** SHEET — OF — REVISION NO. 4

DESIGN PRODUCTS CO.



Typical Representations: Refinements May Be Made During Final Engineering

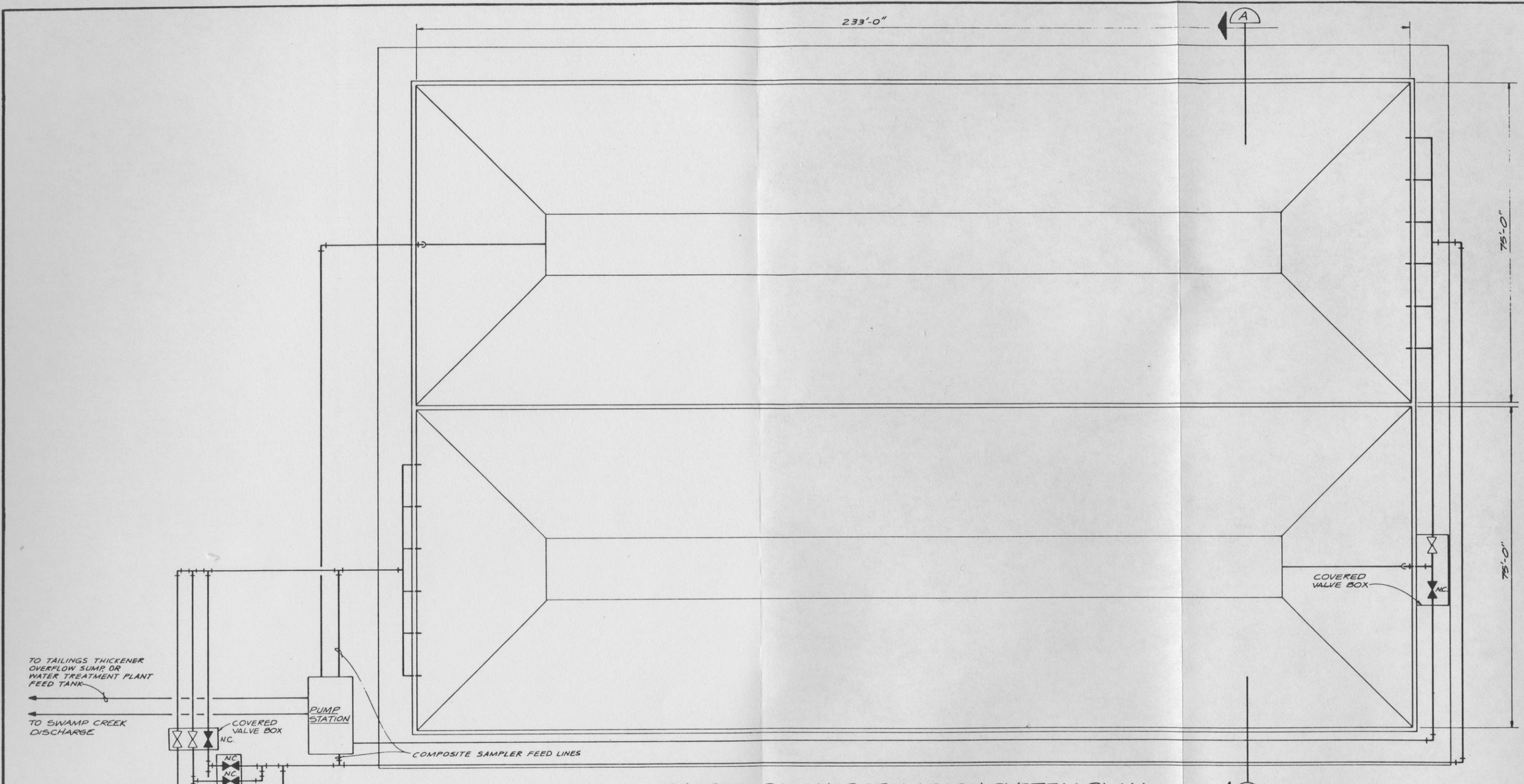
EXXON MINERALS COMPANY
CRANDON PROJECT

TITLE
FLOW DIAGRAM FOR SANITARY WASTEWATER TREATMENT

SCALE	STATE	COUNTY
NONE	WISCONSIN	FOREST

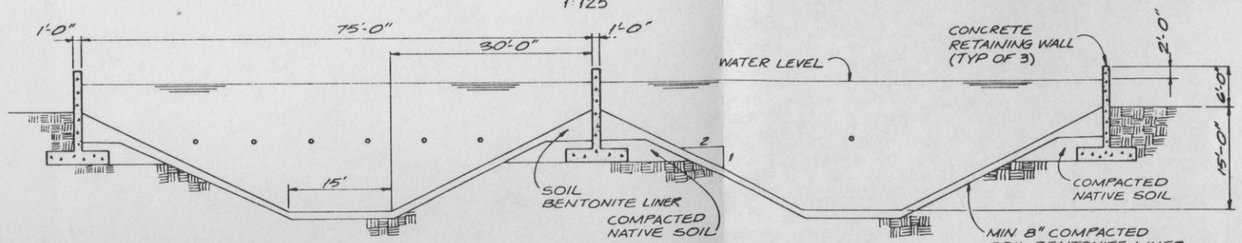
DRAWN BY	DATE	CHECKED BY	DATE
DR SPRINGBORN	12/85		
APPROVED BY	DATE	APPROVED BY	DATE
APPROVED BY	DATE	EXXON	DATE

DRAWING NO **FIGURE 001-3** SHEET ___ OF ___ REVISION NO



EXCESS DISCHARGE LAGOON SYSTEM PLAN

1:125



SECTION A

1:125

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

CH2M HILL

REVISED	DATE	BY	
1	10/19/85	MRH	GENERAL REVISIONS

TYPICAL REPRESENTATIONS REFINEMENTS MAY BE MADE DURING FINAL ENGINEERING

EXXON MINERALS COMPANY
CRANDON PROJECT

TITLE: PRELIMINARY GENERAL ARRANGEMENT
EXCESS DISCHARGE LAGOON SYSTEM CONCEPTUAL DESIGN

SCALE: AS SHOWN	STATE: WISCONSIN	COUNTY: FOREST	
DRAWN: MJL	DATE: 7/15/84	CHECKED BY: MRH	DATE: 7-15-84
APPROVED BY:	DATE:	APPROVED BY: MRH	DATE: 7-18-84
APPROVED BY:	DATE:	EXXON	DATE
DRAWING NO.		SHEET ___ OF ___	REVISION NO. 1

FIGURE 001-4

STANDARD FORM C – MANUFACTURING AND COMMERCIAL DISCHARGERS

FOR DEPT. USE

SECTION II. BASIC DISCHARGE DESCRIPTION

Complete this section for each discharge indicated in Section I, Item 9, that is to surface waters. This includes discharges to municipal sewerage systems in which the wastewater does not go through a treatment works prior to being discharged to surface waters. Discharges to wells must be described where there are also discharges to surface waters from this facility. SEPARATE DESCRIPTIONS OF EACH DISCHARGE ARE REQUIRED EVEN IF SEVERAL DISCHARGES ORIGINATE IN THE SAME FACILITY. All values for an existing discharge should be representative of the twelve previous months of operation. If this is a proposed discharge, values should reflect best engineering estimates.

ADDITIONAL INSTRUCTIONS FOR SELECTED ITEMS APPEAR IN SEPARATE INSTRUCTION BOOKLET AS INDICATED. REFER TO BOOKLET BEFORE FILLING OUT THESE ITEMS.

1. Discharge Serial No. and Name		
a. **Discharge Serial No.** (see instructions)	201a	002 (1-7)
b. **Discharge Name** Give name of discharge, if any. (see instructions)	201b	Erosion Control Facilities (Mine/Mill Site plus Mine Waste Disposal Facilities - which includes Tailings Pond T1 and the Reclaim Water Pond)
c. **Previous Discharge Serial No.** If previous permit application was made for this discharge (see Item 4, Section I), provide previous discharge serial number.	201c	N/A
2. Discharge Operating Dates		
a. **Discharge Began Date** If the discharge described below is in operation, give the date (within best estimate) the discharge began.	202a	N/A (See Additional Information) YR MO
b. **Discharge to Begin Date** If the discharge has never occurred but is planned for some future date, give the date (within best estimate) the discharge will begin.	202b	1987 (See Additional Information) YR MO
c. **Discharge to End Date** If discharge is scheduled to be discontinued within the next 5 years, give the date (within best estimate) the discharge will end.	202c	N/A YR MO
3. Engineering Report Available Check if an engineering report is available to reviewing agency upon request. (see instructions)	203	☒ (See Additional Information)

4. Discharge Location Name the political boundaries within which the point of discharge is located.

			For Dept. Use	
State	204a	Wisconsin	204d	
County	204b	Forest	204e	
(if applicable) City or Town	204c	Lincoln Township	204f	

5. Discharge Point Description Discharge is into (check one): (see instructions)

Stream (includes ditches, arroyos, and other intermittent watercourses)	205a	☐STR
Lake		☐LKE
Ocean		☐OCE
Municipal Sanitary Wastewater Transport System		☐MTS
Municipal Combined Sanitary and Storm Transport System		☐MCS

This section contains 9 pages.

DISCHARGE SERIAL NUMBER

002

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Municipal Storm Water Transport System ☐ STS

Well (Injection) ☐ WEL

Other ☒ OTH

If 'other' is checked, specify 206b: A series of ditches, culverts, dikes and retention ponds to be constructed to provide for settling of suspended solids and subsequent conveyance of treated water to natural surface water drainage.

6. **Discharge Point — Lat/Long** Give the precise location of the point of discharge to the nearest second.

Latitude 206a: ____DEG ____MIN ____SEC (See Additional Information)

Longitude 206b: ____DEG ____MIN ____SEC

7. **Discharge Receiving Water Name** Name the waterway at the point of discharge.(see instructions) 207a: Swamp Creek and Pickerel Creek Drainage Basins

If the discharge is through an outfall that extends beyond the shoreline or is below the mean low water line, complete Item 8.

207b:

For Dept. Use		
Major	Minor	Sub

207c: For Dept. Use 303e

8. **Offshore Discharge**

a. **Discharge Distance from Shore** 208a: N/A feet

b. **Discharge Depth Below Water Surface** 208b: N/A feet

9. **Discharge Type and Occurrence**

a. **Type of Discharge** Check whether the discharge is continuous or intermittent. (see instructions) 209a: ☐ (con) Continuous ☒ (int) Intermittent (See Additional Information)

b. **Discharge Occurrence Days per Week** Enter the average number of days per week (during periods of discharge) this discharge occurs. 209b: N/A days per week (See Additional Information)

c. **Discharge Occurrence** —Months If this discharge normally operates (either intermittently, or continuously) on less than a year-around basis (excluding shutdowns for routine maintenance), check the months during the year when the discharge is operating. (see instructions) 209c: ☐JAN ☐FEB ☐MAR ☐APR ☐MAY ☐JUN ☐JUL ☐AUG ☐SEP ☐OCT ☐NOV ☐DEC (See Additional Information)

Complete Items 10 and 11 if "intermittent" is checked in Item 9.a. Otherwise, proceed to Item 12.

10. **Intermittent Discharge Quantity** State the average volume per discharge occurrence in thousands of gallons. 210: N/A thousand gallons per discharge occurrence. (See Additional Information)

11. **Intermittent Discharge Duration and Frequency**

a. **Intermittent Discharge Duration Per Day** State the average number of hours per day the discharge is operating. 211a: N/A hours per day (See Additional Information)

b. **Intermittent Discharge Frequency** State the average number of discharge occurrences per day during days when discharging. 211b: N/A discharge occurrences per day (See Additional Information)

12. **Maximum Flow Period** Give the time period in which the maximum flow of this discharge occurs. 212: From N/A (month) to N/A (month) (See Additional Information)

DISCHARGE SERIAL NUMBER

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13. Activity Description Give a narrative description of activity producing this discharge.(see instructions)

213a These intermittent discharges would be from drainage basins designed to contain uncontaminated surface water runoff.

14. Activity Causing Discharge For each SIC Code which describes the activity causing this discharge, supply the type and maximum amount of either the raw material consumed (Item 14a) or the product produced (Item 14b) in the units specified in Table I of the Instruction Booklet. For SIC Codes not listed in Table I, use raw material or production units normally used for measuring production.(see instructions)

a. **Raw Materials**

214a SIC Code (1)	Name (2)	Maximum Amount/Day (3)	Unit (See Table I) (4)	Shared Discharges (Serial Number) (5)
1021	Copper Ores	8,200*	STPD**	None
1031	Lead and Zinc Ores	Design Capacity		

b. **Products**

214b SIC Code (1)	Name (2)	Maximum Amount/Day (3)	Unit (See Table I) (4)	Shared Discharges (Serial Number) (5)
1021	Copper Concentrates	210	STPD**	None
1031	Lead and Zinc Concentrates	1,536	STPD**	None
	(Product exits process as metal sulfide concentrates.)			

*8,200 STPD is the design production rate of zinc, copper and lead ore. Annual production expressed as daily average is 7,400 STPD.

**Short tons per day.

DISCHARGE SERIAL NUMBER

002

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15. **Waste Abatement**

a. **Waste Abatement Practices** Describe the waste abatement practices used on this discharge with a brief narrative. (see instructions)

218a Narrative: Control of surface runoff will be accomplished by constructing a series of ditches, dikes and retention ponds. These will be designed to utilize the existing topography for drainage control, with ditches and dikes constructed to direct discharge into the surrounding natural drainage. Surface runoff with potential for high suspended solids content will be diverted through sedimentation ponds before discharge. Bales of hay will be used to provide small dikes and filtration for localized control. Design characteristics of the

(continued below)

b. **Waste Abatement Codes** Using the codes listed in Table II of the Instruction Booklet, describe the waste abatement processes for this discharge in the order in which they occur if possible.

218b (1) _____, (2) _____, (3) _____,

(4) _____, (5) _____, (6) _____,

(7) _____, (8) _____, (9) _____,

(10) _____, (11) _____, (12) _____,

(13) _____, (14) _____, (15) _____,

(16) _____, (17) _____, (18) _____,

(19) _____, (20) _____, (21) _____,

(22) _____, (23) _____, (24) _____,

(25) _____.

settling ponds are provided below. The storm event used to determine the potential for runoff and erosion at the Mine Waste Disposal Facility is the 100-year, 24-hour duration rainstorm. The rainfall intensity for this design storm is 0.22 inches per hour based on data from Nicolet College Weather Station. The 100-year, 24-hour duration storm applies to storms occurring during the months of March through November.

The design storm used to size the erosion control facilities for the mine and mill site areas is the 25-year, 24-hour storm event. The rainfall intensity for this storm is 0.18 inches/hour.

TSS is the only contaminant expected in the discharge from the erosion control facilities to be above existing levels in surface runoff. Although it is possible that trace amounts of oil and grease could be present in the discharge streams, it is not expected that this will be the case since influent to the ponds from areas where oil and grease may be present will pass through oil/water separators prior to flowing into the sedimentation pond. As a result, no visible sheen of oil and grease is anticipated in the discharge.

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16. Wastewater Characteristics N/A

Check the box beside each constituent which is present in the effluent (discharge water). This determination is to be based on actual analysis or best estimate.(see instructions)

Parameter 216	Present	Parameter 216	Present
Color 00080		Copper 01042	
Ammonia 00610		Iron 01045	
Organic nitrogen 00605		Lead 01051	
Nitrate 00620		Magnesium 00927	
Nitrite 00615		Manganese 01055	
Phosphorus 00665		Mercury 71900	
Sulfate 00945		Molybdenum 01062	
Sulfide 00745		Nickel 01067	
Sulfite 00740		Selenium 01147	
Bromide 71870		Silver 01077	
Chloride 00940		Potassium 00937	
Cyanide 00720		Sodium 00929	
Fluoride 00951		Thallium 01059	
Aluminum 01105		Titanium 01152	
Antimony 01097		Tin 01102	
Arsenic 01002		Zinc 01092	
Beryllium 01012		Algicides* 74051	
Barium 01007		Chlorinated organic compounds* 74052	
Boron 01022		Pesticides* 74053	
Cadmium 01027		Oil and grease 00550	
Calcium 00916		Phenols 32730	
Cobalt 01037		Surfactants 38260	
Chromium 01034		Chlorine 50060	
Fecal coliform bacteria 74055		Radioactivity* 74050	

*Specify substances, compounds and/or elements in Item 26.

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17. **Description of Intake and Discharge** (Intermittent discharge of surface water runoff)

For each of the parameters listed below, enter in the appropriate box the value or code letter answer called for.(see instructions)

In addition, enter the parameter name and code and all required values for any of the following parameters if they were checked in item 16; ammonia, cyanide, aluminum, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, phenols, oil and grease, and chlorine (residual).

Parameter and Code 217a	Influent		Effluent					
	Untreated Intake Water (Daily Average) (1)	In-Plant Treated Intake Water (Daily Average) (2)	Daily Average (3)	Minimum Value Observed or Expected During Discharge Activity (4)	Maximum Value Observed or Expected During Discharge Activity (5)	Frequency of Analysis (6)	Number of Analyses (7)	Sample Type (8)
Flow* Gallons per day 00056	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
pH Units 00400	N/A	N/A	X	N/A	N/A	N/A	N/A	N/A
Temperature (winter) ° F 74028	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Temperature (summer) ° F 74027	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biochemical Oxygen Demand (BOD 5-day) mg/l 00310	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chemical Oxygen Demand (COD) mg/l 00340	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Suspended (nonfilterable) Solids mg/l 00530	XXX	N/A	20	N/A	N/A	N/A	N/A	N/A
Specific Conductance micromhos/cm at 25° C 00095	N/A	N/A	X	N/A	N/A	N/A	N/A	N/A
Settleable Matter (residue) ml/l 00545	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Other discharges sharing intake flow (serial numbers).(see instructions)

DISCHARGE SERIAL NUMBER
002

FOR DEPT. USE

17. (Cont'd.) N/A

Parameter and Code 217a	Influent		Effluent					
	Untreated Intake Water (Daily Average) (1)	In-Plant Treated Intake Water (Daily Average) (2)	Daily Average (3)	Minimum Value Observed or Expected During Discharge Activity (4)	Maximum Value Observed or Expected During Discharge Activity (5)	Frequency of Analysis (6)	Number of Analyses (7)	Sample Type (8)

18. **Plant Controls** Check if the following plant controls are available for this discharge. 218

Alternate power source for major pumping facility. ☐ APS N/A

Alarm or emergency procedure for power or equipment failure ☐ ALM

Complete item 19 if discharge is from cooling and/or steam water generation and water treatment additives are used.

19. **Water Treatment Additives** If the discharge is treated with any conditioner, inhibitor, or algicide, answer the following:

a. Name of Material(s) 219a None

b. Name and address of manufacturer 219b N/A

c. Quantity (pounds added per million gallons of water treated). 219c N/A

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FOR DEPT. USE

d. Chemical composition of these additives (see instructions). 219d N/A

Complete items 20-25 if there is a thermal discharge (e.g., associated with a steam and/or power generation plant, steel mill, petroleum refinery, or any other manufacturing process) and the total discharge flow is 10 million gallons per day or more. (see instructions)

20. Thermal Discharge Source Check the appropriate item(s) indicating the source of the discharge. (see instructions) 220

Boiler Blowdown	☐ BLBD
Boiler Chemical Cleaning	☐ BCCL
Ash Pond Overflow	☐ APOF N/A
Boiler Water Treatment — Evaporator Blowdown	☐ EPBD
Oil or Coal Fired Plants — Effluent from Air Pollution Control Devices	☐ OCFP
Condense Cooling Water	☐ COND
Cooling Tower Blowdown	☐ CTBD
Manufacturing Process	☐ MFPR
Other	☐ OTHR

21. Discharge/Receiving Water Temperature Difference

Give the maximum temperature difference between the discharge and receiving waters for summer and winter operating conditions. (see instructions)

Summer 221a _____ °F.

Winter 221b _____ °F.

N/A

22. Discharge Temperature, Rate of Change Per Hour 222 _____ °F./hour

Give the maximum possible rate of temperature change per hour of discharge under operating conditions. (see instructions)

23. Water Temperature, Percentile Report (Frequency of Occurrence)

In the table below, enter the temperature which is exceeded 10% of the year, 5% of the year, 1% of the year and not at all (maximum yearly temperature). (see instructions)

Frequency of occurrence

	10%	5%	1%	Maximum
a. Intake Water Temperature (Subject to natural changes) 223a	°F	°F	°F	°F
b. Discharge Water Temperature 223b	°F	°F	°F	°F

24. Water Intake Velocity (see instructions) 224 _____ feet/sec. N/A

25. Retention Time Give the length of time, in minutes, from start of water temperature rise to discharge of cooling water. (see instructions) 225 _____ minutes

DISCHARGE SERIAL NUMBER

002

FOR DEPT. USE

26. Additional Information

Item	Information
202 (a&b)	Figure 002-1 shows the erosion control measures specific to Phase 1 of MWDF construction. Each proposed discharge point to the existing drainage area is numerically designated. MWDF facilities are reflected as discharge points 002-(3), 002-(4), 002(5), 002(6) and 002(7), respectively. The additional MWDF development phases which will be covered in subsequent permit renewals are presented on Figure 002-2. Locations of discharge facilities 002(1) and 002(2) are shown onFigures 002-3 and 002-4.
202 b	Facilities 002(1) and 002(2) will collect disturbed area drainage from the mine and mill facilities. Discharge number 002(2) will begin discharge in Project Year 1 and end discharge when the mill starts up near Project Month 30. After mill start-up, the water from this basin will be pumped to the reclaim pond via the tailings thickener overflow box and will no longer represent a discharge point. This will be done because of potential contamination of this runoff from an inadvertent mill spillage. Facilities 002(3) through 002(7) are associated with the Mine Waste Disposal Facility (MWDF) Phase 1 development (Figure 002-1). Although there are additional development phases for the other tailing ponds (Figure 002-2), this application requests approval of only the Phase 1 facilities presented on Figure 002-1. Further information related to the details of the remaining development phases for the tailings ponds is presented in the NR 182.08 MWDF Feasibility Report dated November 1985.

Item 26. Additional Information (continued)

Item 209-212.

Discharge will occur on an intermittent basis. The frequency, duration, and flow of this discharge is dependent on individual rainfall events. Average annual precipitation is 31 inches. However, a 25- year, 24-hour storm is 4.3 inches of rain, and a 100-year, 24-hour event is 5.28 inches.

The purpose of surface drainage (collection) basin No. 3 (see Figure 002-4) is to collect and divert surface water runoff from the preproduction ore storage area to a sump pump inside the basin. Drainage from the preproduction ore storage area will be pumped to the reclaim pond via the tailings thickener overflow chamber. No direct surface water discharge from the preproduction ore storage area will occur. This collection basin is not intended primarily to trap sediment; the actual layout of the facility was guided by the need to provide sufficient storm water runoff volume consistent with the existing topography. Sediment deposition was a secondary consideration in designing the preproduction ore storage area and its collection basin.

The bulk fuel storage and unloading area and the fuel tank area near the fuel delivery borehole will be bermed and have sufficient capacity to contain the entire contents of the fuel tanks. The outlet from the

Item 26. Additional Information (continued)

Item 209-212. (continued)

bermed area will be closed. During or following a precipitation event, the valve controlling the discharge must be operated manually. The outlet will have an oil/water separator. This arrangement provides assurance that any small spills and washdown water will be contained in a sump within the berm. If a spill occurs, oil-contaminated water will be pumped out as required and transported by tank truck to one of the on-site oil/water separators for treatment.

The runoff coefficients of 0.75 for surface drainage basins No. 1 and 2 [002(1) and 002(2), respectively] and 1.0 for the preproduction ore storage area collection basin No. 3 were used to size the basins to ensure they would be adequate to contain surface water runoff from the design storm (25 year, 24-hour event).

Surface drainage basins No. 1 and 2 [002(1) and 002(2), respectively] will drain paved and unpaved areas and a portion of the precipitation will infiltrate the soil and will not constitute surface water runoff. However, a relatively high runoff coefficient of 0.75 was used and combined with the assumption that prestorm saturation conditions exist. Use of these conservative runoff coefficients ensure adequate capacity exists in the sedimentation basins to contain runoff from the design storm event.

Item 26. Additional Information (continued)

Item 209-212. (continued)

The capacities of the basins are as follows:

Drainage Basin	Working Capacity[a]
1	10,900 yd^3
2	14,250 yd^3
3[b]	4,530 yd^3

[a] Not including 3.3 ft of freeboard and 3.3 ft of sediment depth.
[b] Collection basin without a discharge to the environment.

The basis for the surface water runoff/rainfall ratios was a conservative engineering judgment with guidance provided in ASCE - Manuals and Reports on Engineering Practice - No. 37 "Design and Construction of Sanitary and Storm Sewers." This runoff coefficient represents the decimal fraction of precipitation that would not be intercepted by vegetation, infiltrate into permeable soils, be retained in surface depressions, or evaporate during the design storm event.

Oil-water separators will be associated with the two oily water runoff collection areas shown in Figure 002-3. A separator (No. 1) will be associated with the northern oily runoff area near the reagent building. Effluent from this separator feeds the tailings thickener overflow sump and thus becomes part of the excess water system. The other separator (No. 2) is associated with a construction/operation laydown area near the head frame and also feeds the tailing thickener overflow.

Item 26. Additional Information (continued)

Item 209-212. (continued)

These two separators are of standard American Petroleum Industry design. Separator No. 1 has been designed to accommodate twice the 25-year storm or 400 gallons per minute. Separator No. 2 is sized to accommodate the 25-year storm or 50 gallons per minute. Surface water runoff in excess of design will overflow to drainage ditches and to the drainage basins.

The five drainage sediment basins which are used during Phase 1 are sediment ponds SP-A, SP-B, SP-C, HBF-M, and SP-P as shown in Figure 002-1. These sediment basins are designed to contain estimated quantities of soil erroded during the life of the facility. The outflow structures are designed to pass the peak flow from a 100-year 24-hour storm. These design flows are shown in the following table.

Discharge 002	MWDF Surface Runoff Control Drainage Basin	Area (Acres) Approximate	100-Year, 24-Hour Peak Basin Outflow (CFS)
3	SP-A	123	145
4	SP-B	29	50
5	SP-C	25	35
6	HBF-M	22	35
7	SP-P	45	55

The wetlands south of the proposed MWDF through which water drains into Deep Hole Lake have received special attention. The large wetland in the lower portion of this wetland system will be preserved since surface water drainage from the MWDF area will be maintained to it. Sedimentation and water flow rates will be controlled to

Item 26. Additional Information (continued)

Item 209-212. (continued)

maintain, as much as possible through the construction/operation phases, the water quantity and quality currently entering this lower portion of the wetland system. Post-operation conditions are discussed in the report on "Water Balance Analyses for Wetlands in the Mine Waste Disposal Facility Area", prepared by Ayres Associates, October 1985.

N 33,000 N 34,000 N 35,000 N 36,000

E 696,000

E 697,000

DEEP HOLE LAKE

DUCK LAKE

SKUNK LAKE

DISCHARGE 002 (3)
El. 495.0
Q_{100}= 4.1 cms
SP-A

DISCHARGE 002 (4)
El. 500.2
Q_{100}= 1.4 cms
SP-B

Reclaim Pond

Reclaim Pond

Toe Of Embankment Slope

Toe Of Embankment Slope

El. 517.1
Q_{100}= 1.0 cms
DISCHARGE 002 (5)
SP-C

El. 514.0
Q_{100}= 1.6 cms
DISCHARGE 002 (7)
SP-F

Temporary Stockpile Area

CONSTRUCTION SUPPORT AREA

HBF-M El. 518.0
Q_{100}= 1.0 cms
DISCHARGE 002 (6)

MINE REFUSE DISPOSAL FACILITY

CREEK

HEMLOCK

T1 T2 T3 T4

1 2 3 4 5

LEGEND

HBF-A	Hay Bale Filter A With Stone Spillway
	Dike
	Drainage Ditch & Flow Direction
	Drainage Basin Limits
5	Drainage Basin #5
El. 520	Discharge Point & Spillway Elevation
Q_{100}= 1.2 cms	100 Year Discharge (Cubic Meters/Second)
T4	Tailings Pond T-4
SP-A	Sedimentation Pond A
	Area Of Construction
	Area Of Confinement
	Area Of Reclamation

GENERAL NOTES

1. ELEVATIONS IN METERS ABOVE MSL BASED ON 1929 ADJUSTMENT.
2. BASE MAP AND AERIAL PHOTOGRAPHY (1976) BY AERO-METRIC ENGINEERING, INC.
3. GRID COORDINATES IN METERS BASED ON WISCONSIN STATE PLANE COORDINATE SYSTEM.

0 200 400 800 1200 1600
SCALE IN FEET

0 50 100 150 200 300 400 500
SCALE IN METERS

REVISED	DATE	BY	DESCRIPTION

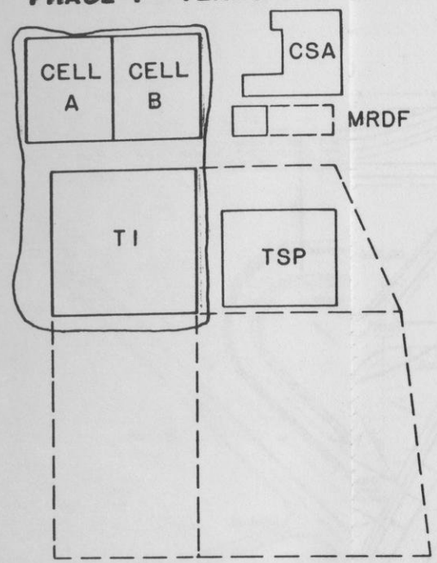
Typical Representations: Refinements May Be Made During Final Engineering

EXXON MINERALS COMPANY
CRANDON PROJECT

TITLE
WASTE DISPOSAL SYSTEM
SITE 41-114C
EROSION CONTROL - PHASE 1

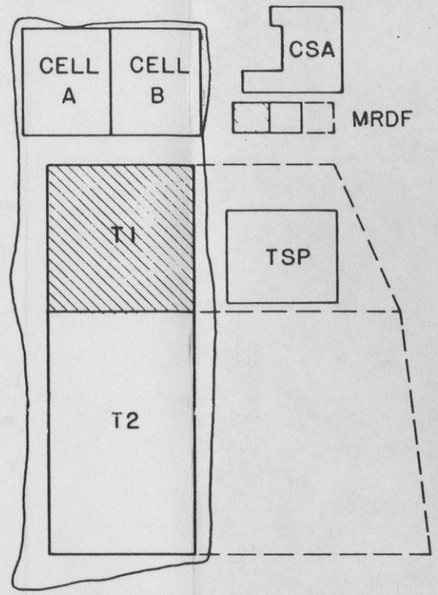
SCALE AS SHOWN	STATE WISCONSIN		COUNTY FOREST		
DRAWN BY CJD	DATE 11-85	CHECKED BY C. Schaefer	DATE 12/6/85		
APPROVED BY WJW	DATE 11-85	APPROVED BY EXXON P. S. Lewis	DATE 12/6/85		
APPROVED BY TKD	DATE 11-85		DATE		
DRAWING NO FIGURE 002-1	SHEET 2 OF 7		REVISION NO		

PHASE 1 - YEARS 1-4



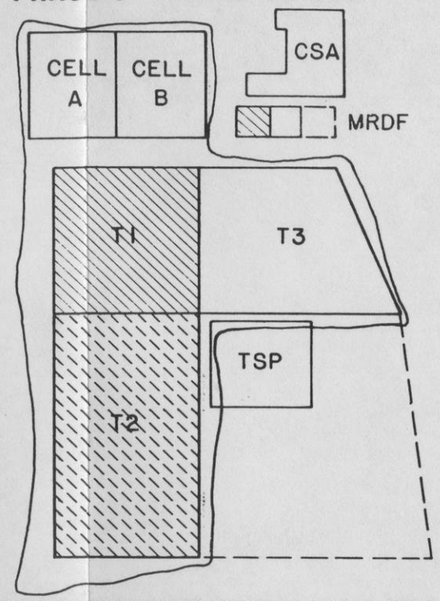
CONSTRUCTION OF TAILING POND T1, WATER RECLAIM POND, MRDF CELL 1 & CSA

PHASE 2 - YEARS 5-11



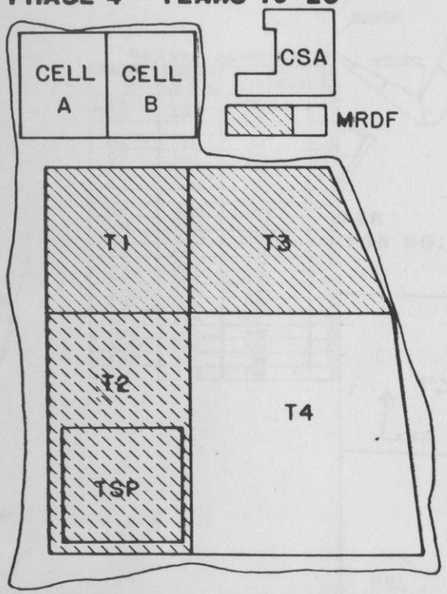
CONSTRUCTION OF TAILING POND T2 & MRDF CELL 2
RECLAMATION OF TAILING POND T1 & MRDF CELL 1

PHASE 3 - YEARS 12-16



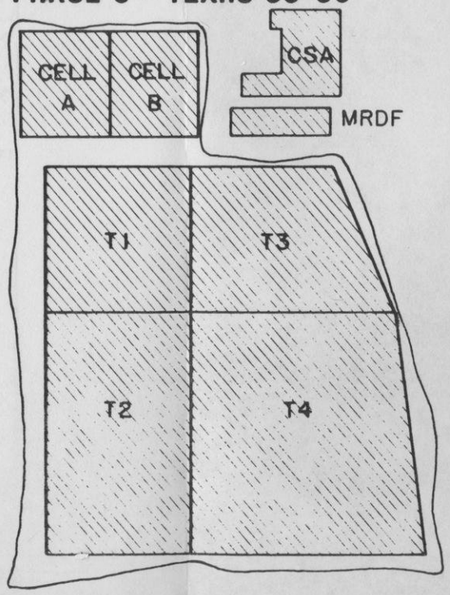
CONSTRUCTION OF TAILING POND T3
PARTIAL RECLAMATION OF TAILING POND T2

PHASE 4 - YEARS 19-23



CONSTRUCTION OF TAILING POND T4 & MRDF CELL 3
RECLAMATION OF TAILING POND T3 & MRDF CELL 2

PHASE 5 - YEARS 33-36



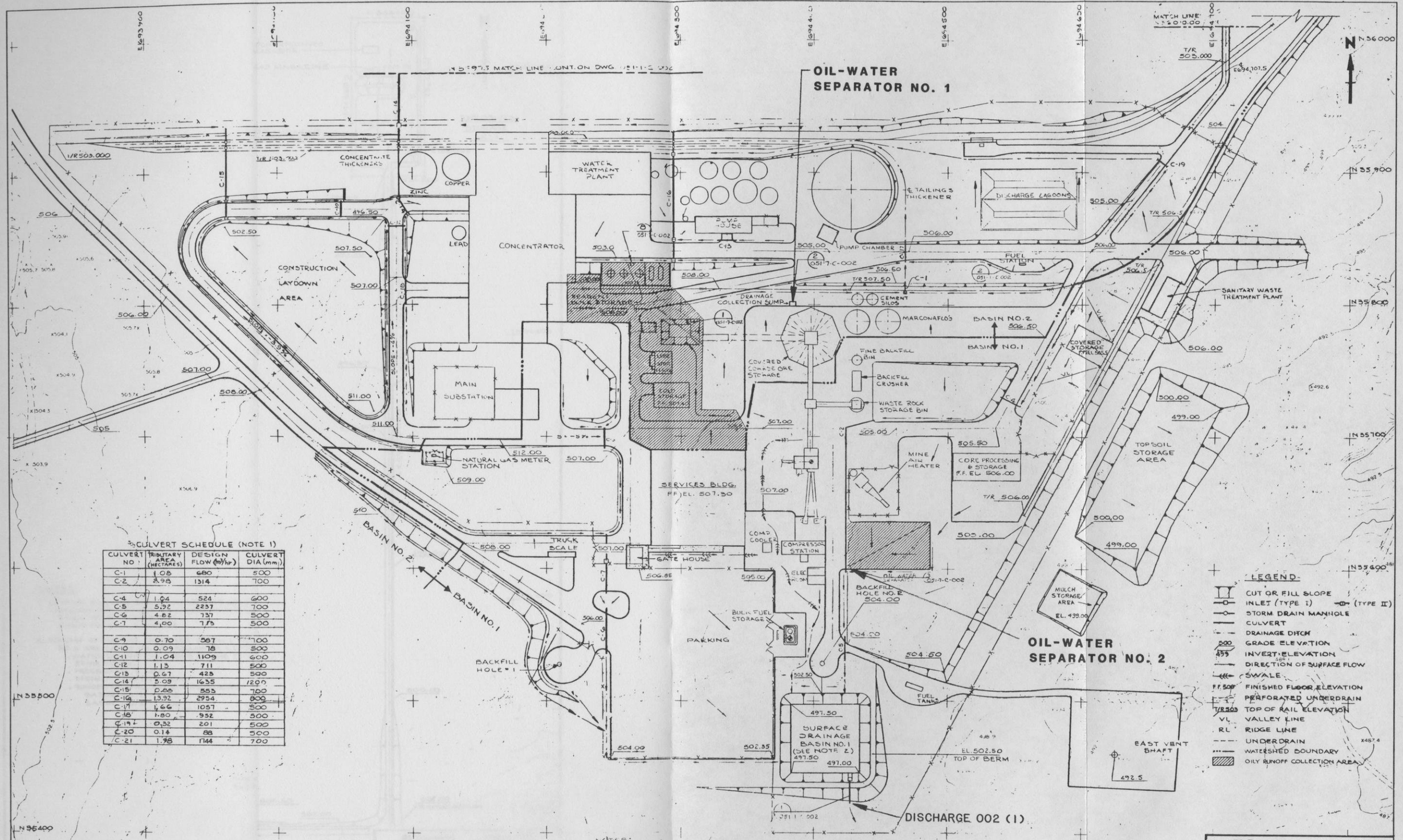
RECLAMATION OF TAILING POND T2 & T4, WATER RECLAIM POND, MRDF CELL 3 & CSA

LEGEND:
CSA - CONSTRUCTION SUPPORT AREA
TSP - TILL STOCKPILE
MRDF - MINE REFUSE DISPOSAL FACILITY

EXXON MINERALS COMPANY
CRANDON PROJECT

TITLE
WASTE DISPOSAL AREA FACILITIES CONSTRUCTION & RECLAMATION PHASES

SCALE: NONE	STATE: WISCONSIN	COUNTY: FOREST	
DRAWN BY: DR SPRINGBORN	DATE: 10/85	CHECKED BY:	DATE
APPROVED BY:	DATE	APPROVED BY: C.C. Schroeder	DATE: 11/13/85
APPROVED BY:	DATE	EXXON: D.E. Mine	DATE: 11/19/85
DRAWING NO: FIGURE 002-2	SHEET ___ OF ___		REVISION NO



CULVERT SCHEDULE (NOTE 1)

CULVERT NO.	TRIBUTARY AREA (HECTARES)	DESIGN FLOW (m^3/hr)	CULVERT DIA (mm)
C-1	1.08	680	500
C-2	8.98	1314	700
C-4	1.04	524	600
C-5	5.92	2257	700
C-6	4.82	737	500
C-7	4.00	775	500
C-9	0.70	587	700
C-10	0.09	78	500
C-11	1.04	1109	600
C-12	1.13	711	500
C-13	0.67	423	500
C-14	5.09	1635	1200
C-15	0.88	553	700
C-16	13.92	2954	800
C-17	1.66	1057	500
C-18	1.80	952	500
C-19	0.32	201	500
C-20	0.14	88	500
C-21	1.98	1144	700

NOTES:

1. CULVERT DIAMETERS ARE BASED ON ABILITY TO PASS THE PEAK FLOW FROM 10-YR 8-HRMS CALCULATED BY THE RATIONAL FORMULA AND USING THE FOLLOWING RUNOFF COEFFICIENTS:
   - PAVED AREAS AND ROOFS C=0.90
   - GRAVEL AND NATURAL GROUND C=0.50
   - COMPOSITE AREAS C=0.70

   MINIMUM CULVERT DIAMETER = 500MM
2. VOLUME OF SURFACE DRAINAGE BASIN NO.1 IS BASED ON THE FOLLOWING CRITERIA:
   - WATER CAPACITY IS BASED ON THE 25-YR, 24-HR STORM VOLUME (8325 M^3 NOT INCLUDING FREEBOARD & SEDIMENT VOLUME)
   - RUNOFF/RAINFALL RATIO = 0.75
   - FREEBOARD = 1.0 M
   - SEDIMENT DEPTH = 1.0M

Typical Representations: Refinements May Be Made During Final Engineering

SCALE 1:1000

REVISED	DATE	BY	DESCRIPTION
4	10-84	DRS	UNDERGROUND MINE
3	1-11-84	DRS	GEN REVISION
2	11-16-83	JD	GENERAL REVISION
1	9-16-83	JD	GENERAL REVISION

Raymond Kaiser Engineers
RKE JOB NO. 83157

EXXON MINERALS COMPANY
CRANDON PROJECT

GRADING & DRAINAGE PLAN

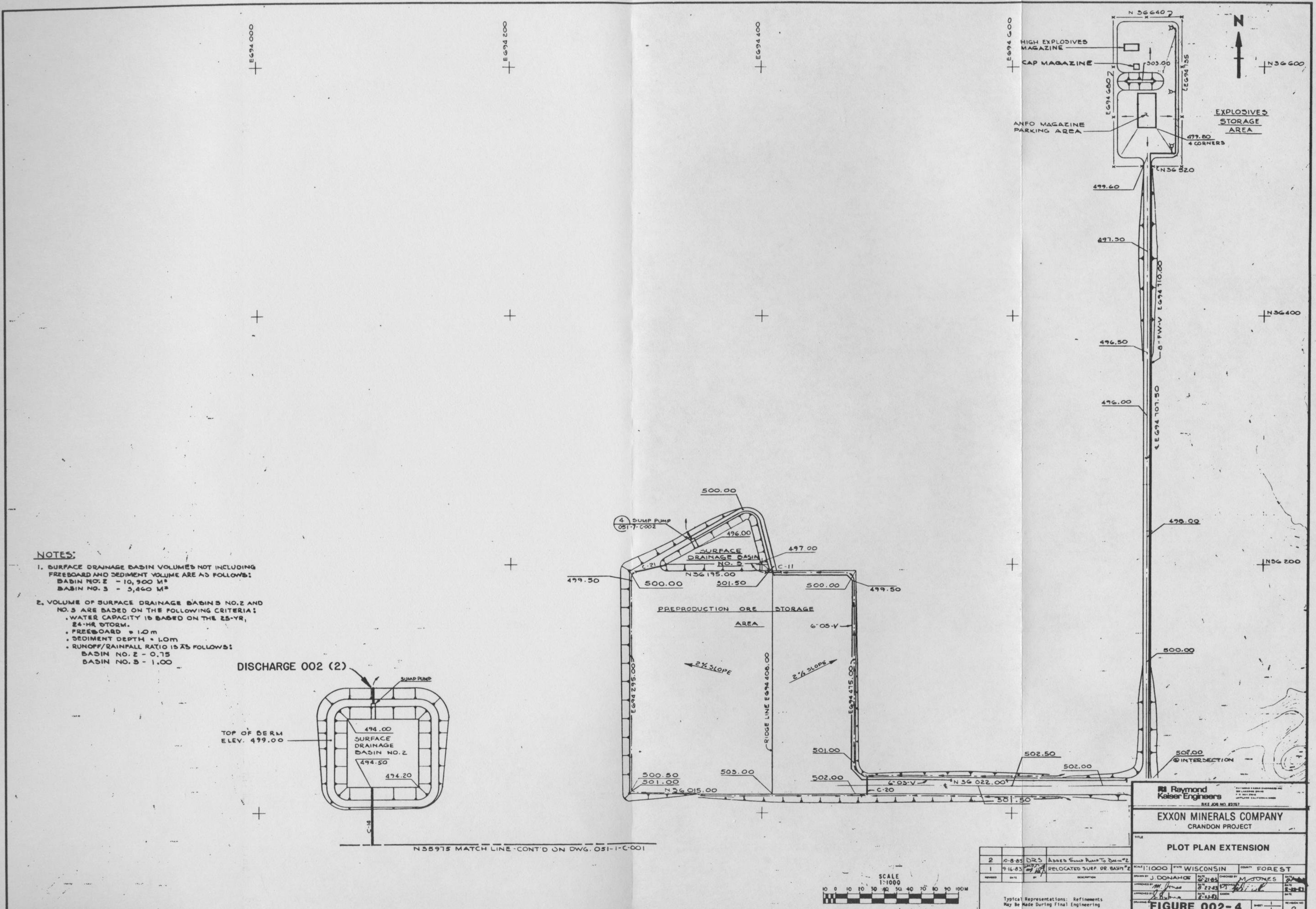
SCALE 1:1000 | STATE WISCONSIN | COUNTY FOREST

DRAWN BY J. DONAHOE 2/23/83 | CHECKED BY M. MYERS 2/22/83 | APPROVED 2/25/83

FIGURE 002-3

051-1-C-001

REVISION NO. 4



E694 000
E694 200
E694 400
E694 600
N 36640
HIGH EXPLOSIVES MAGAZINE
CAP MAGAZINE
503.00
E694 680
E694 755
N
N36600
EXPLOSIVES STORAGE AREA
ANFO MAGAZINE
PARKING AREA
499.80
4 CORNERS
N36 520
499.60
497.50
8"FW-V
E694 710.00
N36400
496.50
496.00
E694 707.50
498.00
N36 200
500.00
SUMP PUMP
051-7-C002
496.00
SURFACE DRAINAGE BASIN NO. 3
497.00
C-21
C-11
N36 195.00
499.50
500.00
501.50
500.00
499.50
PREPRODUCTION ORE STORAGE AREA
6"-03-V
2% SLOPE
2% SLOPE
E694 295.00
RIDGE LINE E694 408.00
E694 475.00
500.00
501.00
502.50
502.00
502.00
@ INTERSECTION
500.50
501.00
503.00
502.00
6"-03-V
N 36 022.00
C-20
N 36 015.00
501.50
NOTES:
1. SURFACE DRAINAGE BASIN VOLUMES NOT INCLUDING FREEBOARD AND SEDIMENT VOLUME ARE AS FOLLOWS:
BASIN NO. 2 - 10,900 M³
BASIN NO. 3 - 3,460 M³
2. VOLUME OF SURFACE DRAINAGE BASINS NO. 2 AND NO. 3 ARE BASED ON THE FOLLOWING CRITERIA:
. WATER CAPACITY IS BASED ON THE 25-YR, 24-HR STORM.
. FREEBOARD = 1.0 m
. SEDIMENT DEPTH = 1.0m
. RUNOFF/RAINFALL RATIO IS AS FOLLOWS:
BASIN NO. 2 - 0.75
BASIN NO. 3 - 1.00
DISCHARGE 002 (2)
SUMP PUMP
TOP OF BERM ELEV. 499.00
494.00
SURFACE DRAINAGE BASIN NO. 2
494.50
494.20
C-18
N35975 MATCH LINE - CONT'D ON DWG. 051-1-C-001
SCALE 1:1000
10 0 10 20 30 40 50 60 70 80 90 100M
2 10-8-85 DRS ADDED SUMP PUMP TO BASIN #2
1 9-16-83 RELOCATED SURF. DR. BASIN #2
REVISED DATE BY DESCRIPTION
Typical Representations: Refinements May Be Made During Final Engineering
Raymond Kaiser Engineers
RKE JOB NO. 83157
EXXON MINERALS COMPANY
CRANDON PROJECT
TITLE
PLOT PLAN EXTENSION
SCALE 1:1000
STATE WISCONSIN
COUNTY FOREST
DRAWN BY J. DONAHOE
DATE 6-21-83
CHECKED BY M. JONES
DATE 8-22-83
DATE 8-23-83
FIGURE 002-4
SHEET 1 OF 1
REVISION NO. 2

STANDARD FORM C – MANUFACTURING AND COMMERCIAL DISCHARGERS

FOR DEPT. USE

SECTION II. BASIC DISCHARGE DESCRIPTION

Complete this section for each discharge indicated in Section I, Item 9, that is to surface waters. This includes discharges to municipal sewerage systems in which the wastewater does not go through a treatment works prior to being discharged to surface waters. Discharges to wells must be described where there are also discharges to surface waters from this facility. SEPARATE DESCRIPTIONS OF EACH DISCHARGE ARE REQUIRED EVEN IF SEVERAL DISCHARGES ORIGINATE IN THE SAME FACILITY. All values for an existing discharge should be representative of the twelve previous months of operation. If this is a proposed discharge, values should reflect best engineering estimates.

ADDITIONAL INSTRUCTIONS FOR SELECTED ITEMS APPEAR IN SEPARATE INSTRUCTION BOOKLET AS INDICATED. REFER TO BOOKLET BEFORE FILLING OUT THESE ITEMS.

1. Discharge Serial No. and Name		
a. **Discharge Serial No.** (see instructions)	201a	003 (1-23)
b. **Discharge Name** Give name of discharge, if any. (see instructions)	201b	Erosion Control Facilities (Mine/Mill Access Road [003-1 through 003-10] and Railroad Spur [003-11 through 003-23])
c. **Previous Discharge Serial No.** If previous permit application was made for this discharge (see Item 4, Section I), provide previous discharge serial number.	201c	N/A
2. Discharge Operating Dates		
a. **Discharge Began Date** If the discharge described below is in operation, give the date (within best estimate) the discharge began.	202a	N/A (YR MO)
b. **Discharge to Begin Date** If the discharge has never occurred but is planned for some future date, give the date (within best estimate) the discharge will begin.	202b	1987 (YR MO) (See Additional Information)
c. **Discharge to End Date** If discharge is scheduled to be discontinued within the next 5 years, give the date (within best estimate) the discharge will end.	202c	N/A (YR MO)
3. Engineering Report Available Check if an engineering report is available to reviewing agency upon request. (see instructions)	203	☒ (See Additional Information)

4. Discharge Location Name the political boundaries within which the point of discharge is located.

			For Dept. Use	
State	204a	Wisconsin	204d	
County	204b	Forest	204e	
(if applicable) City or Town	204c	Nashville and Lincoln Townships	204f	

5. Discharge Point Description Discharge is into (check one): (see instructions)

Stream (includes ditches, arroyos, and other intermittent watercourses)	205a	☒ STR
Lake		☐ LKE
Ocean		☐ OCE
Municipal Sanitary Wastewater Transport System		☐ MTS
Municipal Combined Sanitary and Storm Transport System		☐ MCS

This section contains 9 pages.

DISCHARGE SERIAL NUMBER

003

FOR DEPT. USE

Municipal Storm Water Transport System ☐ STS

Well (Injection) ☐ WEL

Other XX OTH

If 'other' is checked, specify 206b: A series of ditches, culverts, dikes, and retention ponds to be constructed to provide for settling of suspended soilids and subsequent conveyance of water to natural surface water drainage.

6. **Discharge Point — Lat/Long** Give the precise location of the point of discharge to the nearest second.

Latitude 206a: ____DEG ____MIN ____SEC (See Additional Information)

Longitude 206b: ____DEG ____MIN ____SEC

7. **Discharge Receiving Water Name** Name the waterway at the point of discharge.(see instructions) 207a: Swamp Creek Drainage Basin

If the discharge is through an outfall that extends beyond the shoreline or is below the mean low water line, complete Item 8.

207b:

For Dept. Use		
Major	Minor	Sub

207c

For Dept. Use: 303e

8. **Offshore Discharge**

a. **Discharge Distance from Shore** 208a: N/A feet

b. **Discharge Depth Below Water Surface** 208b: N/A feet

9. **Discharge Type and Occurrence**

a. **Type of Discharge** Check whether the discharge is continuous or intermittent. (see instructions) 209a: ☐ (con) Continuous ☒ (int) Intermittent (See Additional Information)

b. **Discharge Occurrence Days per Week** Enter the average number of days per week (during periods of discharge) this discharge occurs. 209b: N/A days per week

c. **Discharge Occurrence** —Months If this discharge normally operates (either intermittently, or continuously) on less than a year-around basis (excluding shutdowns for routine maintenance), check the months during the year when the discharge is operating. (see instructions) 209c: ☐ JAN ☐ FEB ☐ MAR ☐ APR ☐ MAY ☐ JUN ☐ JUL ☐ AUG N/A ☐ SEP ☐ OCT ☐ NOV ☐ DEC

Complete Items 10 and 11 if "Intermittent" is checked in Item 9.a. Otherwise, proceed to Item 12.

10. **Intermittent Discharge Quantity** State the average volume per discharge occurrence in thousands of gallons. 210: N/A thousand gallons per discharge occurrence.

11. **Intermittent Discharge Duration and Frequency**

a. **Intermittent Discharge Duration Per Day** State the average number of hours per day the discharge is operating. 211a: N/A hours per day

b. **Intermittent Discharge Frequency** State the average number of discharge occurrences per day during days when discharging. 211b: N/A discharge occurrences per day

12. **Maximum Flow Period** Give the time period in which the maximum flow of this discharge occurs. 212: From N/A (month) to N/A (month)

DISCHARGE SERIAL NUMBER

003

FOR DEPT. USE

13. Activity Description Give a narrative description of activity producing this discharge.(see instructions)

213a These intermittent discharges would be from culverts and ponds designed to handle uncontaminated surface runoff.

14. Activity Causing Discharge For each SIC Code which describes the activity causing this discharge, supply the type and maximum amount of either the raw material consumed (Item 14a) or the product produced (Item 14b) in the units specified in Table I of the Instruction Booklet. For SIC Codes not listed in Table I, use raw material or production units normally used for measuring production.(see instructions)

a. **Raw Materials**

214a SIC Code (1)	Name (2)	Maximum Amount/Day (3)	Unit (See Table I) (4)	Shared Discharges (Serial Number) (5)
1021	Copper Ores			None
1031	Lead and Zinc Ores	8,200* STPD**	Design	Capacity

b. **Products**

214b SIC Code (1)	Name (2)	Maximum Amount/Day (3)	Unit (See Table I) (4)	Shared Discharges (Serial Number) (5)
1021	Copper Concentrates	210	STPD**	None
1031	Lead and Zinc Concentrates	1,536	STPD**	None
	(Product exists process as metal sulfide concentrates.)			

*8,200 STPD is the design production rate of zinc, copper, and lead ore. Annual production expressed as daily average is 7,400 STPD.

**Short tons per day.

DISCHARGE SERIAL NUMBER

003

FOR DEPT. USE

15. **Waste Abatement**

a. **Waste Abatement Practices** Describe the waste abatement practices used on this discharge with a brief narrative. (see instructions)

21Ba

Narrative: Control of surface runoff will be accomplished by constructing a series of ditches, dikes and retention ponds. These will be designed to utilize the existing topography for drainage control, with ditches and dikes constructed to direct discharge into the surrounding natural drainage. Surface runoff with potential for high suspended solids content will be diverted through sedimentation ponds before discharge. The storm event used to determine the potential for runoff and erosion along the road is generally the 10-year,24-hour storm. (continued below)

b. **Waste Abatement Codes** Using the codes listed in Table II of the Instruction Booklet, describe the waste abatement processes for this discharge in the order in which they occur if possible.

21Bb

(1) _____, (2) _____, (3) _____,

(4) _____, (5) _____, (6) _____,

(7) _____, (8) _____, (9) _____,

(10) _____, (11) _____, (12) _____,

(13) _____, (14) _____, (15) _____,

(16) _____, (17) _____, (18) _____,

(19) _____, (20) _____, (21) _____,

(22) _____, (23) _____, (24) _____,

(25) _____.

The rainfall intensity for this storm is 0.15 inches/hour based on the Nicolet College Weather Station. The storm event used to size culverts on the railroad was the 25-year, 24-hour storm. The rainfall intensity for this storm is 0.18 inches/hour.

The storm event used for sizing the Swamp Creek bridges for either road or railroad is the 100-year, 24-hour storm which has a rainfall intensity of 0.22 inches/hour. The drainage areas, design flows, and culvert sizings are given as additional information.

DISCHARGE SERIAL NUMBER

003

FOR DEPT. USE

16. Wastewater Characteristics N/A

Check the box beside each constituent which is present in the effluent (discharge water). This determination is to be based on actual analysis or best estimate.(see instructions)

Parameter 216	Present	Parameter 216	Present
Color 00080		Copper 01042	
Ammonia 00610		Iron 01045	
Organic nitrogen 00605		Lead 01051	
Nitrate 00620		Magnesium 00927	
Nitrite 00615		Manganese 01055	
Phosphorus 00665		Mercury 71900	
Sulfate 00945		Molybdenum 01062	
Sulfide 00745		Nickel 01067	
Sulfite 00740		Selenium 01147	
Bromide 71870		Silver 01077	
Chloride 00940		Potassium 00937	
Cyanide 00720		Sodium 00929	
Fluoride 00951		Thallium 01059	
Aluminum 01105		Titanium 01152	
Antimony 01097		Tin 01102	
Arsenic 01002		Zinc 01092	
Beryllium 01012		Algicides* 74051	
Barium 01007		Chlorinated organic compounds* 74052	
Boron 01022		Pesticides* 74053	
Cadmium 01027		Oil and grease 00550	
Calcium 00916		Phenols 32730	
Cobalt 01037		Surfactants 38260	
Chromium 01034		Chlorine 50060	
Fecal coliform bacteria 74055		Radioactivity* 74050	

*Specify substances, compounds and/or elements in Item 26.

DISCHARGE SERIAL NUMBER

003

FOR DEPT. USE

17. **Description of Intake and Discharge** (Intermittent discharge of surface water runoff)

For each of the parameters listed below, enter in the appropriate box the value or code letter answer called for.(see instructions)

In addition, enter the parameter name and code and all required values for any of the following parameters if they were checked in item 16; ammonia, cyanide, aluminum, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, phenols, oil and grease, and chlorine (residual).

Parameter and Code 217a	Influent		Effluent					
	Untreated Intake Water (Daily Average) (1)	In-Plant Treated Intake Water (Daily Average) (2)	Daily Average (3)	Minimum Value Observed or Expected During Discharge Activity (4)	Maximum Value Observed or Expected During Discharge Activity (5)	Frequency of Analysis (6)	Number of Analyses (7)	Sample Type (8)
Flow* Gallons per day 00056	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
pH Units 00400	N/A	N/A	X	N/A	N/A	N/A	N/A	N/A
Temperature (winter) ° F 74028	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Temperature (summer) ° F 74027	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biochemical Oxygen Demand (BOD 5-day) mg/l 00310	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chemical Oxygen Demand (COD) mg/l 00340	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Suspended (nonfilterable) Solids mg/l 00530	XXX	N/A	20	N/A	N/A	N/A	N/A	N/A
Specific Conductance micromhos/cm at 25° C 00095	N/A	N/A	X	N/A	N/A	N/A	N/A	N/A
Settleable Matter (residue) ml/l 00545	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Other discharges sharing intake flow (serial numbers).(see instructions)

DISCHARGE SERIAL NUMBER
003

FOR DEPT. USE

17. (Cont'd.)

Parameter and Code 217a	Influent		Effluent					
	Untreated Intake Water (Daily Average) (1)	In-Plant Treated Intake Water (Daily Average) (2)	Daily Average (3)	Minimum Value Observed or Expected During Discharge Activity (4)	Maximum Value Observed or Expected During Discharge Activity (5)	Frequency of Analysis (6)	Number of Analyses (7)	Sample Type (8)

18. **Plant Controls** Check if the following plant controls are available for this discharge. 218

Alternate power source for major pumping facility. ☐ APS

N/A

Alarm or emergency procedure for power or equipment failure ☐ ALM

Complete item 19 if discharge is from cooling and/or steam water generation and water treatment additives are used.

19. **Water Treatment Additives** If the discharge is treated with any conditioner, inhibitor, or algicide, answer the following:

a. Name of Material(s) 219a None

b. Name and address of manufacturer 219b N/A

c. Quantity (pounds added per million gallons of water treated). 219c N/A

DISCHARGE SERIAL NUMBER

003

FOR DEPT. USE

d. Chemical composition of these additives (see instructions). | 219d | N/A

Complete items 20-25 if there is a thermal discharge (e.g., associated with a steam and/or power generation plant, steel mill, petroleum refinery, or any other manufacturing process) and the total discharge flow is 10 million gallons per day or more. (see instructions)

20. Thermal Discharge Source Check the appropriate item(s) indicating the source of the discharge. (see instructions) | 220

N/A

- ☐ Boiler Blowdown — BLBD
- ☐ Boiler Chemical Cleaning — BCCL
- ☐ Ash Pond Overflow — APOF
- ☐ Boiler Water Treatment — Evaporator Blowdown — EPBD
- ☐ Oil or Coal Fired Plants — Effluent from Air Pollution Control Devices — OCFP
- ☐ Condense Cooling Water — COND
- ☐ Cooling Tower Blowdown — CTBD
- ☐ Manufacturing Process — MFPR
- ☐ Other — OTHR

21. Discharge/Receiving Water Temperature Difference

Give the maximum temperature difference between the discharge and receiving waters for summer and winter operating conditions. (see instructions)

N/A

Summer | 221a | _____ °F.

Winter | 221b | _____ °F.

22. Discharge Temperature, Rate of Change Per Hour | 222 | _____ °F./hour

Give the maximum possible rate of temperature change per hour of discharge under operating conditions. (see instructions)

23. Water Temperature, Percentile Report (Frequency of Occurrence)

In the table below, enter the temperature which is exceeded 10% of the year, 5% of the year, 1% of the year and not at all (maximum yearly temperature). (see instructions)

Frequency of occurrence

		10%	5%	1%	Maximum
a. Intake Water Temperature (Subject to natural changes)	223a	°F	°F	°F	°F
b. Discharge Water Temperature	223b	°F	°F	°F	°F

24. Water Intake Velocity (see instructions) | 224 | _____ feet/sec.

N/A

25. Retention Time Give the length of time, in minutes, from start of water temperature rise to discharge of cooling water. (see instructions) | 225 | _____ minutes

Item 26. Additional Information

Item 203. Foth and Van Dyke and Associates, Inc., 1982a, Preliminary engineering, mine/mill railroad spur: Green Bay, Wisconsin.

_____, 1982b, Preliminary engineering, mine/mill access road (alternate alignment): Green Bay, Wisconsin.

Items 202b; 206a,b; and 209a.

The mine/mill access road is described in the August 1982 Preliminary Engineering Report by Foth and Van Dyke and is presented in Figures 003-1 through 003-11. The general location of each discharge point is identified in Figure 003-1. The three mile access road is constructed in Years 1 and 2 of the Project with drainage control in place by the end of Year 1. The storm water drain control is described in Appendix 4 of the Foth and Van Dyke Report (1982b). The first six road culverts from State Highway 55 toward the mine/mill site are summarized as follows:

Discharge Point	Station	Culvert Size (Inches)	Drainage Area (Acres)	Design Flow-10-Yr. Storm (CFS)*
1	7620	24	345	16
2	8104	24	86	18
3	1100	24	124	15
4	1352	24	124	14
5	1701	24	157	20
6	2535	24	140	13

*CFS = Cubic feet per second

There is a culvert at station 7920 (shown on Figure 003-3) which is essentially an equalizer pipe and has a negligible flow associated with it. It has therefore not been identified as a discharge point.

Item 26. Additional Information (continued)

Items 202b; 206a,b; and 209a. (continued)

The Swamp Creek bridge is at station 2780 and is designed to handle a 100-year flood flow of 1,010 CFS. The ditches along the road drain into Swamp Creek from the north and south banks at the Swamp Creek bridge. The discharge on the north bank is surface water runoff from approximately 820 feet of right-of-way between station 2535 and 2780. These two ditches do not have settling basins. On the south side of the stream, settling basins for both roadside ditches are located uphill from the bridge as shown in Figure 003-7. The discharge from these two settling basins to Swamp Creek is at station 2830. The design of these settling basins is shown in Figure 003-11 which also shows special details of the ditch bottom. The total discharge to Swamp Creek from these four points is:

Discharge Point	Station	Drainage Area (Acres)	Design Flow-10-Yr. Storm (CFS)
7	2780	1	1
8	2780	1	1
9	2830	1	1
10	2830	5	3

In summary, six culverts, two settling basins, and two short ditch discharges are associated with the mine/mill access road. This represents ten storm water runoff discharge points (numbers 1 thru 10).

Item 26. Additional Information(continued)

Item 202b; 206a,b; and 209a. (continued)

The mine/mill railroad spur is described in the Preliminary Engineering Report by Foth and Van Dyke (1982). This 2.7 mile railroad spur is scheduled for construction in Project Year 1 and 2 with drainage control completed in Year 1. The railroad is shown in Figure 003-12 with arrows indicating the general location of 13 storm water discharge points (numbers 11 through 23).

Figures 003-13 through 003-22 show the plan and profile for the railroad spur and also indicate the location of each of the storm water discharge points. The seven railroad culverts associated with the storm water discharge points are described below:

Discharge Point	Station	Culvert Size (Inches)	Drainage Area (Acres)	Design Flow-25-Yr. Storm (CFS)
11	501 + 80	24	13	2
12	501 + 00	24	12	1
13	502 + 20	24	17	4
14	509 + 70	30	166	19
15	511 + 80	96	282	38*
20	522 + 90	24	90	29
21	533 + 60	24	12	2

* Discharge Point 15 design was based on a 100-year 24-hour storm.

Discharge points 16-19 represent surface water drainage to Swamp Creek from either side of the track at the Swamp Creek bridge. The surface water drainage on the south side of Swamp Creek has two

Item 26. Additional Information (continued)

Item 202b; 206a,b; and 209a. (continued)

settling basins just uphill from the bridge. The design of these basins is presented in Figure 003-23. Surface water drainage into the north bank of Swamp Creek is from a small watershed and as in the case of the access road does not need settling basins. The affected areas are:

Discharge Point	Station	Drainage Area (Acres)	Design Flow-10-Yr. Storm (CFS)
16	517 + 00	1	1
17	517 + 00	1	1
18	517 + 60	12	6
19	517 + 60	1	1

Surface water runoff discharge points 22 and 23 represent drainage away from each side of the track at a point just before the railroad spur enters the Mine/Mill Site. In this situation the track runs along the spine of a ridge and drainage is from a very short section of track. The affected acreage on either side is approximately 1 acre and the 10-year flow would be less than 1 CFS.

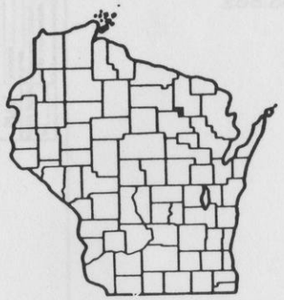
The Swamp Creek bridge is shown in Figure 003-24 and is designed to handle a 100-year flood flow of 1,010 CFS.

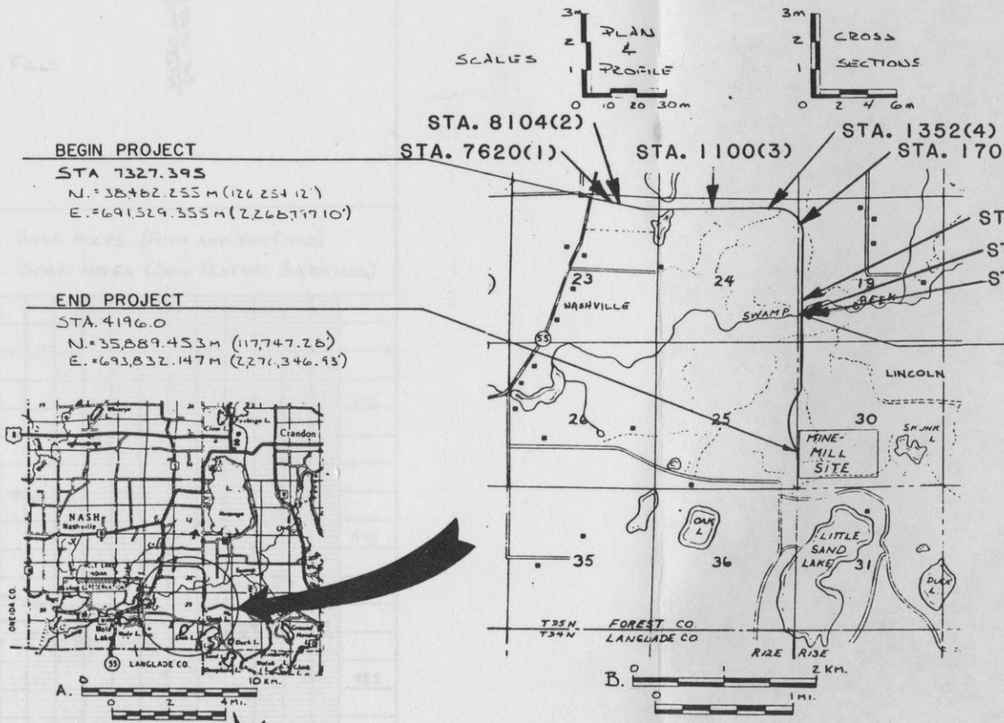
EXXON MINERALS COMPANY

CRANDON PROJECT

MINE / MILL ACCESS ROAD

PRELIMINARY PLAN





Total Net Length of Centerline = 4.76 km (2.96mi.)

Design Designation

A.D.T. 1980	= 0
A.D.T. 2000	=802
D.H.V. 2000	=72
D.	=50%
T.	=5%
V.	=96.6 KM./HR. (60 M.P.H.)

Conventional Signs

- County Line
- Township or Range Line
- Section Line
- Corporate or City Limits
- Property line
- Lot Line
- Existing Right of Way Line
- New Right of Way Line
- Base or Survey Line
- Slope Intercept
- Existing Roadway or Private Entrance
- Caution Symbol (Combustible fluids under pressure) — CRANDON
- Railroads
- Fence
- Culverts in Place
- Culverts Required
- Power Pole
- Telephone or Telegraph Pole
- Right of Way Markers
- Marsh
- Wooded Area
- Grade Elevation

Discharge Points

TIE-IN BACK TO
2464, 2475, 2477, 2478, 2483, 2484, 2486, 2630, 2682, 2697, 2698

REVISED	DATE	BY	DESCRIPTION
	8-18-81	PRW	LAYOUT MF ADDITIONS
2	7-27-82	JGL	ROUTE LOCATION

Typical Representations: Refinements May Be Made During Final Engineering

WISCONSIN — KENNETH A. ENGLEBERT E-16310 — PROFESSIONAL ENGINEER — Green Bay, Wis. — August 18, 1982

WISCONSIN — PETER R. WILLS E-12903 — PROFESSIONAL ENGINEER — Abrams, Wis. — August 18, 1982

WISCONSIN — THOMAS J. JANSSEN, SR. E-18618 — PROFESSIONAL ENGINEER — Washington, D.C. — 18 AUG 82

ORIGINAL PLANS PREPARED BY

Foth & Van Dyke
engineers/architects

2737 S. RIDGE ROAD · P.O. BOX 3000 · GREEN BAY, WI 54303-1200
OTHER OFFICES (SHIPPING MI - MILWAUKEE WI
1-414-497-2500

EXXON MINERALS COMPANY
CRANDON PROJECT

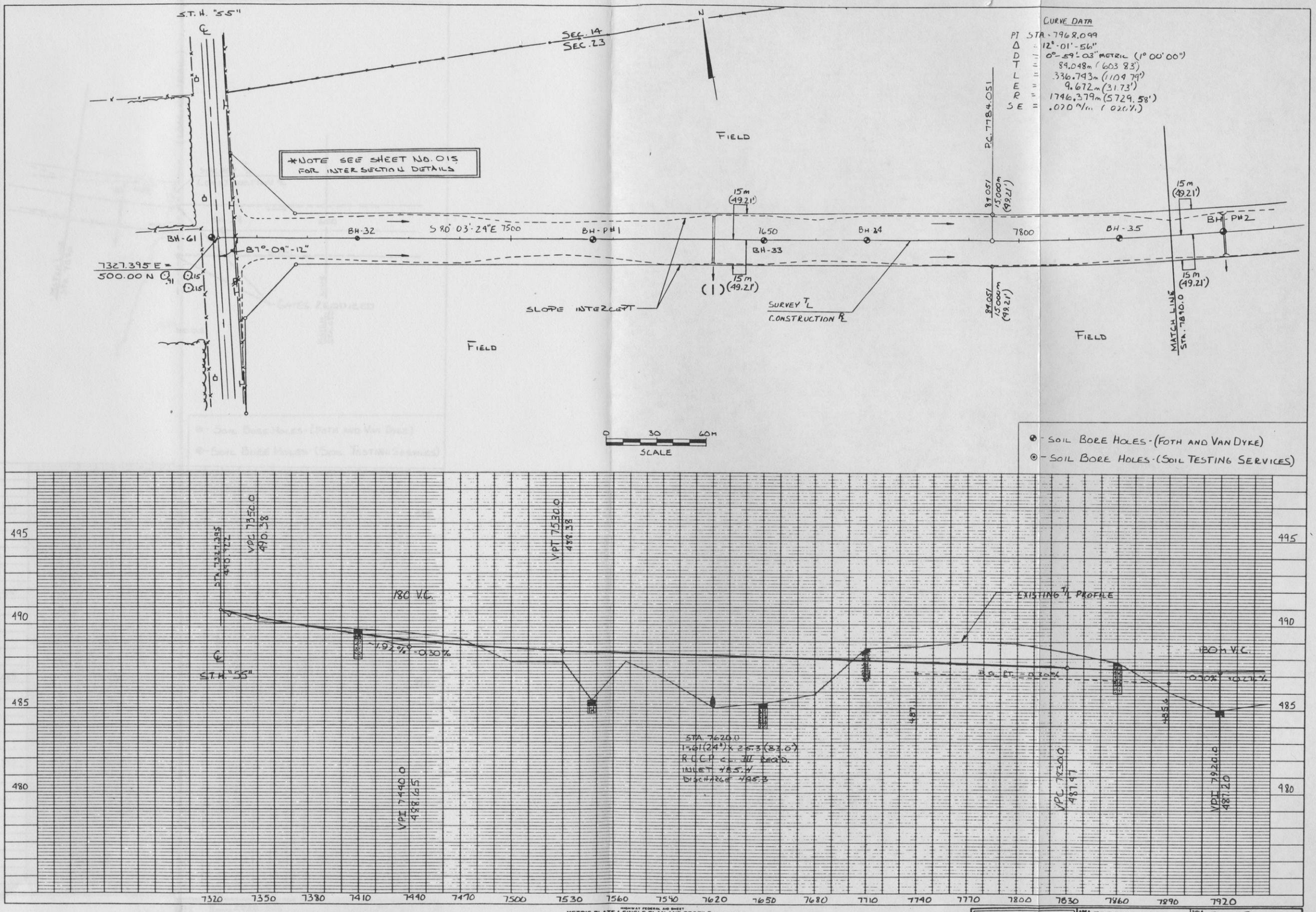
TITLE: TITLE SHEET

SCALE: AS SHOWN	STATE: WISCONSIN		COUNTY: FOREST
DRAWN BY: JJJ	DATE: 6-15	CHECKED BY: JGL	DATE: 8-6-82
APPROVED BY: PRW	DATE: 8-6-82	APPROVED BY:	DATE
APPROVED BY: TJJ	DATE: 8-6-82	EXXON	DATE

FIGURE 003-1

SHEET ___ OF ___ — REVISION NO.

DESIGN PRODUCTS CO.



PLAN — SURVEYED — PLOTTED — QUANTITIES CHECKED — R. W.'s MONUMENTS CHECKED — NOTE BOOK — No. — DATE 6-82

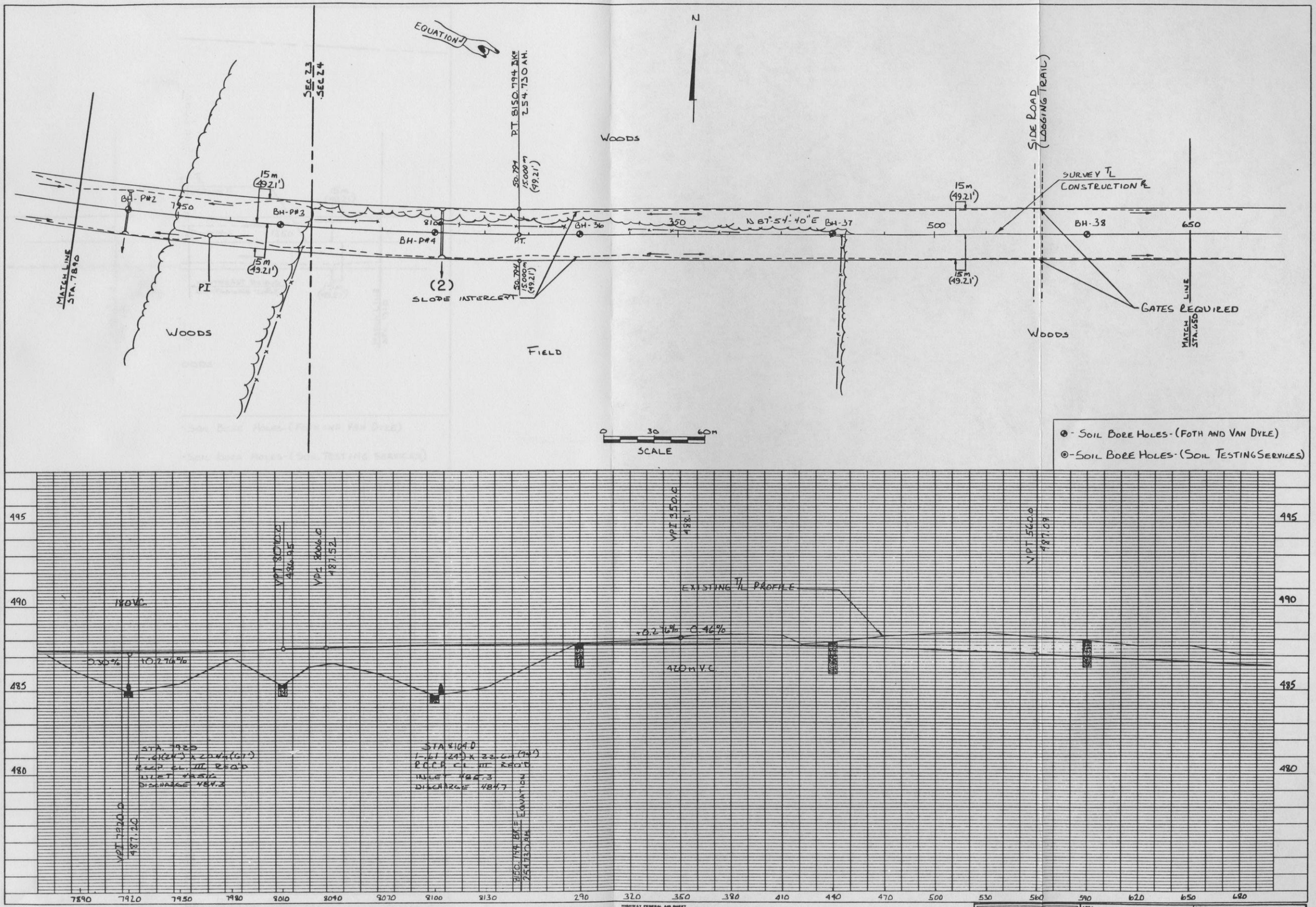
PROFILE — SURVEYED U.S. 51 & J.W. — PLOTTED T.J.L. II — QUANTITIES CHECKED — R. W.'s MONUMENTS CHECKED — NOTE BOOK — No. — STRUCTURE NOTATIONS CHECKED — DATE 6-82 — 6-82

HIGHWAY FEDERAL AID SHEET
METRIC PLATE 1-SINGLE PLAN AND PROFILE-FULL LINE
WTELEXNE
PRINTED IN U.S.A.

EXXON MINERALS COMPANY	AREA 7327.395 - 7890	TITLE PLAN & PROFILE		
	CO & ST		BY	
	SCALE 015-113-C-007	PROJ NO	DATE	FILE NO

Typical Representations: Refinements May Be Made During Final Engineering

FIGURE 003-2



PLAN — SURVEYED; PLOTTED; DRAWN; CHECKED; NOTE BOOK; No.; BY; DATE 6-82

PROFILE — SURVEYED; DRAWN; CHECKED; NOTE BOOK; No.; BY; DATE 6-82; STRUCTURE NOTATIONS CHECKED

HIGHWAY FEDERAL AID SHEET
METRIC PLATE 1-SINGLE PLAN AND PROFILE-FULL LINE
"P" TELEDYNE
PRINTED IN U.S.A.

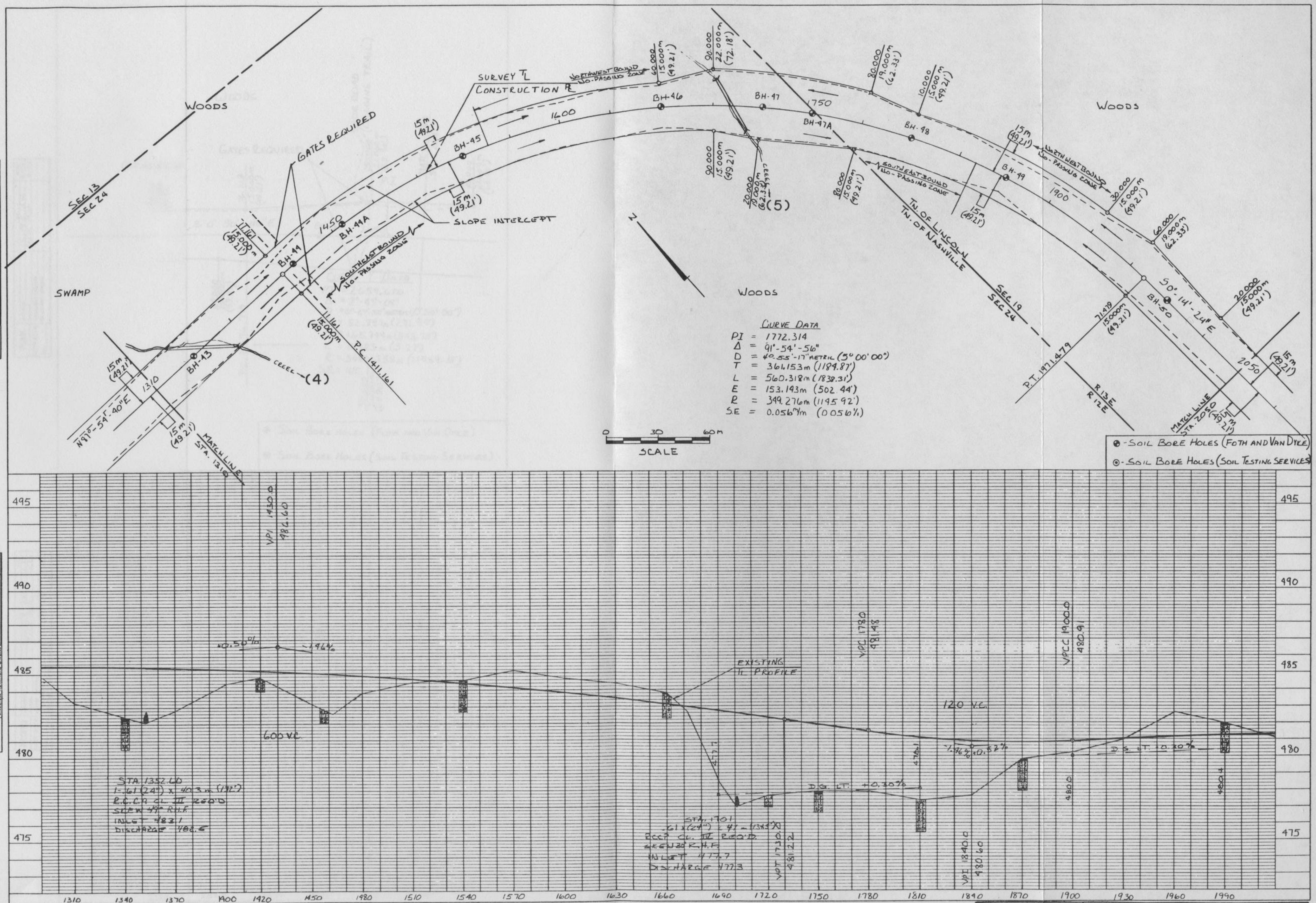
EXXON MINERALS COMPANY	AREA 7890-650	TITLE PLAN & PROFILE
	CO & ST	BY
	SCALE 051-115-C-008	PROJ NO / DATE / FILE NO

Typical Representations: Refinements May Be Made During Final Engineering

FIGURE 003-3

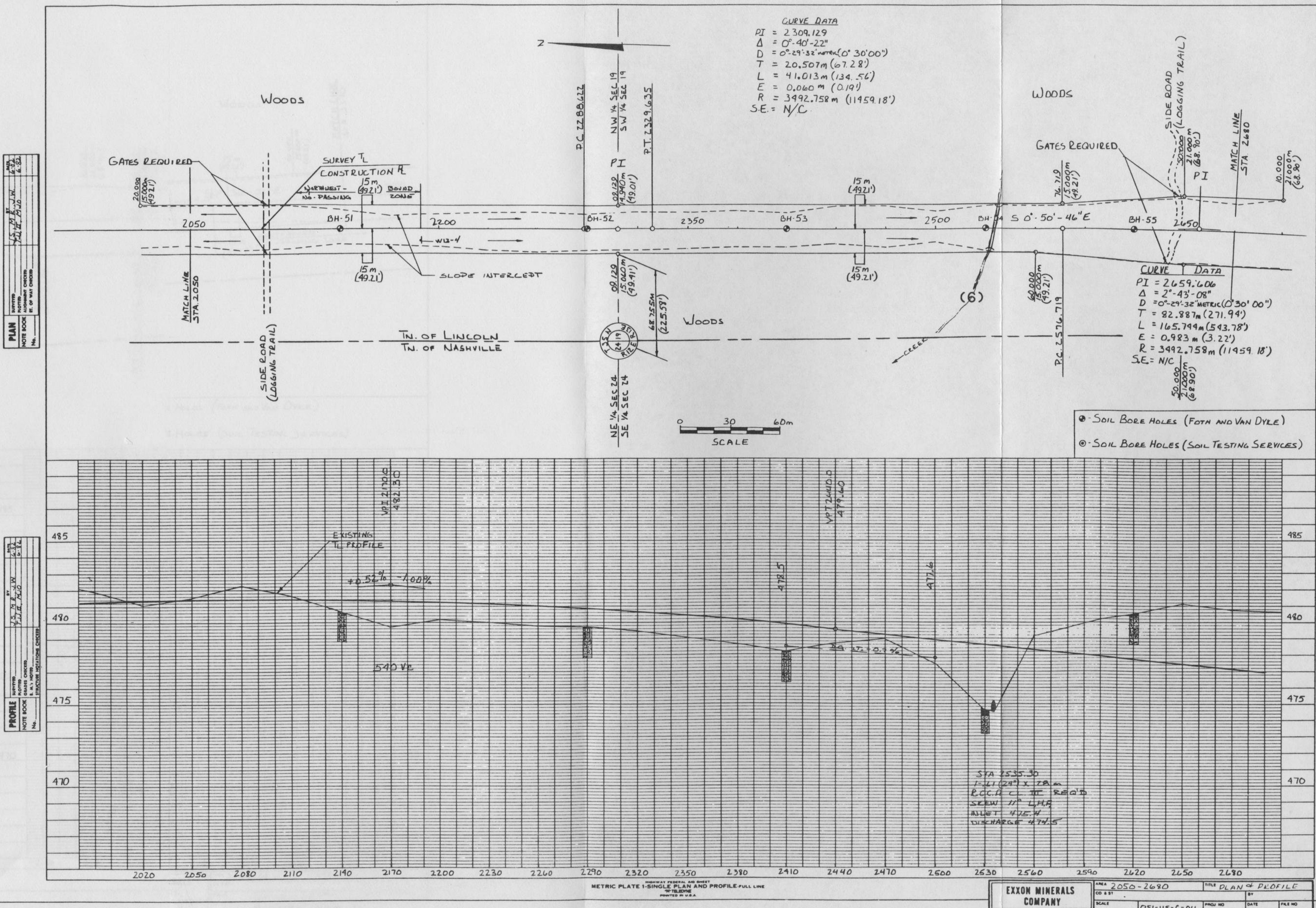
Typical Representations: Refinements May Be Made During Final Engineering

FIGURE 003-4



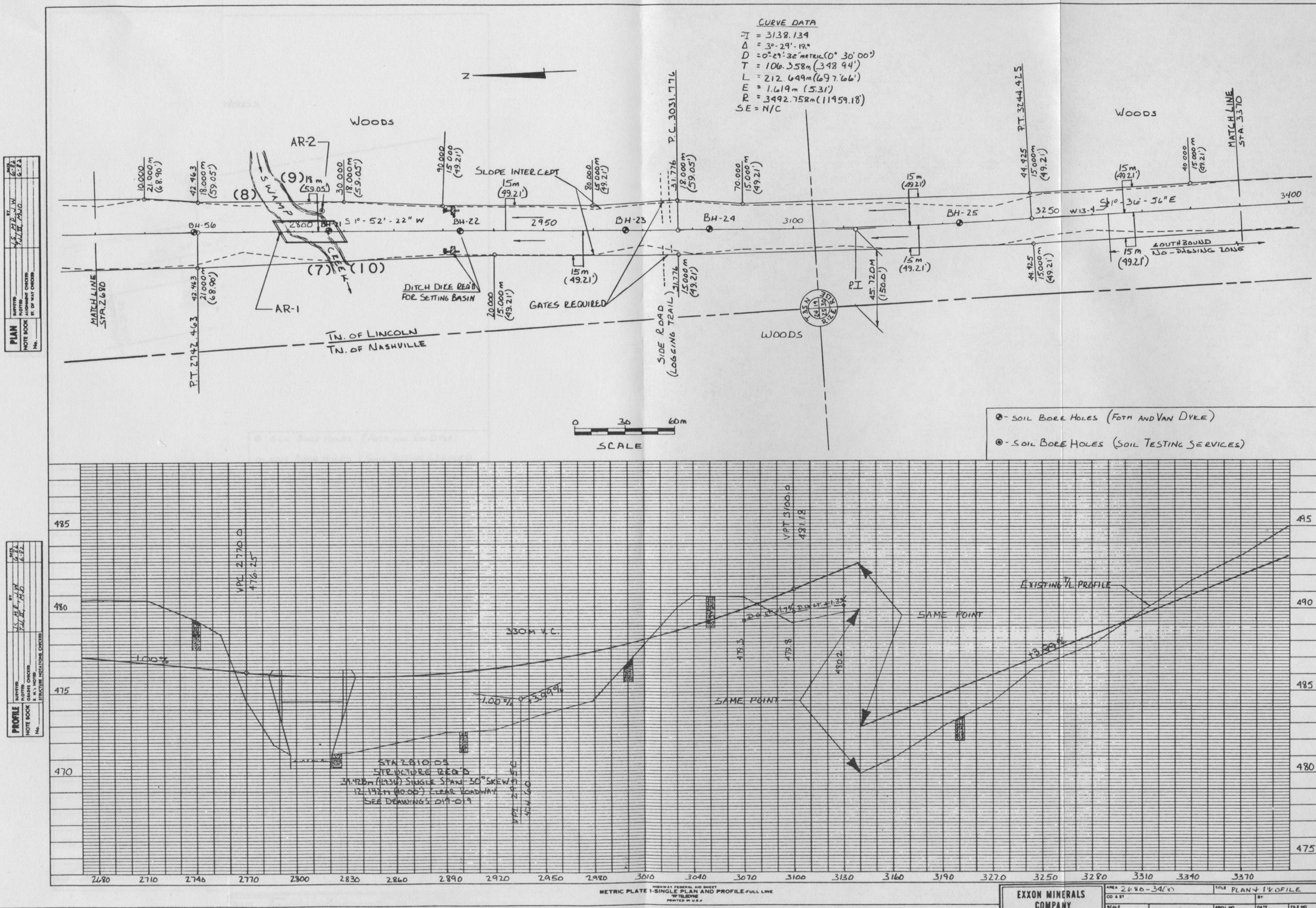
Typical Representations: Refinements May Be Made During Final Engineering

FIGURE 003-5



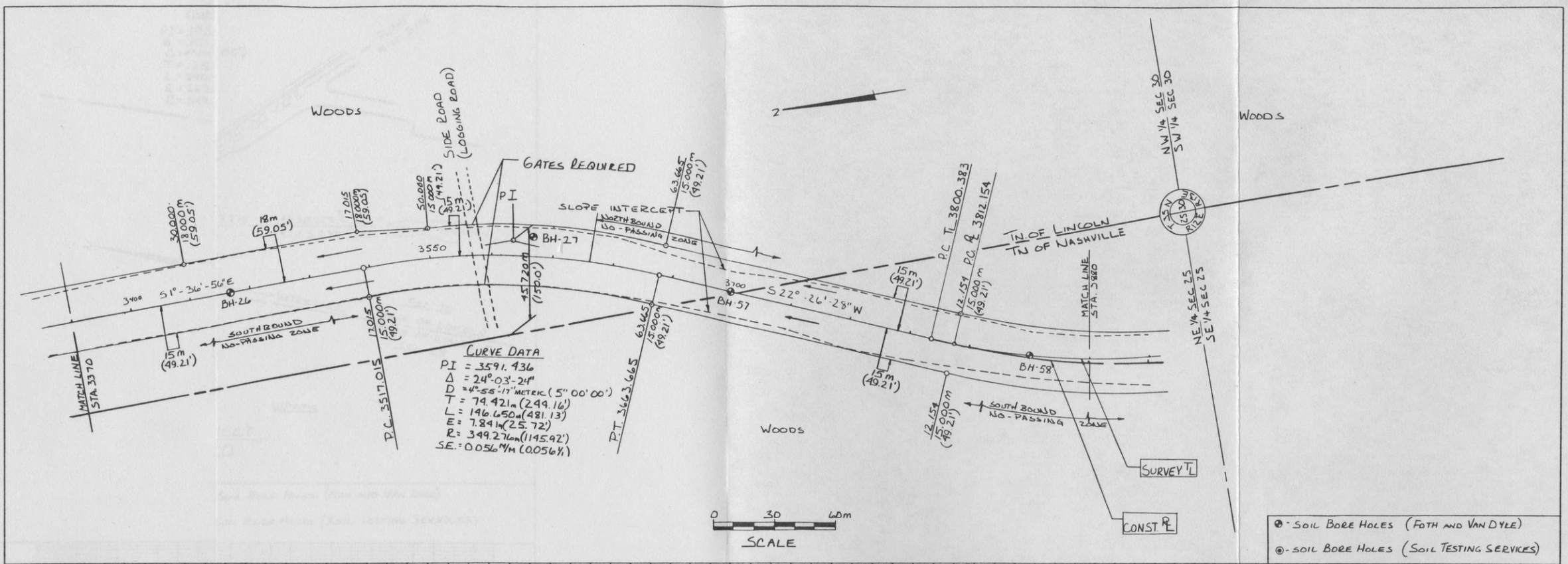
Typical Representations: Refinements May Be Made During Final Engineering

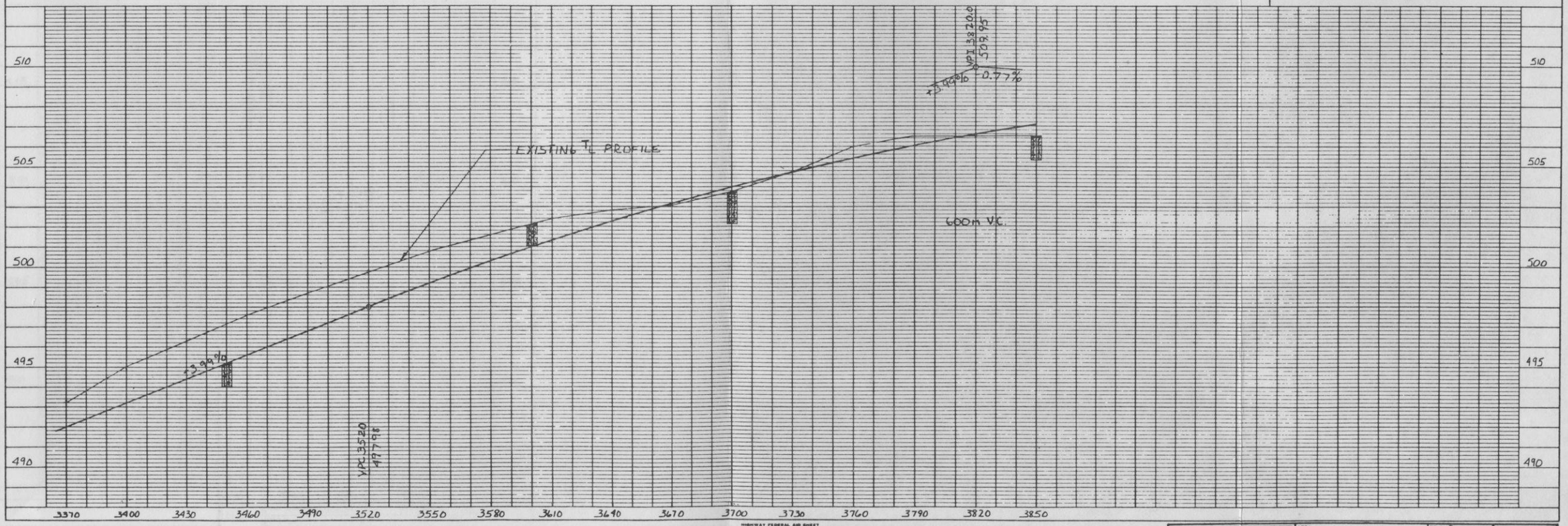
FIGURE 003-6



Typical Representations: Refinements May Be Made During Final Engineering

FIGURE 003-7





PLAN — SURVEYED: N.S., M.R., J.W. — PLOTTED: T.W.H., M.J.D. — NOTE BOOK: — No. — CHECKED: — BY OF WAY CHECKED: — DATE: 6-82

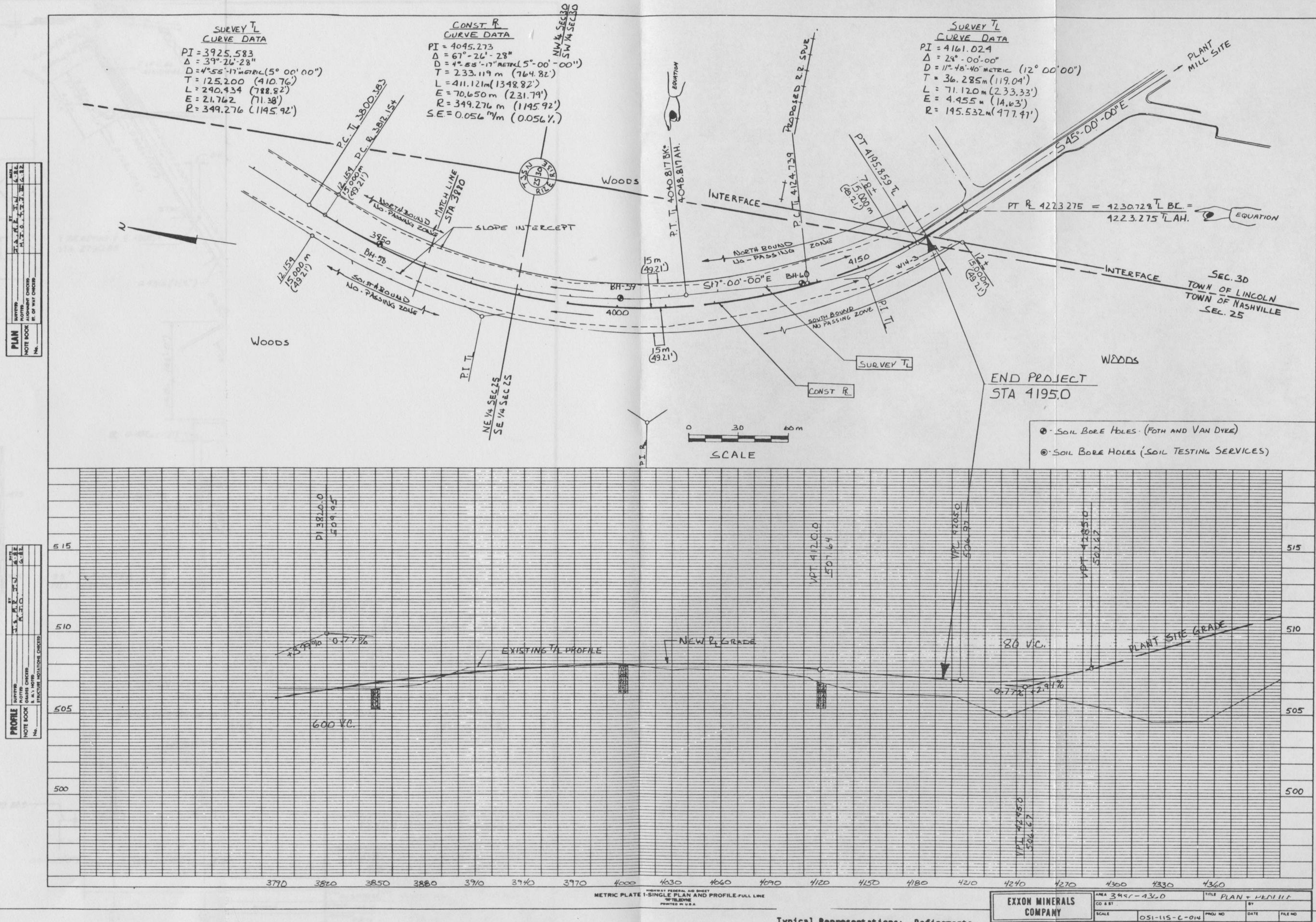
PROFILE — SURVEYED: N.S., J.W. — PLOTTED: T.W.H., M.J.D. — NOTE BOOK: — No. — CHECKED: — R. W.'s NOTED: — STRUCTURE NOTATIONS CHECKED: — DATE: 6-82

HIGHWAY FEDERAL AID SHEET
METRIC PLATE 1-SINGLE PLAN AND PROFILE-FULL LINE
TELEDYNE
PRINTED IN U.S.A.

EXXON MINERALS COMPANY	AREA 3370 - 3[illegible]	TITLE PLAN & PROFILE
	CO & ST	BY
	SCALE 051-115-C-013	PROJ NO / DATE / FILE NO

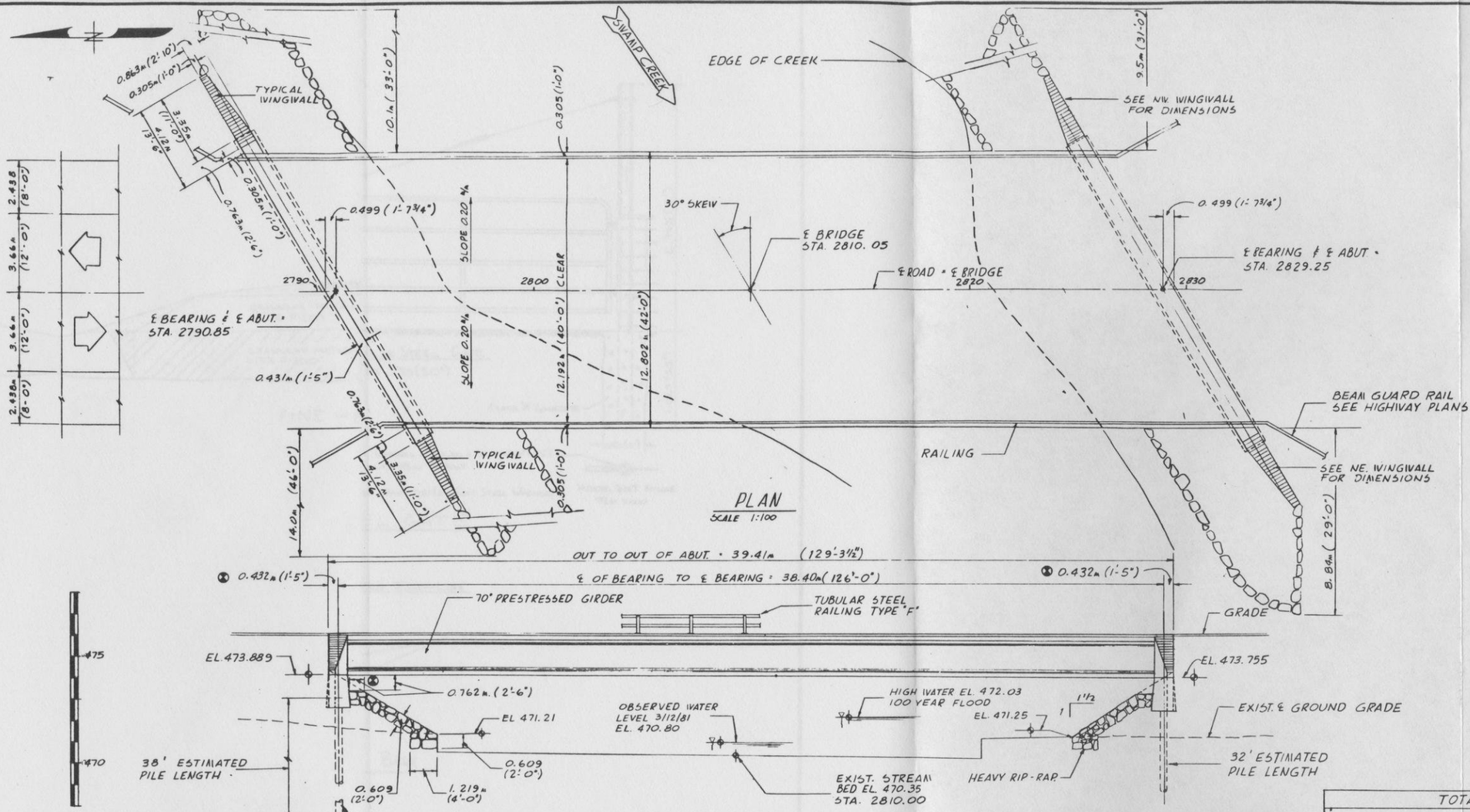
Typical Representations: Refinements May Be Made During Final Engineering

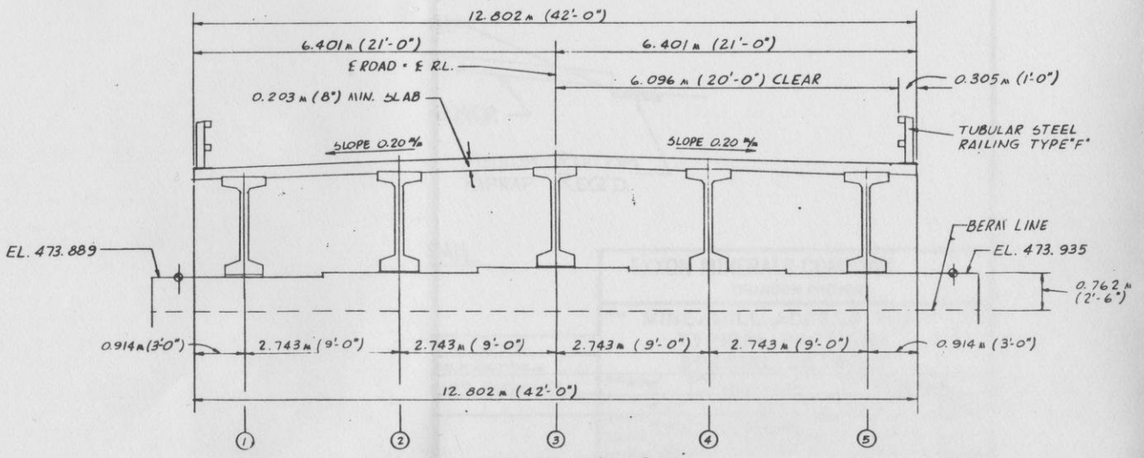
FIGURE 003-8

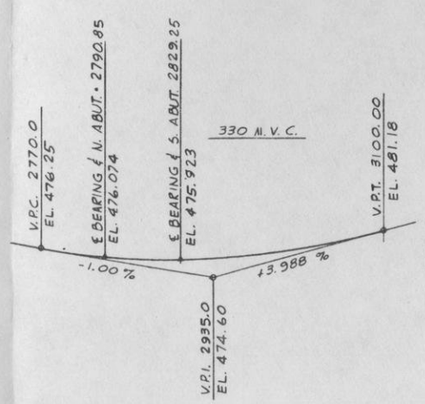


Typical Representations: Refinements May Be Made During Final Engineering

FIGURE 003-9







⊠ MEASURED PERPENDICULAR TO ABUTMENT

TOTAL ESTIMATED QUANTITIES

BID ITEMS	UNIT	N ABUT.	S ABUT.	SUPER	TOTAL
EXCAVATION FOR STRUCTURES	L.S.				
CONCRETE MASONRY	C.M.(C.Y.)	92.8(56)	92.8(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.)	1158(380)	975(320)	—	2133(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)

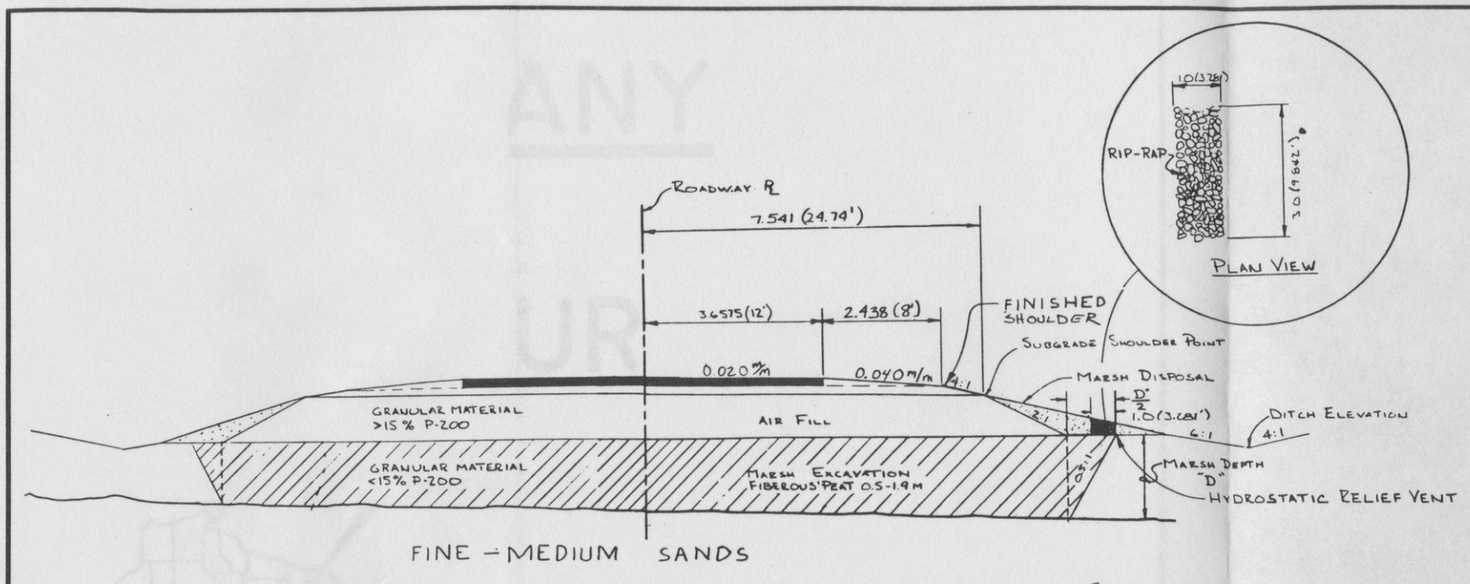
Typical Representations: Refinements May Be Made During Final Engineering

REVISED	DATE	BY	DESCRIPTION

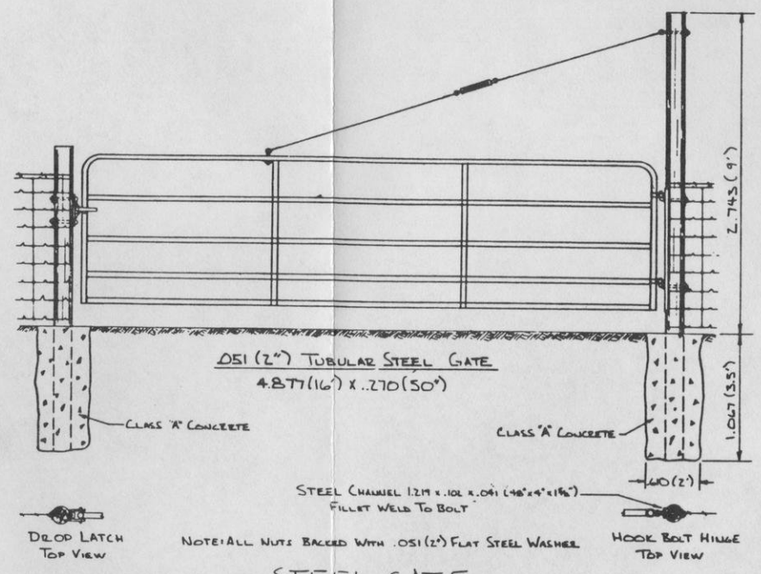
EXXON MINERALS COMPANY
CRANDON PROJECT

TITLE: MINE/MILL ACCESS ROAD SWAMP CREEK BRIDGE GENERAL PLAN

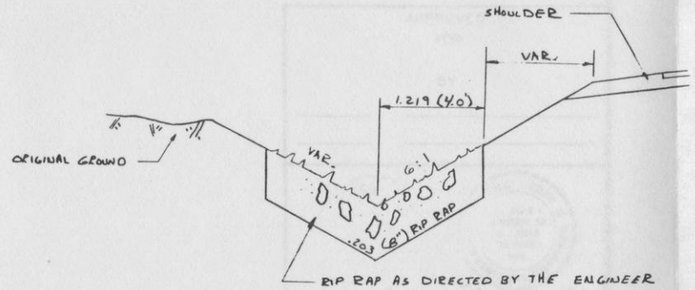
SCALE: AS SHOWN	STATE: WISCONSIN		COUNTY: FOREST
DRAWN BY: W.L.Y.	DATE: 7/82	CHECKED BY: J.G.L.	DATE: 8-6-82
APPROVED BY: P.R.W.	DATE: 8-6-82	APPROVED BY: K.A.E.	DATE: 8-6-82
APPROVED BY: T.J.J.	DATE: 8-6-82	EXXON	DATE
DRAWING NO: FIGURE 003-10	SHEET: — OF —		REVISION NO



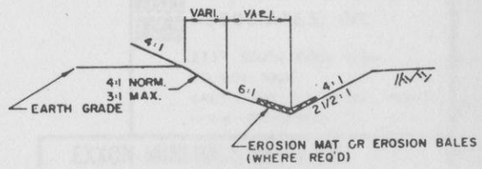
TYPICAL MARSH EXCAVATION SECTION



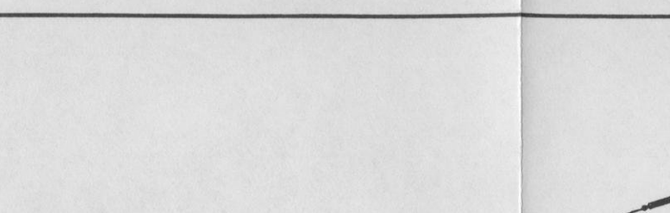
STEEL GATE



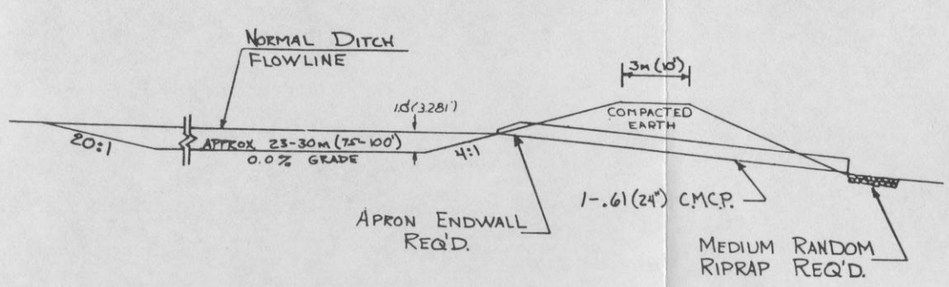
DITCH BOTTOM DETAIL



SPECIAL DITCH *



TYPICAL SECTION SETTLING BASIN



SETTLING BASIN DETAIL

REVISED	DATE	BY	DESCRIPTION
1	8-18-81	P.R.W.	DITCH DETAILS
2	8-6-82	J.G.L.	MINOR REVISIONS

Typical Representations: Refinements May Be Made During Final Engineering

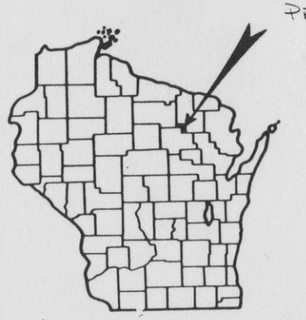
EXXON MINERALS COMPANY
CRANDON PROJECT

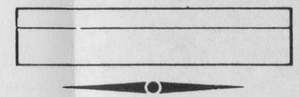
TITLE: MINE/MILL ACCESS ROAD
TYPICAL SECTIONS
SPECIAL DETAILS

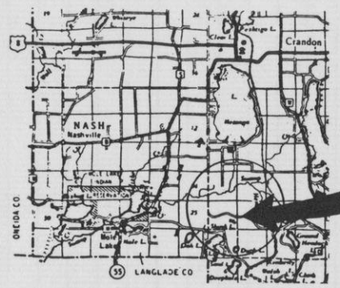
SCALE: NONE	STATE: WISCONSIN	COUNTY: FOREST	
DRAWN BY: M.J.O.	DATE: 3-27	CHECKED BY: J.G.L.	DATE: 8-6-82
APPROVED BY: P.R.W.	DATE: 8-6-82	APPROVED BY:	DATE:
APPROVED BY: T.J.J.	DATE: 8-6-82	EXXON	DATE:
DRAWING NO.		SHEET ___ OF ___	REVISION NO.

FIGURE 003-11

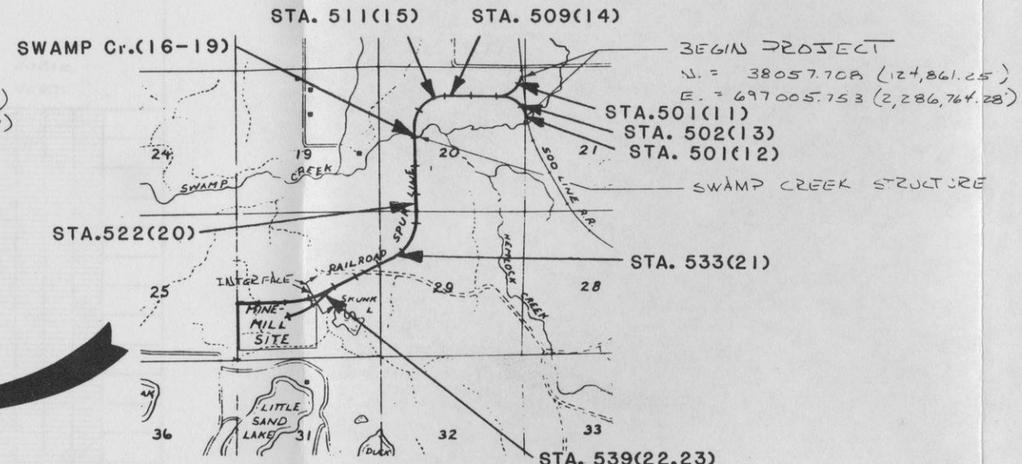
EXXON MINERALS COMPANY
CRANDON PROJECT
MINE / MILL RAILROAD SPUR
PRELIMINARY PLAN







A. SCALE 1.0cm. = 1.610 KM (1.0 MI.)



B. SCALE 1.0cm. = 0.322 KM. (0.2 MI.)

Conventional Signs

County Line	Caution Symbol (Combustible fluids under pressure)
Township or Range Line	Railroads
Section Line	Fence
Corporate or City Limits	Culverts in Place
Property line	Culverts Required
Lot Line	Power Pole
Existing Right of Way Line	Telephone or Telegraph Pole
New Right of Way Line	Right of Way Markers
Base or Survey Line	Marsh
Slope Intercept	Wooded Area
Existing Roadway or Private Entrance	Grade Elevation
	Discharge Points (17)

Layout

Scales A. 1.0 cm = 1.610 KM. (1.0 MI.)
B. 1.0cm = 0.322 K.M. (0.2 MI.)

Total Net Length of Centerline = 5.1 km. (3.13 mi.)

Typical Representations: Refinements May Be Made During Final Engineering

BOOK No's 2531, 2532, 2533, 2534

REVISED	DATE	BY	DESCRIPTION

APPROVED
FOR
BY

PLANS PREPARED BY

FOTH & VAN DYKE & ASSOCIATES, INC.
2737 SOUTH RIDGE ROAD
P.O. BOX 3000
GREEN BAY, WISCONSIN 54303
1-414-497-2500

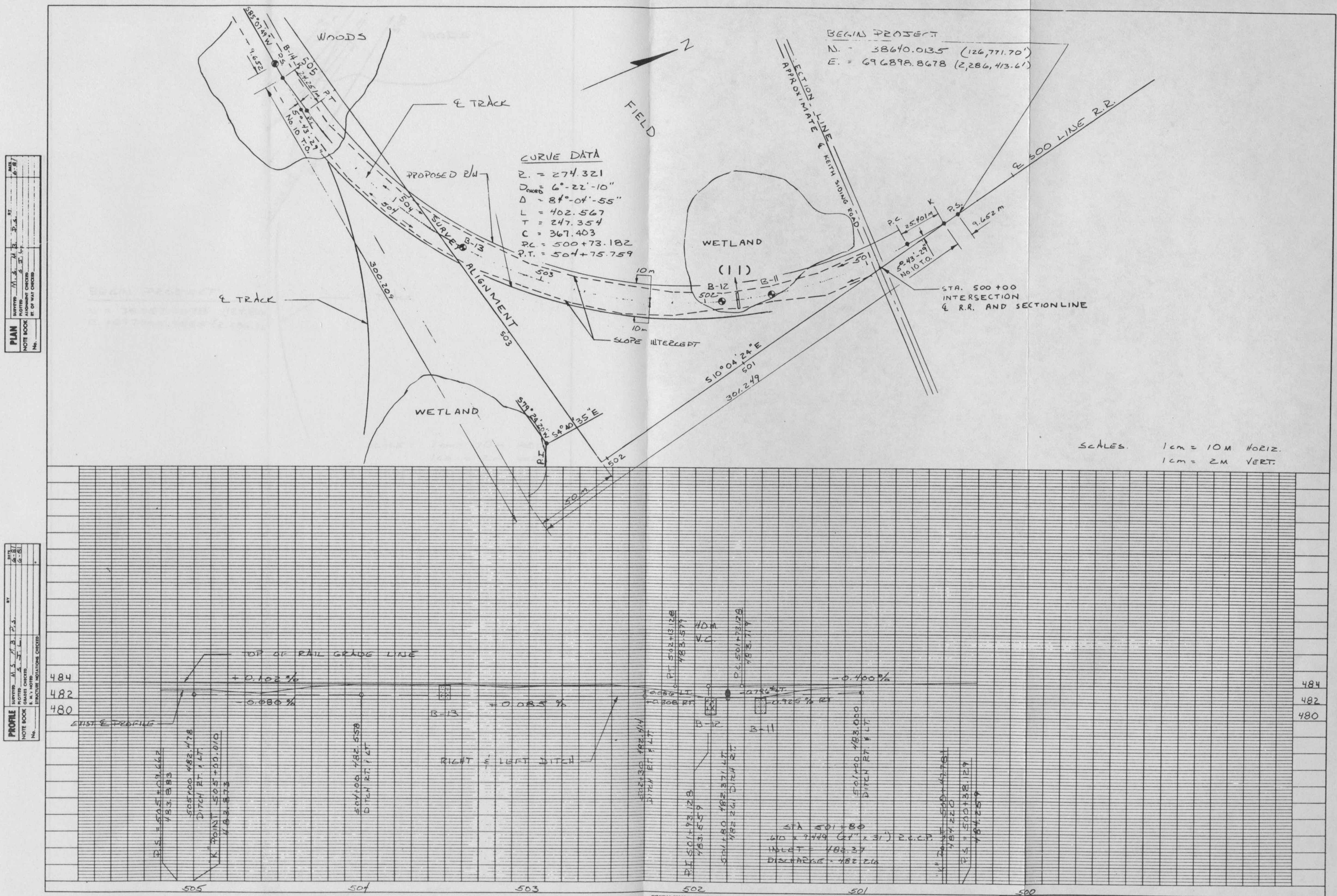
EXXON MINERALS COMPANY
CRANDON PROJECT

TITLE: TITLE SHEET

SCALE: AS SHOWN | STATE | COUNTY
DRAWN BY: J.J. | DATE: 12-8 | CHECKED BY: DJ | DATE
APPROVED BY: DJ | DATE: 12-8 | APPROVED BY | DATE
APPROVED BY | DATE | EXXON | DATE
DRAWING NO. | SHEET OF | REVISION NO.

FIGURE 003-12

DESIGN PRODUCTS CO.



METRIC PLATE 1-SINGLE PLAN AND PROFILE-FULL LINE

Typical Representations: Refinements May Be Made During Final Engineering

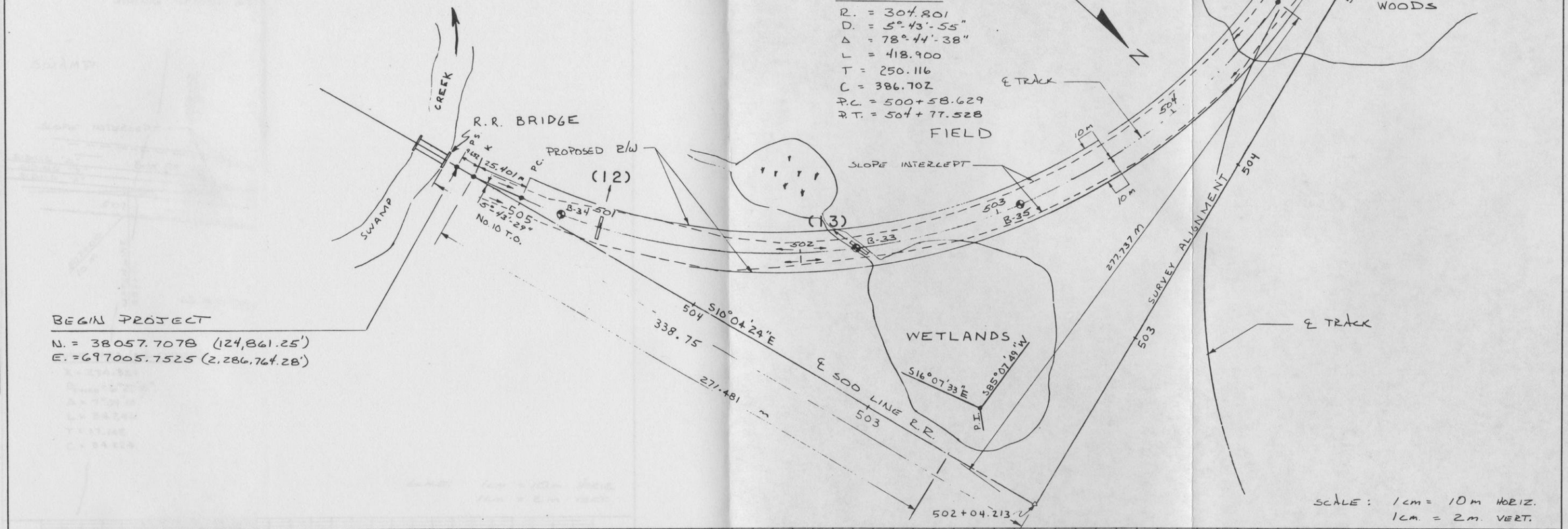
EXXON MINERALS COMPANY

TITLE PLAN & PROFILE

FIGURE 003-13

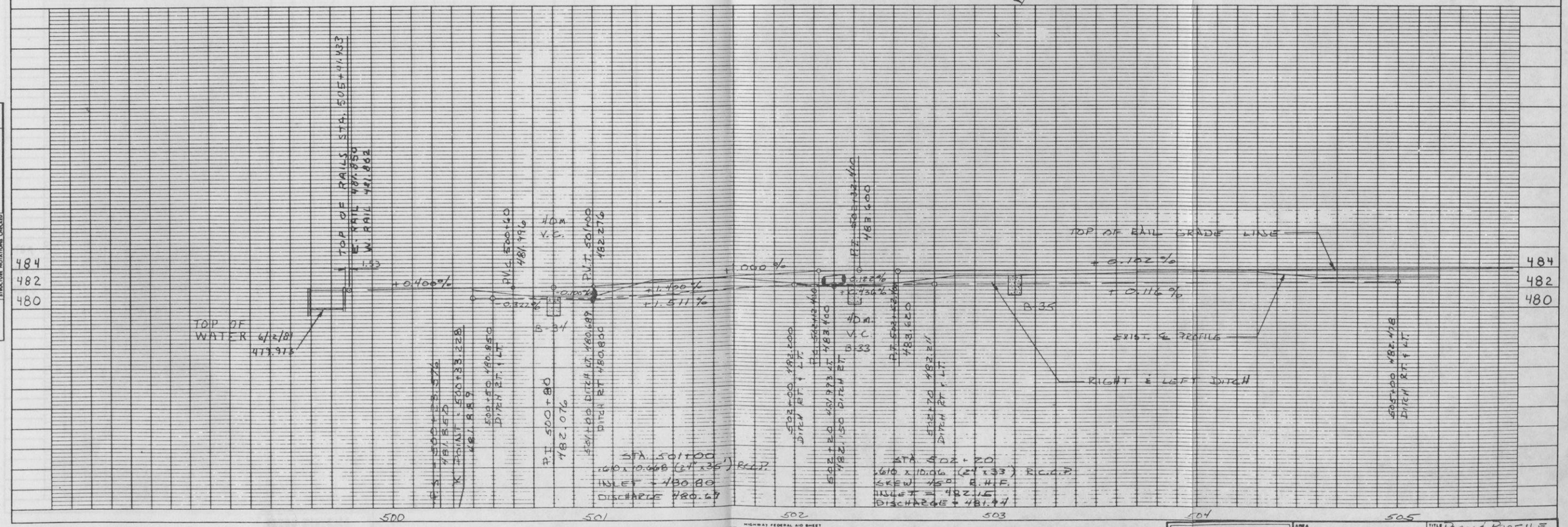
PLAN — SURVEYED N.S. A.B. 2.3. BY; PLOTTED A.B. 2.3.L.; NOTE BOOK 8.3.L.; ALIGNMENT CHECKED; GRADES CHECKED; R.W. NOTATIONS CHECKED; STRUCTURE NOTATIONS CHECKED; No.; DATE 6-81 6-81

PROFILE — SURVEYED N.S. A.B. 2.3. BY; PLOTTED A.3.L.; NOTE BOOK; GRADES CHECKED; R.W. NOTATIONS CHECKED; STRUCTURE NOTATIONS CHECKED; No.; DATE 6-81 6-81



CURVE DATA
R. = 304.801
D. = 5°-43'-55"
Δ = 78°-44'-38"
L = 418.900
T = 250.116
C = 386.702
P.C. = 500+58.629
P.T. = 504+77.528

BEGIN PROJECT
N. = 38057.7078 (124,861.25')
E. = 697005.7525 (2,286,764.28')



METRIC PLATE 1-SINGLE PLAN AND PROFILE-FULL LINE — HIGHWAY FEDERAL AID SHEET — TELEDYNE — PRINTED IN U.S.A.

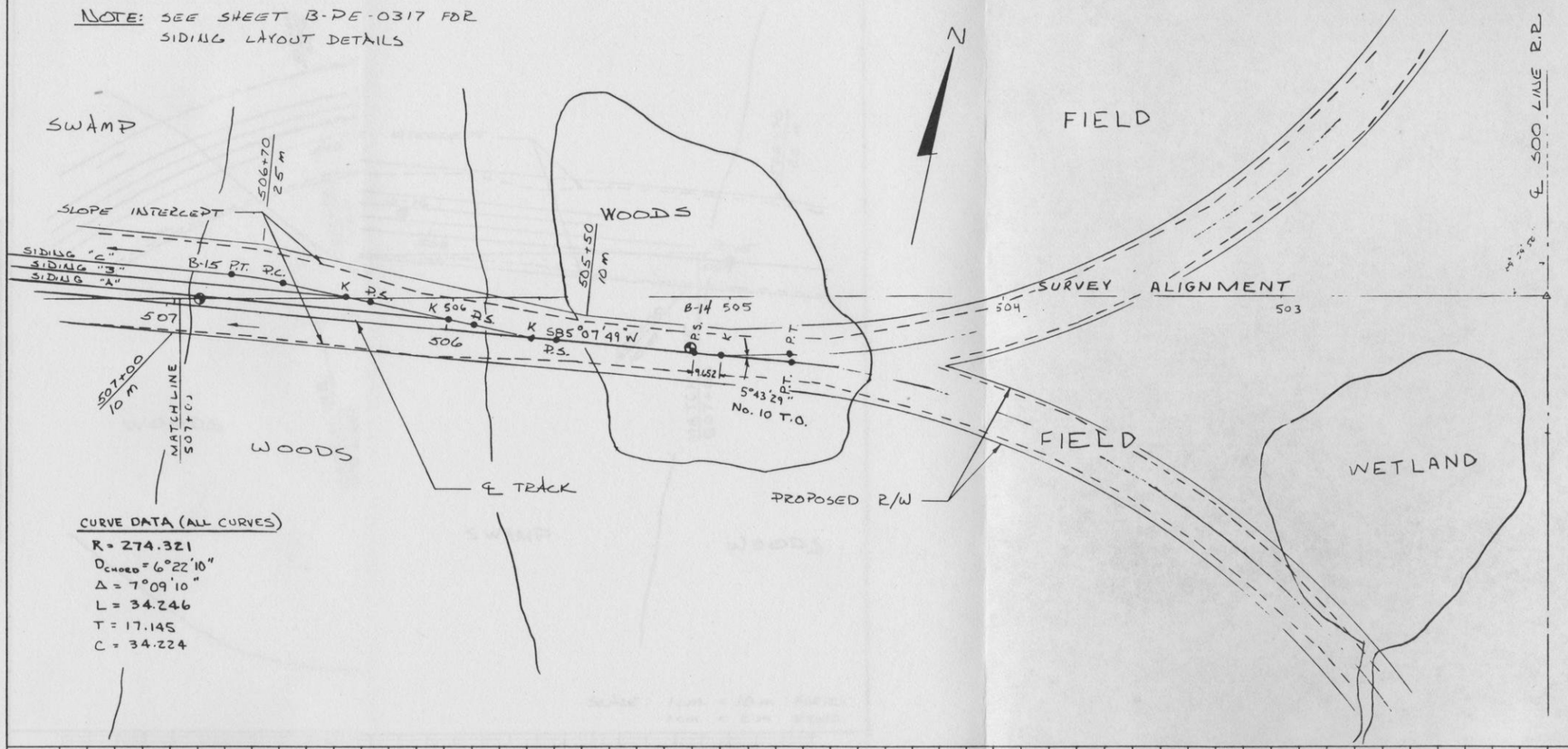
Typical Representations: Refinements May Be Made During Final Engineering

EXXON MINERALS COMPANY

AREA; CO & ST; SCALE; TITLE PLAN & PROFILE; BY; DATE; FILE NO.

FIGURE 003-14

NOTE: SEE SHEET B-PE-0317 FOR SIDING LAYOUT DETAILS



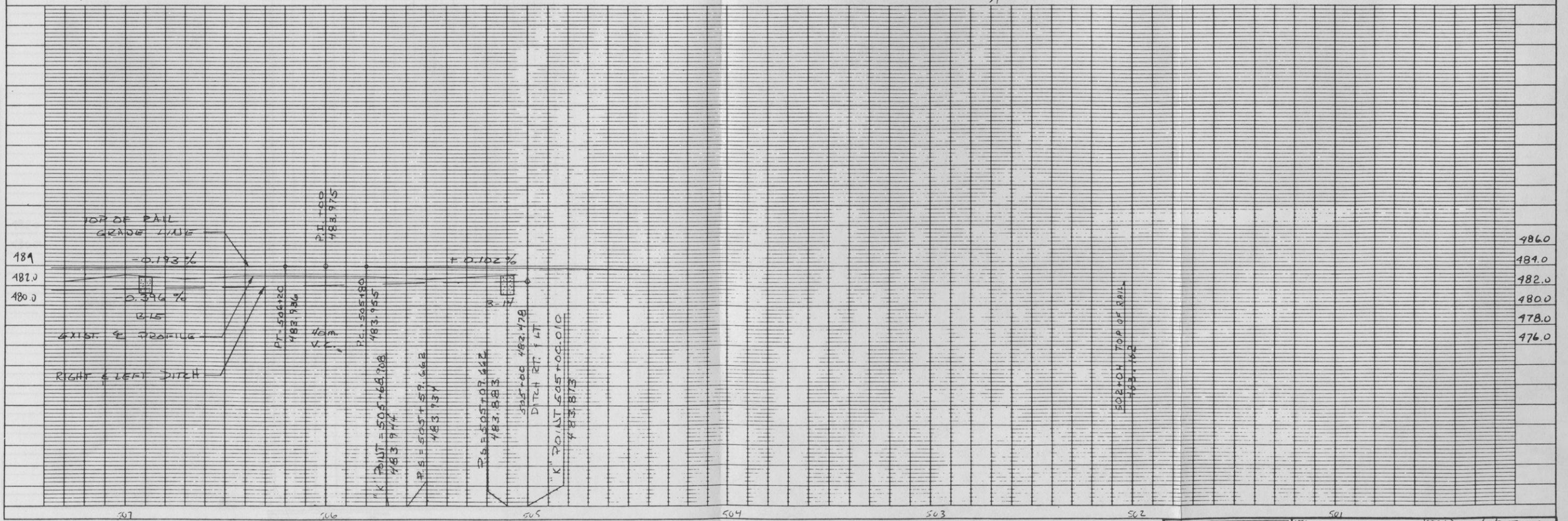
CURVE DATA (ALL CURVES)

R = 274.321
D_{CHORD} = 6°22'10"
Δ = 7°09'10"
L = 34.246
T = 17.145
C = 34.224

SCALE: 1cm = 10m HORIZ.
1cm = 2m VERT.

PLAN — SURVEYED A.S., A.R., P.S. 6-81; PLOTTED A.S. 6-81; ALIGNMENT CHECKED; BY OR WAY CHECKED; NOTE BOOK; No.

PROFILE — SURVEYED A.S., A.R., P.S. 6-81; PLOTTED; GRADE CHECKED; NOTE BOOK; No.; STRUCTURE NOTATIONS CHECKED

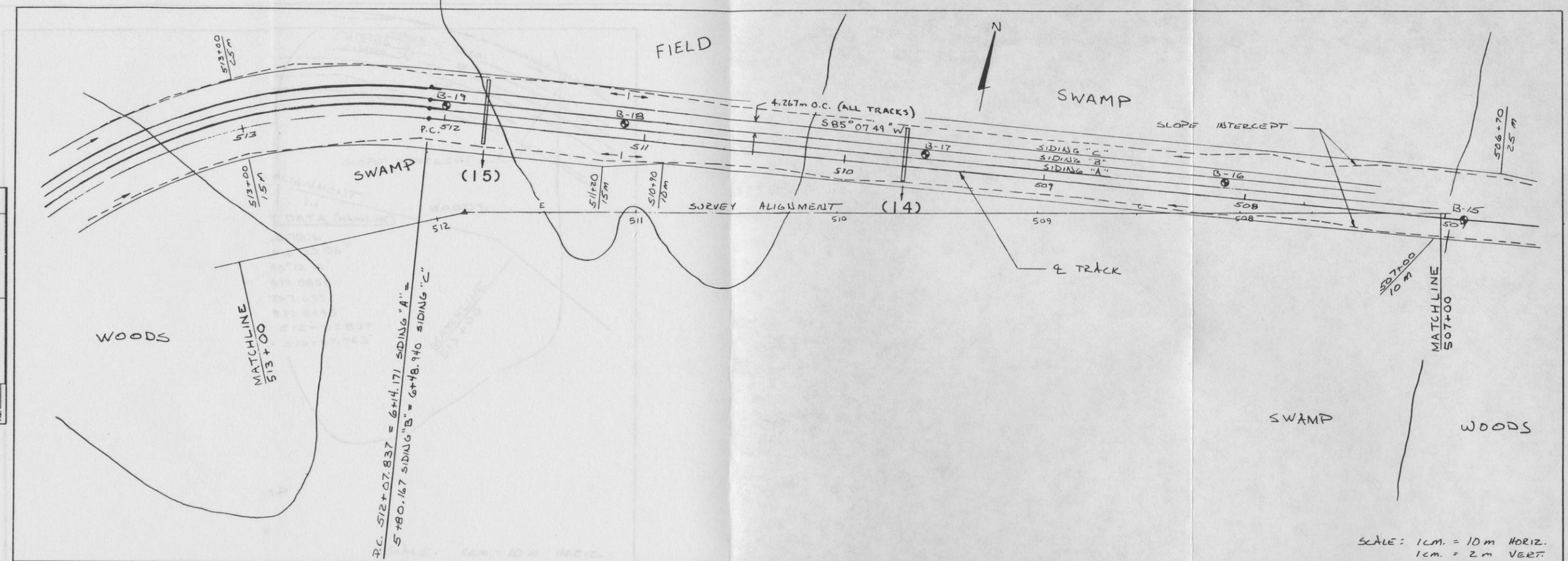


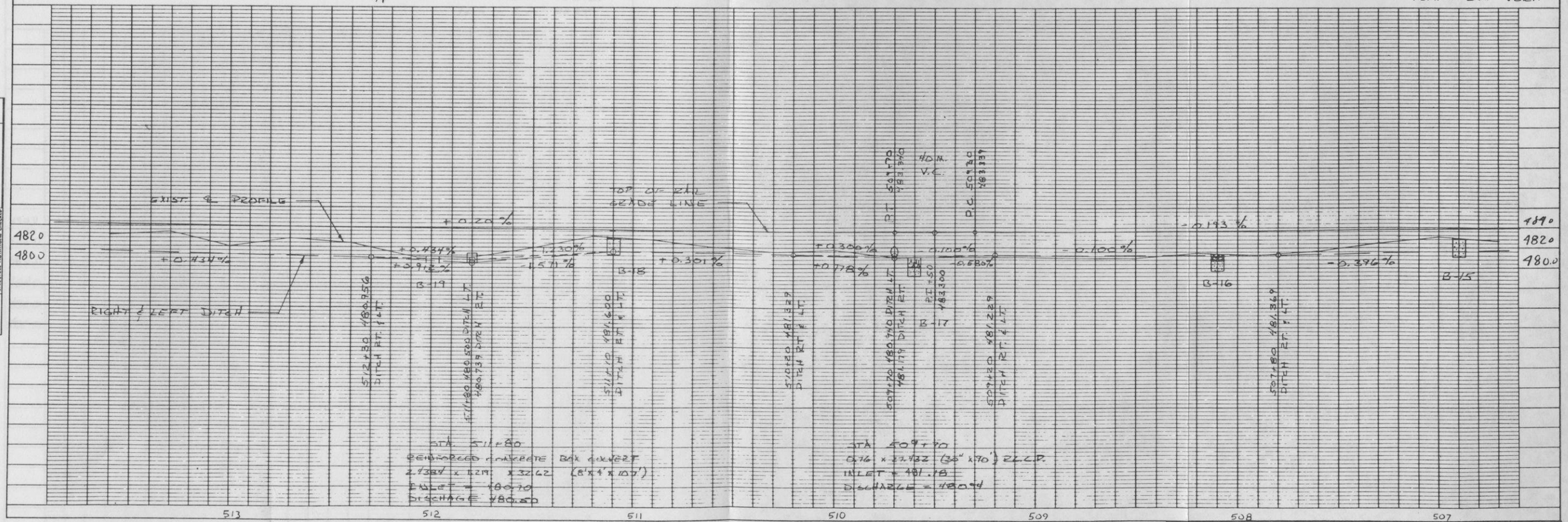
METRIC PLATE 1-SINGLE PLAN AND PROFILE-FULL LINE
HIGHWAY FEDERAL AID SHEET
W-TILEDYNE
PRINTED IN U.S.A.

Typical Representations: Refinements May Be Made During Final Engineering

EXXON MINERALS COMPANY

AREA | TITLE PLAN & PROFILE
CO & ST | BY
SCALE FIGURE 003-15 | DATE | FILE NO





PLAN — SURVEYED M.S., M.B., P.S. — PLOTTED — DRAWN — CHECKED — NOTE BOOK ALIGNMENT CHECKED — No. RT. OF WAY CHECKED — STRUCTURE NOTATIONS CHECKED

PROFILE — SURVEYED M.S., M.B., P.S. — PLOTTED — DRAWN — CHECKED — NOTE BOOK — No.

METRIC PLATE 1-SINGLE PLAN AND PROFILE-FULL LINE
HIGHWAY FEDERAL AID SHEET
TELEDYNE
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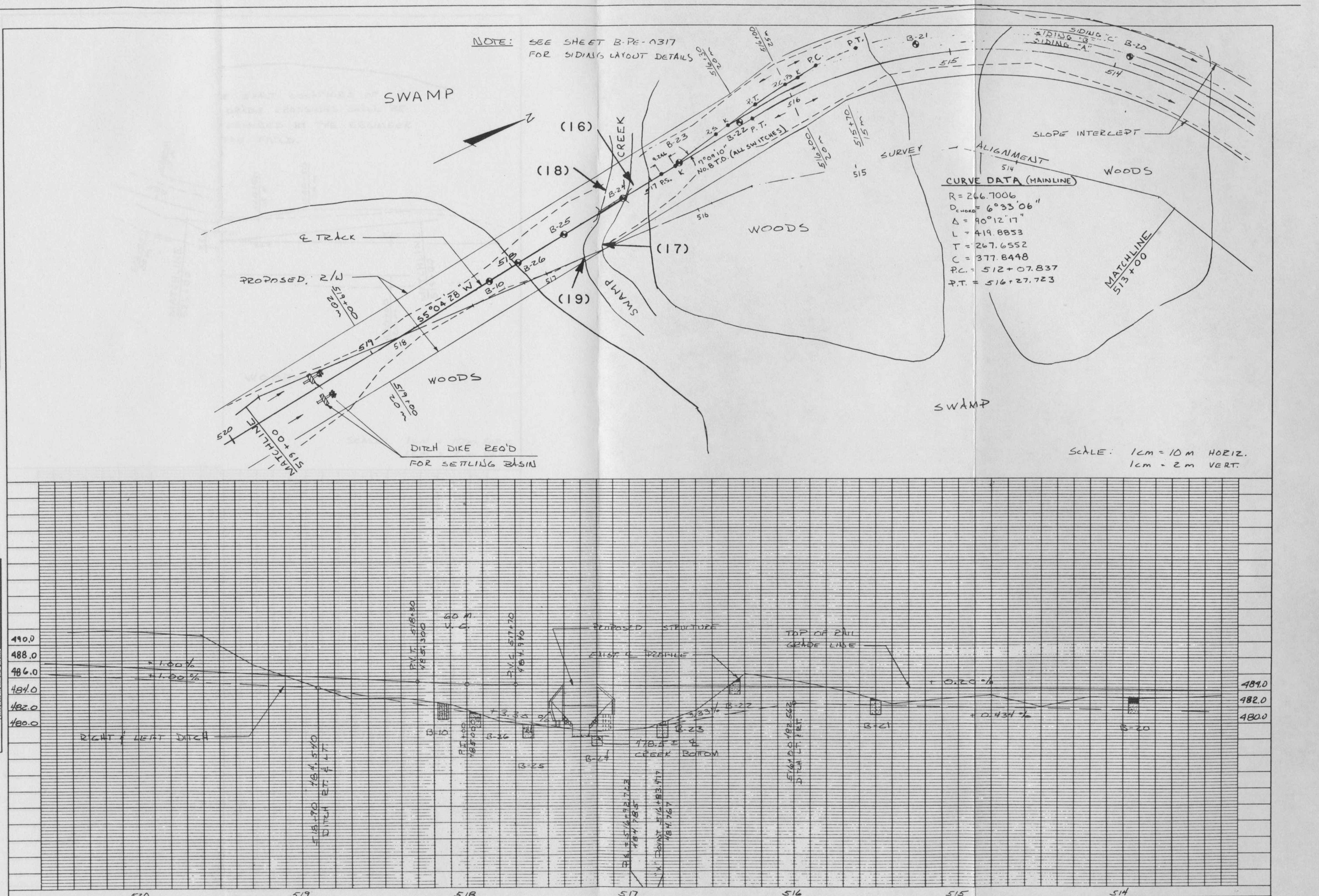
EXXON MINERALS COMPANY

AREA — CO & ST — SCALE FIGURE 003-16 — TITLE PLAN & PROFILE — BY — DATE — FILE NO



PLAN — NOTE BOOK No. — SURVEYED M.S. — PLOTTED M.B. — ALIGNMENT CHECKED J.S. — RT. OF WAY CHECKED — 6-81

PROFILE — NOTE BOOK No. — SURVEYED M.S. — PLOTTED M.B. — GRADES CHECKED J.S. — B.M.'s NOTED — STRUCTURE NOTATIONS CHECKED — 6-81

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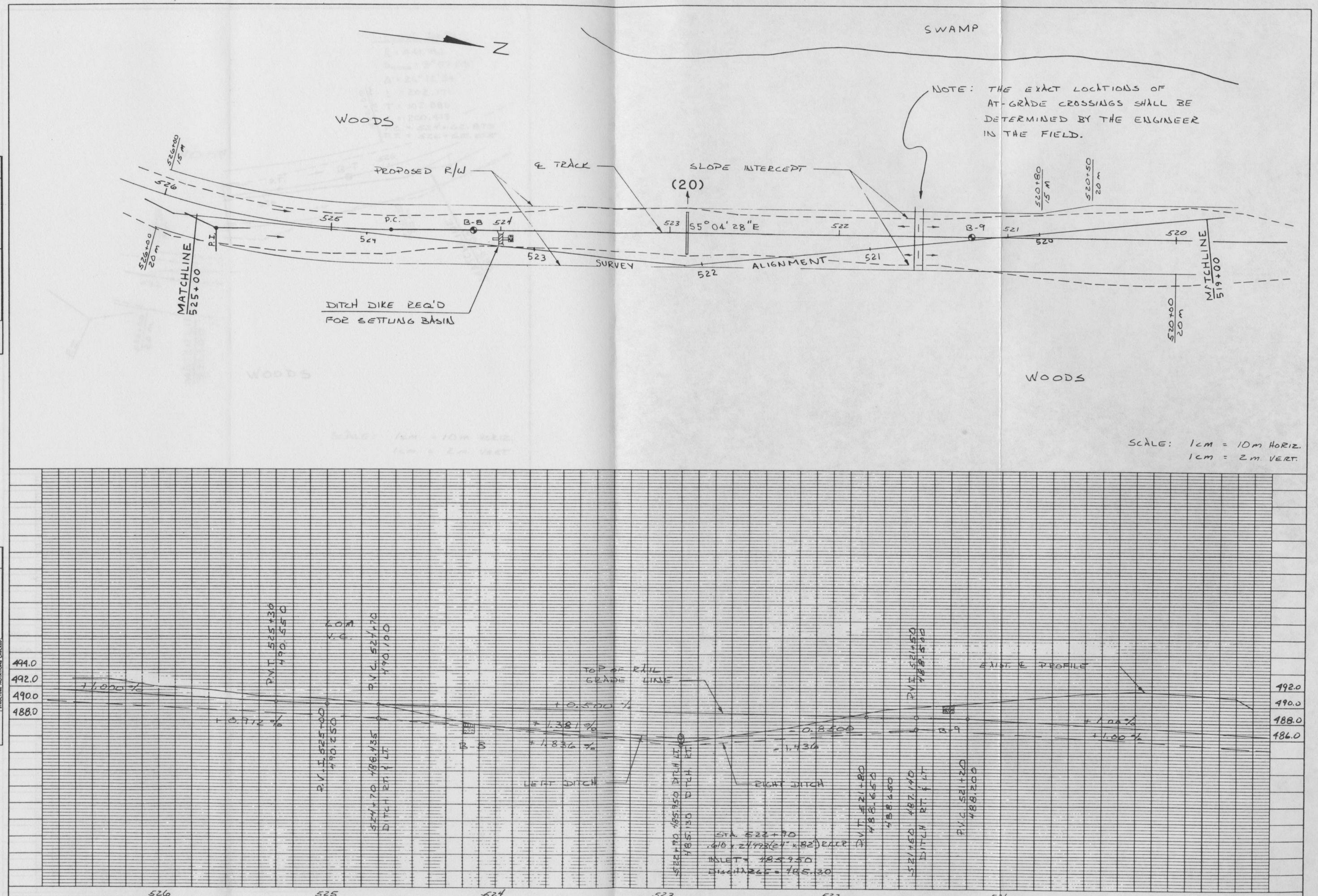
EXXON MINERALS COMPANY

TITLE Plan & Profile

FIGURE 003-17



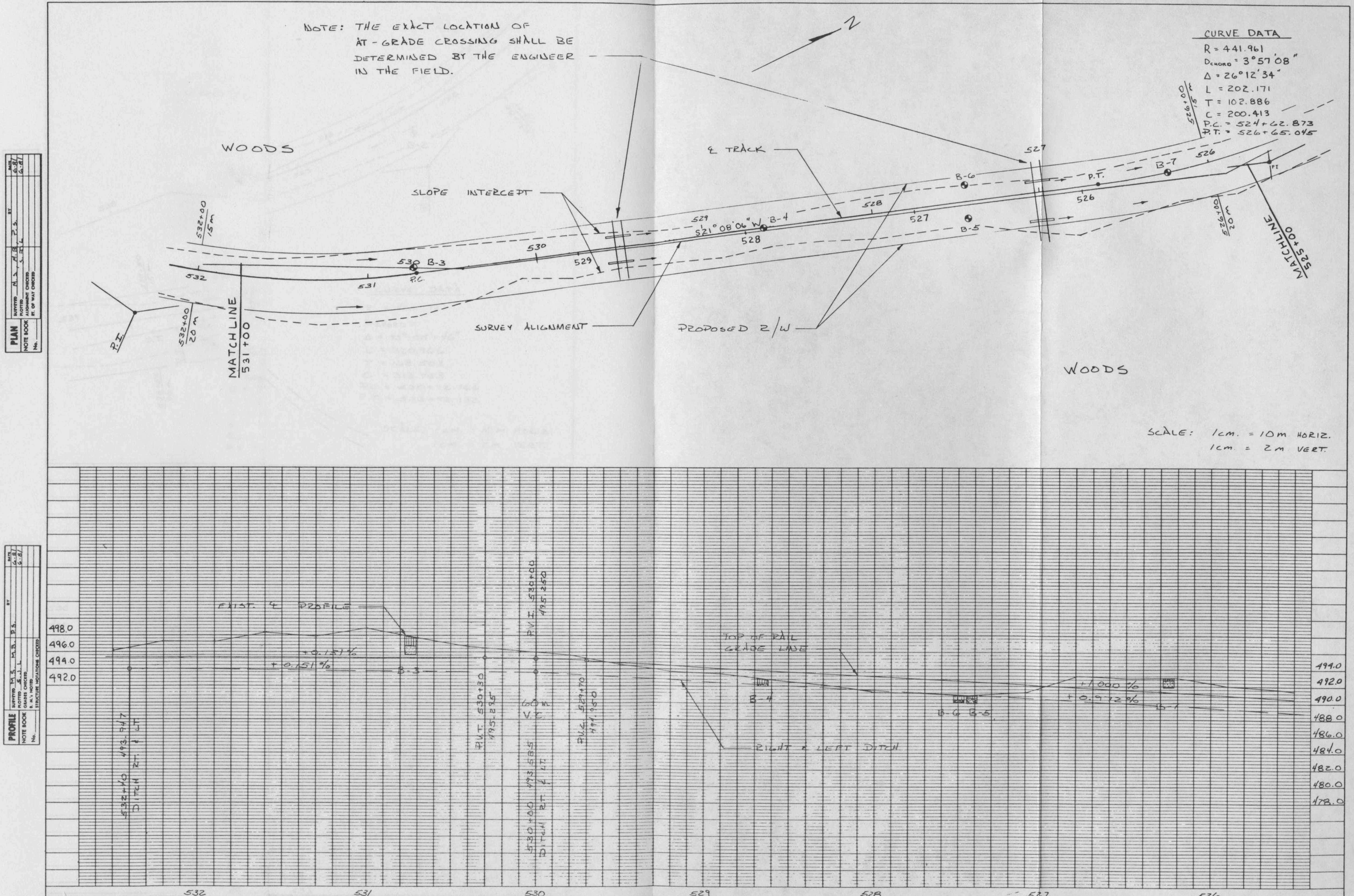
METRIC PLATE 1-SINGLE PLAN AND PROFILE-FULL LINE

Typical Representations: Refinements May Be Made During Final Engineering

EXXON MINERALS COMPANY

TITLE: PLAN & PROFILE

FIGURE 003-18



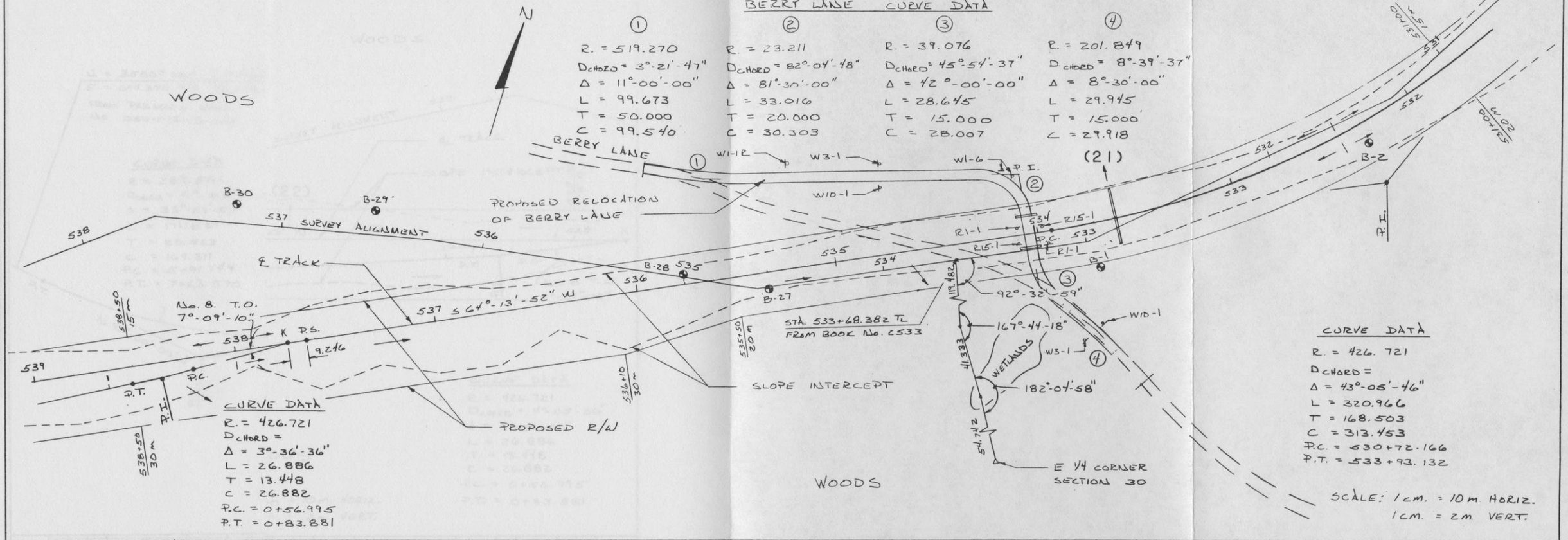
METRIC PLATE 1-SINGLE PLAN AND PROFILE-FULL LINE

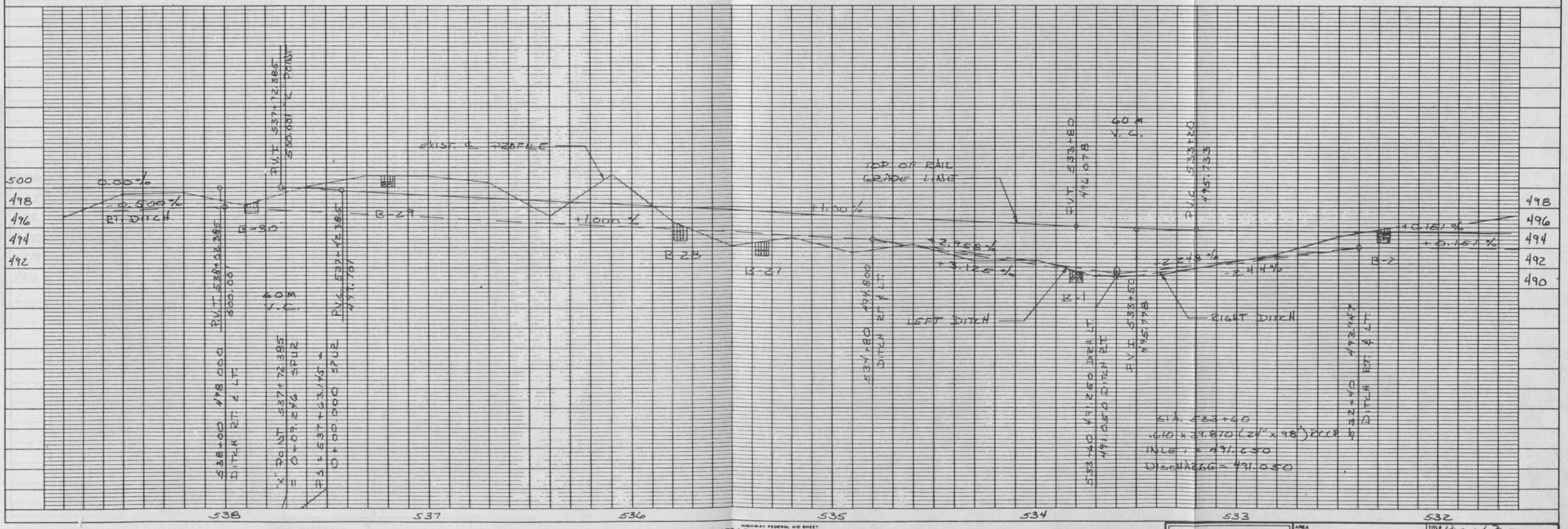
Typical Representations: Refinements May Be Made During Final Engineering

EXXON MINERALS COMPANY

TITLE: PLAN & PROFILE

FIGURE 003-19





METRIC PLATE HIGHWAY FEDERAL AID SHEET 1-SINGLE PLAN AND PROFILE-FULL LINE TELEDYNE PRINTED IN U.S.A.

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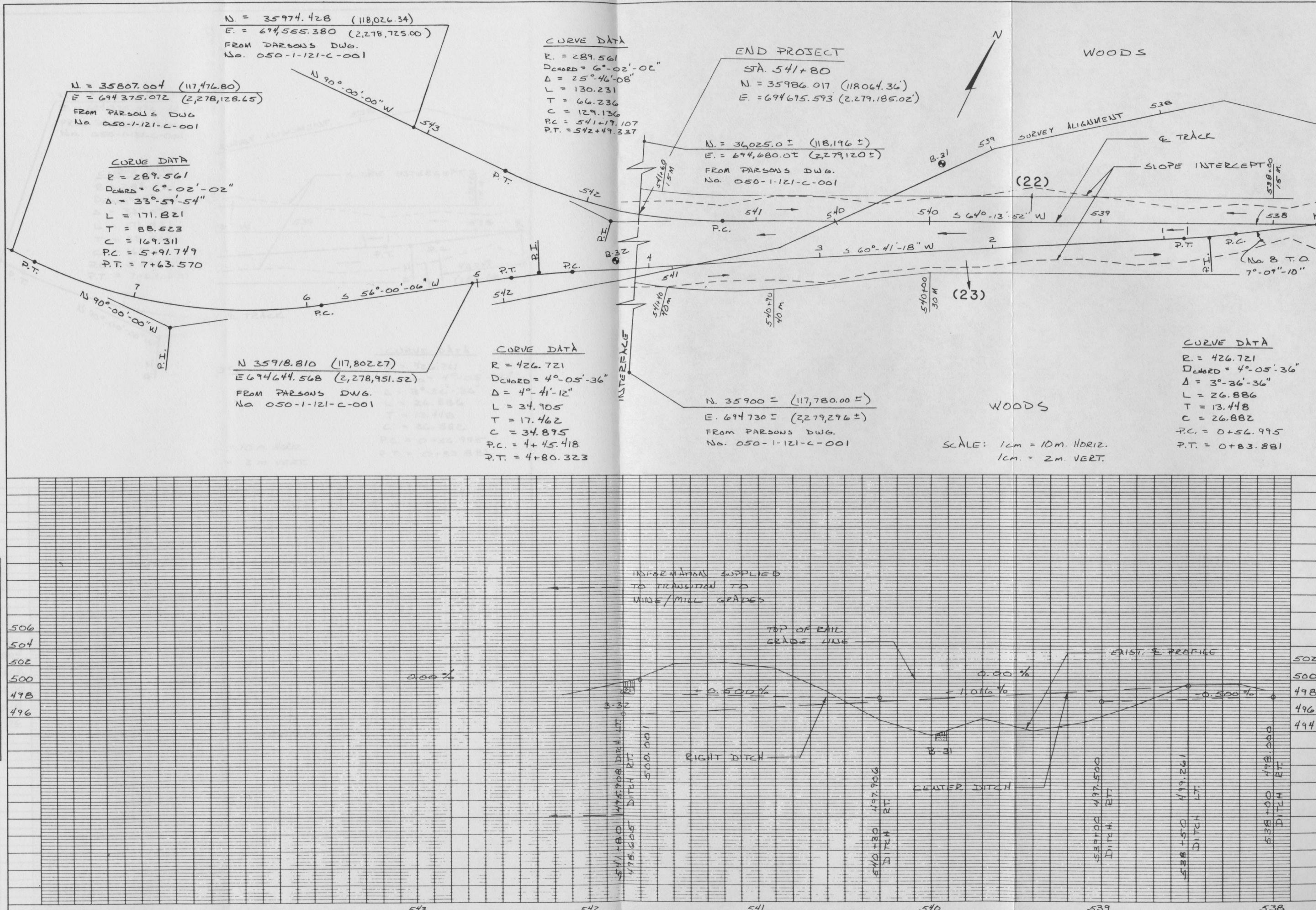
EXXON MINERALS COMPANY

TITLE PLAN & PROFILE

FIGURE 003-20



METRIC PLATE 1-SINGLE PLAN AND PROFILE-FULL LINE

Typical Representations: Refinements May Be Made During Final Engineering

EXXON MINERALS COMPANY

TITLE PLAN & PROFILE

FIGURE 003-21

N. = 35974.428 (118,026.34)
E. = 694555.380 (2,278,725.00)
FROM PARSONS DWG.
No. 050-1-121-C-001

N = 35807.004 (117,476.80)
E. = 694375.072 (2278128.65)
FROM PARSONS DWG
No. 050-1-121-C-001

CURVE DATA
R = 289.561
D_CHORD = 6°-02'-02"
Δ = 33°-59'-54"
L = 171.821
T = 88.523
C = 169.311
P.C. = 5+91.749
P.T. = 7+63.570

N 90°-00'-00" W

N 35918.810 (117,802.27)
E 694644.568 (2,278,951.52)
FROM PARSONS DWG.
No. 050-1-121-C-001

CURVE DATA
R. = 426.721
D_CHORD = 4°-05'-36"
Δ = 4°-41'-12"
L = 34.905
T = 17.462
C = 34.895
P.C. = 4+45.418
P.T. = 4+80.323

CURVE DATA
R. = 289.561
D_CHORD = 6°-02'-02"
Δ = 25°-46'-08"
L = 130.231
T = 66.236
C = 129.136
P.C. = 541+19.107
P.T. = 542+49.337

N. = 36025.0± (118,196±)
E = 694680.0± (2,279,120±)
FROM PARSONS DWG.
No. 050-1-121-C-001

S 56°-00'-06" W

S 64°-13'-52" W

S 60°-41'-18 W

SURVEY ALIGNMENT

SLOPE INTERCEPT

WOODS

WOODS

& TRACK

INTERFACE

END PROJECT
STA. 4+18
N. = 35955.865 (117,965.44')
E. = 694,707.654 (2,279,224.59)

N. 35900± (117,780.00±)
E. 694730± (2279296±)
FROM PARSONS DWG.
No. 050-1-121-C-001

CURVE DATA
R. = 426.721
D. CHORD = 4°-05'-36"
Δ = 3°-36'-36"
L = 26.886
T = 13.448
C = 26.882
P.C. = 0+56.995
P.T. = 0+83.881

SCALE: 1cm. = 10 m. HORIZ.
1cm = 2 m. VERT.

+0.980 %

P.V.I. 4+80.323
505.818

P.V.T. 5+40.323
505.405

P.V.C. 4+60.323
505.818

40 m V.C.

INFORMATION SUPPLIED TO TRANSITION TO NIMSE/MILL GRADE

TOP OF RAIL GRADE LINE

+1.173 %

+1.005 %

EXIST & PROFILE

LEFT DITCH

P.V.I. 0+68.281
508.218

P.V.C. 0+48.281
508.001

P.V.T. 0+88.281
508.001

40 m V.C.

0.00 %

504
502
500
498
496
494

7 6 5 4 3 2 1

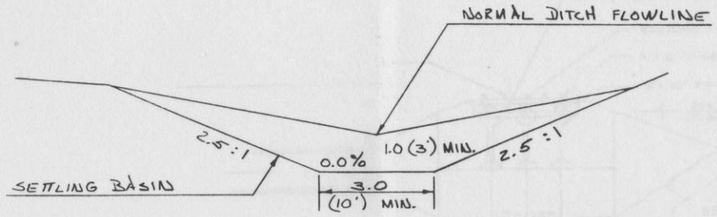
METRIC PLATE 1-SINGLE PLAN AND PROFILE-FULL LINE
HIGHWAY FEDERAL AID SHEET
W. TELEDYNE
PRINTED IN U.S.A.

Typical Representations: Refinements May Be Made During Final Engineering

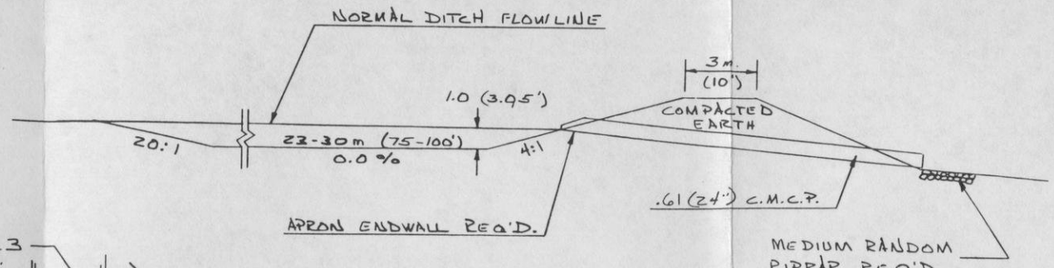
EXXON MINERALS COMPANY

TITLE PLAN & PROFILE
AREA
CO & ST
SCALE
BY
DATE
FILE NO

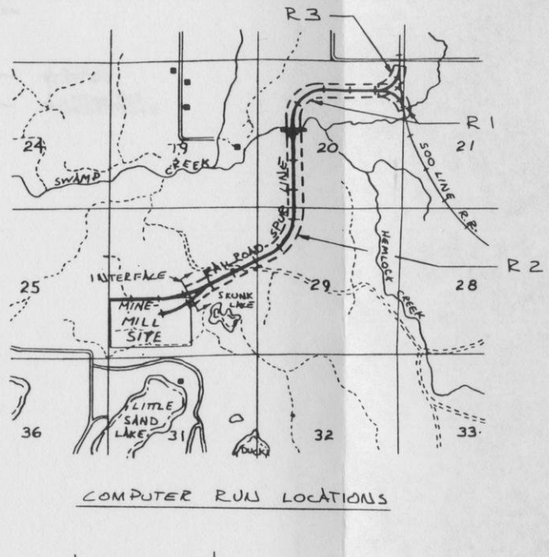
FIGURE 003-22



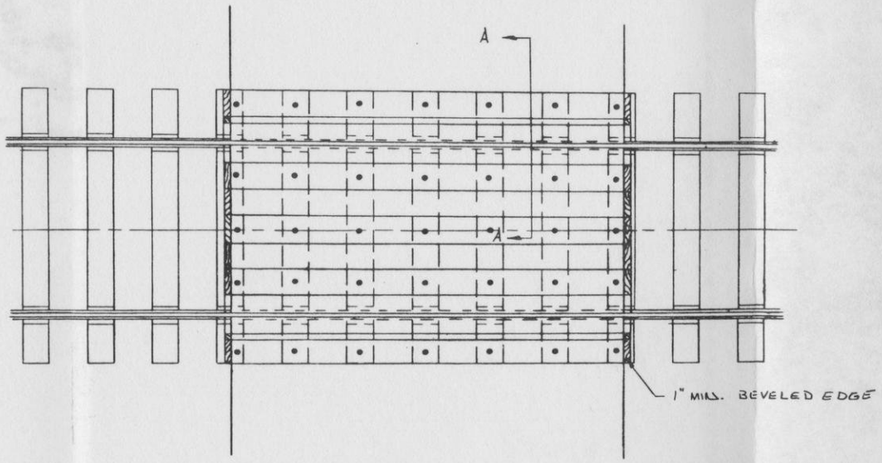
TYPICAL SECTION SETTLING BASIN



SETTLING BASIN DETAIL



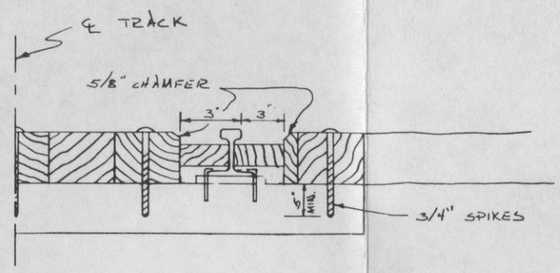
COMPUTER RUN LOCATIONS



TYPICAL AT GRADE WOOD PLANK CROSSING

PLAN

NOTE: ACTUAL WIDTH OF WOOD PLANK CROSSING SHALL BE DETERMINED BY THE ENGINEER IN THE FIELD.



PROFILE
SECTION A-A

TOPSOIL
PEAT OR MUCK
SAND
SAND & GRAVEL
SILT
SILTY SAND & CLAYEY SILT

SOILS LEGEND

Typical Representations: Refinements May Be Made During Final Engineering

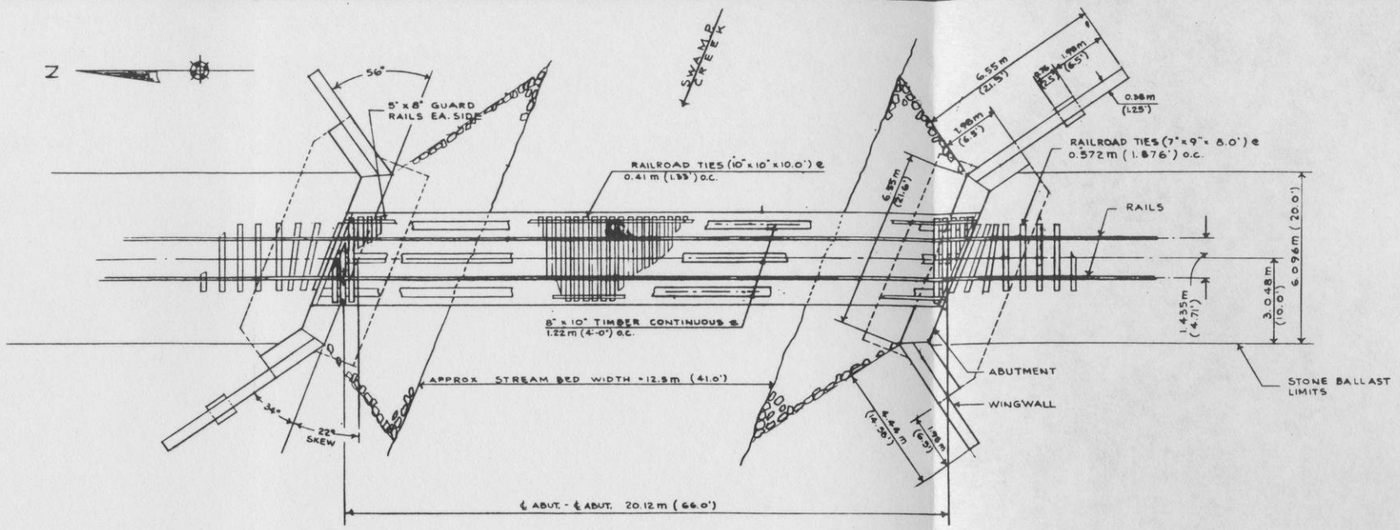
REVISED	DATE	BY	DESCRIPTION

EXXON MINERALS COMPANY
CRANDON PROJECT

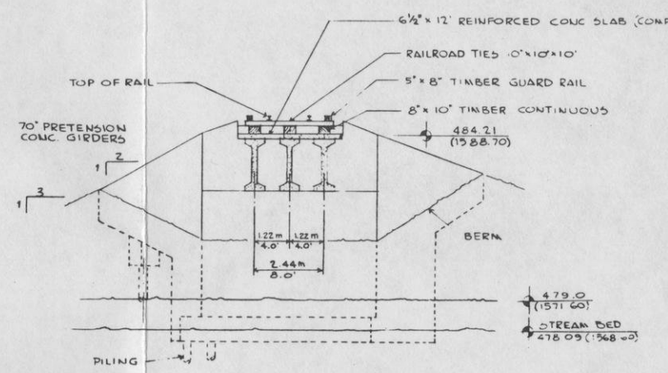
TITLE: MINE/MILL RAILROAD SPUR SPECIAL DETAILS

SCALE NONE	STATE WISCONSIN		COUNTY FOREST		
DRAWN BY M.J.O.	DATE 11/4	CHECKED BY J.M.M., P.R.W.	DATE 12-81		
APPROVED BY P.R.W.	DATE 12-81	APPROVED BY T. J. J.	DATE 12-81		
APPROVED BY	DATE	EXXON	DATE		
DRAWING NO. FIGURE 003-23		SHEET ___ OF ___	REVISION NO		

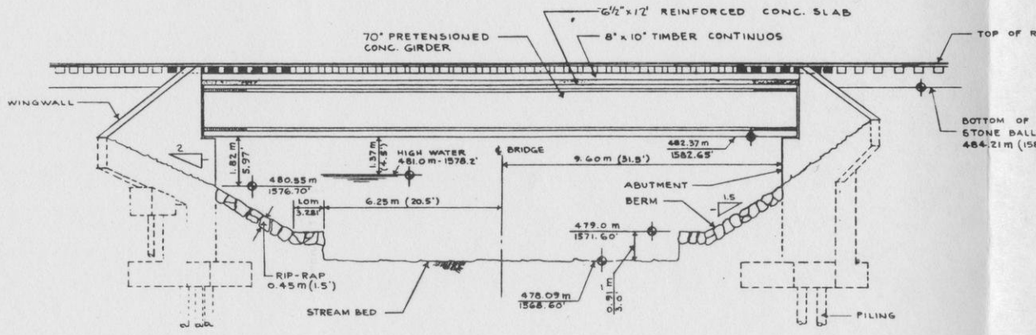
GDS 5/1981



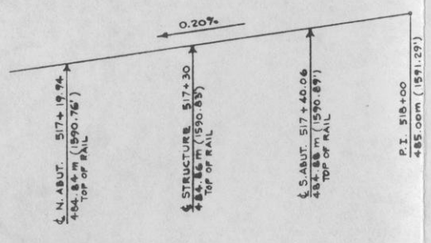
PLAN
1:100
1 CM = 1 METER



TYPICAL SECTION
1:100
1 CM = 1 METER



ELEVATION
1:100
1 CM = 1 METER



PROFILE GRADE LINE

Typical Representations: Refinements May Be Made During Final Engineering

REVISED	DATE	BY	DESCRIPTION

EXXON MINERALS COMPANY
CRANDON PROJECT

TITLE: MINE/MILL RAILROAD SPUR
SWAMP CREEK BRIDGE
GENERAL PLAN

SCALE AS SHOWN	STATE WISCONSIN	COUNTY FOREST	
DRAWN BY H.W	DATE 11-81	CHECKED BY W.A.Y., K.A.E.	DATE 12-81
APPROVED BY K.A.E.	DATE 12-81	APPROVED BY	DATE
APPROVED BY	DATE	EXXON	DATE

DRAWING NO. FIGURE 003-24 | SHEET ___ OF ___ | REVISION NO.

GBB 5/1981

STANDARD FORM C – MANUFACTURING AND COMMERCIAL DISCHARGERS

FOR DEPT. USE

SECTION II. BASIC DISCHARGE DESCRIPTION

Complete this section for each discharge indicated in Section I, Item 9, that is to surface waters. This includes discharges to municipal sewerage systems in which the wastewater does not go through a treatment works prior to being discharged to surface waters. Discharges to wells must be described where there are also discharges to surface waters from this facility. SEPARATE DESCRIPTIONS OF EACH DISCHARGE ARE REQUIRED EVEN IF SEVERAL DISCHARGES ORIGINATE IN THE SAME FACILITY. All values for an existing discharge should be representative of the twelve previous months of operation. If this is a proposed discharge, values should reflect best engineering estimates.

ADDITIONAL INSTRUCTIONS FOR SELECTED ITEMS APPEAR IN SEPARATE INSTRUCTION BOOKLET AS INDICATED. REFER TO BOOKLET BEFORE FILLING OUT THESE ITEMS.

1. Discharge Serial No. and Name		
a. **Discharge Serial No.** (see instructions)	201a	004 (1-6)
b. **Discharge Name** Give name of discharge, if any. (see instructions)	201b	Contingency Mitigation For Surface Waters
c. **Previous Discharge Serial No.** If previous permit application was made for this discharge (see Item 4, Section I), provide previous discharge serial number.	201c	N/A
2. Discharge Operating Dates		
a. **Discharge Began Date** If the discharge described below is in operation, give the date (within best estimate) the discharge began.	202a	N/A (YR MO)
b. **Discharge to Begin Date** If the discharge has never occurred but is planned for some future date, give the date (within best estimate) the discharge will begin.	202b	(YR MO) (See Additional Information)
c. **Discharge to End Date** If discharge is scheduled to be discontinued within the next 5 years, give the date (within best estimate) the discharge will end.	202c	N/A (YR MO)
3. Engineering Report Available Check if an engineering report is available to reviewing agency upon request. (see instructions)	203	☒ X (See Additional Information)

4. Discharge Location Name the political boundaries within which the point of discharge is located.

			For Dept. Use	
State	204a	Wisconsin	204d	
County	204b	Forest	204e	
(if applicable) City or Town	204c	--	204f	

5. Discharge Point Description Discharge is into (check one): (see instructions)

Stream (includes ditches, arroyos, and other intermittent watercourses)	205a	☒ X STR (See Item 207a)
Lake		☒ LKE
Ocean		☐ OCE
Municipal Sanitary Wastewater Transport System		☐ MTS
Municipal Combined Sanitary and Storm Transport System		☐ MCS

This section contains 9 pages.

DISCHARGE SERIAL NUMBER

004

FOR DEPT. USE

Municipal Storm Water Transport System ☐ STS

Well (Injection) ☐ WEL

Other ☐ OTH

If 'other' is checked, specify 208b _____

6. **Discharge Point — Lat/Long** Give the precise location of the point of discharge to the nearest second.

Latitude 206a ____DEG ____MIN ____SEC

Longitude 206b ____DEG ____MIN ____SEC (See Additional Information)

7. **Discharge Receiving Water Name** Name the waterway at the point of discharge.(see instructions) 207a Hoffman Spring, Swamp Creek, Creek 12-7, Martin Spring and Skunk Lake

If the discharge is through an outfall that extends beyond the shoreline or is below the mean low water line, complete Item 8.

207b

For Dept. Use			207c	For Dept. Use
Major	Minor	Sub		303e

8. **Offshore Discharge**

a. **Discharge Distance from Shore** 208a N/A feet

b. **Discharge Depth Below Water Surface** 208b N/A feet

9. **Discharge Type and Occurrence**

a. **Type of Discharge** Check whether the discharge is continuous or intermittent. (see instructions) 209a ☐ (con) Continuous ☒ (int) Intermittent (See Additional Information)

b. **Discharge Occurrence Days per Week** Enter the average number of days per week (during periods of discharge) this discharge occurs. 209b N/A days per week

c. **Discharge Occurrence** —Months If this discharge normally operates (either intermittently, or continuously) on less than a year-around basis (excluding shutdowns for routine maintenance), check the months during the year when the discharge is operating. (see instructions) 209c ☐ JAN ☐ FEB ☐ MAR ☐ APR ☐ MAY ☐ JUN ☐ JUL ☐ AUG N/A ☐ SEP ☐ OCT ☐ NOV ☐ DEC

Complete Items 10 and 11 if "Intermittent" is checked in Item 9.a. Otherwise, proceed to Item 12.

10. **Intermittent Discharge Quantity** State the average volume per discharge occurrence in thousands of gallons. 210 N/A thousand gallons per discharge occurrence.

11. **Intermittent Discharge Duration and Frequency**

a. **Intermittent Discharge Duration Per Day** State the average number of hours per day the discharge is operating. 211a N/A hours per day

b. **Intermittent Discharge Frequency** State the average number of discharge occurrences per day during days when discharging. 211b N/A discharge occurrences per day

12. **Maximum Flow Period** Give the time period in which the maximum flow of this discharge occurs. 212 From N/A month to N/A month

DISCHARGE SERIAL NUMBER

004

FOR DEPT. USE

13. Activity Description Give a narrative description of activity producing this discharge.(see instructions)

213a

These six discharges are provided as a contingency for hydrological impacts that may occur to surface waters due to mine dewatering. These discharges would provide supplementary water to springs, creeks, and a lake to mitigate the effect that ground water drawdown may have on these surface waters.

Discharge points 004-1, 004-2, 004-3, 004-4 and 004-5 will be discharging ground water from wells constructed in accordance with NR 115. The discharge water lines will be constructed out of non-reactive piping. The discharge of the pumped ground water into the stream or spring will be done in a manner so as not to create any turbidity. Consequently, the schedules requested in Items 16 and 17 have not been completed because polluted water is not being discharged.

Discharge 004-6 is described under Item 15 below.

14. Activity Causing Discharge For each SIC Code which describes the activity causing this discharge, supply the type and maximum amount of either the raw material consumed (Item 14a) or the product produced (Item 14b) in the units specified in Table I of the Instruction Booklet. For SIC Codes not listed in Table I, use raw material or production units normally used for measuring production.(see instructions)

a. Raw Materials

214a

SIC Code (1)	Name (2)	Maximum Amount/Day (3)	Unit (See Table I) (4)	Shared Discharges (Serial Number) (5)
1021	Copper Ores	8,200*	STPD**	None
1031	Lead and Zinc Ores	Design Capacity		

b. Products

214b

SIC Code (1)	Name (2)	Maximum Amount/Day (3)	Unit (See Table I) (4)	Shared Discharges (Serial Number) (5)
1021	Copper Concentrates	210	STPD**	None
1031	Lead and Zinc Concentrates	1,536	STPD**	
	(Product exits	process as metal sulfide		concentrates.)

*8,200 STPD is the design production rate of the zinc, copper, and lead ore. Annual production expressed as a daily average is 7,400 STPD.

**Short tons per day.

DISCHARGE SERIAL NUMBER
004

FOR DEPT. USE

15. Waste Abatement

a. Waste Abatement Practices Describe the waste abatement practices used on this discharge with a brief narrative. (see instructions)

215a

Narrative: The water discharged to Hoffman Spring (004-1), Creek 12-9 (004-2), Swamp Creek (004-3 and 004-4) and Martin Spring (004-5) would be supplied from wells near each discharge location. No treatment of this water would occur prior to discharge. The water discharged to Skunk Lake (004-6) would be treated mine water. This water would be the same as the water discharged to Swamp Creek (001). The treatment methods used and the composition of the treated mine water have been described in detail in Discharge 001.

215b

b. Waste Abatement Codes Using the codes listed in Table II of the Instruction Booklet, describe the waste abatement processes for this discharge in the order in which they occur if possible.

(1) _____, (2) _____, (3) _____,

(4) _____, (5) _____, (6) _____,

(7) _____, (8) _____, (9) _____,

(10) _____, (11) _____, (12) _____,

(13) _____, (14) _____, (15) _____,

(16) _____, (17) _____, (18) _____,

(19) _____, (20) _____, (21) _____,

(22) _____, (23) _____, (24) _____,

(25) _____.

DISCHARGE SERIAL NUMBER

004

FOR DEPT. USE

16. Wastewater Characteristics (See Item 13)

Check the box beside each constituent which is present in the effluent (discharge water). This determination is to be based on actual analysis or best estimate.(see instructions)

Parameter 216	Present	Parameter 216	Present
Color 00080		Copper 01042	
Ammonia 00610		Iron 01045	
Organic nitrogen 00605		Lead 01051	
Nitrate 00620		Magnesium 00927	
Nitrite 00615		Manganese 01055	
Phosphorus 00665		Mercury 71900	
Sulfate 00945		Molybdenum 01062	
Sulfide 00745		Nickel 01067	
Sulfite 00740		Selenium 01147	
Bromide 71870		Silver 01077	
Chloride 00940		Potassium 00937	
Cyanide 00720		Sodium 00929	
Fluoride 00951		Thallium 01059	
Aluminum 01105		Titanium 01152	
Antimony 01097		Tin 01102	
Arsenic 01002		Zinc 01092	
Beryllium 01012		Algicides* 74051	
Barium 01007		Chlorinated organic compounds* 74052	
Boron 01022		Pesticides* 74053	
Cadmium 01027		Oil and grease 00550	
Calcium 00916		Phenols 32730	
Cobalt 01037		Surfactants 38260	
Chromium 01034		Chlorine 50060	
Fecal coliform bacteria 74055		Radioactivity* 74050	

*Specify substances, compounds and/or elements in Item 26.

DISCHARGE SERIAL NUMBER

004

FOR DEPT. USE

17. Description of Intake and Discharge (See Item 13)

For each of the parameters listed below, enter in the appropriate box the value or code letter answer called for.(see instructions)

In addition, enter the parameter name and code and all required values for any of the following parameters if they were checked in Item 16; ammonia, cyanide, aluminum, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, phenols, oil and grease, and chlorine (residual).

Parameter and Code 217a	Influent		Effluent					
	Untreated Intake Water (Daily Average) (1)	In-Plant Treated Intake Water (Daily Average) (2)	Daily Average (3)	Minimum Value Observed or Expected During Discharge Activity (4)	Maximum Value Observed or Expected During Discharge Activity (5)	Frequency of Analysis (6)	Number of Analyses (7)	Sample Type (8)
Flow* Gallons per day 00056								
pH Units 00400			X					
Temperature (winter) ° F 74028								
Temperature (summer) ° F 74027								
Biochemical Oxygen Demand (BOD 5-day) mg/l 00310								
Chemical Oxygen Demand (COD) mg/l 00340								
Total Suspended (nonfilterable) Solids mg/l 00530								
Specific Conductance micromhos/cm at 25° C 00095			X					
Settleable Matter (residue) ml/l 00545								

*Other discharges sharing intake flow (serial numbers).(see instructions)

DISCHARGE SERIAL NUMBER
004

FOR DEPT. USE

17. (Cont'd.)

Parameter and Code 217a	Influent		Effluent					
	Untreated Intake Water (Daily Average) (1)	In-Plant Treated Intake Water (Daily Average) (2)	Daily Average (3)	Minimum Value Observed or Expected During Discharge Activity (4)	Maximum Value Observed or Expected During Discharge Activity (5)	Frequency of Analysis (6)	Number of Analyses (7)	Sample Type (8)

18. **Plant Controls** Check if the following plant controls are available for this discharge. 218

Alternate power source for major pumping facility. ☐ APS N/A

Alarm or emergency procedure for power or equipment failure ☐ ALM

Complete item 19 if discharge is from cooling and/or steam water generation and water treatment additives are used.

19. **Water Treatment Additives** If the discharge is treated with any conditioner, inhibitor, or algicide, answer the following:

a. Name of Material(s) 219a — No water treatment additives will be used for the well water discharge. The additives used in the treatment of mine water are described in Section II Discharge 001.

b. Name and address of manufacturer 219b

c. Quantity (pounds added per million gallons of water treated). 219c — N/A

DISCHARGE SERIAL NUMBER
004

FOR DEPT. USE

d. Chemical composition of these additives (see instructions). 219d — N/A

Complete items 20-25 if there is a thermal discharge (e.g., associated with a steam and/or power generation plant, steel mill, petroleum refinery, or any other manufacturing process) and the total discharge flow is 10 million gallons per day or more. (see instructions)

20. Thermal Discharge Source Check the appropriate item(s) indicating the source of the discharge. (see instructions) — 220 — N/A

- Boiler Blowdown — ☐ BLBD
- Boiler Chemical Cleaning — ☐ BCCL
- Ash Pond Overflow — ☐ APOF
- Boiler Water Treatment — Evaporator Blowdown — ☐ EPBD
- Oil or Coal Fired Plants — Effluent from Air Pollution Control Devices — ☐ OCFP
- Condense Cooling Water — ☐ COND
- Cooling Tower Blowdown — ☐ CTBD
- Manufacturing Process — ☐ MFPR
- Other — ☐ OTHR

21. Discharge/Receiving Water Temperature Difference — N/A

Give the maximum temperature difference between the discharge and receiving waters for summer and winter operating conditions. (see instructions)

Summer — 221a — _____ °F.

Winter — 221b — _____ °F.

22. Discharge Temperature, Rate of Change Per Hour — 222 — N/A °F./hour

Give the maximum possible rate of temperature change per hour of discharge under operating conditions. (see instructions)

23. Water Temperature, Percentile Report (Frequency of Occurrence) — N/A

In the table below, enter the temperature which is exceeded 10% of the year, 5% of the year, 1% of the year and not at all (maximum yearly temperature). (see instructions)

Frequency of occurrence

		10%	5%	1%	Maximum
a.	Intake Water Temperature (Subject to natural changes) 223a	°F	°F	°F	°F
b.	Discharge Water Temperature 223b	°F	°F	°F	°F

24. Water Intake Velocity (see instructions) — 224 — N/A feet/sec.

25. Retention Time Give the length of time, in minutes, from start of water temperature rise to discharge of cooling water. (see instructions) — 225 — N/A minutes

Item 26. Additional Information

Item 202b. These discharges will begin only if specified triggering mechanisms indicate that supplementary water flow to the described surface waters is required. Each of the six discharges (004-1 through 004-6) described in this section has criteria which must be met in order to initiate the discharge. These criteria include ground water level as measured at designated sites and lake or spring level or stream flow rate. These triggering mechanisms are described in detail in "High Capacity Well Approval Applications" (Exxon Minerals Company, December 1985).

Based on hydrological studies, it is not expected that steady state mine inflow will be reached until Project Years 6-8. Hence, ground water drawdown will occur very slowly, and it is likely that these contingency discharges will not be required during the time period covered by this permit application, if at all.

Item 203. Detailed information on the contingency mitigation is described in "High Capacity Well Approval Applications" (Exxon Minerals Company, December 1985).

Item 206a. The locations of the six discharges covered by this permit section are shown in Section I, Figure 1. They are also shown in more detail in Figures 004-1 through 004-6.

Item 26. Additional Information (continued)

Item 206a. Springs/Creeks

(continued) As shown in Table 1, the discharge of well water to Hoffman Spring [004(1)] would be continuous at 50 gpm if the triggering point is reached. The location of the well (C-1) and the discharge location are shown in Figure 004-1. The details on the well diameter and depth and the discharge pipeline diameter and length for this discharge for this well and the other four well discharges are shown in Table 2.

The effluent quality required for discharge into each of the springs and creeks was presented in a letter from the DNR to EMC October, 1985 (B. Baker and R. Roden to B. J. Hansen). Comparison of the expected well water quality to the water quality limits indicated that there would be no problem meeting the limitations for each spring/creek.

The discharge to Creek 12-9 [004(2)] would come from well C-2 at a rate of 200 gpm on an intermittent basis depending on the stream flow rate. the location of the well and discharge are shown in Figure 004-2.

The discharges to Swamp Creek [004(3) and 004(4)] would come from wells C-3 and C-4, respectively, both at a rate of 375 gpm on an intermittent basis depending on the stream flow rate. The locations of these wells and discharges are shown in Figures 004-3 and 004-4.

Item 26. Additional Information (continued)

Item 206a. (continued)

TABLE 1

PROJECTED WATER SUPPLEMENTS FOR PROJECT AREA
SPRINGS, CREEKS AND LAKES

DISCHARGE 004-	WATER BODY	FLOW (gpm)	DURATION	WATER TYPE
1	Hoffman Spring/Creek	50	Continuous	Well
2	Creek 12-9	200	Intermittent[a]	Well
3	Swamp Creek	375	Intermittent[a]	Well
4	Swamp Creek	375	Intermittent[a]	Well
5	Martin Spring/Creek	25	Continuous	Well
6	Skunk Lake	25	Continuous	Treated Mine[b] Water

[a]Based on a flow measurement.

[b]See Section II - Discharge 001 for additional water quality details.

Item 26. Additional Information (continued)

Item 206a. (continued)

TABLE 2

CONTINGENCY WELL AND DISCHARGE SYSTEM INFORMATION

DISCHARGE 004-	SPRING/CREEK	WELL NUMBER	WELL DIAMETER (inches)	WELL DEPTH (feet)	DISCHARGE PIPELINE DIAMETER (inches)	DISCHARGE PIPELINE LENGTH (feet)
1	Hoffman Spring/Creek	C-1	6	100	3	1,800
2	Creek 12-9	C-2	8	75	4	100
3	Swamp Creek	C-3	10	40	6	380
4	Swamp Creek	C-4	10	45	6	350
5	Martin Spring/Creek	C-5	6	30	2	1,250

Item 26. Additional Information (continued)

Item 206a. Springs/Creeks

(continued) The discharge to Martin Spring [004(5)] would come from well C-5. This discharge would be continuous at 25 gpm once the triggering point is reached. The location of well C-5 and the discharge location are shown in Figure 004-5

The typical discharge structure for each of the spring or creek discharges will consist of a small concrete headwall, a short length of 8-12 inch diameter discharge pipe, and protective stone riprap.

Skunk Lake

The discharge to Skunk Lake [004(6)] will begin if the triggering point is reached. The water supplement would be continuous at 25 gpm unless the lake elevation goes above a prescribed point, at which time the supplement will be temporarily interrupted.

The treated mine water which would be discharged, when required, to Skunk Lake has been described in detail in Section II, Discharge 001. This section includes description of the treatment methods to be used and the range of discharge compositions expected under the various conditions.

Item 26. Additional Information (continued)

Item 206a. (continued) For the addition of water to Skunk Lake, a 3-inch diameter pipeline will be installed from the mine/mill site to a discharge structure located at the southern end of the wetland southeast of the lake, as shown in Figure 004-6. The discharge structure will drain into a rip-rap channel leading into the wetland.

EXXON MINERALS COMPANY.
CRANDON PROJECT

TITLE
CONTINGENCY SYSTEM FOR HOFFMAN SPRING & HOFFMAN CREEK DISCHARGE 004(1)

SCALE	STATE	COUNTY	
SHOWN	WISCONSIN	FOREST	
DRAWN BY: DR SPRINGBORN	DATE: 8/85	CHECKED BY: C.C. Schocan	DATE: 1-16-86
APPROVED BY	DATE	APPROVED BY: G.G. Demarte	DATE: 1-16-86
APPROVED BY	DATE	EXXON	DATE
DRAWING NO.		SHEET ___ OF ___	REVISION NO.

FIGURE 004-1

LITTLE SAND LAKE

MIHALKO LAND & LOGGING

DHUEY

POWER LINE

P. RENKUS

WELL C-2

DISCHARGE 004(2)

100' 4" Ø WATER LINE

CONSOLIDATED PAPERS

N

LANGLADE COUNTY

12-9

CREEK

WISCONSIN TIMBER ASSOCIATES

400 0 400 800

scale feet

EXXON MINERALS COMPANY

CRANDON PROJECT

TITLE

CONTINGENCY SYSTEM FOR CREEK 12-9, DISCHARGE 004(2)

SCALE	STATE	COUNTY	
SHOWN	WISCONSIN	FOREST	
DRAWN BY: DR SPRINGBORN	DATE: 8/85	CHECKED BY: C.C. Schroeder	DATE: 1-15-86
APPROVED BY:	DATE:	APPROVED BY: J.A. DeMonte	DATE: 1-15-86
APPROVED BY:	DATE:	EXXON	DATE:
DRAWING NO.		SHEET ___ OF ___	REVISION NO.

FIGURE 004-2

EXXON MINERALS COMPANY
CRANDON PROJECT

TITLE
CONTINGENCY SYSTEM FOR SWAMP CREEK, DISCHARGE 004(3)

SCALE	STATE	COUNTY
SHOWN	WISCONSIN	FOREST

DRAWN BY	DATE	CHECKED BY	DATE
DR SPRINGBORN	8/85	G.C. Schroeder	1-15-86
APPROVED BY	DATE	APPROVED BY	DATE
		J.H. LaMarche	1-15-86
APPROVED BY	DATE	EXXON	DATE

DRAWING NO. **FIGURE 004-3** SHEET OF REVISION NO.

EXXON MINERALS COMPANY
CRANDON PROJECT

TITLE
CONTINGENCY SYSTEM FOR SWAMP CREEK, DISCHARGE 004(4)

SCALE	STATE	COUNTY	
SHOWN	WISCONSIN	FOREST	
DRAWN BY: DR SPRINGBORN	DATE: 8/85	CHECKED BY: C.C. Schweden	DATE: 1-15-86
APPROVED BY	DATE	APPROVED BY: J.D. Bernarte	DATE: 1-15-86
APPROVED BY	DATE	EXXON	DATE
DRAWING NO. FIGURE 004-4		SHEET ____ OF ____	REVISION NO.

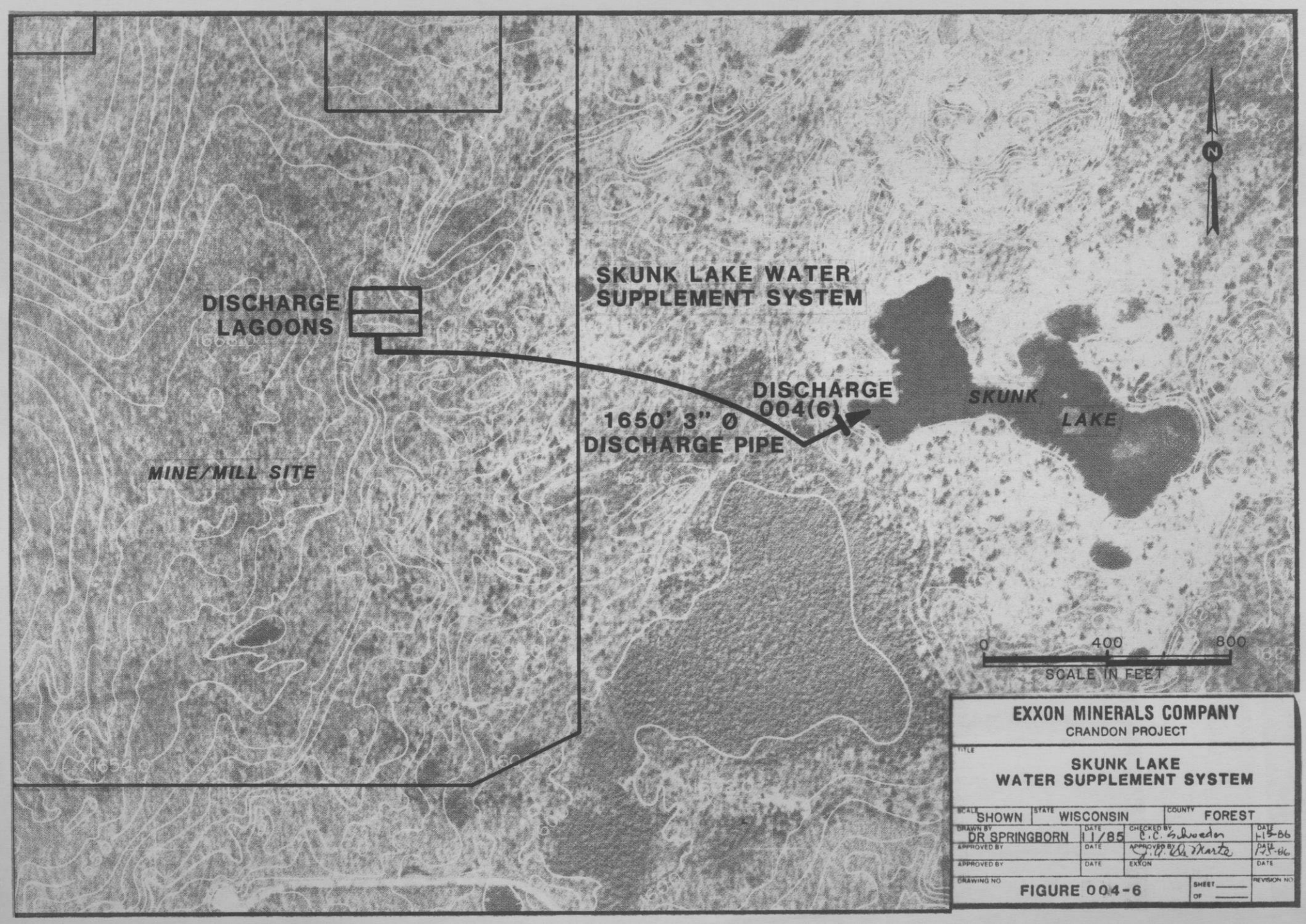
EXXON MINERALS COMPANY
CRANDON PROJECT

TITLE
CONTINGENCY SYSTEM FOR MARTIN SPRING & CREEK 11-4 DISCHARGE 004(5)

SCALE	STATE	COUNTY
SHOWN	WISCONSIN	FOREST

DRAWN BY	DATE	CHECKED BY	DATE
DR SPRINGBORN	8/85	C.C. Schroeder	1-16-86
APPROVED BY	DATE	APPROVED BY	DATE
		G.W. DeMarte	1-16-86
APPROVED BY	DATE	EPSON	DATE

DRAWING NO. **FIGURE 004-5** SHEET ___ OF ___ REVISION NO.



EXXON MINERALS COMPANY
CRANDON PROJECT

TITLE
SKUNK LAKE
WATER SUPPLEMENT SYSTEM

SCALE	STATE	COUNTY
SHOWN	WISCONSIN	FOREST

DRAWN BY	DATE	CHECKED BY	DATE
DR SPRINGBORN	11/85	C.C. Schweder	1-13-86
APPROVED BY	DATE	APPROVED BY	DATE
		J.G. DeMarte	1-13-86
APPROVED BY	DATE	EXXON	DATE

DRAWING NO
FIGURE 004-6

SHEET ____ OF ____

REVISION NO