6.8.7.1 (Continued)

Analyzer Buildings are located in the process areas and contain process analyzers and their supporting sampling systems.

These buildings house the automatic process analyzers and associated sampling systems. Nine structures of this type are provided.

(5) Substation Buildings

The Substation Buildings house switch gear, test cables, panels, and circuit breakers.

The buildings are composed of an elevated reinforced concrete slab supported on concrete columns. The bearing walls are constructed of concrete masonry blocks. The roof is constructed of a metal deck with concrete fill.

6.8.7.2 BUILDING DESIGN

(1) Building List

The following is a compilation of the permanent facility buildings. The construction type referred to in the building list is described in a later section.

6.8.7.2 (Continued)

ADMINISTRATION BUILDINGS

Unit	Building Name	Constr. Type	Approx. Size	No. Req'd	Total Area (Sq. Ft.)
61	Administration Building	1	80x320x28 (2 story)	1	51,200
61	Cafeteria	1	100x102x15	1	9,000
61	Laboratory	1	54x164x15	1	8,196
61	Change Room	1	50x95x12	1	4,750
61	Fire House	1	50x80x20	1	4,000
61	First Aid	1	50x40x12	1	2,000
61	Guard House	1	10x30x12	1	300

MAINTENANCE BUILDINGS

Unit	Building Name	Constr. Type	Approx. Size	No. Req'd	Total Area (Sq. Ft.)
61	Warehouse Trade Shops	2	160x500x25	1	80,000
61	Paint Storage	2	40x60x15	1	2,400
61	Chemical Storage	2	50x50x15	1	2,500

6.8.7.2 (Continued)

PROCESS BUILDINGS

Unit	Building Name	Constr. Type	Approx. Size	No. Req'd	Total Area (Sq. Ft.)
02	Screening Bldg.	2	30x50x30	1	1,500
10	Lock Gas Compressor Bldg.	2	50x100x50	1	5,000
13	Refr., Process Compressor Bldg.	2	55x50x50	2	5,500
21	MeOH Synthesis Bldg.	2	25x50x30	1	1,250
23	SNG Compression Bldg.	2	140x45x50	1	6,300
23	Odorant Bldg.	2	30x50x10	1	1,500
40	Air Compressor Bldg.	2	50x75x50	1	3,750
41	Steam Gen. Bldg.	2	75x105x250	3	23,625
41	Coal Handling Bay	2	65x510x100	1	33,150
42	Turbine Bldg.	2	80x550x100	1	44,000
43	Flue Gas Desulfurization	2	28x130x50	1	3,640
44/45	Raw Water & BFW Treating Bldg.	2	240x390x25	1	93,600
46	Air Compressor Bldg.	2	40x80x30	1	3,200
47	Chlorination Bldg.	3	30x100x10	2	6,000
48	Process Cooling Tower Make-up Water Treatment	2	140x410x30	1	57,400

6.8.7.2 (Continued)

PROCESS BUILDINGS

Unit	Building Name	Constr. Type	Approx. Size	No. Req'd	Total Area (Sq. Ft.)
48	Chlorination Bldg.	2	30x100x10	1	3,000
51	Fire Wtr. Pump Bldg.	2	40x150x30	1	6,000
54	Waste Water Bldg.	1	80x260x25	1	20,800
55	Ammonia Compression	2	50x150x30	1	7,500

CONTROL FACILITIES

Unit	Building Name	Constr. Type	Approx. Size	No. Req'd	Total Area (Sq. Ft.)
61	Control Bldg.	3	120x150x18	1	16,800

NOTE: Control Building is designed to be blast resistant.

01/02/ 03/10	Control Shelter	2	12x50x12	3	1,800
11	Control Shelter	2	12x50x12	1	600
12/14	Control Shelter	2	12x30x12	2	720

6.8.7.2 (Continued)

CONTROL FACILITIES

Unit	Building Name	Constr. Type	Approx. Size	No. Req'd	Total Area (Sq. Ft.)
13	Control Shelter	2	12x50x12	2	1,200
15/16/21/24/25	Control Shelter	2	12x50x12	1	600
17/18	Control Shelter	2	12x30x12	2	720
19/20	Control Shelter	2	12x40x12	2	960
22/23/55	Control Shelter	2	12x50x12	1	600
40/46	Control Shelter	2	12x50x12	2	1,200
41/42/43	Control Shelter	2	12x50x12	2	1,800
44/45 51/48/50	Control Shelter	2	12/40/12	3	1,440
47/54	Control Shelter	2	12x50x12	1	600
10	Analyzer Bldg.	2	10x30x12	1	300
18	Analyzer Bldg.	2	10x10x12	1	100
15/21/25	Analyzer Bldg.	2	10x40x12	1	400
19/20	Analyzer Bldg.	2	10x20x12	1	200
22/23	Analyzer Bldg.	2	10x40x12	1	400
40	Analyzer Bldg.	2	10x10x12	1	100
41/42/45	Analyzer Bldg.	2	10x10x12	1	100
44	Analyzer Bldg.	2	10x20x12	1	200

6.8.7.2 (Continued)

SUBSTATION BUILDINGS

Unit	Building Name	Constr. Type	Approx. Size	No. Req'd	Total Area (Sq. Ft.)
54	Analyzer Bldg.	2	10x30x12	1	300
61	Substation Bldg.	4	20x40x16	8	7,200
61	Substation Bldg.	4	24x70x16	5	8,400
61	Substation Bldg.	4	24x100x16	6	14,400
61	Substation	4	24x190	1	4,560
			Totals	86	556,761 Sq. Ft.

List of Overhead Building Cranes

The following is a list of overhead cranes required in the various buildings.

Unit	Building Name	Crane Size (tons)	Span (ft)	Total No. of Cranes
61	Warehouse/Shops	15	80	2
10	Lock Gas Compressor Bldg.	5	50	1
13	Refr., Process Compressor Bldg.	15	50	2
21	MeOH Synthesis Bldg.	5	25	1

6.8.7.2 (Continued)

Unit	Building Name	Crane Size (tons)	Span (ft)	Total No. of Cranes
23	SNG Compression Bldg.	15	45	3
40	Air Compressor Bldg.	15	50	2
41	Steam Gen. Bldg.	10	75	3
42	Turbine Bldg.	20	80	1
		5	80	1 (auxiliary)
44/45	Raw Water & BFW Treating Bldg.	5	50	1
46	Air Compressor Bldg.	5	40	1
51	Fire Water Pump Bldg.	5	40	1
55	Ammonia Compression Bldg.	15	50	1

Building Construction Types

Type 1 - Steel Frame with Aluminum Panel Cladding

Structure

Frame	Structural steel with fireproofing when required
Floors	Ground floor - concrete slab on compacted fill Supported floors - concrete slab on metal decking
Roof deck	Lightweight concrete on metal decking
Exterior walls	Insulated aluminum panel cladding with fixed insulating glass windows
Interior walls	Nonbearing metal stud and drywall

6.8.7.2 (Continued)

Exterior Finishes

Walls	Anodized natural aluminum with tinted glass windows
Roofing	Three-ply built-up roofing over rigid insulation and vapor barrier
Entry Area and Walks	Concrete with rock-salt finish

Interior Finishes

Floors	Carpet in lobby and public areas of Administration building only otherwise vinyl tile vinyl tile in offices, corridors, etc.; ceramic tile in toilet rooms; exposed concrete with sealer and hardener in mechanical rooms
Walls	Vinyl wall covering in lobby and public areas of Administration building only otherwise paint; paint in offices and corridors; ceramic tile in toilet rooms
Ceilings	Acoustic tile in lobby, public areas, dining room, offices, corridors, etc.; drywall painted in toilet rooms, kitchen areas, etc.; exposed construction in mechanical rooms

Doors and Frames

Exterior	Hollow metal in pressed steel frames
Interior	Solid core wood in pressed steel frames

Windows

Fixed glass	1/4 inch double glazed with tinted glass

6.8.7.2 (Continued)

Thermal Insulation

Roof and Walls	Rigid or batt type insulation with thickness as required to achieve a 0.1 U factor for the wall system

Heating, Ventilation, and Air Conditioning

Air conditioning to be provided based upon need and type of useage, otherwise heated and ventilated only.

Type 2 - Steel Frame with Metal Wall and Roof Panels

Structure

Frame	Rigid steel frame with steel girts and purlins
Crane	Overhead crane rails and supports are provided where applicable
Floor	Six (6) inch concrete slab on compacted fill
Roof	Insulated metal sandwich panels, mechanically attached to roof purlins
Exterior Walls	Insulated metal sandwich panels with fixed insulating glass windows
Interior Walls	Nonbearing concrete masonry units

Exterior Finishes

Walls	Factory finish
Roof	Factory finish

6.8.7.2 (Continued)

Interior Finishes

Floors	Exposed concrete with sealer and hardener in shops and warehouse areas; vinyl asbestos tile in offices; ceramic tile in toilet rooms
Ceilings	Acoustic tile in offices; gypsum board in toilet rooms; exposed construction elsewhere
Walls	Exposed concrete block in shop and warehouse areas; gypsum board painted in offices; ceramic tile in toilet rooms

Doors and Frames

Exterior and Interior	Hollow metal personnel doors in pressed steel frames; rolling steel overhead doors for equipment access (motor operated) where required

Windows

Fixed glass	1/4 inch double glaze with tinted glass

Thermal Insulation

Roof and Walls	Preinsulated metal roof and wall panels, with thickness as required to achieve a U factor of 0.1

Equipment

Bridge Cranes	Bridge cranes where required

6.8.7.2 (Continued)

Heating, Ventilation, and Air Conditioning

Offices to be air conditioned; other areas to be heated and ventilated only

Type 3 - Concrete (Blast Resistant)

Structure

Frame	Structural steel
Floor	Reinforced concrete slab on compacted fill Floors in computer room and control room is a vinyl covered, computer-type, raised floor. Floors in the offices are carpeted
Roof	Reinforced concrete, blast resistant
Exterior Walls	Reinforced concrete, blast resistant
Interior Walls	Metal stud with gypsum board

Exterior Finishes

Walls	Exposed concrete - sandblasted finish
Roofing	Three-ply built-up roofing over rigid insulation and vapor barrier
Entry and Walks	Concrete with rock-salt finish

Interior

Floors	Vinyl tile in public areas and offices; ceramic tile in toilets; exposed concrete with sealer and hardener in mechanical areas, access floor with vinyl tile finish in computer areas and control room

6.8.7.2 (Continued)

Interior (Continued)

Walls	Painted in public areas and offices; ceramic tile in toilet rooms; exposed in mechanical areas
Ceilings	Acoustic tile in public areas and offices; gypsum board painted in toilet rooms; exposed construction in mechanical areas

Doors and Frames

Exterior	Standard low yield blast doors and frames where required
Interior	Solid core wood doors in pressed steel frames

Windows None

Insulation

Roof	Rigid insulation with thickness as required to achieve a 0.1 U factor
Walls	Rigid or batt type insulation with thickness as required to achieve a U factor of 0.1

Heating, Ventilation, and Air Conditioning

Air conditioning with pressurization throughout

6.8.7.2 (Continued)

Type 4 - Masonry Bearing Wall

Structure

Frame	Bearing wall
Floor	Concrete (elevated above grade)
Roof Frame	Steel framing
Roof Deck	Metal deck with concrete fill
Exterior Walls	Reinforced concrete block
Interior Walls	None

Exterior Finishes

Walls	Exposed concrete block
Roofing	Three-ply built-up

Interior Finishes

Floors	Exposed concrete with sealer and hardener
Walls	Exposed concrete block
Ceiling	Exposed construction

Doors and Frames

Exterior and Interior	Hollow metal in pressed steel frames

Windows None

6.8.7.2 (Continued)

Insulation

Roof	Rigid insulation with thickness as required to achieve a 0.1 U factor
Walls	Rigid or batt type insulation with thickness as required to achieve a U factor of 0.1

Heating, Ventilation, and Air Conditioning

Heating and ventilation only

List of Drawings

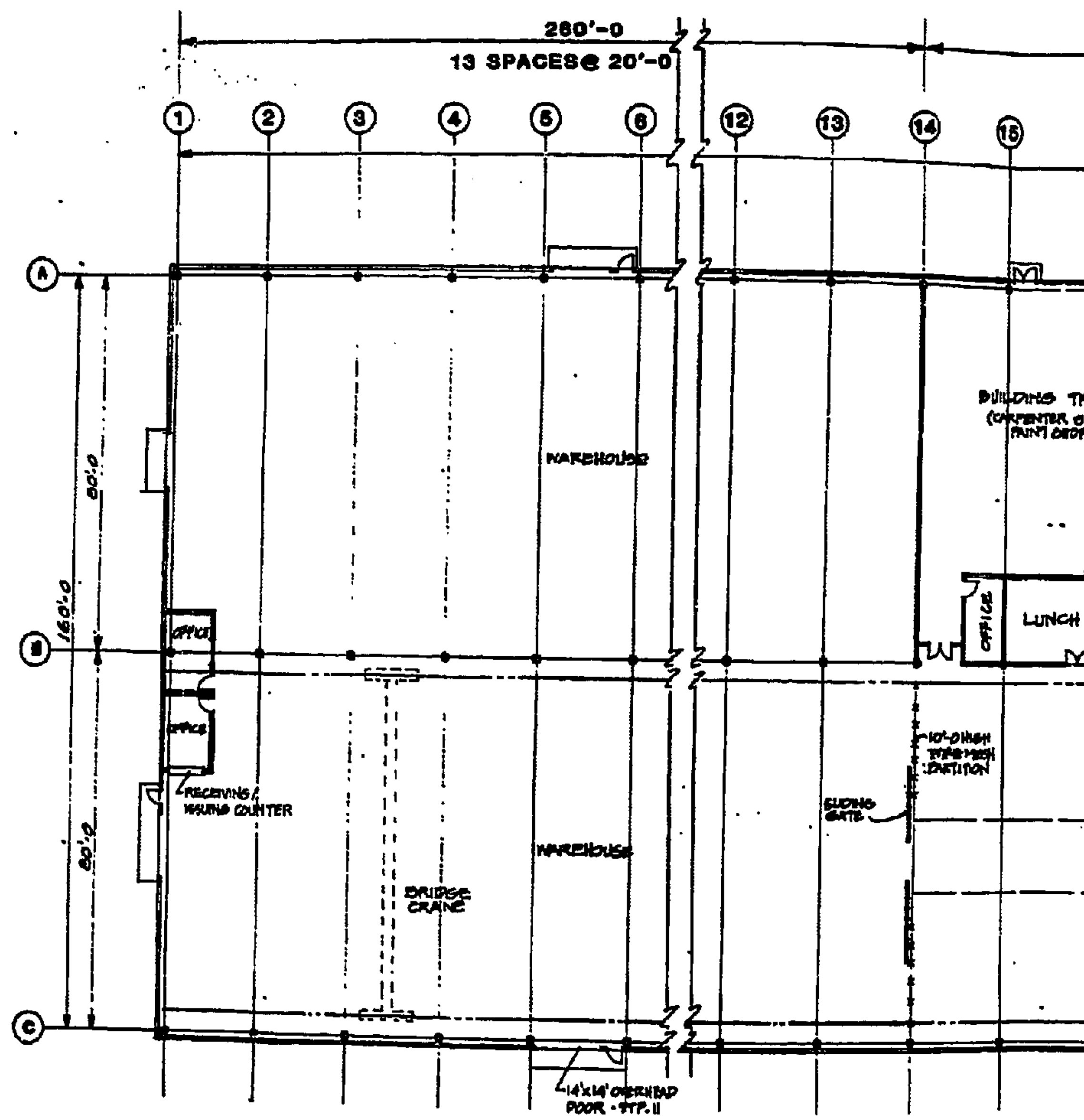
The design drawings for the major plant buildings are listed below:

Maintenance Buildings

Drawing 835704-61-2-304	Warehouse/Shop Building Floor Plan

Process Buildings

Drawing 835704-61-2-305	Typical Process Building Plan and Elevation
Drawing 835704-41-4-302	Power Generation Buildings Intermediate Floor Plan
Drawing 835704-41-4-303	Power Generation Buildings Section



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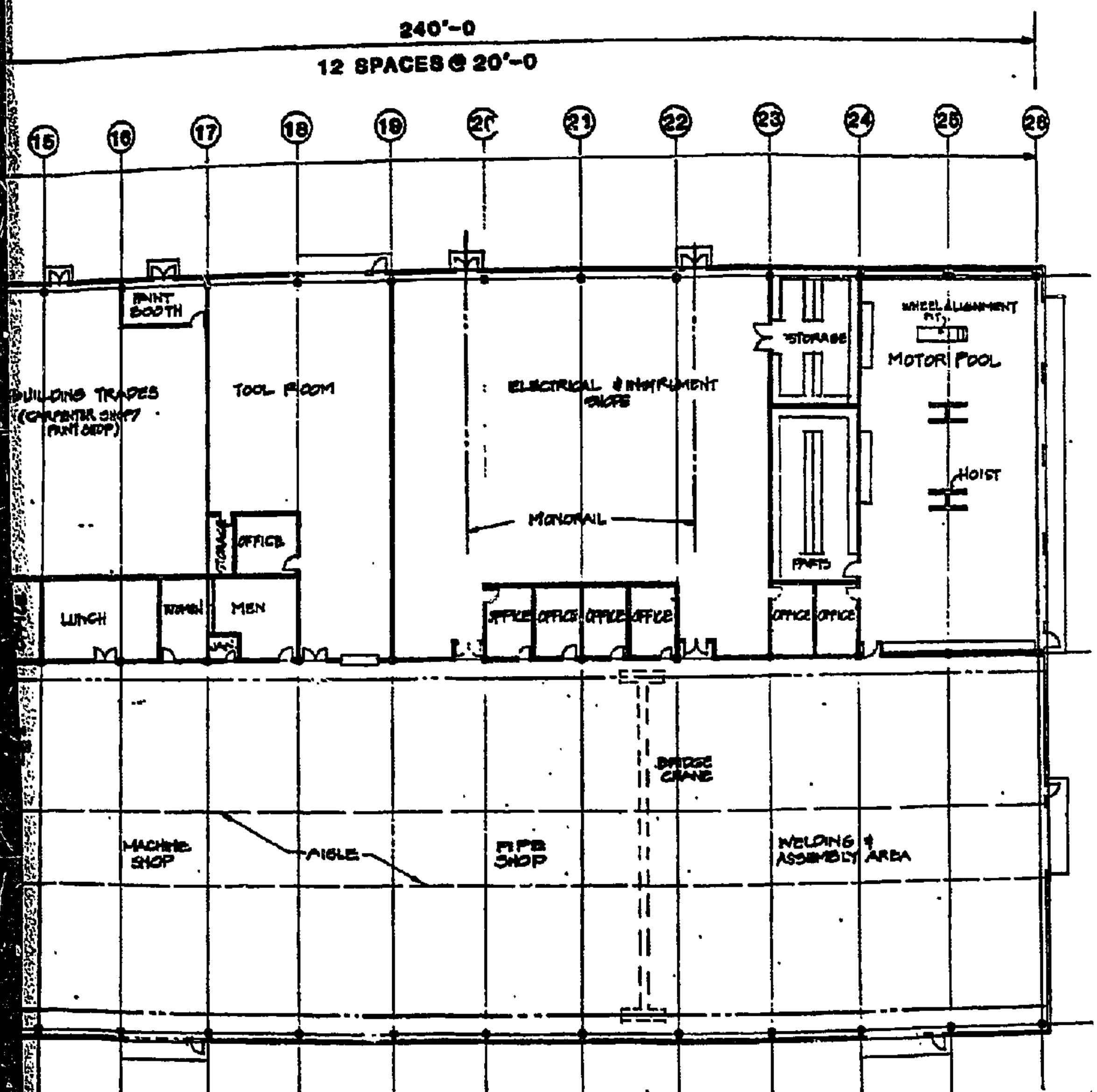

FLOOR PLAN

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CHECKED BY: M. DORIN		
SUPERVISOR: R. ASHTON	RELEASE DATE: 6/9/82	
SUPERVISING ENGR.: M. DORIN	INITIALS: M. Dorin	
PROJECT ENGR.: R. LANG	APP. DATE: RAL 6/9/82	
CLIENT	APP. DATE	

WAREHOUSE/SHOPS BUILDING
FLOOR PLAN
SYNFUELS FEASIBILITY STUDY

CROW TRIBE OF INDIANS — MONTANA

SCALE	DRAWING NUMBER	REVISION
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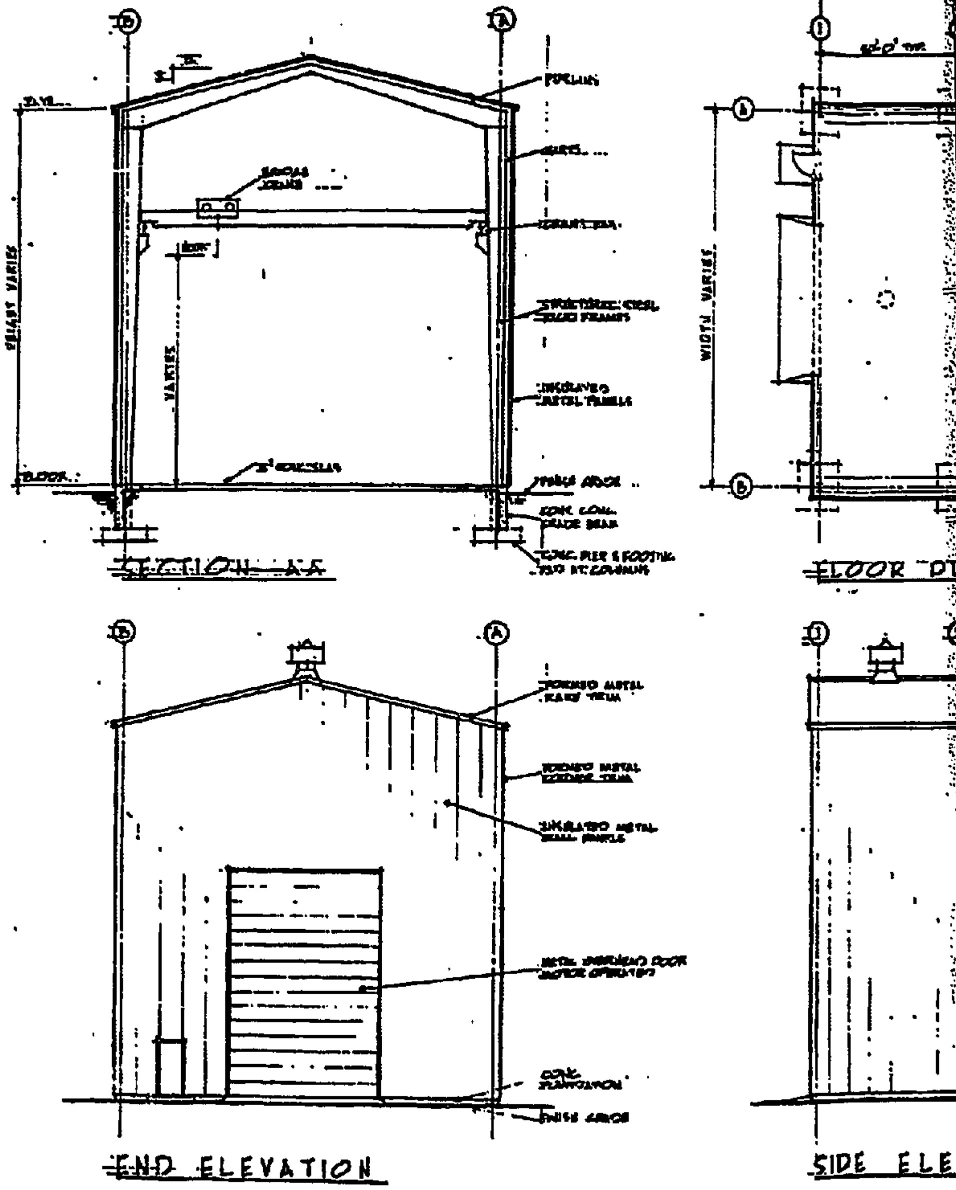

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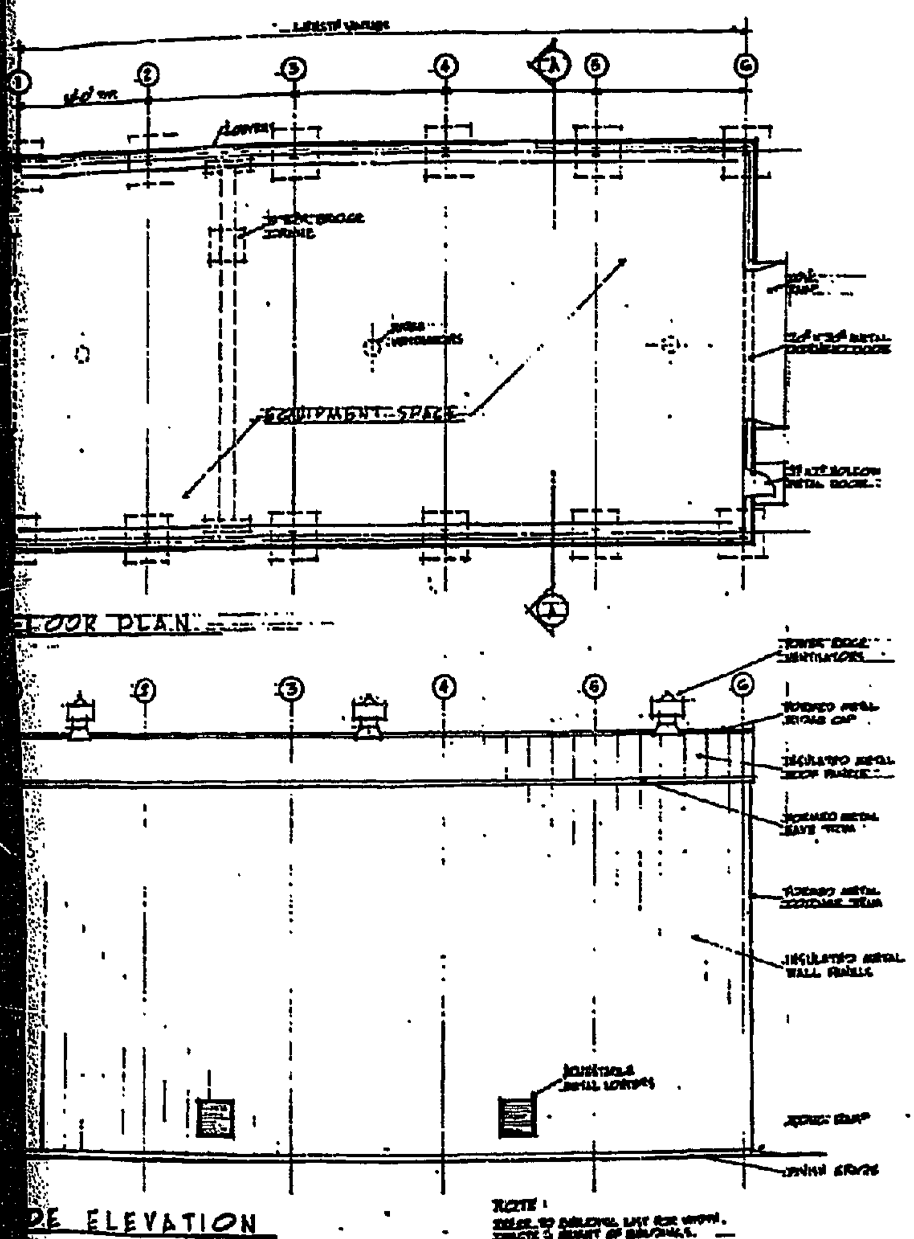

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OR

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CHECKED BY	M. DORIN
SUPERVISOR	A. QUINONES
RELEASE DATE	6/3/82
SUPERVISING ENGR.	M. DORIN
INITIALS	M Dorin
PROJECT ENGR.	R. LANG
APP. DATE	RL 6/4/82
CLIENT	
APP. DATE	

TYPICAL PROCESS BUILDING
PLAN, SECTION, & ELEVATIONS

SYNFUELS FEASIBILITY STUDY

CROW TRIBE OF INDIANS — MONTANA

SCALE	DRAWING NUMBER	REVISION
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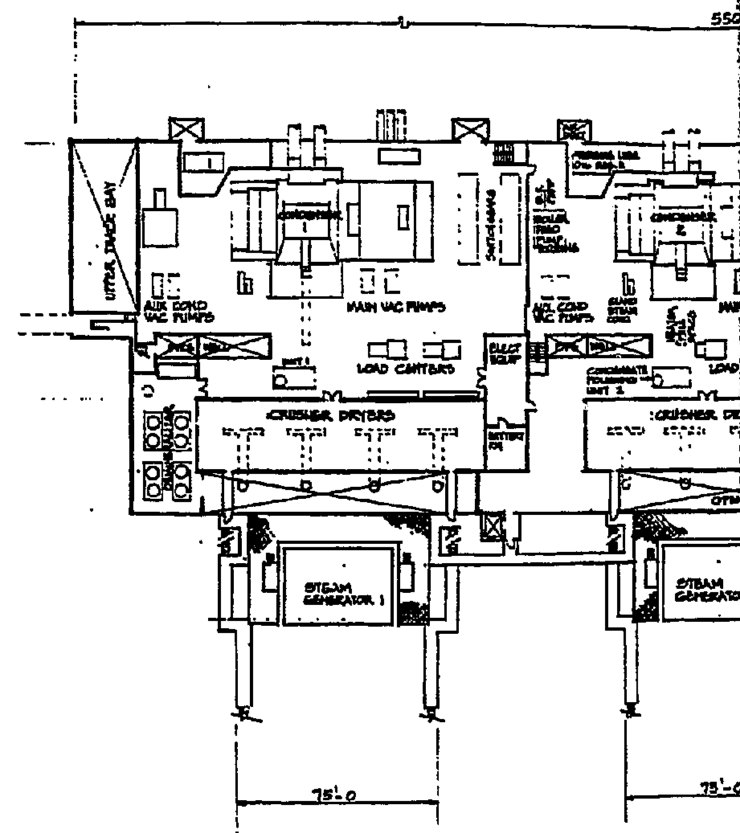

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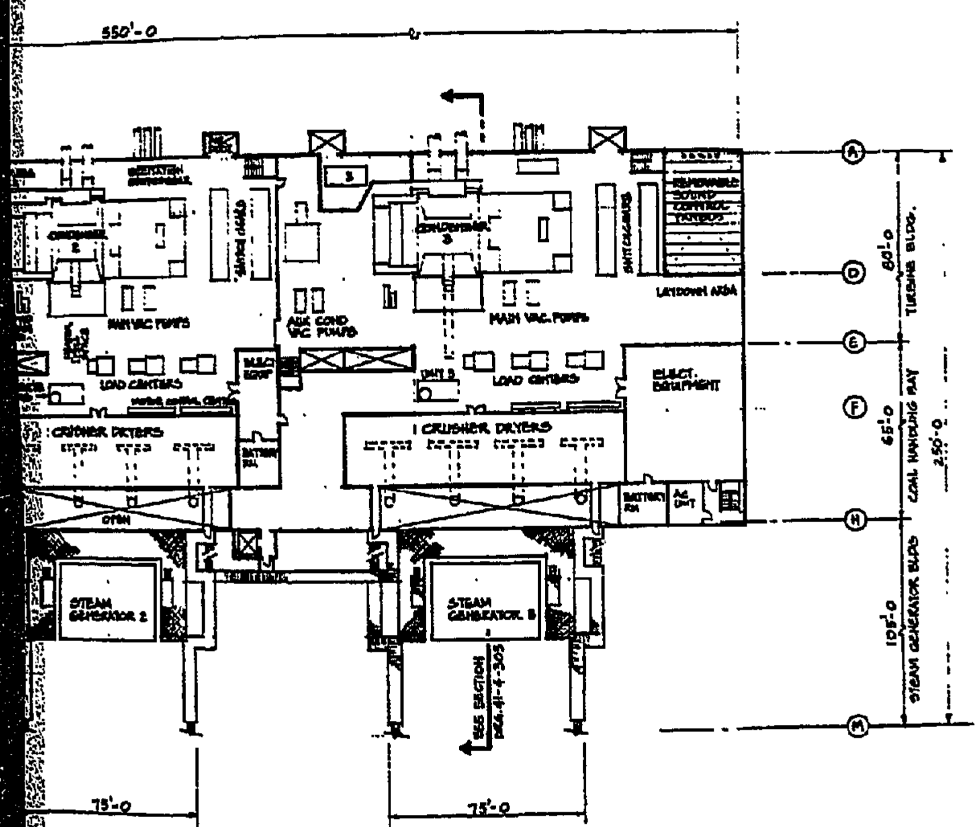

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FLUOR

POWER GENERATION BUILDINGS
INTERMEDIATE FLOOR PLAN
SYNFUELS FEASIBILITY STUDY
CROW TRIBE OF INDIANS — MONTANA

P. KIM	
M. DORSI	
J. ADISSI	6/21/82
M. TIORNI	
R. LANG	

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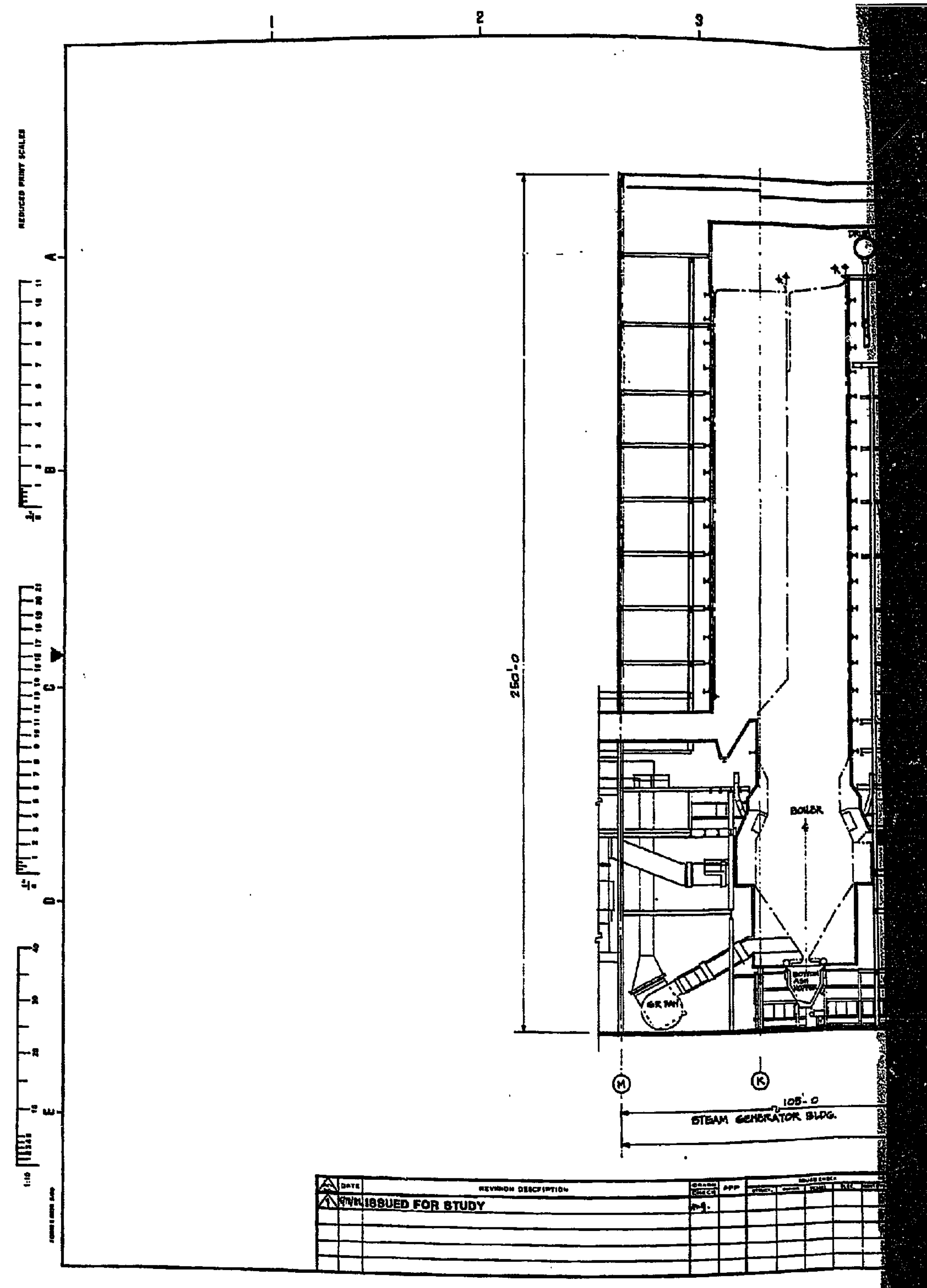
Drawing number: 835704-41-4-302
Revision: 1



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REDUCED PRINT SCALES
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BOILER
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STEAM GENERATOR BLDG.
DATE
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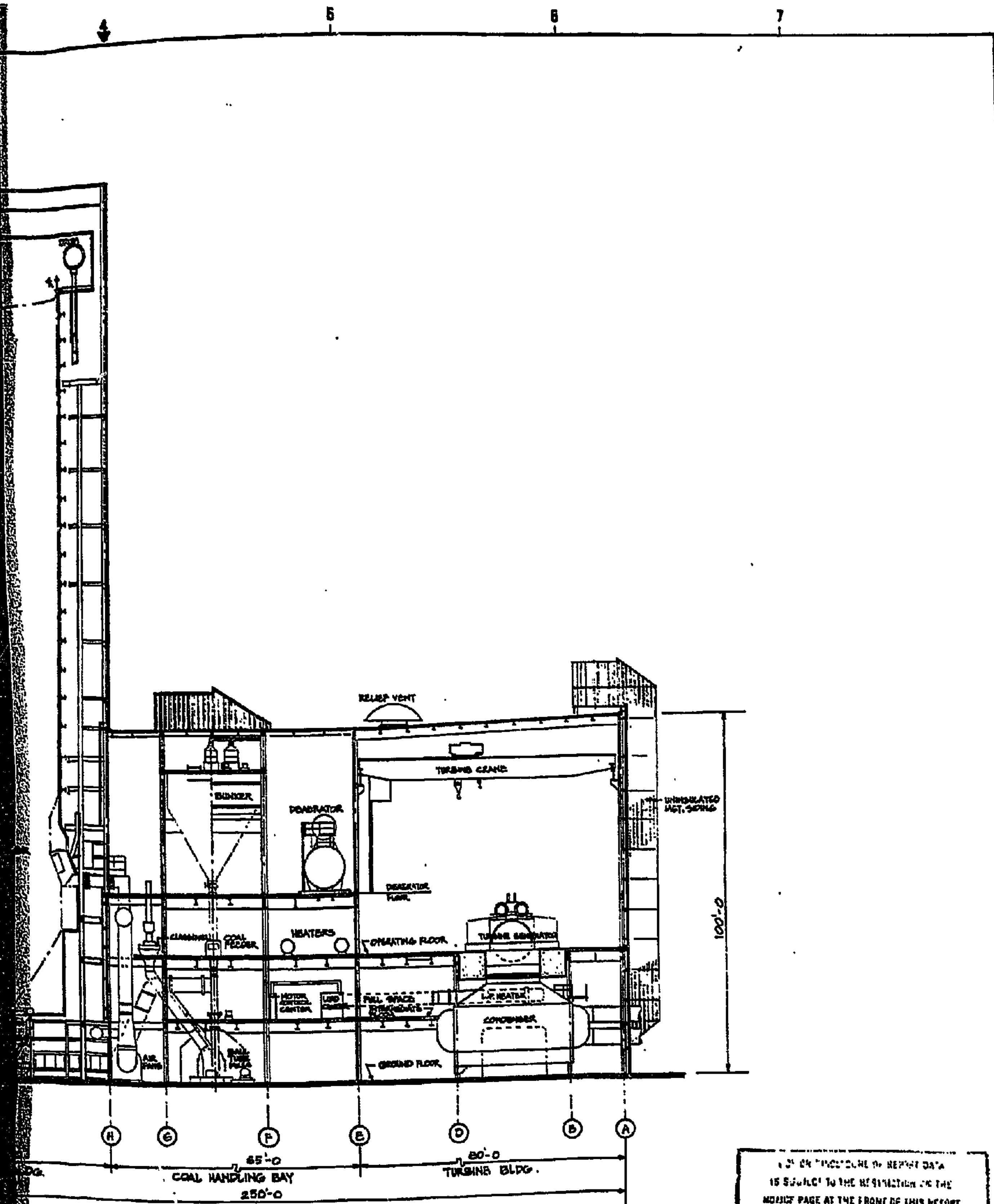

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FLUOR

POWER GENERATION BUILDINGS
SECTION

SYNFUELS FEASIBILITY STUDY

CROW TRIBE OF INDIANS — MONTANA

P. KIM	
M. DORN	
J. ADIBI	
M. DORN	
R. LANG	6/1/81

Scale	Drawing Number	Revision
1/16"=1'-0"	835704-41-4-303	1

6.8.7.2 (Continued)

Control Buildings

Drawing 835704-61-4-306	Control Building Floor Plan and Elevation
Drawing 835704-61-2-307	Typical Control Shelter Plan and Elevation

Substation Buildings

Drawing 835704-61-2-308	Typical Substation Floor Plan
Drawing 835704-61-2-309	Typical Substation Elevation
Drawing 835704-61-2-310	Typical Substation Sections and Details

(2) Administration Area Buildings Design

Building Material Selection

Aluminum composite cladding is proposed for use on the Administration area buildings for the following reasons:

They are aesthetically appealing.

They are versatile and can be formed and cut to any configuration and will accept a variety of finishes.

They are light in weight, easily erected in a minimum of time, thus resulting in lower building costs.

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3 SPACES @ 40'-0 EQUAL 120'-0

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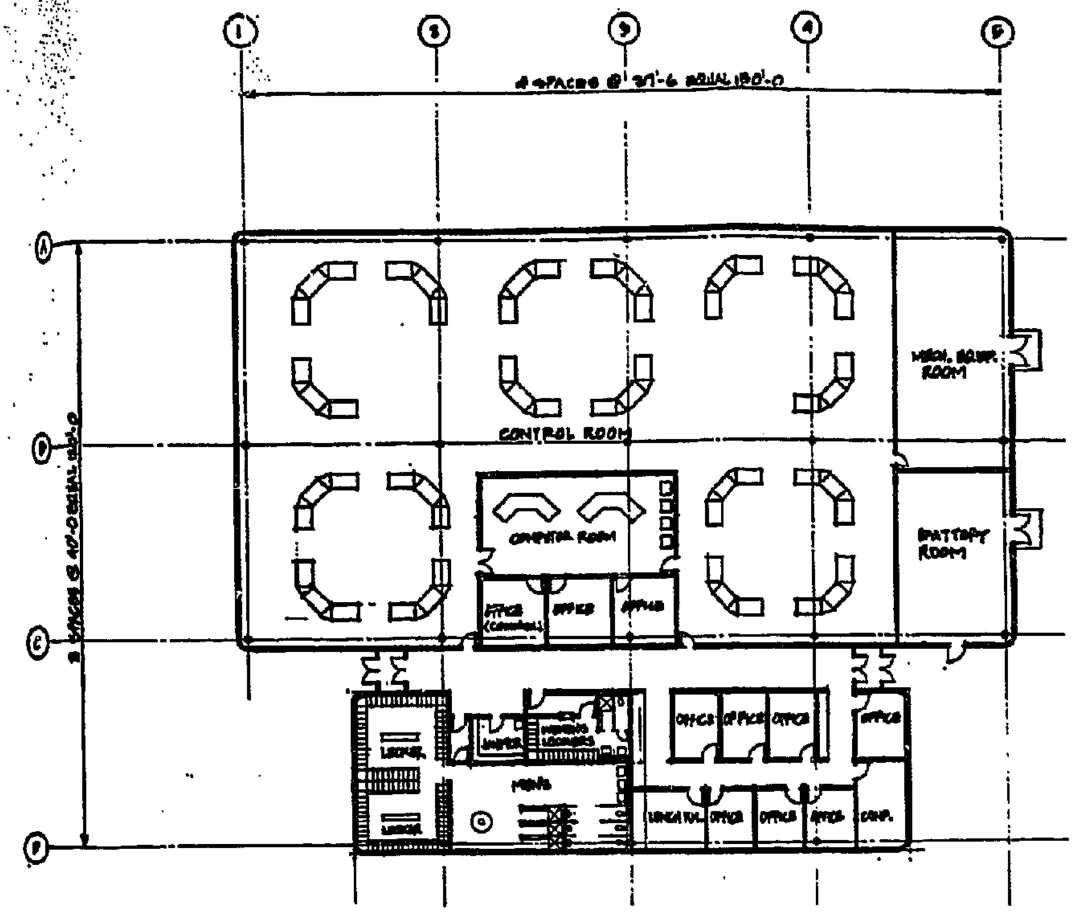
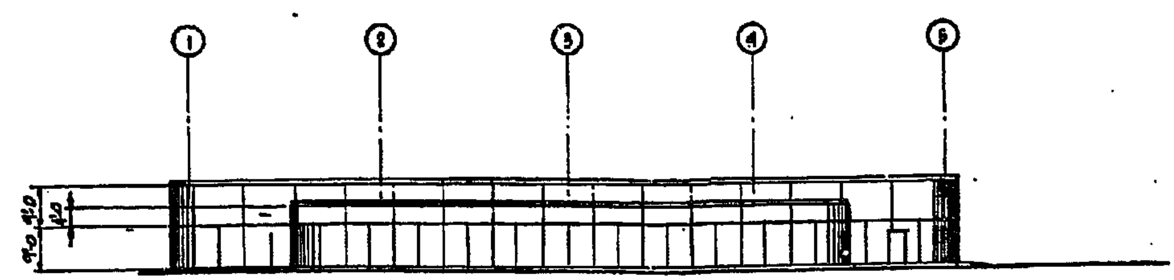
		ISSUED FOR STUDY			



FLOOR PLAN



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FLUOR

T. LOUIS

J. ADDISON

R. LANG

CONTROL BUILDING
PLAN & ELEVATION

SYNFUELS FEASIBILITY STUDY

CROW TRIBE OF INDIANS — MONTANA

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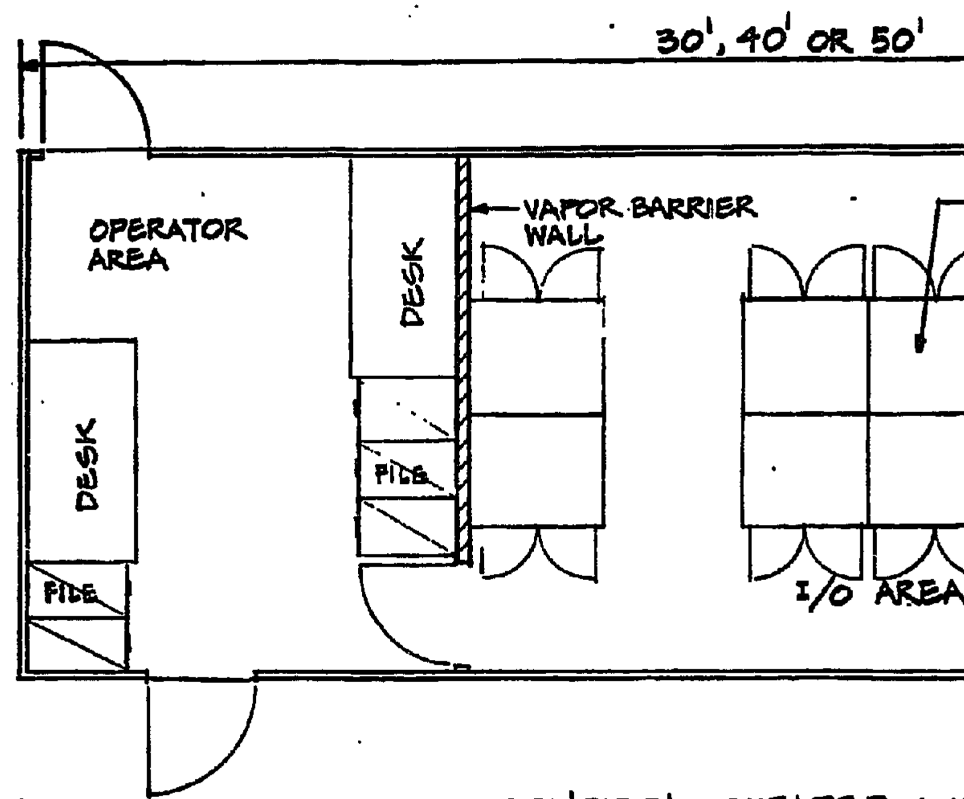
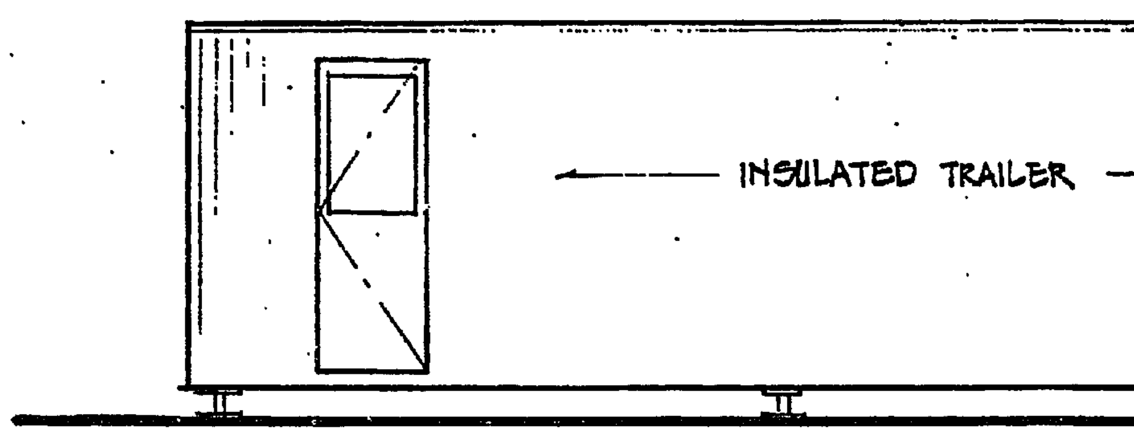


CONTROL SHELTER LA



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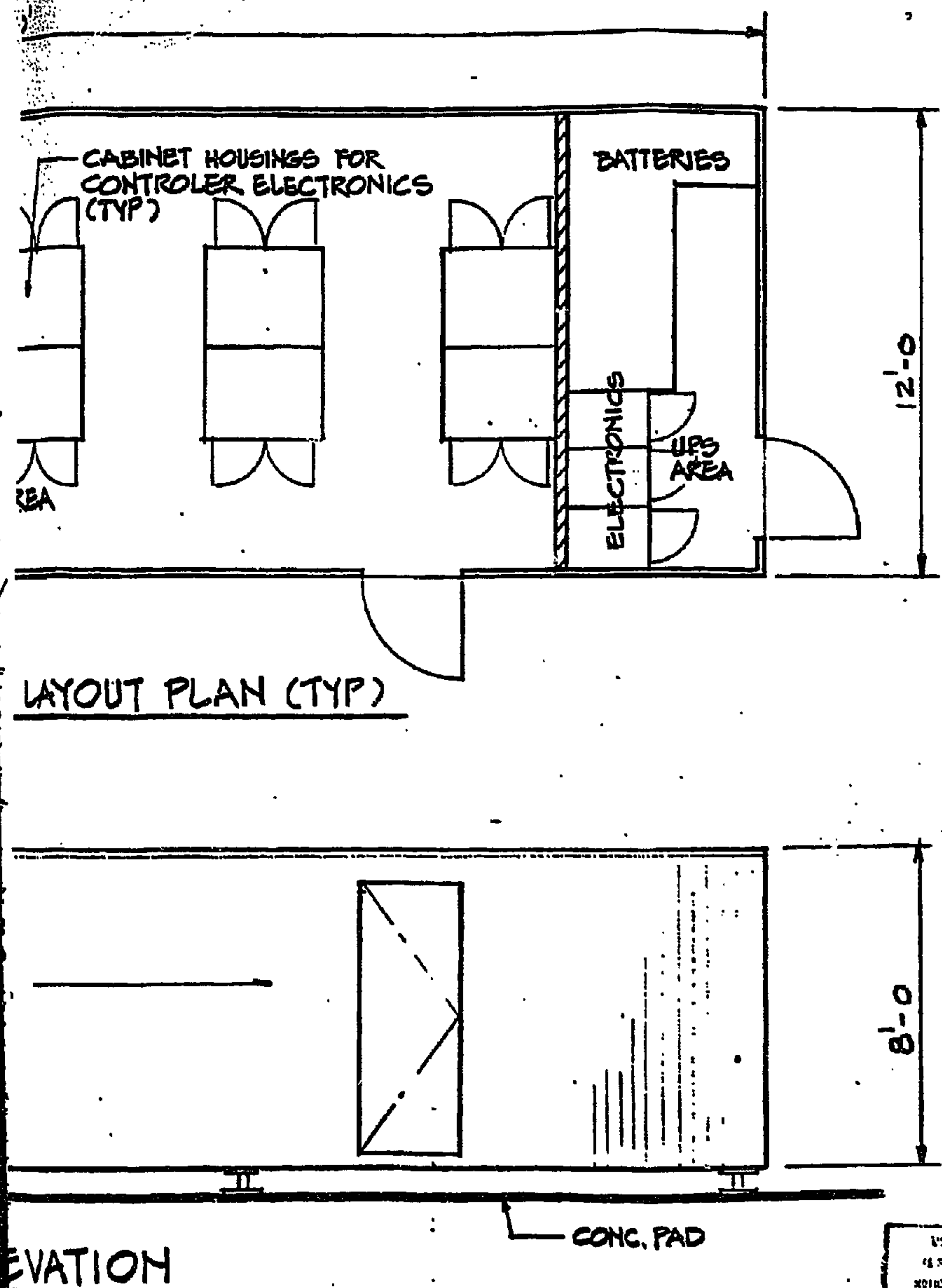

OR

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CHECKED BY: M. DORIN	
SUPERVISOR: A. QUINONES	RELEASE DATE: 6/3/82
SUPERVISING ENGR.: M. DORIN	INITIALS: M. Dorin
PROJECT ENGR.: R. LANG	APP. DATE: RL 6/4/82
CLIENT	APP. DATE

TYPICAL CONTROL SHELTER
FOR FIELD MOUNTED CONTROLLERS

SYNFUELS FEASIBILITY STUDY

CROW TRIBE OF INDIANS — MONTANA

SCALE	DRAWING NUMBER	REVISION
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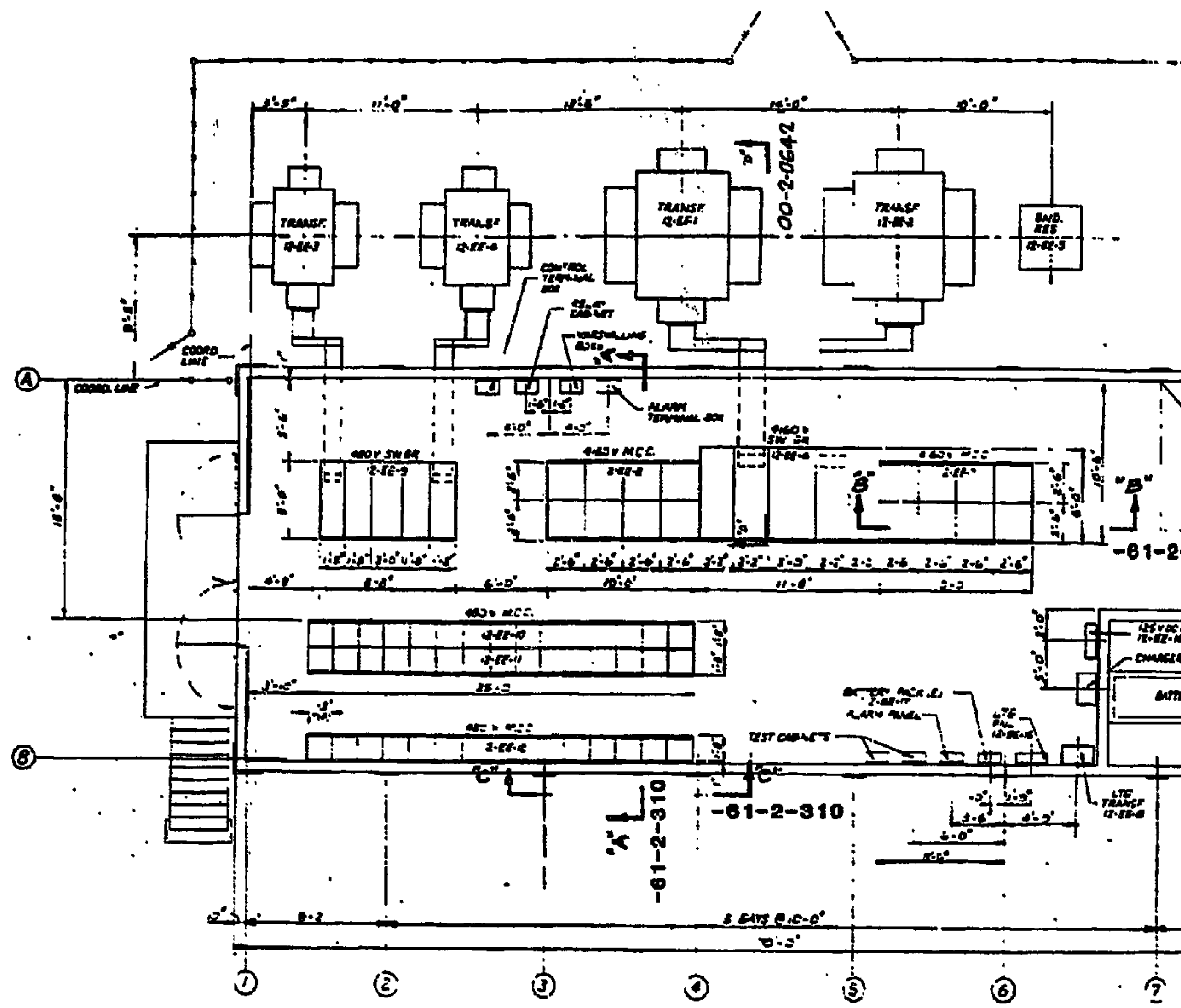

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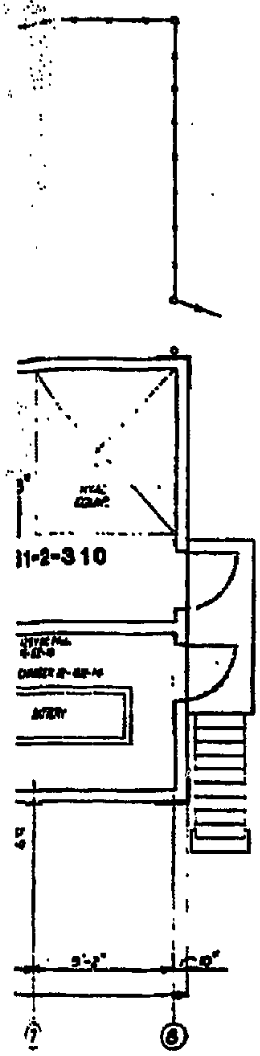

DRAWN BY: L. CUEVAS		**TYPICAL SUBSTATION FLOOR PLAN**
CHECKED BY: M. DORIN		SYNFUELS FEASIBILITY STUDY
SUPERVISOR: A. QUINONES	RELEASE DATE: 6/3/82	
SUPERVISING ENGR.: M. DORIN	INITIALS: M. Dorin	CROW TRIBE OF INDIANS — MONTANA
PROJECT ENGR.: R. LANG	APP. DATE: RAL 6/4/82	SCALE: NONE — DRAWING NUMBER: 835704-61-2-308 — REVISION: 1
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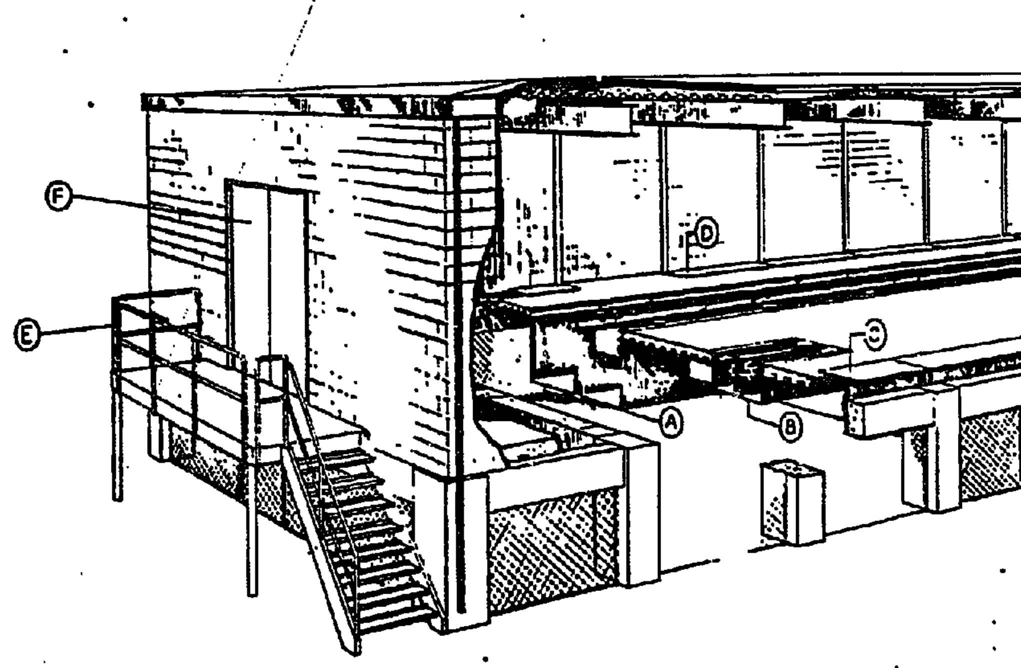

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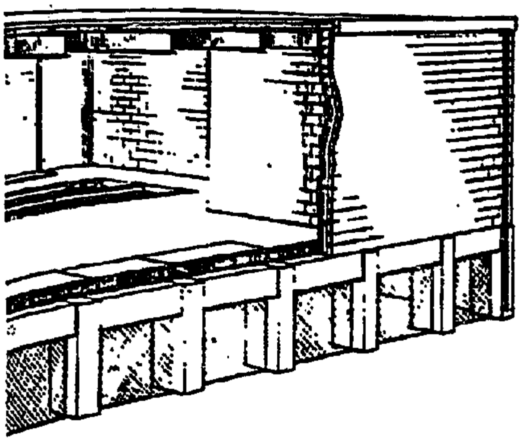

LEGEND

A. MEDIUM VOLTAGE MOTOR CONTROL CENTER CONDUIT AND/OR DIRECT BURIAL CABLE ENTRANCE.
B. LOW VOLTAGE MOTOR CONTROL CENTER CONDUIT AND/OR DIRECT BURIAL CABLE ENTRANCE
C. LOW VOLTAGE MOTOR CONTROL CENTER CONDUIT AND/OR DIRECT BURIAL CABLE ENTRANCE.
D. CONDUIT ENTRANCE PLATE FOR WALL MOUNTED EQUIPMENT.
E. REMOVABLE HANDRAIL
F. EQUIPMENT DOOR

DRAWN BY: L. CUEVAS		TYPICAL SUBSTATION ELEVATION
CHECKED BY: M. DORIN		SYNFUELS FEASIBILITY STUDY
SUPERVISOR: A. QUINONES	RELEASE DATE: 6/3/82	
SUPERVISING ENGR.: M. DORIN	INITIALS: M. Dorin	CROW TRIBE OF INDIANS — MONTANA
PROJECT ENGR.: R. LANG	APP. DATE: RAL 6/4/82	SCALE: NONE; DRAWING NUMBER: 835704-61-2-309; REVISION: 1
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TYPICAL SUBSTATION
ELEVATION

SYNFUELS FEASIBILITY STUDY

CROW TRIBE OF INDIANS MONTANA

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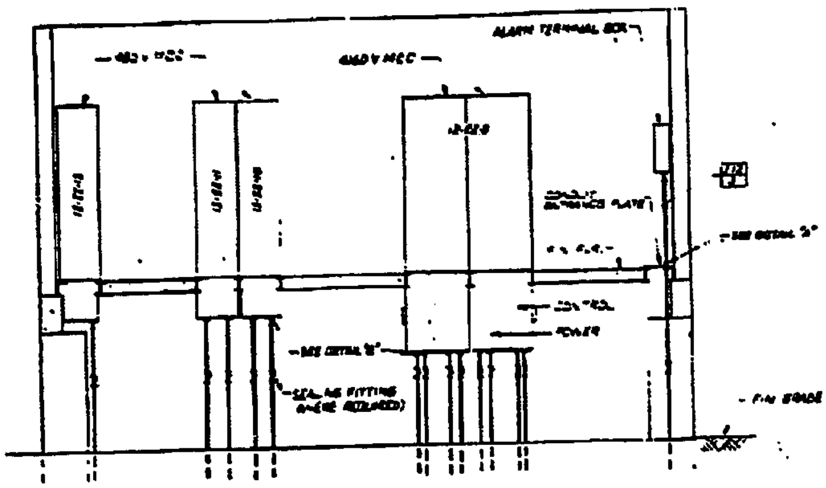

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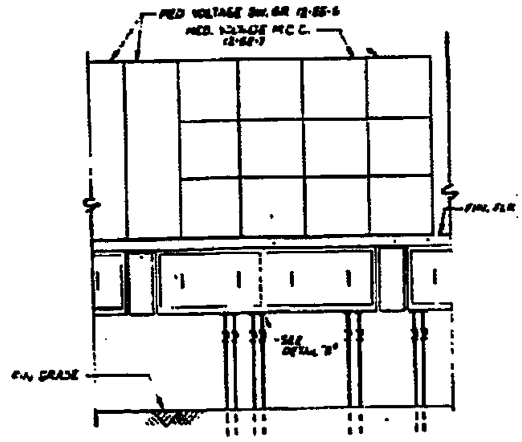

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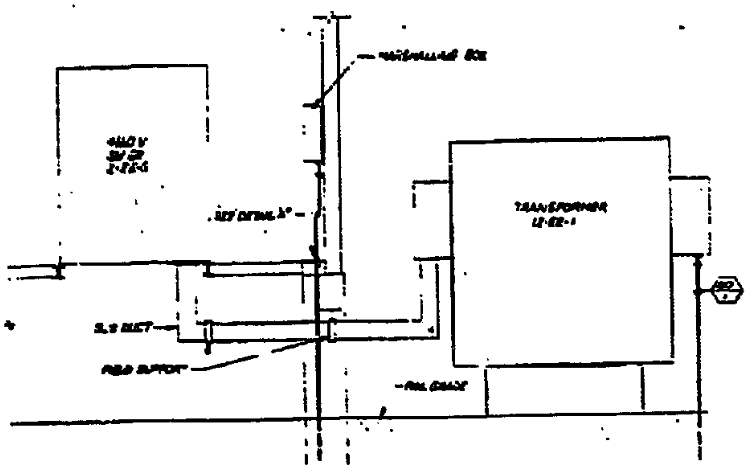

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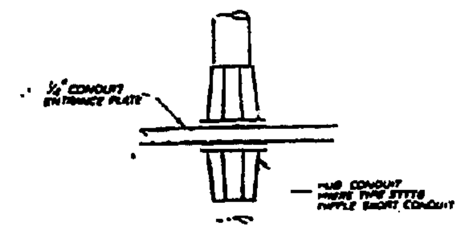
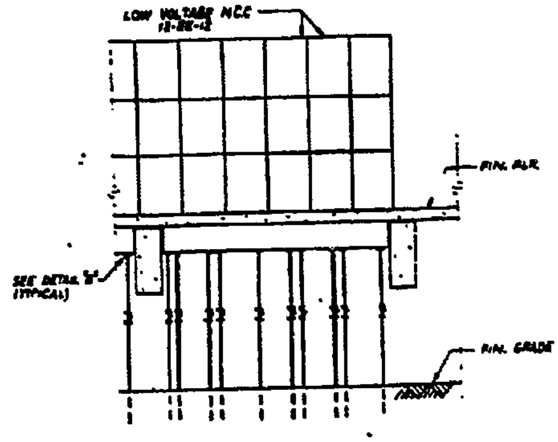


DETAIL "A"
NO SCALE

DETAIL "B"
CONDUIT TERMINATION
LOW AND MEDIUM VOLTAGE MOTOR CONTROL CENTERS
NO SCALE

REV. NO.	DATE	REVISION DESCRIPTION	DRAWN / CHECK	DATE
1	5/28/82	ISSUED FOR STUDY	L.C. / M.J.	6/3/82

FLUO



SECTION 'C-C'
00-2-0640
NO SCALE

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TYPICAL SUBSTATION SECTIONS & DETAILS

SYNFUELS FEASIBILITY STUDY

CROW TRIBE OF INDIANS — MONTANA

DRAWN BY: L. CUEVAS			
CHECKED BY: M. DORIN			
SUPERVISOR: A. QUINONES	RELEASE DATE: 6/3/82		
SUPERVISING ENGR.: M. DORIN	INITIALS: M. Dorin		
PROJECT ENGR.: R. LANG	APP. DATE: RDL 6/4/82	SCALE: NONE	DRAWING NUMBER: 835704-61-2-310
CLIENT	APP. DATE		REVISION: 1

6.8.7.2 (Continued)

They can be insulated on the back side with thermal insulation to any extent to provide for an energy efficient building when combined with insulating glass windows.

They can have metallic finishes that are easily maintained and will provide an effective contrast with the surrounding area.

Floor Plan Area Details

The floor plan of the various Administration Area Buildings are described below:

Administration Building

	Size, Ft.	Area, Sq. Ft.
Administrative Offices		24,500
Conference Rooms and Support Area		9,860
Computer Area w/Access Floor	40x80	3,200
Toilets/Janitorial/Storage		1,800
Mechanical Equipment Room	30x50	1,500
Entry and Circulation Areas		7,780
Allowance for walls plus 5%		2,560
	Total Gross Area	51,200 Sq. Ft.

Building Size: 80 x 320 x 2 stories = 51,200 Sq. Ft.
Building Construction Type 1: 28 feet high
Building to be air conditioned

6.8.7.2 (Continued)

	Size, Ft.	Area Sq. Ft.
Cafeteria		
250 Seat Dining Room for Staff Personnel	@ 15 Sq. Ft./ person	3,750
40 Seat Private Dining Room for V.I.P.	@ 20/person	800
Kitchen Area	@ 1/3 of dining area	1,250
Toilets/Lockers, etc.	2 @ 20x20	800
Mechanical Equipment Room	20x20	400
Office, Receiving and Storage	15x20	300
Entry and Circulation		1,250
Allowance for walls plus 5%		450
	Total Gross Area	9,000 Sq. Ft.

Building Size: 90 x 100 = 9,000 Sq. Ft.
Building Construction Type 1: 15 feet high
Building to be air conditioned

	Size, Ft.	Area, Sq. Ft.
Laboratory Building		
Offices	4 @ 10x12	480
Library and Records	18x21	378
Chemical Storage	18x24	432
Gas Laboratories	2 @ 22x30	1,320
Testing Laboratories	3 @ 20x30	1,800
Men and Women's Toilets and Locker Rooms		540
Retained Sample Storage and General Storage	16x18	288
Storage	9x12	108

6.8.7.2 (Continued)

Laboratory Building (Continued)

Instrument Repair	8x18	144
Wash	14x18	252
Circulation		1,380
Mechanical Equipment Room	24x26	624
Allowance for walls plus 5%		450
	Total Gross Area	8,196 Sq. Ft.

Building Size: 164 x 54 = 8,196 sq. ft.
Building Construction Type 1: 15 feet high
Building to be air conditioned

Warehouse/Shop Building	Size, Ft.	Area Sq. Ft
Warehouse/Storage Area	160x260	41,600
Machine Shop	80x100	8,000
Welding and Pipe Shop	80x140	11,200
Electric Shop	65x40	2,600
Instrument Shop	65x40	2,600
Paint Booth	10x20	200
Tool Room	40x600	2,400
Building Trades	60x60	3,600
Offices	10 @ 10x20	2,000
Toilets (men and women)		375
Motor Pool	80x40	3,200
Circulation		925
Allowance for walls plus 2%		1,300
	Total Gross Area	80,000 Sq. Ft.

6.8.7.2 (Continued)

Warehouse/Shop Building (Continued)

Building Size: 160x500 = 80,000 Sq. Ft.

Building Construction Type 2: 25 feet high

Offices, Electric Shop, and Instrument Shop to be air conditioned.

All others areas to be heated and ventilated only.

	Size, Ft.	Area Sq. Ft.
Control Building		
Control Room	80x130	9,040
Mechanical Equipment Room	20x45	900
Battery Room	20x35	700
Computer Room with Offices	34x40	1,360
Offices, Conference Room, Lunch Room	32x56	1,792
Toilets and Lockers (Men and Women)		1,792
Circulation		816
Allowance for walls plus 2%		400
Total Gross Area		16,800 Sq. Ft.

Building Size: 150x120 = 16,800 Sq. Ft.

Building Construction Type 3: 15 feet high

Building to be air conditioned and pressurized

Building to be designed for blast resistant walls and roof

	Size, Ft.	Area Sq. Ft.
Change Building		
Locker Rooms (Men and Women)		2,650
Toilets (Men and Women)		270

6.8.7.2 (Continued)

	Size, Ft.	Area Sq. Ft.
Change Building (Continued)		
Showers and Drying Area		
Men and Women		520
Wash Area		
Men and Women		360
Janitor and Water Heater	10x10	100
Time Alley w/Time Clock	5x10	50
Time Keeper Office	10x10	100
Circulation		400
Allowance for walls plus 5%		220
	Total Gross Area	4,750 Sq. Ft.

Building Size: 50x95 = 4,750 Sq. Ft.
Building Construction Type 1: 12 feet high
Building to be heated and ventilated, but not air conditioned

	Size, Ft.	Area Sq. Ft.
Fire Station Area		
Garage for Three Trucks (Powder, Foam, Pumper)	45x50	2,250
Chemical, CO_2 Fire Fighting Equipment Space	20x40	800

6.8.7.2 (Continued)

	Size, Ft.	Area Sq. Ft.
Fire Station Area (Continued)		
One Office	12x12	144
Toilets/Showers/Lockers		300
Mechanical Equipment Room	8x10	80
Circulation		226
Allowance for walls		200
	Total Gross Area	4,000 Sq. Ft.

Area Size: 50x80 = 4,000 Sq. Ft.
Building Construction Type 1 20 feet high
Office area to be air conditioned
Garage and fire fighting equipment spaces to be heated and ventilated

	Size, Ft.	Area Sq. Ft.
First Aid Area		
Treatment Room	12x18	215
Nurse and Records	12x15	180
Emergency Room	15x20	300
Toilets and Pantry	15x20	300
Waiting Room	12x15	180
Storage	10x15	150
Mechanical Equipment Room	15x15	225
Circulation		300
Allowance for walls plus 5%		150
	Total Gross Area	2,000 Sq. Ft.

Area Size: 40x50 - 2,000 Sq. Ft.
Building Construction Type 1: 12 feet high
This area to be air conditioned

6.8.7.2 (Continued)

(3) Process Buildings Design

Building Materials Selection

(a) Foundations and Floor Slab

Concrete footings at columns extend five (5) feet below grade

Concrete grade beams extend approximately 3 1/2 feet below grade

Six (6) inch concrete slab over compacted fill

(b) Building Frame

Rigid steel frames are approximately 20 feet on center (roof slope 3:12)

Steel girts and purlins are approximately seven (7) feet on center

Overhead crane rails and supports are provided where applicable

(c) Roof Panels

Two (2) inch thick pre-insulated sandwich type metal roof panels with U factor of 0.1 mechanically attached to wall girts

(d) Wall Panels

Two (2) inch thick pre-insulated sandwich type metal wall panels with U factor of 0.1, mechanically attached to roof purlins.

6.8.7.2 (Continued)

(e) Bridge Cranes
Bridge cranes to travel entire length of building

(f) Doors
1-20'x30' overhead door at each end of the building (power operated)
1-3'-7' personnel door at each end of the building

(g) Windows
Windows are not generally used in process buildings except where natural light in preferable, e.g., office areas

(h) Wall Louvers
Approximately 150 sq. ft. of wall louvers are provided

(i) Roof ventilators
Power roof exhausts are provided

(j) Wall and Roof Openings
Wall openings and roof openings are provided

(k) Painting
All doors, trim and structural steel are painted
All wall and roof panels have a factory finish

(l) Plumbing
Plumbing is provided in buildings that have toilets and washing facilities

6.8.7.2 (Continued)

(m) Heating Ventilation and Air Conditioning
All buildings are provided with power roof exhaust fans and closeable wall louvers for summer ventilation and suspended unit heaters for winter heating (approximately 12 air changes per hour)

(n) Electrical
Power is provided for HVAC equipment items, process equipment etc., also for motor operated overhead doors and bridge cranes
Industrial type lighting is provided and is located above the bridge cranes

(4) Heating, Ventilation, and Air Conditioning Design

Administration Buildings

The buildings in the Administration Area are air conditioned by means of central station type air handling units. The units consist of chilled water cooling coils, hot water heating coils, and high efficiency dust filters. The source of the chilled water supply is from a central chilled water plant which utilizes multiple air cooled centrifugal type liquid chillers. The heating hot water supply is obtained from the steam/hot water heat exchangers which utilize plant steam.

The systems are designed for maximum reliability and energy efficiency by utilizing heat from lights and variable volume type air distribution systems. In addition, energy recovery heat exchangers are used at the laboratory building.

6.8.7.2 (Continued)

The systems are designed in accordance with the latest ASHRAE Standards, maintaining 78°F interior temperatures during the summer and 30-50 percent relative humidity. Winter humidity conditions are maintained by means of steam humidifiers in the air handling systems. Preheat coils with outdoor temperature sensing controls is included to prevent coil freeze-up during severe outdoor conditions. A slight positive pressure is maintained to minimize dust infiltration.

Process Buildings

Process Buildings are heated and ventilated. Summer ventilation is accomplished by power roof exhaust fans and adjustable (closeable) motor operated wall louvers. One set of wall louvers are located near ground level for summer ventilation and, where required, another set of wall louvers are located approximately 15 feet above ground level for winter ventilation.

Winter heating is be means of suspended steam unit heaters. These heaters are operated in groups by means of thermostats and hand-off-automatic switches. Where required for hazardous conditions, forced air ventilation by means of air handling units with heating coils are provided for year-round ventilation with preheated air.

Maintenance Buildings

Warehouses and shops are heated and ventilated by means of suspended unit heaters and power roof ventilators. Offices are cooled by packaged type air conditioning units. Where practical packaged units shall include air distribution ducts to allow cooling of multiple offices from a single unit.

6.8.7.2 (Continued)

Paint and Chemical Storage buildings are heated and ventilated by means of central station fan coil units. These units have explosion-proof fan sections and controls to provide year round ventilation and heating.

Control Building

The Control Building is provided with a central air conditioning system to provide year-round heating, air conditioning, and humidity control. The refrigeration system is water cooled with cooling water from the process cooling towers. All equipment is located inside the building. Refrigeration units and fans are provided with 100 percent stand-by units. Openings for outside air in the blast resistant building are designed to minimize the air pressure/building pressure due to a potential blast. This will prevent damage to ducts and equipment.

The control building is pressurized to maintain a positive building pressure of 0.1 inch Water Gage, with pressurized air taken from a nonhazardous area. Filtration shall include throw-away type prefilters, metal-oxide impregnated activated carbon filters or potassium impregnated activated alumina filters for removal of hydrocarbon-sulfide contaminants, and high efficiency dust filters.

Substation Buildings

Substation Buildings are air conditioned, water-cooled, pre-assembled packaged-type air conditioning units. These units are located inside the building and have a connecting air supply duct system. No heating is required for normal operation due to heat dissipation from electrical equipment. However, electric duct heaters are installed to control temperature and to prevent moisture damage during construction.

6.8.8 PONDS AND BASINS - SITE 1

There are fourteen (14) individual ponds and basins included in the design estimate. These ponds support the various processes and functions of the plant. The ponds and basins included in the estimate are listed below:

Description	Equipment Number
Raw Water Pond	44-TK-0101
Raw Water Recovery Sump	44-TK-0102
Process Cooling Tower Makeup Pond	47-TK-0104
Utility Cooling Tower Recovery Sump	48-TK-0102
Wastewater Equalization Pond	54-TK-0103
Aeration Basins	54-TK-0104 A/B
Waste Collection Sump	54-TK-0110
Diversion Pond	54-TK-0111
Excess Water Holding Pond	54-TK-0113
Diversion Box	54-TK-0114
Clean Stormwater Pond	54-TK-0116
Oily Stormwater Pond	54-TK-0117
Evaporation Pond	54-TK-1024

6.8.8.1 FUNCTION AND REQUIREMENTS

(1) Description of Ponds and Basins

The following is a description of the functions and requirements of the major impoundment structures:

Raw Water Pond (44-TK-0101) has a working capacity of 65.8 million gallons. The water is supplied from the Bighorn

6.8.8.1 (Continued)

River. The pond operates continuously at near maximum capacity to provide a supply of process water and fire water.

Raw Water Recovery Sump (44-TK-0102) has a working capacity of 49,700 gallons. The sump recovers water from sludge clarification and dewatering. The water is returned to the Raw Water Pond.

Process Cooling Tower Makeup Pond (47-TK-0104) has a working capacity of 40.4 million gallons. The pond receives effluent from the wastewater treating system. This effluent is discharged to the process cooling tower as makeup water. The pond has a 7 day storage capacity.

Utility Cooling Tower Recovery Sump (48-TK-0102) has a working capacity of 43,600 gallons. The sump recovers water from sludge clarification and dewatering. The water is returned to the inlet of the utility cooling tower blowdown treatment system.

Wastewater Equalization Pond (54-TK-0103) has a working capacity of 606,000 gallons. This pond receives various biodegradable wastewaters generated within the facility. The blended wastewater is processed in a biological treatment system to produce cooling tower makeup in the facility systems.

Aeration Basins (54-TK-0104 A/B) have a working capacity of 8.5 million gallons each. They receive mixed plant wastes from the Wastewater Equalization Pond. Biodegradation of the wastewater contaminants are carried out by bacteria in the presence of oxygen supplied by a diffuser type aeration system. The basin discharges to the clarifiers.

6.8.8.1 (Continued)

Waste Collection Sump (54-TK-0110) has a working capacity of 11,300 gallons. This sump collects biotreating process sludges. The sludges are sent from this sump to sludge dewatering systems and then to incineration.

Diversion Pond (54-TK-0111) has a working capacity of 36.3 million gallons. Primarily, this pond stores off-spec biotreatment system effluent until the upset condition in that system is corrected. The collected off-spec effluent is returned to the biotreatment system at a controlled rate. In emergencies, the pond also stores other wastewaters originating within the facility until they can be recycled to the proper treatment system.

Excess Water Holding Pond (54-TK-0113) has a working capacity of 11.7 million gallons. This pond receive excess biotreatment system effluent during the cooler months of the year when demand for makeup at the process cooling tower system decreases. During periods of warm weather, the accumulated pond contents will be returned to the process cooling water system at a controlled rate as needed.

Diversion Box (54-TK-0114) has a working capacity of 71,300 gallons. This structure separates the clean and oily storm runoff prior to sending the effluent to the stormwater ponds.

Clean Stormwater Pond (54-TK-0116) has a working capacity of 26.7 million gallons. The pond receives clean runoff from both facility and general site areas. Normally, the clean runoff will be pumped to the utility cooling towers. Should the runoff be contaminated, the contaminated water will be transferred to the oily water treatment system.

6.8.8.1 (Continued)

Oily Stormwater Pond (54-TK-0117) has a working capacity of 3.8 million gallons. The pond receives contaminated stormwater and wastewaters from both processing and general plant site areas. The blended contaminated water is transferred to an oily water treatment system for processing and reused in the facility.

Evaporation Pond (54-TK-0124) has a maximum working volume of 196 million gallons. The pond receives concentrated brine from the evaporator. The influent is evaporated and permanently retained for the operating life of the facility.

(2) Sources of Pond and Basin Influents

Clean Stormwater consists of precipitation runoff from some undeveloped portions of the site area and from uncontaminated areas of the facility site. This runoff is segregated and collected in the Clean Stormwater Pond (54-TK-0116).

Oily Wastewater consists of precipitation runoff and washdown water from process units, utility units, and off-site units. It is collected in the Oily Stormwater Pond (54-TK-0117). This wastewater is deoiled in gravity type oil-water separators followed by air flotation (DAF). The deoiled effluent is sent to the biological treatment system.

The quality of the collected oily wastewater varies with the quantity of contaminants in the areas controlled and with the amount of precipitation.

6.8.8.1 (Continued)

Process Wastewater consists of stripped Lurgi gas liquor effluent. This wastewater is temporarily stored in separate tanks and subsequently transferred to the Wastewater Equalization Pond (54-TK-0103). Other streams that enter this pond and become part of the biological treatment feed stream are: (1) effluent from DAF units, (2) backwash water from the final biological treatment system filter, (3) effluent from sanitary waste treatment, and (4) effluent from Rectisol Unit 13 and POX Unit 24. This blended feed is treated and used internally as the major portion of the required cooling tower makeup.

Should the TOC content of the process waters become excessive, these streams will be diverted to the Diversion Pond (54-TK-0111). The collected wastewater is returned to Wastewater Equalization Pond (54-TK-0103) at a controlled rate to minimize shock effect on the biological treatment system.

Sanitary Sewage is collected in a separate sanitary sewage system and treated in a separate biological treatment system and then added to the Wastewater Equalization Basin (54-TK-0103).

High Salinity Wastewater consists of the following: (1) reject from various reverse osmosis units, (2) spent regenerant solutions from an ion exchange unit, (3) blowdown from the steam system flash drum, and (4) blowdown from the process cooling tower. After further concentration of the combined streams in the wastewater evaporator, the effluent brine is discharged to the Evaporation Pond (54-TK-1024).

6.8.8.1 (Continued)

Low Salinity Wastewater consists of spent regenerant and rinse water from several sodium zeolite softening units plus sufficient blowdown of reverse osmosis reject water to satisfy the quantity required for makeup to the ash handling systems.

Biological Treatment System Effluent is stored during the colder months of the year when the quantity of required makeup to the cooling tower system is reduced. This results in an excess of biological treatment system effluent. This excess quantity is accumulated in the Excess Water Holding Pond (54-TK-0113). The pond is sized to contain the total excess volume accumulated on a yearly basis. As demand for cooling tower makeup increases with warmer weather, the pond contents will be returned to the cooling water system at a controlled rate.

Raw Water is pumped from the Bighorn River to the Raw Water Pond (44-TK-0101).

6.8.8.2 PRELIMINARY DESIGN

A preliminary design of the ponds and basins was prepared. This work included the following:

(1) Design of Lining System
(2) Design of Leakage Detection System
(3) Sizing of Ponds and Basins

(1) Design of Lining System

Lining Materials - All ponds and basins are lined for the purposes of water conservation, prevention of groundwater contamination, and/or ease of maintenance. Three (3) different

6.8.8.2 (Continued)

types of lining materials are used depending on the particular requirements of the individual structures. The three lining materials are:

High-Density Polyethylene (HDPE)
Reinforced Concrete
Clay

HDPE is used to line those ponds where oils and/or corrosive chemicals are stored. HDPE is also used in the Raw Water Pond for water conservation, and also because it creates a clean and durable surface. Reinforced concrete lines those ponds or basins that require vertical walls and/or a very durable surface due to frequent mechanical cleaning or maintenance. Clay is used as the primary lining in ponds that do not require a clean, sediment-free surface and do not impound hazardous materials. Clay is also used as the secondary lining in certain ponds and basins as required.

Other synthetic membrane linings considered, other than HDPE, were the plastic and rubber linings. Polyvinyl chloride (PVC), a plastic lining, is perhaps one of the most widely used of all synthetic linings. The primary disadvantage of PVC is that it cannot be exposed to the sun for any extended period of time before degradation occurs. PVC is also not compatible with oils. The most widely known and used rubber lining is chlorosulphonated polyethylene (CSPE), more commonly known as Hypalon. Hypalon offers excellent resistance to weathering and aging. Although Hypalon has a wide range of chemical resistance, it has limited application where oils and aromatic hydrocarbons are present. Because the plastic and rubber linings discussed above are generally not compatible with oils, they were not used in this facility.

6.8.8.2 (Continued)

HDPE is one of the most chemically inert, abrasive, and puncture resistant synthetic membrane lining available. HDPE is compatible with a very wide range of chemicals including oils, acids, and other corrosive chemicals.

During the detailed engineering phase, further studies will be made to verify the selection of the proper lining. This work will include immersion tests to substantiate the chemical compatibility of the different lining materials with their stored products. In addition, a complete search of any new developments in the lining industry will be made to be certain that the most suitable and economic material is used.

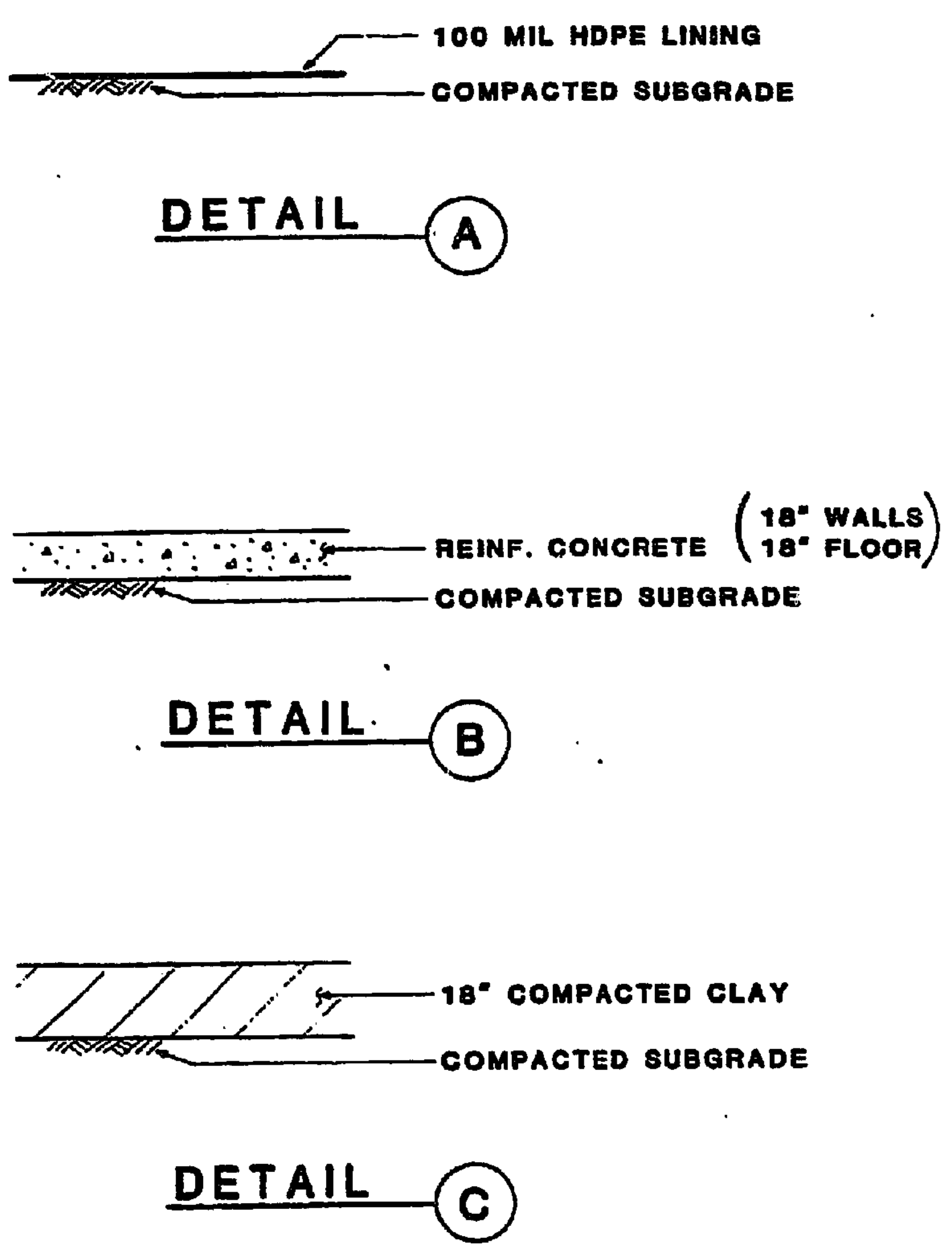
The clay to be used as a lining is available onsite. According to the preliminary geotechnical investigation by Woodward-Clyde Consultants, the clay will make a good construction material for pond linings.

Lining Systems - There are five (5) different lining systems that are used in the various ponds and basins as listed in Table 6.8.8-1 and shown on Drawing 835704-00-1-098A and Drawing 835704-00-1-098B.

TABLE 6.8.8-1

PONDS AND BASINS DETAILS OF CONSTRUCTION

EQUIPMENT NUMBER	DESCRIPTION	LINING SYSTEM DETAIL	DIMENSIONS (FEET) X	Y	x	y	D	FBD	SIDE SLOPE	NO. OF PONDS	LEAKAGE DETECTION REQUIRED
44-TK-0101	Raw Water Pond	A	775	775	667	667	18	3	3:1	1	No
44-TK-0102	Raw Water Recovery Sump	B	30	30	-	-	9	1.6	VERT	1	No
47-TK-0104	Process Cooling Tower Makeup Pond	A	660	660	552	552	18	3	3:1	1	No
48-TK-0102	Utility Cooling Tower Recovery Sump	B	24	24	-	-	12	1.9	VERT	1	No
54-TK-0103	Wastewater Equalization Pond	D	120	120	30	30	15	2	3:1	1	Yes
54-TK-0104A/B	Aeration Basins	E	240	240	-	-	12	2.1	VERT	2	Yes
54-TK-0110	Waste Collection Sump	E	12	12	-	-	12	1.4	VERT	1	Yes
54-TK-0111	Diversion Pond	D	630	630	522	522	18	3	3:1	1	Yes
54-TK-0113	Excess Water Holding Pond	D	380	380	272	272	18	3	3:1	1	Yes
54-TK-0114	Diversion Box	E	30	30	-	-	12	1.4	VERT	1	Yes
54-TK-0116	Clean Stormwater Pond	C	550	550	442	442	18	3	3:1	1	No
54-TK-0117	Oily Stormwater Pond	D	240	240	132	132	18	3	3:1	1	Yes
54-TK-0124	Evaporation Pond	D	1600	1300	1492	1192	18	4	3:1	1	Yes



FLUOR

DR J. GRAU	POND LINING SYSTEM DETAILS
CH M. DORIN	SYNFUELS FEASIBILITY STUDY
SUPV A. QUINONES	
SUPV ENG M. DORIN	CROW TRIBE OF INDIANS — MONTANA
SCALE NONE	DRAWING NUMBER 835704-00-1-098A — REV. 1

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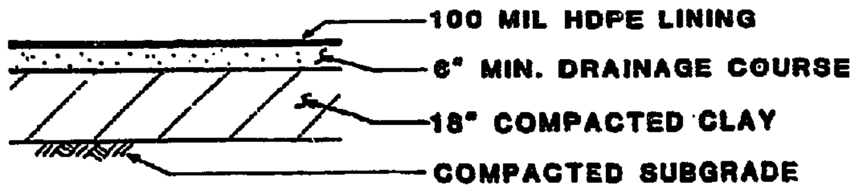
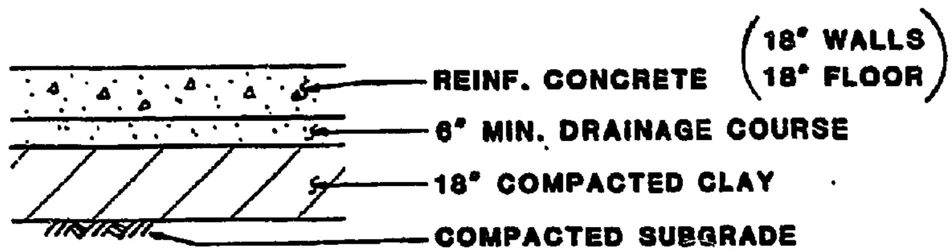


DETAIL (D)



DETAIL (E)

FLUOR

DR J. GRAU	POND LINING SYSTEM DETAILS
CH M. DORIN	SYNFUELS FEASIBILITY STUDY
SUPV A. QUINONES	
SUPPING M. DORIN	CROW TRIBE OF INDIANS MONTANA
SCALE NONE	DRAWING NUMBER 835704-00-1-098B — REV 1

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6.8.8.2 (Continued)

(2) Design of Leakage Detection System

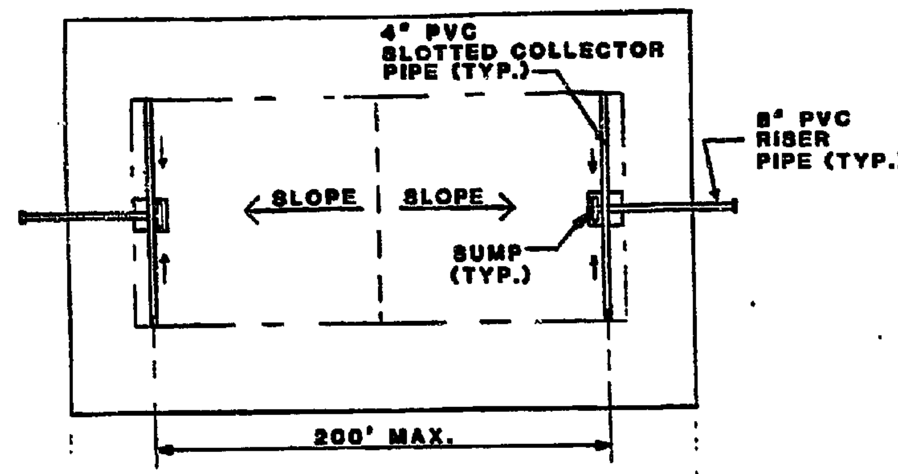
Depending upon the characteristics of the effluent stored, certain ponds have a monitoring system to assure detection of any leakage.

The leakage detection system consists of a drainage layer of gravel sandwiched between the primary lining and clay secondary lining. Any leakage through the primary lining will drain through the gravel drainage layer to slotted collector pipes. The collector pipe will transport the leakage to a sump. A riser pipe extends from the sump to allow sampling and liquid removal. Typical details of the leakage detection system is shown on Drawing 835704-00-1-099.

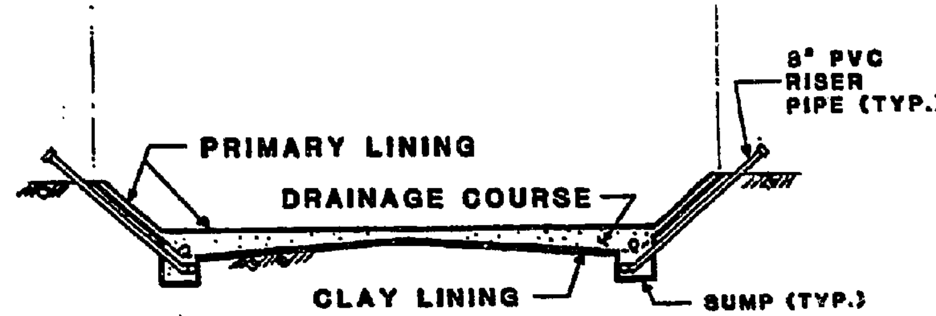
(3) Sizing of Ponds and Basins

The dimensions of the ponds and basins were determined based on their required capacities as discussed in Section 6.8.8.1. The dimensions of each of the impoundment structures is listed on Table 6.8.8-1. Plans and sections of the structures are shown on Drawing 835704-00-1-100A and Drawing 835704-00-1-100B.

The required freeboard for each of the ponds and basins is also included in Table 6.8.8-1. The freeboard was determined by calculating both wave runup and wind setup.

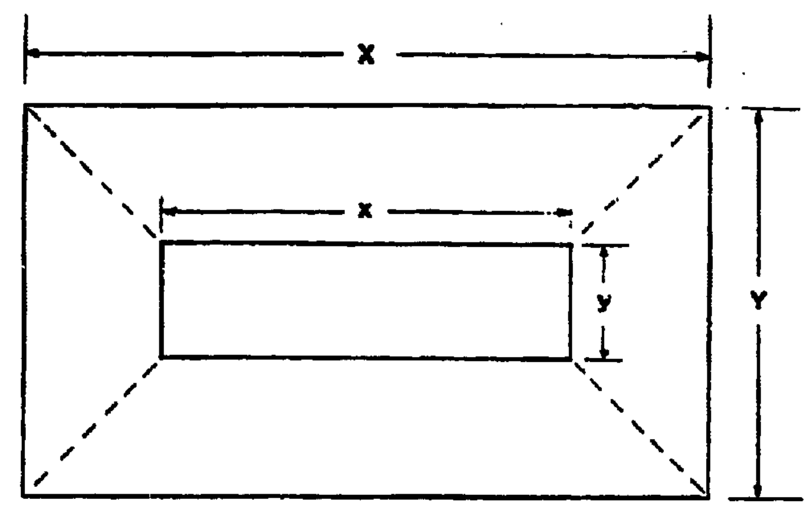


PLAN



SECTION

FLUOR	J. GRAU	TYPICAL LEAKAGE DETECTION DETAILS
	M. DORIN	SYNFUELS FEASIBILITY STUDY
	A. QUINONES	
	M. DORIN	CROW TRIBE OF INDIANS — MONTANA
	SCALE: NONE	DWG NO. NUMBER: 835704-00-1-099 — REV. 1



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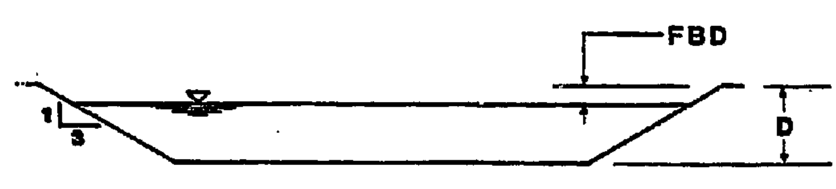

SECTION

FLUOR	DR J. GRAU	POND DETAILS PLAN AND SECTION
	CH M. DORIN	SYNFUELS FEASIBILITY STUDY
	SUPR A. QUINONES	CROW TRIBE OF INDIANS — MONTANA
	SUPR ENG M. DORIN	
	SCALE NONE	DRAWING NUMBER 835704-00-1-100A — REV 1

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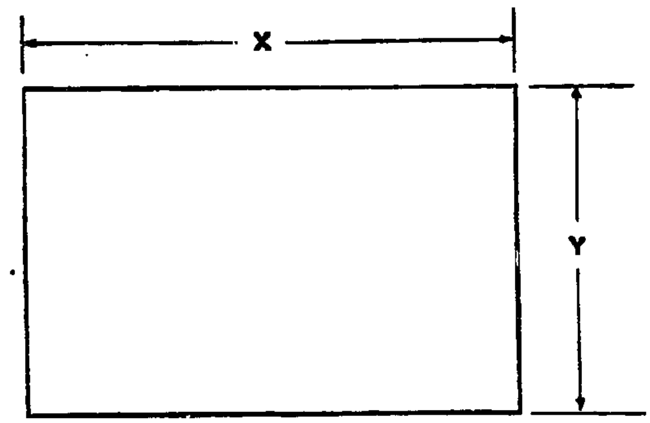

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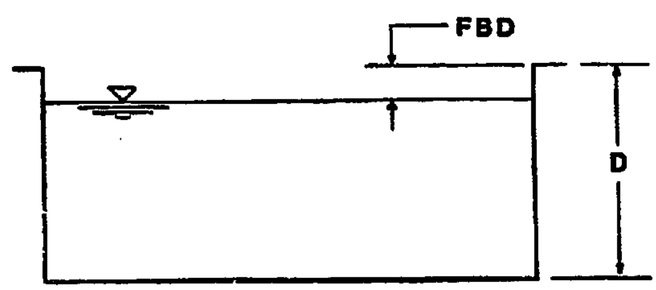

SECTION

FLUOR

DR J. GRAU	POND DETAILS PLAN AND SECTION	
CH M. DORIN		
SUPV A. QUINONES	SYNFUELS FEASIBILITY STUDY	
SUPV ENG M. DORIN	CROW TRIBE OF INDIANS	MONTANA
SCALE NONE	DRAWING NUMBER 835704-00-1-100B	REV. 1

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6.8.9 SITE PREPARATION - SITE 23

6.8.9.1 CLEARING AND GRUBBING

Prior to any excavation operations, the plant site is cleared and grubbed. The area is presently used for grazing. Vegetation consists of low lying shrubs and grasses. There are no trees on the plant site area. All organic material is stockpiled and burned or disposed offsite. The clearing and grubbing operations cover an area of 490 acres at a depth of six (6) inches.

6.8.9.2 PLANT GRADING

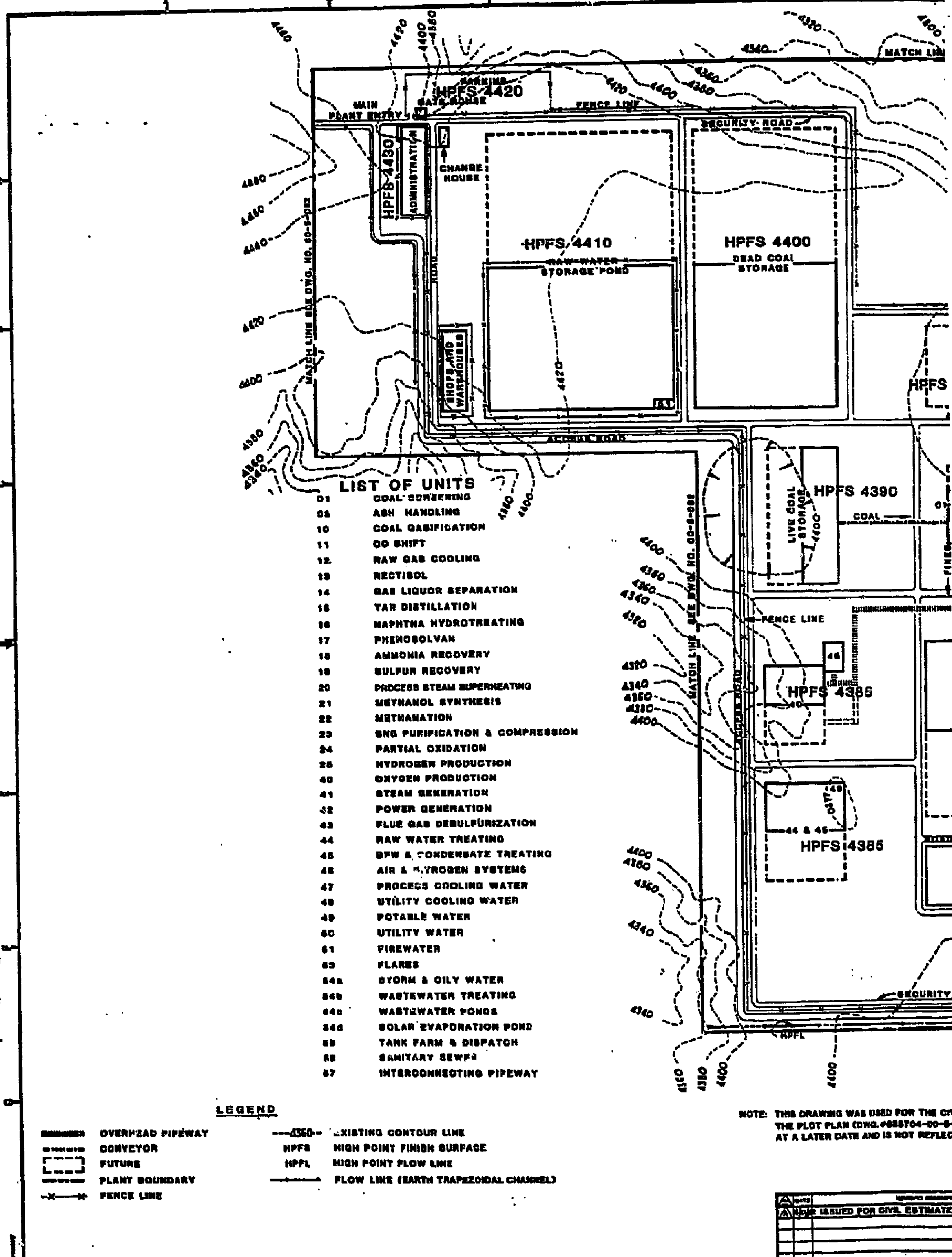
The plant site is graded to create level areas for the process units as shown on Drawing 835704-00-5-084.

The plant is graded to follow as much as practical, the natural terrain of the area thereby minimizing the required earthwork. This necessitates terracing the area and placing some units at different elevations. The terraces step down in the direction of the ponds located in the southeasterly corner of the plant site. The terracing facilitates gravity draining the process areas to the ponds while also minimizing the depth of excavation for drain pipe trenches.

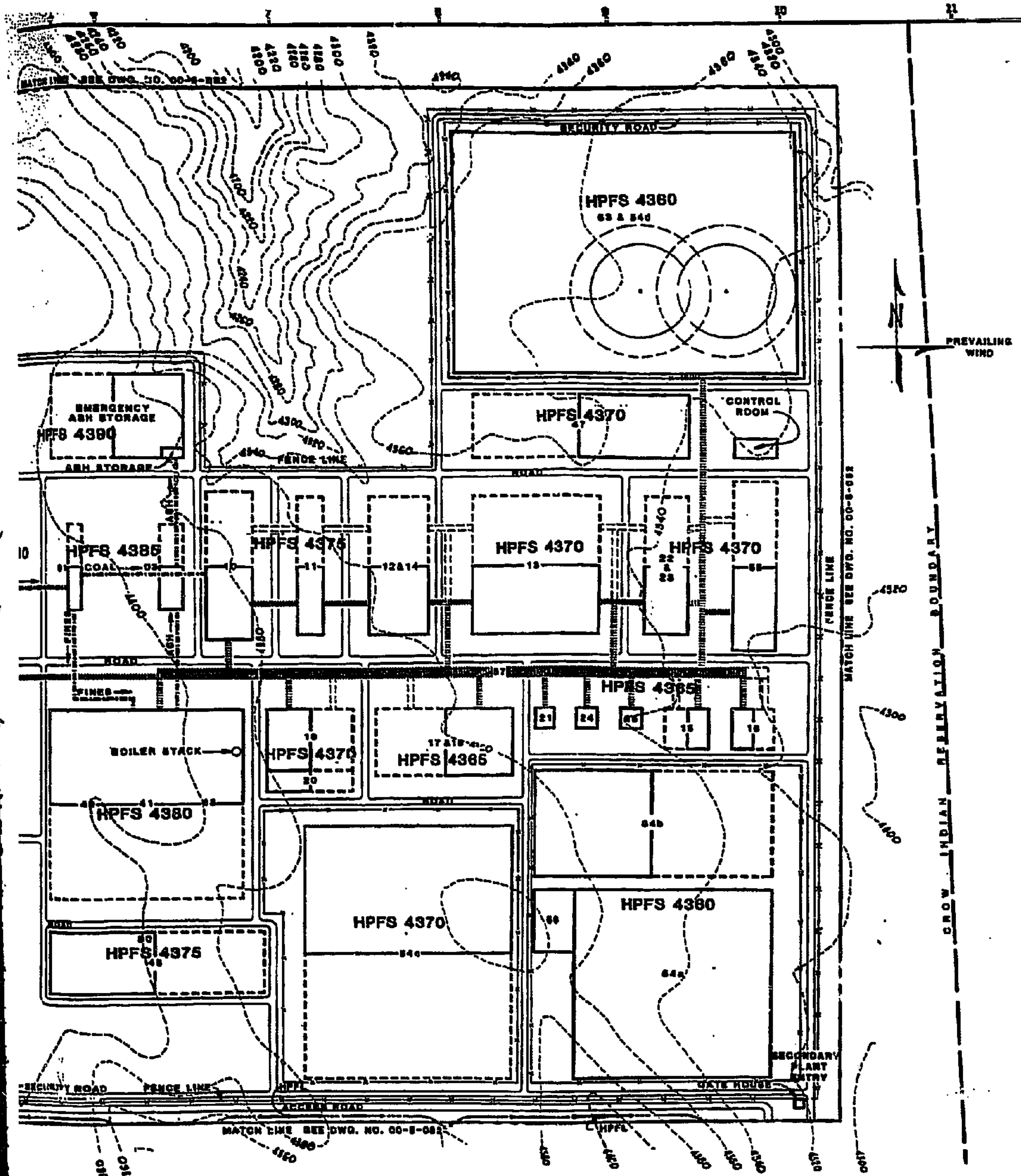
The process areas in the westerly half of the plant site are located on naturally higher ground. This area requires excavation to attain its final grade elevation. The process areas in the easterly half are on fill.

The railroad facility located offsite requires both excavation and fill.

The earthwork quantities of excavation and fill are in balance so that no importing or exporting of material is required. The excavation and



MATCH LINE
PARKING
HPFS 4420
MAIN PLANT ENTRY
GATE HOUSE
FENCE LINE
SECURITY ROAD
HPFS 4430
ADMINISTRATION
CHANGE HOUSE
HPFS 4410
RAW WATER STORAGE POND
HPFS 4400
DEAD COAL STORAGE
SHOPS AND WAREHOUSES
MATCH LINE SEE DWG. NO. 60-8-082
HPFS
HPFS 4390
LIVE COAL STORAGE
COAL
FENCE LINE
HPFS 4385
HPFS 4385
SECURITY
HPFL
LIST OF UNITS
01 COAL SCREENING
05 ASH HANDLING
10 COAL GASIFICATION
11 CO SHIFT
12 RAW GAS COOLING
13 RECTISOL
14 GAS LIQUOR SEPARATION
15 TAR DISTILLATION
16 NAPHTHA HYDROTREATING
17 PHENOSOLVAN
18 AMMONIA RECOVERY
19 SULFUR RECOVERY
20 PROCESS STEAM SUPERHEATING
21 METHANOL SYNTHESIS
22 METHANATION
23 SNG PURIFICATION & COMPRESSION
24 PARTIAL OXIDATION
25 HYDROGEN PRODUCTION
40 OXYGEN PRODUCTION
41 STEAM GENERATION
42 POWER GENERATION
43 FLUE GAS DESULFURIZATION
44 RAW WATER TREATING
45 BFW & CONDENSATE TREATING
46 AIR & NITROGEN SYSTEMS
47 PROCESS COOLING WATER
48 UTILITY COOLING WATER
49 POTABLE WATER
50 UTILITY WATER
51 FIREWATER
53 FLARES
54a STORM & OILY WATER
54b WASTEWATER TREATING
54c WASTEWATER PONDS
54d SOLAR EVAPORATION POND
55 TANK FARM & DISPATCH
56 SANITARY SEWER
57 INTERCONNECTING PIPEWAY
LEGEND
OVERHEAD PIPEWAY
CONVEYOR
FUTURE
PLANT BOUNDARY
FENCE LINE
4350 EXISTING CONTOUR LINE
HPFS HIGH POINT FINISH SURFACE
HPFL HIGH POINT FLOW LINE
FLOW LINE (EARTH TRAPEZOIDAL CHANNEL)
NOTE: THIS DRAWING WAS USED FOR THE CIVI
THE PLOT PLAN (DWG. #
AT A LATER DATE AND IS NOT REFLECT
ISSUED FOR CIVIL ESTIMATE



FOR THE CIVIL COST ESTIMATE. 35704-00-5-061) WAS REVISED NOT REFLECTED IN THIS DRAWING.

USE OR DISCLOSURE OF REPORT DATA IS SUBJECT TO THE RESTRICTION ON THE NOTICE PAGE AT THE FRONT OF THIS REPORT

0 200 400 600 800 1000 FT.
* REDUCED PRINT SCALE

00-5-061	PLOT PLAN
00-5-062	VICINITY MAP

FLUOR

SITE # 23 SITE PREPARATION
OFF-SITE DRAINAGE & GRADING PLAN
SYNFUELS FEASIBILITY STUDY
CROW TRIBE OF INDIANS MONTANA

1" = 200' | 835704-00-5-064 | A.

6.8.9.2 (Continued)

backfill for the site is approximately 5,500,000 cubic yards each. The excavation and backfill for the railroad facility serving the site is 2,000,000 cubic yards. A 15 percent shrinkage factor was assumed. Naturally soft soils including topsoils that are unsuitable for foundations are improved by mixing with other soils for use onsite.

All permanent slopes are constructed to a slope of 2H:1V or flatter.

A discussion of the following items is contained in Section 6.4.1.2:

- Excavation
- Compaction
- Expansive soils
- Control of surface moisture

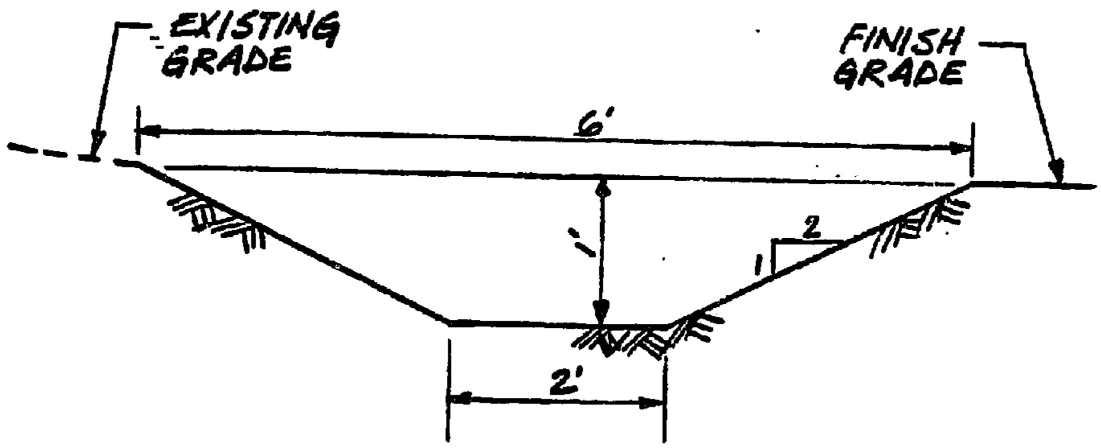
Offsite Drainage

Runoff occuring offsite of the plant areas is intercepted and diverted away from the plant to existing natural drainage courses as shown on Drawing 835704-00-5-084. The offsite drainage is transported by open channels. No runoff from the plant unit areas is allowed to enter the offsite drainage channels.

As discussed in Section 5.2 of this Volume, the direction of the natural drainage is generally away from the site. Therefore, the quantities of required offsite channels is small.

Open channels are provided along the southerly boundary of the site and also along both sides of the northwesterly corner.

Typical details and a summary of the quantities for the offsite channels are shown on Drawing 835704-00-1-129.



TYPICAL SECTION

EARTH TRAPEZOIDAL CHANNEL

LENGTH = 3550'

SITE #23

FLUOR	DR J. GRAU	EARTH TRAPEZOIDAL CHANNEL
	CH M. DORIN	
	SUPR A. QUINONES	SYNFUELS FEASIBILITY STUDY
	SUPR ENG M. DORIN	CROW TRIBE OF INDIANS MONTANA
	SCALE NONE	DRAWING NUMBER 835704-00-1-129 REV. 1

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6.8.9.2 (Continued)

Fencing

The design details of the fencing required for Site 23 is the same as that specified for Site 1 as described in Section 6.8.1.2.

The summary of estimated quantities for Site 23 is as follows:

Item	Quantity
8' high chain link fence	50,000 LF
3'-6" wide gate	13 each
32'-0" wide double swing gate	3 each
16'-0" wide single swing gate	11 each

Plot Plan Late Changes

The plot plan of the plant was modified at a late date. These changes are not reflected in the civil/structural drawings.

6.8.10 ROADS - SITE 23

The roads serve the plant site to connect the plant with outside routes and also to convey internal plant traffic. The new roads serving the plant are divided into two types based on their usage.

(1) Access Roads
(2) Plant Roads

A description of the existing roads in the area is described in Section 5.2 of this Volume.

6.8.10.1 ACCESS ROADS

There are no existing county or state roads presently connecting the plant site with any major highway. Therefore, Access Roads must be constructed to provide vehicular access to the plant site.

Two separate Access Roads are provided; one provides access from the Crow Indian Reservation area, while another provides access from the Sheridan, Wyoming area.

The road providing access to the site from the Reservation area originates at Highway 87 near Wyola and runs in an easterly direction to the plant. This Access Road enters the plant at the primary entrance located in the northwesterly corner of the site. The Access Road continues from the primary entrance, running along the westerly and southerly boundaries of the plant site, to the secondary entrance located in the southeasterly corner of the site.

6.8.10.1 (Continued)

The road providing access to the site form the Sheridan, Wyoming area also enters the site at the plant secondary entrance, and continues to the primary entrance. This Access Road originates near the plant railroad facility located southerly of the proposed Shell Mine. Here the Plant Access Road branches from the Mine Access Road to be built by the Shell Oil Company. The Mine Access Road connects the mine with Highway 338 which connects to Highway 87 north of Sheridan.

The total length of Access Road required for the plant is about 30 miles. The design details of the new Access Road is identical to that used for Site 1 as described in Section 6.8.2.1.

The Access Road is provided with drainage ditches as required. These ditches convey runoff to natural drainages in the area. Bridges and culverts are provided where the Access Road crosses natural drainages as listed below:

Item	Quantity
2 lane bridge over creek	3 each
72" dia. reinforced concrete pipe culvert	320 LF
84" dia. reinforced concrete pipe culvert	480 LF
8'x24' reinforced concrete box culvert	160 LF
8'x40' reinforced concrete box culvert	240 LF

6.8.10.2 PLANT ROADS

There are four types of roads within the plant site:

(1) Access Road
(2) Plant Primary Road
(3) Plant Secondary Road
(4) Plant Security Road

(1) Access Road

The Access Road connects the plant site with major existing offsite roads as described in Section 6.8.2.1. The Access Road extends into the plant site between the administration building and the employee parking and ends at the southwesterly corner of the warehouse facility. At this point the Plant Primary Road begins. The Access Road is extended into the plant site to accommodate the heavier traffic in this area due to warehouse deliveries, plant personnel, and visitors.

(2) Plant Primary Road

The design details for the Plant Primary Road required for Site 23 are identical to that specified for Site 1 as discussed in Section 6.8.1.2.

The estimated length of Plant Primary Road required is 7 miles.

6.8.10.2 (Continued)

(3) Plant Secondary Road

The design details for the Plant Secondary Road required for Site 23 are identical to that specified for Site 1 as discussed in Section 6.8.1.2.

The estimated length of Plant Secondary Road required is 2 miles.

(4) Plant Security Road

The design details of the Plant Security Road required for Site 23 are identical to that specified for Site 1 as discussed in Section 6.8.1.2.2.

The estimated length of Plant Security Road required is 2 miles.

6.8.11 RAILROAD - SITE 23

Since Site 23 is located adjacent to its coal source, a new railroad is provided only for the import of equipment and supplies and export of by-products. The railroad is not used for coal import.

Studies were made in an attempt to route a rail line to the site from Wyola and also from south of the plant. Because of the ruggedness and steepness of the existing terrain it was not economically practical to route the rail line to the plant. Therefore, the railroad loading and unloading facility is located offsite, southerly of the Shell Mine. The new rail line serving the Shell Mine is to be built by the Shell Oil Company and will provide access to the plant railroad facility.

The railroad facility loops off of the new rail line that serves the proposed Shell Mine.

Culverts are provided in the railroad facility as required. It is estimated that 160 LF of 72 inch diameter reinforced concrete pipe is required. A bridge over Little Young's Creek is also provided.

6.8.12 LOGISTIC FACILITIES - SITE 23

The major logistic facilities serving the plant are:

(1) Rail Shipping and Receiving
(2) Truck Shipping and Receiving

6.8.12.1 RAIL SHIPPING AND RECEIVING FACILITIES

The railroad facility serves as an area for loading and shipping of some byproducts and spent catalysts. The facility is also used for receiving and shipping of materials during construction and plant operation.

The rail facility is composed of several tracks for the loading, unloading, storage and maneuvering of cars. The looping track within the facility is left unobstructed at all times.

A platform is provided at the rail facility for the loading and unloading of trucks serving the plant.

6.8.12.2 TRUCK SHIPPING AND RECEIVING FACILITIES

There are two major truck shipping and receiving areas provided with platforms for the loading and unloading of materials, equipment, and supplies. These facilities are located at:

(1) Railroad facility
(2) Truck loading and unloading docks at the warehouse/shops facility

6.8.12.2 (Continued)

All truck facilities are used for the shipping and receiving of equipment, building materials, chemicals, catalysts and other supplies. Since there is no railroad within the plant site, all materials to be stored must be transported by truck to the warehouse/shops facility.

6.8.13 PAVING - SITE 23

The design details of the paving for Site 23 are the same as that specified for Site 1 as described in Section 6.8.5.

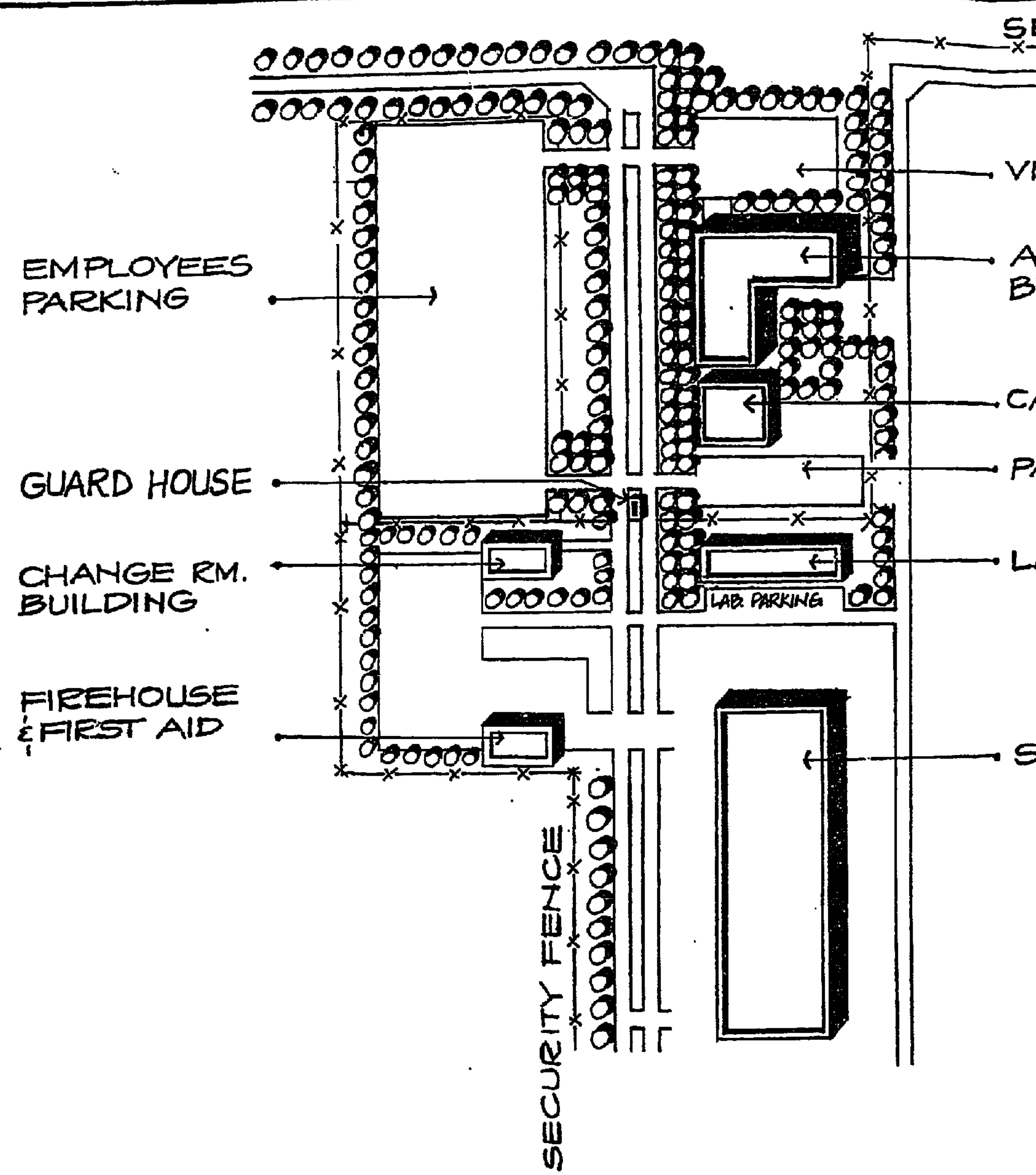
6.8.14 FOUNDATIONS AND STRUCTURES - SITE 23

The soils characteristics of Site 23 is assumed to be similar to Site 1. Therefore, the foundations and structures for Site 23 are the same as for Site 1 as described in Section 6.8.6.

6.8.15 BUILDINGS - SITE 23

The individual buildings required for Site 23 are identical to those specified for Site 1 as described in Section 6.8.7.

The layout of the Administration area for Site 23 is shown in Drawing 835704-61-2-301.



REV NO.	DATE	REVISION DESCRIPTION	DRAWN / CHECK	DATE
1	5/3/82	ISSUED FOR STUDY	M.D.	5/3/82

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OR

SECURITY FENCE

SECURITY ROAD

VISITORS PARKING

ADMINISTRATION BLD'G.

CAFETERIA

PARKING

LABORATORY BLD'G.

SHOPS & WAREHOUSE

N

OR

DRAWN BY A. CYGA		SITE #23 LAYOUT OF ADMINISTRATION/WAREHOUSE AREA
CHECKED BY M. DORIN		SYNFUELS FEASIBILITY STUDY
SUPERVISOR J. ADISSI	RELEASE DATE 5-3-82	CROW TRIBE OF INDIANS — MONTANA
SUPERVISING ENGR. M. DORIN	INITIALS M. Dorin	
PROJECT ENGR. R. LANG	APP. DATE RAL 6/3/82	SCALE 1"=200' · DRAWING NUMBER 835704-61-2-301 · REVISION 1
CLIENT	APP. DATE	

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6.8.16 PONDS AND BASINS - SITE 23

The ponds and basins required for Site 23 are identical to those specified for Site 1 as described in Section 6.8.8.

6.9 COST ESTIMATES

All cost estimates which were discussed in Sections 5.6, and 5.7 are presented in the following Sections 6.9.1, 6.9.2, 6.9.3, 6.9.4, and 6.9.5.

6.9.1 CAPITAL COST SUMMARY

Capital costs for the four cases evaluated in the feasibility study are summarized in Table 6.9.1-1. The Direct Field Costs are presented for each major section of the synfuels facility. The Material Transport Costs, Indirect Field Costs, Home Office Costs, and Other Capital Costs make up the Total Field and Office Costs. The Financing Costs and Interest During Construction are not included in the Total Capital Costs.

The Base Case reflects a three percent lower capital cost than the Shell Coal Case. The increased capital costs reflect the additional water pipeline, access roads, and site preparation costs required for Site 23. Also, increased capital costs result because of additional power generating facilities for the Shell Coal Case. Because the Shell Coal has a higher heating value, less coal is required to supply the inplant energy consumption therefore a corresponding greater power export results.

Comparing the Base Case and the Power Self-sufficiency Case, the capital cost difference is $364.9 million to produce an additional 283.2 MW of power. This is $1288/kW which is comparable to the installed cost for new coal fired power generating facilities.

For the Coproduction Case, the capital costs are very similar to those of the Base Case.

TABLE 6.9.1-1

CAPITAL COST SUMMARY

AREA	BASE CASE @ SITE 1 $ x 10³	SELF-SUFFICIENCY CASE @ SITE 1 $ x 10³	COPRODUCTION CASE @ SITE 1 $ x 10³	SHELL COAL CASE @ SITE 23 $ x 10³
Coal Handling	29,100	23,200	29,100	26,300
Gas Production	164,800	164,800	146,700	167,400
Byproduct Processing	75,100	75,100	137,600	80,300
Methanation and SNG	42,000	42,000	17,200	42,000
Oxygen Production	35,000	44,900	35,700	35,800
Utilities	328,700	174,000	309,300	335,000
Offsites	171,800	150,100	174,700	172,600
General	33,700	33,700	33,700	61,900
Ash Disposal	4,200	3,400	4,200	0
Total DFC	884,400	711,200	888,200	921,300
Material Transport	70,000	56,000	70,600	74,000
Indirect Field Costs	351,600	289,100	348,200	352,700
Total Field Costs	1,306,000	1,056,300	1,307,000	1,348,000
Home Office Costs	160,000	132,200	170,000	165,000
Total Field and Office Costs	1,466,000	1,188,500	1,477,000	1,513,000
Other Capital Costs	570,400	483,000	570,700	580,900
Total Capital Costs(1)	2,036,400	1,671,500	2,047,700	2,093,900

(1) Does not include financing costs and interest during construction (IDC).

6.9.2 CAPITAL COST ESTIMATE

Capital costs for each case are summarized individually in Tables 6.9.2-1, 6.9.2-2, 6.9.2-3, and 6.9.2-4. Details in the summaries include direct field manhours, direct field labor dollars, and direct field materials in addition to the information presented previously in the cost summary. Direct field costs for each unit and each area are presented in Table 6.9.2-5.

TABLE 6.9.2-1

CAPITAL COST ESTIMATE

Base Case: Westmoreland Coal, 40% Fines @ Site 1, SNG - 137 MM SCF/SD, 18,000 T/D Coal to Plant	Manhours X 10^3	1st Qtr 1982 Estimated Cost in U.S. $ X 10^3 with World Wide Procurement		
		Labor	Material	Total
AREA				
Coal Handling	870	15,300	13,800	29,100
Gas Production	2,970	52,300	112,500	164,800
Byproduct Processing	1,760	31,000	44,100	75,100
Methanation and SNG	730	12,800	29,200	42,000
Oxygen Production	380	6,700	28,300	35,000
Utilities	4,750	83,500	245,200	328,700
Offsites	4,050	71,200	100,600	171,800
General	930	13,100	20,700	33,800
Ash Disposal	170	2,400	1,800	4,200
Sub-Total	16,610	288,300	596,200	884,500
Final Adjustments & Roundoffs	270	4,700	(4,800)	(100)
Total Direct Field Costs	16,880	293,000	591,400	884,400
Material Transport			70,000	70,000
Indirect Field Costs	5,360			351,600
Total Field Costs	22,240			1,306,000
Home Office Costs	3,650			160,000
Total Field and Office Costs				1,466,000
Other Capital Costs				570,400
Total Capital Costs				2,036,400

TABLE 6.9.2-2

CAPITAL COST ESTIMATE

Power Self-Sufficiency Case: Westmoreland Coal @ Site 1 SNG - 137 MM SCF/SD 13,166 T/D Coal to Plant	Manhours X 10^3	1st Qtr 1982 Estimated Cost in U.S. $ X 10^3 with World Wide Procurement		
		Labor	Material	Total
AREA				
Coal Handling	690	12,200	11,000	23,200
Gas Production	2,970	52,300	112,500	164,800
Byproduct Processing	1,760	31,000	44,100	75,100
Methanation and SNG	730	12,800	29,200	42,000
Oxygen Production	450	7,800	37,100	44,900
Utilities	3,060	53,900	159,600	174,000
Offsites	3,710	65,200	84,900	150,100
General	930	13,100	20,600	33,700
Ash Disposal	120	2,100	1,300	3,400
Total Direct Field Costs	14,420	250,400	500,300	711,200
Material Transport			59,000	56,000
Indirect Field Costs	4,610			289,100
Total Field Costs	19,030			1,056,300
Home Office Costs	3,210			132,200
Total Field and Office Costs				1,188,500
Other Capital Costs				483,000
Total Capital Costs				1,671,500

TABLE 6.9.2-3

CAPITAL COST ESTIMATE

Coproduction Case: Westmoreland Coal @ Site 1 SNG - 67.4 MM SCF/SD Methanol - 3,752 T/SD 18,000 T/D Coal to Plant	Manhours X 10^3	1st Qtr 1982 Estimated Cost in U.S. $ X 10^3 with World Wide Procurement: Labor	Material	Total
AREA				
Coal Handling	870	15,300	13,800	29,100
Gas Production	2,690	47,300	99,400	146,700
Byproduct Processing	2,830	49,800	87,800	137,600
Methanation and SNG	240	4,200	13,000	17,200
Oxygen Production	390	6,900	28,800	35,700
Utilities	4,460	78,500	230,800	309,300
Offsites	4,130	72,700	102,000	174,700
General	930	13,100	20,600	33,700
Ash Disposal	170	2,400	1,800	4,200
Total Direct Field Costs	16,710	290,200	598,000	888,200
Material Transport			70,600	70,600
Indirect Field Costs	5,350			348,200
Total Field Costs	22,060			1,307,000
Home Office Costs	3,900			170,000
Total Field and Office Costs				1,477,000
Other Capital Costs				570,700
Total Capital Costs				2,047,700

TABLE 6.9.2-4

CAPITAL COST ESTIMATE

Shell Coal Case: Shell Coal @ Site 23 SNG - 137.5 MM SCF/SD 17,600 T/D Coal to Plant	Manhours X 10^3	1st Qtr 1982 Estimated Cost in U.S. $ X 10^3 with World Wide Procurement		
		Labor	Material	Total
AREA				
Coal Handling	810	14,200	12,100	26,300
Gas Production	2,980	52,500	114,900	167,400
Byproduct Processing	1,920	33,900	46,400	80,300
Methanation and SNG	730	12,800	29,200	42,009
Oxygen Production	390	6,900	28,900	35,800
Utilities	4,800	84,400	250,600	335,000
Offsites	4,070	71,700	100,900	172,600
General	1,260	17,600	44,300	61,900
Ash Disposal	-0-	-0-	-0-	-0-
Total Direct Field Costs	16,960	294,000	627,300	921,300
Material Transport			74,000	74,000
Indirect Field Costs	5,420			352,700
Total Field Costs	22,380			1,348,000
Home Office Costs	3,800			165,000
Total Field and Office Costs				1,513,000
Other Capital Costs				580,900
Total Capital Costs				2,093,900

TABLE 6.9.2-5

DIRECT FIELD COSTS

AREA COAL HANDLING	BASE CASE @ SITE 1 $ x 10^3	SELF-SUFFICENCY CASE @ SITE 1 $ x 10^3	COPRODUCTION CASE @ SITE 1 $ x 10^3	SHELL COAL CASE @ SITE 23 $ x 10^3
01 Coal Handling		Confidential Data		
02 Coal Distribution				
03 Ash Handling				
Sub-Total				
GAS PRODUCTION				
10 Gasification		Confidential Data		
11 Shift Conversion				
12 Gas Cooling				
13 Rectisol				
24 Partial Oxidation				
Sub-Total				
BY PRODUCT PROCESSING				
14 Liquor Separation		Confidential Data		
15 Tar Distillation				
16 Naphtha Hydrogenation				
17 Phensolvan				
18 Ammonia Recovery				
19 Sulfur Recovery				
20 Process steam superheating				
21 Methanol Synthesis				
25 PSA H_2 Production				
Sub-Total				
Total Page 1 Carried Forward				

TABLE 6.9.2-5 (Continued)

DIRECT FIELD COSTS

AREA	BASE CASE @ SITE 1 $ x 10^3	SELF-SUFFICENCY CASE @ SITE 1 $ x 10^3	COPRODUCTION CASE @ SITE 1 $ x 10^3	SHELL COAL CASE @ SITE 23 $ x 10^3
S/T Brought Forward		Confidential Data		
METHANATION AND SNG				
22 Methanation		Confidential Data		
23 SNG Compression and Purification				
Sub-Total				
OXYGEN PRODUCTION				
40 Oxygen Production		Confidential Data		
Sub-Total				
UTILITIES				
41 Steam Generation		Confidential Data		
42 Power Generation				
43 Flue Gas Desulfurization				
44 Raw Water Treating				
45 BFW and Condensate Treating				
46 Air and Nitrogen Supply				
47 Process Cooling Water				
48 Utility Cooling Water				
49 Potable Water				
50 Utility Water				
51 Firewater System				
52 Flue Gas				
53 Flare				
Sub-Total				
Total Page 2 carried Forward				

TABLE 6.9.2-5 (Continued)
DIRECT FIELD COSTS SUMMARY

AREA OFFSITES	BASE CASE @ SITE 1 $ x 10³	SELF-SUFFICENCY CASE @ SITE 1 $ x 10³	COPRODUCTION CASE @ SITE 1 $ x 10³	SHELL COAL CASE @ SITE 23 $ x 10³
S/T Brought Forward		Confidential Data		
54 Wastewater Treating				
55 Tank Farm and Despatch				
56 Sanitary Sewer				
57 Interconnecting Pipeway				
61 Buildings				
63 Communications (with Electrical)				
65 Electrical Distrib.				
67 Control Systems				
Sub-Total				
GENERAL				
71 Site Preparation		Confidential Data		
75 Site Improvements				
Sub-Total				
ASH DISPOSAL				
68 Ash Disposal		Confidential Data		
Sub-Total				
Total DFC				

6.9.3 OTHER CAPITAL COST ALLOWANCES

Other capital costs discussed in Section 5.6 are presented in Table 6.9.3-1. The variations between cases is proportional to the difference in Total Field and Office Costs. The lower the Total Field and Office Costs, the lower the other capital costs are because many of the other capital costs are proportioned from the Total Field and Office Costs.

TABLE 6.9.3-1

OTHER CAPITAL COSTS

	Base Case @ Site 1 $ x 10^3	Self-Sufficiency Case @ Site 1 $ x 10^3	Coproduction Case @ Site 1 $ x 10^3	Shell Coal Case @ Site 23 $ x 10^3
Construction Camp	56,000	47,000	56,000	56,000
Initial Catalysts and Chemicals	6,000	6,000	5,000	6,000
Land	1,000	1,000	1,000	1,000
Spare Parts	12,000	9,500	12,000	12,000
Paidup Royalties	13,500	13,500	15,000	13,500
Shop, Machinery, and Lab Equipment	10,500	10,500	10,500	10,500
Owners Costs	88,000	78,000	88,000	88,000
Startup Costs	120,900	96,100	120,000	124,100
Management Reserve	230,000	196,000	231,000	236,000
Working Capital	32,500	25,400	32,200	33,800
Total Other Capital Costs	570,400	483,000	570,700	580,900

Note: Financing and Interest During Construction costs are not included.

6.9.4 OPERATING AND MAINTENANCE COST ALLOWANCES

Operating and maintenance costs are presented for each of the four cases in Table 6.9.4-1. Also presented are the byproducts credits and the resulting net annual operating and maintenance costs. These values serve as the basis for cost of service calculations presented in Volume III, Financial and Legal Analysis.

Examining the operating costs shows the highest operating costs for the Shell Coal Case primarily because of the higher coal costs and higher electrical costs associated with the longer water pipeline for Site 23. The Self-sufficiency Case is a simpler plant requiring fewer operating personnel and less overall maintenance labor and materials. The Base Case and Coproduction Case are very similar in operating costs.

Examining the byproduct credits, the Shell Coal Case has the highest value because of the greater quantity of naphtha and export power produced. The Self-sufficiency Case byproduct value is much less than the other cases because there is no export power credit. The Coproduction Case is lower than the Base Case reflecting the reduction of naphtha and power export.

The net results of combining the annual operating costs with the byproduct credits show the lowest net annual operating costs are reflected in the Shell Coal Case.

A discounted cash flow analysis is necessary for each of the four cases studied to determine which case has the lowest cost of service. The discounted cash flow analysis along with various sensitivity analyses are presented in Volume III, Financial and Legal Analysis.

TABLE 6.9.4-1

OPERATING AND MAINTENANCE SUMMARY

	Base Case @ Site 1 ($ Million)	Self-Sufficiency Case @ Site 1 ($ Million)	Coproduction Case @ Site 1 ($ Million)	Shell Coal Case @ Site 23 ($ Million)
Coal Cost	88.1	64.6	88.1	92.6
Catalysts and Chemicals	13.6	11.0	11.0	12.8
Plant Management Staff	1.6	1.6	1.6	1.6
Operating Labor and Materials	16.0	15.1	16.4	16.0
Maintenance Labor and Materials	36.1	28.8	36.3	36.4
Water Pumping	0.5	0.3	0.5	2.5
Solid Waste Disposal	2.2	1.5	2.2	2.1
Taxes and Insurance	37.0	29.7	37.2	38.5
Total	195.1	152.6	193.3	202.5
Byproduct Credit	(115.2)	(25.1)	(83.5)	(135.3)
New Annual Operating Cost	79.9	127.5	109.8	67.2

NOTE: Operating costs for 1989 are assumed to be 67 percent of the above values.

6.9.5 CASH FLOW DATA

The cash disbursement schedules shown in Table 6.9.5-1 through 6.9.5-4 are based on the project management plan and associated master schedule presented in Volume I, Executive Summary.

TABLE 6.9.5-1

CASH FLOW - BASE CASE

	$ Million	%
4th Quarter 1982	1.7	.08
1st Quarter 1983	2.6	.13
2nd Quarter 1983	3.1	.15
3rd Quarter 1983	5.0	.25
4th Quarter 1983	6.8	.33
1st Quarter 1984	8.3	.41
2nd Quarter 1984	9.0	.44
3rd Quarter 1984	9.5	.47
4th Quarter 1984	9.7	.47
1st Quarter 1985	10.8	.53
2nd Quarter 1985	12.4	.61
3rd Quarter 1985	12.9	.63
4th Quarter 1985	39.3	1.93
1st Quarter 1986	66.9	3.28
2nd Quarter 1986	99.8	4.90
3rd Quarter 1986	131.1	6.44
4th Quarter 1986	156.0	7.66
1st Quarter 1987	182.3	8.95
2nd Quarter 1987	200.4	9.84
3rd Quarter 1987	204.8	10.06
4th Quarter 1987	191.8	9.42
1st Quarter 1988	184.1	9.04
2nd Quarter 1988	171.1	8.40
3rd Quarter 1988	136.5	6.70
4th Quarter 1988	106.4	5.22
1st Quarter 1989	68.7	3.37
2nd Quarter 1989	5.4	0.27
Total	$2,036.4	100%

TABLE 6.9.5-2

CASH FLOW - SELF-SUFFICIENCY

	$ Million	%
4th Quarter 1982	1.5	.09
1st Quarter 1983	2.3	.14
2nd Quarter 1983	2.7	.16
3rd Quarter 1983	4.3	.26
4th Quarter 1983	5.9	.35
1st Quarter 1984	7.2	.43
2nd Quarter 1984	7.7	.46
3rd Quarter 1984	8.0	.48
4th Quarter 1984	8.2	.49
1st Quarter 1985	9.5	.57
2nd Quarter 1985	11.0	.66
3rd Quarter 1985	11.4	.68
4th Quarter 1985	33.1	1.98
1st Quarter 1986	55.7	3.33
2nd Quarter 1986	82.3	4.92
3rd Quarter 1986	107.7	6.44
4th Quarter 1986	128.0	7.66
1st Quarter 1987	149.2	8.93
2nd Quarter 1987	[illegible]	9.81
3rd Quarter 1987	16[illegible].7	10.04
4th Quarter 1987	157.2	9.41
1st Quarter 1988	151.2	9.04
2nd Quarter 1988	139.8	8.36
3rd Quarter 1988	110.7	6.62
4th Quarter 1988	85.8	5.13
1st Quarter 1989	55.2	3.30
2nd Quarter 1989	4.2	0.25
Total	$1,671.5	100%

TABLE 6.9.5-3

CASH FLOW - COPRODUCTION CASE

	$ Million	%
4th Quarter 1982	1.8	.09
1st Quarter 1983	2.7	.13
2nd Quarter 1983	3.2	.15
3rd Quarter 1983	5.2	.25
4th Quarter 1983	7.1	.35
1st Quarter 1984	8.7	.42
2nd Quarter 1984	9.4	.46
3rd Quarter 1984	9.9	.48
4th Quarter 1984	10.0	.49
1st Quarter 1985	11.4	.55
2nd Quarter 1985	13.1	.64
3rd Quarter 1985	13.6	.66
4th Quarter 1985	40.3	1.97
1st Quarter 1986	68.3	3.34
2nd Quarter 1986	101.2	4.94
3rd Quarter 1986	132.5	6.47
4th Quarter 1986	157.4	7.69
1st Quarter 1987	183.4	8.96
2nd Quarter 1987	201.1	9.83
3rd Quarter 1987	205.2	10.02
4th Quarter 1987	191.8	9.37
1st Quarter 1988	183.7	8.97
2nd Quarter 1988	170.7	8.34
3rd Quarter 1988	136.1	6.65
4th Quarter 1988	106.0	5.17
1st Quarter 1989	68.5	3.34
2nd Quarter 1989	5.4	0.26
Total	$2,047.7	100%

TABLE 6.9.5-4

CASH FLOW - SHELL COAL CASE

	$ Million	%
4th Quarter 1982	1.8	.08
1st Quarter 1983	2.7	.13
2nd Quarter 1983	3.1	.15
3rd Quarter 1983	5.1	.24
4th Quarter 1983	6.9	.33
1st Quarter 1984	8.5	.41
2nd Quarter 1984	9.2	.44
3rd Quarter 1984	9.7	.46
4th Quarter 1984	9.9	.47
1st Quarter 1985	11.0	.53
2nd Quarter 1985	12.6	.60
3rd Quarter 1985	13.1	.62
4th Quarter 1985	40.2	1.92
1st Quarter 1986	69.2	3.31
2nd Quarter 1986	103.4	4.94
3rd Quarter 1986	135.7	6.48
4th Quarter 1986	161.2	7.60
1st Quarter 1987	188.2	8.99
2nd Quarter 1987	206.5	9.86
3rd Quarter 1987	210.8	10.07
4th Quarter 1987	197.0	9.41
1st Quarter 1988	188.6	9.01
2nd Quarter 1988	175.3	8.37
3rd Quarter 1988	139.5	6.66
4th Quarter 1988	108.7	5.19
1st Quarter 1989	70.4	3.36
2nd Quarter 1989	5.6	0.27
Total	$2,093.9	100%