ONE LINE & ELEMENTARY DIAGRAMS

- GANG OPERATED HORN GAP SWITCH
- HIGH VOLTAGE PRIMARY FUSE CUTOUT
- 60A — DISCONNECT SWITCH – SIZE AS INDICATED (3 POLE UNLESS OTHERWISE NOTED)
- GROUNDING SWITCH
- 3 L.A. — LIGHTNING ARRESTER (NUMBER INDICATES QUANTITY)
- CAPACITOR
- DISCONNECT LINK
- 100A N E A L — TRANSFER SWITCH – SIZE AS INDICATED
  - A – AUTOMATIC
  - M – MANUAL
  - N – NORMAL
  - E – EMERGENCY
  - L – LOAD
- GROUNDING TRANSFORMER SIZE & RATING AS INDICATED
- 1 — GROUND DETECTION CURRENT TRANSFORMER – NUMBER INDICATES QUANTITY – RATIO AS NOTED
- 3 — CURRENT TRANSFORMER – NUMBER INDICATES QUANTITY RATIO AS NOTED
- 3 — BUSHING TYPE CURRENT TRANSFORMER NUMBER INDICATES QUANTITY RATIO AS NOTED
- 2 — BUSHING TYPE POTENTIAL DEVICE NUMBER INDICATES QUANTITY RATING AS NOTED
- 2 — POTENTIAL TRANSFORMER NUMBER INDICATES QUANTITY RATING AS NOTED
- POWER TRANSFORMER SIZE & RATING AS NOTED (NUMBER OF WINDINGS AS SHOWN)
- MEDIUM OR HIGH VOLTAGE DRAWOUT TYPE ELECTRICALLY OPERATED AIR CIRCUIT BREAKER, INTERRUPTING CAPACITY, SIZE & VOLTAGE AS NOTED
- AF AT U — AIR CIRCUIT BREAKER DRAWOUT TYPE ELECTRICALLY OPERATED, MAGNETIC OVERCURRENT TRIP – CURRENT RATING & INTERRUPTING CAPACITY AS NOTED
  - AIC = AMP INTERRUPTING CAPACITY
  - AF = AMP FRAME
  - AT = AMP TRIP
  - U = UNDERVOLTAGE ATTACHMENTS
  - M = MANUALLY OPERATED
- AIR CIRCUIT BREAKER 3 POLE UNLESS OTHERWISE NOTED
- GROUND CONNECTION
- DRAWOUT DISCONNECT DEVICE
- 1 — MAGNETIC STARTER WITH THERMAL OVERLOADS, SINGLE SPEED, NON-REVERSING FULL VOLTAGE – NUMBER INDICATES NEMA SIZE (SYMBOL WITH "RV" INDICATES REDUCED VOLTAGE)
- 1 — MAGNETIC STARTER WITH THERMAL OVERLOADS, SINGLE SPEED, REVERSING FULL VOLTAGE – NUMBER INDICATES NEMA SIZE (SYMBOL WITH "RV" INDICATES REDUCED VOLTAGE)
- 2 25 — MAGNETIC STARTER WITH THERMAL OVERLOADS, 2S=MULTI SPEED NON-REVERSING, FULL VOLTAGE NUMBER INDICATES NEMA SIZE
- 2 F — THIS SYMBOL ABOVE STARTER OR CONTACTOR INDICATES COMBINATION STARTER OR CONTACTOR
  - F – INDICATES FUSED DISC SWITCH & FUSE
  - B – INDICATES CIRCUIT BREAKER
  - S – INDICATES UNFUSED DISC SWITCH
- 1 — MAGNETIC CONTACTOR NUMBER INDICATES NEMA SIZE
- NANUAL MOTOR STARTER, 1 POLE WITH THERMAL OVERLOAD

- GENERATOR SIZE & RATING AS NOTED
- 15 — MOTOR – NUMBER INDICATES HORSEPOWER
- 10 HP (MOT) / 7½ KW (GEN) — MOTOR – GENERATOR SET
- 1750 — SYNCHRONOUS MOTOR – NUMBER INDICATES HORSEPOWER
- EXC — EXCITER
- BATTERY
- HEATER
- FUSE
- SHUNT
- RESISTOR
- RTD — RESISTANCE TEMPERATURE DETECTOR
- ---E--- — INTERLOCKS:
  - E – ELECTRICAL
  - K – KEY
  - M – MECHANICAL
- NO — NORMALLY OPEN
- NC — NORMALLY CLOSED
- CONTROL SWITCH WITH INDICATING LIGHTS
- START – STOP MAINTAINED CONTACT PUSH BUTTON
- START – STOP MAINTAINED CONTACT PUSH BUTTON WITH INDICATING LIGHTS
- START – STOP MOMENTARY CONTACT PUSH BUTTON
- T — START – STOP MOMENTARY CONTACT PUSH BUTTON WITH INDICATING LIGHTS T = TEST
- INDICATING LIGHTS
- SLECTOR SWITCH WITH INDICATING LIGHTS
- STOP LOCK-OUT PUSH BUTTON
- PERMISSIVE SWITCH WITH INDICATING LIGHTS

TS — CONTROL DEVICE: TYPE AS NOTED

TS – TEMP SW CONTACT	T – THERMOSTAT
LVS – LEVEL SW CONTACT	PE – PNEU-ELEC RELAY
PS – PRESS SW CONTACT	EP – ELEC-PHEU SW
FS – FLOAT SW CONTACT	H – HUMIDISTAT
LS – LIMIT SW CONTACT	
FR – FIRE RELAY CONTACT	

(A) METERS & INSTRUMENTS — [AS] SWITCHES

PREFIX "R" DENOTES RECORDING TYPE, NUMBER NEXT TO SYMBOL DENOTES QUANTITY IF MORE THAN ONE IS REQD

A AMMETER	AS-AMMETER SW
V VOLTMETER	VS-VOLTMETER SW
W WATTMETER	SYN SW-SYNCHRO SW
VAR VARMETER	
WH WATTHOUR METER	HS-HAND SW
F FREQUENCY METER	SS-SEL SW
WHD DEMAND WATTHOUR METER	CS-CONTROL SW
SY SYNCHROSCOPE	TS-TEST SWITCH
PF POWER FACTOR METER	
THC THERMAL CONVERTER	
TR TEMP RECORDER	
TI TEMP INDICATOR	
TACH TACHOMETER	
TM TRANSMITTER	

- TRD — TRANSDUCER
- VA — VOLTAGE ADJUSTING RHEOSTAT

–TRANSFORMER CONNECTIONS–

- 3ø, 3W DELTA
- 3ø, OPEN DELTA
- SINGLE PHASE
- 3ø, WYE OR STAR

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(86) RELAYS & DEVICES

NUMBER NEXT TO SYMBOL DENOTES QUANTITY IF MORE THAN ONE IS REQUIRED

21	DISTANCE	63	PRESSURE
27	UNDERVOLTAGE	64	GROUND PROTECTIVE
30	ANNUN ALARM	67	AC DIRECTIONAL OVERCURRENT
40	LOSS OF FIELD		
46	NEGATIVE SEQUENCE	74	ALARM AUX RELAY
50	INSTANT OVERCURRENT	76	DC OVEREXCITATION
50–1	INSTANT ELEMENT SHORT CIRC TRIP	81	FREQUENCY
		86	LOCKOUT
50–2	INSTANT ELEMENT LOCKED ROTOR TRIP	87	DIFFERENTIAL
		25	SYNCHRONIZING CHECK
50/51	OVERCURR-INSTANT & TIME DELAY		
51	AC OVERCURRENT-TIME DELAY		
55	POWER FACTOR		
59	OVERVOLTAGE		
60	VOLTAGE BALANCE		

- CR CONTROL RELAY
- AR AUXILIARY RELAY
- LR LATCHING RELAY (LATCH OR UNLATCH COIL AS SHOWN)

TDR TIME DELAY RELAY
COIL: TDPU – TIME DELAY PICK UP
TDDO – TIME DELAY DROP OUT

CONTACT
- TDCAE – TIME DELAY CLOSE AFTER ENERGIZATION
- TDOAE – TIME DELAY OPEN AFTER ENERGIZATION
- TDCAD – TIME DELAY CLOSE AFTER DE-ENERGIZATION
- TDOAD – TIME DELAY OPEN AFTER DE-ENERGIZATION

DEVICES

2	TIME DELAY CLOSING RELAY		
20	ELEC OPER VALVE		
33	POSITION OR LIMIT SW	62	TIME DELAY OPENING RELAY
41	FIELD CIRCUIT BREAKER	71	LEVEL SWITCH
42	MOTOR STARTER	72	DC CIRCUIT BREAKER
52	AC CIRCUIT BREAKER	80	FLOW SWITCH

RELAY OR DEVICE "SUFFIX LETTERS"

F	FIELD	IAS	4160V SWGR START-UP BKR 1A
G	GROUND	IAN	4160V SWGR NORMAL BKR 1A
N	NEUTRAL		
TELM	TELEMETRERING	IBS	4160V SWGR START-UP BKR 1B
V	VOLTAGE		
X	AUXILIARY	IBN	4160V SWGR NORMAL BKR 1B
GN	GENERATOR FIFFERENTIAL		
GD	GENERATOR DISTANCE	ICS	4160V SWGR START-UP BKR 1C
GF	GENERATOR FIELD		
GG	GENERATOR GROUND	ICN	4160V SWGR NORMAL BKR 1C
GNS	GENERATOR NEG SEQUENCE		
GT	GENERATOR TRANSFORMER	IDS	4160V SWGR START-UP BKR 1D
GOE	GENERATOR OVER EXCITATION		
L	345KV LINE	IDN	4160V SWGR NORMAL BKR 1D
TGP	MAIN TRANSFORMER GAS		
TN	MAIN TRANSFORMER NEUTRAL	IFS	4160V SWGR EMERG BKR 1F
LGT	LINE GEN TRANSF OVERALL		
NGP	NORM STA SERV TRANSF GAS	IGS	4160V SWGR EMERG BKR 1G
NT	NORM STA SERV TRANSF		
SGP	START UP STA SERV TRANSF GAS	DG1	DIESEL GEN NO 1
ST	START UP STA SERV TRANSF	DG2	DIESEL GEN NO 2
STL	161KV LINE	IFE	DIESEL GEN NO 1 BKR 1FE
EGP	EMERG TRANSF GAS	IGE	DIESEL GEN NO 2 BKR 1GE
T	TURBINE	NB	4160V SWGR NORMAL SUPPLY
		SB	4160V SWGR START-UP SUPPLY

- SOLENOID
- WIRE TERMINAL POINT
- WIRE CONNECTION POINT
- (R) INDICATING LIGHT WITH DROPPING RESISTOR
  - R-RED, B-BLUE
  - G-GREEN, C-CLEAR
  - W-WHITE, A-AMBER
- (R) INDICATING LIGHT
- TEST JACK CONNECTION POINT
- PUSH BUTTON-MOMENTARY CONTACT NORMALLY CLOSED
- PUSH BUTTON-MOMENTARY CONTACT NORMALLY OPEN
- PUSH BUTTON-MAINTAINED CONTACT
- O L — MANUAL MOTOR STARTER – SINGLE POLE WITH THERMAL OVERLOAD
- OL — OVERLOADS (THREE LINE DIAGRAM)
- BLOCKING DIODE
- OL — OVERLOADS
- CONTACT – NORMALLY OPEN (NO)
- CONTACT – NORMALLY CLOSED (NC)
- BA — BELL ALARM CONTACT (OPEN OR CLOSED AS INDICATED)
- 52A — BREAKER CONTACT (OPEN WHEN BREAKER IS OPEN)
- 52B — BREAKER CONTACT (CLOSED WHEN BREAKER IS OPEN)
- 52H IN — BREAKER POSITION SWITCH (CLOSED WHEN BREAKER IS IN OPERATING POSITION)
- 52H OUT — BREAKER POSITION SWITCH (OPEN WHEN BREAKER IS IN OPERATING POSITION)
- CS 2 — CONTROL SWITCH, CONTACTS AS INDICATED IN CONTROL SWITCH DEVELOPMENT
- CS T C — CONTROL SWITCH TEST, LOCATED AT 4160V SWGR
  - C – INDICATES CLOSED POSITION
  - T – INDICATES TEST POSITION
- MULTIPLE CONDUCTOR – SHIELDED CABLE (TWO CONDUCTOR SHOWN)
- MULTIPLE CONDUCTOR – SHIELDED CABLE – SHIELD GROUNDED (TWO CONDUCTOR SHOWN)
- SIGNAL CONNECTOR (MULTI CONDUCTOR)

POWER, GROUNDING, & LIGHTING PLANS

- LIGHTING PANEL (SEE LIGHTING PANEL SCHEDULES)
- PANEL – MISCELLANEOUS AS NOTED ON PLAN DWGS
- POWER PANEL
- MOTOR HORIZONTALLY MOUNTED
- MOTOR – VERTICALLY MOUNTED
- CONTACTOR
- MOTOR STARTER OR CONTROLLER
- TRANSFER SWITCH-SIZE & TYPE AS NOTED
- DISCONNECT OR SAFETY SWITCH SIZE AS NOTED
- TRANSFORMER – DRAW TO SCALE SIZE & RATING AS NOTED
- MOTOR OPERATED VALVE
- AV — AIR OPERATED VALVE
- LOCAL PUSHBUTTON STATION OR LOCAL CONTROL STATION, TYPE AS NOTED
- OL SEL — SINGLE POLE MANUAL MOTOR STARTER WITH THERMAL OVERLOAD SEL = SELECTOR SWITCH
- (J) — J – JUNCTION BOX, TB – TERMINAL BOX, PB – PULL BOX
- RIGID CONDUIT – RUN EXPOSED
- RIGID CONDUIT – RUN CONCEALED
- CONDUIT OR CABLE TURNING UP OR TOWARDS OBSERVER
- CONDUIT OR CABLE TURNING DOWN OR AWAY FROM OBSERVER
- DIRECT BURIAL CABLE
- FLEXIBLE CONDUIT
- CONDUIT "SEALING" FITTING
- HORZ / VERT — UNIT HEATER

TS — CONTROL DEVICES: TYPE AS NOTED

TS – TEMP SW	PE – PNEU-ELECT RELAY
SV – SOLENOID VALVE	SP – ELECT-PNEU SWITCH
LVS – LEVEL SWITCH	T/C – THERMOCOUPLE
PS – PRESSURE SWITCH	H – HUMIDISTAT
FS – FLOAT SWITCH	FT – FLOW TRANSFMITTER
LS – LIMIT SWITCH	PT – PRESSURE TRANS
SS – SELECTOR SWITCH	LT – LEVEL TRANS
CS – CONTROL SWITCH	FI – FLOW INDICATOR
PMS – PERMISSIVE SW	FLS – FLOW SWITCH
RTD – RESIST TEMP DETEC	A – ALTERNATOR
T – THERMOSTAT	SD – SMOKE DETECT
TE – TEMP ELEMENT	V – VALVE

- CABLE TRAY OR CABLE LADDER (SIZE & ELEVATION AS NOTED ON PLAN DWGS)
- —IG— INSTRUMENT GROUND CABLE
- —G— GROUND CABLE – RUN EXPOSED
- – –G– – GROUND CABLE – RUN CONCEALED OR BELOW GRADE
- GROUND ROD 5/8" DIA x 20'-0" LONG COPPER WELD
- GROUND CONNECTION "THERMO PROCESS" WELD "CADWELD" OR APPROVED EQUAL
- GROUND CONNECTION – PRESSURE TYPE SOLDERLESS CONNECTOR

- ARC — INDICATES AUXLIARY RELAY CABINET
- INDICATES LOCAL DEVICE
- INDICATES LOCAL DEVICE ON LOCAL PANEL
- B — INDICATES EQUIPMENT LOCATED AT BENCHBOARD LETTER OR NUMBER DESIGNATION AS SHOWN
- 40–27 — INDICATES EQUIPMENT LOCATED AT CABINET NUMBER DESIGNATION AS SHOWN
- F — INDICATES EQUIPMENT LOCATED AT VERTICAL BOARD, LETTER OR NUMBER DESIGNATION AS SHOWN
- 40–11 — INDICATES EQUIPMENT LOCATED AT COMPUTER EQUIPMENT DESK, LETTER OR NUMBER DESIGNATION AS SHOWN
- C — INDICATES ANNUNCIATION – LETTER DENOTES BOARD OR PANEL LOCATION

- 3 / A 2–40 / 10'-0" — "A" INDICATES FIXTURE TYPE; "2-40" INDICATES NO. & WATTAGE OF LAMPS; "3" INDICATES NO. OF FIXTURES; 10'-0" INDICATES MOUNTING HEIGHT
- CEILING MTD (A) C-2 / WALL MTD — INCANDESCENT OR MERCURTY LTG FIXTURE; "A" INDICATES FIXTURE TYPE; "C-2" INDICATES LTG PNL "C", CIRCUIT 2 (SMALL CIRCLE FOR INDIVIDUAL IDENTIFICATION)
- EXIT LIGHTING FIXTURE
- FLUORESCENT LIGHTING FIXTURE
- BARE LAMP FLUORESCENT STRIP
- STREET LIGHTING FIXTURE
- FLOODLIGHT FIXTURE
- EMERGENCY LIGHTING UNIT AC/DC
- EMERGENCY LIGHTING REMOTE LAMP
- GOOSENECK LIGHING STANCHION AND FIXTURE
- REMOTE LAMP MOUTNED ABOVE EMERGENCY LIGHTING UNIT
- a 3 P — SWITCH – SINGLE POLE
  - 120V 20A TOGGLE
  - a – INDICATES ASSOCIATED CONTROLLED FIXTURES
  - 3 – INDICATES 3 WAY SWITCH
  - P – INDICATES SWITCH WITH PILOT LIGHT
- CKTS LP9,11,15 4#12 — HOME RUN TO PANELBOARD – ALL UNMARKED CONDUITS ARE 3/4" IN SIZE AND CONTAIN 2#12 UNLESS OTHERWISE NOTED
- SWITCH & SINGLE CONVENIENCE RECEPTACLE COMBINATION
- SWITCH & DUPLEX CONVENIENCE RECEPTACLE COMBINATION 20A, 125VAC, GE 5951-1 OR EQUAL
- SINGLE RECEPTACLE, CONVENIENCE, 2P 3W 15A 125V HUBBELL TYPE 5261 OR APPVD EQUAL
- DUPLEX RECEPTACLE, CONVENIENCE, 2P 3W 15A 125V HUBBELL TYPE 5262 OR APPVD EQUAL
- CR — DUPLEX RECEPTACLE, CONVENIENCE, 2P 3W 15A 125V – "CR" INDICATES CORROSION RESISTANCE. HUBBELL TYPE 52CM62 WITH 52CM08 CAP OR APPVD EQUAL
- R — DUPLEX RECEPTACLE, CONVENIENCE, 2P 3W 15A 125V HUBBELL TYPE 5262I OR APPVD EQUAL – "R" INDICATES REGULATED VOLTAGE
- SINCLE RECEPTACLE 2P 3W GROUNDING 20A 250V NEMA 6-20R, HUBBELL TYPE 5461 WITH SUPER STAINLESS PLATE HUBBELL 93091 OR APPVD EQUAL
- POWER RECEPTACLE 3W 4P 60A 600VAC CROUSE-HINDS TYPE "AREA" CAT NO. AREA6425 OR APPVD EQUAL
- POWER RECEPTACLE 3W 4P 30A 600VAC CROUSE-HINDS TYPE "ARE" CAT NO. ARE3423 OR APPVD EQUAL
- PLUG-IN STRIP – TYPE AS NOTED ON DWGS

CEILING MTD / WALL MTD

- (FN) FAN OUTLET
- (CK) CLOCK OUTLET
- (RL) REELITE
- (DC) DROP CORD
- (P) PORCELAIN LAMP HOLDER (PC INDICATES PULL CHAIN)
- OUTLET BOX

FIRE ALARM & COMMUNCATION PLANS

- TS — TELEPHONE SWITCHBOARD
- PUBLIC TELEPHONE CO. TELEPHONE WITH ACCESS TO PUBLIC EXCHANGE, DESK TYPE
- PUBLIC TELEPHONE IN FULL BOOTH
- D — INDUSTRIAL TYPE TELEPHONE
  - D = DESK SET
  - W = WALL SET
  - WP = WEATHERPROOF WALL SET
- SOUND POWERED TELEPHONE SET
- S.P. — JACK FOR SOUND POWERED TELEPHONE
- T — OUTLET FOR PLUG-IN PORTABLE INDUSTRIAL TELEPHONE
- LOUDSPEAKER, HORN TYPE, SINGLE UNIT
- LOUDSPEAKER, SPECIAL TYPE
- LOUDSPEAKER, OFFICE TYPE WITH VOLUME CONTROL
- I — TWO-WAY INTERCOM SET
- MICROPHONE (RADWASTE AREA)
- TV R — CLOSED CIRCUIT TELEVISION RECEIVER
- TV C — CLOSED CIRCUIT TELEVISION TRANSMITTER & CAMERA

ABBREVIATIONS

TRANSF	TRANSFORMER
SWGR	SWITCHGEAR
MCC	MOTOR CONTROL CENTER
PDP	POWER DISTRIBUTION PANEL
LDP	LIGHT DISTRIBUTION PANEL
PP	POWER PANEL
LP	LIGHTING PANEL
GND	GROUND
CND	CONDUIT
PT	POTENTIAL TRANSFORMER
CT	CURRENT TRANSFORMER
POS(+)	POSITIVE
NEG(–)	NEGATIVE
RP	RELAY PANEL
EP	EXPLOSION PROOF
WP	WEATHER PROOF
VT	VAPOR TIGHT
DT	DUST TIGHT
WT	WATER TIGHT (SUBMERSIBLE)
EC	EMPY CONDUIT
DP	DRIP PROOF

POLE LINE & UNDERGROUND DISTRIBUTION PLANS

- 35-5 — EXISTING POLE LENGTH & CLASS AS NOTED
- 35-5 — NEW POLE LENGTH & CLASS AS NOTED
- 35-5-6M — POLE WITH DOWN GUY & ANCHOR-LENGTH & CLASS & STRENGTH OF GUY IN POUNDS AS NOTED
- 35-5-6M — POLE WITH STREET LIGHTING FIXTURE LENGTH & CLASS AS NOTED
- 1 — SINGLE PHASE TRANSFORMER SIZE & RATING AS NOTED
- 3 — THREE PHASE TRANSFORMER SIZE & RATING AS NOTED
- STREET LIGHTING REGULATOR RATING AS NOTED
- SECTIONALIZING SWITCH-MOUNTED ON CROSSARM – NORMALLY OPEN
- SECTIONALIZING SWITCH-MOUNTED ON CROSSARM – NORMALLY CLOSED
- POLE TOP SWITCH
- L.A. — LIGHTING ARRESTER IN EACH PHASE WIRE
- 3#2 — PRIMARY LINE – NO. & SIZE OF WIRE AS NOTED
- #8 — SERIES STREET LTG CKT 1/C OF SIZE NOTED
- 3#2 — 3ø SECONDARY LINE – NO. & SIZE OF WIRE AS NOTED
- 1ø SECONDARY LINE – NO. & SIZE OF WIRE AS NOTED
- CONDUCTOR DEAD END
- MH# — MANHOLE
- HH# — HANDHOLE
- TOP OF DUCTBANK (ELEV AS NOTED)
- INDICATES NUMBER & ARRGT OF DUCTS IN DUCTBANK
- INDICATES ℄ OF DUCTBANK (LOCATE WITH DIMENSIONS OR CO-ORDINATE NUMBERS)
- ARROW INDICATES DIRECTION OF DUCTBANK TOWARDS LOW POINT

NOTES

1. FOR ADDITIONAL SYMBOLS RELATED TO BENCHBOARD & CABINET DESIGNATIONS SEE DWG 3032.

NON CONTROLLED PRINT
MAR 20 2007
N.P.P.D.. RIMS

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AS BUILT — CADD DRAWING — DO NOT REVISE MANUALLY

FOR PREVIOUS REVISIONS, SEE SUPERSEDED CARDS

REVISIONS BY N.P.P.D.

NO.	REVISIONS	DFT	CKD	APP	DATE
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N06	DCN 05-1970	RGA	RGA	KG	12/30/05

SIGNIFICANT NUMBER — GROUP 1 2 3 4 5 6

ELECTRICAL
SYMBOL LIST
COOPER NUCLEAR STATION

DRAWN RGA DATE 8/18/05 — CHECKED DATE — APPROVED DATE SEE SUPERSEDED CARDS — FILMED

BURNS & ROE

3070 — REVISION N06 — CADD FILE: C0053207

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