PRIMARY ELEMENT SYMBOLS

- ORIFICE PLATE
- PITOT TUBE OR ANNUBAR
- FI — ROTAMETER
- FI — FLOW ELEMENT (MAGNETIC, SONIC, ULTRASONIC)
- LEVEL METER (ULTRASONIC)
- FLUME
- WEIR
- PROPELLER OR TURBINE METER
- VENTURI TUBE
- FLOAT SWITCH
- CHEMICAL SEAL
- RUPTURE DISK
- TE — TEMPERATURE ELEMENT W/THERMOWELL
- THERMAL ELEMENT
- M — MAGMETER

LINE TYPES

- MAIN PROCESS LINE
- AUXILIARY PROCESS LINE
- PNEUMATIC SIGNAL (ANALOG)
- PNEUMATIC SIGNAL (ON/OFF)
- ELECTRICAL SIGNAL (ANALOG)
- ELECTRICAL SIGNAL (DIGITAL)
- CAPILLARY TUBING
- HYDRAULIC SIGNAL
- ELECTROMAGNETIC OR SONIC SIGNAL
- DIRECTION OF FLOW
- MECHANICAL LINK

CROSS REFERENCE SYMBOLS

- 1-801 — CONTINUATION ON SHEET 1-801
- 1-800 — CONTINUATION FROM SHEET 1-800

INSTRUMENT SYMBOLS

- LOCALLY MOUNTED FIELD INSTRUMENT
- PANEL MOUNTED OPERATOR ACCESSIBLE
- PPCP — MOUNTED ON AUXILIARY PANEL (SUBSCRIPT INDICATES PANEL) OPERATOR ACCESSIBLE
- PILOT LIGHT
- MULTI FUNCTION INSTRUMENT
- XX — PROGRAMMABLE CONTROLLER I/O
- I — COMPLEX INTERLOCK AS DEFINED IN CONTROL DIAGRAM "I" OR IN SPECS
- XX / XXX — RTU LOGIC CONTROL BLOCK

FUNCTION DESIGNATIONS FOR RELAYS AND CONTROLLERS

SYMBOL	FUNCTION
X^N or $X^{1/N}$	EXPONENTIAL
1:1	PROPORTIONAL
REV	REVERSE ACTION
E/P, I/P (TYPICAL)	FOR INPUT/OUTPUT CONVERTERS USING THE FOLLOWING SYMBOLS: E – VOLTS H – HYDRAULIC I – CURRENT O – ELECTROMAGNETIC OR SONIC P – PNEUMATIC R – RESISTANCE A – ANALOG B – BINARY D – DIGITAL F – FREQUENCY
% or P	PROPORTIONAL CONTROL ACTION
∫ or I	INTEGRAL CONTROL ACTION
d/dt or D	DERIVATIVE CONTROL ACTION
1:3, 1:2 (TYPICAL)	GAIN OR ATTENUATE

MECHANICAL EQUIPMENT SYMBOLS

- CENTRIFUGAL PUMP
- ROTARY PUMP
- METERING PUMP
- MIXER OR FLOCCULATOR
- T-801 — TANK
- FILTER
- EDUCTOR
- M — MOTOR
- HEAT EXCHANGER
- SG — SIGHT GLASS
- FAN / BLOWER
- SUMP PUMP
- VERTICAL TURBINE PUMP
- ROTOMETER
- PROGRESSIVE CAVITY PUMP
- DIFFUSER

VALVE / ACTUATOR SYMBOLS

- GATE VALVE
- BALL VALVE
- BUTTERFLY VALVE
- SWING & BALL CHECK
- GLOBE VALVE
- PINCH VALVE
- ECCENTRIC ROTATING PLUG VALVE
- NEEDLE VALVE
- DIAPHRAGM VALVE
- COCK
- 3-WAY VALVE
- 4-WAY VALVE
- ANGLE VALVE
- PLUG VALVE

VALVE / ACTUATOR SYMBOLS (CONT.)

- SOLENOID VALVE
- PRESSURE RELIEF VALVE (SPRING LOADED)
- BACK PRESSURE VALVE (SELF CONTAINED)
- PRESSURE REDUCING VALVE (SELF OPERATED)
- BALANCING VALVE W/ ORIFICE CONNECTION
- CONCENTRIC REDUCER
- PIPE UNION
- WASH OR SPRAY NOZZLE
- CONICAL SCREEN
- FLAT SCREEN
- LEVEL REGULATOR W/FLOAT
- CALIBRATION POT W/ ISOLATION VALVE
- CHEMICAL INJECTOR
- FLEXIBLE HOSE
- OPERATOR

PANEL SCHEDULE

NOTES:

1. THESE SCHEMATICS ARE PRESENTED IN DIAGRAMMATIC FORM TO SHOW PROCESS FLOWS, CONTROL CONCEPTS AND OPERATING PARAMETERS, AND AS SUCH ARE NOT INTENDED TO SHOW ALL VALVING, PIPING AND INSTRUMENTATION SYSTEMS.

INSTRUMENT PREFIX DEFINITIONS

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER FLAME		USERS CHOICE	USERS CHOICE	USERS CHOICE
C	CONDUCTIVITY (ELECTRICAL)			CONTROL	
D	DENSITY (MASS) OR SPECIFIC GRAVITY	DIFFERENTIAL			
E	VOLTAGE (EMF)		PRIMARY ELEMENT		
F	FLOW RATE	RATIO (FRACTION)			
G	FIRE/SMOKE		GLASS		
H	HAND (MANUALLY INITIATED)				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME OR TIME SCHEDULE			CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOISTURE OR HUMIDITY				MIDDLE OR INTERMEDIATE
N	TORQUE				
O	USERS CHOICE		ORIFICE (RESTRICTION)		
P	PRESSURE OR VACUUM		POINT (TEST CONNECTION)		
Q	QUANTITY OR EVENT	INTEGRATE OR TOTALIZE			
R	RADIOACTIVITY		RECORD OR PRINT		
S	SPEED OR FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VISCOSITY			VALVE, DAMPER, OR LOUVER	
W	WEIGHT OR FORCE		WELL		
X	UNCLASSIFIED			RELAY OR COMPUTE	
Y	UNCLASSIFIED	GENERAL		CONVERTOR	
Z	POSITION			DRIVE, ACTUATE, OR UNCLASSIFIED FINAL CONTROL ELEMENT	

HDR

HDR Engineering, Inc.

Issue No.	Description	Date	Drwn.	Chkd.	Resp. Engr.	Proj. Mgr.
1	CORRECTED ACCORDING TO CONSTRUCTION RECORD	1/95	TDC	EFH	MJH	JJC
A	ISSUED FOR BIDS	4/20/92	RCB	LDS	LDS	JJC

Project Manager: JOHN J. CHUEH
Architect
I&C/Process: L. SMITHEY
Civil
Mechanical
Electrical
Structural
Drawn By: R. BURNS

City of Las Vegas

Water Pollution Control Facility
Nitrification / Filtration Facilities

Contract 17
NITRIFICATION COMPLEX

INSTRUMENTATION

ABBREVIATIONS & SYMBOLS

Date	Project No.	Drawing No.	Issue
APRIL 1992	00120-084-141	I-001	1

Scale: NONE

311.36