APPENDICES

SCHEDULES

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CONTROL NARRATIVES - PROCESS AREAS

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	Area S Secondary Clarifiers	15
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END OF SECTION

WORK SHEET:	**AREA H - HEADWORKS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	H600

GENERAL & CABINET

UNIT TYPE:	DIRECT FIRED, PACKAGED, MAKE-UP AIR UNIT	UNIT MODEL NO.:	ENG AIR HE, ICE BMA OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS DOORS:	LEFT HAND, SERVICE DOORS PIANO HINGED c/w 1/4 TURN POSITIVE LOCK CLOSING HARDWARE BOTH SIDES, FULLY INSULATED AND LINED NEOPRENE GASKETTING
APPROX. SHIPPING WEIGHT:		NO. OF PIECES:	1
MAXIMUM DIMENSIONS:	3725 L x 2350 W x 1900 H , WIDTH INCLUDES AN ALLOWANCE FOR THE CONTROL PANEL		
INSULATION:	25 mm, 24 kg/m^3 , PLUS UNDERSIDE INSULATION C/W SOLID 304 SS LINER THROUGHOUT	CASING:	16 GAUGE SATIN COAT GALVANIZED STEEL, FORMED CONSTRUCTION, REINFORCED, BRACED TO MANUF'S STD C/W LIFTING LUGS, ELECTROSTATICALLY APPLIED ENAMEL PAINT COATING ON ALL EXPOSED SURFACES
APPROVALS:	CSA 3.7, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	9,152 L/s	ESP:	74.7 Pa (0.3 inch W.C.)
AIR FLOW (HIGH RATE):	7,000 L/s	ESP:	161.9 Pa (0.65 inch W.C.)
FAN RATING TO AMCA 210:	CLASS 2 (minimum)		
FAN SIZE:		QTY:	1
FAN TYPE:	BI OR AIRFOIL	RPM:	
MOUNTING:	FREE STANDING WITH RIS VIB ISOLATION	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL SATIN COAT	WHEEL CONST.:	STEEL
BEARING TYPE:	PILLOW BLOCK WITH EXTENDED SS TUBING TO GREASING NIPPLES ACCESSED FROM MANIFOLD ON EXTERIOR OF UNIT CABINET	SHAFT TYPE:	CARBON STEEL MINIMUN C1045 WITH RUST INHIBITOR COATING
MOTOR SIZE:	14.92 kW	TYPE:	HIGH EFFICIENCY, TEFC, 1800 rpm
BHP:	kW	DRIVE:	BELT DRIVE, FAN & MOTOR ON PAINTED STEEL, FABRICATED BASE C/W ADJUSTABLE JACKING BOLTS FOR TENSION ADJUSTMENT, SF OF DRIVE 1.5
MOTOR SERVICE FACTOR:	1.15		

WORK SHEET:	**AREA H - HEADWORKS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	H600

AIR OPENINGS	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	TOP	SUPPLY AIR DISCHARGE: PARALLEL BLADE, SS-CONSTRUCTION, LOW-LEAKAGE, AIR FOIL BLADES, C/W DIRECT MOUNT ELECTRIC ACTUATOR, POSITION OPEN & CLOSED LIMIT SWITCHES ; STD OF ACCEPTANCE; RUSKIN CD80 DAMPER, GREENHECK HCD DAMPER, HONEYWELL MS ACTUATOR	OPEN/CLOSED
RETURN AIR	N/A	N/A	
OUTSIDE AIR	REAR HORIZONTAL	N/A	
EXHAUST AIR	N/A	N/A	

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		50-mm, THROWAWAY, MERV 8, AAF PerfectPleat HC M8	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:	STAINLESS STEEL METAL FRAME	ORIENTATION:	ANGLE
SPARES:	COMPLETE FILTER SET		

HEATING SECTION DATA

TYPE:	DIRECT-FIRED	BURNER TURNDOWN:	15:1 MINIMUM
GAS SUPPLY:	NATURAL GAS		
INLET PRESSURE:	249 Pa	HEAT INPUT:	740 Kw (2,524,876 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	48 °C
MODULATING BYPASS DAMPER:	YES		

ELECTICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

CONTROL DATA

Applicable Documents:	Specification 23 74 00
	Drawing E600
	Appendix: Headworks Controls Narrative

WORK SHEET:	**AREA H - HEADWORKS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	H650

GENERAL & CABINET

UNIT TYPE:	DIRECT FIRED, PACKAGED, MAKE-UP AIR UNIT	UNIT MODEL NO.:	ENG AIR HE, ICE BMA OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS DOORS:	RIGHT HAND, SERVICE DOORS PIANO HINGED c/w 1/4 TURN POSITIVE LOCK CLOSING HARDWARE BOTH SIDES, FULLY INSULATED AND LINED NEOPRENE GASKETTING
APPROX. SHIPPING WEIGHT:		NO. OF PIECES:	1
MAXIMUM DIMENSIONS:	3725 L x 2350 W x 1900 H , WIDTH INCLUDES AN ALLOWANCE FOR THE CONTROL PANEL		
INSULATION:	25 mm, 24 kg/m^3 , PLUS UNDERSIDE INSULATION C/W SOLID 304 SS LINER THROUGHOUT	CASING:	16 GAUGE SATIN COAT GALVANIZED STEEL, FORMED CONSTRUCTION, REINFORCED, BRACED TO MANUF'S STD C/W LIFTING LUGS, ELECTROSTATICALLY APPLIED ENAMEL PAINT COATING ON ALL EXPOSED SURFACES
APPROVALS:	CSA 3.7, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	9,152 L/s	ESP:	74.7 Pa (0.3 inch W.C.)
AIR FLOW (HIGH RATE):	7,000 L/s	ESP:	161.9 Pa (0.65 inch W.C.)
FAN RATING TO AMCA 210:	CLASS 2 (minimum)		
FAN SIZE:		QTY:	1
FAN TYPE:	BI OR AIRFOIL	RPM:	
MOUNTING:	FREE STANDING WITH RIS VIB ISOLATION	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL SATIN COAT	WHEEL CONST.:	STEEL
BEARING TYPE:	PILLOW BLOCK WITH EXTENDED SS TUBING TO GREASING NIPPLES ACCESSED FROM MANIFOLD ON EXTERIOR OF UNIT CABINET	SHAFT TYPE:	CARBON STEEL MINIMUN C1045 WITH RUST INHIBITOR COATING
MOTOR SIZE:	14.92 kW	TYPE:	HIGH EFFICIENCY, TEFC, 1800 rpm
BHP:	kW	DRIVE:	BELT DRIVE, FAN & MOTOR ON PAINTED STEEL, FABRICATED BASE C/W ADJUSTABLE JACKING BOLTS FOR TENSION ADJUSTMENT, SF OF DRIVE 1.5
MOTOR SERVICE FACTOR:	1.15		

WORK SHEET:	**AREA H - HEADWORKS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	H650

AIR OPENINGS	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	TOP	SUPPLY AIR DISCHARGE: PARALLEL BLADE, SS-CONSTRUCTION, LOW-LEAKAGE, AIR FOIL BLADES, C/W DIRECT MOUNT ELECTRIC ACTUATOR, POSITION OPEN & CLOSED LIMIT SWITCHES ; STD OF ACCEPTANCE; RUSKIN CD80 DAMPER, GREENHECK HCD DAMPER, HONEYWELL MS ACTUATOR	OPEN/CLOSED
RETURN AIR	N/A	N/A	
OUTSIDE AIR	REAR HORIZONTAL	N/A	
EXHAUST AIR	N/A	N/A	

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		50-mm, THROWAWAY, MERV 8, AAF PerfectPleat HC M8	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:	STAINLESS STEEL METAL FRAME	ORIENTATION:	ANGLE
SPARES:	COMPLETE FILTER SET		

HEATING SECTION DATA

TYPE:	DIRECT-FIRED	BURNER TURNDOWN:	15:1 MINIMUM
GAS SUPPLY:	NATURAL GAS		
INLET PRESSURE:	249 Pa	HEAT INPUT:	740 Kw (2,524,876 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	48 °C
MODULATING BYPASS DAMPER:	YES		

ELECTICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

CONTROL DATA

Applicable Documents:	Specification 23 74 00
	Drawing E600
	Appendix: Headworks Controls Narrative

WORK SHEET:	**AREA H - HEADWORKS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	H700

GENERAL & CABINET

UNIT TYPE:	DIRECT FIRED, PACKAGED, MAKE-UP AIR UNIT	UNIT MODEL NO.:	ENG AIR HE, ICE BMA OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS DOORS:	RIGHT HAND, SERVICE DOORS PIANO HINGED c/w 1/4 TURN POSITIVE LOCK CLOSING HARDWARE BOTH SIDES, FULLY INSULATED AND LINED NEOPRENE GASKETTING
APPROX. SHIPPING WEIGHT:		NO. OF PIECES:	1
MAXIMUM DIMENSIONS:	3200 L x 1700 W x 1350 H , WIDTH INCLUDES AN ALLOWANCE FOR THE CONTROL PANEL		
INSULATION:	25 mm, 24 kg/m^3 , PLUS UNDERSIDE INSULATION C/W SOLID 304 SS LINER THROUGHOUT	CASING:	16 GAUGE SATIN COAT GALVANIZED STEEL, FORMED CONSTRUCTION, REINFORCED, BRACED TO MANUF'S STD C/W LIFTING LUGS, ELECTROSTATICALLY APPLIED ENAMEL PAINT COATING ON ALL EXPOSED SURFACES
APPROVALS:	CSA 3.7, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	2,980 L/s	ESP:	154.6 Pa (0.62 inch W.C.)
AIR FLOW (HIGH RATE):	N/A	ESP:	N/A
FAN RATING TO AMCA 210:	CLASS 2 (minimum)		
FAN SIZE:		QTY:	1
FAN TYPE:	BI OR AIRFOIL	RPM:	
MOUNTING:	FREE STANDING WITH RIS VIB ISOLATION	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL SATIN COAT	WHEEL CONST.:	STEEL
BEARING TYPE:	PILLOW BLOCK WITH EXTENDED SS TUBING TO GREASING NIPPLES ACCESSED FROM MANIFOLD ON EXTERIOR OF UNIT CABINET	SHAFT TYPE:	CARBON STEEL MINIMUN C1045 WITH RUST INHIBITOR COATING
MOTOR SIZE:	3.73 kW	TYPE:	HIGH EFFICIENCY, TEFC, 1800 rpm
BHP:	kW	DRIVE:	BELT DRIVE, FAN & MOTOR ON PAINTED STEEL, FABRICATED BASE C/W ADJUSTABLE JACKING BOLTS FOR TENSION ADJUSTMENT, SF OF DRIVE 1.5
MOTOR SERVICE FACTOR:	1.15		

WORK SHEET:	**AREA H - HEADWORKS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	H700

AIR OPENINGS	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	FRONT	SUPPLY AIR DISCHARGE: PARALLEL BLADE, SS-CONSTRUCTION, LOW-LEAKAGE, AIR FOIL BLADES, C/W DIRECT MOUNT ELECTRIC ACTUATOR, POSITION OPEN & CLOSED LIMIT SWITCHES ; STD OF ACCEPTANCE; RUSKIN CD80 DAMPER, GREENHECK HCD DAMPER, HONEYWELL MS ACTUATOR	OPEN/CLOSED
RETURN AIR	N/A	N/A	
OUTSIDE AIR	REAR HORIZONTAL	N/A	
EXHAUST AIR	N/A	N/A	

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		50-mm, THROWAWAY, MERV 8, AAF PerfectPleat HC M8	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:	STAINLESS STEEL METAL FRAME	ORIENTATION:	ANGLE
SPARES:	COMPLETE FILER SET		

HEATING SECTION DATA

TYPE:	DIRECT-FIRED	BURNER TURNDOWN:	15:1 MINIMUM
GAS SUPPLY:	NATURAL GAS		
INLET PRESSURE:	249 Pa	HEAT INPUT:	223.5 Kw (796,492 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	46 °C
MODULATING BYPASS DAMPER:	N/A		

ELECTICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

CONTROL DATA

Applicable Documents:	Specification 23 74 00
	Drawing E600
	Appendix: Headworks Controls Narrative

WORK SHEET:	**AREA H - HEADWORKS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	H725

GENERAL & CABINET

UNIT TYPE:	DIRECT FIRED, PACKAGED, MAKE-UP AIR UNIT	UNIT MODEL NO.:	ENG AIR HE, ICE BMA OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS DOORS:	LEFT HAND, SERVICE DOORS PIANO HINGED c/w 1/4 TURN POSITIVE LOCK CLOSING HARDWARE BOTH SIDES, FULLY INSULATED AND LINED NEOPRENE GASKETTING
APPROX. SHIPPING WEIGHT:		NO. OF PIECES:	1
MAXIMUM DIMENSIONS:	3200 L x 1700 W x 1350 H , WIDTH INCLUDES AN ALLOWANCE FOR THE CONTROL PANEL		
INSULATION:	25 mm, 24 kg/m^3 , PLUS UNDERSIDE INSULATION C/W SOLID 304 SS LINER THROUGHOUT	CASING:	16 GAUGE SATIN COAT GALVANIZED STEEL, FORMED CONSTRUCTION, REINFORCED, BRACED TO MANUF'S STD C/W LIFTING LUGS, ELECTROSTATICALLY APPLIED ENAMEL PAINT COATING ON ALL EXPOSED SURFACES
APPROVALS:	CSA 3.7, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	2,540 L/s	ESP:	81.3 Pa (0.33 inch W.C.)
AIR FLOW (HIGH RATE):	N/A	ESP:	N/A
FAN RATING TO AMCA 210:	CLASS 2 (minimum)		
FAN SIZE:		QTY:	1
FAN TYPE:	BI OR AIRFOIL	RPM:	
MOUNTING:	FREE STANDING WITH RIS VIB ISOLATION	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL SATIN COAT	WHEEL CONST.:	STEEL
BEARING TYPE:	PILLOW BLOCK WITH EXTENDED SS TUBING TO GREASING NIPPLES ACCESSED FROM MANIFOLD ON EXTERIOR OF UNIT CABINET	SHAFT TYPE:	CARBON STEEL MINIMUN C1045 WITH RUST INHIBITOR COATING
MOTOR SIZE:	2.24 kW	TYPE:	HIGH EFFICIENCY, TEFC, 1800 rpm
BHP:	kW	DRIVE:	BELT DRIVE, FAN & MOTOR ON PAINTED STEEL, FABRICATED BASE C/W ADJUSTABLE JACKING BOLTS FOR TENSION ADJUSTMENT, SF OF DRIVE 1.5
MOTOR SERVICE FACTOR:	1.15		

WORK SHEET:	**AREA H - HEADWORKS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	H725

AIR OPENINGS	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	FRONT	SUPPLY AIR DISCHARGE: PARALLEL BLADE, SS-CONSTRUCTION, LOW-LEAKAGE, AIR FOIL BLADES, C/W DIRECT MOUNT ELECTRIC ACTUATOR, POSITION OPEN & CLOSED LIMIT SWITCHES ; STD OF ACCEPTANCE; RUSKIN CD80 DAMPER, GREENHECK HCD DAMPER, HONEYWELL MS ACTUATOR	OPEN/CLOSED
RETURN AIR	N/A	N/A	
OUTSIDE AIR	REAR HORIZONTAL	N/A	
EXHAUST AIR	N/A	N/A	

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		50-mm, THROWAWAY, MERV 8, AAF PerfectPleat HC M8	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:	STAINLESS STEEL METAL FRAME	ORIENTATION:	ANGLE
SPARES:	COMPLETE FILTER SET		

HEATING SECTION DATA

TYPE:	DIRECT-FIRED	BURNER TURNDOWN:	15:1 MINIMUM
GAS SUPPLY:	NATURAL GAS		
INLET PRESSURE:	249 Pa	HEAT INPUT:	200 Kw (682,294 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	46.2 °C
MODULATING BYPASS DAMPER:	N/A		

ELECTICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

CONTROL DATA

Applicable Documents:	Specification 23 74 00
	Drawing E600
	Appendix: Headworks Controls Narrative

WORK SHEET:	**AREA U - TUNNELS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U600

GENERAL & CABINET

UNIT TYPE:	DIRECT FIRED, PACKAGED, MAKE-UP AIR UNIT	UNIT MODEL NO.:	ENG AIR HE, ICE BMA OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS DOORS:	RIGHT HAND, SERVICE DOORS PIANO HINGED c/w 1/4 TURN POSITIVE LOCK CLOSING HARDWARE BOTH SIDES, FULLY INSULATED AND LINED NEOPRENE GASKETTING
APPROX. SHIPPING WEIGHT:		NO. OF PIECES:	4, MAX DIMENSIONS: 1675 x 2425
MAXIMUM DIMENSIONS:	4425 L x 2425 W x 1875 H , WIDTH INCLUDES AN ALLOWANCE FOR THE CONTROL PANEL		
INSULATION:	25 mm, 24 kg/m^3 , PLUS UNDERSIDE INSULATION C/W SOLID 304 SS LINER THROUGHOUT	CASING:	16 GAUGE SATIN COAT GALVANIZED STEEL, FORMED CONSTRUCTION, REINFORCED, BRACED TO MANUF'S STD C/W LIFTING LUGS, ELECTROSTATICALLY APPLIED ENAMEL PAINT COATING ON ALL EXPOSED SURFACES
APPROVALS:	CSA 3.7, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	16,990 L/s	ESP:	348.7 Pa (1.4 inch W.C.)
AIR FLOW (HIGH RATE):	N/A	ESP:	N/A
FAN RATING TO AMCA 210:	CLASS 2 (minimum)		
FAN SIZE:		QTY:	1
FAN TYPE:	BI OR AIRFOIL	RPM:	
MOUNTING:	FREE STANDING WITH RIS VIB ISOLATION	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL SATIN COAT	WHEEL CONST.:	STEEL
BEARING TYPE:	PILLOW BLOCK WITH EXTENDED SS TUBING TO GREASING NIPPLES ACCESSED FROM MANIFOLD ON EXTERIOR OF UNIT CABINET	SHAFT TYPE:	CARBON STEEL MINIMUN C1045 WITH RUST INHIBITOR COATING
MOTOR SIZE:	29.84 kW	TYPE:	HIGH EFFICIENCY, TEFC, 1800 rpm
BHP:	kW	DRIVE:	BELT DRIVE, FAN & MOTOR ON PAINTED STEEL, FABRICATED BASE C/W ADJUSTABLE JACKING BOLTS FOR TENSION ADJUSTMENT, SF OF DRIVE 1.5
MOTOR SERVICE FACTOR:	1.15		

WORK SHEET:	**AREA U - TUNNELS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U600

AIR OPENINGS	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	FRONT	SUPPLY AIR DISCHARGE: PARALLEL BLADE, SS-CONSTRUCTION, LOW-LEAKAGE, AIR FOIL BLADES, C/W DIRECT MOUNT ELECTRIC ACTUATOR, POSITION OPEN & CLOSED LIMIT SWITCHES ; STD OF ACCEPTANCE; RUSKIN CD80 DAMPER, GREENHECK HCD DAMPER, HONEYWELL MS ACTUATOR	OPEN/CLOSED
RETURN AIR	N/A	N/A	
OUTSIDE AIR	REAR HORIZONTAL	N/A	
EXHAUST AIR	N/A	N/A	

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		50-mm, THROWAWAY, MERV 8, AAF PerfectPleat HC M8	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:	STAINLESS STEEL METAL FRAME	ORIENTATION:	ANGLE
SPARES:	COMPLETE FILTER SET		

HEATING SECTION DATA

TYPE:	DIRECT-FIRED	BURNER TURNDOWN:	15:1 MINIMUM
GAS SUPPLY:	NATURAL GAS		
INLET PRESSURE:	249 Pa	HEAT INPUT:	1,355 Kw (4,622,354 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	47.1 °C
MODULATING BYPASS DAMPER:	N/A		

ELECTICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

CONTROL DATA

Applicable Documents:	Specification 23 74 00
	Drawing E400
	Appendix: Tunnels Controls
	Narrative

WORK SHEET:	**AREA S - SECONDARY CLARIFIERS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/IU	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	S600

GENERAL & CABINET

UNIT TYPE:	DIRECT FIRED, PACKAGED, MAKE-UP AIR UNIT	UNIT MODEL NO.:	ENG AIR HE, ICE BMA OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS DOORS:	RIGHT HAND, SERVICE DOORS PIANO HINGED c/w 1/4 TURN POSITIVE LOCK CLOSING HARDWARE BOTH SIDES, FULLY INSULATED AND LINED NEOPRENE GASKETTING
APPROX. SHIPPING WEIGHT:	2,000 kg	NO. OF PIECES:	1
MAXIMUM DIMENSIONS:	3725 L x 2350 W x 1900 H , WIDTH INCLUDES AN ALLOWANCE FOR THE CONTROL PANEL		
INSULATION:	25 mm, 24 kg/m^3 , PLUS UNDERSIDE INSULATION C/W SOLID 304 SS LINER THROUGHOUT	CASING:	16 GAUGE SATIN COAT GALVANIZED STEEL, FORMED CONSTRUCTION, REINFORCED, BRACED TO MANUF'S STD C/W LIFTING LUGS, ELECTROSTATICALLY APPLIED ENAMEL PAINT COATING ON ALL EXPOSED SURFACES
APPROVALS:	CSA 3.7, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	8,490 L/s (18,000 cfm)	ESP:	498 Pa (2.0 inch W.C.)
AIR FLOW (HIGH RATE):	7,547 L/s (16,000 cfm)	ESP:	212 Pa (0.85 inch W.C.)
FAN RATING TO AMCA 210:	CLASS 2 (minimum)		
FAN SIZE:		QTY:	1
FAN TYPE:	BI OR AIRFOIL	RPM:	
MOUNTING:	FREE STANDING WITH RIS VIB ISOLATION	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL SATIN COAT	WHEEL CONST.:	STEEL
BEARING TYPE:	PILLOW BLOCK WITH EXTENDED SS TUBING TO GREASING NIPPLES ACCESSED FROM MANIFOLD ON EXTERIOR OF UNIT CABINET	SHAFT TYPE:	CARBON STEEL MINIMUN C1045 WITH RUST INHIBITOR COATING
MOTOR SIZE:	14.92 kW	TYPE:	HIGH EFFICIENCY, TEFC, 1800 rpm
BHP:	kW	DRIVE:	BELT DRIVE, FAN & MOTOR ON PAINTED STEEL, FABRICATED BASE C/W ADJUSTABLE JACKING BOLTS FOR TENSION ADJUSTMENT, SF OF DRIVE 1.5
MOTOR SERVICE FACTOR:	1.15		

WORK SHEET:	**AREA S - SECONDARY CLARIFIERS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/IU	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	S600

AIR OPENINGS	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	BOTTOM	SUPPLY AIR DISCHARGE: PARALLEL BLADE, SS-CONSTRUCTION, LOW-LEAKAGE, AIR FOIL BLADES, C/W DIRECT MOUNT ELECTRIC ACTUATOR, POSITION OPEN & CLOSED LIMIT SWITCHES ; STD OF ACCEPTANCE; RUSKIN CD80 DAMPER, GREENHECK HCD DAMPER, HONEYWELL MS ACTUATOR	OPEN/CLOSED
RETURN AIR	N/A	N/A	
OUTSIDE AIR	REAR HORIZONTAL	N/A	
EXHAUST AIR	N/A	N/A	

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		50-mm, THROWAWAY, MERV 8, AAF PerfectPleat HC M8	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:	STAINLESS STEEL METAL FRAME	ORIENTATION:	ANGLE
SPARES:	COMPLETE FILTER SET		

HEATING SECTION DATA

TYPE:	DIRECT-FIRED	BURNER TURNDOWN:	15:1 MINIMUM
GAS SUPPLY:	NATURAL GAS		
INLET PRESSURE:	249 Pa	HEAT INPUT:	581.0 Kw (1,982,436 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	40.7 ^{o}C
MODULATING BYPASS DAMPER:	N/A		

ELECTICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

CONTROL DATA

Applicable Documents:	Specification 23 74 00 Drawing E200 Appendix: Secondary Clarifiers Controls Narrative

WORK SHEET:	**AREA S - SECONDARY CLARIFIERS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/IU	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	S650

GENERAL & CABINET

UNIT TYPE:	DIRECT FIRED, PACKAGED, MAKE-UP AIR UNIT	UNIT MODEL NO.:	ENG AIR HE, ICE BMA OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS DOORS:	LEFT HAND, SERVICE DOORS PIANO HINGED c/w 1/4 TURN POSITIVE LOCK CLOSING HARDWARE BOTH SIDES, FULLY INSULATED AND LINED NEOPRENE GASKETTING
APPROX. SHIPPING WEIGHT:	2,000 kg	NO. OF PIECES:	1
MAXIMUM DIMENSIONS:	3725 L x 2350 W x 1900 H , WIDTH INCLUDES AN ALLOWANCE FOR THE CONTROL PANEL		
INSULATION:	25 mm, 24 kg/m^3 , PLUS UNDERSIDE INSULATION C/W SOLID 304 SS LINER THROUGHOUT	CASING:	16 GAUGE SATIN COAT GALVANIZED STEEL, FORMED CONSTRUCTION, REINFORCED, BRACED TO MANUF'S STD C/W LIFTING LUGS, ELECTROSTATICALLY APPLIED ENAMEL PAINT COATING ON ALL EXPOSED SURFACES
APPROVALS:	CSA 3.7, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	8,490 L/s (18,000 cfm)	ESP:	498 Pa (2.0 inch W.C.)
AIR FLOW (HIGH RATE):	7,547 L/s (16,000 cfm)	ESP:	212 Pa (0.85 inch W.C.)
FAN RATING TO AMCA 210:	CLASS 2 (minimum)		
FAN SIZE:		QTY:	1
FAN TYPE:	BI OR AIRFOIL	RPM:	
MOUNTING:	FREE STANDING WITH RIS VIB ISOLATION	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL SATIN COAT	WHEEL CONST.:	STEEL
BEARING TYPE:	PILLOW BLOCK WITH EXTENDED SS TUBING TO GREASING NIPPLES ACCESSED FROM MANIFOLD ON EXTERIOR OF UNIT CABINET	SHAFT TYPE:	CARBON STEEL MINIMUN C1045 WITH RUST INHIBITOR COATING
MOTOR SIZE:	14.92 kW	TYPE:	HIGH EFFICIENCY, TEFC, 1800 rpm
BHP:	kW	DRIVE:	BELT DRIVE, FAN & MOTOR ON PAINTED STEEL, FABRICATED BASE C/W ADJUSTABLE JACKING BOLTS FOR TENSION ADJUSTMENT, SF OF DRIVE 1.5
MOTOR SERVICE FACTOR:	1.15		

WORK SHEET:	**AREA S - SECONDARY CLARIFIERS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/IU	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	S650

AIR OPENINGS	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	BOTTOM	SUPPLY AIR DISCHARGE: PARALLEL BLADE, SS-CONSTRUCTION, LOW-LEAKAGE, AIR FOIL BLADES, C/W DIRECT MOUNT ELECTRIC ACTUATOR, POSITION OPEN & CLOSED LIMIT SWITCHES ; STD OF ACCEPTANCE; RUSKIN CD80 DAMPER, GREENHECK HCD DAMPER, HONEYWELL MS ACTUATOR	OPEN/CLOSED
RETURN AIR	N/A	N/A	
OUTSIDE AIR	REAR HORIZONTAL	N/A	
EXHAUST AIR	N/A	N/A	

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		50-mm, THROWAWAY, MERV 8, AAF PerfectPleat HC M8	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:	STAINLESS STEEL METAL FRAME	ORIENTATION:	ANGLE
SPARES:	COMPLETE FILTER SET		

HEATING SECTION DATA

TYPE:	DIRECT-FIRED	BURNER TURNDOWN:	15:1 MINIMUM
GAS SUPPLY:	NATURAL GAS		
INLET PRESSURE:	249 Pa	HEAT INPUT:	581.0 Kw (1,982,436 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	40.7 ^{o}C
MODULATING BYPASS DAMPER:	N/A		

ELECTICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

CONTROL DATA

Applicable Documents:	Specification 23 74 00 Drawing E200 Appendix: Secondary Clarifiers Controls Narrative

WORK SHEET:	**AREA U - MECHANICAL BAY - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U610

GENERAL & CABINET

UNIT TYPE:	DIRECT FIRED, PACKAGED, MAKE-UP AIR UNIT	UNIT MODEL NO.:	ENG AIR HE, ICE BMA OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS DOORS:	RIGHT HAND, SERVICE DOORS PIANO HINGED c/w 1/4 TURN POSITIVE LOCK CLOSING HARDWARE BOTH SIDES, FULLY INSULATED AND LINED NEOPRENE GASKETTING
APPROX. SHIPPING WEIGHT:	885 kg	NO. OF PIECES:	1
MAXIMUM DIMENSIONS:	3150 L x 1575 W x 1050 H , WIDTH INCLUDES AN ALLOWANCE FOR THE CONTROL PANEL		
INSULATION:	25 mm, 24 kg/m^3 , PLUS UNDERSIDE INSULATION C/W SOLID 304 SS LINER THROUGHOUT	CASING:	16 GAUGE SATIN COAT GALVANIZED STEEL, FORMED CONSTRUCTION, REINFORCED, BRACED TO MANUF'S STD C/W LIFTING LUGS, ELECTROSTATICALLY APPLIED ENAMEL PAINT COATING ON ALL EXPOSED SURFACES
APPROVALS:	CSA 3.7, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	2,880 L/s	ESP:	62.5 Pa (0.25 inch W.C.)
AIR FLOW (HIGH RATE):	N/A	ESP:	N/A
FAN RATING TO AMCA 210:	CLASS 2 (minimum)		
FAN SIZE:		QTY:	1
FAN TYPE:	BI OR AIRFOIL	RPM:	
MOUNTING:	FREE STANDING WITH RIS VIB ISOLATION	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL SATIN COAT	WHEEL CONST.:	STEEL
BEARING TYPE:	PILLOW BLOCK WITH EXTENDED SS TUBING TO GREASING NIPPLES ACCESSED FROM MANIFOLD ON EXTERIOR OF UNIT CABINET	SHAFT TYPE:	CARBON STEEL MINIMUN C1045 WITH RUST INHIBITOR COATING
MOTOR SIZE:	3.75 kW	TYPE:	HIGH EFFICIENCY, TEFC, 1800 rpm
BHP:	kW	DRIVE:	BELT DRIVE, FAN & MOTOR ON PAINTED STEEL, FABRICATED BASE C/W ADJUSTABLE JACKING BOLTS FOR TENSION ADJUSTMENT, SF OF DRIVE 1.5
MOTOR SERVICE FACTOR:	1.15		

WORK SHEET:	**AREA U - MECHANICAL BAY - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U610

AIR OPENINGS	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	FRONT	SUPPLY AIR DISCHARGE: PARALLEL BLADE, SS-CONSTRUCTION, LOW-LEAKAGE, AIR FOIL BLADES, C/W DIRECT MOUNT ELECTRIC ACTUATOR, POSITION OPEN & CLOSED LIMIT SWITCHES ; STD OF ACCEPTANCE; RUSKIN CD80 DAMPER, GREENHECK HCD DAMPER, HONEYWELL MS ACTUATOR	OPEN/CLOSED
RETURN AIR	N/A	N/A	
OUTSIDE AIR	REAR HORIZONTAL	N/A	
EXHAUST AIR	N/A	N/A	

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		50-mm, THROWAWAY, MERV 8, AAF PerfectPleat HC M8	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:	STAINLESS STEEL METAL FRAME	ORIENTATION:	ANGLE
SPARES:	COMPLETE FILTER SET		

HEATING SECTION DATA

TYPE:	DIRECT-FIRED	BURNER TURNDOWN:	15:1 MINIMUM
GAS SUPPLY:	NATURAL GAS		
INLET PRESSURE:	249 Pa	HEAT INPUT:	200 Kw (682,294 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	46.2 °C
MODULATING BYPASS DAMPER:	N/A		

ELECTICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

CONTROL DATA

Applicable Documents:	Specification 23 74 00
	Drawing E500
	Appendix: Utilities Controls
	Narrative

WORK SHEET:	**AREA U - MECHANICAL BAY - AHU SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U605

GENERAL & CABINET

UNIT TYPE:	INDIRECT FIRED, PACKAGED, AIR HANDLER	UNIT MODEL NO.:	ENG AIR DJE, ICE GIDMH OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS DOORS:	RIGHT HAND, SERVICE DOORS PIANO HINGED c/w 1/4 TURN POSITIVE LOCK CLOSING HARDWARE BOTH SIDES, FULLY INSULATED AND LINED NEOPRENE GASKETTING
APPROX. SHIPPING WEIGHT:	2,676 kg	NO. OF PIECES:	3
MAXIMUM DIMENSIONS:	3575 L x 2500 W x 1625 H , WIDTH INCLUDES AN ALLOWANCE FOR THE BURNER SECTION		
INSULATION:	25 mm, 24 kg/m^3 , PLUS UNDERSIDE INSULATION C/W SOLID 304 SS LINER THROUGHOUT	CASING:	16 GAUGE SATIN COAT GALVANIZED STEEL, FORMED CONSTRUCTION, REINFORCED, BRACED TO MANUF'S STD C/W LIFTING LUGS, ELECTROSTATICALLY APPLIED ENAMEL PAINT COATING ON ALL EXPOSED SURFACES
APPROVALS:	CSA 3.7, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	7,080 L/s	ESP:	142 Pa (0.57 inch W.C.)
AIR FLOW (HIGH RATE):	N/A	ESP:	N/A
FAN RATING TO AMCA 210:	CLASS 2 (minimum)		
FAN SIZE:		QTY:	1
FAN TYPE:	BI OR AIRFOIL	RPM:	
MOUNTING:	FREE STANDING WITH RIS VIB ISOLATION	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL SATIN COAT	WHEEL CONST.:	STEEL
BEARING TYPE:	PILLOW BLOCK WITH EXTENDED SS TUBING TO GREASING NIPPLES ACCESSED FROM MANIFOLD ON EXTERIOR OF UNIT CABINET	SHAFT TYPE:	CARBON STEEL MINIMUN C1045 WITH RUST INHIBITOR COATING
MOTOR SIZE:	11.19 kW	TYPE:	HIGH EFFICIENCY, TEFC, 1800 rpm
BHP:	kW	DRIVE:	BELT DRIVE, FAN & MOTOR ON PAINTED STEEL, FABRICATED BASE C/W ADJUSTABLE JACKING BOLTS FOR TENSION ADJUSTMENT, SF OF DRIVE 1.5
MOTOR SERVICE FACTOR:	1.15		

WORK SHEET:	**AREA U - MECHANICAL BAY - AHU SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U605

AIR OPENINGS	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	FRONT		
RETURN AIR	TOP	RETURN AIR INTAKE: PARALLEL BLADE, SS-CONSTRUCTION, LOW-LEAKAGE, AIR FOIL BLADES, C/W DIRECT MOUNT ELECTRIC ACTUATOR; STD OF ACCEPTANCE; RUSKIN CD80 DAMPER, GREENHECK HCD DAMPER, HONEYWELL MS ACTUATOR	MODULATING
OUTSIDE AIR	REAR HORIZONTAL	OUTSIDE AIR INTAKE: PARALLEL BLADE, SS-CONSTRUCTION, LOW-LEAKAGE, AIR FOIL BLADES, C/W DIRECT MOUNT ELECTRIC ACTUATOR ; STD OF ACCEPTANCE; RUSKIN CD80 DAMPER, GREENHECK HCD DAMPER, HONEYWELL MS ACTUATOR	MODULATING
EXHAUST AIR	N/A	N/A	

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		50-mm, THROWAWAY, MERV 8, AAF PerfectPleat HC M8	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:	STAINLESS STEEL METAL FRAME	ORIENTATION:	ANGLE
SPARES:	COMPLETE FILTER SET		

MIXED AIR SECTION

BAFFLING:	NO	ACCESS SIDE:	RIGHT
RELIEF:	NO	RELIEF AIR DAMPER:	NONE
OUTDOOR AIR DAMPER:	MOTORIZED. MODULATING	RETURN AIR DAMPER:	MOTORIZED, MODULATING
OUTDOOR AIR REQUIREMENT:	29%		

HEATING SECTION DATA

TYPE:	INDIRECT-FIRED	BURNER TURNDOWN:	15:1 MINIMUM
GAS SUPPLY:	NATURAL GAS	HEAT INPUT:	263.8 kW (900,000 Btuh)
INLET PRESSURE:	249 Pa	HEAT OUTPUT:	215 kW (733,610 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	25 °C
MODULATING BYPASS DAMPER:	N/A		

FIXED PLATE HEAT EXCHANGER

PRIMARY MATERIAL:	STAINLESS STEEL
SECONDARY MATERIAL:	STAINLESS STEEL
DRAIN PAN:	STAINLESS STEEL

ELECTICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

WORK SHEET:	**AREA U - MECHANICAL BAY - AHU SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U605

CONTROL DATA

Applicable Documents:	Specification 23 74 00
	Drawing E500
	Appendix: Utilities Controls Narrative

WORK SHEET:	**AREA U - MECHANICAL BAY - AHU SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U640

GENERAL & CABINET

UNIT TYPE:	INDIRECT FIRED, PACKAGED, AIR HANDLER	UNIT MODEL NO.:	ENG AIR DJE, ICE GIDMH OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS DOORS:	LEFT HAND, SERVICE DOORS PIANO HINGED c/w 1/4 TURN POSITIVE LOCK CLOSING HARDWARE BOTH SIDES, FULLY INSULATED AND LINED NEOPRENE GASKETTING
APPROX. SHIPPING WEIGHT:	1,497 kg	NO. OF PIECES:	1
MAXIMUM DIMENSIONS:	2625 L x 2000 W x 1200 H , WIDTH INCLUDES AN ALLOWANCE FOR THE BURNER SECTION		
INSULATION:	25 mm, 24 kg/m^3 , PLUS UNDERSIDE INSULATION C/W SOLID 304 SS LINER THROUGHOUT	CASING:	16 GAUGE SATIN COAT GALVANIZED STEEL, FORMED CONSTRUCTION, REINFORCED, BRACED TO MANUF'S STD C/W LIFTING LUGS, ELECTROSTATICALLY APPLIED ENAMEL PAINT COATING ON ALL EXPOSED SURFACES
APPROVALS:	CSA 3.7, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	4,267 L/s	ESP:	597.8 Pa (2.4 inch W.C.)
AIR FLOW (HIGH RATE):	N/A	ESP:	N/A
FAN RATING TO AMCA 210:	CLASS 2 (minimum)		
FAN SIZE:		QTY:	1
FAN TYPE:	BI OR AIRFOIL	RPM:	
MOUNTING:	FREE STANDING WITH RIS VIB ISOLATION	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL SATIN COAT	WHEEL CONST.:	STEEL
BEARING TYPE:	PILLOW BLOCK WITH EXTENDED SS TUBING TO GREASING NIPPLES ACCESSED FROM MANIFOLD ON EXTERIOR OF UNIT CABINET	SHAFT TYPE:	CARBON STEEL MINIMUN C1045 WITH RUST INHIBITOR COATING
MOTOR SIZE:	11.19 kW	TYPE:	HIGH EFFICIENCY, TEFC, 1800 rpm
BHP:	kW	DRIVE:	BELT DRIVE, FAN & MOTOR ON PAINTED STEEL, FABRICATED BASE C/W ADJUSTABLE JACKING BOLTS FOR TENSION ADJUSTMENT, SF OF DRIVE 1.5
MOTOR SERVICE FACTOR:	1.15		

WORK SHEET:	**AREA U - MECHANICAL BAY - AHU SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U640

AIR OPENINGS	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	FRONT		
RETURN AIR	TOP	RETURN AIR INTAKE: PARALLEL BLADE, SS-CONSTRUCTION, LOW-LEAKAGE, AIR FOIL BLADES, C/W DIRECT MOUNT ELECTRIC ACTUATOR; STD OF ACCEPTANCE; RUSKIN CD80 DAMPER, GREENHECK HCD DAMPER, HONEYWELL MS ACTUATOR	MODULATING
OUTSIDE AIR	REAR HORIZONTAL	OUTSIDE AIR INTAKE: PARALLEL BLADE, SS-CONSTRUCTION, LOW-LEAKAGE, AIR FOIL BLADES, C/W DIRECT MOUNT ELECTRIC ACTUATOR ; STD OF ACCEPTANCE; RUSKIN CD80 DAMPER, GREENHECK HCD DAMPER, HONEYWELL MS ACTUATOR	MODULATING
EXHAUST AIR	N/A	N/A	

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		50-mm, THROWAWAY, MERV 8, AAF PerfectPleat HC M8	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:	STAINLESS STEEL METAL FRAME	ORIENTATION:	ANGLE
SPARES:	COMPLETE FILTER SET		

MIXED AIR SECTION

BAFFLING:	NO	ACCESS SIDE:	LEFT
RELIEF:	NO	RELIEF AIR DAMPER:	NONE
OUTDOOR AIR DAMPER:	MOTORIZED. MODULATING	RETURN AIR DAMPER:	MOTORIZED, MODULATING
OUTDOOR AIR REQUIREMENT:	7%		

HEATING SECTION DATA

TYPE:	INDIRECT-FIRED	BURNER TURNDOWN:	15:1 MINIMUM
GAS SUPPLY:	NATURAL GAS	HEAT INPUT:	106 kW (361, 688 Btuh)
INLET PRESSURE:	249 Pa	HEAT OUTPUT:	84.8 Kw (289,350 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	14 °C
MODULATING BYPASS DAMPER:	N/A		

FIXED PLATE HEAT EXCHANGER

PRIMARY MATERIAL:	STAINLESS STEEL
SECONDARY MATERIAL:	STAINLESS STEEL
DRAIN PAN:	STAINLESS STEEL

ELECTICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

WORK SHEET:	**AREA U - MECHANICAL BAY - AHU SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U640

CONTROL DATA

Applicable Documents:	Specification 23 74 00 Drawing E500 Appendix: Utilities Controls Narrative

WORK SHEET:	**AREA P - PRIMARY CLARIFIERS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/IU	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	P600

GENERAL & CABINET

UNIT TYPE:	DIRECT FIRED, PACKAGED, MAKE-UP AIR UNIT	UNIT MODEL NO.:	ENG AIR DJE, ICE GIDMH OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS DOORS:	LEFT HAND, SERVICE DOORS PIANO HINGED c/w 1/4 TURN POSITIVE LOCK CLOSING HARDWARE BOTH SIDES, FULLY INSULATED AND LINED NEOPRENE GASKETTING
APPROX. SHIPPING WEIGHT:	2,000 kg	NO. OF PIECES:	1
MAXIMUM DIMENSIONS:	3725 L x 2350 W x 1900 H , WIDTH INCLUDES AN ALLOWANCE FOR THE CONTROL PANEL		
INSULATION:	25 mm, 24 kg/m^3 , PLUS UNDERSIDE INSULATION C/W SOLID 304 SS LINER THROUGHOUT	CASING:	16 GAUGE SATIN COAT GALVANIZED STEEL, FORMED CONSTRUCTION, REINFORCED, BRACED TO MANUF'S STD C/W LIFTING LUGS, ELECTROSTATICALLY APPLIED ENAMEL PAINT COATING ON ALL EXPOSED SURFACES
APPROVALS:	CSA 3.7, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	8,490 L/s (18,000 cfm)	ESP:	224.2 Pa (0.9 inch W.C.)
AIR FLOW (HIGH RATE):	7,547 L/s (16,000 cfm)	ESP:	485.7 Pa (1.95 inch W.C.)
FAN RATING TO AMCA 210:	CLASS 2 (minimum)		
FAN SIZE:		QTY:	1
FAN TYPE:	BI OR AIRFOIL	RPM:	
MOUNTING:	FREE STANDING WITH RIS VIB ISOLATION	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL SATIN COAT	WHEEL CONST.:	STEEL
BEARING TYPE:	PILLOW BLOCK WITH EXTENDED SS TUBING TO GREASING NIPPLES ACCESSED FROM MANIFOLD ON EXTERIOR OF UNIT CABINET	SHAFT TYPE:	CARBON STEEL MINIMUN C1045 WITH RUST INHIBITOR COATING
MOTOR SIZE:	14.92 kW	TYPE:	HIGH EFFICIENCY, TEFC, 1800 rpm
BHP:	kW	DRIVE:	BELT DRIVE, FAN & MOTOR ON PAINTED STEEL, FABRICATED BASE C/W ADJUSTABLE JACKING BOLTS FOR TENSION ALIGNMENT ADJUSTMENT, SF OF DRIVE 1.5
MOTOR SERVICE FACTOR:	1.15		

WORK SHEET:	**AREA P - PRIMARY CLARIFIERS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/IU	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	P600

AIR OPENINGS	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	TOP	SUPPLY AIR DISCHARGE INTEGRAL TO UNIT: PARALLEL BLADE, SS-CONSTRUCTION, LOW-LEAKAGE, AIR FOIL BLADES, C/W DIRECT MOUNT ELECTRIC ACTUATOR, POSITION OPEN & CLOSED LIMIT SWITCHES ; STD OF ACCEPTANCE; RUSKIN CD80AF3 DAMPER, GREENHECK HCD230 DAMPER, HONEYWELL MS ACTUATOR	OPEN/CLOSED
RETURN AIR	N/A	N/A	
OUTSIDE AIR	REAR HORIZONTAL	N/A	
EXHAUST AIR	N/A	N/A	

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		50-mm, THROWAWAY, MERV 8, AAF PerfectPleat HC M8	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:	STAINLESS STEEL METAL FRAME	ORIENTATION:	ANGLE
SPARES:	COMPELTE FILTER SET		

HEATING SECTION DATA

TYPE:	DIRECT-FIRED	BURNER TURNDOWN:	15:1 MINIMUM
GAS SUPPLY:	NATURAL GAS		
INLET PRESSURE:	249 Pa	HEAT INPUT, kW:	633
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE, ^oC:	50
MODULATING BYPASS DAMPER:	N/A		

ELECTICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

CONTROL DATA

Applicable Documents:	Specification 23 74 00
	Drawing E100
	Appendix: Primary Clarifiers
	Controls Narrative

WORK SHEET:	**AREA P - PRIMARY CLARIFIERS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/IU	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	P650

GENERAL & CABINET

UNIT TYPE:	DIRECT FIRED, PACKAGED, MAKE-UP AIR UNIT	UNIT MODEL NO.:	ENG AIR DJE, ICE GIDMH OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS DOORS:	RIGHT HAND, SERVICE DOORS PIANO HINGED c/w 1/4 TURN POSITIVE LOCK CLOSING HARDWARE BOTH SIDES, FULLY INSULATED AND LINED NEOPRENE GASKETTING
APPROX. SHIPPING WEIGHT:	2,000 kg	NO. OF PIECES:	1
MAXIMUM DIMENSIONS:	3725 L x 2350 W x 1900 H , WIDTH INCLUDES AN ALLOWANCE FOR THE CONTROL PANEL		
INSULATION:	25 mm, 24 kg/m^3 , PLUS UNDERSIDE INSULATION C/W SOLID 304 SS LINER THROUGHOUT	CASING:	16 GAUGE SATIN COAT GALVANIZED STEEL, FORMED CONSTRUCTION, REINFORCED, BRACED TO MANUF'S STD C/W LIFTING LUGS, ELECTROSTATICALLY APPLIED ENAMEL PAINT COATING ON ALL EXPOSED SURFACES
APPROVALS:	CSA 3.7, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	8,490 L/s (18,000 cfm)	ESP:	224.2 Pa (0.9 inch W.C.)
AIR FLOW (HIGH RATE):	7,547 L/s (16,000 cfm)	ESP:	485.7 Pa (1.95 inch W.C.)
FAN RATING TO AMCA 210:	CLASS 2 (minimum)		
FAN SIZE:		QTY:	1
FAN TYPE:	BI OR AIRFOIL	RPM:	
MOUNTING:	FREE STANDING WITH RIS VIB ISOLATION	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL SATIN COAT	WHEEL CONST.:	STEEL
BEARING TYPE:	PILLOW BLOCK WITH EXTENDED SS TUBING TO GREASING NIPPLES ACCESSED FROM MANIFOLD ON EXTERIOR OF UNIT CABINET	SHAFT TYPE:	CARBON STEEL MINIMUN C1045 WITH RUST INHIBITOR COATING
MOTOR SIZE:	14.92 kW	TYPE:	HIGH EFFICIENCY, TEFC, 1800 rpm
BHP:	kW	DRIVE:	BELT DRIVE, FAN & MOTOR ON PAINTED STEEL, FABRICATED BASE C/W ADJUSTABLE JACKING BOLTS FOR TENSION ADJUSTMENT, SF OF DRIVE 1.5
MOTOR SERVICE FACTOR:	1.15		

WORK SHEET:	**AREA P - PRIMARY CLARIFIERS - MUA SPECIFICATIONS**		
DESIGNED BY:	DD/IU	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	P650

AIR OPENINGS	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	TOP	SUPPLY AIR DISCHARGE: PARALLEL BLADE, SS-CONSTRUCTION, LOW-LEAKAGE, AIR FOIL BLADES, C/W DIRECT MOUNT ELECTRIC ACTUATOR, POSITION OPEN & CLOSED LIMIT SWITCHES ; STD OF ACCEPTANCE; RUSKIN CD80 DAMPER, GREENHECK HCD DAMPER, HONEYWELL MS ACTUATOR	OPEN/CLOSED
RETURN AIR	N/A	N/A	
OUTSIDE AIR	REAR HORIZONTAL	N/A	
EXHAUST AIR	N/A	N/A	

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		50-mm, THROWAWAY, MERV 8, AAF PerfectPleat HC M8	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:	STAINLESS STEEL METAL FRAME	ORIENTATION:	ANGLE
SPARES:	COMPLETE FILTER SET		

HEATING SECTION DATA

TYPE:	DIRECT-FIRED	BURNER TURNDOWN:	15:1 MINIMUM
GAS SUPPLY:	NATURAL GAS		
INLET PRESSURE:	249 Pa	HEAT INPUT:	579.0 Kw (1,975,799 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	37.7 ^{o}C
MODULATING BYPASS DAMPER:	N/A		

ELECTICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

CONTROL DATA

Applicable Documents:	Specification 23 74 00
	Drawing E100
	Appendix: Primary Clarifiers
	Controls Narrative

WORK SHEET:	**AREA H - HEADWORKS - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	H605

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	INDOOR, CEILING (HEATED SPACE)	MODEL:	TCVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	201 kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	BRACKETS WELDED TO SIDE OF CASING

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	24B7	CLASS:	II
BLADE ANGLE / TYPE:	40° / FIXED	FAN WHEEL DIAMETER:	600 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	2.24 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	1800 RPM
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	2540 L/s	OUTLET VELOCITY:	###
ESP:	373.7 Pa (1.50 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	1210	MECHANICAL EFFICIENCY:	###
BHP:	1.61 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR
UL 705 PACKAGE, ENG-STD E1-06

WORK SHEET:	**AREA H - HEADWORKS - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	H730

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	INDOOR, CEILING (HEATED SPACE)	MODEL:	TCVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	714 kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	BRACKETS WELDED TO SIDE OF CASING

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	48B4	CLASS:	II
BLADE ANGLE / TYPE:	30° / FIXED	FAN WHEEL DIAMETER:	1200 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	29.8 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	1800 RPM
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	15710 L/s	OUTLET VELOCITY:	###
ESP:	822 Pa (3.3 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	1295	MECHANICAL EFFICIENCY:	###
BHP:	20.3 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR
UL 705 PACKAGE, ENG-STD E1-06

WORK SHEET:	**AREA H - HEADWORKS - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	H605A

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	INDOOR, CEILING (HEATED SPACE)	MODEL:	TCVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	202 kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	BRACKETS WELDED TO SIDE OF CASING

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	24B7	CLASS:	II
BLADE ANGLE / TYPE:	45° / FIXED	FAN WHEEL DIAMETER:	600 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	2.24 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	1800 RPM
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	2980 L/s	OUTLET VELOCITY:	###
ESP:	311.4 Pa (1.25 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	1173	MECHANICAL EFFICIENCY:	###
BHP:	1.76 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR
UL 705 PACKAGE, ENG-STD E1-06

WORK SHEET:	**AREA H - HEADWORKS - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	H630

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	INDOOR, CEILING (HEATED SPACE)	MODEL:	TCVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	500 kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	BRACKETS WELDED TO SIDE OF CASING

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	42B5	CLASS:	II
BLADE ANGLE / TYPE:	45° / FIXED	FAN WHEEL DIAMETER:	1050 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	7.46 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	1800 RPM
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	9958 L/s	OUTLET VELOCITY:	###
ESP:	274 Pa (1.1 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	710	MECHANICAL EFFICIENCY:	###
BHP:	4.7 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR
UL 705 PACKAGE, ENG-STD E1-06

WORK SHEET:	**AREA H - HEADWORKS - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-09-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	H655

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	INDOOR, WALL MOUNTED	MODEL:	##
HOUSING:	HEAVY-GAUGE STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	#### kg
FAN WHEEL:	STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	STAINLESS STEEL, IF AVAILABLE		

DESCRIPTION

TYPE:	CENTRIFUGAL	ARRANGEMENT:	CW THD
FAN SIZE:		CLASS:	22
FAN SHAFT BEARINGS:	ROLLER, IF AVAILABLE	FAN WHEEL DIAMETER:	
MOTOR SIZE:	0.56 Kw	TYPE:	TEFC
BEARING TYPE:		SHAFT TYPE:	
DRIVE:	BELT DRIVE, 1.5 SF	SHAFT SEAL:	STANDARD TYPE
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	165 L/s	OUTLET VELOCITY:	###
ESP:	996 Pa (4.0 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	##	MECHANICAL EFFICIENCY:	###
BHP:	### kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR

NOTES

Applicable Documents:	Specification 23 34 00
	Drawing E600
	Appendix: Headworks Controls Narrative

WORK SHEET:	**AREA H - HEADWORKS - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	H672

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	OUTDOOR, ROOF MOUNTED	MODEL:	UBVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	466 kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	ROOF MOUNTED

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	36B4	CLASS:	II
BLADE ANGLE / TYPE:	45° / FIXED	FAN WHEEL DIAMETER:	900 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	3.73 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	1800 RPM
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	7,973 L/s	OUTLET VELOCITY:	###
ESP:	127 Pa (0.51 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	792	MECHANICAL EFFICIENCY:	###
BHP:	2.42 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR

WORK SHEET:	**AREA U - TUNNELS - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	P625

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	OUTDOOR, ROOF MOUNTED	MODEL:	TCVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	265 kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	ROOF MOUNTED

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	32B5	CLASS:	II
BLADE ANGLE / TYPE:	45° / FIXED	FAN WHEEL DIAMETER:	800 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	2.24 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	1800 RPM
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	6200 L/s	OUTLET VELOCITY:	###
ESP:	107 Pa (0.43 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	786	MECHANICAL EFFICIENCY:	###
BHP:	1.62 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR

WORK SHEET:	**AREA U - TUNNELS - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	S695

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	OUTDOOR, ROOF MOUNTED	MODEL:	TCVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	244 kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	ROOF MOUNTED

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	32B5	CLASS:	II
BLADE ANGLE / TYPE:	50° / FIXED	FAN WHEEL DIAMETER:	800 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	2.24 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	1800 RPM
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	6200 L/s	OUTLET VELOCITY:	###
ESP:	74.7 Pa (0.3 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	704	MECHANICAL EFFICIENCY:	###
BHP:	1.39 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR
UL 705 PACKAGE, ENG-STD E1-06

WORK SHEET:	**AREA U - TUNNELS - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	S612

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	OUTDOOR, ROOF MOUNTED	MODEL:	UBVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	101 kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	ROOF MOUNTED

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	12B7	CLASS:	II
BLADE ANGLE / TYPE:	50° / FIXED	FAN WHEEL DIAMETER:	300 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	0.37 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	1800 RPM
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	490 L/s	OUTLET VELOCITY:	###
ESP:	42.3 Pa (0.17 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	1433	MECHANICAL EFFICIENCY:	###
BHP:	0.12 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR

WORK SHEET:	**AREA U - TUNNELS - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	S675

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	OUTDOOR, ROOF MOUNTED	MODEL:	UBVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	137 kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	ROOF MOUNTED

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	18B5	CLASS:	II
BLADE ANGLE / TYPE:	50° / FIXED	FAN WHEEL DIAMETER:	450 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	0.37 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	1800 RPM
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	1529 L/s	OUTLET VELOCITY:	###
ESP:	49.8 Pa (0.2 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	1014	MECHANICAL EFFICIENCY:	###
BHP:	0.24 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR

WORK SHEET:	**AREA U - TUNNELS - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	S680

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	OUTDOOR, ROOF MOUNTED	MODEL:	UBVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	137 kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	ROOF MOUNTED

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	18B5	CLASS:	II
BLADE ANGLE / TYPE:	50° / FIXED	FAN WHEEL DIAMETER:	450 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	0.37 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	1800 RPM
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	1529 L/s	OUTLET VELOCITY:	###
ESP:	49.8 Pa (0.2 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	1014	MECHANICAL EFFICIENCY:	###
BHP:	0.24 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR

WORK SHEET:	**AREA U - TUNNELS - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	S690

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	OUTDOOR, ROOF MOUNTED	MODEL:	UBVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	137 kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	ROOF MOUNTED

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	18B5	CLASS:	II
BLADE ANGLE / TYPE:	50° / FIXED	FAN WHEEL DIAMETER:	450 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	0.37 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	1800 RPM
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	1529 L/s	OUTLET VELOCITY:	###
ESP:	17.5 Pa (0.07 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	932	MECHANICAL EFFICIENCY:	###
BHP:	0.18 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR

WORK SHEET:	**AREA U - MECHANICAL BAY - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U670

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	OUTDOOR, ROOF MOUNTED	MODEL:	UBVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	117 kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	ROOF MOUNTED

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	15B6	CLASS:	II
BLADE ANGLE / TYPE:	45° / FIXED	FAN WHEEL DIAMETER:	375 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	0.37 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	1800 RPM
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	830 L/s	OUTLET VELOCITY:	###
ESP:	132 Pa (0.53 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	1283	MECHANICAL EFFICIENCY:	###
BHP:	0.2 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR

WORK SHEET:	**AREA U - MECHANICAL BAY - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U675

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	OUTDOOR, ROOF MOUNTED	MODEL:	UBVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	269 kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	ROOF MOUNTED

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	28B4	CLASS:	II
BLADE ANGLE / TYPE:	45° / FIXED	FAN WHEEL DIAMETER:	700 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	0.56 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	1800 RPM
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	2880 L/s	OUTLET VELOCITY:	###
ESP:	44.8 Pa (0.18 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	631	MECHANICAL EFFICIENCY:	###
BHP:	0.34 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR

WORK SHEET:	**AREA U - MECHANICAL BAY - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-09-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U635

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	INDOOR, WALL MOUNTED	MODEL:	RBO
HOUSING:	HEAVY-GAUGE STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	kg
FAN WHEEL:	STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	STAINLESS STEEL		

DESCRIPTION

TYPE:	CENTRIFUGAL	ARRANGEMENT:	CW UBD
FAN SIZE:		CLASS:	22
FAN SHAFT BEARINGS:	ROLLER, IF AVAILABLE	FAN WHEEL DIAMETER:	
MOTOR SIZE:	0.75 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
BEARING TYPE:		SHAFT TYPE:	
DRIVE:	BELT DRIVE, 1.5 SF	SHAFT SEAL:	STANDARD TYPE
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	330 L/s	OUTLET VELOCITY:	###
ESP:	498 Pa (2.0 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	1872	MECHANICAL EFFICIENCY:	###
BHP:	0.38 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR

NOTES

Applicable Documents:	Specification 23 34 00
	Drawing E500
	Appendix: Utllities Controls
	Narrative

WORK SHEET:	**AREA U - ADMINISTRATION BUILDING - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-09-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U720

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	GREENHECK
MOUNTING:	OUTDOOR, ROOF MOUNTED	MODEL:	GB
HOUSING:	ALUMINUM	APPROX. SHIPPING WEIGHT:	25 kg
FAN WHEEL:	ALUMINUM	VIBRATION ISOLATORS:	
ACCESSORIES:	ALUMINUM		

DESCRIPTION

TYPE:	CENTRIFUGAL	ARRANGEMENT:	
FAN SIZE:		CLASS:	I
FAN SHAFT BEARINGS:	ROLLER, IF AVAILABLE	FAN WHEEL DIAMETER:	
MOTOR SIZE:	0.19 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
BEARING TYPE:		SHAFT TYPE:	
DRIVE:	BELT DRIVE, 1.5 SF	SHAFT SEAL:	STANDARD TYPE
BELT GUARD TYPE:	STANDARD	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	354 L/s	OUTLET VELOCITY:	###
ESP:	62 Pa (0.25 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	##	MECHANICAL EFFICIENCY:	###
BHP:	### kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	115 VOLTS 1 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR

NOTES

Applicable Documents:	Specification 23 34 00

WORK SHEET:	**AREA U - ADMINISTRATION BUILDING - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-09-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U725

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	GREENHECK
MOUNTING:	OUTDOOR, ROOF MOUNTED	MODEL:	GB
HOUSING:	ALUMINUM	APPROX. SHIPPING WEIGHT:	25 kg
FAN WHEEL:	ALUMINUM	VIBRATION ISOLATORS:	
ACCESSORIES:	ALUMINUM		

DESCRIPTION

TYPE:	CENTRIFUGAL	ARRANGEMENT:	
FAN SIZE:		CLASS:	I
FAN SHAFT BEARINGS:	ROLLER, IF AVAILABLE	FAN WHEEL DIAMETER:	
MOTOR SIZE:	0.19 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
BEARING TYPE:		SHAFT TYPE:	
DRIVE:	BELT DRIVE, 1.5 SF	SHAFT SEAL:	STANDARD TYPE
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	283 L/s	OUTLET VELOCITY:	###
ESP:	62 Pa (0.25 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	##	MECHANICAL EFFICIENCY:	###
BHP:	### kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	115 VOLTS 1 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR

NOTES

Applicable Documents:	Specification 23 34 00

WORK SHEET:	**AREA U - ADMINISTRATION BUILDING - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-09-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U726

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	GREENHECK
MOUNTING:	OUTDOOR, ROOF MOUNTED	MODEL:	GB
HOUSING:	ALUMINUM	APPROX. SHIPPING WEIGHT:	29 kg
FAN WHEEL:	ALUMINUM	VIBRATION ISOLATORS:	
ACCESSORIES:	ALUMINUM		

DESCRIPTION

TYPE:	CENTRIFUGAL	ARRANGEMENT:	
FAN SIZE:		CLASS:	I
FAN SHAFT BEARINGS:	ROLLER, IF AVAILABLE	FAN WHEEL DIAMETER:	
MOTOR SIZE:	0.19 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
BEARING TYPE:		SHAFT TYPE:	
DRIVE:	BELT DRIVE, 1.5 SF	SHAFT SEAL:	STANDARD TYPE
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	661 L/s	OUTLET VELOCITY:	###
ESP:	62 Pa (0.25 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	##	MECHANICAL EFFICIENCY:	###
BHP:	### kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	115 VOLTS 1 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR

NOTES

Applicable Documents:	Specification 23 34 00

WORK SHEET:	**AREA S - SECONDARY CLARIFIERS - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	S605

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	OUTDOOR, ROOF	MODEL:	TCVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	450 kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	INCLUDE
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	BRACKETS WELDED TO SIDE OF CASING

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	36B4	CLASS:	II
BLADE ANGLE / TYPE:	30° / FIXED	FAN WHEEL DIAMETER:	900 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	11.2 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	VARIABLE
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	VARIABLE FREQUENCY DRIVE

PERFORMANCE

AIR FLOW:	8495 L/s [NORMAL] 7550 L/s [PURGE]	OUTLET VELOCITY:	###
ESP:	448.4 Pa (1.8 inch W.C.) [NORMAL] 597.8 Pa (2.4 inch W.C.) [PURGE]	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	1317 (Purge)/1158(Normal)	MECHANICAL EFFICIENCY:	###
BHP:	9.0 Kw (Purge)/6.0 Kw (Normal)		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR
UL 705 LISTED

WORK SHEET:	**AREA S - SECONDARY CLARIFIERS - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	S655

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	OUTDOOR, ROOF	MODEL:	TCVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	450 kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	INCLUDE
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	BRACKETS WELDED TO SIDE OF CASING

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	36B4	CLASS:	II
BLADE ANGLE / TYPE:	30° / FIXED	FAN WHEEL DIAMETER:	900 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	11.2 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	VARIABLE
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	VARIABLE FREQUENCY DRIVE

PERFORMANCE

AIR FLOW:	8495 L/s [NORMAL] 7550 L/s [PURGE]	OUTLET VELOCITY:	###
ESP:	448.4 Pa (1.8 inch W.C.) [NORMAL] 597.8 Pa (2.4 inch W.C.) [PURGE]	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	1317 (Purge)/1158(Normal)	MECHANICAL EFFICIENCY:	###
BHP:	9.0 Kw (Purge)/6.0 Kw (Normal)		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR
UL 705 LISTED

WORK SHEET:	**AREA P - PRIMARY CLARIFIERS - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	P605

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	INDOOR, FLOOR (HEATED SPACE)	MODEL:	TCVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	INCLUDE
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	BRACKETS WELDED TO SIDE OF CASING

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	32B5	CLASS:	II
BLADE ANGLE / TYPE:	30° / FIXED	FAN WHEEL DIAMETER:	815 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	14.92 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	VARIABLE
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	VARIABLE FREQUENCY DRIVE

PERFORMANCE

AIR FLOW:	8495 L/s [NORMAL] 7550 L/s [PURGE]	OUTLET VELOCITY:	###
ESP:	298.9 Pa (1.2 inch W.C.) [NORMAL] 946.5 Pa (3.8 inch W.C.) [PURGE]	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	1954 (Purge)/1517 (Normal)	MECHANICAL EFFICIENCY:	###
BHP:	12.6 Kw (Purge)/5.3 Kw (Normal)		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR
UL 705 LISTED

WORK SHEET:	**AREA P - PRIMARY CLARIFIERS - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	P655

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	INDOOR, FLOOR (HEATED SPACE)	MODEL:	TCVS
HOUSING:	316 STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	kg
FAN WHEEL:	316 STAINLESS STEEL	VIBRATION ISOLATORS:	INCLUDE
ACCESSORIES:	316 STAINLESS STEEL	SUPPORTS:	BRACKETS WELDED TO SIDE OF CASING

DESCRIPTION

TYPE:	VANE-AXIAL	ARRANGEMENT:	9
FAN SIZE:	32B5	CLASS:	II
BLADE ANGLE / TYPE:	30° / FIXED	FAN WHEEL DIAMETER:	815 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	14.92 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	VARIABLE
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	VARIABLE FREQUENCY DRIVE

PERFORMANCE

AIR FLOW:	8495 L/s [NORMAL] 7550 L/s [PURGE]	OUTLET VELOCITY:	###
ESP:	298.9 Pa (1.2 inch W.C.) [NORMAL] 946.5 Pa (3.8 inch W.C.) [PURGE]	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	1954 (Purge)/1517 (Normal)	MECHANICAL EFFICIENCY:	###
BHP:	12.6 Kw (Purge)/5.3 Kw (Normal)		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR
UL 705 LISTED

WORK SHEET:	**AREA S - ODOUR DISPERSION - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-09-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	S735

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	INDOOR, FLOOR MOUNTED	MODEL:	TSL
HOUSING:	STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	2,828 kg
FAN WHEEL:	STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	STAINLESS STEEL		

DESCRIPTION

TYPE:	INLINE CENTRIFUGAL	ARRANGEMENT:	N/A
FAN SIZE:		CLASS:	II
FAN SHAFT BEARINGS:	ROLLER, IF AVAILABLE	FAN WHEEL DIAMETER:	
MOTOR SIZE:	74.6 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	VARIABLE
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	VARIABLE FREQUENCY DRIVE

PERFORMANCE

AIR FLOW:	33,840 L/s	OUTLET VELOCITY:	###
ESP:	1,348 Pa (5.41 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	##	MECHANICAL EFFICIENCY:	###
BHP:	65.5 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR
UL 705 LISTED

NOTES

Applicable Documents:	Specification 23 34 00
	Drawing E300
	Appendix: ODS Controls Narrative

WORK SHEET:	**AREA S - ODOUR DISPERSION - EF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-09-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	S745

GENERAL

UNIT TYPE:	EXHAUST FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	INDOOR, FLOOR MOUNTED	MODEL:	TSL
HOUSING:	STAINLESS STEEL	APPROX. SHIPPING WEIGHT:	2,828 kg
FAN WHEEL:	STAINLESS STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	STAINLESS STEEL		

DESCRIPTION

TYPE:	INLINE CENTRIFUGAL	ARRANGEMENT:	N/A
FAN SIZE:		CLASS:	II
FAN SHAFT BEARINGS:	ROLLER, IF AVAILABLE	FAN WHEEL DIAMETER:	
MOTOR SIZE:	74.6 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	VARIABLE
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	VARIABLE FREQUENCY DRIVE

PERFORMANCE

AIR FLOW:	33,840 L/s	OUTLET VELOCITY:	###
ESP:	1,348 Pa (5.41 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	##	MECHANICAL EFFICIENCY:	###
BHP:	65.5 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR
UL 705 LISTED

NOTES

Applicable Documents:	Specification 23 34 00
	Drawing E300
	Appendix: ODS Controls Narrative

WORK SHEET:	**AREA U - MECHANICAL BAY - SF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-09-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U620

GENERAL

UNIT TYPE:	SUPPLY FAN	MANUFACTURER:	TWIN CITY
MOUNTING:	INDOOR, HEATED SPACE	MODEL:	BC-SW
HOUSING:	CAST ALUMINUM	APPROX. SHIPPING WEIGHT:	71 kg
FAN WHEEL:	CAST ALUMINUM	VIBRATION ISOLATORS:	
ACCESSORIES:	CAST ALUMINUM		

DESCRIPTION

TYPE:	CENTRIFUGAL	ARRANGEMENT:	CW-UBD
FAN SIZE:	122	CLASS:	II
FAN SHAFT BEARINGS:	ROLLER	FAN WHEEL DIAMETER:	
MOTOR SIZE:	0.75 kW	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
BEARING TYPE:		SHAFT TYPE:	
DRIVE:	DIRECT DRIVE, 1.5 SF	SHAFT SEAL:	STANDARD TYPE
BELT GUARD TYPE:	N/A	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	830 L/s	OUTLET VELOCITY:	###
ESP:	64.8 Pa (0.26 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	1724	MECHANICAL EFFICIENCY:	###
BHP:	94.7 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR
UL 705 LISTED

NOTES

Applicable Documents:	Specification 23 74 00
	Drawing E500
	Appendix: Utilities Controls
	Narrative

WORK SHEET:	**AREA S - ELECTRICAL ROOM - SF SPECIFICATIONS**		
DESIGNED BY:	IU/JC	CHECKED BY:	AG
DESIGN DATE:	2010-09-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	S670

GENERAL

UNIT TYPE:	PRESSURIZATION FAN	MANUFACTURER:	Cincinnati
MOUNTING:	INDOOR, HEATED SPACE	MODEL:	PB
HOUSING:	CAST ALUMINUM	APPROX. SHIPPING WEIGHT:	#### kg
FAN WHEEL:	CAST ALUMINUM	VIBRATION ISOLATORS:	
ACCESSORIES:	CAST ALUMINUM		

DESCRIPTION

TYPE:	CENTRIFUGAL	ARRANGEMENT:	CW-UB
FAN SIZE:		CLASS:	II
FAN SHAFT BEARINGS:	ROLLER, IF AVAILABLE	FAN WHEEL DIAMETER:	
MOTOR SIZE:	0.22 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
BEARING TYPE:		SHAFT TYPE:	
DRIVE:	DIRECT DRIVE, 1.5 SF	SHAFT SEAL:	STANDARD TYPE
BELT GUARD TYPE:	N/A	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	189 L/s	OUTLET VELOCITY:	###
ESP:	249.1 Pa (1.0 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:		MECHANICAL EFFICIENCY:	###
BHP:	0.08 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR

NOTES

Applicable Documents:	Specification 23 74 00
	Drawing E200
	Appendix: Secondary Clarifiers
	Controls Narrative

WORK SHEET:	**AREA U - MECHANICAL BAY - RF SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-07-09	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U625

GENERAL

UNIT TYPE:	RELIEF FAN	MANUFACTURER:	Twin City
MOUNTING:	INDOOR, WALL MOUNTED	MODEL:	WPB
HOUSING:	STEEL	APPROX. SHIPPING WEIGHT:	245 kg
FAN WHEEL:	STEEL	VIBRATION ISOLATORS:	
ACCESSORIES:	STEEL	SUPPORTS:	WALL MOUNT

DESCRIPTION

TYPE:	PROPELLER	ARRANGEMENT:	9
FAN SIZE:	30Z5	CLASS:	II
BLADE ANGLE / TYPE:	30° / FIXED	FAN WHEEL DIAMETER:	750 mm
FAN SHAFT BEARINGS:	ROLLER		
MOTOR SIZE:	0.56 Kw	TYPE:	HIGH EFFICIENCY, TEFC, INVERTER DUTY RATED (IF REQUIRED)
MOTOR MOUNTS:	ADJUSTABLE	SHAFT TYPE:	
BEARING TYPE:		SHAFT SEAL:	STANDARD TYPE
DRIVE:	V-BELT, 1.5 SF	MOTOR SPEED:	1750 RPM
BELT GUARD TYPE:	STANDARD, PAINTED YELLOW	CONTROL TYPE:	SINGLE SPEED

PERFORMANCE

AIR FLOW:	2029 L/s	OUTLET VELOCITY:	###
ESP:	62.3 Pa (0.25 inch W.C.)	MAX SPEED FOR CLASS:	####
TSP:	### Pa	STATIC EFFICIENCY:	###
RPM:	750	MECHANICAL EFFICIENCY:	###
BHP:	0.22 kW		

ELECTRICAL DATA

UNIT POWER SUPPLY:	575 VOLTS 3 PHASE 60 HZ	CONTROL CIRCUIT:	## AMPS
SUPPLY MOTOR F.L.A.:	## AMPS	MAX. FUSE (D.E.):	## AMPS
MAIN FEEDER AMPACITY:	## AMPS	MAX. BREAKER:	## AMPS
DISCONNECT SWITCH:	REMOTE MOUNTED, NON FUSED		

ADDITIONAL FEATURES

MOUNT TFC MOTOR
EXTENDED LUBE LINES TO FAN HOUSING EXTERIOR

WORK SHEET:	**AREA U - ADMINISTRATION BUILDING - FURNACE SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U700

GENERAL & CABINET

UNIT TYPE:	FORCED AIR FURNACE	UNIT MODEL NO.:	CARRIER 58MCB, ENGA XE OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS:	FRONT SIDE, 0.76 mm THICK REMOVABLE ACCESS PANEL
APPROX. SHIPPING WEIGHT:	kg	NO. OF PIECES:	1
MAXIMUM DIMENSIONS:	724 L x 445 W x 1029 H		
CASING:	0.76 mm THICKNESS MINIMUM, PRE-PAINTED GALVANIZED STEEL	INSULATION:	FOIL FACED INSULATION IN HEAT EXCHANGER SECTION
APPROVALS:	CSA 2.3, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	556 L/s	ESP:	187 Pa (0.75 inch W.C.)
FAN SIZE:		QTY:	1
FAN TYPE:	CENTRIFUGAL	RPM:	
MOUNTING:	INTERNALLY SOFT MOUNTED	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL	WHEEL CONST.:	GALVANIZED STEEL
MOTOR SIZE:	0.37 kW	TYPE:	PSC TYPE
BHP:	kW	DRIVE:	MULTI SPEED, DIRECT DRIVE, SF OF DRIVE 1.5

AIR OPENINGS	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	TOP		
RETURN AIR	RIGHT SIDE		
OUTSIDE AIR	RETURN AIR DUCT		
EXHAUST AIR			
PROFILE PLATE			

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		406 x 635 x 19 WASHABLE TYPE	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:		ORIENTATION:	FLAT
SPARES:			

MIXED AIR SECTION

BAFFLING:	NO	ACCESS SIDE:	N/A
RELIEF:	NO	RELIEF AIR DAMPER:	NO
OUTDOOR AIR DAMPER:	NO	RETURN AIR DAMPER:	NO
OUTDOOR AIR REQUIREMENT:	10%		

HEATING SECTION DATA

TYPE:	INDIRECT-FIRED	BURNER TURNDOWN:	
GAS SUPPLY:	NATURAL GAS	HEAT INPUT:	17.6 kW (60,000 Btuh)
INLET PRESSURE:	3,487 Pa	HEAT OUTPUT:	16.4 kW (56,000 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	

FIXED PLATE HEAT EXCHANGER

PRIMARY MATERIAL:	STAINLESS STEEL
SECONDARY MATERIAL:	STAINLESS STEEL
DRAIN PAN:	STAINLESS STEEL

WORK SHEET:	**AREA U - ADMINISTRATION BUILDING - FURNACE SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U700

CONDENSER

UNIT TYPE:	AIR COOLED	UNIT MODEL NO.:	CARRIER 24ABB3 OR APPROVED EQUAL IN ACCORDANCE WITH B6
SEER (MAXIMUM):	14	CABINET:	GALVANIZED STEEL, BONDERIZED, POWDERCOATED
OPERATING WEIGHT:	Kg	CAPACITY:	10.6 KW (3 tons of refrigeration)
REFRIGERANT:	R-410A	REGRIGERANT CHARGE:	2.4 KG
COMPRESSOR TYPE:	SCROLL	COIL:	MECHANICALLY BONDED ALUMINUM FINS TO COPPER TUBES
FACE AREA:	m^2	FINS PER INCH:	
ROWS:		CIRCUITS:	
COOLING FAN:	PROPELLER TYPE, DIRECT DRIVE	AIRFLOW:	1,394 L/s
MOTOR SIZE:	0.19 Kw	AIR DISCHARGE:	VERTICAL
MOTOR SPEED:	RPM	ELECTRICAL:	208 VOLTS 1 PHASE 60 HZ

COOLING COIL

UNIT TYPE:	DX, VERTICAL N-TYPE	UNIT MODEL NO.:	CARRIER CNPVU OR APPROVED EQUAL IN ACCORDANCE WITH B6
CABINET:	UNCASED	TUBE MATERIAL:	COPPER
CAPACITY:	10.6 KW (3 tons of refrigeration)	REFRIGERANT:	R-410A

ELECTICAL DATA

UNIT POWER SUPPLY:	115 VOLTS 1 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

CONTROL DATA

Applicable Documents:	Specification 23 54 16

WORK SHEET:	**AREA U - ADMINISTRATION BUILDING - FURNACE SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U705

GENERAL & CABINET

UNIT TYPE:	FORCED AIR FURNACE	UNIT MODEL NO.:	CARRIER 58MCB, ENGA XE OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS:	FRONT SIDE, 0.76 mm THICK REMOVABLE ACCESS PANEL
APPROX. SHIPPING WEIGHT:	kg	NO. OF PIECES:	1
MAXIMUM DIMENSIONS:	724 L x 533 W x 1029 H		
CASING:	0.76 mm THICKNESS MINIMUM, PRE-PAINTED GALVANIZED STEEL	INSULATION:	FOIL FACED INSULATION IN HEAT EXCHANGER SECTION
APPROVALS:	CSA 2.3, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	755 L/s	ESP:	187 Pa (0.75 inch W.C.)
FAN SIZE:		QTY:	1
FAN TYPE:	CENTRIFUGAL	RPM:	
MOUNTING:	INTERNALLY SOFT MOUNTED	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL	WHEEL CONST.:	GALVANIZED STEEL
MOTOR SIZE:	0.56 kW	TYPE:	PSC TYPE
BHP:	kW	DRIVE:	MULTI SPEED, DIRECT DRIVE, SF OF DRIVE 1.5

AIR OPENINGS	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	TOP		
RETURN AIR	LEFT SIDE		
OUTSIDE AIR	RETURN AIR DUCT		
EXHAUST AIR			
PROFILE PLATE			

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		508 x 635 x 19 WASHABLE TYPE	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:		ORIENTATION:	FLAT
SPARES:			

MIXED AIR SECTION

BAFFLING:	NO	ACCESS SIDE:	N/A
RELIEF:	NO	RELIEF AIR DAMPER:	NO
OUTDOOR AIR DAMPER:	NO	RETURN AIR DAMPER:	NO
OUTDOOR AIR REQUIREMENT:	10%		

HEATING SECTION DATA

TYPE:	INDIRECT-FIRED	BURNER TURNDOWN:	
GAS SUPPLY:	NATURAL GAS	HEAT INPUT:	23.4 kW (80,000 Btuh)
INLET PRESSURE:	3,487 Pa	HEAT OUTPUT:	21.7 kW (74,000 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	

FIXED PLATE HEAT EXCHANGER

PRIMARY MATERIAL:	STAINLESS STEEL
SECONDARY MATERIAL:	STAINLESS STEEL
DRAIN PAN:	STAINLESS STEEL

WORK SHEET:	**AREA U - ADMINISTRATION BUILDING - FURNACE SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U705

CONDENSER

UNIT TYPE:	AIR COOLED	UNIT MODEL NO.:	CARRIER 24ABB3 OR APPROVED EQUAL IN ACCORDANCE WITH B6
SEER (MAXIMUM):	14	CABINET:	GALVANIZED STEEL, BONDERIZED, POWDERCOATED
OPERATING WEIGHT:	Kg	CAPACITY:	14 KW (4 tons of refrigeration)
REFRIGERANT:	R-410A	REGRIGERANT CHARGE:	3.2 KG
COMPRESSOR TYPE:	SCROLL	COIL:	MECHANICALLY BONDED ALUMINUM FINS TO COPPER TUBES
FACE AREA:	m^2	FINS PER INCH:	
ROWS:		CIRCUITS:	
COOLING FAN:	PROPELLER TYPE, DIRECT DRIVE	AIRFLOW:	1,588 L/s
MOTOR SIZE:	0.19 Kw	AIR DISCHARGE:	VERTICAL
MOTOR SPEED:	RPM	ELECTRICAL:	208 VOLTS 1 PHASE 60 HZ

COOLING COIL

UNIT TYPE:	DX, VERTICAL N-TYPE	UNIT MODEL NO.:	CARRIER CNPVU OR APPROVED EQUAL IN ACCORDANCE WITH B6
CABINET:	UNCASED	TUBE MATERIAL:	COPPER
CAPACITY:	14 KW (4 tons of refrigeration)	REFRIGERANT:	R-410A

ELECTICAL DATA

UNIT POWER SUPPLY:	115 VOLTS 1 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

CONTROL DATA

Applicable Documents:	Specification 23 54 16

WORK SHEET:	**AREA U - ADMINISTRATION BUILDING - FURNACE SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U710

GENERAL & CABINET

UNIT TYPE:	FORCED AIR FURNACE	UNIT MODEL NO.:	CARRIER 58MCB, ENGA XE OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS:	FRONT SIDE, 0.76 mm THICK REMOVABLE ACCESS PANEL
APPROX. SHIPPING WEIGHT:	kg	NO. OF PIECES:	1
MAXIMUM DIMENSIONS:	724 L x 622 W x 1029 H		
CASING:	0.76 mm THICKNESS MINIMUM, PRE-PAINTED GALVANIZED STEEL	INSULATION:	FOIL FACED INSULATION IN HEAT EXCHANGER SECTION
APPROVALS:	CSA 2.3, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	944 L/s	ESP:	187 Pa (0.75 inch W.C.)
FAN SIZE:		QTY:	1
FAN TYPE:	CENTRIFUGAL	RPM:	
MOUNTING:	INTERNALLY SOFT MOUNTED	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL	WHEEL CONST.:	GALVANIZED STEEL
MOTOR SIZE:	0.56 kW	TYPE:	PSC TYPE
BHP:	kW	DRIVE:	MULTI SPEED, DIRECT DRIVE, SF OF DRIVE 1.5

AIR OPENINGS	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	BOTTOM		
RETURN AIR	TOP		
OUTSIDE AIR	RETURN AIR DUCT		
EXHAUST AIR			
PROFILE PLATE			

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		2 - 406 x 635 x 19 WASHABLE TYPE	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:		ORIENTATION:	FLAT
SPARES:			

MIXED AIR SECTION

BAFFLING:	NO	ACCESS SIDE:	N/A
RELIEF:	NO	RELIEF AIR DAMPER:	NO
OUTDOOR AIR DAMPER:	NO	RETURN AIR DAMPER:	NO
OUTDOOR AIR REQUIREMENT:	35%		

HEATING SECTION DATA

TYPE:	INDIRECT-FIRED	BURNER TURNDOWN:	
GAS SUPPLY:	NATURAL GAS	HEAT INPUT:	35.1 kW (120,000 Btuh)
INLET PRESSURE:	3,487 Pa	HEAT OUTPUT:	32.8 kW (112,000 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	

FIXED PLATE HEAT EXCHANGER

PRIMARY MATERIAL:	STAINLESS STEEL
SECONDARY MATERIAL:	STAINLESS STEEL
DRAIN PAN:	STAINLESS STEEL

WORK SHEET:	**AREA U - ADMINISTRATION BUILDING - FURNACE SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U710

CONDENSER

UNIT TYPE:	AIR COOLED	UNIT MODEL NO.:	CARRIER 24ABB3 OR APPROVED EQUAL IN ACCORDANCE WITH B6
SEER (MAXIMUM):	13.5	CABINET:	GALVANIZED STEEL, BONDERIZED, POWDERCOATED
OPERATING WEIGHT:	Kg	CAPACITY:	17.6 KW (5 tons of refrigeration)
REFRIGERANT:	R-410A	REGRIGERANT CHARGE:	3.7 KG
COMPRESSOR TYPE:	SCROLL	COIL:	MECHANICALLY BONDED ALUMINUM FINS TO COPPER TUBES
FACE AREA:	m^2	FINS PER INCH:	
ROWS:		CIRCUITS:	
COOLING FAN:	PROPELLER TYPE, DIRECT DRIVE	AIRFLOW:	1,588 L/s
MOTOR SIZE:	0.19 Kw	AIR DISCHARGE:	VERTICAL
MOTOR SPEED:	RPM	ELECTRICAL:	208 VOLTS 1 PHASE 60 HZ

COOLING COIL

UNIT TYPE:	DX, VERTICAL N-TYPE	UNIT MODEL NO.:	CARRIER CNPVU OR APPROVED EQUAL IN ACCORDANCE WITH B6
CABINET:	UNCASED	TUBE MATERIAL:	COPPER
CAPACITY:	17.6 KW (5 tons of refrigeration)	REFRIGERANT:	R-410A

ELECTICAL DATA

UNIT POWER SUPPLY:	115 VOLTS 1 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

CONTROL DATA

Applicable Documents:	Specification 23 54 16

WORK SHEET:	**AREA U - ADMINISTRATION BUILDING - FURNACE SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U780

GENERAL & CABINET

UNIT TYPE:	FORCED AIR FURNACE	UNIT MODEL NO.:	CARRIER 58MCB, ENGA XE OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS:	FRONT SIDE, 0.76 mm THICK REMOVABLE ACCESS PANEL
APPROX. SHIPPING WEIGHT:	kg	NO. OF PIECES:	1
MAXIMUM DIMENSIONS:	724 L x 445 W x 1029 H		
CASING:	0.76 mm THICKNESS MINIMUM, PRE-PAINTED GALVANIZED STEEL	INSULATION:	FOIL FACED INSULATION IN HEAT EXCHANGER SECTION
APPROVALS:	CSA 2.3, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	378 L/s	ESP:	187 Pa (0.75 inch W.C.)
FAN SIZE:		QTY:	1
FAN TYPE:	CENTRIFUGAL	RPM:	
MOUNTING:	INTERNALLY SOFT MOUNTED	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL	WHEEL CONST.:	GALVANIZED STEEL
MOTOR SIZE:	0.25 kW	TYPE:	PSC TYPE
BHP:	kW	DRIVE:	MULTI SPEED, DIRECT DRIVE, SF OF DRIVE 1.5

AIR OPENINGS	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	TOP		
RETURN AIR	RIGHT SIDE		
OUTSIDE AIR	RETURN AIR DUCT		
EXHAUST AIR			
PROFILE PLATE			

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		1 - 406 x 635 x 19 WASHABLE TYPE	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:		ORIENTATION:	FLAT
SPARES:			

MIXED AIR SECTION

BAFFLING:	NO	ACCESS SIDE:	N/A
RELIEF:	NO	RELIEF AIR DAMPER:	NO
OUTDOOR AIR DAMPER:	NO	RETURN AIR DAMPER:	NO
OUTDOOR AIR REQUIREMENT:	10%		

HEATING SECTION DATA

TYPE:	INDIRECT-FIRED	BURNER TURNDOWN:	
GAS SUPPLY:	NATURAL GAS	HEAT INPUT:	11.7 kW (40,000 Btuh)
INLET PRESSURE:	3,487 Pa	HEAT OUTPUT:	10.8 kW (37,000 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	

FIXED PLATE HEAT EXCHANGER

PRIMARY MATERIAL:	STAINLESS STEEL
SECONDARY MATERIAL:	STAINLESS STEEL
DRAIN PAN:	STAINLESS STEEL

WORK SHEET:	**AREA U - ADMINISTRATION BUILDING - FURNACE SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U780

CONDENSER

UNIT TYPE:	AIR COOLED	UNIT MODEL NO.:	CARRIER 24ABB3 OR APPROVED EQUAL IN ACCORDANCE WITH B6
SEER (MAXIMUM):	14.25	CABINET:	GALVANIZED STEEL, BONDERIZED, POWDERCOATED
OPERATING WEIGHT:	Kg	CAPACITY:	7 KW (2 tons of refrigeration)
REFRIGERANT:	R-410A	REGRIGERANT CHARGE:	1.7 KG
COMPRESSOR TYPE:	SCROLL	COIL:	MECHANICALLY BONDED ALUMINUM FINS TO COPPER TUBES
FACE AREA:	m^2	FINS PER INCH:	
ROWS:		CIRCUITS:	
COOLING FAN:	PROPELLER TYPE, DIRECT DRIVE	AIRFLOW:	1,047 L/s
MOTOR SIZE:	0.075 Kw	AIR DISCHARGE:	VERTICAL
MOTOR SPEED:	RPM	ELECTRICAL:	208 VOLTS 1 PHASE 60 HZ

COOLING COIL

UNIT TYPE:	DX, VERTICAL N-TYPE	UNIT MODEL NO.:	CARRIER CNPVU OR APPROVED EQUAL IN ACCORDANCE WITH B6
CABINET:	UNCASED	TUBE MATERIAL:	COPPER
CAPACITY:	7 KW (2 tons of refrigeration)	REFRIGERANT:	R-410A

ELECTICAL DATA

UNIT POWER SUPPLY:	115 VOLTS 1 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

CONTROL DATA

Applicable Documents:	Specification 23 54 16

WORK SHEET:	**AREA U - ADMINISTRATION BUILDING - FURNACE SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U785

GENERAL & CABINET

UNIT TYPE:	FORCED AIR FURNACE	UNIT MODEL NO.:	CARRIER 58MCB, ENGA XE OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS:	1 mm THICK REMOVABLE ACCESS PANEL
APPROX. SHIPPING WEIGHT:	kg	NO. OF PIECES:	1
MAXIMUM DIMENSIONS:	775 L x 400 W x 1425 H		
CASING:	1 mm THICKNESS MINIMUM, SATIN COATED SHEET METAL WITH BAKED POWDER COATED ENAMEL FINISH	INSULATION:	13 mm FOIL BACKED FIBERGLASS INSULATION
APPROVALS:	CSA 2.3, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	283 L/s	ESP:	187 Pa (0.75 inch W.C.)
FAN SIZE:		QTY:	1
FAN TYPE:	CENTRIFUGAL	RPM:	
MOUNTING:	RUBBER MOUNTED	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL	WHEEL CONST.:	STEEL
MOTOR SIZE:	0.19 kW	TYPE:	
BHP:	kW	DRIVE:	BELT DRIVE, SF OF DRIVE 1.5

AIR OPENINGS	LOCATION
SUPPLY AIR	TOP
RETURN AIR	
OUTSIDE AIR	LEFT SIDE
EXHAUST AIR	
PROFILE PLATE	

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		1 - x x 25 WASHABLE TYPE	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:		ORIENTATION:	FLAT
SPARES:			

MIXED AIR SECTION

BAFFLING:	NO	ACCESS SIDE:	N/A
RELIEF:	NO	RELIEF AIR DAMPER:	NO
OUTDOOR AIR DAMPER:	NO	RETURN AIR DAMPER:	NO
OUTDOOR AIR REQUIREMENT:	100%		

HEATING SECTION DATA

TYPE:	INDIRECT-FIRED	BURNER TURNDOWN:	
GAS SUPPLY:	NATURAL GAS	HEAT INPUT:	19 kW (65,000 Btuh)
INLET PRESSURE:	3,487 Pa	HEAT OUTPUT:	15.2 kW (52,000 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	26.8°C

FIXED PLATE HEAT EXCHANGER

PRIMARY MATERIAL:	STAINLESS STEEL
SECONDARY MATERIAL:	STAINLESS STEEL
DRAIN PAN:	STAINLESS STEEL

WORK SHEET:	**AREA U - ADMINISTRATION BUILDING - FURNACE SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U785

CONDENSER

UNIT TYPE:	AIR COOLED	UNIT MODEL NO.:	CARRIER 24ABB3 OR APPROVED EQUAL IN ACCORDANCE WITH B6
SEER (MAXIMUM):	14.5	CABINET:	GALVANIZED STEEL, BONDERIZED, POWDERCOATED
OPERATING WEIGHT:	Kg	CAPACITY:	5.3 KW (1.5 tons of refrigeration)
REFRIGERANT:	R-410A	REGRIGERANT CHARGE:	1.6 KG
COMPRESSOR TYPE:	SCROLL	COIL:	MECHANICALLY BONDED ALUMINUM FINS TO COPPER TUBES
FACE AREA:	m^2	FINS PER INCH:	
ROWS:		CIRCUITS:	
COOLING FAN:	PROPELLER TYPE, DIRECT DRIVE	AIRFLOW:	846 L/s
MOTOR SIZE:	0.062 Kw	AIR DISCHARGE:	VERTICAL
MOTOR SPEED:	RPM	ELECTRICAL:	208 VOLTS 1 PHASE 60 HZ

COOLING COIL

UNIT TYPE:	DX, VERTICAL N-TYPE	UNIT MODEL NO.:	CARRIER CNPVU OR APPROVED EQUAL IN ACCORDANCE WITH B6
CABINET:	UNCASED	TUBE MATERIAL:	COPPER
CAPACITY:	5.3 KW (1.5 tons of refrigeration)	REFRIGERANT:	R-410A

ELECTICAL DATA

UNIT POWER SUPPLY:	115 VOLTS 1 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

CONTROL DATA

Applicable Documents:	Specification 23 54 16

WORK SHEET:	**AREA U - ADMINISTRATION BUILDING - FURNACE SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U787

GENERAL & CABINET

UNIT TYPE:	FORCED AIR FURNACE	UNIT MODEL NO.:	CARRIER 58MCB, ENGA XE OR APPROVED EQUAL IN ACCORDANCE WITH B6
MOUNTING:	INDOOR BASE MOUNTED (Heated Space)	SERVICE ACCESS:	1 mm THICK REMOVABLE ACCESS PANEL
APPROX. SHIPPING WEIGHT:	kg	NO. OF PIECES:	1
MAXIMUM DIMENSIONS:	775 L x 813 W x 1500 H		
CASING:	1 mm THICKNESS MINIMUM, SATIN COATED SHEET METAL WITH BAKED POWDER COATED ENAMEL FINISH	INSULATION:	13 mm FOIL BACKED FIBERGLASS INSULATION
APPROVALS:	CSA 2.3, CETL, ETL AND REQUIREMENTS OF LOCAL AHJ (DOL MECHANICAL & ENGINEERING BRANCH)		

SUPPLY AIR DATA

AIR FLOW (NORMAL):	788 L/s	ESP:	187 Pa (0.75 inch W.C.)
FAN SIZE:		QTY:	1
FAN TYPE:	CENTRIFUGAL	RPM:	
MOUNTING:	RUBBER MOUNTED	TSP:	Pa
MAX. SOUND POWER LEVEL:	dba		
HOUSING CONST.:	STEEL	WHEEL CONST.:	STEEL
MOTOR SIZE:	0.56 kW	TYPE:	
BHP:	kW	DRIVE:	BELT DRIVE, SF OF DRIVE 1.5

AIR OPENINGS	LOCATION
SUPPLY AIR	TOP
RETURN AIR	
OUTSIDE AIR	LEFT SIDE
EXHAUST AIR	
PROFILE PLATE	

FILTER DATA (FILTERS MOUNTED IN METAL FRAMES)

QTY/SIZE/TYPE:		1 - x x 25 WASHABLE TYPE	
TOTAL GROSS AREA:	m^2	FACE VELOCITY (MAX/ACTUAL):	2.23 m/s (MAX)/ m/s (ACT)
FRAME:		ORIENTATION:	FLAT
SPARES:			

MIXED AIR SECTION

BAFFLING:	NO	ACCESS SIDE:	N/A
RELIEF:	NO	RELIEF AIR DAMPER:	NO
OUTDOOR AIR DAMPER:	NO	RETURN AIR DAMPER:	NO
OUTDOOR AIR REQUIREMENT:	100%		

HEATING SECTION DATA

TYPE:	INDIRECT-FIRED	BURNER TURNDOWN:	
GAS SUPPLY:	NATURAL GAS	HEAT INPUT:	65.9 kW (225,000 Btuh)
INLET PRESSURE:	3,487 Pa	HEAT OUTPUT:	52.8 kW (180,000 Btuh)
FIELD CONNECTION SIZE:	mm	TEMPERATURE RISE:	37.7°C

FIXED PLATE HEAT EXCHANGER

PRIMARY MATERIAL:	STAINLESS STEEL
SECONDARY MATERIAL:	STAINLESS STEEL
DRAIN PAN:	STAINLESS STEEL

WORK SHEET:	**AREA U - ADMINISTRATION BUILDING - FURNACE SPECIFICATIONS**		
DESIGNED BY:	DD/JC	CHECKED BY:	AG
DESIGN DATE:	2010-06-10	CHECK DATE:	2010-11-30
CUSTOMER:	CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT		
JOB NAME:	WEWPCC HVAC REPLACEMENT		
JOB NO.:	CW-10-M660-1		

TAG:	U787

CONDENSER

UNIT TYPE:	AIR COOLED	UNIT MODEL NO.:	CARRIER 24ABB3 OR APPROVED EQUAL IN ACCORDANCE WITH B6
SEER (MAXIMUM):	14	CABINET:	GALVANIZED STEEL, BONDERIZED, POWDERCOATED
OPERATING WEIGHT:	Kg	CAPACITY:	14 KW (4 tons of refrigeration)
REFRIGERANT:	R-410A	REGRIGERANT CHARGE:	3.2 KG
COMPRESSOR TYPE:	SCROLL	COIL:	MECHANICALLY BONDED ALUMINUM FINS TO COPPER TUBES
FACE AREA:	m^2	FINS PER INCH:	
ROWS:		CIRCUITS:	
COOLING FAN:	PROPELLER TYPE, DIRECT DRIVE	AIRFLOW:	1,588 L/s
MOTOR SIZE:	0.19 Kw	AIR DISCHARGE:	VERTICAL
MOTOR SPEED:	RPM	ELECTRICAL:	208 VOLTS 1 PHASE 60 HZ

COOLING COIL

UNIT TYPE:	DX, VERTICAL N-TYPE	UNIT MODEL NO.:	CARRIER CNPVU OR APPROVED EQUAL IN ACCORDANCE WITH B6
CABINET:	UNCASED	TUBE MATERIAL:	COPPER
CAPACITY:	14 KW (4 tons of refrigeration)	REFRIGERANT:	R-410A

ELECTICAL DATA

UNIT POWER SUPPLY:	115 VOLTS 1 PHASE 60 HZ	CONTROL CIRCUIT:	AMPS
SUPPLY MOTOR F.L.A.:	AMPS	MAX. FUSE (D.E.):	AMPS
MAIN FEEDER AMPACITY:	AMPS	MAX. BREAKER:	AMPS
DISCONNECT SWITCH:	NON FUSED - BY OTHERS		

CONTROL DATA

Applicable Documents:	Specification 23 54 16

WEWPCC Headworks
Controls Narrative

REV 0

December 2010

KGS GROUP
CONSULTING ENGINEERS

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APPENDICES

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LIST OF APPENDICES

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B. Sequence of Operations – Headworks
C. Drawing 1-0103G-P0001-001 – Process and Instrumentation Diagram Sheet 1 of 3
Drawing 1-0103G-P0001-002 – Process and Instrumentation Diagram Sheet 2 of 3
Drawing 1-0103G-P0001-003 – Process and Instrumentation Diagram Sheet 3 of 3

1.0 SYSTEM DESCRIPTION

The ventilation system for the headworks building is divided into three separate systems. The first system is comprised of the main process floor, grit screening mezzanine and the sludge truck bay. The second system is comprised of the lower process floor. The last system is comprised of the grit truck bay.

Make-up air units H600 & H650 serve the first system and are located in an upper level mechanical room generally located above the sludge truck bay. The outside air supply to each of the MUA units comes from two new penthouse style air intakes constructed on the roof of the mechanical room. Ductwork from the air intakes is run to the existing common air intake plenums located inside the mechanical room. Exhaust fans H630 and H730 are located in the lower process level elevated from floor level. The fans exhausts air from the main process floor, grit screening mezzanine and the sludge truck bay to the ODS collection ductwork.

Make-up air unit H700 serves the second system and is located in the upper level mechanical room. The outside air supply is from the existing common air intake plenum located within the mechanical room. Exhaust fan H605A is located in the lower process level elevated from floor level. The fan exhausts air from the lower process floor to the ODS collection ductwork.

Make-up air unit H725 serves the last system and is located in the upper level mechanical room. The outside air supply is from the existing common air intake plenum located within the mechanical room. Exhaust fan H605 is located in the lower process level elevated from floor level. The fan exhausts air from the lower process floor to the ODS collection ductwork.

1.1 GENERAL OPERATING DESCRIPTION

The upper process floor which also includes the grit screening mezzanine and the adjacent sludge truck bay will normally be heated and ventilated by a lead, direct-fired make-up air (MUA) unit and exhaust fan system. An identical lag system provides full redundancy in the event of lead system failure. Activation of the lag-system to permit parallel operation of both systems, to achieve a high rate ventilation mode, can also be automatically triggered by the lower-explosive-limit (LEL) sensors reading from the upper process floor as sensed by two LEL sensors; one sensor calibrated to H_2S and one calibrated for gasoline. If at any time the LEL

sensors detect gas levels higher than the high rate condition, a purge mode is initiated shutting down the MUA units and associated exhaust fan; a separate exhaust fan and intake damper system takes over. The supply ducts from each of the MUA units are interconnected to permit either unit to supply the service areas identified above. The new exhaust fans H630 and H730 operate during normal and high rate modes respectively. These exhaust fans operate at constant speed and are interlocked to both MUA units.

The lower process area in the headworks building will be heated and ventilated by a single direct-fired MUA unit H700 and an exhaust fan H605A operating as one system. This system is a constant volume system that operates to maintain an adjustable space setpoint temperature.

The grit truck bay in the headworks building will be heated and ventilated by a single direct-fired MUA unit H725 and an exhaust fan H605 operating as one system. This system is a constant volume system that operates to maintain an adjustable space setpoint temperature.

2.0 REFERENCE DRAWINGS

Drawing	Sheet	Description
1-0103G-P0001-001	1	Area H – Headworks Process & Instrumentation Diagram
1-0103G-P0001-002	2	Area H – Headworks Process & Instrumentation Diagram
1-0103G-P0001-003	3	Area H – Headworks Process & Instrumentation Diagram
1-0103G-E0005-001	1	Area H – Headworks MUA-H600, MCC-1H Schematic & Wiring Diagram
1-0103G-E0006-001	1	Area H – Headworks MUA-H650, MCC-1H Schematic & Wiring Diagram
1-0103G-E0007-001	1	Area H – Headworks EF-H630 FVNR Schematic & Wiring Diagram
1-0103G-E0008-001	1	Area H – Headworks EF-H730 FVNR Schematic & Wiring Diagram
1-0103G-E0009-001	1	Area H – Headworks MUA-H700, MCC-1H Schematic &

		Wiring Diagram
1-0103G-E0010-001	1	Area H – Headworks EF-H605A FVNR Schematic & Wiring Diagram
1-0103G-E0011-001	1	Area H – Headworks MUA-H725, MCC-2H Schematic & Wiring Diagram
1-0103G-E0012-001	1	Area H – Headworks EF-H605 FVNR Schematic & Wiring Diagram
1-0103G-E0013-001	1	Area H – Headworks EF-H672 FVNR Schematic & Wiring Diagram
1-0103G-E0014-001	1	Area H – Headworks EF-H655 FVNR Schematic & Wiring Diagram

3.0 NORMAL OPERATION

Normal operation is defined as all hand-off-auto switches in the auto position with the PLC controlling operation of the system and the TCP/IP communications system functioning (ie. PLC's communicating with each other and the Bailey DCS).

Direct gas fired units MUA H600 and MUA H650 operate in a lead lag system in normal mode of operation. Normal operation is for one system unit to operate at one time. In the event of an MUA unit failure on the lead system, the lag system will automatically start, and the lead system shutdown. Either system can be selected to be the lead system.

In normal mode of operation exhaust fan H630 operates along with whichever MUA unit is selected as the lead MUA unit.

In the event of a high gasoline vapor alarm (calibrated CH_4 sensor) or high hydrogen sulfide alarm (H_2S), as detected at the existing combustible gas detection panel, and relayed to the Utilities PLC over TCP/IP, the lag MUA is automatically started as well to provide a higher ventilation rate. The exhaust fan H630 shuts down and exhaust fan H730 starts to handle the capacity of both MUA units. If the gasoline vapors or hydrogen sulfide concentrations continue to increase then the system will go into a purge mode of operation where the MUA units shutdown along with the exhaust fan H730 and damper H672 opens and exhaust fan H672

starts.

3.1 COMMON SYSTEM PRINCIPLES

The MUA units are direct-fired, natural gas units and require hard wired, proved interlock with its associated exhaust fan. This is provided by current sensing relays (CSR's) in the exhaust fan motor starters hard wired to the MUA unit controllers.

Upon initial start-up the fan motors in the MUA units are not inhibited to start by the CSR's, only the burner firing circuit is inhibited until the exhaust fan is proven.

Discharge air temperature control setpoint of the units is set at the PLC HMI by the operator.

The space temperature at the process floor, as determined by a temperature element in the space, shall be maintained by modulating the supply air temperature of the operating MUA. The space temperature shall be kept at 21°C (adjustable).

In the event of a TCP/IP communication failure, the Headworks control system shall continue to operate automatically under PLC control. The only lost functionality are:

- No reporting of status and alarm information to the Bailey DCS.
- No automatic initiation of the purge mode due to a high hydrogen sulfide or LEL alarm.

3.2 MAKE-UP AIR (MUA) UNITS H600 AND H650, EXHAUST FAN H630 AND H730

During normal operation (non-purge and non-high rate conditions) each system unit, H600 and H650, and their exhaust fan, H630, operate in lead/lag mode where the lead equipment is on and lag equipment is off. The lead/lag operation shall be settable by the operator from the HMI at any time but the PLC shall incorporate an automatic lead/lag cycling of the equipment by an adjustable time period initially set at 24 hours.

The process floor has a space temperature transducer (H600-TE2) that reports back to the PLC. The operating MUA will modulate the discharge air temperature to maintain the space temperature.

During system startup the MUA discharge damper (H600-MD or H650-MD) and the exhaust fan discharge damper (H630-MD) open. Once both dampers are confirmed open by limit switches the MUA blower fan and exhaust fan starts. After the exhaust fan is up to speed the CSR contact closes to prove back to the MUA unit as a permissive on the burner. This system startup control is all provided by hardwired controls.

An existing methane gas detector, H600GT-AT, calibrated for gasoline detects the presence of any gasoline vapors within the headworks building and reports the level back to an existing Drager control panel. If the gasoline levels are above 20% LEL or hydrogen sulfide gas levels above 2 ppm, an alarm is triggered and reported to the existing DCS control system through a digital communications link. The DCS will then digitally communicate this alarm back to the PLC which will trigger a high rate mode. Similarly, if the gasoline vapor level rise above 30% LEL or the H_2S levels rise above 4 ppm a second alarm is triggered and the system will initiate a purge mode.

During high rate operation both make-up air units H600 and H650 operate while exhaust fans H630 shuts down and H730 starts up. In this situation one MUA and exhaust fan H630 are already running so the startup sequence is slightly different. Exhaust fan H630 is shutdown; when the CSR proves this, the exhaust fan's discharge damper closes and a limit switch proves it closed. The discharge damper for H730 is then opened and proved open by a limit switch. The discharge damper for H650 is opened; instead of waiting for the limit switches to prove open before the MUA blower starts it will start after the MUA discharge damper closed limit switch is broken and a timing relay starts timing while the open limit switch is still not made. During the duration of the timer, the supply fan and H730 start and the burner is initiated. If the supply fan, exhaust fan and the supply air damper is not proven after a 15 second (adjustable) period then the blower fan will trip out. This control like normal operation is also hardwired within the starter circuit. Any trips as a result of the timing relay timing out requires a manual reset.

The reason for this requirement is to prevent air from the running MUA unit blowing in the backwards direction through the starting MUA unit.

When in purge mode the exhaust fan is shutdown first then the MUA unit(s) shutdown. If a purge has been initiated within the primary clarifiers then the headworks high rate mode will be inhibited since the ODS collection ductwork is not capable of handling both the primary clarifiers

and headworks in high rate mode at the same time. In this case, if high rate mode is required in headworks, the system will override to purge mode.

3.3 EXHAUST FAN H672

When a purge mode operation is initiated (as described in 3.1) from the gas detector, inlet damper H672-MD opens. Once the damper is proven open by an open limit switch, exhaust fan H672 starts.

3.4 EXHAUST FAN H655

Exhaust fan H655 operates manually on an on/off switch local to the fan. When sludge is being loaded into a truck the operator will manually initiate the fan and then turn off the fan once the operation is complete.

3.5 MAKE-UP AIR (MUA) UNIT H700, EXHAUST FAN H605A

MUA unit H700 and its associated fan H605A work as a system. During system startup the MUA intake damper H700-MD opens. Once the damper is confirmed open by a limit switch the MUA blower fan starts. After the supply fan has been proven, exhaust fan H605A starts; the burner permissive is not made until exhaust fan H605A has a CSR close to prove that it is running. The system operates to maintain a temperature (H700-TT) of 21°C (adjustable) within the headworks lower process level.

3.6 MAKE-UP AIR (MUA) UNIT H725, EXHAUST FAN H605

MUA unit H725 and its associated fan H605 work as a system. During system startup the MUA intake damper H725-MD opens. Once the damper is confirmed open by a limit switch the MUA blower fan starts. After the supply fan has been proven, exhaust fan H605 starts; the burner permissive is not made until exhaust fan H605 has a CSR close to prove that it is running. The system operates to maintain a temperature (H725-TT) of 21°C (adjustable) within the headworks grit truck bay.

4.0 MANUAL OPERATION

The control in hand has the same hardwired control operations as automatic control with the a few minor exceptions. As opposed to starting the system from a PLC output, manual operation is achieved by setting the system hand-off-auto switches in manual. The only difference to initiate a high rate or purge mode the operator needs to manually start the other equipment. Additionally the MUA units taking the operating setpoints from the operator interface on the MUA units as opposed to a 4-20 mA control signal from the PLC.

APPENDIX A

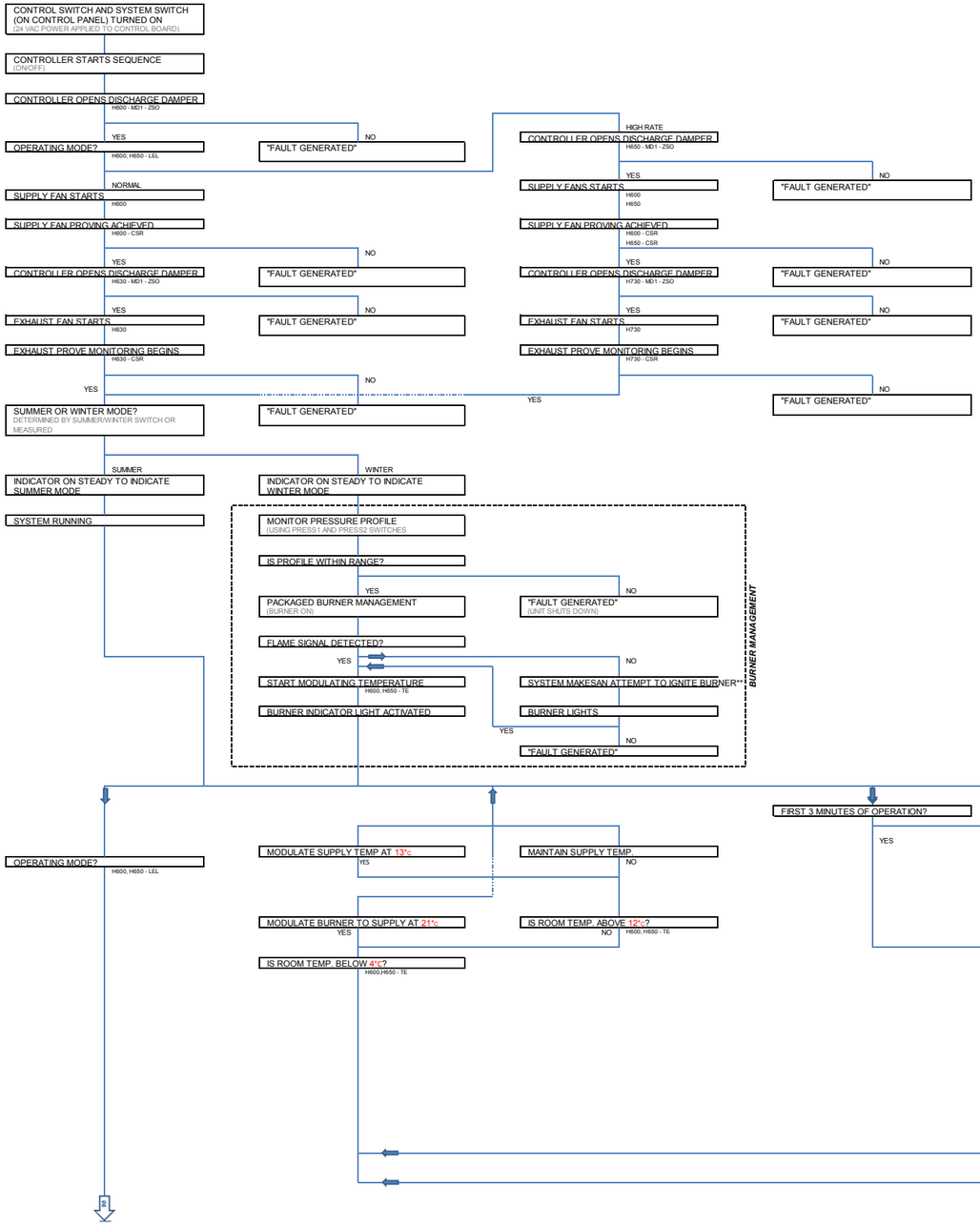
Headworks I/O List

Tag	IO Type	PLC Tag	DCS Tag	Description
H600-*	Modbus\TCP	H01-H600-*		Other MUA H600 Status's Available via Modbus\TCP
H600-QA	DI	H01-H600-QA		MUA H600 fault status
H600-MM	DI	H01-H600-MM		MUA H600 run status
H600-HS	DI	H01-H600-HI		MUA H600 switch in auto
H600-MN	DO	H01-H600-MN		MUA H600 start/stop
H600-TC	AO	H01-H600-TIC		MUA H600 temperature controller
H600-ZSB-1	DI	H01-H600-ZB		MUA H600 discharge damper close limit switch
H600-ZSD-1	DI	H01-H600-ZD		MUA H600 discharge damper close limit switch
H600-TT-1	AI	H01-H600-TI1		Headworks main process floor space temperature
H605-QA	DI	H01-H605-QA		EF H605 fault status
H605-MM	DI	H01-H605-MM		EF H605 run status
H605-HS	DI	H01-H605-HI		EF H605 switch in auto
H605-MN	DO	H01-H605-MN		EF H605 start/stop
H605A-QA	DI	H01-H605A-QA		EF H605A fault status
H605A-MM	DI	H01-H605A-MM		EF H605A run status
H605A-HS	DI	H01-H605A-HI		EF H605A switch in auto
H605A-MN	DO	H01-H605A-MN		EF H605A start/stop
H605GT-AIT-1	Modbus\TCP via DCS	H01-H605GT-AI1		Headworks main process floor methane gas detector
H605GT-AIT-2	Modbus\TCP via DCS	H01-H605GT-AI2		Headworks main process floor propane gas detector
H606GT-AIT	Modbus\TCP via DCS	H01-H606GT-AI		Headworks main process floor hydrogen sulfide gas detector
H607GT-AIT	Modbus\TCP via DCS	H01-H607GT-AI		Headworks truck bay hydrogen sulfide gas detector
H608GT-AIT	Modbus\TCP via DCS	H01-H608GT-AI		Headworks grit truck bay hydrogen sulfide gas detector
H630-QA	DI	H01-H630-QA		EF H630 fault status
H630-MM	DI	H01-H630-MM		EF H630 run status
H630-HS	DI	H01-H630-HI		EF H630 switch in on
H630-MN	DO	H01-H630-MN		EF H630 start/stop
H630-ZSB	DI	H01-H630-ZB		EF H630 discharge damper close limit switch
H630-ZSD	DI	H01-H630-ZD		EF H630 discharge damper close limit switch
H650-*	Modbus\TCP	H01-H650-*		Other MUA H650 Status's Available via Modbus\TCP
H650-QA	DI	H01-H650-QA		MUA H650 fault status
H650-MM	DI	H01-H650-MM		MUA H650 run status
H650-HS	DI	H01-H650-HI		MUA H650 switch in auto
H650-MN	DO	H01-H650-MN		MUA H650 start/stop
H650-TC	AO	H01-H650-TIC		MUA H650 temperature controller
H650-ZSB-1	DI	H01-H650-ZB		MUA H650 discharge damper close limit switch
H650-ZSD-1	DI	H01-H650-ZD		MUA H650 discharge damper close limit switch
H655-MM	DI	H01-H655-MM		EF H655 run status
H672-QA	DI	H01-H672-QA		EF H672 fault status
H672-MM	DI	H01-H672-MM		EF H672 run status
H672-HS	DI	H01-H672-HI		EF H672 switch in auto
H672-MN	DO	H01-H672-MN		EF H672 start/stop
H672-ZSB	DI	H01-H672-ZB		EF H672 suction damper close limit switch
H672-ZSD	DI	H01-H672-ZD		EF H672 suction damper close limit switch
H700-*	Modbus\TCP	H01-H700-*		Other MUA H700 Status's Available via Modbus\TCP
H700-QA	DI	H01-H7005-QA		MUA H700 fault status
H700-MM	DI	H01-H700-MM		MUA H700 run status
H700-HS	DI	H01-H700-HI		MUA H700 switch in auto

Headworks I/O List

Tag	IO Type	PLC Tag	DCS Tag	Description
H700-MN	DO	H01-H700-MN		MUA H700 start/stop
H700-TC	AO	H01-H700-TIC		MUA H700 temperature controller
H700-ZSB	DI	H01-H700-ZB		MUA H700 discharge damper close limit switch
H700-ZSD	DI	H01-H700-ZD		MUA H700 discharge damper close limit switch
H700-TT-1	AI	H01-H700-TI		Headworks lower process level space temperature
H710-MM	DI	H01-H710-MM		EF H710 run status
H725-*	Modbus\TCP	H01-H725-*		Other MUA H725 Status's Available via Modbus\TCP
H725-QA	DI	H01-H725-QA		MUA H725 fault status
H725-MM	DI	H01-H725-MM		MUA H725 run status
H725-HS	DI	H01-H725-HI		MUA H725 switch in auto
H725-MN	DO	H01-H725-MN		MUA H725 start/stop
H725-TC	AO	H01-H725-TIC		MUA H725 temperature controller
H725-ZSB	DI	H01-H725-ZB		MUA H725 discharge damper close limit switch
H725-ZSD	DI	H01-H725-ZD		MUA H725 discharge damper close limit switch
H725-TT-1	AI	H01-H725-TI		Headworks grit truck bay space temperature
H730-QA	DI	H01-H730-QA		EF H730 fault status
H730-MM	DI	H01-H730-MM		EF H730 run status
H730-HS	DI	H01-H730-HI		EF H730 switch in auto
H730-MN	DO	H01-H730-MN		EF H730 start/stop
H730-ZSB	DI	H01-H730-ZB		EF H730 discharge damper close limit switch
H730-ZSD	DI	H01-H730-ZD		EF H730 discharge damper close limit switch
H765-TT	AI	H01-H765-TI		Headworks mechanical room space temperature

APPENDIX B



DEVICES

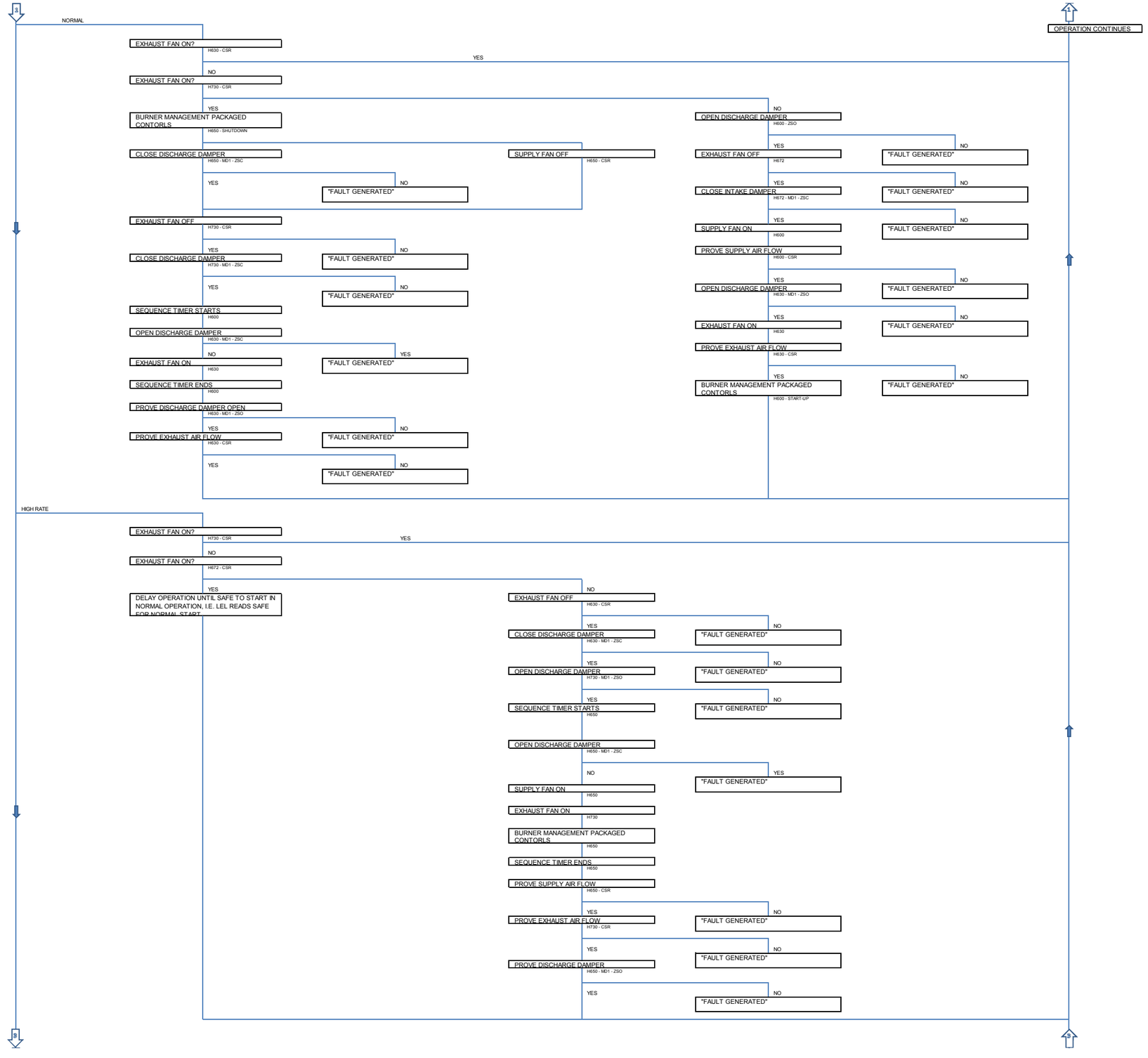
TAG	DESCRIPTION	INPUT/OUTPUT
H600 - MD1	Motorized Damper for H600 Intake	DO
H600 - MD1 - ZSO	Damper Position (Open) Switch for Discharge Damper	DI
H600 - MD1 - ZSC	Damper Position (Closed) Switch for Discharge Damper	DI
H600 - CSR	Current Sensing Relay for MUA blower	AI
H600 - TSL	Low Temperature Switch for H600	DI
H600 - TE	Temperature Element for H600	AI
H650 - MD1	Motorized Damper for H650 Intake	DO
H650 - MD1 - ZSO	Damper Position (Open) Switch for Discharge Damper	DI
H650 - MD1 - ZSC	Damper Position (Closed) Switch for Discharge Damper	DI
H650 - CSR	Current Sensing Relay for MUA blower	AI
H650 - TSL	Low Temperature Switch for H650	DI
H600 - TE	Temperature Element for H650	AI
H600, H650 - TS	Temperature Switch for H600 & H650	DI
H600, H650 - LEL	Lower Explosive Limit Sensor for H600 & H650	AI
H672 - MD1	Motorized Damper for H672 Intake	DO
H672 - MD1 - ZSO	Damper Position (Open) Switch for Intake Damper Permissive for H672 Operation	DI
H672 - MD1 - ZSC	Damper Position (Closed) Switch for Intake Damper	DI
H672 - CSR	Current Sensing Relay for Exhaust Fan	AI
H630 - MD1	Motorized Damper for H630	DO
H630 - MD1 - ZSO	Damper Position (Open) Switch for Discharge Damper	DI
H630 - MD1 - ZSC	Damper Position (Closed) Switch for Discharge Damper	DI
H630 - CSR	Current Sensing Relay for Exhaust Fan	AI
H730 - MD1	Motorized Damper for H730	DO
H730 - MD1 - ZSO	Damper Position (Open) Switch for Discharge Damper	DI
H730 - MD1 - ZSC	Damper Position (Closed) Switch for Discharge Damper	DI
H730 - CSR	Current Sensing Relay for Exhaust Fan	AI

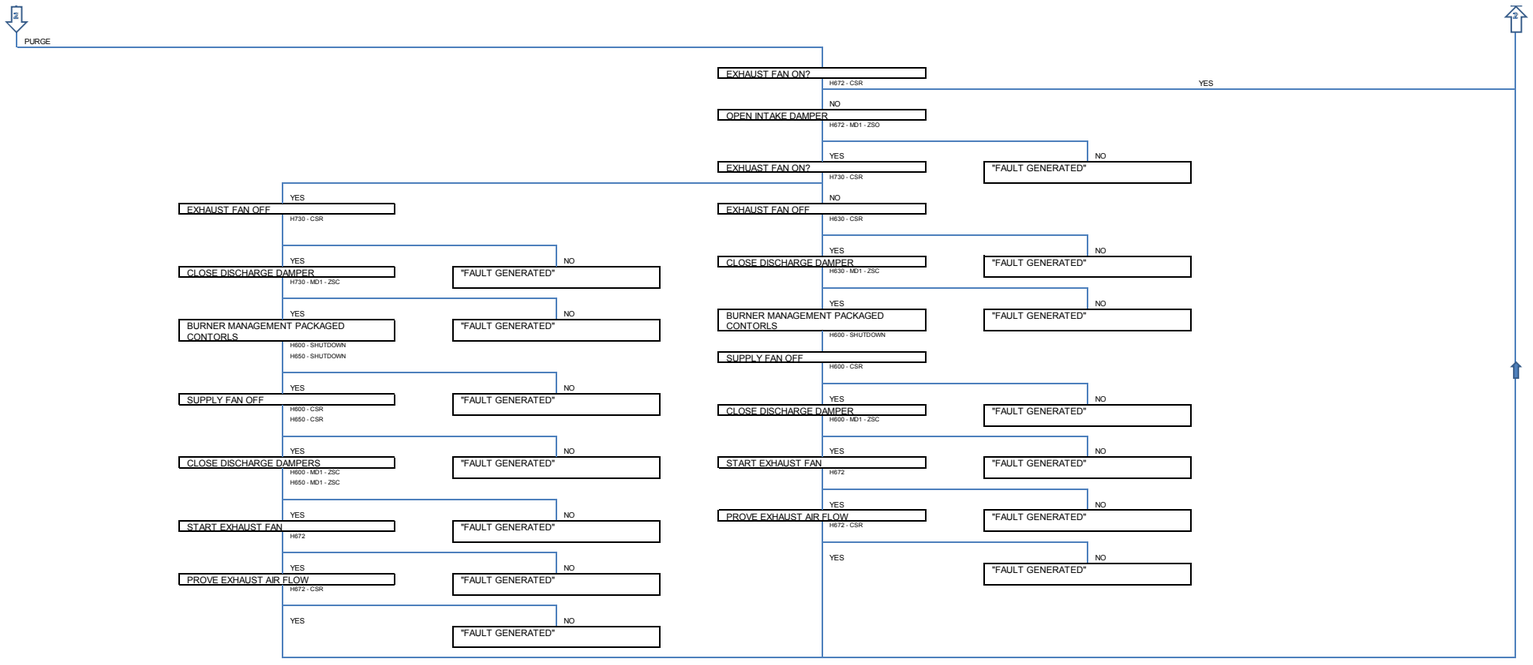
EQUIPMENT

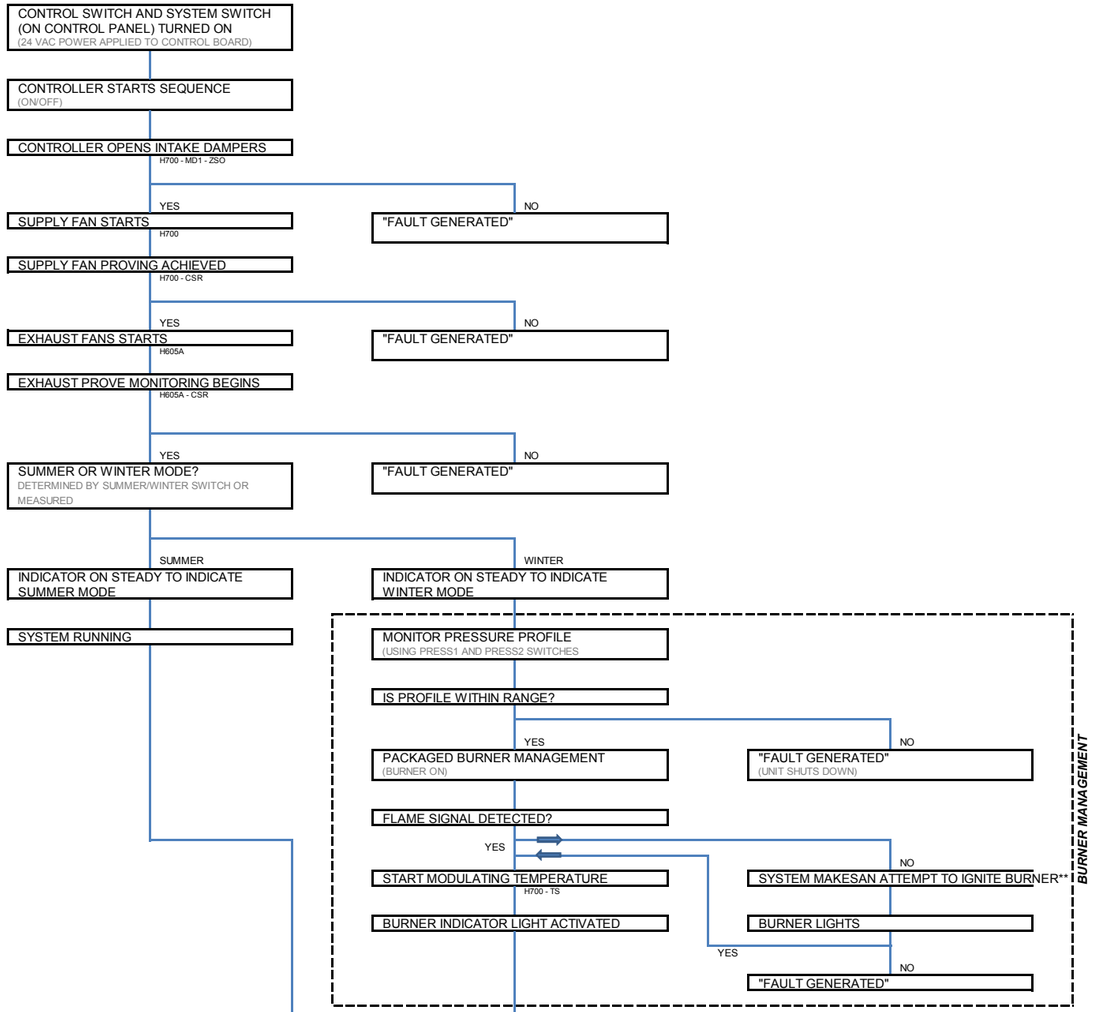
TAG	DESCRIPTION
H600	Make-Up Air Unit
H650	Make-Up Air Unit
H630	Exhaust Fan
H730	Exhaust Fan
H672	Exhaust Fan
H655	Exhaust Fan
H710	Exhaust Fan

NOTE: WHEN IN SUMMER MODE, BURNER MANAGEMENT PACKAGED CONTROLS ARE NOT USED.

NOTE:
PRELIMINARY, INSTRUMENT TAGS WILL BE REVISED UPON RECEIPT OF SHOP DRAWINGS


A
NORMAL
EXHAUST FAN ON?
H630 - CSR
YES
NO
EXHAUST FAN ON?
H730 - CSR
YES
BURNER MANAGEMENT PACKAGED CONTORLS
H650 - SHUTDOWN
CLOSE DISCHARGE DAMPER
H650 - MD1 - ZSC
YES
NO
"FAULT GENERATED"
SUPPLY FAN OFF
H650 - CSR
EXHAUST FAN OFF
H730 - CSR
YES
NO
CLOSE DISCHARGE DAMPER
H730 - MD1 - ZSC
"FAULT GENERATED"
YES
NO
"FAULT GENERATED"
SEQUENCE TIMER STARTS
H600
OPEN DISCHARGE DAMPER
H630 - MD1 - ZSC
NO
YES
EXHAUST FAN ON
H630
"FAULT GENERATED"
SEQUENCE TIMER ENDS
H600
PROVE DISCHARGE DAMPER OPEN
H630 - MD1 - ZSO
YES
NO
PROVE EXHAUST AIR FLOW
H630 - CSR
"FAULT GENERATED"
YES
NO
"FAULT GENERATED"
NO
OPEN DISCHARGE DAMPER
H650 - ZSO
YES
NO
EXHAUST FAN OFF
H672
"FAULT GENERATED"
YES
NO
CLOSE INTAKE DAMPER
H672 - MD1 - ZSC
"FAULT GENERATED"
YES
NO
SUPPLY FAN ON
H600
"FAULT GENERATED"
PROVE SUPPLY AIR FLOW
H600 - CSR
YES
NO
OPEN DISCHARGE DAMPER
H630 - MD1 - ZSO
"FAULT GENERATED"
YES
NO
EXHAUST FAN ON
H630
"FAULT GENERATED"
PROVE EXHAUST AIR FLOW
H630 - CSR
YES
NO
BURNER MANAGEMENT PACKAGED CONTORLS
H600 - START-UP
"FAULT GENERATED"
OPERATION CONTINUES
A
HIGH RATE
EXHAUST FAN ON?
H730 - CSR
YES
NO
EXHAUST FAN ON?
H672 - CSR
YES
DELAY OPERATION UNTIL SAFE TO START IN NORMAL OPERATION, I.E. LEL READS SAFE FOR NORMAL START
NO
EXHAUST FAN OFF
H630 - CSR
YES
NO
CLOSE DISCHARGE DAMPER
H630 - MD1 - ZSC
"FAULT GENERATED"
YES
NO
OPEN DISCHARGE DAMPER
H730 - MD1 - ZSO
"FAULT GENERATED"
YES
NO
SEQUENCE TIMER STARTS
H650
"FAULT GENERATED"
OPEN DISCHARGE DAMPER
H650 - MD1 - ZSC
NO
YES
SUPPLY FAN ON
H650
"FAULT GENERATED"
EXHAUST FAN ON
H730
BURNER MANAGEMENT PACKAGED CONTORLS
H650
SEQUENCE TIMER ENDS
H650
PROVE SUPPLY AIR FLOW
H650 - CSR
YES
NO
PROVE EXHAUST AIR FLOW
H730 - CSR
"FAULT GENERATED"
YES
NO
PROVE DISCHARGE DAMPER
H650 - MD1 - ZSO
"FAULT GENERATED"
YES
NO
"FAULT GENERATED"
B
B


2
PURGE
EXHAUST FAN ON?
H672 - CSR
YES
NO
OPEN INTAKE DAMPER
H672 - MD1 - ZSO
YES
NO
EXHAUST FAN ON?
H730 - CSR
"FAULT GENERATED"
YES
NO
EXHAUST FAN OFF
H730 - CSR
EXHAUST FAN OFF
H630 - CSR
YES
NO
CLOSE DISCHARGE DAMPER
H730 - MD1 - ZSC
CLOSE DISCHARGE DAMPER
H630 - MD1 - ZSC
"FAULT GENERATED"
YES
NO
BURNER MANAGEMENT PACKAGED CONTORLS
H600 - SHUTDOWN
H650 - SHUTDOWN
BURNER MANAGEMENT PACKAGED CONTORLS
H600 - SHUTDOWN
"FAULT GENERATED"
YES
NO
SUPPLY FAN OFF
H600 - CSR
H650 - CSR
SUPPLY FAN OFF
H600 - CSR
"FAULT GENERATED"
YES
NO
CLOSE DISCHARGE DAMPERS
H600 - MD1 - ZSC
H650 - MD1 - ZSC
CLOSE DISCHARGE DAMPER
H600 - MD1 - ZSC
"FAULT GENERATED"
YES
NO
START EXHAUST FAN
H672
START EXHAUST FAN
H672
"FAULT GENERATED"
YES
NO
PROVE EXHAUST AIR FLOW
H672 - CSR
PROVE EXHAUST AIR FLOW
H672 - CSR
"FAULT GENERATED"
YES
NO
"FAULT GENERATED"
2



DEVICES

TAG	DESCRIPTION	INPUT/OUTPUT
H700 - MD1	Motorized Damper for H700 Intake	DO
H700 - MD1 - ZSO	Damper Position (Open) Switch for Intake Damper	DI
H700 - CSR	Current Sensing Relay for MUA blower	AI
H700 - TSL	Low Temperature Switch for H700	DI
H700 - TE1	Temperature Element for H700	AI
H700 - TE2	Temperature Switch for H700	AI
H605A-CSR	Current Sensing Relay for Exhaust Fan	AI

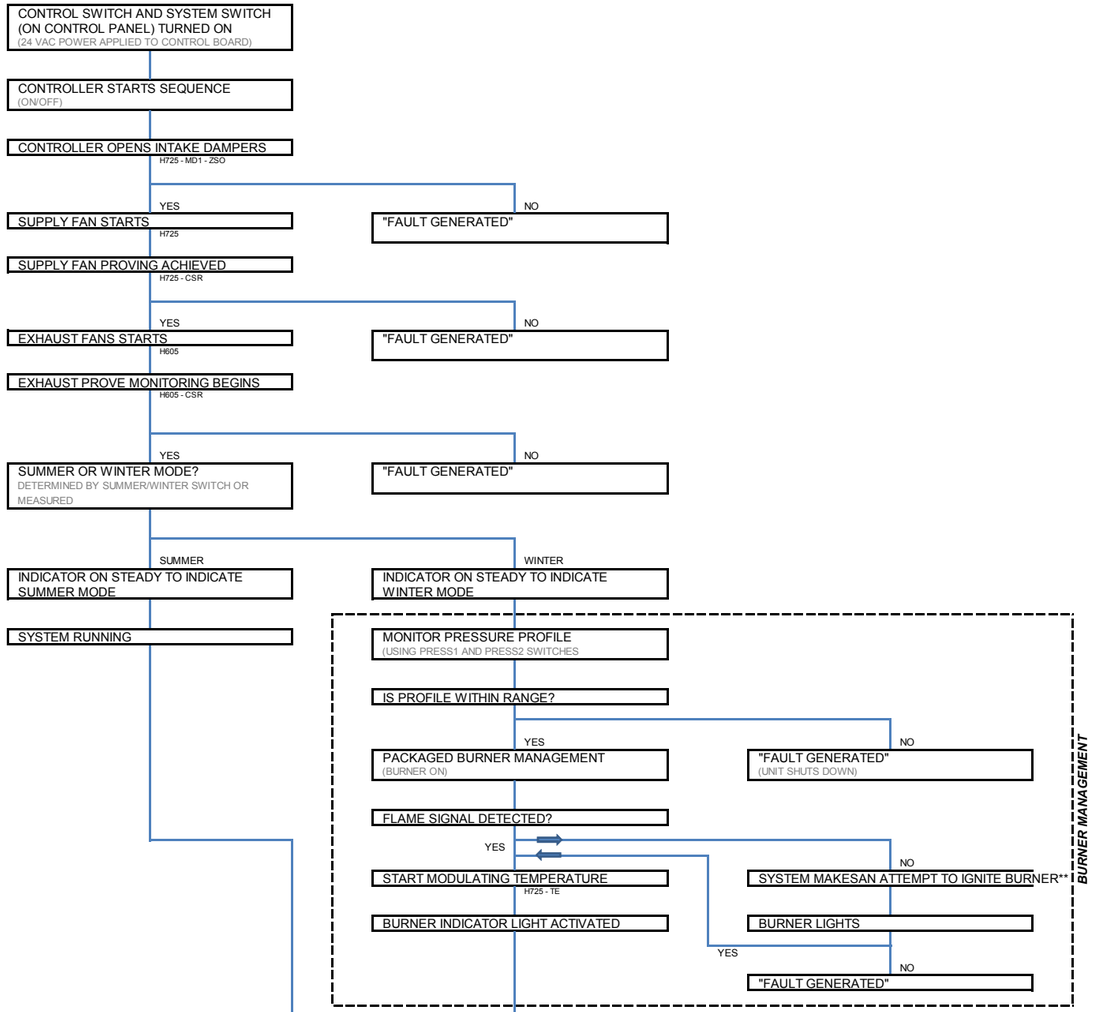
EQUIPMENT

TAG	DESCRIPTION
H700	Make-Up Air Unit
H605A	Exhaust Fan

NOTE: WHEN IN SUMMER MODE, BURNER MANAGEMENT PACKAGED CONTROLS ARE NOT USED.

NOTE:

PRELIMINARY, INSTRUMENT TAGS WILL REVISED UPON RECEIPT OF SHOP DRAWINGS



DEVICES

TAG	DESCRIPTION	INPUT/OUTPUT
H725 - MD1	Motorized Damper for H725 Intake	DO
H725 - MD1 - ZSO	Damper Position (Open) Switch for Intake Damper	DI
H725 - CSR	Current Sensing Relay for MUA blower	AI
H725 - TSL	Low Temperature Switch for H725	DI
H725 - TE1	Temperature Element for H725	AI
H725 - TE2	Temperature Switch for H725	AI
H605 - CSR	Current Sensing Relay for Exhaust Fan	AI

EQUIPMENT

TAG	DESCRIPTION
H725	Make-Up Air Unit
H605	Exhaust Fan

NOTE: WHEN IN SUMMER MODE, BURNER MANAGEMENT PACKAGED CONTROLS ARE NOT USED.

NOTE:

PRELIMINARY, INSTRUMENT TAGS WILL REVISED UPON RECEIPT OF SHOP DRAWINGS

APPENDIX C

NORTHERN INTAKE PLENUM

SOUTHERN INTAKE PLENUM

H600 — FILTER SECTION, BURNER SECTION, BLOWER AND MOTOR SECTION, DISCHARGE DAMPER — PKG GAS TRAIN — H600 MD1

H650 — FILTER SECTION, BURNER SECTION, BLOWER AND MOTOR SECTION, DISCHARGE DAMPER — PKG GAS TRAIN — H650 MD1

H765 — GHS, GHR

H672 ON ROOF — H672 MD1

MECHANICAL ROOM

TO MEZZANINE — REF. E600 SHT.2

TO MEZZANINE — REF. E600 SHT.2

TO HSH1 ROOF

H655

EA 200ø 150 — FROM NEW EXTRACTION ARM

EXHAUST FAN COLLECTS AIR DISPLACED DURING SLUDGE TRUCK LOADING PROCESS

EXISTING SLUDGE TANKS OPERATING VENT

TRUCK BAY

SA 500x250 130/260

EA 1200x450 1021/1551

SA 1200x450 830/1240

SA 600x600 609/948

EA 750x750 908/1415

METHANE H605GT AI1 — PROPANE H605GT AI2 — HYDROGEN SULFIDE H606GT AI

H607GT AI — H607GT AIT — H607GT AE

FROM MEZZANINE AND CHANNELS — REF. HP2.2

MAIN PROCESS FLOOR

EA 250x150 24

SLUDGE TANKS

EA 200ø 330

TO EXHAUST FAN H710 — REF. E600 SHT.3

TO EXHAUST FAN H630/H730 — REF. E600 SHT.3

AREA/EQUIPMENT TAG	H600	H650	H655	H672	H655
FUNCTION	MUA	MUA	EF	EF	UH
TYPE	DIRECT FIRED	DIRECT FIRED	CENTRIFUGAL	VANEAXIAL	GH
VOLUME (L/s)	9152	9152	61	9152	–
HEAT INPUT/OUTPUT (kW)	938/750	938/750	N/A	N/A	–
ELECTRICAL (kW)	14.92 (20HP) 575/3/60	14.92 (20HP) 575/3/60			–

SEQUENCE OF OPERATION

DEVICE LISTING

TAG	DESCRIPTION
NON-PACKAGED	
H600-TE/TT-1	HEADWORKS MAIN PROCESS FLOOR TEMPERATURE
H605GT-AE/AIT-1	HEADWORKS MAIN PROCESS FLOOR METHANE DETECTOR
H605GT-AE/AIT-2	HEADWORKS MAIN PROCESS FLOOR PROPANE DETECTOR
H606GT-AE/AIT	HEADWORKS MAIN PROCESS FLOOR HYDROGEN SULFIDE DETECTOR
H607GT-AE/AIT	HEADWORKS MAIN PROCESS FLOOR HYDROGEN SULFIDE DETECTOR
H655-HS	EF H655 ON-OFF SWITCH
H655-MM	EF H655 RUN STATUS
H672-MD	EF H672 INTAKE DAMPER ACTUATOR
H672-ZSD	EF H672 INTAKE DAMPER OPEN LIMIT SWITCH
H672-ZSB	EF H672 INTAKE DAMPER CLOSED LIMIT SWITCH
H672-MM	EF H672 RUN STATUS
H672-QA	EF H672 FAULT STATUS
H672-HS	EF H672 HAND-OFF-AUTO SWITCH
H672-MN	EF H672 START/STOP
H765-TE/TT	HEADWORKS MECHANICAL ROOM TEMPERATURE
PACKAGED	
H600-TC	MUA H600 TEMPERATURE CONTROLLER
H600-MM	MUA H600 CURRENT SENSING RELAY FOR BLOWER
H600-QA	MUA H600 FAULT
H600-TE2	MUA H600 DISCHARGE DUCT TEMPERATURE
H600-TE3	MUA H600 FREEZE PROTECTION
H600-MD	MUA H600 DISCHARGE DAMPER ACTUATOR
H600-HS	MUA H600 HAND-OFF-AUTO SWITCH
H600-ZSD-1/2	OPEN LIMIT SWITCH FOR MUA H600 DISCHARGE DAMPER
H600-ZSB-1/2	CLOSED LIMIT SWITCH FOR MUA H600 DISCHARGE DAMPER
H650-TC	MUA H650 TEMPERATURE CONTROLLER
H650-MM	MUA H650 CURRENT SENSING RELAY FOR BLOWER
H650-QA	MUA H650 FAULT
H650-TE2	MUA H650 DISCHARGE DUCT TEMPERATURE
H650-TE3	MUA H650 FREEZE PROTECTION
H650-MD	MUA H650 DISCHARGE DAMPER ACTUATOR
H650-HS	MUA H650 HAND-OFF-AUTO SWITCH
H650-ZSD-1/2	OPEN LIMIT SWITCH FOR MUA H650 DISCHARGE DAMPER
H650-ZSB-1/2	CLOSED LIMIT SWITCH FOR MUA H650 DISCHARGE DAMPER
H765-TC	UNIT HEATER THERMOSTAT

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KGS GROUP CONSULTING ENGINEERS

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VERTICAL	N.T.S.		
DATE	2010 07 15	DATE	

ENGINEER'S SEAL — PROVINCE OF MANITOBA — R.E. WILLMS Member 3833 — REGISTERED PROFESSIONAL ENGINEER

TENDER No. HP2.1
FILENAME: 1-0103G-P0001-001-Rev 00.dwg
PLOT DATE: 2010/12/16

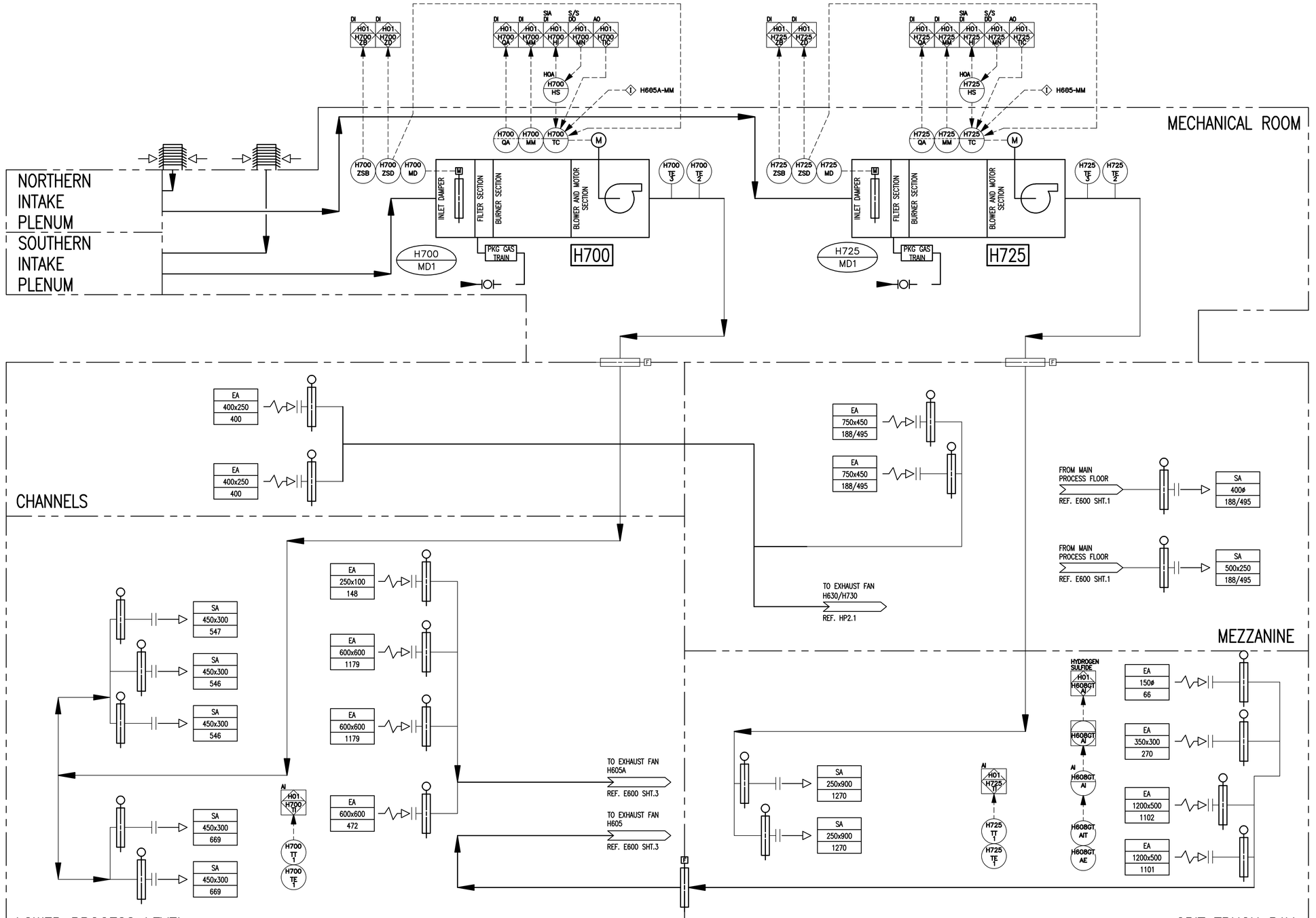
Winnipeg

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

2010 HVAC REPLACEMENT AND ASSOCIATED WORKS
WEWPCC
AREA H – HEADWORKS
PROCESS & INSTRUMENTATION DIAGRAM

SHEET 1 OF 3

CITY DRAWING NUMBER
1-0103G-P0001-001



SEQUENCE OF OPERATION

DEVICE LISTING

TAG	DESCRIPTION
NON-PACKAGED	
H700-TE/TT-1	HEADWORKS LOWER PROCESS LEVEL TEMPERATURE
H725-TE/TT-1	HEADWORKS GRIT TRUCK BAY TEMPERATURE
H608GT-AE/AIT	HEADWORKS GRIT TRUCK BAY HYDROGEN SULFIDE DETECTOR
PACKAGED	
H700-MD	MUA H700 INLET DAMPER ACTUATOR
H700-ZSD	MUA H700 INLET DAMPER OPEN LIMIT SWITCH
H700-ZSB	MUA H700 INLET DAMPER CLOSED LIMIT SWITCH
H700-MM	MUA H700 RUN STATUS
H700-QA	MUA H700 DAMPER FAILURE ALARM
H700-HS	MUA H700 HAND-OFF-AUTO SWITCH
H700-MN	MUA H700 START/STOP
H700-TE-2	MUA H700 DISCHARGE DUCT TEMPERATURE
H700-TE-3	MUA H700 FREEZE PROTECTION
H725-MD	MUA H725 INLET DAMPER ACTUATOR
H725-ZSD	MUA H725 INLET DAMPER OPEN LIMIT SWITCH
H725-ZSB	MUA H725 INLET DAMPER CLOSED LIMIT SWITCH
H725-MM	MUA H725 RUN STATUS
H725-QA	MUA H725 DAMPER FAILURE ALARM
H725-HS	MUA H725 HAND-OFF-AUTO SWITCH
H725-MN	MUA H725 START/STOP
H725-TE-2	MUA H725 DISCHARGE DUCT TEMPERATURE
H725-TE-3	MUA H725 FREEZE PROTECTION

AREA/EQUIPMENT TAG	H700	H725
FUNCTION	MUA	MUA
TYPE	DIRECT FIRED	DIRECT FIRED
VOLUME (L/s)	2643	2643
HEAT INPUT/OUTPUT (kW)	270/216	270/216
ELECTRICAL (kW)		

APEGM Certificate of Authorization
KGS Group
No. 245 Date: 2010/12/21

KGS GROUP CONSULTING ENGINEERS

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ALLIANCE Engineering Services Inc.

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DRAWN BY	GCN	APPROVED BY	REW
HOR. SCALE	N.T.S.	RELEASED FOR CONSTRUCTION	
VERTICAL	N.T.S.		
DATE	2009 11 19	DATE	

ENGINEER'S SEAL
PROVINCE OF MANITOBA R.E. WILLMS Member 3833 REGISTERED PROFESSIONAL ENGINEER

TENDER No. HP2.2
FILENAME: 1-0103G-P0001-002-Rev 00.dwg
PLOT DATE: 2010/12/16

Winnipeg
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

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CITY DRAWING NUMBER
1-0103G-P0001-002

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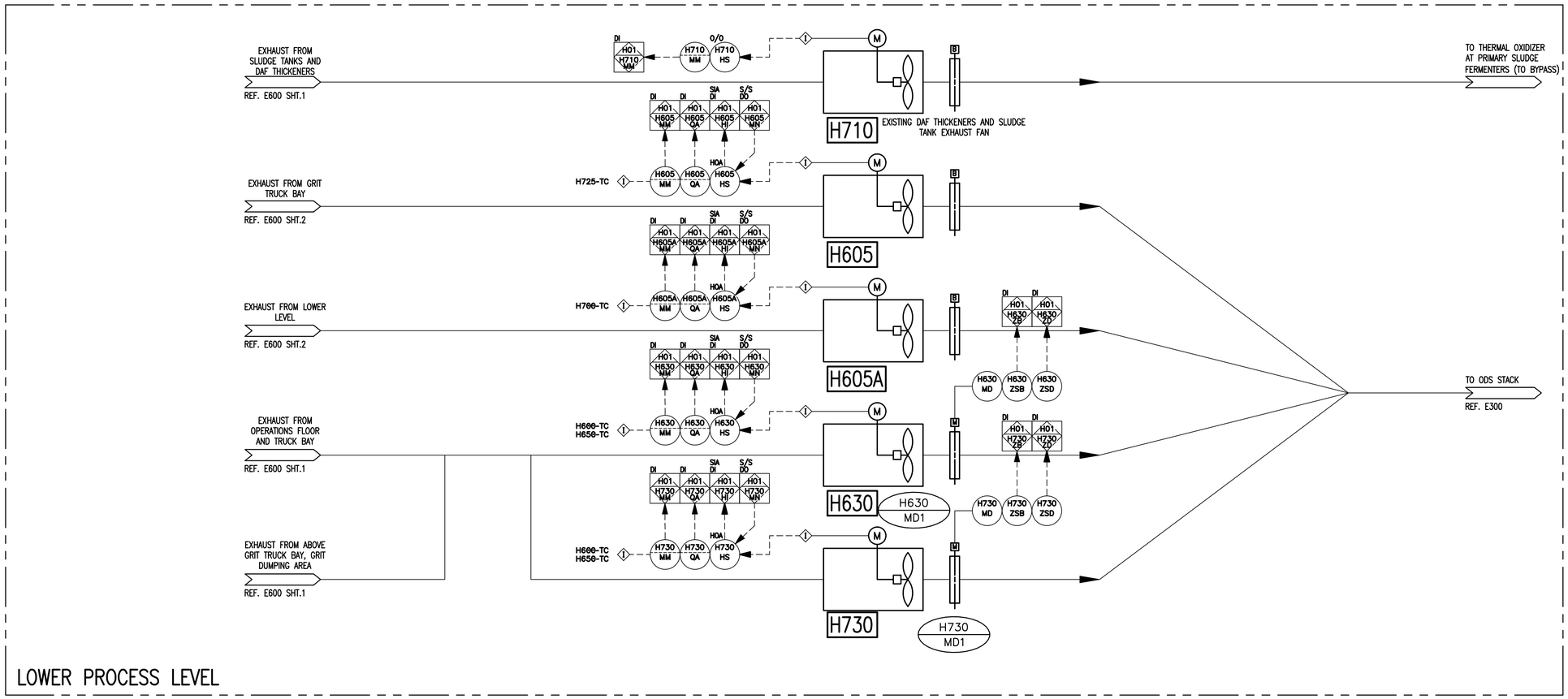
CW-10-M660-1



SEQUENCE OF OPERATION

DEVICE LISTING

TAG	DESCRIPTION
NON-PACKAGED	
H605A-MM	EF H605A RUN STATUS
H605A-QA	EF H605A FAULT STATUS
H605A-HS	EF H605A HAND-OFF-AUTO SWITCH
H605A-MN	EF H605A START/STOP
H605-MM	EF H605 RUN STATUS
H605-QA	EF H605 FAULT STATUS
H605-HS	EF H605 HAND-OFF-AUTO SWITCH
H605-MN	EF H605 START/STOP
H630-MD	EF H630 DISCHARGE DAMPER
H630-ZSD	EF H630 DISCHARGE DAMPER OPEN LIMIT SWITCH
H630-ZSB	EF H630 DISCHARGE DAMPER CLOSED LIMIT SWITCH
H630-MM	EF H630 RUN STATUS
H630-QA	EF H630 FAULT STATUS
H630-HS	EF H630 HAND-OFF-AUTO SWITCH
H630-MN	EF H630 START/STOP
H730-MD	EF H730 DISCHARGE DAMPER
H730-ZSD	EF H730 DISCHARGE DAMPER OPEN LIMIT SWITCH
H730-ZSB	EF H730 DISCHARGE DAMPER CLOSED LIMIT SWITCH
H730-MM	EF H730 RUN STATUS
H730-QA	EF H730 FAULT STATUS
H730-HS	EF H730 HAND-OFF-AUTO SWITCH
H730-MN	EF H730 START/STOP

AREA/EQUIPMENT TAG	H605	H605A	H630	H730	H710
FUNCTION	EF	EF	EF	EF	EF
TYPE	VANEAXIAL	VANEAXIAL	VANEAXIAL	VANEAXIAL	CENTRIFUGAL
VOLUME (L/s)	3050	2643	9152	14440	350
HEAT INPUT/OUTPUT (kW)					
ELECTRICAL (kW)	2.24 (3HP) 575/3/60	2.24 (3HP) 575/3/60	7.46 (10HP) 575/3/60	29.84 (40HP) 575/3/60	0.74 (1 HP) 575/3/60

Certificate of Authorization
KGS Group
No. 245 Date: 2010/12/21

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HOR. SCALE	N.T.S.	RELEASED FOR CONSTRUCTION	
VERTICAL	N.T.S.		
DATE	2010 03 17	DATE	

ENGINEER'S SEAL
PROVINCE OF MANITOBA
R.E. WILLMS
Member 3833
REGISTERED PROFESSIONAL ENGINEER

TENDER No. HP2.3
FILENAME: 1-0103G-P0001-003-Rev 00.dwg
PLOT DATE: 2010/12/16

Winnipeg
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

2010 HVAC REPLACEMENT AND ASSOCIATED WORKS
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PROCESS & INSTRUMENTATION DIAGRAM

SHEET 3 OF 3
CITY DRAWING NUMBER
1-0103G-P0001-003

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WEWPCC Utilities
Controls Narrative

REV 0

December 2010

KGS GROUP
CONSULTING ENGINEERS

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3.0 NORMAL OPERATION 3
3.1 COMMON SYSTEM PRINCIPLES 3
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3.5 SUPPLY FAN U620 AND EXHAUST FAN U670 4
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APPENDICES

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LIST OF APPENDICES

A. Utilities I/O List
B. Sequence of Operations – Mechanical Bay
C. Drawing 1-0103V-P0004-001 – Process and Instrumentation Diagram Sheet 1 of 3
Drawing 1-0103V-P0004-002 – Process and Instrumentation Diagram Sheet 2 of 3
Drawing 1-0103V-P0004-003 – Process and Instrumentation Diagram Sheet 3 of 3

1.0 SYSTEM DESCRIPTION

The ventilation system for the utility building is divided into three separate systems. The first system is comprised of the main floor offices and the lower level. The second system is comprised of the mechanical bay and chemical storage. The last system is comprised of the blower room.

Air handling unit U640 serves the first system and is located on the mezzanine level in the mechanical bay. The outside air supply to the air handling unit comes from an existing penthouse style air intake located on the roof of the mechanical bay; make-up air is relieved to the tunnels.

Make-up air unit U610 serves the second system and is located in a storage room generally above the main floor offices. The outside air supply to the make-up air unit comes from a new penthouse style air intake constructed on the roof of the storage room. Supply fan U620 provides the chemical storage room with supply air from U610. Exhaust fan U675 and U670 are located in the mechanical bay ceiling space and exhaust air from the mechanical bay and chemical storage room respectively to the outside. Exhaust fan U635 is intermittently used to exhaust welding fumes outside.

Air handling unit U605 serves the last system and is located in the mechanical room generally located above the main floor offices. The outside air supply to the air handler comes from an existing intake louver located on the east exterior wall and an existing penthouse style air intake located on the mechanical room roof. Exhaust fan U625 is located in the blower room and is only operated at certain times of the year.

1.1 GENERAL OPERATING DESCRIPTION

The main floor offices and lower level will normally be heated and ventilated using a single indirect-fired air handling unit complete with an automatic mixed air section (return-air & outside-air) to allow partial re-circulation of air flows. During the summer and winter seasons, the air handler operates with the intake and return air dampers set at their minimum positions. During the shoulder seasons, the unit provides full make-up air. Make-up air is relieved to the tunnels. This system is a constant volume system that operates to maintain an adjustable space set-

point temperature.

The utility building mechanical bay will normally be heated and ventilated using a single direct-fired, make up air unit and exhaust fan system. This system is a constant volume system and operates to maintain an adjustable space set-point temperature. The chemical storage room will normally be ventilated by a supply and exhaust fan system. A manually operated exhaust fan operates intermittently to extract welding fumes.

The blower room will be heated and ventilated using an indirect-fired, air handling unit complete with an automatic mixed air section (return-air & outside-air) to allow partial re-circulation of air flows. During the summer and winter seasons, the air handler operates with the intake and return air damper set at their minimum positions. During the shoulder seasons, the unit provides full make-up air. In all modes of operation, process blowers remove air from the space; a relief fan exhausts excess air when the unit is in economizer mode.

2.0 REFERENCE DRAWINGS

Drawing	Sheet	Description
1-0103V-P0004-001	1	Area U – Utilities Process & Instrumentation Diagram
1-0103V-P0004-002	2	Area U – Utilities Process & Instrumentation Diagram
1-0103V-P0004-003	3	Area U – Utilities Process & Instrumentation Diagram
1-0103V-E0011-001	1	Area U – Utilities MUA-U640, MCC-2U Schematic & Wiring Diagram
1-0103V-E0012-001	1	Area U – Utilities MUA-U605, MCC-2U Schematic & Wiring Diagram
1-0103V-E0013-001	1	Area U – Utilities MUA-U610, MCC-1U Schematic & Wiring Diagram
1-0103V-E0014-001	1	Area U – Utilities EF-U620 FVNR Schematic & Wiring Diagram
1-0103V-E0015-001	1	Area U – Utilities EF-U670 FVNR Schematic & Wiring Diagram
1-0103V-E0016-001	1	Area U – Utilities EF-U675 FVNR Schematic & Wiring Diagram

1-0103V-E0017-001	1	Area U – Utilities EF-U625 FVNR Schematic & Wiring Diagram
1-0103V-E0018-001	1	Area U – Utilities EF-U635 FVNR Schematic & Wiring Diagram

3.0 NORMAL OPERATION

Normal operation is defined as all hand-off-auto switches in the auto position with the PLC controlling operation of the system and the TCP/IP communications system functioning (ie. PLC's communicating with each other and the Bailey DCS).

Exhaust fan U625 operates only when AHU U605 is operating in economizer mode.

3.1 COMMON SYSTEM PRINCIPLES

The MUA unit U610 is direct-fired natural gas unit and require hard wired, proved interlock with its associated exhaust fan U675. This is provided by current sensing relays (CSR's) in the exhaust fan motor starters hard wired to the MUA unit controllers.

Upon initial start-up the fan motor in the MUA unit is not inhibited to start by the CSR's, only the burner firing circuit is inhibited until the exhaust fan is proven.

Discharge air temperature control setpoint of the units is set at the PLC HMI by the operator.

The space temperature, as determined by a temperature element in the space, shall be maintained by modulating the supply air temperature of the operating MUA/AHU. The space temperature shall be kept at 21°C (adjustable).

In the event of a TCP/IP communication failure, the Utilities control system shall continue to operate automatically under PLC control. The only lost functionality are:

- No reporting of status and alarm information to the Bailey DCS.
- No automatic initiation of the purge mode due to a high hydrogen sulfide alarm.

3.2 MAKE-UP AIR (MUA) UNIT U610 AND EXHAUST FAN U675

Mechanical bay has a space temperature transducer (U610-TE1) that reports back to the PLC. The HMI shall have a temperature setpoint for the mechanical bay.

During system startup the MUA inlet damper (U610-MD) opens. Once the damper is confirmed open by limit switches the MUA blower fan and exhaust fan (U675) starts. After the exhaust fan is up to speed the CSR contact closes to prove back to the MUA unit as a permissive on the burner. This system startup control is all provided by hardwired controls.

3.3 AIR HANDLING UNIT (AHU) UNIT U640

MUA unit U640 is an indirect fired natural gas unit and as such does not require hardwired interlocking with any exhaust fan. Therefore is has its own control except for a remote start/stop and temperature setpoint. The AHU unit maintains a setpoint discharge temperature (U640-TE-2) of 21°C (adjustable) which can be reset upwards/downwards in response to a space thermostat signal.

3.4 AIR HANDLING UNIT (AHU) UNIT U605 AND EXHAUST FAN U625

AHU unit U605 is an indirect fired natural gas unit and as such does not require hardwired interlocking with any exhaust fan. Therefore is has its own control except for a remote start/stop and temperature setpoint. The MUA unit operates to maintain a setpoint temperature (U605-TT-4) of 21°C (adjustable) in the blower room.

Exhaust fan U625 is started only when AHU unit U605 is in economizer mode.

3.5 SUPPLY FAN U620 AND EXHAUST FAN U670

Supply fan U620 and exhaust fan U670 operate on a single on/off switch. When supply fan U620 starts it requests U670 to start.

3.6 EXHAUST FAN U635

Exhaust fan U635 operates manually on an on/off switch local to the fan.

4.0 MANUAL OPERATION

The control in hand has the same hardwired control operations as automatic control with the a few minor exceptions. As opposed to starting the system from a PLC output, manual operation is achieved by setting the hand-off-auto switches in manual. Additionally the MUA units taking the operating setpoints from the operator interface on the MUA units as opposed to a 4-20 mA control signal from the PLC.

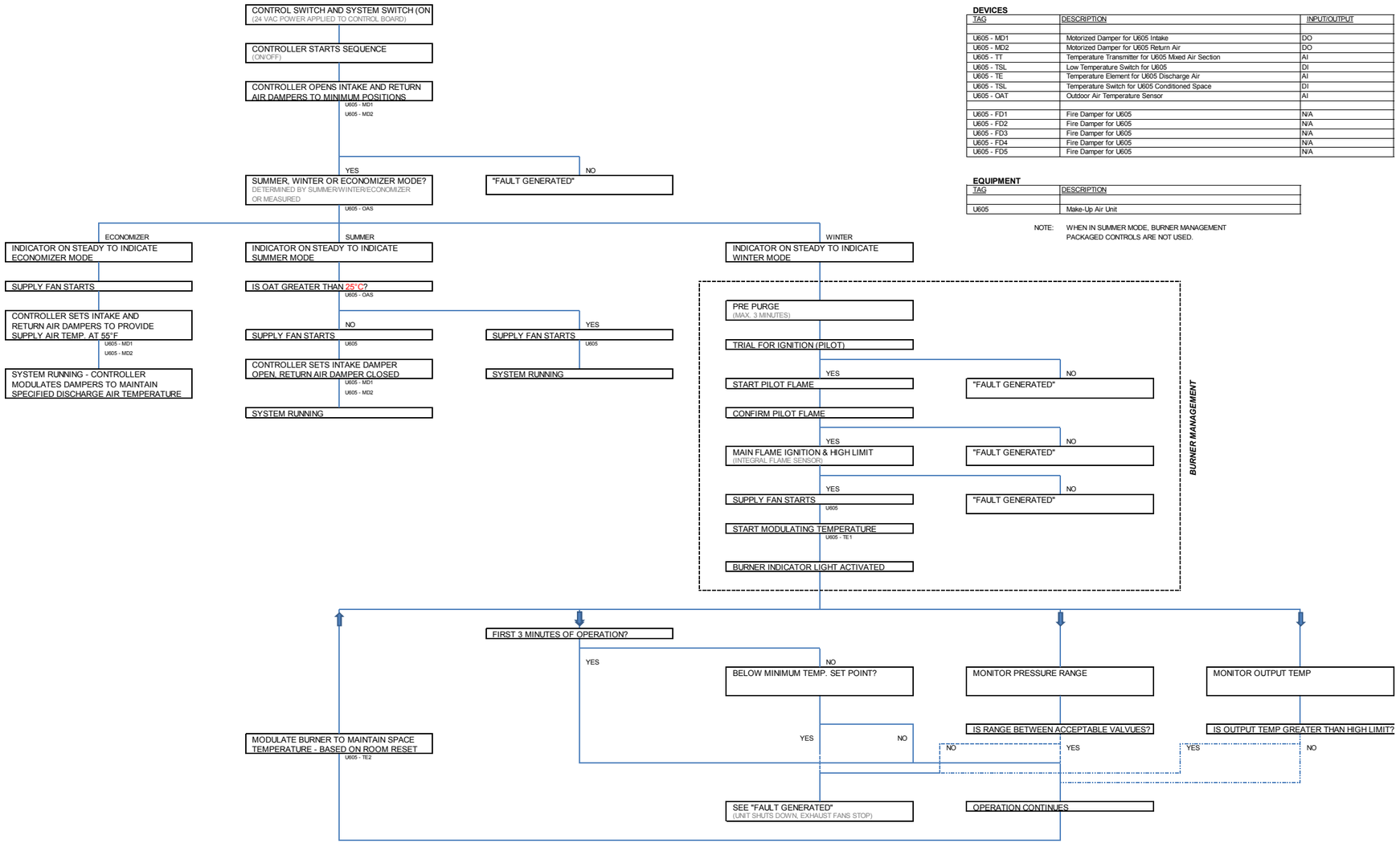
APPENDIX A

Utilties I/O List

Tag	IO Type	PLC Tag	DCS Tag	Description
U605-*	Modbus\TCP	U01-U605-*		Other MUA U605 Status's Available via Modbus\TCP
U605-MN	DO	U01-U605-MN		MUA U605 start/stop
U605-QA	DI	U01-U605-QA		MUA U605 fault status
U605-MM	DI	U01-U605-MM		MUA U605 run status
U605-HS	DI	U01-U605-HI		MUA U605 switch in auto
U605-TC-2	AO	U01-U605-TIC		MUA U605 temperature controller
U605-TT-4	AI	U01-U605-TI-4		MUA U605 space temperature
U610-*	Modbus\TCP	U01-U610-*		Other MUA U610 Status's Available via Modbus\TCP
U610-MN	DO	U01-U610-MN		MUA U610 start/stop
U610-QA	DI	U01-U610-QA		MUA U610 fault status
U610-MM	DI	U01-U610-MM		MUA U610 run status
U610-HS	DI	U01-U610-HI		MUA U610 switch in auto
U610-TC	AO	U01-U610-TIC		MUA U610 temperature controller
U610-TT-1	AI	U01-U605-TI1		Utilities building mechanical bay space temperature
U610-ZSB	DI	H01-H610-ZB		MUA H610 discharge damper close limit switch
H610-ZSD	DI	H01-H610-ZD		MUA H610 discharge damper close limit switch
U620-MM	DI	U01-U620-MM		Supply fan U620 run status
U625-MM	DI	U01-U625-MM		EF U625 run status
U635-MM	DI	U01-U635-MM		EF U635 run status
U640-*	Modbus\TCP	U01-U640-*		Other MUA U640 Status's Available via Modbus\TCP
U640-TC-2	AO	U01-U640-TIC		MUA U640 temperature controller
U640-MN	DO	U01-U640-MN		MUA U640 start/stop
U640-QA	DI	U01-U640-QA		MUA U640 fault status
U640-MM	DI	U01-U640-MM		MUA U640 run status
U640-HS	DI	U01-U640-HI		MUA U640 switch in auto
U670-MM	DI	U01-U670-MM		EF U670 run status
U675-MN	DO	U01-U675-MN		EF U675 start/stop
U675-QA	DI	U01-U675-QA		EF U675 fault status
U675-MM	DI	U01-U675-MM		EF U675 run status
U675-HS	DI	U01-U675-HI		EF U675 switch in auto

APPENDIX B

Sequence of Operations
Area U - Mechanical Bay - U605



DEVICES

TAG	DESCRIPTION	INPUT/OUTPUT
U605 - MD1	Motorized Damper for U605 Intake	DO
U605 - MD2	Motorized Damper for U605 Return Air	DO
U605 - TT	Temperature Transmitter for U605 Mixed Air Section	AI
U605 - TSL	Low Temperature Switch for U605	DI
U605 - TE	Temperature Element for U605 Discharge Air	AI
U605 - TSL	Temperature Switch for U605 Conditioned Space	DI
U605 - OAT	Outdoor Air Temperature Sensor	AI
U605 - FD1	Fire Damper for U605	N/A
U605 - FD2	Fire Damper for U605	N/A
U605 - FD3	Fire Damper for U605	N/A
U605 - FD4	Fire Damper for U605	N/A
U605 - FD5	Fire Damper for U605	N/A

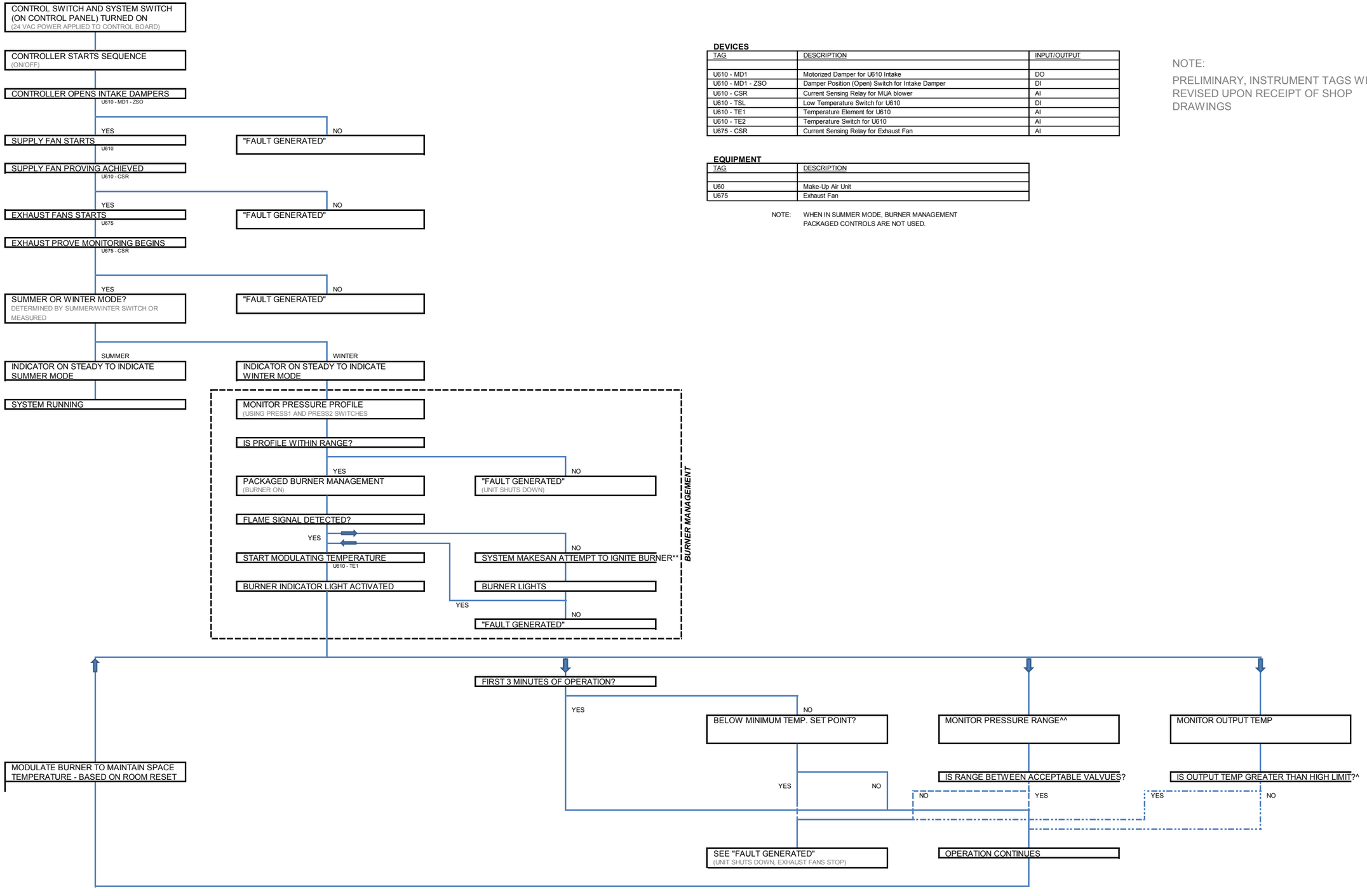
EQUIPMENT

TAG	DESCRIPTION
U605	Make-Up Air Unit

NOTE: WHEN IN SUMMER MODE, BURNER MANAGEMENT PACKAGED CONTROLS ARE NOT USED.

NOTE:

PRELIMINARY, INSTRUMENT TAGS WILL BE REVISED UPON RECEIPT OF SHOP DRAWINGS



DEVICES

TAG	DESCRIPTION	INPUT/OUTPUT
U610 - MD1	Motorized Damper for U610 Intake	DO
U610 - MD1 - ZSO	Damper Position (Open) Switch for Intake Damper	DI
U610 - CSR	Current Sensing Relay for MUA blower	AI
U610 - TSL	Low Temperature Switch for U610	DI
U610 - TE1	Temperature Element for U610	AI
U610 - TE2	Temperature Switch for U610	AI
U675 - CSR	Current Sensing Relay for Exhaust Fan	AI

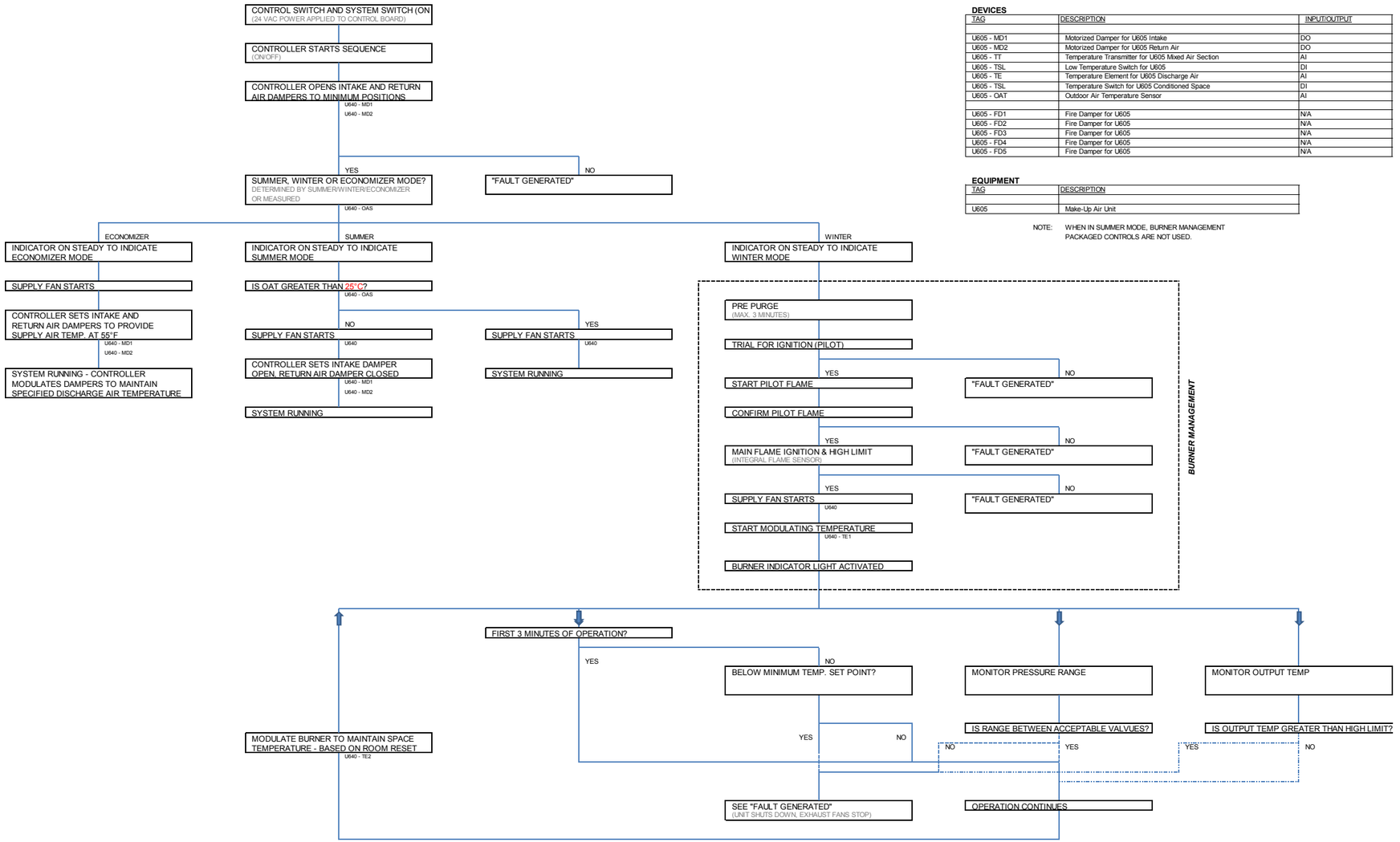
EQUIPMENT

TAG	DESCRIPTION
U60	Make-Up Air Unit
U675	Exhaust Fan

NOTE: WHEN IN SUMMER MODE, BURNER MANAGEMENT PACKAGED CONTROLS ARE NOT USED.

NOTE:

PRELIMINARY, INSTRUMENT TAGS WILL REVISED UPON RECEIPT OF SHOP DRAWINGS



DEVICES

TAG	DESCRIPTION	INPUT/OUTPUT
U605 - MD1	Motorized Damper for U605 Intake	DO
U605 - MD2	Motorized Damper for U605 Return Air	DO
U605 - TT	Temperature Transmitter for U605 Mixed Air Section	AI
U605 - TSL	Low Temperature Switch for U605	DI
U605 - TE	Temperature Element for U605 Discharge Air	AI
U605 - TSL	Temperature Switch for U605 Conditioned Space	DI
U605 - OAT	Outdoor Air Temperature Sensor	AI
U605 - FD1	Fire Damper for U605	N/A
U605 - FD2	Fire Damper for U605	N/A
U605 - FD3	Fire Damper for U605	N/A
U605 - FD4	Fire Damper for U605	N/A
U605 - FD5	Fire Damper for U605	N/A

EQUIPMENT

TAG	DESCRIPTION
U605	Make-Up Air Unit

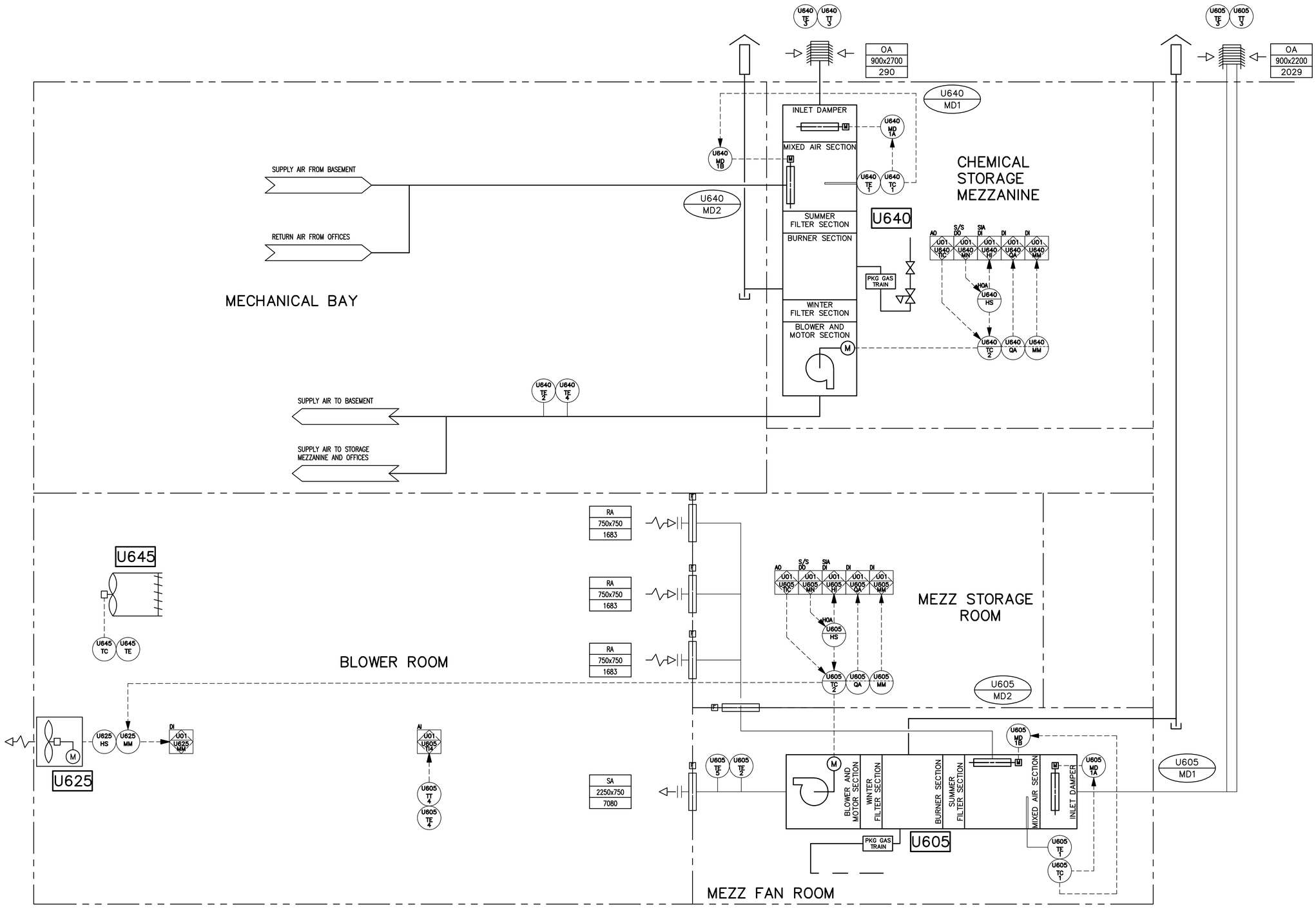
NOTE: WHEN IN SUMMER MODE, BURNER MANAGEMENT PACKAGED CONTROLS ARE NOT USED.

NOTE:

PRELIMINARY, INSTRUMENT TAGS WILL BE REVISED UPON RECEIPT OF SHOP DRAWINGS

APPENDIX C

CW-10-M660-1



AREA/EQUIPMENT TAG	U605	U640	U625
FUNCTION	MUA	MUA	EF
TYPE	INDIRECT FIRED	INDIRECT FIRED	BELT DRIVE PROPELLER
VOLUME (L/s)	7080	4265	4265
HEAT INPUT (kW)	268.75	106	N/A
ELEC. LOAD (kW)			

GENERAL NOTES

SEQUENCE OF OPERATION

DEVICE LISTING

TAG	DESCRIPTION
NON-PACKAGED	
U605-TE/TT-4	MECHANICAL BAY SPACE TEMPERATURE
U625-HS	EF U625 ON/OFF SWITCH
U625-MM	EF U625 RUN STATUS
PACKAGED	
U605-HS	EXHAUST FAN U605 HAND/OFF/AUTO SWITCH
U605-TC2	MUA U605 TEMPERATURE CONTOLLER
U605-MM	MUA U605 RUN STATUS
U605-QA	MUA U605 FAILURE ALARM
U605-MD1A	MUA U605 INLET DAMPER (FC)
U605-MD1B	MUA U605 RETURN AIR DAMPER (FO)
U605-TE/TC-1	MUA U605 MIXED AIR SECTION CONTROLLER
U605-TE2	MUA U605 DISCHARGE TEMPERATURE TRANSMITTER
U605-TE/TT-3	MUA U605 OUTDOOR AIR TEMPERATURE
U605-TE5	MUA U605 FREEZE PROTECTION
U640-HS	EXHAUST FAN U640 HAND/OFF/AUTO SWITCH
U640-TC2	MUA U640 TEMPERATURE CONTOLLER
U640-MM	MUA U640 RUN STATUS
U640-QA	MUA U640 FAILURE ALARM
U640-MD1A	MUA U640 INLET DAMPER (FC)
U640-MD1B	MUA U640 RETURN AIR DAMPER (FO)
U640-TE/TC-1	MUA U640 MIXED AIR SECTION CONTROLLER
U640-TE2	MUA U640 DISCHARGE TEMPERATURE TRANSMITTER
U640-TE/TT-3	MUA U640 OUTDOOR AIR TEMPERATURE
U640-TE4	MUA U640 FREEZE PROTECTION
U645-TE/TC	UNIT HEATER THERMOSTAT CONTROL

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DATE	2009 11 17	DATE	

ENGINEER'S SEAL — PROVINCE OF MANITOBA — R.E. WILLMS Member 3833 — REGISTERED PROFESSIONAL ENGINEER

TENDER No. UP6.1
FILENAME: 1-0103V-P0004-001-Rev 00.dwg
PLOT DATE: 2010/12/16

Winnipeg

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CITY DRAWING NUMBER
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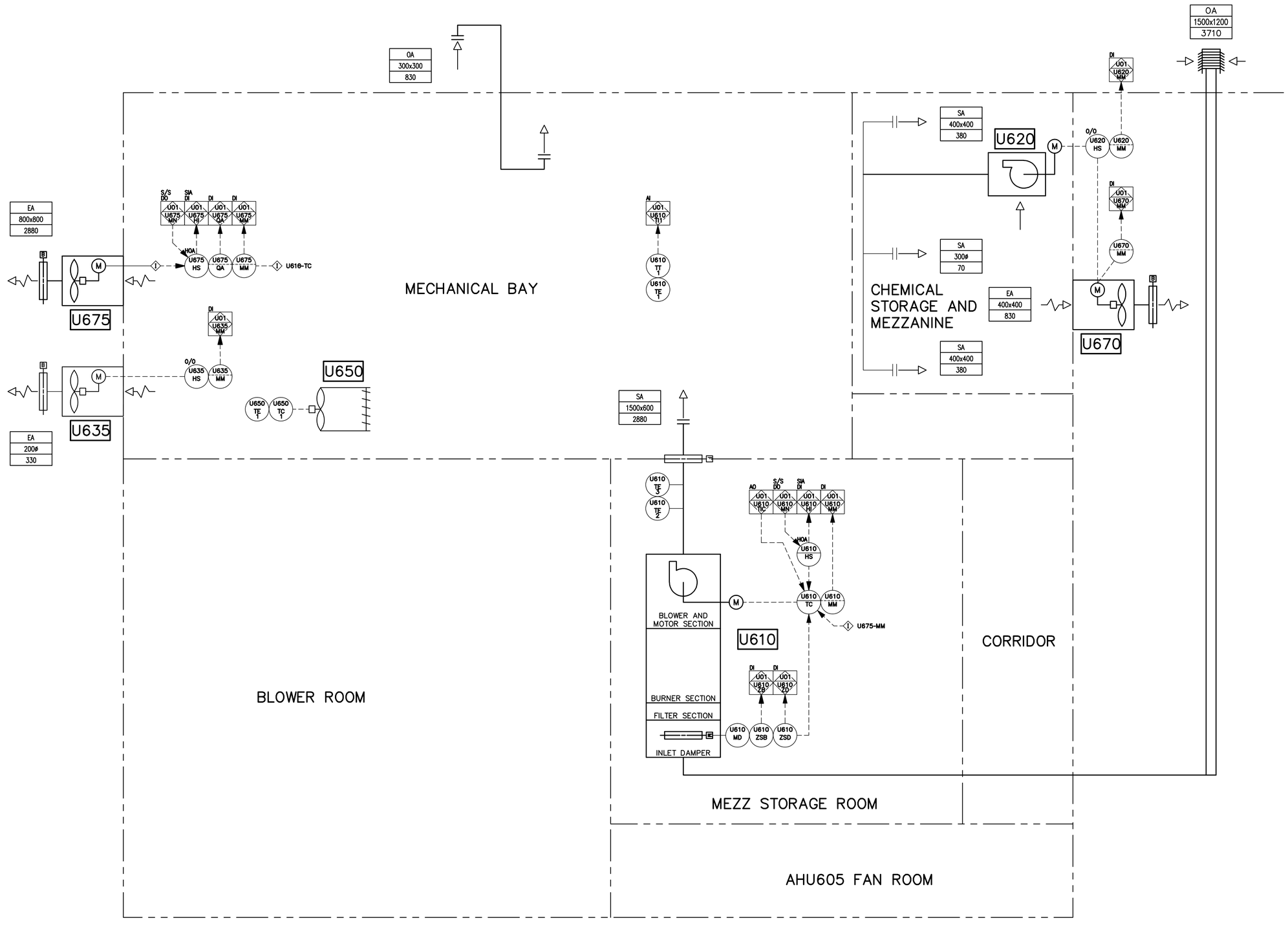

SEQUENCE OF OPERATION

DEVICE LISTING

TAG	DESCRIPTION
NON-PACKAGED	
U635-HS	EXHAUST FAN U635 ON/OFF SWITCH
U635-MM	EXHAUST FAN U635 RUN STATUS
U675-HS	EXHAUST FAN U675 HAND/OFF/AUTO SWITCH
U675-MM	EXHAUST FAN U675 RUN STATUS
U675-QA	EXHAUST FAN U675 FAULT STATUS
U620-HS	EXHAUST FAN U620 ON/OFF SWITCH
U620-MM	EXHAUST FAN U620 RUN STATUS
U675-MM	EXHAUST FAN U670 RUN STATUS
PACKAGED	
U610-HS	EXHAUST FAN U610 HAND/OFF/AUTO SWITCH
U610-TC	MUA U610 TEMPERATURE CONTOLLER
U610-MM	MUA U610 RUN STATUS
U610-QA	MUA U610 FAILURE ALARM
U610-MD	MUA U610 DAMPER
U610-ZSB	MUA U610 DAMPER CLOSE LIMIT SWITCH
U610-ZSD	MUA U610 DAMPER OPEN LIMIT SWITCH
U610-TE/TT-1	MECHANICAL BAY TEMPERATURE
U610-TE2	MUA U610 DISCHARGE TEMPERATURE TRANSMITTER
U610-TE3	MUA U610 FREEZE PROTECTION
U650-TE/TC	UNIT HEATER THERMOSTAT CONTROL

AREA/EQUIPMENT TAG	U610
FUNCTION	MUA
TYPE	DIRECT FIRED
VOLUME (L/s)	3710
HEAT INPUT (kW)	461
ELEC. LOAD (kW)	

AREA/EQUIPMENT TAG	U670	U675	U635
FUNCTION	AEF	AEF	AEF
TYPE	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL
VOLUME (L/s)	830	2880	330
HEAT INPUT (kW)	N/A	N/A	N/A
ELEC. LOAD (kW)	0.187	0.556	0.187

AREA/EQUIPMENT TAG	U620
FUNCTION	AEF
TYPE	CENTRIFUGAL
VOLUME (L/s)	1025
HEAT INPUT (kW)	N/A
ELEC. LOAD (kW)	

AREA/EQUIPMENT TAG	U650
FUNCTION	UH
TYPE	POWER VENTED
VOLUME (L/s)	N/A
HEAT INPUT (kW)	
ELEC. LOAD (kW)	

GENERAL NOTES

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CITY DRAWING NUMBER
1-0103V-P0004-002

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CW-10-M660-1

SUPPLY AIR FROM U640

RETURN AIR TO U640

U615

U615
EF

U655

U655
EF

CORRIDOR

EA
300x300
70

WASHROOM

SA
300x300
60

SA
250ø
250

EA
300x300
190

SA
250x400
190

MECHANICAL STORAGE

RA
600x600
55

SA
150ø
55

INSTRUMENT/ELECTRICAL SHOP

SA
250ø
150

OFFICE

U640
TE

RA
600x600
150

BLOWER ROOM

SA
250x250
140

RA
600x600
140

SA
250ø
150

OFFICE

RA
600x600
150

INSTRUMENT STORAGE

RA
600x600
250

JANITOR

EA
300x300
30

AREA/EQUIPMENT TAG	U615	U655
FUNCTION	AEF	AEF
TYPE	CENTRIFUGAL	CENTRIFUGAL
VOLUME (L/s)	70	220
HEAT INPUT (kW)	N/A	N/A
ELEC. LOAD (kW)	0.187	0.187

GENERAL NOTES

SEQUENCE OF OPERATION

DEVICE LISTING

TAG	DEVICE DESCRIPTION

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VERTICAL	N.T.S.		
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R.E. WILLMS
Member 3833
REGISTERED PROFESSIONAL ENGINEER

TENDER No. UP6.3
FILENAME: 1-0103V-P0004-003-Rev 00.dwg
PLOT DATE: 2010/12/16

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CITY DRAWING NUMBER
1-0103V-P0004-003

WEWPCC Primary Clarifiers
Controls Narrative

REV 0

December 2010

KGS GROUP
CONSULTING ENGINEERS

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3.0 NORMAL OPERATION 2
3.1 COMMON SYSTEM PRINCIPLES 3
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3.2 UNIT HEATER P665 5
4.0 MANUAL OPERATION 6

APPENDICES

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LIST OF APPENDICES

A. Primary Clarifiers I/O List
B. Sequence of Operations – Primary Clarifiers 1 & 2
C. Drawing 1-0103P-P0004-001 – Process and Instrumentation Diagram

1.0 SYSTEM DESCRIPTION

This ventilated space is comprised of primary clarifier domes No.1 and 2, and the primary distribution building. Primary clarifier domes No.1 and 2 are each dome shaped fibreglass roof structures located over top of their respective clarifiers. The primary distribution building is located on the roof of the sludge pump gallery.

Make-up air units P600 and P650 are located at floor level in the primary distribution building and draw air from the new intake air plenums constructed on the south wall of the distribution building. Make-up air units P600 and P650 supply primary clarifier domes No.1 and 2 along with the primary distribution building.

The new exhaust fans P605 and P655 are located at floor level in the lower tunnel/pump room area. Exhaust fans P605 and P655 exhaust air from primary clarifier domes no. 1 and 2 along with the primary distribution building to the ODS exhaust duct main.

1.1 GENERAL OPERATING DESCRIPTION

In normal operating mode a lead, direct-fired make-up air (MUA) and exhaust fan system will heat and ventilate the two primary clarifier domes and the primary distribution building. An identical lag system provides full redundancy in the event of lead system failure. In the purge operating mode, activation of the lag-system to permit parallel operation of both systems can be automatically activated by a lower-explosive-limit (LEL) reading in the clarifier dome as sensed by two LEL sensors; calibrated to sense methane (calibrated for gasoline) vapours. The discharge or supply ducts from each of the MUA units are interconnected to permit either unit to supply both domes in normal mode.
New exhaust fans; P605 and P655 have volumetric capacity matched to each of the MUA units. Exhaust fans, P605 and P655 are equipped with VFD drives to satisfy both normal and purge operating scenarios and are interlocked with P600 and P650 respectively.

2.0 REFERENCE DRAWINGS

Drawing	Sheet	Description
1-0103P-P0004-001	1	Area P – Primary Clarifiers 1 & 2 Process & Instrumentation Diagram
1-0103P-E0003-001	1	Area P – Primary Clarifiers 1 & 2 HVAC Schematic & Wiring Diagram
1-0103P-E0004-001	1	Area P – Primary Clarifiers 1 & 2 MUA-P600, MCC-1H Schematic & Wiring Diagram
1-0103P-E0005-001	1	Area P – Primary Clarifiers 1 & 2 MUA-P650, MCC-2H Schematic & Wiring Diagram
1-0103P-E0006-001	1	Area P – Primary Clarifiers 1 & 2 EF-605 VFD Schematic & Wiring Diagram
1-0103P-E0007-001	1	Area P – Primary Clarifiers 1 & 2 EF-655 VFD Schematic & Wiring Diagram

3.0 NORMAL OPERATION

Normal operation is defined as all hand-off-auto switches in the auto position with the PLC controlling operation of the system and the TCP/IP communications system functioning (ie. PLC's communicating with each other and the Bailey DCS).

Direct gas fired unit MUA P600, along with its associated exhaust fan P605, operates together as a system unit. Similarly, direct gas fired unit MUA P650 operates together with its exhaust fan P655 as a system unit.

Normal operation is for one system unit to operate at one time. Either system can be selected to be the lead system. In the event of an equipment failure on the lead system, the lag system will automatically start, and the lead system shutdown.

In the event of a high methane alarm (CH_4), as detected at the existing combustible gas detection panel, and relayed to the Primary Clarifier PLC over TCP/IP, the lag system is automatically started as well to provide a higher ventilation rate.

3.1 COMMON SYSTEM PRINCIPLES

The MUA units are direct-fired natural gas units and require hard wired, proved interlock with its associated exhaust fan. This is provided by current sensing relays (CSR's) in the exhaust fan motor starters hard wired to the MUA unit controllers.

Upon initial start-up the fan motors in the MUA units are not inhibited to start by the CSR's, only the burner firing circuit is inhibited until the exhaust fan is proven.

Discharge air temperature control setpoint of the units is set at the PLC HMI by the operator.

Should the space temperature in either clarifier, as determined by temperature element fall below setpoint (4°C) the unit's controls shall reset the discharge air temperature to 21°C (adjustable) until the space temperature in the coldest clarifier reaches (13°C). After reaching 13°C (adjustable) the unit's controls reset the discharge air temperature back to 10°C (adjustable).

There is no intent to run in normal mode with MUA P600 and the other system units exhaust fan P655 or other combinations of equipment.

The normal desirable winter space temperatures are 4°C to 13°C. A discharge air temperature set at 10°C (adjustable) is set to maintain this temperature range.

There are times however when maintenance is required in the clarifiers. During these maintenance periods, it is desirable to have warmer space temperatures. In the clarifiers the warmer temperatures are achieved by operating in occupied mode, resetting the discharge air temperature to 21°C.

In the event of a TCP/IP communication failure, the Primary Clarifier control system shall continue to operate automatically under PLC control. The only lost functionality are:

- No reporting of status and alarm information to the Bailey DCS.
- No automatic initiation of the purge mode due to a high methane alarm.

The exhaust fans are equipped with variable frequency drives. Although there are only two operating modes required (normal and purge) a conventional 2-speed motor can not accommodate (match) the operating parameters. This is the reason for a VFD being used.

It is important not to create a negative pressure inside the clarifier. A negative pressure could cause the roof to collapse. A counter weighted mechanical relief damper is provided as a safety measure to guard against the scenario where a system exhaust fan is operating and flow, for whatever reason, from the MUA is compromised.

3.2 MAKE-UP AIR (MUA) UNITS P600 AND P650, EXHAUST FAN P605 AND P655

During normal operation (non-purge condition) each system unit, P600 and P650, and their related exhaust fans, P605 and P655, operate in lead/lag mode where the lead equipment is on and lag equipment is off. The lead/lag operation shall be settable by the operator from the HMI at any time but the PLC shall incorporate an automatic lead/lag cycling of the equipment by an adjustable time period initially set at 24 hours.

Clarifiers 1 & 2 each have a space temperature transducer (P600-TE1 and P650-TE1) that reports back to the PLC. The HMI shall have an occupied/unoccupied software switch for each clarifier along with a temperature setpoint for both occupied and unoccupied mode. When both clarifiers are in unoccupied mode the unoccupied mode temperature setpoint is used to control MUA discharge temperature. If either clarifier is set to occupied mode then the MUA will control to the occupied mode temperature setpoint.

During system startup the MUA discharge damper (P600-MD or P650-MD) and the exhaust fan discharge damper (P605-MD or P655-MD) open. Once both dampers are confirmed open by limit switches the MUA blower fan starts. When enough current is drawn by the blower fan to prove that it has started and is moving air the current sensing relay triggers its associated exhaust fan to start. It does not depend on the PLC so this scheme minimizes the risk of a negative pressure. After the exhaust fan is up to speed the VFD closes a contact to prove back to the MUA unit as a permissive on the burner. This system startup control is all provided by hardwired controls.

An existing methane gas detector calibrated for gasoline, P607GT-AT, detects the presence of

any gasoline vapors within the primary distribution building and reports the level back to an existing Drager control panel. If the gas levels are above 20% LEL an alarm is triggers and reported to the existing DCS control system through a digital communications link. The DCS will then digitally communicate this alarm back to the PLC which will trigger purge mode.

During purge operation both make-up air units P600 and P650 operate along with their related exhaust fans P605 and P655. In this situation one set of MUA and exhaust fan is already running so the startup sequence is slightly different. Similarly to when only one MUA is running the MAU discharge damper and the exhaust fan discharge damper start opening first. Instead of waiting for the limit switches to prove open before the MUA blower starts it will start after the MUA discharge damper closed limit switch is broken and a timing relay starts timing while the open limit switch is still not made. If the open limit switch is not proven with a 15 second (adjustable) period then the blower fan will trip out. Similarly the exhaust fan starts immediately after the exhaust fan discharge dampers closed limit switch is not longer made. As with the MUA blower the exhaust fan also has a timing relay that will trip the exhaust fan if the open limit switch on the exhaust fan discharge damper is not proven within 15 seconds (adjustable). This control like normal operation is also hardwired within the starter circuit. Any trips as a result of the timing relay timing out requires a manual reset.

The reason from this requirement is to prevent air from the running MUA unit blowing in the backwards direction through the starting MUA unit and also prevent the running exhaust fan from discharging back into the clarifiers.

When in purge mode operation a second output from the PLC is also required to change the speed the exhaust fans are operating at to a higher operating speed.

3.2 UNIT HEATER P665

Unit heater P665 is controlled by a wall mounted thermostat.

4.0 MANUAL OPERATION

The control in hand has the same hardwired control operations as automatic control with the a few minor exceptions. As opposed to starting the system from a PLC output, manual operation is achieved by setting the system hand-off-auto switches in manual. The only difference to initiate a purge mode the operator needs to manually start the second system. While in manual mode of operation if a purge is initiated the VFD's will kick into high speed on confirmation of both MUA unit blower fans running via a hardwired contacts as opposed to a PLC contact. Additionally the MUA units taking the operating setpoints from the operator interface on the MUA units as opposed to a 4-20 mA control signal from the PLC.

APPENDIX A

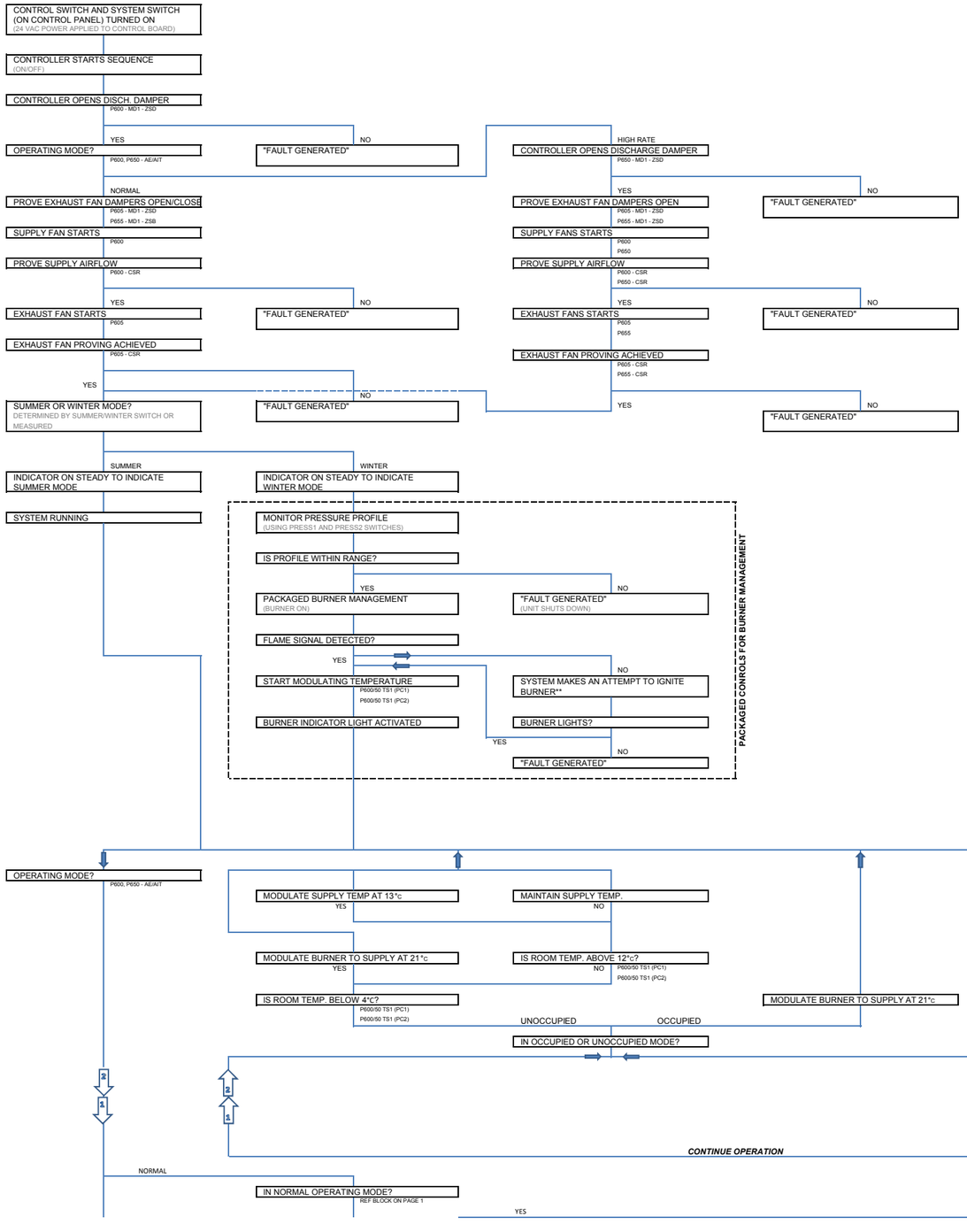
Primary Clarifiers I/O List

Tag	IO Type	PLC Tag	DCS Tag	Description
P600-ZSB-1	DI	P01-P600-ZB		MUA P600 discharge damper close limit switch (contact closed when damper closed)
P600-ZSD-1	DI	P01-P600-ZD		MUA P600 discharge damper close limit switch (contact open when damper closed)
P600-TC	AO	P01-P600-TIC		MUA P600 temperature controller
P600-MM	DI	P01-P600-MM		MUA P600 run status (CSR)
P600-MN1	DO	P01-P600-MN1		MUA P600 start/stop
P600-MN2	DO	P01-P600-MN2		MUA P600 high fire
P600-QA	DI	P01-P600-QA		MUA P600 damper failure lockout
P600-HS	DI	P01-P600-HI		MUA P600 switch in auto
P600-TT-1	AI	P01-P600-TI1		Primary Clarifier No.1 space temperature
P600-TE-2	Modbus\TCP	P01-P600-TI2		MUA P600 discharge temperature
P600-*	Modbus\TCP	P01-P600-*		Other MUA P600 Status's Available via Modbus\TCP
P600-TSL-1	DI	P01-P600-TSL		Primary Clarifier No.1 low temperature switch
P605-ZSB-1	DI	P01-P605-ZB		EF P605 discharge damper close limit switch (contact closed when damper closed)
P605-ZSD-1	DI	P01-P605-ZD		EF P605 discharge damper close limit switch (contact open when damper closed)
P605-HS	DI	P01-P605-HI		EF P605 hand-off-auto switch
P605-QA	DI	P01-P605-QA		EF P605 VFD fault
P605-MM-1	DI	P01-P605-MM		EF P605 VFD run status
P605-MN	DO	P01-P605-MN		EF P605 high speed
P605-*	Modbus\TCP	P01-P605-*		Other EF P605 Status's Available via Modbus\TCP (VFD is an ABB ACS800 Series)
P650-ZSB-1	DI	P01-P650-ZB		MUA P650 discharge damper close limit switch (contact closed when damper closed)
P650-ZSD-1	DI	P01-P650-ZD		MUA P650 discharge damper close limit switch (contact open when damper closed)
P650-TC	AO	P01-P650-TIC		MUA P650 temperature controller
P650-MM	DI	P01-P650-MM		MUA P650 run status (CSR)
P650-MN1	DO	P01-P650-MN1		MUA P650 start/stop
P650-MN2	DO	P01-P650-MN2		MUA P650 high fire
P650-QA	DI	P01-P650-QA		MUA P650 damper failure lockout
P650-HS	DI	P01-P650-HI		MUA P650 switch in auto
P650-TT-1	AI	P01-P650-TI1		Primary Clarifier No.2 space temperature
P650-TE-2	Modbus\TCP	P01-P650-TI2		MUA P650 discharge temperature
P650-*	Modbus\TCP	P01-P650-*		Other MUA P600 Status's Available via Modbus\TCP
P650-TSL-1	DI	P01-P650-TSL		Primary Clarifier No.2 low temperature switch
P655-ZSB-1	DI	P01-P655-ZB		EF P655 discharge damper close limit switch (contact closed when damper closed)
P655-ZSD-1	DI	P01-P655-ZD		EF P655 discharge damper close limit switch (contact open when damper closed)
P655-HS	DI	P01-P655-HI		EF P655 hand-off-auto switch
P655-QA	DI	P01-P655-QA		EF P655 VFD fault
P655-MM-1	DI	P01-P655-MM		EF P655 VFD run status
P655-MN	DO	P01-P655-MN		EF P655 high speed
P655-*	Modbus\TCP	P01-P655-*		Other EF P655 Status's Available via Modbus\TCP (VFD is an ABB ACS800 Series)
P607GT-AIT	Modbus\TCP via DCS	P01-P607GT-AI		Primary building methane gas level
P605GT-AIT	Modbus\TCP via DCS	P01-P605GT-AI		Primary Clarifier No.1 methane gas level
P655GT-AIT	Modbus\TCP via DCS	P01-P655GT-AI		Primary Clarifier No.2 methane gas level
P600-TSL	DI	P01-P600-TSL		Primary distribution building low temperature switch
P950-XA-1	DI	P01-P950-XA1		PLC Panel 24 VDC power supply status No.1
P950-XA-2	DI	P01-P950-XA2		PLC Panel 24 VDC power supply status No.2
P934-XA	D	P01-P934-XA		PLC Panel utility power status
P935-XA	DI	P01-P935-XA		PLC Panel UPS status

Primary Clarifiers I/O List

Tag	IO Type	PLC Tag	DCS Tag	Description
P936-XA	DI	P01-P936-XA		PLC Panel ethernet switch status

APPENDIX B



DEVICES

TAG	DESCRIPTION	INPUT/OUTPUT
NON-PACKAGED		
P600 - TSL	Low Temperature Switch for P201 (Distribution Building)	DI
P600/50 - AE/AIT	Lower Explosive Limit - 20%	
P600 - TE - 1	Temperature Element for Primary Clarifier 1	AI
P600 - TSL - 1	Low Temperature Switch for Primary Clarifier 1	DI
P600/50 - TS1 (PC1)	Unoccupied Temperature Switch for Primary Clarifier 1	DI
P600/50 - TS2 (PC1)	Occupied Temperature Switch for Primary Clarifier 1	DI
P650 - TE - 1	Temperature Element for Primary Clarifier 2	AI
P650 - TSL - 1	Low Temperature Switch for Primary Clarifier 2	DI
P600/50 - TS1 (PC2)	Unoccupied Temperature Switch for Primary Clarifier 2	DI
P600/50 - TS2 (PC2)	Occupied Temperature Switch for Primary Clarifier 2	DI
P605 - HRN (A,B,C)	Alarm Horns for Primary Clarifiers 1, 2 and Pump Room	DI
P605 - CSR	Current Sensing Relay for Exhaust Fan P605	AI
P605 MD1 - ZSD	Damper Position (Open) Switch for Exhaust Fan P605 Damper	DI
P605 MD1 - ZSB	Damper Position (Closed) Switch for Exhaust Fan P605 Damper	DI
P655 - CSR	Current Sensing Relay for Exhaust Fan P655	AI
P655 MD1 - ZSD	Damper Position (Open) Switch for Exhaust Fan P655 Damper	DI
P655 MD1 - ZSB	Damper Position (Closed) Switch for Exhaust Fan P655 Damper	DI
PACKAGED		
P600 - CSR	Current Sensing Relay for MUA units Blower Motor	AI
P600 MD - ZSD	Damper Position (Open) for MUA units Discharge Damper	DI
P600 MD - ZSB	Damper Position (Closed) for MUA units Discharge Damper	DI
P600 - TSL - 2	Low Temperature Switch for MUA unit	DI
P600 - TE - 2	Temperature Element for MUA unit	AI
P650 - CSR	Current Sensing Relay for MUA units Blower Motor	AI
P650 MD - ZSD	Damper Position (Open) for MUA units Discharge Dampe	DI
P650 MD - ZSB	Damper Position (Closed) for MUA units Discharge Damper	DI
P650 - TSL - 2	Low Temperature Switch for MUA unit	DI
P650 - TE - 2	Temperature Element for MUA unit	AI

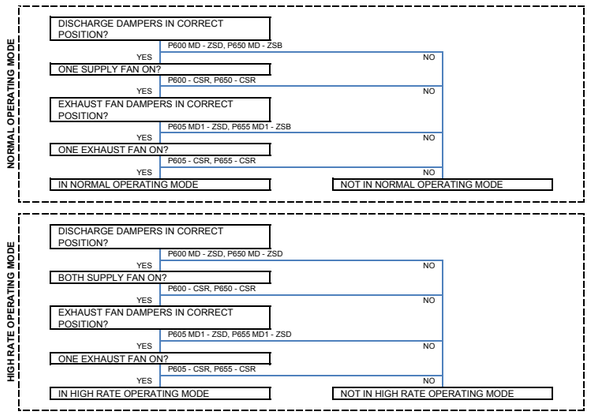
EQUIPMENT

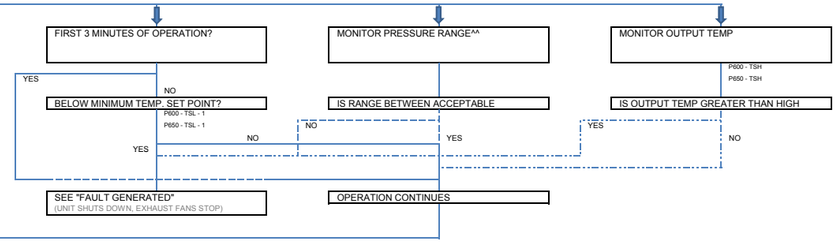
TAG	DESCRIPTION
P600	Makeup Air Unit
P605	Exhaust Fan
P650	Makeup Air Unit
P655	Exhaust Fan

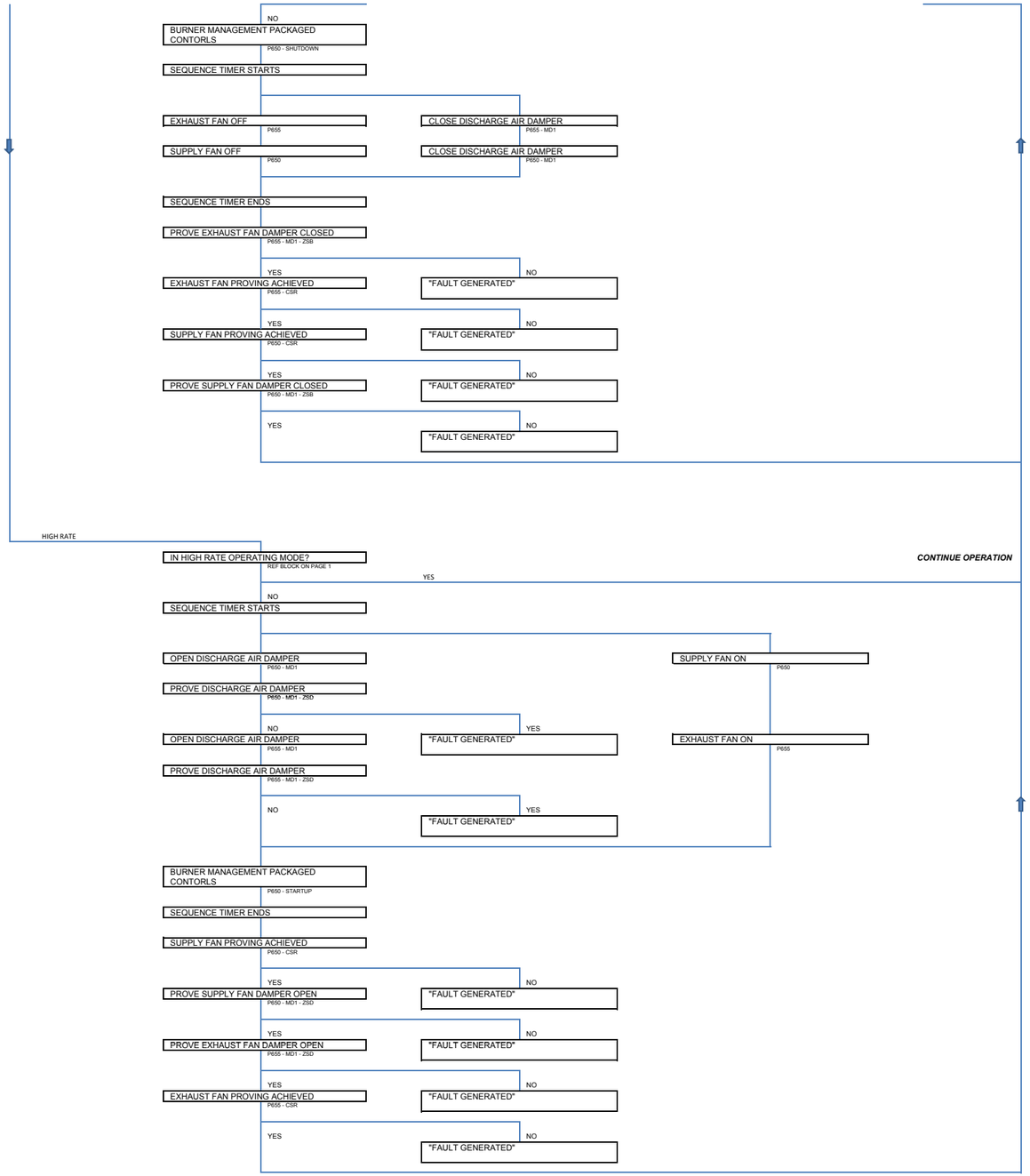
NOTE: WHEN IN SUMMER MODE, BURNER MANAGEMENT PACKAGED CONTROLS ARE NOT USED.

NOTE:

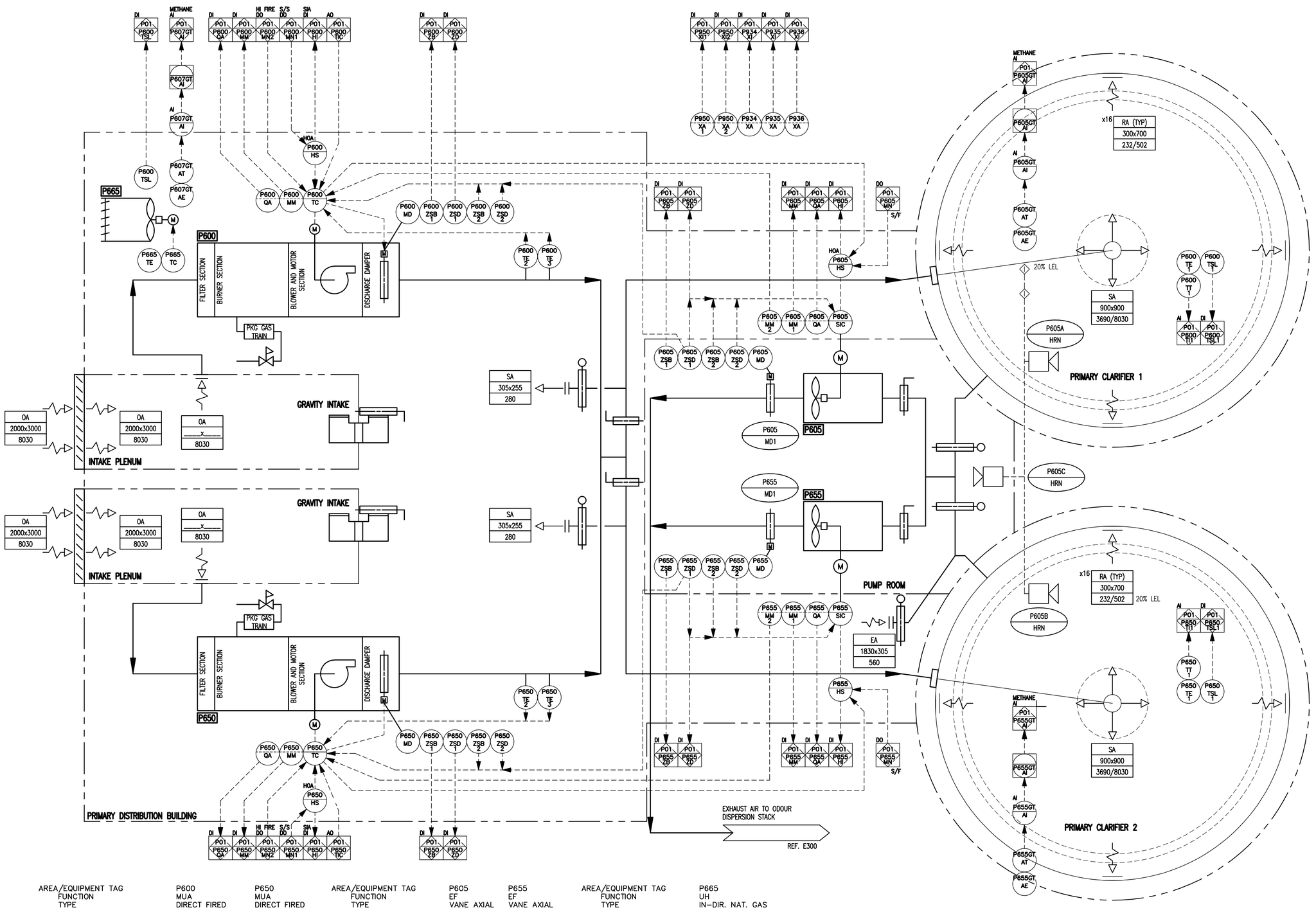
PRELIMINARY, INSTRUMENT TAGS WILL BE REVISED UPON RECEIPT OF SHOP DRAWINGS






NO
BURNER MANAGEMENT PACKAGED CONTORLS
P650 - SHUTDOWN
SEQUENCE TIMER STARTS
EXHAUST FAN OFF
P655
CLOSE DISCHARGE AIR DAMPER
P655 - MD1
SUPPLY FAN OFF
P650
CLOSE DISCHARGE AIR DAMPER
P650 - MD1
SEQUENCE TIMER ENDS
PROVE EXHAUST FAN DAMPER CLOSED
P655 - MD1 - ZSB
YES
NO
EXHAUST FAN PROVING ACHIEVED
P655 - CSR
"FAULT GENERATED"
YES
NO
SUPPLY FAN PROVING ACHIEVED
P650 - CSR
"FAULT GENERATED"
YES
NO
PROVE SUPPLY FAN DAMPER CLOSED
P650 - MD1 - ZSB
"FAULT GENERATED"
YES
NO
"FAULT GENERATED"
HIGH RATE
IN HIGH RATE OPERATING MODE?
REF BLOCK ON PAGE 1
CONTINUE OPERATION
YES
NO
SEQUENCE TIMER STARTS
OPEN DISCHARGE AIR DAMPER
P650 - MD1
SUPPLY FAN ON
P650
PROVE DISCHARGE AIR DAMPER
P650 - MD1 - ZSD
NO
YES
OPEN DISCHARGE AIR DAMPER
P655 - MD1
"FAULT GENERATED"
EXHAUST FAN ON
P655
PROVE DISCHARGE AIR DAMPER
P655 - MD1 - ZSD
NO
YES
"FAULT GENERATED"
BURNER MANAGEMENT PACKAGED CONTORLS
P650 - STARTUP
SEQUENCE TIMER ENDS
SUPPLY FAN PROVING ACHIEVED
P650 - CSR
YES
NO
PROVE SUPPLY FAN DAMPER OPEN
P650 - MD1 - ZSD
"FAULT GENERATED"
YES
NO
PROVE EXHAUST FAN DAMPER OPEN
P655 - MD1 - ZSD
"FAULT GENERATED"
YES
NO
EXHAUST FAN PROVING ACHIEVED
P655 - CSR
"FAULT GENERATED"
YES
NO
"FAULT GENERATED"

APPENDIX C



AREA/EQUIPMENT TAG	P600	P650	AREA/EQUIPMENT TAG	P605	P655	AREA/EQUIPMENT TAG	P665
FUNCTION	MUA	MUA	FUNCTION	EF	EF	FUNCTION	UH
TYPE	DIRECT FIRED	DIRECT FIRED	TYPE	VANE AXIAL	VANE AXIAL	TYPE	IN-DIR. NAT. GAS
VOLUME (L/s)	8030	8030	VOLUME (L/s)	8030	8030	VOLUME (L/s)	
HEAT INPUT/OUTPUT (kW)	525/525	525/525	HEAT INPUT (kW)	N/A	N/A	HEAT INPUT (kW)	
ELEC. LOAD (kW)			ELEC. LOAD (kW)			ELEC. LOAD (kW)	

DEVICE LISTING

TAG	DESCRIPTION
NON-PACKAGED	
P600-TSL	LOW TEMPERATURE SWITCH FOR DISTRIBUTION BLDG.
P605GT-AT	ALARM HORNS FOR PRIMARY CLARIFIERS 1, 2 AND PUMP ROOM
P607GT-AE/AT	METHANE GAS DETECTOR FOR DISTRIBUTION BLDG.
P607GT-AI	GAS DETECTION PANEL
P600-HS	P600/P605 SYSTEM HAND/OFF/AUTO SWITCH
P600-TE/TT-1	TEMPERATURE ELEMENT FOR PRIMARY CLARIFIER 1
P600-TSL-1	LOW TEMPERATURE SWITCH FOR PRIMARY CLARIFIER 1
P650-HS	P650/P655 SYSTEM HAND/OFF/AUTO SWITCH
P650-TE/TT-1	TEMPERATURE ELEMENT FOR PRIMARY CLARIFIER 2
P650-TSL-1	LOW TEMPERATURE SWITCH FOR PRIMARY CLARIFIER 2
P605-HS	EXHAUST FAN P605 HAND/OFF/AUTO SWITCH
P605-SIC	EXHAUST FAN P605 VFD
P605-MM-1/2	EXHAUST FAN P605 VFD RUN STATUS
P605-QA	EXHAUST FAN P605 VFD FAULT ALARM
P605-MD	EXHAUST FAN P605 DAMPER ACTUATOR
P605-ZSD-1/2	OPEN LIMIT SWITCH FOR EXHAUST FAN P605 DAMPER
P605-ZSB-1/2	CLOSED LIMIT SWITCH FOR EXHAUST FAN P605 DAMPER
P655-HS	EXHAUST FAN P655 HAND/OFF/AUTO SWITCH
P655-SIC	EXHAUST FAN P655 VFD
P655-MM-1/2	EXHAUST FAN P655 VFD RUN STATUS
P655-QA	EXHAUST FAN P655 VFD FAULT ALARM
P655-MD	EXHAUST FAN P655 DAMPER ACTUATOR
P655-ZSD-1/2	OPEN LIMIT SWITCH FOR EXHAUST FAN P655 DAMPER
P655-ZSB-1/2	CLOSED LIMIT SWITCH FOR EXHAUST FAN P655 DAMPER
P665-TC	UNIT HEATER P665 TEMPERATURE CONTROLLER
P665-TE	UNIT HEATER P665 TEMPERATURE ELEMENT
P950-XA1	PLC PANEL 24 VDC POWER SUPPLY STATUS NO.1
P950-XA2	PLC PANEL 24 VDC POWER SUPPLY STATUS NO.2
P934-XA	PLC PANEL UTILITY POWER STATUS
P935-XA	PLC PANEL UPS STATUS
P936-XA	PLC PANEL ETHERNET SWITCH STATUS
PACKAGED	
P600-MM	CURRENT SENSING RELAY FOR MUA P600 BLOWER MOTOR
P600-TC	MUA P600 TEMPERATURE CONTROLLER
P600-MD	MUA P600 DISCHARGE DAMPER ACTUATOR
P600-ZSD-1/2	OPEN LIMIT SWITCH FOR MUA P600 DISCHARGE DAMPER
P600-ZSB-1/2	CLOSED LIMIT SWITCH FOR MUA P600 DISCHARGE DAMPER
P600-TE2	TEMPERATURE ELEMENT FOR MUA UNIT
P600-TE3	MUA P600 FREEZE PROTECTION
P600-MN1	MUA P600 START/ STOP
P600-MN2	MUA P600 HIGH FIRE
P600-QA	MUA P600 DAMPER FAILURE
P650-TC	MUA P650 TEMPERATURE CONTROLLER
P650-MM	CURRENT SENSING RELAY FOR MUA UNITS BLOWER MOTOR
P650-MD	MUA P650 DISCHARGE DAMPER ACTUATOR
P650-ZSD-1/2	OPEN LIMIT SWITCH FOR MUA P650 DISCHARGE DAMPER
P650-ZSB-1/2	CLOSED LIMIT SWITCH FOR MUA P650 DISCHARGE DAMPER
P650-TE2	TEMPERATURE ELEMENT FOR MUA UNIT
P650-TE3	MUA P650 FREEZE PROTECTION
P650-MN1	MUA P600 START/ STOP
P650-MN2	MUA P600 HIGH FIRE
P650-QA	MUA P600 DAMPER FAILURE

GENERAL NOTES

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NO.	REVISIONS	DATE	BY

APEGM Certificate of Authorization KGS Group No. 245 Date: 2010/12/21

KGS GROUP CONSULTING ENGINEERS

ALLIANCE Engineering Services Inc.

DESIGNED BY	DD/DDW	CHECKED BY	REW
DRAWN BY	DD/GCN	APPROVED BY	REW
HOR. SCALE	N.T.S.	RELEASED FOR CONSTRUCTION	
VERTICAL	N.T.S.		
DATE	2010-02-23	DATE	

ENGINEER'S SEAL — PROVINCE OF MANITOBA — R.E. WILLMS Member 3833 — REGISTERED PROFESSIONAL ENGINEER

TENDER No. PP2.1
FILENAME: 1-0103P-P0004-001-Rev 00.dwg
PLOT DATE: 2010/12/16

Winnipeg

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

2010 HVAC REPLACEMENT AND ASSOCIATED WORKS
WEWPCC
AREA P – PRIMARY CLARIFIERS 1 & 2
PROCESS & INSTRUMENTATION DIAGRAM

SHEET 1 OF 1
CITY DRAWING NUMBER
1-0103P-P0004-001

CW-10-M660-1

FileName: P:\Projects\2009\09-0754-08\Doc.Control\ToBeIssued\DWG\ELECTRICAL\1-0103P-P0004-001-Rev 00.dwg - Tab: 1-0103P-P0004-001 Plotted By: GNelson 12/16/2010 [Thu 4:55pm]

WEWPCC Secondary Clarifiers
Controls Narrative

REV 0

December 2010

KGS GROUP
CONSULTING ENGINEERS

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LIST OF APPENDICES

A. Secondary Clarifiers I/O List
B. Sequence of Operations – Secondary Clarifiers 1 & 2
C. Drawing 1-0103S-P0020-001 – Process and Instrumentation Diagram

1.0 SYSTEM DESCRIPTION

This ventilated space is comprised of Secondary Clarifier domes 1 and 2, and the Secondary Distribution building. Secondary clarifier domes no. 1 and 2 are each dome shaped fibreglass roof structures located over top of their respective clarifiers. The Secondary Distribution Building is located on the roof of the sludge pump gallery.

Make-up air units S600 and S650 are located at floor level in a new mechanical penthouse and draw air from the new intake louvers located in the south wall of the penthouse. Make-up air units S600 and S650 supply secondary clarifier domes no. 1 and 2 along with the Secondary Distribution Building.

The new exhaust fans S605 and S655 are located at roof level of the lower tunnel/pump room area. Exhaust fans S605 and S655 exhaust air from secondary clarifier domes no. 1 and 2 along with the Secondary Distribution Building to atmosphere.

1.1 GENERAL OPERATING DESCRIPTION

In normal operating mode a lead, direct-fired make-up air (MUA) and exhaust fan system will heat and ventilate the two secondary clarifier domes and the secondary distribution building. An identical lag system provides full redundancy in the event of lead system failure. In the purge operating mode, activation of the lag-system to permit parallel operation of both systems can be manually initiated. The discharge or supply ducts from each of the MUA units are interconnected to permit either unit to supply both domes in normal mode.

New exhaust fans; S605 and S655 have volumetric capacity matched to each of the MUA units. Exhaust fans, S605 and S655 are equipped with VFD drives to satisfy both normal and purge operating scenarios and are interlocked with S600 and S650 respectively.

2.0 REFERENCE DRAWINGS

Drawing	Sheet	Description
1-0103S-P0020-001	1	Area S – Secondary Clarifiers 1 & 2 Process & Instrumentation Diagram
1-0103S-E0017-001	1	Area S – Secondary Clarifiers 1 & 2 HVAC Schematic &

		Wiring Diagram
1-0103S-E0018-001	1	Area S – Secondary Clarifiers 1 & 2 MUA-S600, MCC-1S Schematic & Wiring Diagram
1-0103S-E0019-001	1	Area S – Secondary Clarifiers 1 & 2 MUA-S650, MCC-2S Schematic & Wiring Diagram
1-0103S-E0020-001	1	Area S – Secondary Clarifiers 1 & 2 EF-S605 VFD Schematic & Wiring Diagram
1-0103S-E0021-001	1	Area S – Secondary Clarifiers 1 & 2 EF-S655 VFD Schematic & Wiring Diagram
1-0103S-E0027-001	1	Area S – Secondary Clarifiers 1 & 2 EF-S670 FVNR Schematic & Wiring Diagram

3.0 NORMAL OPERATION

Normal operation is defined as all hand-off-auto switches in the auto position with the PLC controlling operation of the system and the TCP/IP communications system functioning (ie. PLC's communicating with each other and the Bailey DCS).

Direct gas fired unit MUA S600, along with its associated exhaust fan S605, operates together as a system unit. Similarly, direct gas fired unit MUA S650 operates together with its exhaust fan S655 as a system unit.

Normal operation is for one system unit to operate at one time. Either system can be selected to be the lead system. In the event of an equipment failure on the lead system, the lag system will automatically start, and the lead system shutdown.

In the event of a manually initiated purge mode the lag system is automatically started as well to provide a higher ventilation rate.

3.1 COMMON SYSTEM PRINCIPLES

The MUA units are direct-fired natural gas units and require hard wired, proved interlock with its associated exhaust fan. This is provided by current sensing relays (CSR's) in the exhaust fan motor starters hard wired to the MUA unit controllers.

Upon initial start-up the fan motors in the MUA units are not inhibited to start by the CSR's, only the burner firing circuit is inhibited until the exhaust fan is proven.

Discharge air temperature control setpoint of the units is set at the PLC HMI by the operator.

Should the space temperature in either clarifier, as determined by temperature element fall below setpoint (4°C) the unit's controls shall reset the discharge air temperature to 21°C (adjustable) until the space temperature in the coldest clarifier reaches (13°C). After reaching 13°C (adjustable) the unit's controls reset the discharge air temperature back to 10°C (adjustable).

There is no intent to run in normal mode with MUA S600 and the other system units exhaust fan S655 or other combinations of equipment.

The normal desirable winter space temperatures are 4°C to 13°C. A discharge air temperature set at 10°C (adjustable) is set to maintain this temperature range.

There are times however when maintenance is required in the clarifiers. During these maintenance periods, it is desirable to have warmer space temperatures. In the clarifiers the warmer temperatures are achieved by operating in occupied mode, resetting the discharge air temperature to 21°C.

In the event of a TCP/IP communication failure, the Secondary Clarifier control system shall continue to operate automatically under PLC control. The only lost functionality are:

- No reporting of status and alarm information to the Bailey DCS.

The exhaust fans are equipped with variable frequency drives. Although there are only two operating modes required (normal and purge) a conventional 2-speed motor can not accommodate (match) the operating parameters. This is the reason for a VFD being used.

It is important not to create a negative pressure inside the clarifier. A negative pressure could cause the roof to collapse. A counter weighted mechanical relief damper is provided as a safety measure to guard against the scenario where a system exhaust fan is operating and flow, for

whatever reason, from the MUA is compromised.

3.2 MAKE-UP AIR (MUA) UNITS S600 AND S650, EXHAUST FAN S605 AND S655

During normal operation (non-purge condition) each system unit, S600 and S650, and their related exhaust fans, S605 and S655, operate in lead/lag mode where the lead equipment is on and lag equipment is off. The lead/lag operation shall be settable by the operator from the HMI at any time but the PLC shall incorporate an automatic lead/lag cycling of the equipment by an adjustable time period initially set at 24 hours.

Clarifiers 1 & 2 each have a space temperature transducer (S600-TE1 and S650-TE1) that reports back to the PLC. The HMI shall have an occupied/unoccupied software switch for each clarifier along with a temperature setpoint for both occupied and unoccupied mode. When both clarifiers are in unoccupied mode the unoccupied mode temperature setpoint is used to control MUA discharge temperature. If either clarifier is set to occupied mode then the MUA will control to the occupied mode temperature setpoint.

During system startup the MUA discharge damper (S600-MD or S650-MD) and the exhaust fan discharge damper (S605-MD or S655-MD) open. Once both dampers are confirmed open by limit switches the MUA blower fan starts. When enough current is drawn by the blower fan to prove that it has started and is moving air the current sensing relay triggers its associated exhaust fan to start. It does not depend on the PLC so this scheme minimizes the risk of a negative pressure. After the exhaust fan is up to speed the VFD closes a contact to prove back to the MUA unit as a permissive on the burner. This system startup control is all provided by hardwired controls.

During purge operation both make-up air units P600 and P650 operate along with their related exhaust fans P605 and P655. In this situation one set of MUA and exhaust fan is already running so the startup sequence is slightly different. Similarly to when only one MUA is running the MUA discharge damper and the exhaust fan discharge damper start opening first. Instead of waiting for the limit switches to prove open before the MUA blower starts it will start after the MUA discharge damper closed limit switch is broken and a timing relay starts timing while the open limit switch is still not made. If the open limit switch is not proven with a 15 second (adjustable) period then the blower fan will trip out. Similarly the exhaust fan starts immediately

after the exhaust fan discharge dampers closed limit switch is not longer made. As with the MUA blower the exhaust fan also has a timing relay that will trip the exhaust fan if the open limit switch on the exhaust fan discharge damper is not proven within 15 seconds (adjustable). This control like normal operation is also hardwired within the starter circuit. Any trips as a result of the timing relay timing out requires a manual reset.

The reason from this requirement is to prevent air from the running MUA unit blowing in the backwards direction through the starting MUA unit and also prevent the running exhaust fan from discharging back into the clarifiers.

When in purge mode operation a second output from the PLC is also required to change the speed the exhaust fans are operating at to a higher operating speed.

3.2 EXHAUST FAN S670

Exhaust fan S670 is manually controlled by an on/off switch located next to the exhaust fan. A current sensing relay provides run status feedback to the PLC.

3.3 UNIT HEATERS S625, S626 AND S665

Unit heater S625 and S626 are controlled by a wall mounted thermostats. Unit heater S665 is controlled by an on/off switch with a timer that automatically turns the heater off after an adjustable time period from 0 to 60 minutes.

4.0 MANUAL OPERATION

The control in hand has the same hardwired control operations as automatic control with the a few minor exceptions. As opposed to starting the system from a PLC output, manual operation is achieved by setting the system hand-off-auto switches in manual. While in manual mode of operation if a purge is initiated the VFD's will kick into high speed on confirmation of both MUA unit blower fans running via a hardwired contacts as opposed to a PLC contact. Additionally the MUA units taking the operating setpoints from the operator interface on the MUA units as opposed to a 4-20 mA control signal from the PLC.

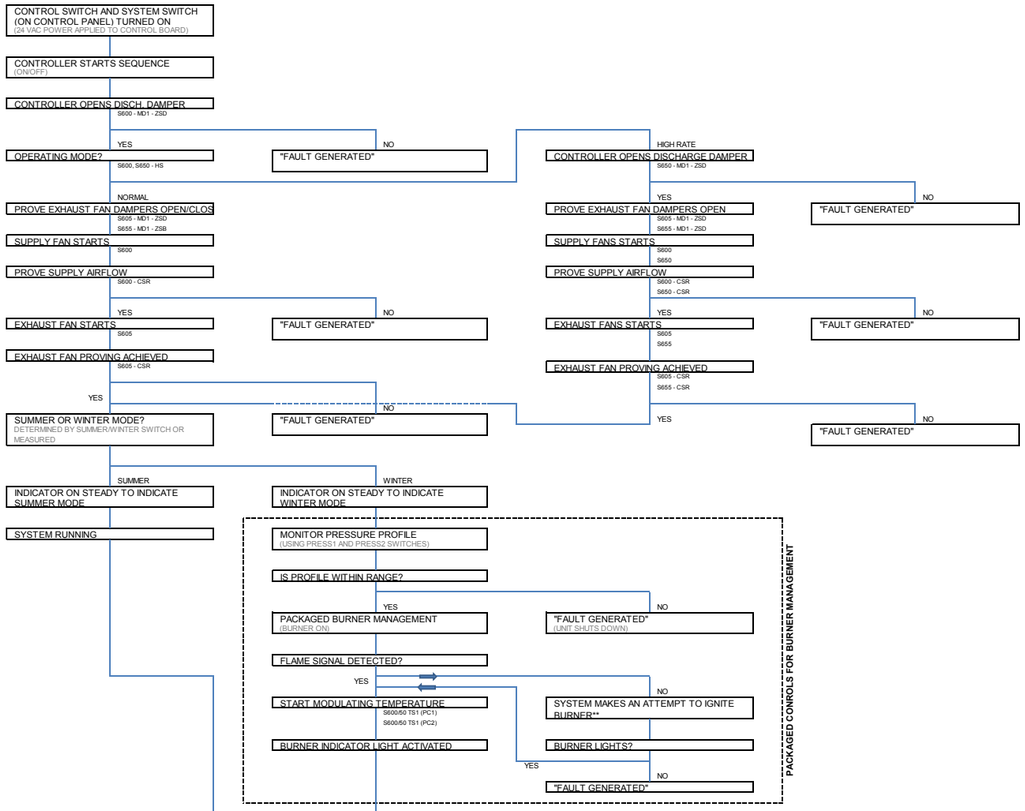
APPENDIX A

Secondary Clarifiers I/O List

Tag	IO Type	PLC Tag	DCS Tag	Description
S600-ZSB-1	DI	P01-S600-ZB		MUA S600 discharge damper close limit switch (contact closed when damper closed)
S600-ZSD-1	DI	P01-S600-ZD		MUA S600 discharge damper close limit switch (contact open when damper closed)
S600-TC	AO	P01-S600-TIC		MUA S600 temperature controller
S600-MM	DI	P01-S600-MM		MUA S600 run status (CSR)
S600-MN1	DO	P01-S600-MN1		MUA S600 start/stop
S600-MN2	DO	P01-S600-MN2		MUA S600 high fire
S600-QA	DI	P01-S600-QA		MUA S600 damper failure lockout
S600-HS	DI	P01-S600-HI		MUA S600 switch in auto
S600-TT-1	AI	P01-S600-TI1		Secondary Clarifier No.1 space temperature
P600-TE-2	Modbus\TCP	P01-S600-TI2		MUA S600 discharge temperature
S600-*	Modbus\TCP	P01-S600-*		Other MUA S600 Status's Available via Modbus\TCP
S600-TSL-1	DI	P01-S600-TSL		Secondary Clarifier No.1 low temperature switch
S605-ZSB-1	DI	P01-S605-ZB		EF S605 discharge damper close limit switch (contact closed when damper closed)
S605-ZSD-1	DI	P01-S605-ZD		EF S605 discharge damper close limit switch (contact open when damper closed)
S605-HS	DI	P01-S605-HI		EF S605 hand-off-auto switch
S605-QA	DI	P01-S605-QA		EF S605 VFD fault
S605-MM-1	DI	P01-S605-MM		EF S605 VFD run status
S605-MN	DO	P01-S605-MN		EF S605 high speed
S605-*	Modbus\TCP	P01-S605-*		Other EF S605 Status's Available via Modbus\TCP (VFD is an ABB ACS800 Series)
S650-ZSB-1	DI	P01-S650-ZB		MUA S650 discharge damper close limit switch (contact closed when damper closed)
S650-ZSD-1	DI	P01-S650-ZD		MUA S650 discharge damper close limit switch (contact open when damper closed)
S650-TC	AO	P01-S650-TIC		MUA S650 temperature controller
S650-MM	DI	P01-S650-MM		MUA S650 run status (CSR)
S650-MN1	DO	P01-S650-MN1		MUA S650 start/stop
S650-MN2	DO	P01-S650-MN2		MUA S650 high fire
S650-QA	DI	P01-S650-QA		MUA S650 damper failure lockout
S650-HS	DI	P01-S650-HI		MUA S650 switch in auto
S650-TT-1	AI	P01-S650-TI1		Secondary Clarifier No.2 space temperature
S650-TE-2	Modbus\TCP	P01-S650-TI2		MUA S650 discharge temperature
S650-*	Modbus\TCP	P01-S650-*		Other MUA S600 Status's Available via Modbus\TCP
S650-TSL-1	DI	P01-S650-TSL		Secondary Clarifier No.2 low temperature switch
S655-ZSB-1	DI	P01-S655-ZB		EF S655 discharge damper close limit switch (contact closed when damper closed)
S655-ZSD-1	DI	P01-S655-ZD		EF S655 discharge damper close limit switch (contact open when damper closed)
S655-HS	DI	P01-S655-HI		EF S655 hand-off-auto switch
S655-QA	DI	P01-S655-QA		EF S655 VFD fault
S655-MM-1	DI	P01-S655-MM		EF S655 VFD run status
S655-MN	DO	P01-S655-MN		EF S655 high speed
S655-*	Modbus\TCP	P01-S655-*		Other EF S655 Status's Available via Modbus\TCP (VFD is an ABB ACS800 Series)
S950-XA-1	DI	P01-S950-XA1		PLC Panel 24 VDC power supply status No.1
S950-XA-2	DI	P01-S950-XA2		PLC Panel 24 VDC power supply status No.2
S934-XA	D	P01-S934-XA		PLC Panel utility power status
S935-XA	DI	P01-S935-XA		PLC Panel UPS status
S936-XA	DI	P01-S936-XA		PLC Panel ethernet switch status
S650-TSL-3		P01-S650-TSL3		East Mechanical room low temp switch
S600-TSL-3		P01-S600-TSL3		West Mechanical room low temp switch
S670-MM		P01-S670-MM		EF S670 run status

APPENDIX B

Sequence of Operations
Area S - Secondary Clarifiers - S600, S650



DEVICES

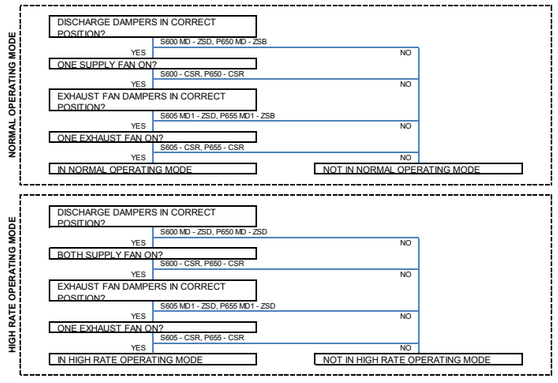
TAG	DESCRIPTION	INPUT/OUTPUT
NON-PACKAGED		
S600/50 - TSL	Low Temperature Switch for S201 (Distribution Building)	DI
S600/50 - HS	Hand Switch	
S600/50 - TE - 1	Temperature Element for Secondary Clarifier 1	AI
S600/50 - TSL - 1	Low Temperature Switch for Secondary Clarifier 1	DI
S600/50 - TS1 (PC1)	Unoccupied Temperature Switch for Secondary Clarifier 1	DI
S600/50 - TS2 (PC1)	Occupied Temperature Switch for Secondary Clarifier 1	DI
S600/50 - TE - 1	Temperature Element for Secondary Clarifier 2	AI
S600/50 - TSL - 1	Low Temperature Switch for Secondary Clarifier 2	DI
S600/50 - TS1 (PC2)	Unoccupied Temperature Switch for Secondary Clarifier 2	DI
S600/50 - TS2 (PC2)	Occupied Temperature Switch for Secondary Clarifier 2	DI
S605 - CSR	Current Sensing Relay for Exhaust Fan S605	AI
S605 MD1 - ZSD	Damper Position (Open) Switch for Exhaust Fan S605 Damper	DI
S605 MD1 - ZSB	Damper Position (Closed) Switch for Exhaust Fan S605 Damper	DI
S655 - CSR	Current Sensing Relay for Exhaust Fan S655	AI
S655 MD1 - ZSD	Damper Position (Open) Switch for Exhaust Fan S655 Damper	DI
S655 MD1 - ZSB	Damper Position (Closed) Switch for Exhaust Fan S655 Damper	DI
PACKAGED		
S600 - CSR	Current Sensing Relay for MUA units Blower Motor	AI
S600 MD - ZSD	Damper Position (Open) for MUA units Discharge Damper	DI
S600 MD - ZSB	Damper Position (Closed) for MUA units Discharge Damper	DI
S600 - TSL - 2	Low Temperature Switch for MUA unit	DI
S600 - TE - 2	Temperature Element for MUA unit	AI
S650 - CSR	Current Sensing Relay for MUA units Blower Motor	AI
S650 MD - ZSD	Damper Position (Open) for MUA units Discharge Damper	DI
S650 MD - ZSB	Damper Position (Closed) for MUA units Discharge Damper	DI
S650 - TSL - 2	Low Temperature Switch for MUA unit	DI
S650 - TE - 2	Temperature Element for MUA unit	AI

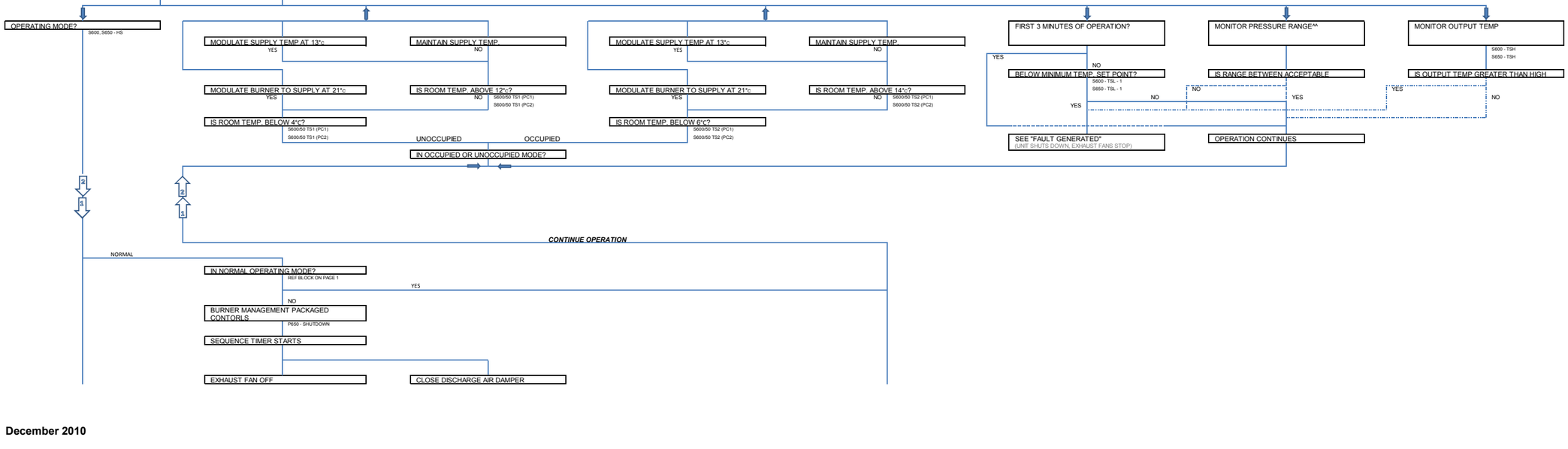
EQUIPMENT

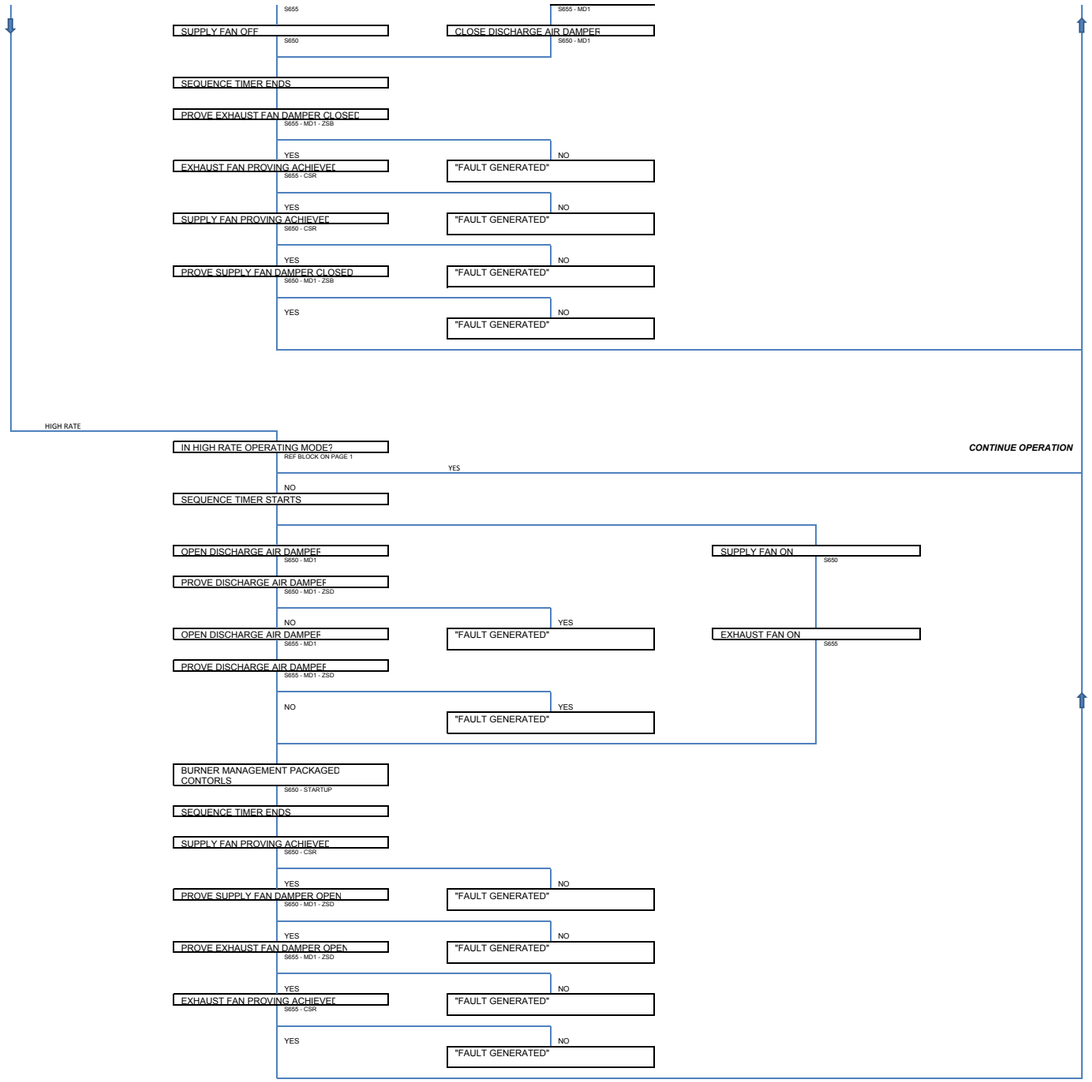
TAG	DESCRIPTION
S600	Makeup Air Unit
S605	Exhaust Fan
S650	Makeup Air Unit
S655	Exhaust Fan

NOTE: WHEN IN SUMMER MODE, BURNER MANAGEMENT PACKAGED CONTROLS ARE NOT USED.

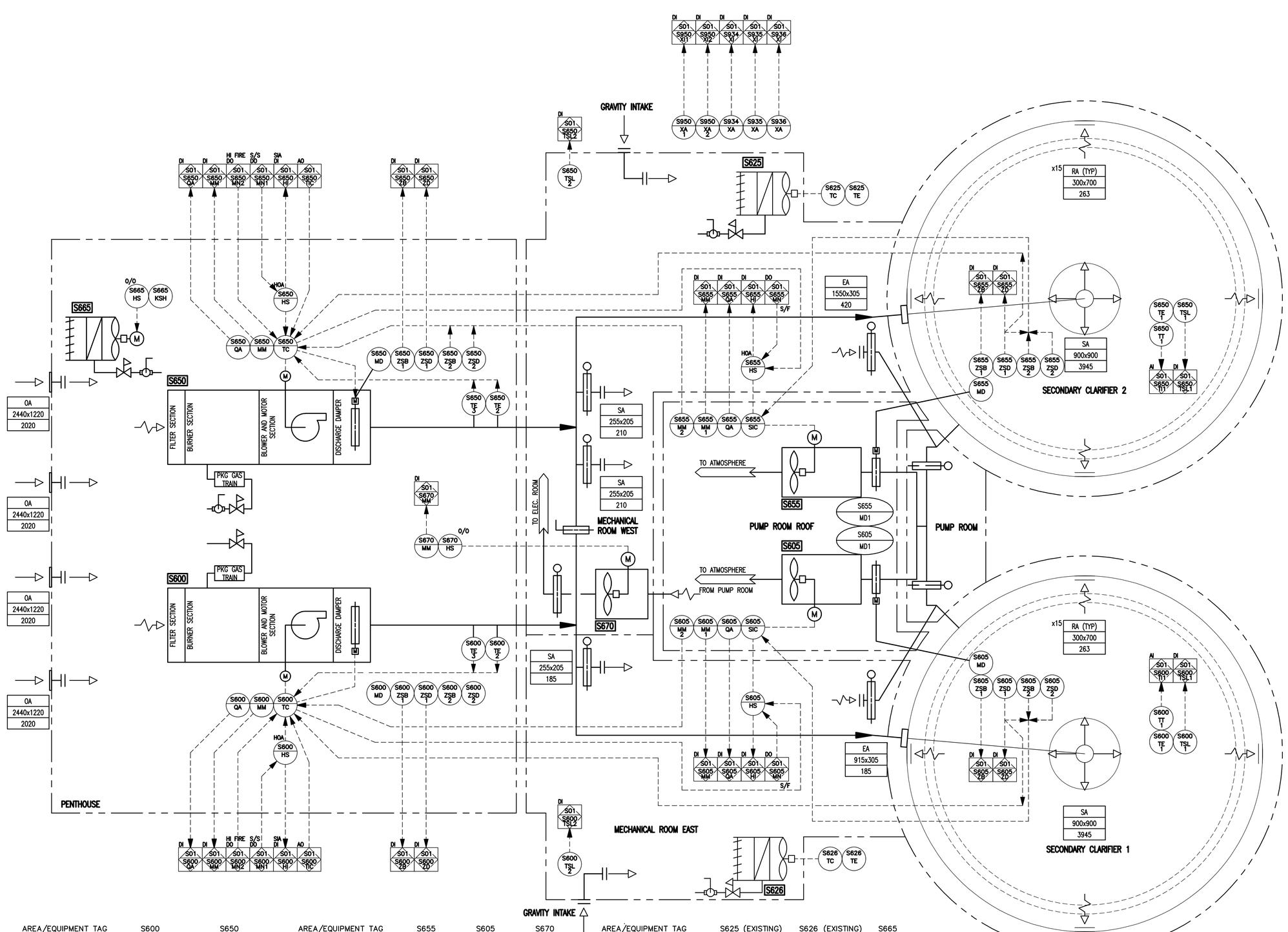
NOTE:
PRELIMINARY, INSTRUMENT TAGS WILL BE REVISED UPON RECEIPT OF SHOP DRAWINGS






S655
S655 - MD1
SUPPLY FAN OFF
CLOSE DISCHARGE AIR DAMPER
S650
S650 - MD1
SEQUENCE TIMER ENDS
PROVE EXHAUST FAN DAMPER CLOSED
S655 - MD1 - ZSB
YES
NO
EXHAUST FAN PROVING ACHIEVED
S655 - CSR
"FAULT GENERATED"
SUPPLY FAN PROVING ACHIEVED
S650 - CSR
PROVE SUPPLY FAN DAMPER CLOSED
S650 - MD1 - ZSB
HIGH RATE
IN HIGH RATE OPERATING MODE?
REF BLOCK ON PAGE 1
CONTINUE OPERATION
SEQUENCE TIMER STARTS
OPEN DISCHARGE AIR DAMPER
S650 - MD1
SUPPLY FAN ON
S650
PROVE DISCHARGE AIR DAMPER
S650 - MD1 - ZSD
EXHAUST FAN ON
S655
S655 - MD1
S655 - MD1 - ZSD
BURNER MANAGEMENT PACKAGED CONTORLS
S650 - STARTUP
SEQUENCE TIMER ENDS
SUPPLY FAN PROVING ACHIEVED
S650 - CSR
PROVE SUPPLY FAN DAMPER OPEN
S650 - MD1 - ZSD
PROVE EXHAUST FAN DAMPER OPEN
S655 - MD1 - ZSD
EXHAUST FAN PROVING ACHIEVED
S655 - CSR

APPENDIX C



AREA/EQUIPMENT TAG	S600	S650	S655	S605	S670	S625 (EXISTING)	S626 (EXISTING)	S665
FUNCTION	MUA	MUA	EF	EF	EF	UH	UH	UH
TYPE	DIRECT FIRED	DIRECT FIRED	VANE AXIAL	VANE AXIAL	CENTRIFUGAL	IN-DIR. NAT. GAS	IN-DIR. NAT. GAS	IN-DIR. NAT. GAS
VOLUME (L/s)	8495	8495	8495	8495	190			
HEAT INPUT (kW)	580/580	580/580	N/A	N/A				13.2
ELEC. LOAD (kW)								

DEVICE LISTING

TAG	DESCRIPTION
NON-PACKAGED	
S600-HS	S600/S605 SYSTEM HAND/OFF/AUTO SWITCH
S600-TE/TT-1	TEMPERATURE ELEMENT FOR SECONDARY CLARIFIER 1
S600-TSL-1	LOW TEMPERATURE SWITCH FOR SECONDARY CLARIFIER 1
S600-TSL-2	EAST MECHANICAL ROOM LOW TEMP SWITCH
S650-HS	S650/S655 SYSTEM HAND/OFF/AUTO SWITCH
S650-TE/TT-1	TEMPERATURE ELEMENT FOR SECONDARY CLARIFIER 2
S650-TSL-1	LOW TEMPERATURE SWITCH FOR SECONDARY CLARIFIER 2
S650-TSL-2	WEST MECHANICAL ROOM LOW TEMP SWITCH
S605-CSR	CURRENT SENSING RELAY FOR EXHAUST FAN S605
S605-HS	EXHAUST FAN S605 HAND/OFF/AUTO SWITCH
S605-SIC	EXHAUST FAN S605 VFD
S605-MM-1/2	EXHAUST FAN S605 VFD RUN STATUS
S605-QA	EXHUAST FAN S605 VFD FAULT ALARM
S605-MD	EXHAUST FAN S605 DISCHARGE DAMPER ACTUATOR
S605-ZSD-1/2	OPEN LIMIT SWITCH FOR EF S605 DISCHARGE DAMPER
S605-ZSB-1/2	CLOSED LIMIT SWITCH FOR EF S605 DISCHARGE DAMPER
S655-CSR	CURRENT SENSING RELAY FOR EXHAUST FAN S655
S655-HS	EXHAUST FAN S655 HAND/OFF/AUTO SWITCH
S655-SIC	EXHAUST FAN S655 VFD
S655-MM-1/2	EXHAUST FAN S655 VFD RUN STATUS
S655-QA	EXHUAST FAN S655 VFD FAULT ALARM
S655-MD	EXHAUST FAN S655 DISCHARGE DAMPER ACTUATOR
S655-ZSD-1/2	OPEN LIMIT SWITCH FOR EF S655 DISCHARGE DAMPER
S655-ZSB-1/2	CLOSED LIMIT SWITCH FOR EF S655 DISCHARGE DAMPER
S665-HS	EXAUST FAN S665 ON/OFF SWITCH
S670-HS	EXHAUST FAN S670 ON/OFF SWITCH
S670-MM	EXHAUST FAN S670 RUN STATUS
S950-XA1	PLC PANEL 24 VDC POWER SUPPLY STATUS NO.1
S950-XA2	PLC PANEL 24 VDC POWER SUPPLY STATUS NO.2
S934-XA	PLC PANEL UTILITY POWER STATUS
S935-XA	PLC PANEL UPS STATUS
S936-XA	PLC PANEL ETHERNET SWITCH STATUS
PACKAGED	
S600-MM	CURRENT SENSING RELAY FOR MUA S600 BLOWER MOTOR
S600-QA	MUA S600 DISCHARGE DAMPER ACTUATOR FAILURE
S600-TC	MUA S600 TEMPERATURE CONTROLLER
S600-MD	MUA S600 DISCHARGE DAMPER ACTUATOR
S600-ZSD-1/2	OPEN LIMIT SWITCH FOR MUA S600 DISCHARGE DAMPER
S600-ZSB-1/2	CLOSED LIMIT SWITCH FOR MUA S600 DISCHARGE DAMPER
S600-TE2	TEMPERATURE ELEMENT FOR MUA UNIT
S600-TE3	MUA S600 FREEZE PROTECTION
S650-TC	MUA S650 TEMPERATURE CONTROLLER
S650-MM	CURRENT SENSING RELAY FOR MUA UNITS BLOWER MOTOR
S650-QA	MUA S650 DISCHARGE DAMPER ACTUATOR FAILURE
S650-MD	MUA S650 DISCHARGE DAMPER ACTUATOR
S650-ZSD-1/2	OPEN LIMIT SWITCH FOR MUA S650 DISCHARGE DAMPER
S650-ZSB-1/2	CLOSED LIMIT SWITCH FOR MUA S650 DISCHARGE DAMPER
S650-TE2	TEMPERATURE ELEMENT FOR MUA UNIT
S650-TE3	MUA S650 FREEZE PROTECTION

SEQUENCE OF OPERATION

TAG	ASSOCIATED EQUIPMENT	NORMAL COND.
S600	S600	ON*
EF	S605	ON*
S625	S625	EXISTING
S626	S626	EXISTING
S665	S665	ON/OFF CONTROL FROM MAINTENANCE SWITCH
S650	S650	OFF*
EF	S655	OFF*

NOTES

* DURING NORMAL OPERATION THE TWO MAKE-UP AIR UNITS (S600 & S650) AND THEIR RELATED EXHAUST FANS (S605 & S655) OPERATE IN LEAD (ON) - LAG (OFF) MODE.

GENERAL NOTES

APEGM Certificate of Authorization
KGS Group
No. 245 Date: 2010/12/21

KGS GROUP CONSULTING ENGINEERS

B.M. ELEV.	N/A	FIELD BOOK #:		
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00	ISSUED FOR TENDER	2010-12-21	REW	
NO.	REVISIONS	DATE	BY	

ALLIANCE Engineering Services Inc.

DESIGNED BY	DDW	CHECKED BY	REW
DRAWN BY	GCN	APPROVED BY	REW
HOR. SCALE	N.T.S.	RELEASED FOR CONSTRUCTION	
VERTICAL	N.T.S.		
DATE	2010 02 23	DATE	

ENGINEER'S SEAL
PROVINCE OF MANITOBA
R.E. WILLMS
Member 3833
REGISTERED PROFESSIONAL ENGINEER

TENDER No. SP2.1
FILENAME: 1-0103S-P0020-001-Rev 00.dwg
PLOT DATE: 2010/12/16

Winnipeg

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

2010 HVAC REPLACEMENT
AND ASSOCIATED WORKS
WEWPCC
AREA S - SECONDARY CLARIFIERS 1 & 2
PROCESS & INSTRUMENTATION DIAGRAM

SHEET 1 OF 1
CITY DRAWING NUMBER
1-0103S-P0020-001

FileName: P:\Projects\2009\09-0754-08\Doc.Control\ToBeIssued\DWG\ELECTRICAL\1-0103S-P0020-001-Rev 00.dwg - Tab: 1-0103S-P0020-001 Plotted By: GNelson 12/16/2010 [Thu 4:40pm]

WEWPCC Tunnels
Controls Narrative

REV 0

December 2010

KGS GROUP
CONSULTING ENGINEERS

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1.1 GENERAL OPERATING DESCRIPTION 1
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3.0 NORMAL OPERATION 2
3.1 COMMON SYSTEM PRINCIPLES 2
3.2 MAKE-UP AIR (MUA) UNIT U600, EXHAUST FANS P625, S675, S680, S690 AND S695 3
4.0 MANUAL OPERATION 3

APPENDICES

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LIST OF APPENDICES

A. Tunnels I/O List
B. Sequence of Operations – Tunnel Ventilation
C. Drawing 1-0103V-P0001-001 – Process and Instrumentation Diagram

1.0 SYSTEM DESCRIPTION

This ventilated space is comprised of three main tunnels connecting the various areas of the plant. The Main East-West Tunnel runs from the Headworks Building at the east end of the plant through the sludge pump gallery, past the aeration basins, through the RAS pump gallery, and terminates at the west end of the plant, a short distance beyond the RAS pump gallery. The Main North-South Tunnel runs south from the Utility building located at the north end of the plant to where it intersects the East-West Tunnel – at a location about midway between the primary and secondary clarifiers. This tunnel runs along the east side of the aeration basins. A third tunnel runs North-South along the west side of the aeration basins. Make-up air unit U600 is located in the Utility Building basement and draws outside air from an existing mechanical chase located on the east wall of the Utility Building. MUA U600 provides make-up air to the tunnels; roof mounted exhaust fans P625, S675, S680, S690 and S695 discharge air to the outdoors.

1.1 GENERAL OPERATING DESCRIPTION

Direct fired MUA U600 and exhaust fans system will heat and ventilate the tunnels. Five roof mounted exhaust fans pull air from the space and discharge it to atmosphere; all exhaust fans are interlocked to U600. Three carbon monoxide (CO) sensors located throughout the tunnels monitor CO levels and trigger an alarm if the levels are too high.

2.0 REFERENCE DRAWINGS

Drawing	Sheet	Description
1-0103V-P0001-001	1	Area U – Tunnel Ventilation Process & Instrumentation Diagram
1-0103V-E0004-001	1	Area U – Tunnel Ventilation MUA-U600, MCC-1U Schematic & Wiring Diagram
1-0103V-E0005-001	1	Area U – Tunnel Ventilation EF-P625 FVNR Schematic & Wiring Diagram
1-0103V-E0006-001	1	Area U – Tunnel Ventilation EF-S695 FVNR Schematic & Wiring Diagram

1-0103V-E0007-001	1	Area U – Tunnel Ventilation EF-S612, S675 & S680 Schematic & Wiring Diagram
1-0103V-E0008-001	1	Area U – Tunnel Ventilation EF-S690 FVNR Schematic & Wiring Diagram

3.0 NORMAL OPERATION

Normal operation is defined as all hand-off-auto switches in the auto position with the PLC controlling operation of the system and the TCP/IP communications system functioning (ie. PLC's communicating with each other and the Bailey DCS).

Direct gas fired unit MUA U600, along with its associated exhaust fans P625, S675, S680, S690 and S695 operate together as a system unit.

In the event of a high carbon monoxide alarm (CO) as detected at the existing gas detection panel, and relayed to the Utilities PLC over TCP/IP, an alarm is initiated. Any actions to be carried out on this alarm will be manually initiated.

3.1 COMMON SYSTEM PRINCIPLES

The MUA unit is a direct-fired, natural gas unit and requires hard wired interlock with its associated exhaust fans. This is provided by current sensing relays (CSR's) in the exhaust fans motor starters hard wired to the MUA unit controllers.

The fan motors in the MUA units are not inhibited to start by the CSR's, only the burner firing circuit is inhibited until all the exhaust fans are proven.

Discharge air temperature control setpoint of the units is set at the PLC HMI by the operator.

In the event of a TCP/IP communication failure, the Utilities control system shall continue to operate automatically under PLC control. The only lost functionality are:

- No reporting of status and alarm information to the Bailey DCS.

3.2 MAKE-UP AIR (MUA) UNIT U600, EXHAUST FANS P625, S675, S680, S690 AND S695

During normal operation MUA U600 and its related exhaust fans, P625, S675, S680, S690 and S695, operate to maintain a setpoint discharge temperature on the MUA discharge temperature element (U600-TE).

During system startup the MUA intake damper (U600-MD) opens. Once the damper is confirmed open by limit switches the MUA blower fan starts. When enough current is drawn by the blower fan to prove that it has started and is moving air the current sensing relay triggers its associated exhaust fans to start by releasing the interlock on the fans within the PLC. After the exhaust fans are up to speed the CSR's close to prove back to the MUA unit as a permissive on the burner. This system startup control is all provided by hardwired controls.

Three carbon monoxide detectors, U600GT-AT, detect the presence of any carbon monoxide within the tunnels and reports the level back to a gas detection control panel. If the gas levels are above 15 ppm an alarm is triggered and reported to the existing DCS control system through a digital communications link. The DCS will then digitally communicate this alarm back to the PLC which will trigger an alarm.

4.0 MANUAL OPERATION

The control in hand has the same hardwired control operations as automatic control with a few minor exceptions. As opposed to starting the system from a PLC output, manual operation is achieved by setting the system hand-off-auto switches in manual. Additionally the MUA units taking the operating setpoints from the operator interface on the MUA units as opposed to a 4-20 mA control signal from the PLC.

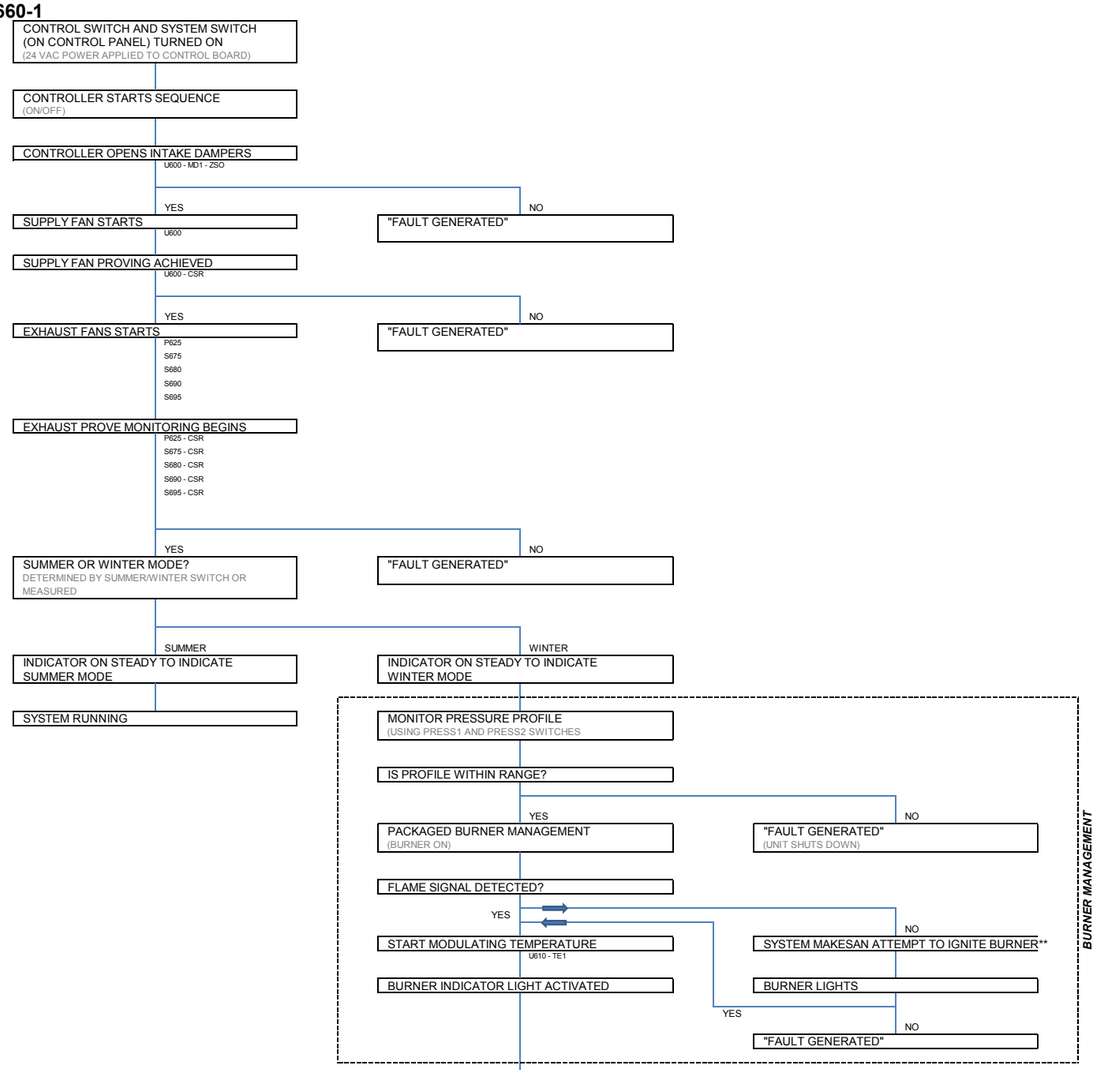
APPENDIX A

Tunnels I/O List

Tag	IO Type	PLC Tag	DCS Tag	Description
U600-QA	DI	U01-U600-QA		MUA U600 fault status
U600-MM	DI	U01-U600-MM		MUA U600 run status
U600-HS	DI	U01-U600-HI		MUA U600 switch in auto
U600-MN	DO	U01-U600-MN		MUA U600 start/stop
U600-TC	AO	U01-U600-TIC		MUA U600 temperature controller
U600-ZSB	DI	U01-U600-ZB		MUA U600 discharge damper close limit switch (contact closed when damper closed)
U600-ZSD	DI	U01-U600-ZD		MUA U600 discharge damper close limit switch (contact open when damper closed)
U600-TT-1	AI	U01-U600-TI1		MUA U600 space temperature
U600-TE-2	Modbus\TCP	U01-U600-TI2		MUA U600 discharge temperature
U600-*	Modbus\TCP	U01-U600-*		Other MUA U600 Status's Available via Modbus\TCP
U605GT-AI1	Modbus\TCP via DCS	U01-U605GT-AI1		Utilities Building Tunnels carbon monoxide gas detector
U605GT-AI2	Modbus\TCP via DCS	U01-U605GT-AI2		Primary Clarifiers Building Tunnels carbon monoxide gas detector
U605GT-AI3	Modbus\TCP via DCS	U01-U605GT-AI3		Secondary Clarifiers Building Tunnels carbon monoxide gas detector
P625-MN	DO	U01-P625-MN		P625 start/stop
P625-HS	DI	U01-P625-HI		P625 switch in on
P625-QA	DI	U01-P625-QA		P625 fault status
P625-MM	DI	U01-P625-MM		P625 run status
S612-MM	DI	U01-S612-MM		EF S612 run status
S612-HS	DI	U01-S612-HI		EF S612 switch in on
S612-MN	DO	U01-S612-MN		EF S612 start/stop
S675-MM	DI	U01-S675-MM		EF S675 run status
S675-HS	DI	U01-S675-HI		EF S675 switch in on
S675-MN	DO	U01-S675-MN		EF S675 start/stop
S680-MM	DI	U01-S680-MM		EF S680 run status
S680-HS	DI	U01-S680-HI		EF S680 switch in on
S680-MN	DO	U01-S680-MN		EF S680 start/stop
S690-MM	DI	U01-S690-MM		EF S690 run status
S690-HS	DI	U01-S690-HI		EF S690 switch in on
S690-MN	DO	U01-S690-MN		EF S690 start/stop
S695-MM	DI	U01-S695-MM		EF S695 run status
S695-QA	DI	U01-S695-QA		EF S695 fault status
S695-HS	DI	U01-S695-HI		EF S695 switch in on
S695-MN	DO	U01-S695-MN		EF S695 start/stop

APPENDIX B

Sequence of Operations
Area U - Tunnels - U600



DEVICES

TAG	DESCRIPTION	INPUT/OUTPUT
U600 - MD1	Motorized Damper for U610 Intake	DO
U600 - MD1 - ZSO	Damper Position (Open) Switch for Intake Damper	DI
U600 - CSR	Current Sensing Relay for MUA blower	AI
U600 - TSL	Low Temperature Switch for U610	DI
U600 - TE1	Temperature Element for U610	AI
U600 - TE2	Temperature Switch for U610	AI
P625 - CSR	Current Sensing Relay for Exhaust Fan	AI
P625 - HS-1	Hand Switch	DO
S675 - CSR	Current Sensing Relay for Exhaust Fan	AI
S675 - HS-1	Hand Switch	DO
S680 - CSR	Current Sensing Relay for Exhaust Fan	AI
S680 - HS-1	Hand Switch	DO
S690 - CSR	Current Sensing Relay for Exhaust Fan	AI
S690- HS-1	Hand Switch	DO
S695 - CSR	Current Sensing Relay for Exhaust Fan	AI
S695- HS-1	Hand Switch	DO
U600 - CO1	Carbon Monoxide Sensor	AO
U600 - CO2	Carbon Monoxide Sensor	AO
U600 - CO3	Carbon Monoxide Sensor	AO

EQUIPMENT

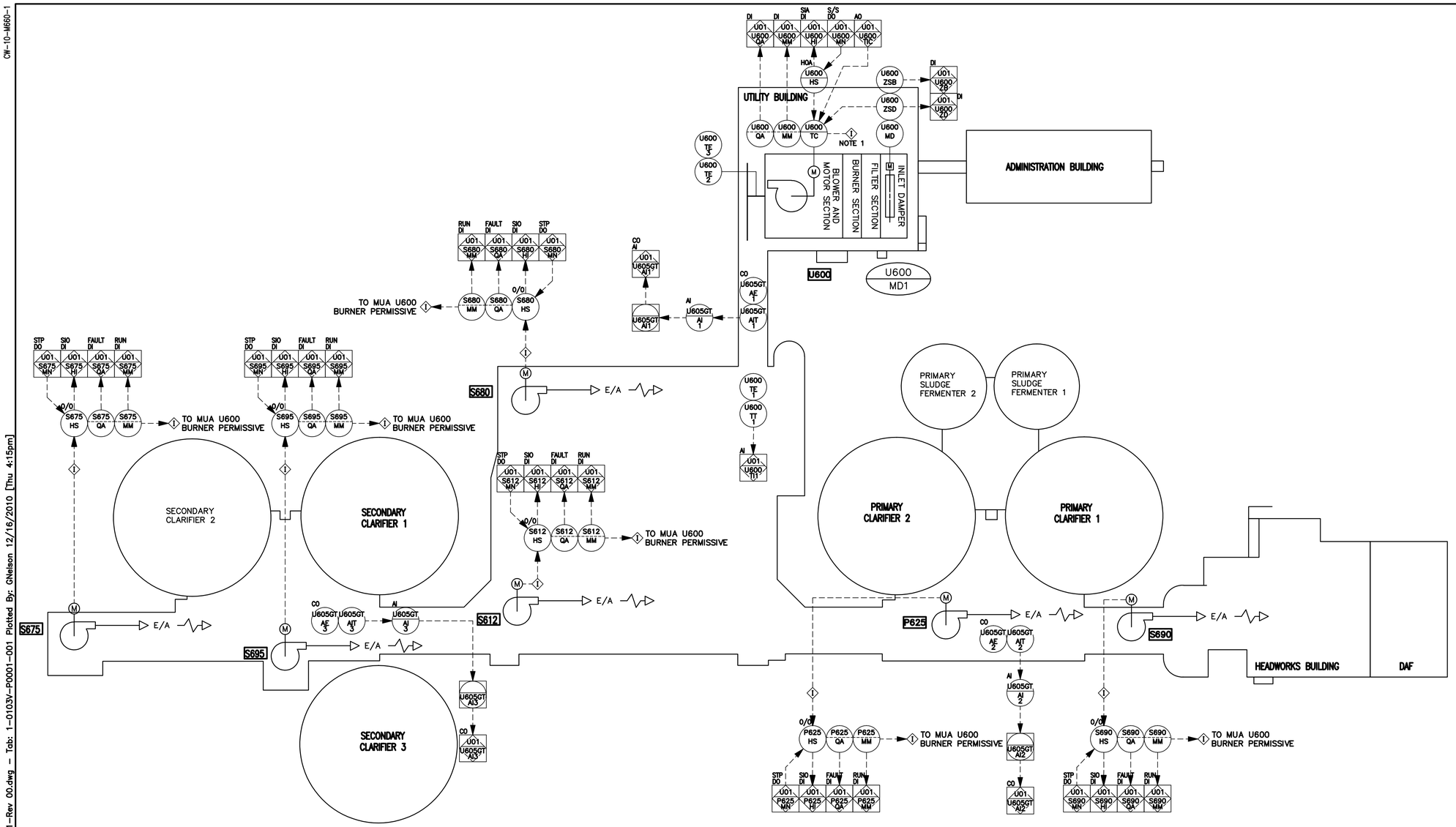
TAG	DESCRIPTION
U600	Make-Up Air Unit
P625	Exhaust Fan
S675	Exhaust Fan
S680	Exhaust Fan
S690	Exhaust Fan
S695	Exhaust Fan

WHEN IN SUMMER MODE, BURNER MANAGEMENT PACKAGED CONTROLS ARE NOT USED.

NOTE:

PRELIMINARY, INSTRUMENT TAGS WILL B
REVISED UPON RECEIPT OF SHOP DRAWI

APPENDIX C



SEQUENCE OF OPERATION

DEVICE LISTING

TAG	DESCRIPTION
NON-PACKAGED	
P625-HS	EXHAUST FAN P625 HAND/OFF/AUTO SWITCH
P625-MM	EXHAUST FAN P625 RUN STATUS
P625-QA	EXHAUST FAN P625 FAULT STATUS
P625-MN	EXHAUST FAN P625 START/STOP
S612-HS	EXHAUST FAN S612 HAND/OFF/AUTO SWITCH
S612-MM	EXHAUST FAN S612 RUN STATUS
S612-QA	EXHAUST FAN S612 FAULT STATUS
S612-MN	EXHAUST FAN S612 START/STOP
S675-HS	EXHAUST FAN S675 HAND/OFF/AUTO SWITCH
S675-MM	EXHAUST FAN S675 RUN STATUS
S675-QA	EXHAUST FAN S675 FAULT STATUS
S675-MN	EXHAUST FAN S675 START/STOP
S680-HS	EXHAUST FAN S680 HAND/OFF/AUTO SWITCH
S680-MM	EXHAUST FAN S680 RUN STATUS
S680-QA	EXHAUST FAN S680 FAULT STATUS
S680-MN	EXHAUST FAN S680 START/STOP
S690-HS	EXHAUST FAN S690 HAND/OFF/AUTO SWITCH
S690-MM	EXHAUST FAN S690 RUN STATUS
S690-QA	EXHAUST FAN S690 FAULT STATUS
S690-MN	EXHAUST FAN S690 START/STOP
S695-HS	EXHAUST FAN S695 HAND/OFF/AUTO SWITCH
S695-MM	EXHAUST FAN S695 RUN STATUS
S695-QA	EXHAUST FAN S695 FAULT STATUS
S695-MN	EXHAUST FAN S695 START/STOP
U600-AE/AIT-1	UTILITIES BLDG TUNNEL CO DETECTOR & TRANSMITTER
U600-AE/AIT-2	PRIMARY CLARIFIERS BLDG TUNNEL CO DETECTOR & TRANSMITTER
U600-AE/AIT-3	SECONDARY CLARIFIERS BLDG TUNNEL CO DETECTOR & TRANSMITTER
PACKAGED	
U600-HS	EXHAUST FAN U600HAND/OFF/AUTO SWITCH
U600-TC	MUA U600 TEMPERATURE CONTOLLER
U600-MM	MUA U600 RUN STATUS
U600-QA	MUA U600 INLET DAMPER FAILURE ALARM
U600-MD	MUA U600 INLET DAMPER
U600-ZSB	MUA U600 INLET DAMPER CLOSE LIMIT
U600-ZSD	MUA U600 INLET DAMPER OPEN LIMIT
U600-TE/TT-1	MUA U600 TEMPERATURE
U600-TE2	MUA U600 DISCHARGE TEMPERATURE TRANSMITTER
U600-TE3	MUA U600 FREEZE PROTECTION

AREA/EQUIPMENT TAG	U600
FUNCTION	MUA
TYPE	DIRECT FIRED
VOLUME (L/s)	16,500
HEAT INPUT (kW)	1,289
ELEC. LOAD (kW)	

AREA/EQUIPMENT TAG	S612	S675	S680	S690	S695	P625
FUNCTION	EF	EF	EF	EF	EF	EF
TYPE	CENTRI.	CENTRI.	CENTRI.	CENTRI.	CENTRI.	CENTRI.
VOLUME (L/s)	490	1500	1500	1500	6000	6000
HEAT INPUT (kW)	N/A	N/A	N/A	N/A	N/A	N/A
ELEC. LOAD (kW)						

APEGM Certificate of Authorization KGS Group No. 245 Date: 2010/12/21

KGS GROUP CONSULTING ENGINEERS

B.M. ELEV.	N/A	FIELD BOOK #:		
POSTED TO LBIS				
00	ISSUED FOR TENDER		2010-12-21	REW
NO.	REVISIONS		DATE	BY

ALLIANCE Engineering Services Inc.

DESIGNED BY	DDW	CHECKED BY	REW
DRAWN BY	GCN	APPROVED BY	REW
HOR. SCALE	N.T.S.	RELEASED FOR CONSTRUCTION	
VERTICAL	N.T.S.		
DATE	2009-09-15	DATE	

ENGINEER'S SEAL — PROVINCE OF MANITOBA — R.E. WILLMS Member 3833 — REGISTERED PROFESSIONAL ENGINEER

TENDER No. UP2.1
FILENAME :
PLOT DATE:

Winnipeg

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

2010 HVAC REPLACEMENT AND ASSOCIATED WORKS
WEWPCC
AREA U – TUNNEL VENTILATION PROCESS & INSTRUMENTATION DIAGRAM

SHEET 1 OF 1
CITY DRAWING NUMBER
1-0103V-P0001-001

WEWPCC Odour Dispersion Controls Narrative

REV 0

December 2010

KGS GROUP CONSULTING ENGINEERS

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1.0 SYSTEM DESCRIPTION

Odour Dispersion fans S735 and S745 are located in the Odour Dispersion Stack (ODS) room elevated above floor level. Foul air from all areas of the plant, except the Secondary Clarifiers, is collected into existing collection ductwork; the ODS fans pull foul air through the ODS collection ductwork and discharge it through the facility's main odour dispersion stack.

Bioreactors 1 and 2 are ventilated by the inherent operation of the odour dispersion fans S735 and S745. Exhaust ductwork located in the headspace of the bioreactors carries exhaust air and connects into the ODS collection ductwork upstream of the ODS room wall penetration. Supply air to the bioreactors is provided by the blowers located in the blower room in the Utility Building.

1.1 GENERAL OPERATING DESCRIPTION

In normal operating mode a lead exhaust fan will pull the foul air from the exhaust stream and through the exhaust stack. An identical lag system provides full redundancy in the event of lead system failure. In the high rate operating mode, activation of the lag-system to permit parallel operation of both exhaust fans can be automatically activated by a pressure sensor located upstream of each fan. The discharge and supply ducts from each of the exhaust fans are interconnected to permit either fan to exhaust air in normal mode. S735 and S745 are equipped with VFD drives to maintain a negative pressure upstream of the fans.

Bioreactors 1 and 2 are ventilated by S735 and S745. A modulating damper and pressure sensor work as a system to control the amount of exhausted air from the bioreactor. Each bioreactor has its own dedicated damper-sensor system.

2.0 REFERENCE DRAWINGS

Drawing	Sheet	Description
1-0103S-P0022-001	1	Area S – Odour Dispersion Room Process & Instrumentation Diagram
1-0103S-E0024-001	1	Area S – Odour Dispersion Room EF-S735 VFD

		Schematic & Wiring Diagram
1-0103S-E0025-001	1	Area S – Odour Dispersion Room EF-S745 VFD Schematic & Wiring Diagram

3.0 NORMAL OPERATION

Normal operation is defined as all hand-off-auto switches in the auto position with the PLC controlling operation of the system and the TCP/IP communications system functioning (ie. PLC's communicating with each other and the Bailey DCS).

Normal operation is for one exhaust fan to operate at one time. Either system can be selected to be the lead system. In the event of an equipment failure on the lead system, the lag system will automatically start, and the lead system shutdown.

The second system can be manually initiated to provide a higher air flow rate through the stack.

3.1 COMMON SYSTEM PRINCIPLES

The exhaust fans are equipped with variable frequency drives to control the pressure in the suction duct to maintain a setpoint negative pressure.

In the event of a TCP/IP communication failure, the Odour Dispersion control system shall continue to operate automatically under PLC control. The only lost functionality are:

- No reporting of status and alarm information to the Bailey DCS.
- No status information is being read in from the VFD's.

3.2 EXHAUST FANS S735 AND S745

During normal operation exhaust fans S735 and S745 operate in lead/lag mode where the lead equipment is on and lag equipment is off. The lead/lag operation shall be settable by the operator from the HMI at any time but the PLC shall incorporate an automatic lead/lag cycling of the equipment by an adjustable time period initially set at 24 hours.

The exhaust fans suction duct has two pressure transducers (S735-PT and S745-PT) that

reports back to the PLC. The PLC shall have a PID loop to maintain a negative pressure in the suction duct by modulating the VFD speed. A negative pressure of 498 Pa is required to pull air from Bioreactor 1 and 2 and overcome the pressure losses associated with the ductwork.

During exhaust fan startup the exhaust fan suction and discharge dampers (S735-MD-1 / S735-MD-2 or S745-MD-1 / S745-MD-2) open. Once both dampers are confirmed open by limit switches the exhaust fan VFD starts. When enough current is drawn by the exhaust fan to prove that it has started and is moving air the VFD closes a contact to prove its running to the PLC. This system startup control is all provided by hardwired controls.

In the event that the VFD has ramped to full speed and it no longer is maintaining setpoint pressure the lag exhaust fan will start. The startup sequence is slightly different when one exhaust is already running when the second one is started. Similarly to when only one exhaust fan is running the exhaust fans suction and discharge dampers start opening first. Instead of waiting for the limit switches to prove open before the exhaust fan starts it will start after the suction and discharge dampers closed limit switches are broken and a timing relay starts timing while the open limit switches are still not made. If one or both of the open limit switches are not proven within a 15 second period (adjustable) then the exhaust fan will trip out. This control like normal operation is also hardwired within the starter circuit. Any trips as a result of the timing relay timing out requires a manual reset.

The reason from this requirement is to prevent air from the running exhaust fan blowing in the backwards direction through the starting exhaust fan.

3.3 BIOREACTORS 1 & 2

Bioreactors 1 and 2 are provided with supply air from blowers located in the utility building; the amount of supply air is controlled by separate process parameters. A pressure sensor located in the headspace of each bioreactor modulates dampers in their respective exhaust air ductwork to maintain a neutral pressure in both bioreactors. A negative pressure is provided downstream of the dampers by S735 and S745, pulling exhaust air into the ODS collection ductwork.

4.0 MANUAL OPERATION

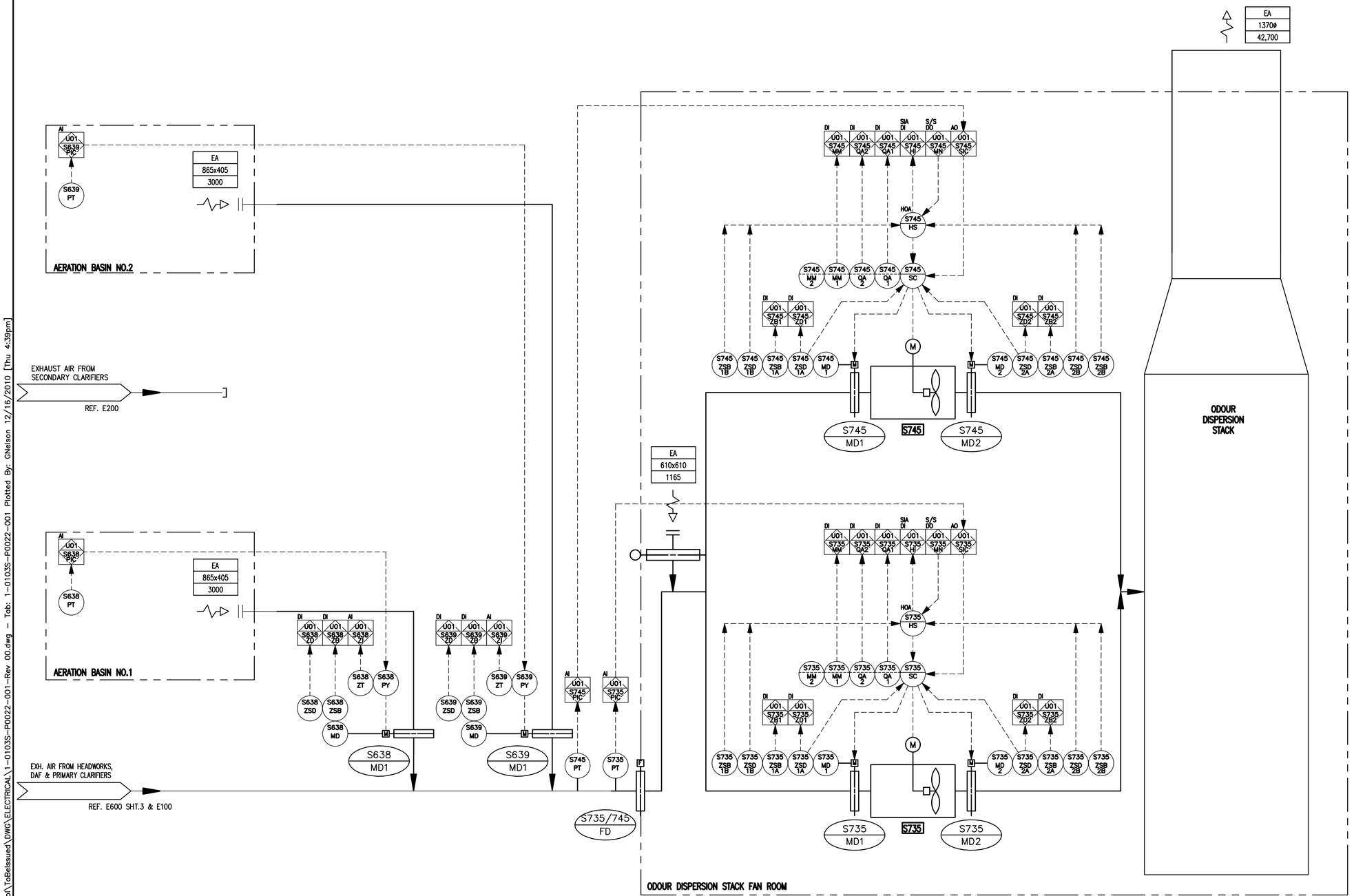
The control in hand has the same hardwired control operations as automatic control with the a few minor exceptions. As opposed to starting the system from a PLC output, manual operation is achieved by setting the system hand-off-auto switches in manual. Additionally the VFD speed will need to be adjusted manually since there is no speed signal coming from the PLC.

APPENDIX A

Odour Dispersion I/O List

Tag	IO Type	PLC Tag	DCS Tag	Description
S638-PY	AO	U01-S638-PY		Aeration basin No.1 damper positioner
S638-ZSB	DI	U01-S638-ZB		Aeration basin No.1 damper close limit switch (contact close when damper closed)
S638-ZSD	DI	U01-S638-ZD		Aeration basin No.1 damper close limit switch (contact open when damper closed)
S638-ZT	AI	U01-S638-ZI		Aeration basin No.1 damper position
S638-PT	AI	U01-S638-PIC		Aeration basin No.1 pressure
S639-PY	AO	U01-S639-PY		Aeration basin No.2 damper positioner
S639-ZSB	DI	U01-S639-ZB		Aeration basin No.2 damper close limit switch (contact close when damper closed)
S639-ZSD	DI	U01-S639-ZD		Aeration basin No.2 damper close limit switch (contact open when damper closed)
S639-ZT	AI	U01-S639-ZI		Aeration basin No.2 damper position
S639-PT	AI	U01-S639-PIC		Aeration basin No.2 pressure
S735-*	Modbus\TCP	U01-S735-*		Other MUA S735 Status's Available via Modbus\TCP
S735-ZSB-1A	DI	U01-S735-ZB1		EF S735 suction damper close limit switch (contact closed when damper closed)
S735-ZSD-1A	DI	U01-S735-ZD1		EF S735 suction damper close limit switch (contact open when damper closed)
S735-ZSB-2A	DI	U01-S735-ZB2		EF S735 discharge damper close limit switch (contact closed when damper closed)
S735-ZSD-2A	DI	U01-S735-ZD2		EF S735 discharge damper close limit switch (contact open when damper closed)
S735-HS	DI	U01-S735-HI		EF S735 hand-off-auto switch
S735-QA1	DI	U01-S735-QA1		EF S735 VFD fault
S735-QA2	DI	U01-S735-QA2		EF S735 damper failure lockout
S735-MM	DI	U01-S735-MM		EF S735 VFD run status
S735-SC	DI	U01-S735-SIC		EF S735 VFD speed control
S735-MN	DO	U01-S735-MN		EF S735 start/stop
S735-PT	AI	U01-S735-PIC		EF S735 suction duct pressure
S745-*	Modbus\TCP	U01-S745-*		Other MUA S745 Status's Available via Modbus\TCP
S745-ZSB-1A	DI	U01-S745-ZB1		EF S745 suction damper close limit switch (contact closed when damper closed)
S745-ZSD-1A	DI	U01-S745-ZD1		EF S745 suction damper close limit switch (contact open when damper closed)
S745-ZSB-2A	DI	U01-S745-ZB2		EF S745 discharge damper close limit switch (contact closed when damper closed)
S745-ZSD-2A	DI	U01-S745-ZD2		EF S745 discharge damper close limit switch (contact open when damper closed)
S745-HS	DI	U01-S745-HI		EF S745 hand-off-auto switch
S745-QA1	DI	U01-S745-QA1		EF S745 VFD fault
S745-QA2	DI	U01-S745-QA2		EF S745 damper failure lockout
S745-MM	DI	U01-S745-MM		EF S745 VFD run status
S745-SC	DI	U01-S745-SIC		EF S745 VFD speed control
S745-MN	DO	U01-S745-MN		EF S745 start/stop
S745-PT	AI	U01-S745-PIC		EF S745 suction duct pressure

APPENDIX B



AREA/EQUIPMENT TAG	S638	S639	S735	S745
FUNCTION	EF	EF	EF	EF
TYPE	VANE AXIAL	VANE AXIAL	VANE AXIAL	VANE AXIAL
VOLUME (L/s)	0→3,000	0→3,000	42,700	42,700
ELEC. LOAD (kW)				

SEQUENCE OF OPERATION

DEVICE LISTING

TAG	DESCRIPTION
NON-PACKAGED	
S735-HS	EXHAUST FAN S735 HAND/OFF/AUTO SWITCH
S735-SC	EXHAUST FAN S735 VFD
S735-MM-1/2	EXHAUST FAN S735 VFD RUN STATUS
S735-QA1	EXHAUST FAN S735 VFD FAULT ALARM
S735-QA2	EXHAUST FAN S735 DAMPER FAILURE ALARM
S735-MD1	EXHAUST FAN S735 SUCTION DAMPER
S735-ZSB1-A/B	EXHAUST FAN S735 SUCTION DAMPER CLOSE LIMIT
S735-ZSD1-A/B	EXHAUST FAN S735 SUCTION DAMPER OPEN LIMIT
S735-MD2	EXHAUST FAN S735 DISCHARGE DAMPER
S735-ZSB2-A/B	EXHAUST FAN S735 DISCHARGE DAMPER CLOSE LIMIT
S735-ZSD2-A/B	EXHAUST FAN S735 DISCHARGE DAMPER OPEN LIMIT
S735-PT	EXHAUST FAN S735 SUCTION PRESSURE TRANSMITTER
S745-HS	EXHAUST FAN S745 HAND/OFF/AUTO SWITCH
S745-SC	EXHAUST FAN S745 VFD
S745-MM-1/2	EXHAUST FAN S745 VFD RUN STATUS
S745-QA1	EXHAUST FAN S745 VFD FAULT ALARM
S745-QA2	EXHAUST FAN S745 DAMPER FAILURE ALARM
S745-MD1	EXHAUST FAN S745 SUCTION DAMPER
S745-ZSB1-A/B	EXHAUST FAN S745 SUCTION DAMPER CLOSE LIMIT
S745-ZSD1-A/B	EXHAUST FAN S745 SUCTION DAMPER OPEN LIMIT
S745-MD2	EXHAUST FAN S745 DISCHARGE DAMPER
S745-ZSB2-A/B	EXHAUST FAN S745 DISCHARGE DAMPER CLOSE LIMIT
S745-ZSD2-A/B	EXHAUST FAN S745 DISCHARGE DAMPER OPEN LIMIT
S745-PT	EXHAUST FAN S745 SUCTION PRESSURE TRANSMITTER
S638-MD	AERATION BASIN NO.1 DAMPER
S638-ZSB	AERATION BASIN NO.1 DAMPER CLOSE LIMIT
S638-ZSD	AERATION BASIN NO.1 DAMPER OPEN LIMIT
S638-PT	AERATION BASIN NO.1 PRESSURE TRANSMITTER
S638-PY	AERATION BASIN NO.1 DAMPER POSITIONER
S638-ZT	AERATION BASIN NO.1 DAMPER POSITION FEEDBACK
S639-MD	AERATION BASIN NO.2 DAMPER
S639-ZSB	AERATION BASIN NO.2 DAMPER CLOSE LIMIT
S639-ZSD	AERATION BASIN NO.2 DAMPER OPEN LIMIT
S639-PT	AERATION BASIN NO.2 PRESSURE TRANSMITTER
S639-PY	AERATION BASIN NO.2 DAMPER POSITIONER
S639-ZT	AERATION BASIN NO.2 DAMPER POSITION FEEDBACK

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THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

2010 HVAC REPLACEMENT AND ASSOCIATED WORKS

WEWPCC

AREA S – ODOUR DISPERSION ROOM
PROCESS & INSTRUMENTATION DIAGRAM

SHEET 1 OF 1

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