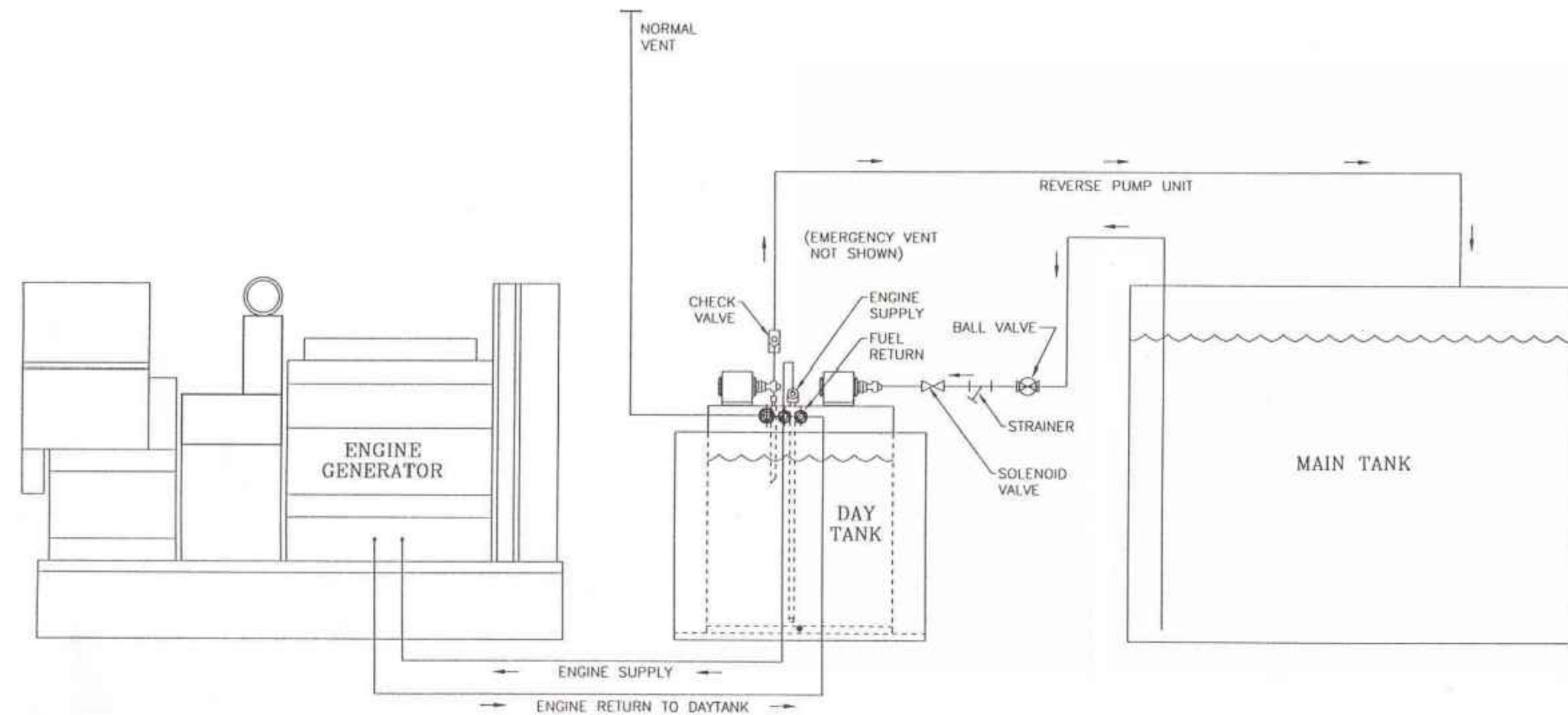


# DIESEL FUEL DAY TANK & PUMP SCHEDULE

DESIGNATION	DAY TANK
MANUFACTURER	TRAMONT
MODEL NUMBER	TRS DAY TANK
LOCATION	INDOOR
SERVICE	DIESEL GENERATOR
TANK TYPE	OPEN-TOP, 150% CONTAINMENT
TANK CAPACITY	50 GALLONS
PUMP LOCATION	INTEGRAL TO DAY TANK
PUMP CAPACITY	2 GPM
PUMP MOTOR	1/3 HP
VOLTS/PHASE	115/1
NOTES	ALL

- NOTES:
- PROVIDE UNIT W/ THE FOLLOWING:
    - 115 VAC, 1 PHASE, 60HZ, MOTOR; CARBONATOR MOUNT.
    - PUMP; CARBONATOR MOUNT
    - REVERSE-PUMP; CARBONATOR MOUNT.
    - TRS FLOAT SENSOR
    - TRS INSPECTION PLATE AND GASKET
    - SYSTEM 2000PLUS ELECTRONIC CONTROL MODULE
    - POLY TANK COVER
    - HEAVY GAUGE STEEL TANK CONSTRUCTION, GRAY PAINTED
    - EXTERIOR, RUST-INHIBITOR COATED INTERIOR.
    - 1" NPT SUPPLY FITTING FOR ENGINE SUPPLY, ENGINE RETURN, AND OVERFLOW.
    - 2" NPT FOR NORMAL VENT, NPT SIZED APPROPRIATE FOR EMERGENCY VENT, AND 3/8" NPT BASIN DRAIN.
    - SQUARE 4" INSPECTION PORT LOCATED BELOW ELECTRICAL CONTROLS.
    - APPROPRIATELY SIZED EMERGENCY VENT.
    - FUEL IN BASIN SWITCH.
    - 2" NPT MUSHROOM CAP W/ SCREEN.
  - SYSTEM 2000PLUS ELECTRONIC CONTROL MODULE SHALL HAVE THE FOLLOWING FEATURES:
    - UL 508 LISTED
    - OPERATES ON STANDARD 120VAC, 1 PHASE SYSTEM, 60 HZ.
    - LED INDICATORS FOR ALL FUNCTIONS.
    - FUEL LEVEL SENSOR.
    - MOTOR CONTROL RELAY WITH LED SIGNAL, RATED UP TO 1/2HP.
    - HIGH AND LOW FUEL LEVEL WARNINGS.
    - CRITICAL LOW FUEL LEVEL WARNING FOR ENGINE SHUTOFF.
    - FUEL-IN-RUPTURE-BASIN WARNING INTERFACE.
    - ECM FUNCTIONAL SIGNAL.
    - MANUAL CONTROL WITH ON, OFF AND TEST BUTTONS.
    - SECURE INTERNAL TEST BUTTON FOR TESTING WARNING.
    - LEDS AND REMOTE ANNUNCIATION OF WARNINGS.
  - PROVIDE ALL FITTINGS, HANGERS, SHUT-OFF VALVES.
  - PROVIDE CHECK VALVES FOR AN INSTALLATION WHERE THE MAIN TANK LEVEL IS HIGHER THAN THE DAY TANK.
  - PROVIDE ALL HARDWARE AS SUITABLE FOR USE WITH DIESEL FUEL.



## DIESEL FUEL DAY TANK INSTALLATION DIAGRAM

SCALE: NTS

NOTE: NOT ALL SYMBOLS, LEGENDS, AND ABBREVIATIONS ARE NOT NECESSARILY USED IN THIS SET OF DRAWINGS.

## MECHANICAL ABBREVIATIONS

A AAV AC AD ADJ AFF AFG AHU AP AR ARCH ASME ASSY AUTO	AUTOMATIC AIR VENT AIR CONDITIONING ACCESS DOOR ADJUSTABLE ABOVE FINISHED FLOOR PLUMBING ABOVE FINISHED GRADE AIR HANDLING UNIT ACCESS PANEL ACID RESISTING ARCHITECT AMERICAN SOCIETY OF MECHANICAL ENGINEERS ASSEMBLY AUTOMATIC	B BDD BFP BOT	BACKDRAFT DAMPER BACKFLOW PREVENTER BOTTOM	C CB CIRC CLG CLR CO CONW COTF COTG COIR COIB COND CONN CONT CONTR COORD CSW CW	CATCH BASIN CIRCULATING COOLING OR CEILING CLEAR CLEANOUT CLEANOUT IN WALL CLEANOUT TO FLOOR CLEANOUT TO GRADE CLEANOUT IN RISER COMBUSTION CONDENSATE, CONDENSER, OR CONDENSING CONNECTION CONTINUED OR CONTINUOUS CONTRACTOR COORDINATE COLD SOFT WATER COLD WATER	D DDCS DET DF DIFF DISCH DMPR DN DSP	DIRECT DIGITAL CONTROL SYSTEM DETAIL DRINKING FOUNTAIN DIFFUSER DISCHARGE DAMPERS DOWN DRY STANDPIPE	E EAT EC EF ELECT EC ELEV EQ EXIST EXH EXP EXT	ENTERING AIR TEMPERATURE ELECTRIC CONTRACTOR (DIVISION 26 CONTRACTOR) EXHAUST FAN ELECTRICAL ELECTRICAL CONTRACTOR ELEVATION EQUAL EXISTING EXHAUST EXPANSION EXTERNAL	F FD FC FCW FDC FDN FE FEC FF	FLOOR DRAIN OR FIRE DAMPER FIRE PROTECTION CONTRACTOR (DIVISION 21 CONTRACTOR) FILTERED COLD WATER FIRE DEPARTMENT CONNECTION FOUNDATION FIRE EXTINGUISHER FIRE EXTINGUISHER CABINET FINISH FLOOR	FHC FLX FLOR FP FS F&T	FIRE HOSE CABINET FLEXIBLE FLOOR FIRE PROTECTION FLOOR SINK FLOAT & THERMOSTATIC	G GA GALV GC GPH GPM GNRC GR GW	GAUGE GALVANIZED GENERAL CONTRACTOR GALLONS PER HOUR GALLONS PER MINUTE GOOSENECK ROOF COWL GRILLE GREASE WASTE	H HB HD HDMW HTS HSW HW HWR HWT	HOSE BIBB HEAD HARDWARE HORIZONTAL HEATING HOT SOFT WATER HOT WATER HOT WATER RECIRCULATION HOT WATER TANK	I IE IECC IFGC	INVERT ELEVATION INTERNATIONAL ENERGY CONSERVATION CODE INTERNATIONAL FUEL GAS CODE INTERNATIONAL MECHANICAL CODE INSULATION OR INSULATE IRRIGATION INDIRECT WASTE	L LAT LAV LIN	LEAVING AIR TEMPERATURE LAVATORY LINEAR	M MAT MC MECH MEZ MFR MH MOD MNT MTD	MIXED AIR TEMPERATURE MECHANICAL CONTRACTOR (DIVISION 23 CONTRACTOR) MECHANICAL MEZZANINE MANUFACTURER MANHOLE MOTOR OPERATED DAMPER MOUNT MOUNTED	N NIC NK NOM NTS NO NC	NOT INCLUDED IN CONTRACT NECK NOMINAL NOT TO SCALE NORMALLY OPEN NORMALLY CLOSED	O OBD OC OFD OFL OH OPNG OSA OS&Y OFCI	OPPOSED BLADE DAMPER ON CENTER OVERFLOW DRAIN OVERFLOW LEADER OPEN HUB OPENING OUTSIDE AIR OUTSIDE STEM & YOKE OWNER FURNISHED, CONTRACTOR INSTALLED	P PERF PC PIV PLBG POC PRESS PRV PVC	PERFORATED PLUMBING CONTRACTOR (DIVISION 21 CONTRACTOR) POST INDICATOR VALVE PLUMBING POINT OF CONNECTION PRESSURE PRESSURE REDUCING VALVE POLYVINYL CHLORIDE	R RA RD REG REGD RET REV RF RTN RML ROOM	RETURN AIR ROOF DRAIN RECIRCULATING REGISTER REQUIRED RETURN REVISED/REVISION RETURN FAN RETURN RAINWATER LEADER ROOM	S SA SAN SCHED SECT SF SHT SHWR SIM SPEC SPKLR SQ SS	SUPPLY AIR SANITARY SCHEDULE SECTION SUPPLY FAN SHEET SHOWER SIMILAR SPECIFICATION SPRINKLER SQUARE SERVICE SINK/ STAINLESS STEEL	STRUCTURAL SUSPENDED SOFT WATER STEAM	T TEMP TSTAT TYP	TEMPERATURE THERMOSTAT TYPICAL	U UON UPC URN	UNLESS OTHERWISE NOTED UNIFORM PLUMBING CODE URINAL	V VD VERT VIB VOL VTR	VENT VERTICAL DAMPER VERTICAL VIBRATION VOLUME VENT THROUGH ROOF	W WC WH WHA WSP	WASTE WATER CLOSET WATER HEATER WATER HAMMER ARRESTOR WET STAND PIPE	X XFER XFMR	TRANSFER TRANSFORMER
--	---	------------------------	--	--	--	--	---	---	--	---	--	---------------------------------------	---	---	--	---	--	-------------------------	--	------------------------	---	---	--	--	---	---	---	--	--	--	--	--	--	--	---------------------------	--------------------------------------	------------------------	---	--------------------------------------	---	-----------------------------	--	-------------------	-------------------------

## BASIS OF DESIGN

OUTDOOR DESIGN TEMPERATURES	92F Db SUMMER 63F Wb SUMMER -1F Db WINTER
INDOOR DESIGN TEMPERATURES	75F Db SUMMER 72F Db WINTER
DESIGN ALTITUDE 2,320 FT ABOVE SEA LEVEL	

## REFERENCE SYMBOLS

	WALL SECTION LETTER SHEET WHERE SHOWN
	REVISION NUMBER (AREA OF CHANGE CLOUDED)
	MATCH LINE
	EQUIPMENT TAG, SEE SCHEDULES
	CONNECTION TO EXISTING
	SHEET NOTE CALLOUT, SEE SHEET NOTES
	RATED DAMPER ASSEMBLY TYPE, SEE SCHEDULE

## GENERAL HVAC NOTES

- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE ACCEPTED IBC, IMC, IECC, IDAHO STATE PLUMBING CODE, NREC, LOCAL RULES, AND STANDARDS OF GOVERNING AGENCIES HAVING JURISDICTION.
- PROVIDE NEC CODE MINIMUM HORIZONTAL AND VERTICAL WORKING CLEARANCES FOR ALL ELECTRICAL PANELS AND EQUIPMENT. OFFSET MECHANICAL WORK AS REQUIRED.
- SHEET METAL DUCTWORK AND COMPONENTS INCLUDING HANGING, SEALING, PLENUMS, & ACCESSORIES SHALL BE CONSTRUCTED IN STRICT ACCORDANCE WITH THE LATEST EDITION OF SMACNA STANDARDS FOR HVAC DUCT CONSTRUCTION & NFPA 90A & B STANDARDS.
- THE MECHANICAL PLANS ARE DIAGRAMMATIC IN NATURE AND DO NOT ATTEMPT TO SHOW ALL REQUIRED OFFSETS. REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR CONSTRUCTION DETAILS.
- PROVIDE NECESSARY OFFSETS FOR DUCTWORK THAT IS ROUTED OVER / UNDER EACH OTHER.
- CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF INSTALLATION STANDARDS AND CONSTRUCTION CONDITIONS. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO SHOP FABRICATION AND/OR FIELD ERECTION. DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THE CONSTRUCTION DRAWINGS SHALL BE CALLED TO THE ATTENTION OF THE ENGINEER. WORK DONE WITHOUT THE ENGINEER'S APPROVAL IS THE RESPONSIBILITY OF THE CONTRACTOR.
- CONTRACTOR TO COORDINATE THEIR WORK WITH ALL OTHER TRADES TO AVOID CONFLICTS IN FIELD.
- ALL ELBOWS SHALL BE LONG RADIUS ELBOWS WHEREVER POSSIBLE, OR SHALL HAVE TURNING VANES WHERE INDICATED ON PLANS.
- PROVIDE UL LISTED FLEXIBLE CONNECTION ON DISCHARGE OF GENERATOR'S RADIATOR. FLEX CONNECTION SHALL CONFORM TO LOCAL BUILDING CODE PROVISIONS, AND BE SUITABLE FOR HIGH TEMPERATURES.
- CONTRACTOR TO PROVIDE TRANSITION TO GENERATOR'S RADIATOR.
- ITEMS NOTED "TYPICAL" OR "TYP" ON ANY SHEET APPLY TO THAT PARTICULAR SHEET.
- HVAC INSTALLER SHALL KEEP A CLEAN SET OF FULL SIZE DRAWINGS ON THE JOB SITE FOR THE SOLE PURPOSE OF AS-BUILDING. AS-BUILTS ARE INTENDED TO BE ACCURATE DRAWINGS OF THE INSTALLED SYSTEMS AS THEY ARE ACTUALLY LOCATED WITHIN THE BUILDING. USE BOLD LINE RED PEN/MARKER WHEN DRAWING REVISED EQUIPMENT LOCATIONS AND DUCT ROUTING. WRITTEN NOTES DESCRIBING CHANGES AND DIAGRAMS ARE ACCEPTABLE FORMS OF COMMUNICATING AS-BUILT INFORMATION.

## GENERAL PLUMBING NOTES

- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE ACCEPTED IBC, IMC, IECC, ADA, IDAHO STATE PLUMBING CODE, NREC, LOCAL RULES, AND STANDARDS OF GOVERNING AGENCIES HAVING JURISDICTION.
- PROVIDE NEC CODE MINIMUM HORIZONTAL AND VERTICAL WORKING CLEARANCES FOR ALL ELECTRICAL PANELS AND EQUIPMENT. OFFSET MECHANICAL WORK AS REQUIRED. FLOOR/CEILING PENETRATIONS THRU FIRE RATED ASSEMBLIES SHALL COMPLY WITH WITH LATEST EDITION OF IBC. COORDINATE WITH ARCHITECTURAL PLANS.
- PIPING INDICATED IS DIAGRAMMATIC. COORDINATE ACTUAL ROUTING WITH ARCHITECTURAL/STRUCTURAL CONDITIONS.
- PLUMBER SHALL KEEP A CLEAN SET OF FULL SIZE DRAWINGS ON THE JOB SITE FOR THE SOLE PURPOSE OF AS-BUILDING. AS-BUILTS ARE INTENDED TO BE ACCURATE DRAWINGS OF THE INSTALLED SYSTEMS AS THEY ARE ACTUALLY LOCATED WITHIN THE BUILDING. USE BOLD LINE RED PEN/MARKER WHEN DRAWING REVISED PIPE ROUTING. WRITTEN NOTES DESCRIBING CHANGES AND RISER DIAGRAMS ARE ACCEPTABLE FORMS OF COMMUNICATING AS-BUILT INFORMATION.

## HVAC SYMBOLS

### SYMBOLS SHOWN DOUBLE LINE

	SECTION - SUPPLY DUCT		DMPR MOTOR OPERATOR
	SECTION - RETURN DUCT		INTERNAL DUCT LINING
	REG OR GR IN BOT OF DUCT		FLEXIBLE DUCTWORK
	DIFFUSER		LINEAR SUPPLY DIFFUSER
	DUCT TURNING VANES		THROW DIRECTION ARROW LIGHT TROFFER DIFFUSER
	SPLITTER DAMPER		FLEXIBLE CONNECTION
	SINGLE BLADE VOL DMPR		AIR OUTLET IN SIDE OF DUCT
	OPPOSED BLADE VOL DMPR		ROUND DUCT SECTION
	VOLUME EXTRACTOR		FLAT OVAL DUCT SECTION
	DUCT OFFSET		MODULAR DIFFUSER
	RATED DAMPER ASSEMBLY TYPE		SCHEDULED MECHANICAL EQUIPMENT
	RATE DAMPER ASSY		SCHEDULED MECHANICAL EQUIPMENT ON ROOF
	THERMOSTAT		REVERSE ACTING THERMOSTAT
	DEMOLITION - EXISTING DUCT/EQUIPMENT		EXISTING - DUCT/EQUIPMENT TO REMAIN

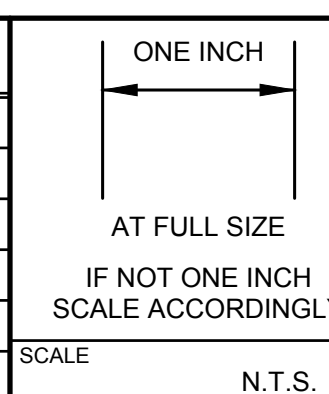
## IECC COMPLIANCE

- HVAC EQUIPMENT SHALL HAVE MINIMUM PERFORMANCE AT SPECIFIED RATING CONDITIONS NOT LESS THAN THE VALUES INDICATED IN THE ACCEPTED IECC AND AS INDICATED ON THE CONTRACT DOCUMENTS.
- PROVIDE DEADBAND BETWEEN HEATING/Cooling SPACE SENSOR SETPOINTS OF 5 DEGREES OR AS DESCRIBED IN THE TEMPERATURE CONTROL SEQUENCES.
- HVAC SYSTEMS SHALL BE EQUIPPED WITH AUTOMATIC CONTROLS CAPABLE OF ACCOMPLISHING SETBACK OR SHUTDOWN DURING UNOCCUPIED PERIODS.
- SUPPLY AIR AND WATER TEMPERATURES SHALL BE AUTOMATICALLY RESET AS REQUIRED IN THE ACCEPTED IECC OR AS DESCRIBED IN THE TEMPERATURE CONTROL SEQUENCES.
- ALL AIR SYSTEMS SHALL BE PROVIDED WITH A 100% CAPABLE AIR ECONOMIZER CAPABILITY, UNLESS CODE APPROVED EXCEPTIONS ARE MET.
- AIR ECONOMIZERS SHALL BE CAPABLE OF PROVIDING PARTIAL COOLING EVEN WHEN ADDITIONAL MECHANICAL COOLING IS REQUIRED TO MEET THE REMAINDER OF THE COOLING LOAD.
- SIMULTANEOUS HEATING AND COOLING TO INDIVIDUAL ZONES SHALL BE PROHIBITED.
- VARIABLE FREQUENCY DRIVES SHALL BE PROVIDED FOR VARIABLE FLOW HEATING AND AIR HANDLING SYSTEMS AS REQUIRED BY ACCEPTED IECC.
- DOMESTIC HOT WATER CIRCULATION PUMPS SHALL BE SHUT DOWN DURING UNOCCUPIED PERIODS.
- RECORD DRAWINGS SHALL BE PROVIDED TO THE OWNER. THE DRAWINGS SHALL INDICATE THE LOCATION AND PERFORMANCE DATA OF EQUIPMENT, GENERAL CONFIGURATION OF DUCTWORK AND PLUMBING DISTRIBUTION SYSTEMS INCLUDING FLOW RATES AS A MINIMUM.
- OPERATION AND MAINTENANCE MANUALS SHALL BE PROVIDED TO THE OWNER. AT A MINIMUM THE MANUALS SHALL INCLUDE:
  - SUBMITTAL DATA
  - OPERATION AND MAINTENANCE DATA FOR EQUIPMENT
  - HVAC CONTROLS SYSTEM MAINTENANCE AND CALIBRATION INFORMATION
  - NARRATIVE OF HOW SYSTEM IS INTENDED TO OPERATE
- COMMISSIONING SHALL BE PROVIDED AND A REPORT OF COMMISSIONING SHALL BE SUBMITTED TO OWNER AS REQUIRED BY THE ACCEPTED IECC.

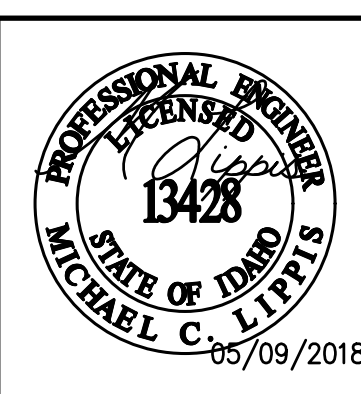
## MECHANICAL SHEET INDEX

- M1 LEGENDS, NOTES & EQUIPMENT SCHEDULES - MECHANICAL PLAN
- M2 DEMOLITION - MECHANICAL PLAN
- M3 NEW WORK - MECHANICAL PLAN
- M4 SPECIFICATIONS - DIVISIONS 22 & 23
- M5 SPECIFICATIONS - DIVISIONS 22 & 23

REVISIONS		DRWN	ENGR	PROJ
REV	DATE	CHKD	APVL	APVL
0	05/10/2018	ALH	ST	



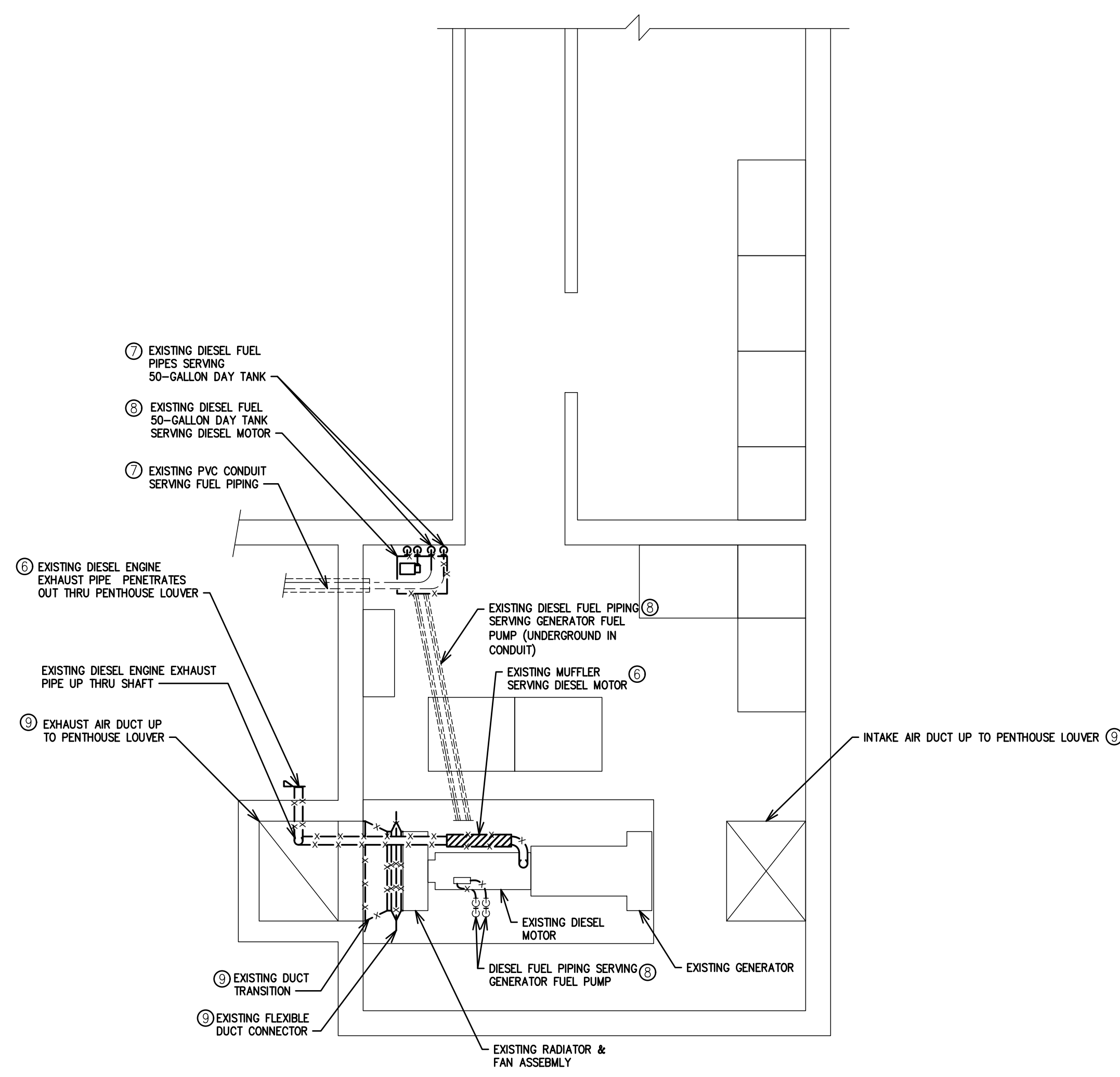
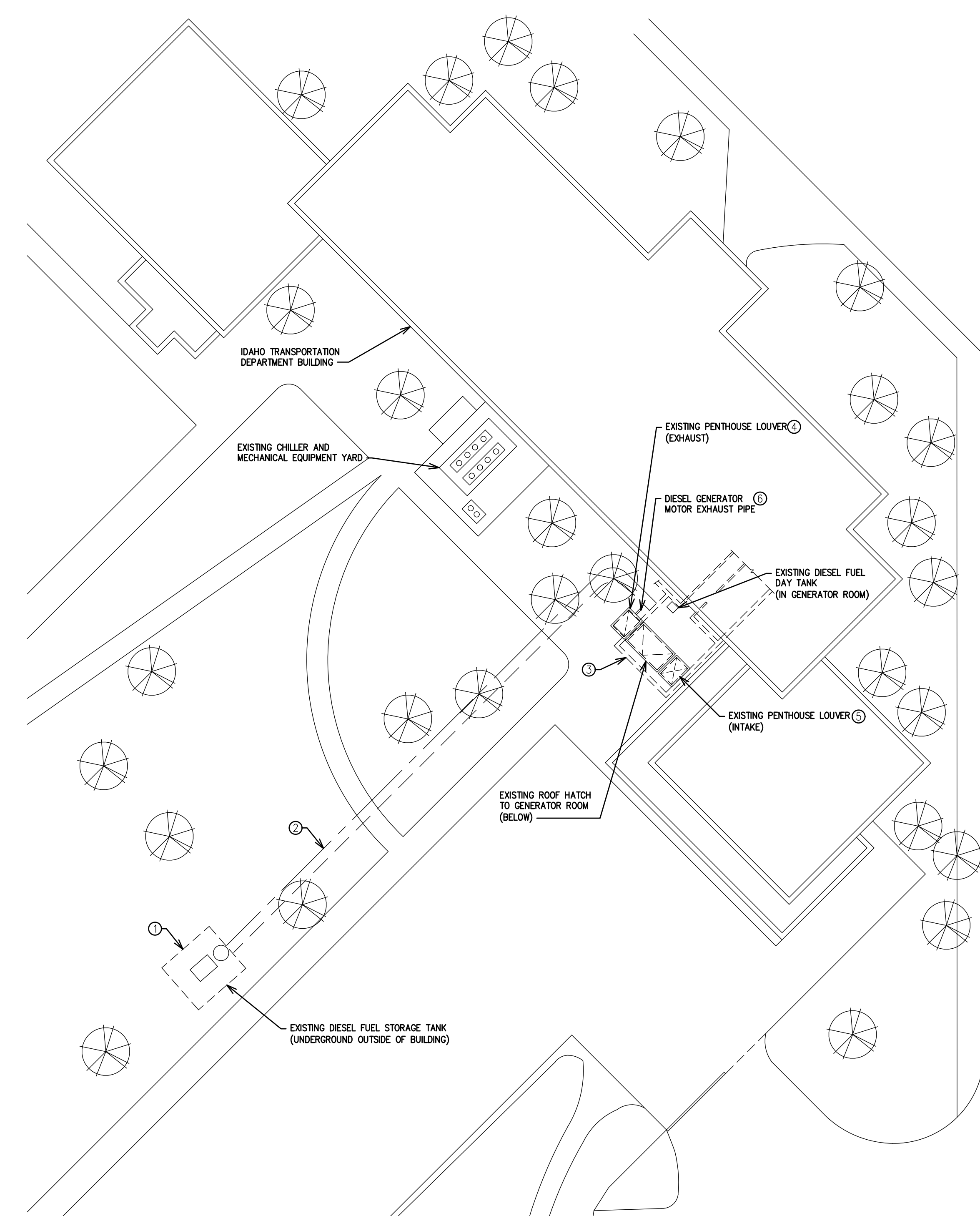
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BY	DATE	
DRAWN	MCL	05/09/2018
DESIGNED	MCL	05/09/2018
CHECKED	MCL	05/09/2018
PROJECT ENG	MCL	05/09/2018
APPROVED	MCL	05/09/2018



PROJECT	ITD GENERATOR REPLACEMENT	PROJECT NUMBER	TRINDERA #18180   JTL #1810
TITLE	LEGENDS, NOTES & EQUIPMENT SCHEDULES MECHANICAL PLAN	ACAD FILE NAME	
PLOT DATE:	05/09/2018	SHEET	1
COMPUTER GENERATED DRAWING NO MANUAL REVISIONS ALLOWED		DWG NUMBER	M1

**SHEET NOTES**

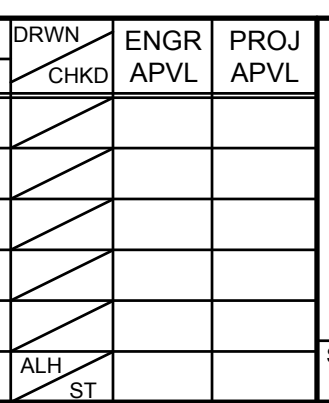
- ① CIRCLED NUMBER SYMBOLS ON THIS SHEET CORRESPOND TO THE ITEMS LISTED BELOW (CIRCLES ARE OMITTED IN THIS LIST)
- 1 EXISTING DIESEL FUEL STORAGE TANK IS LOCATED UNDERGROUND. THE 600 GALLON TANK IS TO REMAIN AS-IS, EXCEPT WHERE SERVICING AND INTERLOCKING TAKES PLACE. SEE NEW WORK PLAN FOR DETAILS. WORK TO BE BY DIV.22 AND COORDINATED W/ GC AND DIV.26.
- 2 ¾" DIESEL FUEL SUPPLY & ¾" RETURN PIPING ROUTED UNDERGROUND WITHIN PVC CONDUIT. PIPING ROUTES FROM STORAGE TANK TO DAY TANK. PIPING AND SLEEVE PENETRATE GENERATOR ROOM THROUGH THE WEST SIDEWALL. ALL UNDERGROUND PIPING IS SOFT COPPER AND SHALL REMAIN AS-IS. PREPARE PIPE FOR CONNECTION TO NEW WORK INSIDE GENERATOR ROOM. SEE NEW WORK PLAN FOR DETAILS. WORK TO BE BY DIV.22 AND COORDINATED W/ GC AND DIV.26.
- 3 EXISTING GENERATOR ROOM LOCATED UNDERGROUND AND ACCESSED FROM WITHIN BUILDING OR THROUGH EXISTING ROOF HATCH. ROOM IS CONSTRUCTED WITH A CONCRETE SHAFT AT EITHER END TO ALLOW FOR INTAKE AND EXHAUST AIR PATHS TO AND FROM THE GENERATOR ROOM (UNDERGROUND).
- 4 EXISTING PENTHOUSE LOUVER MOUNTED ON TOP OF A 30" CONCRETE SHAFT THAT SERVES AS AN EXHAUST OUTLET FOR AIR COOLING THE GENERATOR RADIATOR SYSTEM. SYSTEM TO REMAIN AS-IS.
- 5 EXISTING PENTHOUSE LOUVER MOUNTED ON TOP OF A 30" CONCRETE SHAFT THAT SERVES AS A FRESH AIR INTAKE FOR THE GENERATOR ROOM. SYSTEM TO REMAIN AS-IS.
- 6 DIESEL MOTOR EXHAUST PIPE ROUTED FROM WITHIN THE GENERATOR ROOM, UP THE EXHAUST SHAFT, AND OUT THE SIDE OF THE LOUVER. REMOVE EXISTING EXHAUST PIPING, MUFFLER, AND FLEXIBLE CONNECTION PIPE. SALVAGE TO OWNER AND TAKE CARE NOT TO DAMAGE. SYSTEM SHALL BE BOXED AND KEPT NEAR EXISTING GENERATOR THAT IS BEING REMOVED.
- 7 EXISTING PIPING AND CONDUIT SERVING EXISTING DAY TANK SHALL REMAIN. REMOVE PIPING BRANCHES AS NECESSARY TO INSTALL NEW DAY TANK.
- 8 REMOVE ALL CONTROLS BACK AS NECESSARY AND COORD W/ DIV.26 TO REMOVE ALL POWER CONNECTIONS. REMOVE DAY TANK, INTEGRAL PUMP & INTEGRAL CONTROLLER. SALVAGE ALL EQUIPMENT TO OWNER. DISCONNECT EXISTING GENERATOR FROM SYSTEM AND REMOVE FLEXIBLE FUEL CONNECTORS. PREPARE FOR CONNECTION TO NEW WORK.
- 9 EXISTING DUCTWORK AND FITTINGS SHALL BE RETAINED WHENEVER PRACTICAL. REMOVE FLEXIBLE DUCT CONNECTOR AND DUCT TRANSITION. PREPARE FOR CONNECTION TO NEW WORK. OPENING OF EXHAUST SHAFT DUCT IS 54" x 54". OPENING OF INTAKE SHAFT DUCT IS 48" x 48". INTAKE DUCT HAS AN ANGLED OPENING WITH A 48"x48" SCREEN COVERING THE OPENING.



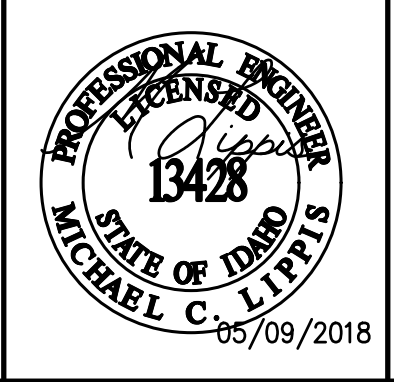
PLAN NORTH  
**SITE DEMOLITION - MECHANICAL PLAN**  
 SCALE: NTS

PLAN NORTH  
**GENERATOR ROOM DEMOLITION - MECHANICAL PLAN**  
 SCALE: NTS

REVISIONS		DRWN	ENGR	PROJ
REV	DATE	CHKD	APVL	APVL
0	05/10/2018	ALH	ST	



ENGR RECORD		
BY	DATE	
DRAWN	MCL	05/09/2018
DESIGNED	MCL	05/09/2018
CHECKED	MCL	05/09/2018
PROJECT ENG	MCL	05/09/2018
APPROVED	MCL	05/09/2018



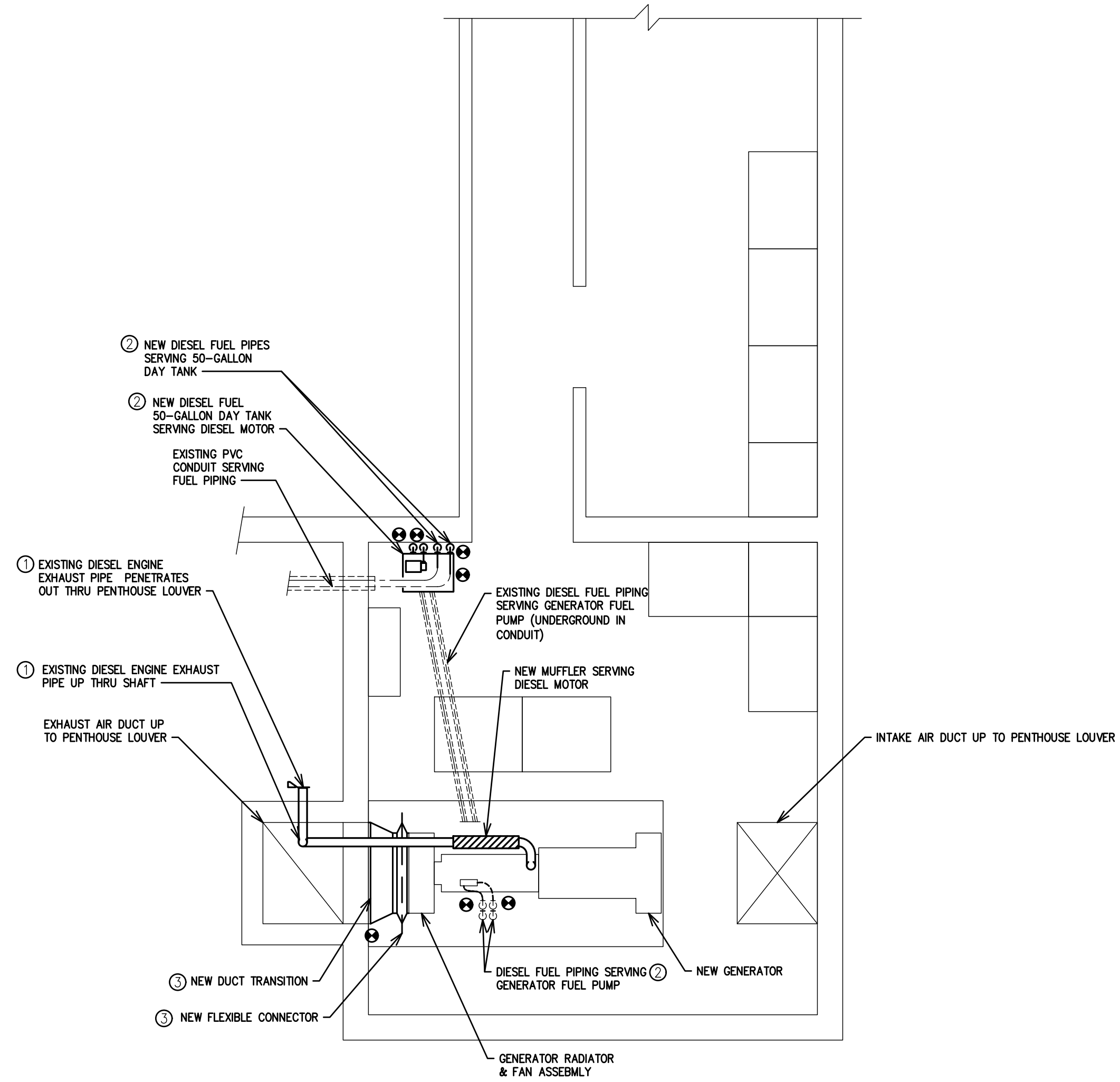
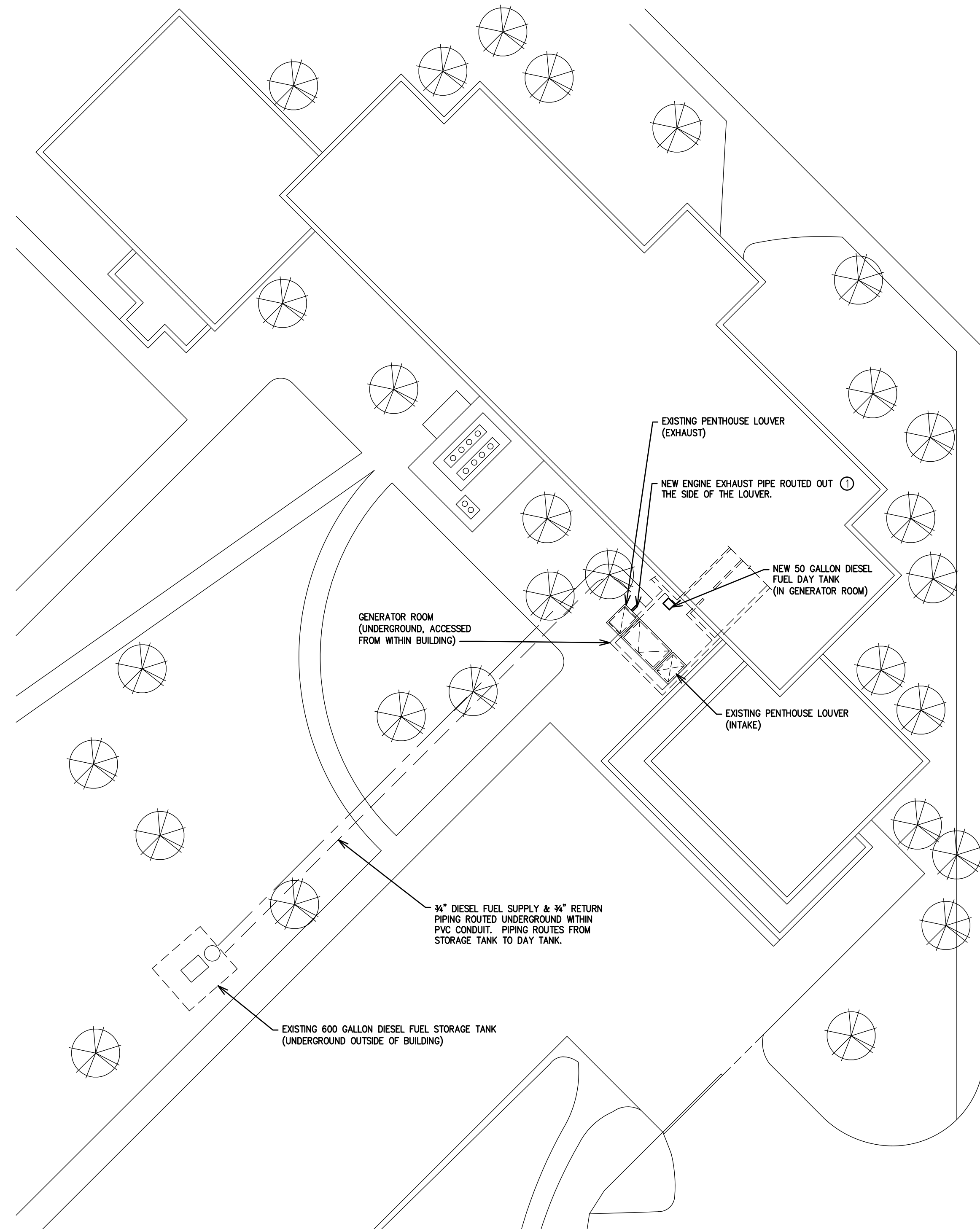
**Trindera**  
 ENGINEERING  
 1875 N. LAKEWOOD DRIVE, SUITE #201  
 COEUR D'ALENE, IDAHO 83814  
 (208) 676-8001 (208) 676-0100

PROJECT	ITD GENERATOR REPLACEMENT
TITLE	DEMOLITION MECHANICAL PLAN

PROJECT NUMBER	TRINDERA #18180   JTL #1810
ACAD FILE NAME	1810_MECH PLANS
SHEET	2
DWG NUMBER	M2
REV	A

**SHEET NOTES**

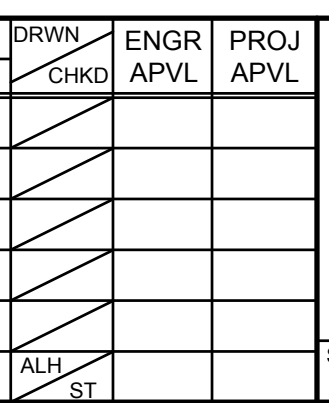
- ① CIRCLED NUMBER SYMBOLS ON THIS SHEET CORRESPOND TO THE ITEMS LISTED BELOW (CIRCLES ARE OMITTED IN THIS LIST)
- 1 NEW ENGINE EXHAUST PIPE ROUTED FROM WITHIN THE GENERATOR ROOM, UP EXISTING EXHAUST SHAFT, AND OUT THE SIDE OF THE LOUVER. TERMINATE W/ RAIN-CAP DESIGNED TO WORK IN THE HORIZONTAL POSITION. (AVAILABLE AT GRAINGER.COM) SIZE IS 3", BUT SHALL BE VERIFIED WITH ACTUAL GENERATOR BEING INSTALLED. AT ENGINE, PROVIDE FLEXIBLE PIPE CONNECTOR TO ENGINE. PIPE CONNECTOR TO BE SIMILAR TO EXISTING FLEXIBLE CONNECTOR AND SUITABLE FOR USE W/ DIESEL MOTORS. PROVIDE NEW MUFFLER (APPROVED BY MANUFACTURER, NEW EXHAUST PIPING AND NEW EXHAUST PIPING SLEEVE (SIMILAR TO EXISTING SLEEVE). HANG SYSTEM FROM EXISTING HANGERS WHEN PRACTICAL. PROVIDE NEW HANGERS AS NECESSARY. HANGERS SHALL BE ANCHORED IN CONCRETE ROOF.
- 2 INSTALL NEW DAY TANK AND INTEGRAL PUMP/CONTROL PACKAGE AS INDICATED. SITUATE TO REUSE EXISTING PIPING. PROVIDE NEW PIPE FITTINGS AND BRANCH PIPING TO CONNECT NEW DAY TANK TO 1/2" ENGINE FUEL SUPPLY & RETURN LINES, 3/4" DIESEL FUEL SUPPLY AND RETURN LINES BETWEEN MAIN AND DAY TANKS, & 2" VENT PIPE. DIV.26 SHALL MAKE ALL INTERLOCKS TO GENERATOR CONTROL AND POWER SYSTEMS. EXISTING MAIN TANK LEVEL INDICATOR TO BE REUSED AND INTERLOCKED TO NEW DAY TANK CONTROLS.
- 3 PROVIDE NEW DUCT TRANSITION FROM NEW GENERATOR RADIATOR TO EXISTING EXHAUST SHAFT DUCT (54"x54"). FIELD MEASURE ALL FITTINGS. PROVIDE FLEXIBLE DUCT CONNECTOR (HIGH TEMP) BETWEEN GENERATOR RADIATOR AND DUCT TRANSITION. SEAL ALL DUCT WITH MASTIC.



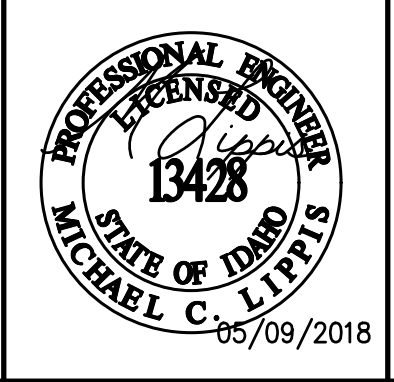
PLAN NORTH  
**SITE NEW WORK - MECHANICAL PLAN**  
 SCALE: NTS

PLAN NORTH  
**GENERATOR ROOM NEW WORK - MECHANICAL PLAN**  
 SCALE: NTS

REVISIONS		DRWN	ENGR	PROJ
REV	DATE	CHKD	APVL	APVL
0	05/10/2018	ALH	ST	



ENGR RECORD		
BY	DATE	
DRAWN	MCL	05/09/2018
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CHECKED	MCL	05/09/2018
PROJECT ENG	MCL	05/09/2018
APPROVED	MCL	05/09/2018



**Trindera ENGINEERING**  
 1875 N. LAKEWOOD DRIVE, SUITE #201  
 COEUR D'ALENE, IDAHO 83814  
 (208) 676-8001 (208) 676-0100

PROJECT	ITD GENERATOR REPLACEMENT
TITLE	NEW WORK MECHANICAL PLAN

PROJECT NUMBER	TRINDERA #18180   JTL #1810
ACAD FILE NAME	1810_MECH PLANS
SHEET	3
DWG NUMBER	M3
REV	A

SECTION 231113 - FACILITY FUEL-OIL PIPING

PART 1 - GENERAL

1.1 PERFORMANCE REQUIREMENTS

- A. Maximum Operating-Pressure Ratings: 3-psig (21-kPa) fuel-oil supply pressure at oil-fired appliances.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, and dimensions of individual components and profiles. Also include, where applicable, rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
  1. Piping specialties.
  2. Valves: Include pressure rating, capacity, settings, and electrical connection data of selected models.
  3. Day tank. Indicate dimensions, weights, loads, components, and location and size of each field connection.
  4. Fuel-oil transfer pumps.
  5. Fuel maintenance system.
  6. Liquid-level gage system.
  7. Leak-detection and monitoring system.

1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fuel-oil equipment and accessories to include in emergency, operation, and maintenance manuals.

1.5 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.6 WARRANTY

- 1. Storage Tanks:
  - a. Warranty Period: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
  1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
  2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M, for butt and socket welding.
  3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
  4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
    - a. Material Group: 1.1.
    - b. End Connections: Threaded or butt welding to match pipe.
    - c. Lapped Face: Not permitted underground.
    - d. Gasket Materials: Asbestos free, ASME B16.20 metallic, or ASME B16.21 nonmetallic, gaskets compatible with fuel oil.
    - e. Bolts and Nuts: ASME B18.2.1, cadmium-plated steel.
  5. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
    - a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.
- B. Drawn-Temper Copper Tube: Comply with ASTM B 88, Type K (ASTM B 88M, Type A).
  1. Copper Fittings: ASME B16.22, wrought copper, streamlined pattern.
  2. Bronze Flanges and Flanged Fittings: ASME B16.24, Class 150.
    - a. Gasket Material: Asbestos free, ASME B16.20, metallic, or ASME B16.21 nonmetallic, gaskets compatible with fuel oil.
    - b. Bolts and Nuts: ASME B18.2.1, cadmium-plated steel.
- C. Annealed-Temper Copper Tube: Comply with [ASTM B 88, Type K (ASTM B 88M, Type A)] [ASTM B 88, Type L (ASTM B 88M, Type B)].
  1. Copper Fittings: ASME B16.22, wrought copper, streamlined pattern.
  2. Flare Fittings: Comply with ASME B16.26 and SAE J513.
    - a. Copper fittings with long nuts.
    - b. Metal-to-metal compression seal without gasket.
    - c. Dryseal threads complying with ASME B1.20.3.

2.2 PIPING SPECIALTIES

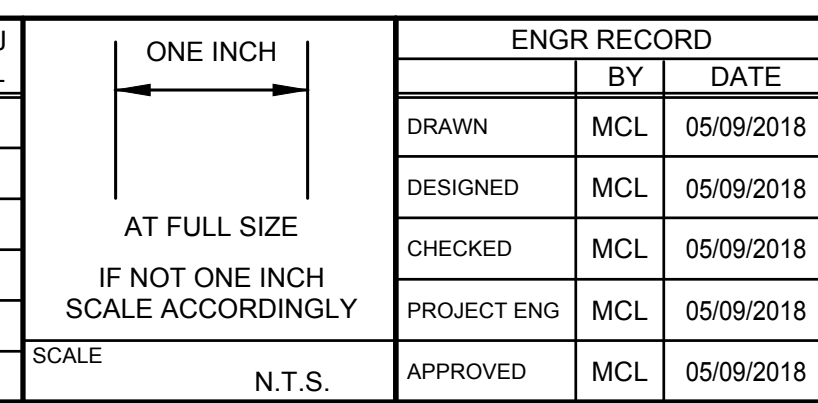
- A. Flexible Connectors: Comply with UL 567.
  1. Metallic Connectors:
    - a. Listed and labeled for aboveground and underground applications by an NRTL acceptable to authorities having jurisdiction.
    - b. Stainless-steel bellows with woven, flexible, bronze or stainless-steel, wire-reinforcing protective jacket.
    - c. Minimum Operating Pressure: 150 psig (1035 kPa).
    - d. End Connections: Socket, flanged, or threaded end to match connected piping.
    - e. Maximum Length: 30 inches (762 mm.)
    - f. Swivel end, 50-psig (345-kPa) maximum operating pressure.
    - g. Factory-furnished anode.
  2. Nonmetallic Connectors:
    - a. Listed and labeled for underground applications by an NRTL acceptable to authorities having jurisdiction.
    - b. PFTE bellows with woven, flexible, bronze or stainless-steel, wire-reinforcing protective jacket.
    - c. Minimum Operating Pressure: 150 psig (1035 kPa).
    - d. End Connections: Socket, flanged, or threaded end to match connected piping.
    - e. Maximum Length: 30 inches (762 mm.)

- f. Swivel end, 50-psig (345-kPa) maximum operating pressure.
- g. Factory-furnished anode.
- B. Y-Pattern Strainers:
  1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
  2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
  3. Strainer Screen: [60] [80]-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
  4. CWP Rating: 125 psig (860 kPa).
- C. Basket Strainers:
  1. Body: ASTM A 126, Class B, high-tensile cast iron with bolted cover and bottom drain connection.
  2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
  3. Strainer Screen: [60] [80]-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
  4. CWP Rating: 125 psig (860 kPa).
- D. T-Pattern Strainers:
  1. Body: Ductile or malleable iron with removable access coupling and end cap for strainer maintenance.
  2. End Connections: Grooved ends.
  3. Strainer Screen: [60] [80]-mesh startup strainer, and perforated stainless-steel basket with 57 percent free area.
  4. CWP Rating: 750 psig (5170 kPa).
- E. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.
  1. Body: Bronze, complying with ASTM B 584.
  2. Ball: Chrome-plated bronze.
  3. Stem: Bronze; blowout proof.
  4. Seats: Reinforced TFE; blowout proof.
  5. Packing: Threaded-body packnut design with adjustable-stem packing.
  6. Ends: Threaded, flared, or socket as indicated in the valve schedule.
  7. CWP Rating: 600 psig (4140 kPa).
  8. Service Mark: Initials "WOG" shall be permanently marked on valve body.
- 2.3 SPECIALTY VALVES
  - A. Pressure Relief Valves: Comply with UL 842.
    1. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
    2. Body: Brass, bronze, or cast steel.
    3. Springs: Stainless steel, interchangeable.
    4. Seat and Seal: Nitrile rubber.
    5. Orifice: Stainless steel, interchangeable.
    6. Maximum Inlet Pressure: 150 psig (1035 kPa).
    7. Relief Pressure Setting: 60 psig (414 kPa).
  - B. Oil Safety Valves: Comply with UL 842.
    1. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
    2. Body: Brass, bronze, or cast steel.
    3. Springs: Stainless steel.
    4. Seat and Diaphragm: Nitrile rubber.
    5. Orifice: Stainless steel, interchangeable.
    6. Manual override port.
    7. Maximum Inlet Pressure: 60 psig (414 kPa).
    8. Maximum Outlet Pressure: 3 psig (21 kPa).
  - C. Emergency Shutoff Valves: Comply with UL 842.
    1. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
    2. Poppet valve.
    3. Body: ASTM A 126, cast iron.
    4. Disk: FPM.
    5. Poppet Spring: Stainless steel.
    6. Stem: Plated brass.
    7. O-Ring: FPM.
    8. Packing Nut: PTFE-coated brass.
    9. Fusible link to close valve at 165 deg F (74 deg C).
    10. Thermal relief to vent line pressure buildup due to fire.
    11. Air test port.
    12. Maximum Operating Pressure: 0.5 psig (3.45 kPa).
  - D. Mechanical Leak Detector: Comply with UL 842.
    1. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
    2. Body: ASTM A 126, cast iron.
    3. O-Rings: Elastomeric compatible with fuel oil.
    4. Piston and Stem Seals: PTFE.
    5. Stem and Spring: Stainless steel.
    6. Piston Cylinder: Burnished brass.
    7. Indicated Leak Rate: Maximum 3 gph (3 mL/s) at 10 psig (69 kPa).
    8. Leak Indication: Reduced flow.
- 2.4 STEEL, FUEL-OIL DAY TANK
  - A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    1. Trամont
    2. Approved Equal.
  - B. Description: UL 142 double-wall, vertical, steel tank; with primary- and secondary-containment walls

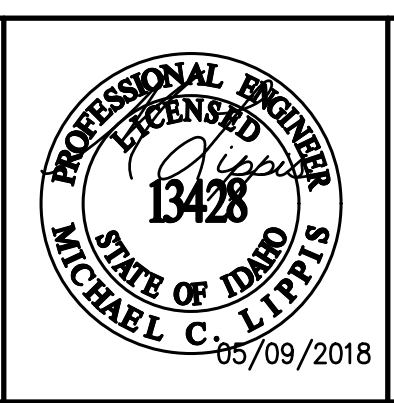
- and interstitial space.
- C. Construction: Fabricated with welded, carbon steel suitable for operation at atmospheric pressure and for storing fuel oil with specific gravity up to 1.1 and maintained temperature up to 150 deg F (66 deg C).
- 2.5 SIMPLEX FUEL-OIL TRANSFER PUMPS
  - A. Description: Comply with UL 343, and HI M109.
    1. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
    2. Type: Positive-displacement, rotary type.
    3. Housing: Carbonator Mounted.
    4. Bearings: Bronze, self-lubricating.
    5. Shaft: Polished steel.
    6. Seals: Mechanical.
    7. Base: Steel.
    8. Pressure Relief: Built in.
    9. Discharge Check Valve: Built in.
  - B. Drive: Direct, close coupled.
  - C. Controls:
    1. Run pump on seven-day schedule.
    2. Alarm motor failure.
    3. Manual reset dry-run protection. Stop pump if fuel level falls below pump suction.
    4. Deenergize and alarm pump locked rotor condition.
    5. Alarm open circuit, high and low voltage.
    6. Indicating lights for power on, run, and off normal conditions.
  - D. Motor: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
    1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
    2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.
- 2.6 LIQUID-LEVEL GAGE SYSTEM
  - A. Description: Calibrated, liquid-level gage system complying with UL 180 with floats or UL 1238 with probes or other sensors and remote annunciator panel.
  - B. Annunciator Panel: With visual and audible, high-tank-level and low-tank-level alarms, fuel indicator with registration in gallons (liters), and overflow alarm. Include gage volume range that covers fuel-oil storage capacity.
  - C. Controls: Electrical, operating on 120 V ac.
- 2.7 LEAK-DETECTION AND MONITORING SYSTEM
  - 1. Calibrated, leak-detection and monitoring system with probes and other sensors and remote alarm panel for fuel-oil storage tanks and fuel-oil piping.
  - 2. Include fittings and devices required for testing.
  - 3. Controls: Electrical, operating on 120V ac.
  - 4. Calibrated, liquid-level gage sensors and annunciator panel.
  - 5. Annunciator Panel: With visual and audible, high-tank-level and low-tank-level alarms, fuel indicator with registration in gallons (liters), and overflow alarm. Include gage volume range that covers fuel-oil storage capacity.
  - 6. Controls: Electrical, operating on 120V ac.
- PART 3 - EXECUTION
- 3.1 EXAMINATION
  - A. Examine roughing-in for fuel-oil piping system to verify actual locations of piping connections before equipment installation.
  - B. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.2 INDOOR PIPING INSTALLATION
  - A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
  - B. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.
  - C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
  - D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
  - E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
  - F. Install piping free of sags and bends.
  - G. Install fittings for changes in direction and branch connections.
  - H. Verify final equipment locations for roughing-in.
  - I. Comply with requirements for equipment specifications in plumbing and HVAC Sections for roughing-in requirements.
  - J. Conceal pipe installations in walls, pipe spaces, or utility spaces; above ceilings; below grade or floors; and in floor channels unless indicated to be exposed to view.
  - K. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
  - L. Connect branch piping from top or side of horizontal piping.
  - M. Install unions in pipes NPS 2 (DN 50) and smaller at final connection to each piece of equipment and elsewhere as indicated. Unions are not required on flanged devices.
  - N. Do not use fuel-oil piping as grounding electrode.
  - O. Install strainer on inlet side of fuel-oil pump.
- 3.3 VALVE INSTALLATION
  - A. Install manual fuel-oil shutoff valves on branch connections to fuel-oil appliance.
  - B. Install valves in accessible locations.

- C. Protect valves from physical damage.
- D. Install metal tag attached with metal chain indicating fuel-oil piping systems.
- E. Install pressure relief valves in distribution piping between the supply and return lines.
- F. Install one-piece, bronze ball valve with hose end connection at low points in fuel-oil piping.
- G. Install emergency shutoff valves at dispensers.
- 3.4 PIPING JOINT CONSTRUCTION
  - A. Ream ends of pipes and tubes and remove burrs.
  - B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
  - C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
    1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
    2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
  - D. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to "Quality Assurance" Article.
    1. Bevel plain ends of steel pipe.
    2. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.
  - E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.
  - F. Flanged Joints: Install gasket material, size, type, and thickness for service application. Install gasket concentrically positioned.
  - G. Flared Joints: Comply with SAE J513. Tighten finger tight, then use wrench according to fitting manufacturer's written recommendations. Do not overtighten.
- 3.5 FUEL-OIL DAY TANK INSTALLATION
  - A. Install tank bases and supports.
  - B. Connect piping and vent fittings.
  - C. Install ground connections.
  - D. Install tank leak-detection and monitoring devices.
  - E. Install steel ASTs according to STI R912.
  - F. Fill storage tanks with fuel oil.
- 3.6 LEAK-DETECTION AND MONITORING SYSTEM INSTALLATION
  - A. Install leak-detection and monitoring system. Install alarm panel inside building where indicated.
    1. Double-Wall, Fuel-Oil Storage Tanks: Use factory-installed integral sensors in interstitial space.
- 3.7 CONNECTIONS
  - A. Install piping adjacent to equipment to allow service and maintenance.
  - B. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment having threaded pipe connection.
  - C. Connect piping to equipment with ball valve and union. Install union between valve and equipment.
  - D. Install flexible piping connectors at final connection to burners or oil-fired appliances that must be moved for maintenance access.
- 3.8 FIELD PAINTING OF DAY TANK
  - A. Prepare and touch up damaged exterior surface of day tank and supports.
  - B. Prepare surface of AST and supports and apply painting systems according to tank manufacturers recommendations.
- 3.9 FIELD QUALITY CONTROL
  - A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
  - B. Perform tests and inspections.
    1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
  - C. Tests and Inspections:
    1. Piping: Minimum hydrostatic or pneumatic test-pressures measured at highest point in system:
      - a. Fuel-Oil Distribution Piping: Minimum [5 psig (34.5 kPa)] <Insert dimension> for minimum [30] <Insert time> minutes.
      - b. Suction Piping: Minimum 20-in. Hg (68 kPa) for minimum [30] <Insert time> minutes.
      - c. Isolate storage tanks if test pressure in piping will cause pressure in storage tanks to exceed 10 psig (69 kPa).
    2. Test liquid-level gage for accuracy by manually measuring fuel-oil levels at not less than four different depths while filling tank and checking against gage indication.
    3. Test leak-detection and monitoring system for accuracy by manually operating sensors and checking against alarm panel indication.
    4. Start fuel-oil transfer pumps to verify for proper operation of pump and check for leaks.
    5. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
    6. Bleed air from fuel-oil piping using manual air vents.
  - D. Fuel-oil piping and equipment will be considered defective if it does not pass tests and inspections.
  - E. Prepare test and inspection reports.
- 3.10 DEMONSTRATION
  - A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain all new systems.
- 3.11 INDOOR PIPING SCHEDULE
  - A. Aboveground fuel-oil piping shall be one of the following:
    1. NPS ¾ and smaller: Annealed-temper copper pipe, wrought copper fittings, and brazed or flared joints.
    2. NPS 1 and larger: Steel pipe, steel or malleable-iron threaded fittings, and threaded joints.

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DESIGNED	MCL	05/09/2018
CHECKED	MCL	05/09/2018
PROJECT ENG	MCL	05/09/2018
APPROVED	MCL	05/09/2018



1875 N. LAKEWOOD DRIVE, SUITE #201  
COEUR D'ALENE, IDAHO 83814  
(208) 676-8001 (208) 676-0100

PROJECT		PROJECT NUMBER
ITD GENERATOR REPLACEMENT		TRINDERA #18180   JTL #1810
TITLE		ACAD FILE NAME
SPECIFICATIONS DIVISIONS 22 & 23		SHEET 4
PLOT DATE: 05/09/2018		DWG NUMBER M4
COMPUTER GENERATED DRAWING NO MANUAL REVISIONS ALLOWED		REV A

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Single-wall rectangular ducts and fittings.
2. Single-wall round and oval ducts and fittings.
3. Sheet metal materials.
4. Duct liner.
5. Sealants and gaskets.
6. Hangers and supports.

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND AND OVAL DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
1. Galvanized Coating Designation: G90.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

2.4 DUCT LINER

- A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. CertainTeed Corporation; Insulation Group.
b. Johns Manville.
c. Knauf Insulation.
d. Owens Corning.
2. Maximum Thermal Conductivity:
a. Type I, Flexible: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
b. Type II, Rigid: 0.23 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
3. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
4. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
a. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
b. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
B. Insulation Pins and Washers:
1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin,

- fully annealed for capacitor-discharge welding, 0.106-inch diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

2.5 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
B. Water-Based Joint and Seam Sealant:
1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

2.6 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
H. Trapeze and Riser Supports:
1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
C. Install round ducts in maximum practical lengths.
D. Install ducts with fewest possible joints.
E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
D. Hangers Exposed to View: Threaded rod and angle or channel supports.
E. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials

3.3 CONNECTIONS

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.4 DUCT SCHEDULE

- A. Supply Ducts:
1. Ducts Connected to Constant-Volume Air-Handling Units:
a. Pressure Class: Positive 2-inch wg., Minimum SMACNA Seal Class: A, SMACNA Leakage Class for Rectangular: 6, SMACNA Leakage Class for Round: 6.
B. Return Ducts:
1. Ducts Connected to Air-Handling Units:
a. Pressure Class: Positive 2-inch wg., Minimum SMACNA Seal Class: A, SMACNA Leakage Class for Rectangular: 6, SMACNA Leakage Class for Round: 6.
C. Exhaust Ducts:
1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
a. Pressure Class: Negative 1-inch wg., Minimum SMACNA Seal Class: A if negative pressure, and A if positive pressure, SMACNA Leakage Class for Rectangular: 12, SMACNA Leakage Class for Round and Flat Oval: 6.
D. Liner:
1. Supply Air Ducts: Fibrous glass, Type I, 1 inch thick, Return Air Ducts: Fibrous glass, Type I, 1 inch thick, Transfer Ducts: Fibrous glass, Type I, 1 inch thick.

END OF SECTION 233113

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
1. Flange connectors.
2. Turning vanes.
3. Flexible connectors.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
1. Galvanized Coating Designation: G90.
2. Exposed-Surface Finish: Mill phosphatized.
B. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.
2.2 FLANGE CONNECTORS
A. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.
B. Material: Galvanized steel.
C. Gage and Shape: Match connecting ductwork.

2.3 TURNING VANES

- A. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
B. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."
C. Vane Construction: Single wall.

2.4 FLEXIBLE CONNECTORS

- A. Materials: Flame-retardant or noncombustible fabrics.
B. Coatings and Adhesives: Comply with UL 181, Class 1.
C. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.
D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
1. Minimum Weight: 26 oz./sq. yd..
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

PART 3 - EXECUTION

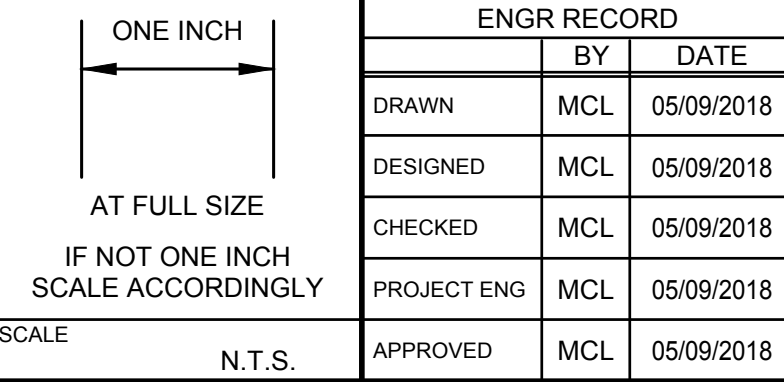
3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts.
B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
C. Install flexible connectors to connect ducts to equipment.

END OF SECTION 233300

Table with columns: REV, DATE, DESCRIPTION, DRWN, ENGR, PROJ. Row 0: 05/10/2018, ISSUED FOR BID.

Table with columns: DRWN, ENGR, PROJ. Row 1: ALH, ST.



ENGR RECORD table with columns: BY, DATE. Rows: DRAWN MCL 05/09/2018, DESIGNED MCL 05/09/2018, CHECKED MCL 05/09/2018, PROJECT ENG MCL 05/09/2018, APPROVED MCL 05/09/2018.

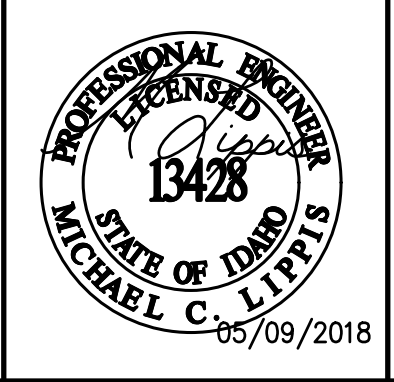


Table with columns: PROJECT, TITLE. Project: ITD GENERATOR REPLACEMENT. Title: SPECIFICATIONS DIVISIONS 22 & 23.

Table with columns: PROJECT NUMBER, ACAD FILE NAME, SHEET, DWG NUMBER, REV. Project Number: TRINDERA #18180 | JTL #1810. Sheet: 5. DWG Number: M5. Rev: A.