

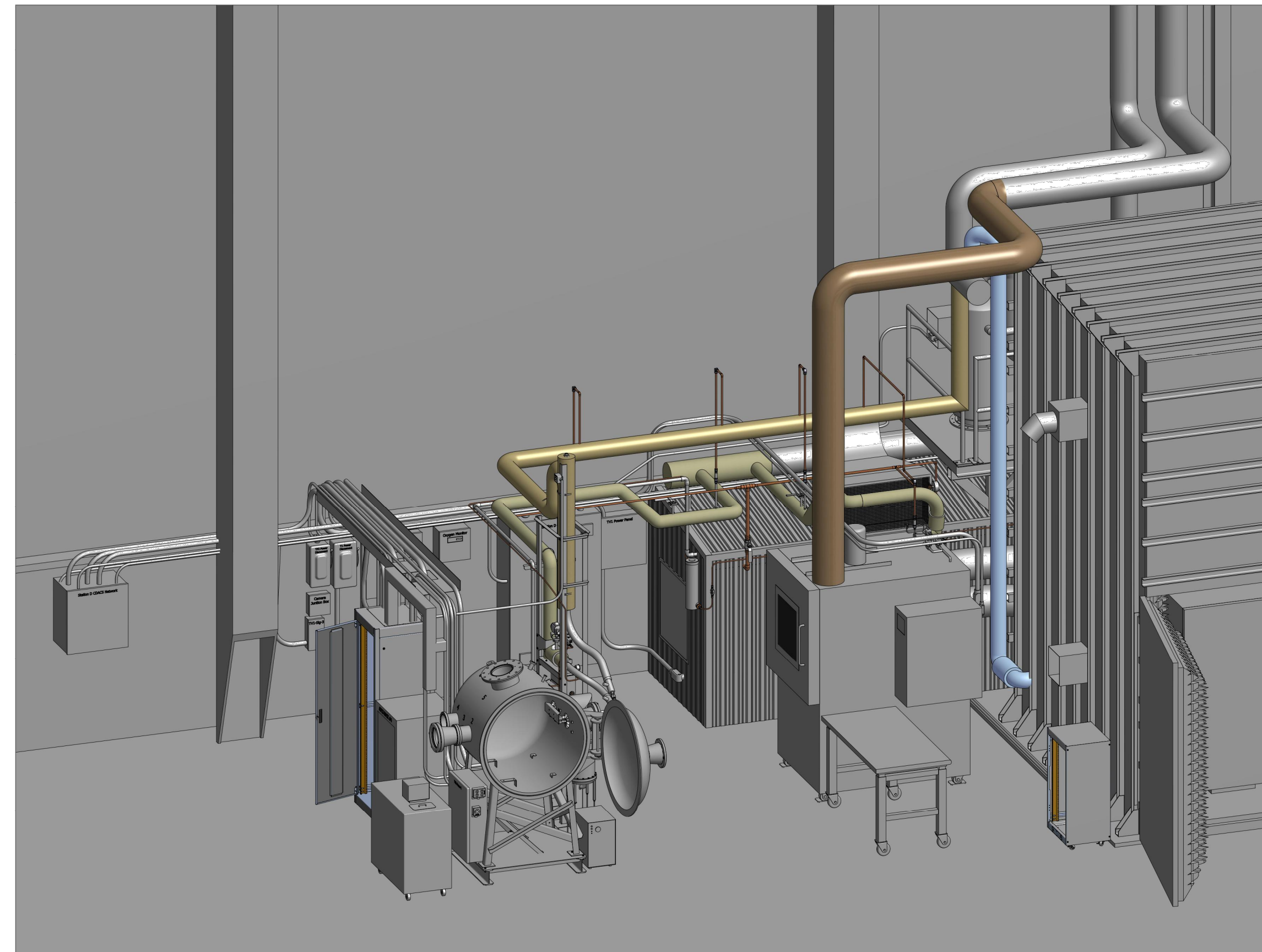
DAVID FLORIDA LABORATORY

BUILDING 65, SHIRLEY'S BAY

Yves Saulnier

Executive Director, Corporate Services & Human Resources

TQF TV1 / TP2 REFIT



DRAWING LIST

ARCHITECTURAL

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- A2 - EQUIPMENT & SERVICES SUPPORTS
- A3 - EQUIPMENT LOCATION & ANCHORAGE

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- M1 - MECH NOTES, LEGEND & INSULATION DETAILS
- M2 - TV1 & TP2 CONDITIONER PLUMBING
- M3 - TP2 CHAMBER & CONDITIONER VENTS
- M4 - TV1 CMP VENT
- M5 - TV1 CMP & TP2 CONDITIONER LN2
- M6 - TV1 & TP2 GN2
- M7 - TV1 COMP. AIR, PNEUMATIC & PUMP EXHAUST

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- E2 - TP2 CHAMBER & CONDITIONER WIRING SCHEMATIC
- E3 - TV1 WIRING SCHEMATIC
- E4 - ELECTRICAL PARTS SCHEDULE
- E5 - TV1 & TP2 POWER & SIGNAL
- E6 - TV1 & TP2 POWER & SIGNAL

YVES GUINDON
MANAGER, SECURITY AND FACILITIES

M. FARID, P. Eng.
PROJECT MANAGER

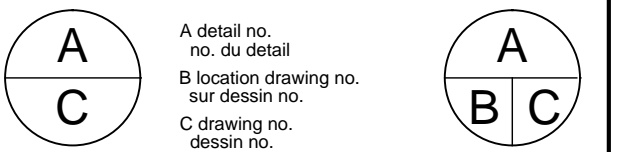
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| No. | REVISION | Date |
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| 5. | | |
| 4. | | |
| 3. | ISSUED FOR TENDER | SEPT, 14 |
| 2. | ISSUED FOR FINAL REVIEW | SEPT, 14 |
| 1. | ISSUED FOR REVIEW | AUG, 14 |

PROFESSIONAL STAMP



project / projet
DAVID FLORIDA LABORATORY
 BUILDING No. 65, SHIRLEY'S BAY, ONTARIO
TQF TV1 / TP2 REFIT

drawing / dessin
COVER SHEET

designed / conçu

date

drawn / dessiné
TQF / B-OPS

date

reviewed / examiné

date

approved / approuvé

date

scale

project no. / no. du projet
CSA13-G1

drawing no. / no. du dessin
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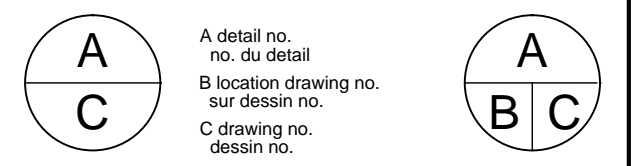
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PROFESSIONAL STAMP



project **DAVID FLORIDA LABORATORY** project
BUILDING No. 65, SHIRLEY'S BAY, ONTARIO
TQF TV1 / TP2 REFIT

drawing **ARCHITECTURAL NOTES & PROJECT MAIN EQUIPMENT** dessin

designed **TQF** conceu

drawn **TQF / B-OPS** dessiné

reviewed **TQF** examiné

approved **TQF** approuvé

scale **N.T.S.**

project no. **CSA13-G1** no. du projet

drawing no. **A1** no. du dessin

| ABBREVIATIONS | |
|---------------|--|
| CSA | CANADIAN SPACE AGENCY |
| DFL | DAVID FLORIDA LABORATORY |
| B-OPS | BUILDING OPERATIONS & SECURITY GROUP |
| TQF | THERMAL QUALIFICATION FACILITY GROUP |
| TV1 | THERMAL VACUUM CHAMBER #1 |
| TCU | THERMAL CONDITIONING UNIT |
| TP2 | THERMAL / PIM CHAMBER #2 |
| LN2 | LIQUID NITROGEN |
| GN2 | GASEOUS NITROGEN |
| CMP | CONTAMINATION MONITORING PLATE |
| CDACS | COMBINED DATA ACQUISITION & CONTROL SYSTEM |
| TRAPS | THERMAL RESPONSE AND POWER SYSTEM |
| ATCS | AUTOMATED THERMAL CONTROL SYSTEM |
| HAAKE | CLOSED LOOP REFRIGERATED CIRCULATOR |



TEMPORARY TARP INSTALLED AT PROJECT AREA IN SWING SPACE, CONTRACTOR TO MODIFY & SEAL IT AS REQUIRED PRIOR TO CONSTRUCTION. **VIEW 1 A1**



OVERALL VIEW OF TV1 & TP2 CONDITIONER UNITS IN SWING SPACE AREA (NOT POSITIONED IN PLACE) **VIEW 2 A1**

- GENERAL ARCHITECTURAL & PARTITION NOTES:**
- THESE DRAWINGS MUST BE READ IN CONJUNCTION WITH ALL ISSUED CONTRACT SPECIFICATIONS, ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL DRAWINGS, EXCEPT WHERE REPLACED OR CHANGED BY DIRECTIVE OR CORRECTIVE ADDENDA OR REVISED DRAWINGS AND SPECIFICATIONS.
- PAY FOR ALL NECESSARY PERMITS AND FEES REQUIRED TO BE PERFORMED BY LOCAL AUTHORITIES HAVING JURISDICTION INCLUDING INSPECTION AND TESTING. TURN OVER TO THE OWNER ORIGINAL APPROVAL DOCUMENTATION & CERTIFICATES. APPLICATION TO THE CITY OF OTTAWA FOR THE BUILDING PERMIT ONLY BY OWNER.
- ALL WORK UNDER THIS CONTRACT SHALL AS A MINIMUM BE IN FULL COMPLIANCE WITH LATEST EDITION OF THE FOLLOWING CODES:
 - ONTARIO BUILDING CODE,
 - ONTARIO ELECTRICAL SAFETY CODE, ONTARIO FIRE CODE,
 - ONTARIO PLUMBING CODE, NFPA-13 & ASHRAE 90.1
- IMMEDIATELY AFTER AWARDING THE CONTRACT, CONTRACTOR TO CHECK THE AVAILABILITY & DELIVERY TIMES OF ALL SUPPLIED ARCHITECTURAL, STRUCTURAL, MECHANICAL & ELECTRICAL ITEMS. PROVIDE CSA PROJECT MANAGER WITH PROJECT SCHEDULE, CRITICAL PATH OF TASKS, COMPLETE SHOP DRAWINGS, INTERFERENCE DRAWINGS, PRODUCT DATA ON MANUFACTURED ITEMS, SAMPLES, MOCK-UPS AND OTHER INFORMATION TO CONFIRM THE CONTRACTOR'S UNDERSTANDING OF THE DESIGN INTENT DOCUMENTS PRIOR TO UNDERTAKING THOSE PORTIONS OF THE WORK. PROVIDE AN UPDATED WEEKLY SCHEDULE BY END OF EACH WEEK.
- THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ARCHITECTURAL, STRUCTURAL, MECHANICAL, ELECTRICAL AND PLUMBING WORK. BE RESPONSIBLE FOR ALL FLOOR CUTTING, CORE DRILLING, ALL CHASES, OPENINGS AND PATCHING AS MAY BE REQUIRED BY ALL SUB TRADES WHO MAY OR MAY NOT BE UNDER HIS CONTRACT AGREEMENTS.
- ALL DIMENSIONS SHALL BE VERIFIED ON SITE. DIMENSIONS SHOWN ON DRAWINGS ARE IN INCHES.
- UNLESS NOTED OTHERWISE, ALL DIMENSIONS SHOWN ARE FROM FINISHED FACES TO FINISHED FACE OF WALLS, CEILINGS AND OTHER SURFACES REFERRED. DIMENSIONS INDICATED AS CLEAR DIMENSIONS SHALL BE FROM FINISHED SURFACES.
- ALL ISSUED DOCUMENTS ARE DESIGN INTENT DOCUMENTS. THEY ARE INTENDED TO CONVEY THE INTENDED FINAL NEW CONDITIONS.
- REVIEW ALL CONSTRUCTION DOCUMENTS, IF ANY DISCREPANCY OCCURS ON THE ENGINEER'S DRAWINGS, THE CONTRACTOR SHALL - DURING TENDERING - ASSUME THE LARGER / GREATER. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
- EXAMINE THE SITE TO DETERMINE THE FULL EXTENT OF THE PROJECT. REFER TO BOUNDARIES ON THE PLAN. CONTRACTOR IS STRONGLY RECOMMENDED TO VISIT THE SITE BEFORE BIDDING THE PROJECT TO DETERMINE THE EXTENT OF ANY REMOVALS, MODIFICATIONS, CUTTING AND PATCHING IN SERVICES, FLOORS, WALLS, CEILING AND ROOF.
- CONTRACTOR SHOULD BE LICENSED TO PERFORM ALL WORK SHOWN IN THE DRAWINGS INCLUDING DEMOLITION. CERTIFICATE OF DISPOSAL TO BE ISSUED TO OWNER AFTER REMOVALS ARE DONE.
- CONTRACTOR IS RESPONSIBLE FOR HEALTH AND SAFETY OF WORKERS, BUILDING OCCUPANTS, AND BUILDING. COMPLY WITH THE ONTARIO OCCUPATIONAL HEALTH AND SAFETY ACT.
- GENERAL CONTRACTOR SHALL BE RESPONSIBLE TO KEEP THE OWNER'S ACCESS AREAS CLEAN. REMOVE GARBAGE / DEBRIS AND CLEAN DAILY AS REQUIRED AND UPON COMPLETION. GENERAL CONTRACTOR SHALL REMOVE ALL PROTECTIVE MATERIALS AND TO HAVE PROFESSIONAL CLEANING SERVICE TO CLEAN AND WIPE DOWN ALL EQUIPMENT, WINDOWS, DOORS, WALLS, FLOORS, CEILINGS & MILLWORK UPON COMPLETION.
- CSA SHALL BE GIVEN THE OPTION OF RETAINING ANY REMOVED PARTS, COMPONENTS OR EQUIPMENT. COORDINATE AND HAND OVER TO OWNER AS NECESSARY. DISPOSE OF ANY REMAINING UNWANTED EQUIPMENT OR SERVICES AND REMOVE OFF SITE.
- REMOVE ALL DEMOLITION AND CONSTRUCTION WASTE FROM SITE ON DAILY BASIS. DO NOT USE CSA WASTE CONTAINERS. AN AREA WILL BE DESIGNATED FOR LOCATING CONTRACTOR WASTE BINS.
- DO NOT DAMAGE EXISTING FIRE SEPARATIONS AND FIRE PROTECTIONS IN THE PROJECT AREAS. ANY DAMAGES INCURRED BY THIS CONTRACT TO EXISTING FIRE SEPARATIONS AND PROTECTIONS SHALL BE RESTORED TO THE ORIGINAL CONDITIONS TO MEET REQUIRED RATING AND CODES AT NO ADDITIONAL COSTS TO THE PROJECT.
- UNDER ANY CIRCUMSTANCES, DO NOT BLOCK REQUIRED ACCESS TO EXITS AND FIRE ESCAPE ROUTES DURING THE PROJECT DURATION. ALL EXISTING LIFE SAFETY SYSTEMS AND INDICATORS SHALL BE OPERATIONAL AT ALL TIMES.
- GENERAL CONTRACTOR TO PROTECT ALL ARCHITECTURAL FINISHES, FLOORS, BUILDING & TESTING EQUIPMENT DURING CONSTRUCTION AND SHALL BE RESPONSIBLE FOR ANY DAMAGES RESULTING FROM THE PROJECT'S WORK. THE CONTRACTOR SHALL MAKE GOOD ALL DAMAGED SURFACES INCLUDING ANY PAINT TOUCH-UPS REQUIRED. REPAIR ALL WALLS AND FLOORS IN CORE AREA WHERE MECHANICAL, PLUMBING, POWER, VOICE AND DATA PASS THROUGH.
- CORE DRILL / CUT CONCRETE AND METAL FLOORS AS REQUIRED TO PERMIT INSTALLATION OF ALL NEW SERVICES AS PER DRAWINGS AND OWNER INSTRUCTIONS & REQUESTS. JACK HAMMERING IS NOT ALLOWED. PATCH & INFILL ABANDONED / UNUSED HOLES WITH HIGH STRENGTH NON-SHRINK GROUT AND REINFORCE WITH WIRE MESH AS REQUIRED.
- ACCESS TO THE SITE FOR MATERIAL, WORK FORCES AND FOR WASTE REMOVAL IS TO BE COORDINATED WITH CSA PROJECT MANAGER, USE ONLY ELEVATORS DESIGNATED BY CSA AND PROTECT THEM FROM DAMAGE.
- CSA WILL PROVIDE SECURITY ESCORTS. PROVIDE AT LEAST 48 HOURS NOTICE OF WHEN WORKERS WILL BE ON SITE TO ALLOW FOR SECURITY ESCORTS. NOTIFY CSA IMMEDIATELY OF ANY CHANGE IN SCHEDULE THAT AFFECTS THE NEED FOR SECURITY ESCORTS.
- UNLESS NOTED OTHERWISE, CARRY OVER THE SAME PARTITION DETAILS OVER DOOR OPENINGS AND SIDELIGHT OPENINGS. BRACE WALLS AND DOOR FRAMES AS REQUIRED.
- UNLESS INDICATED OTHERWISE, ALL DOORS TO BE LOCATED 6" FROM THE ADJACENT WALL FACE TO INSIDE OF HINGED DOOR JAMB.
- CONTRACTOR TO PROVIDE ALL REQUIRED BLOCKING IN WALL AND CEILING WHERE HEAVY LOADING IS ANTICIPATED. THESE BLOCKING AND REINFORCEMENTS MAY NOT BE SHOWN ON DRAWINGS AND DETAILS. ALL REINFORCEMENTS IN CEILING PLENUM AREAS SHALL BE OF NON-COMBUSTIBLE AND SHALL NOT GENERATE AIRBORNE PARTICLES.
- CONTRACTOR TO PROVIDE FULL DRAWINGS, SKETCHES & SPECIFICATIONS FOR ALL PROPOSED SERVICES SUPPORTS, ANCHORS & HANGERS UNDER THIS PROJECT SCOPE FOR PROJECT MANAGER AND TQF GROUP APPROVALS BEFORE COMMENCING ANY WORK.
- CONTRACTOR TO SUPPORT ALL SERVICES SHOWN ON THIS PROJECT SCOPE FROM BUILDING STRUCTURAL MEMBERS, SUPPORT ALL MECHANICAL PIPING USING CLEVIS HANGERS AT ADEQUATE SPACING TO INSURE NO SAG OR FAILURE OF JOINTS, DO NOT USE PERFORATED BAND, WIRE CHAIN OR SOLID RING TYPE HANGERS. ISOLATE COPPER PIPE FROM HANGER OR OTHER PIPING WHERE ELECTROLYTIC ACTION CAN OCCUR. ADEQUATELY BRACE PIPING AND ALLOW FOR EXPANSION OR CONTRACTION. PROVIDE EXPANSION LOOPS OR JOINTS SIZED TO COMPENSATE FOR CHANGES IN PIPE LENGTH CAUSED BY A TEMPERATURE DIFFERENTIAL OF 200°C. ALL SUPPORTS & HANGERS TO BE HOT DIPPED GALVANIZED OR ZINC ELECTROPLATED.
- CONTRACTOR TO PROVIDE FULL SYSTEM OF SUPPORTS AND HANGERS COMPLETE WITH ALL NECESSARY BRACKETS, BASE PLATES, INSERTS, FASTENERS, RODS AND ALL OTHER ACCESSORIES IN ACCORDANCE WITH MSS SP-58 AND TO MATCH EXISTING BUILDING SUPPORTS. ALL SUPPORTS & HANGERS TO BE E. MYATT, ITT GRINNELL OR APPROVED EQUAL.
- NO SUPPORTS IS ALLOWED FROM SWING SPACE OWSJ CEILING, MINIMIZE FLOOR SUPPORTS AND LIMIT TO WITHIN 10" MAX FROM EQUIPMENT OR WALLS TO MAXIMISE FLOOR WORK AREA (SUBJECT TO B-OPS / TQF APPROVAL). USE PAINTED STEEL L BRACKETS & AIRCRAFT GALVANIZED CABLES AS REQUIRED, WELD L BRACKETS TO BUILDING WALL STRUCTURAL BEAMS, NO DRILLING IS ALLOWED, ALL STEEL TO BE PRIMED AND PAINTED, COLOR TO MATCH EXISTING. ANCHORING TO BUILDING INTERIOR SIDING SHEETS IS NOT ALLOWED.
- PROVIDE AS-BUILT DRAWINGS TO RECORD ANY DEVIATIONS FROM THE DESIGN INTENT DRAWINGS.
- WORK UNDER THIS PROJECT MAYBE CONDUCTED IN A CLEANROOM ENVIRONMENT, MANDATING SPECIAL MEASURES TO BE TAKEN TO REDUCE LABORATORY DISRUPTION. CLASS 100,000 CLEANROOM STANDARDS ARE TO BE MET FOR THE AREA SURROUNDING CONSTRUCTION AT ALL TIMES AND ARE SUBJECT TO VERIFICATION.
- EXACT TARPING LIMITS AND ACCESS ROUTES TO BE DETERMINED ON-SITE IN COORDINATION WITH CSA.
- ALL TARPS TO BE WHITE, TIGHT SEALED FROM CEILING TO FLOOR, USE HEAVY DUTY COMMERCIAL DOUBLE SIDED TAPE TO SECURE METAL STUDS TO FLOORS, WALLS & CEILINGS AS REQUIRED, NO WOOD MATERIALS TO BE USED IN TARPS CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR CLEANING, PATCHING, REPAIRING & PAINTING ALL DAMAGED SURFACES & TAPE MARKS AFTER REMOVING TARPS.
- WEEKEND AND/OR AFTER HOURS SHUTDOWNS TO BE SCHEDULED IN AGREEMENT WITH CSA PROJECT MANAGER. ALLOW FOR AT LEAST 48 HOURS NOTICE IN ADVANCE.
- PROVIDE 12" X 12" ACCESS DOORS TO ALL RECESSED PLUMBING, HVAC AND ELECTRIC FIXTURES.
- APPLY SMOOTH BEAD OF CAULKING AS REQUIRED FOR ANY ARCHITECTURAL FINISHES AND TO DOOR FRAMES, MOLDINGS, ETC....
- AT THE END OF CONSTRUCTION, CONTRACTOR TO PAINT ALL WALLS & CEILINGS WITHIN CONSTRUCTION BOUNDARIES, COLOR & FINISH TO MATCH EXISTING.
- WORK UNDER THIS PROJECT MAYBE CONDUCTED AT ELEVATIONS IN EXCESS OF 15m± (50 ft ±). CONTRACTOR MUST ENSURE THAT ALL STAFF & SUB CONTRACTORS ARE TRAINED IN ELEVATED WORK AND FALL PROTECTION.
- DO NOT SUBJECT ANY PART OF THE BUILDING TO ANY NOISE, DUST OR ANY OTHER UNACCEPTABLE ENVIRONMENTAL CONDITIONS DURING THE COURSE OF THE PROJECT. ANY NOISY / DUSTY / SMELLY ACTIVITIES SHALL BE DONE AFTER HOURS OR AT WEEKENDS, COORDINATE WITH CSA PROJECT MANAGER WITH A MINIMUM NOTICE OF 48 HOURS.

YVES GUINDON
MANAGER, SECURITY AND FACILITIES

M. FARID, P. Eng.
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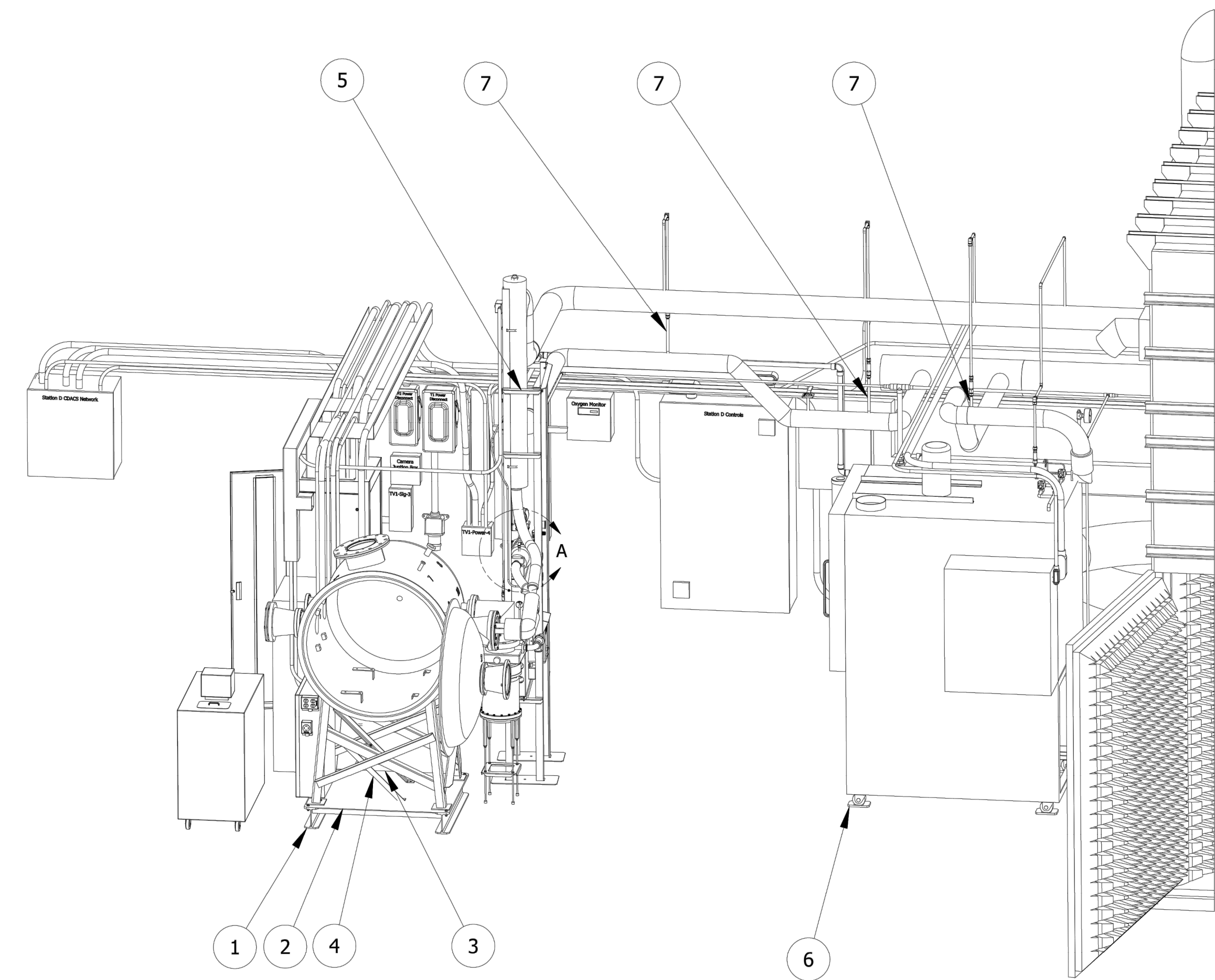
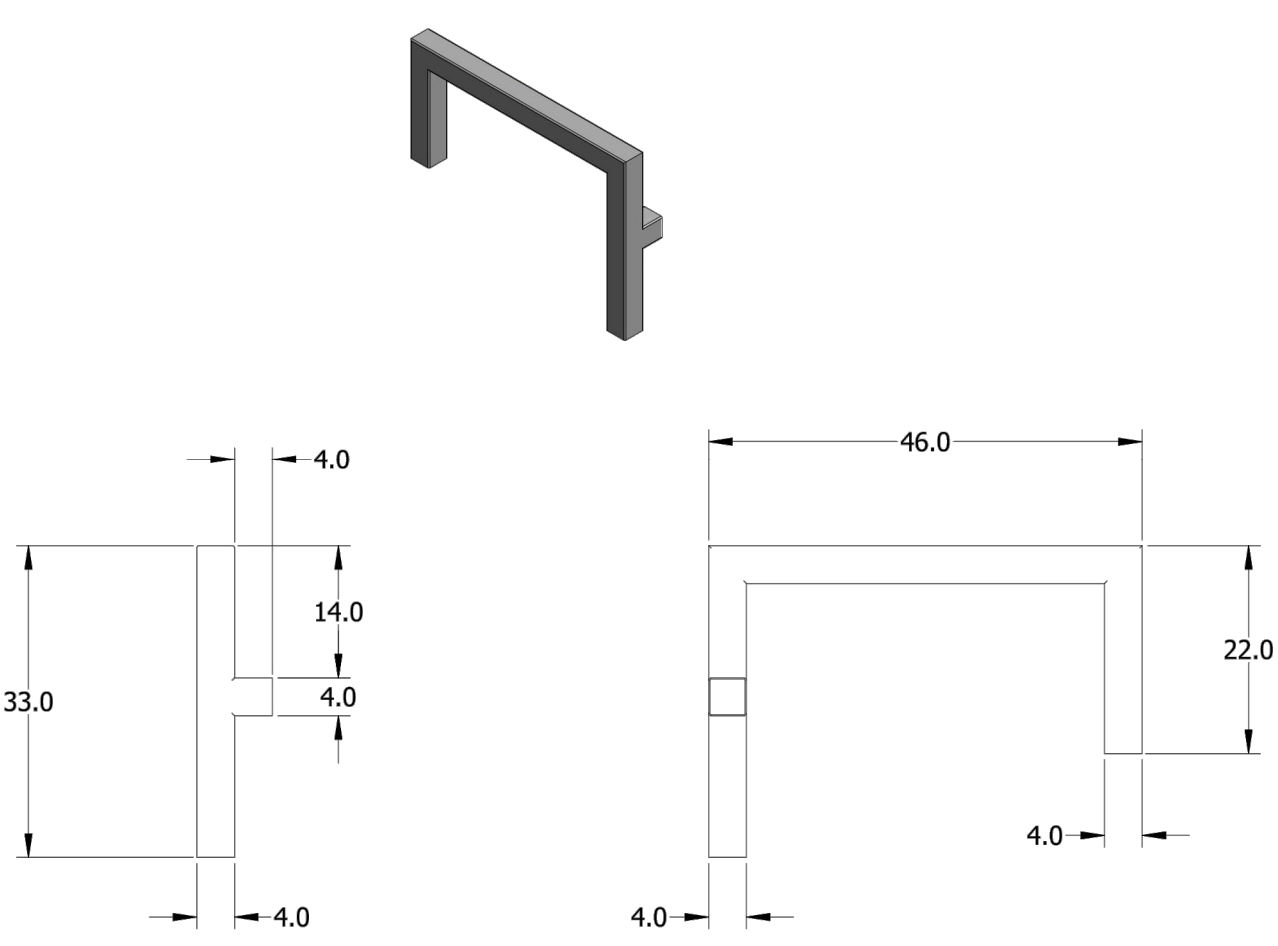
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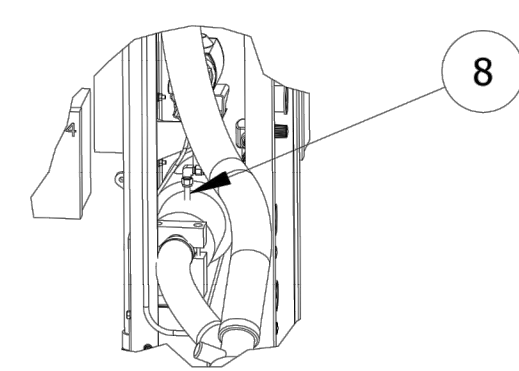
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TV1 Trough

ELECTRICAL TROUGH SUPPLIED BY OWNER, FULLY INSTALLED BY CONTRACTOR



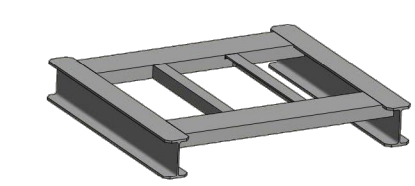
| ITEM | QTY | PARTS LIST PART NAME | SUPPLIED BY |
|------|-----|---|-------------|
| 1 | 1 | TV1 Chamber Base | Owner |
| 2 | 1 | TV1 Chamber Base Cover Plate | Owner |
| 3 | 1 | TV1 Rear Panel | Owner |
| 4 | 1 | TV1 Power-1 Bracket Assembly | Owner |
| 5 | 1 | TV1 Utility Support Assembly | Owner |
| 6 | 4 | TP2 Conditioner Wheel Pad | Owner |
| 7 | 3 | PRV SS 3/4" OD Tube, modify from McMaster 89895K762 | Owner |
| 8 | 1 | TV1 CMP Purge SS 3/8" OD Tube, modify from McMaster 9157K91 | Owner |



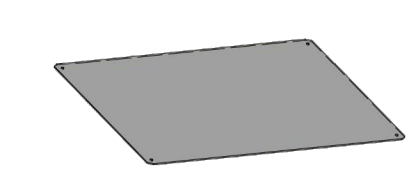
DETAIL A

NOTES:

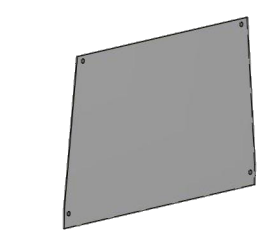
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- ALL PARTS SUPPLIED BY OWNER TO BE FULLY INSTALLED, SUPPORTED & ANCHORED BY CONTRACTOR.



Item 1



Item 2



Item 3



Item 4



Item 5



Item 6

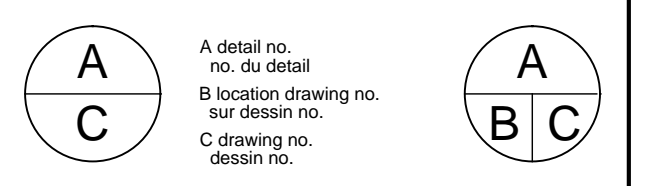


Item 7



Item 8

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BUILDING No. 65, SHIRLEY'S BAY, ONTARIO
TQF TV1 / TP2 REFIT

drawing / dessin
EQUIPMENT & SERVICES SUPPORTS

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A2

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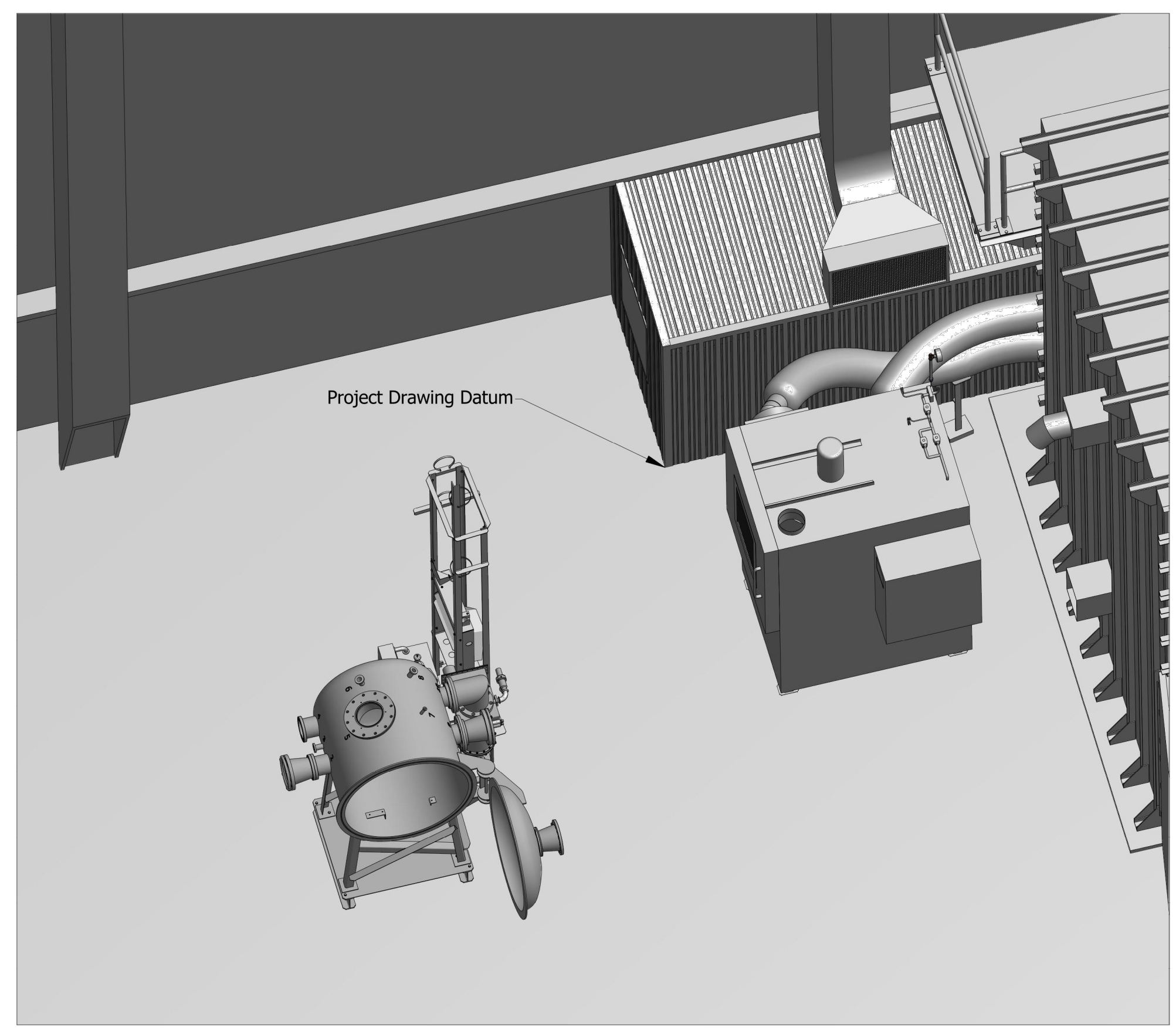
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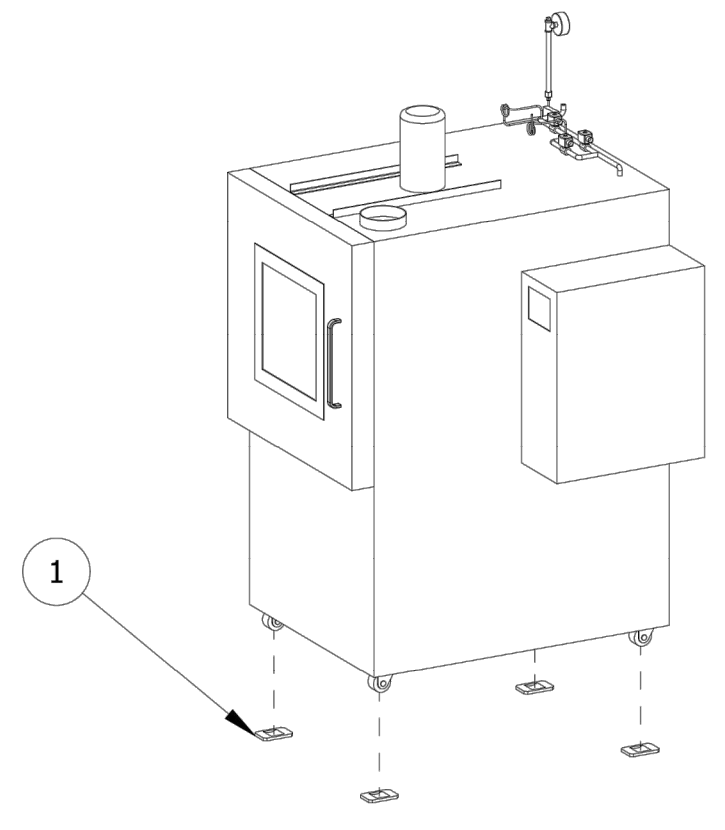
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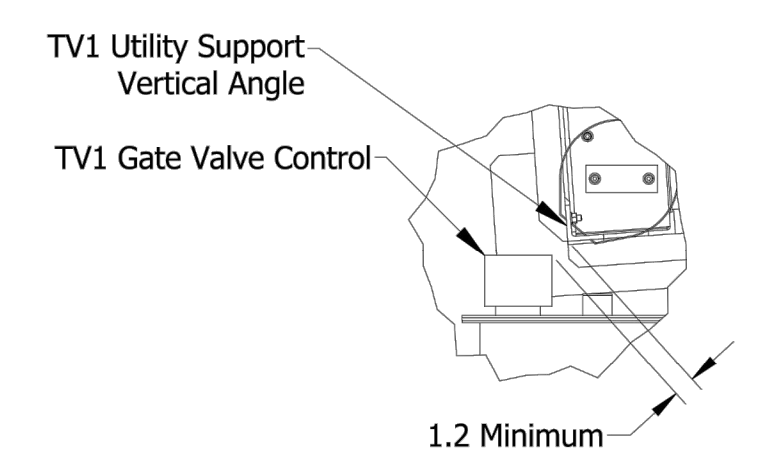
| | | PARTS LIST | |
|------|-----|-----------------------|-------------|
| ITEM | QTY | PART NAME | SUPPLIED BY |
| 1 | 4 | Conditioner Wheel Pad | Owner |



Preparation of TP2 Conditioner

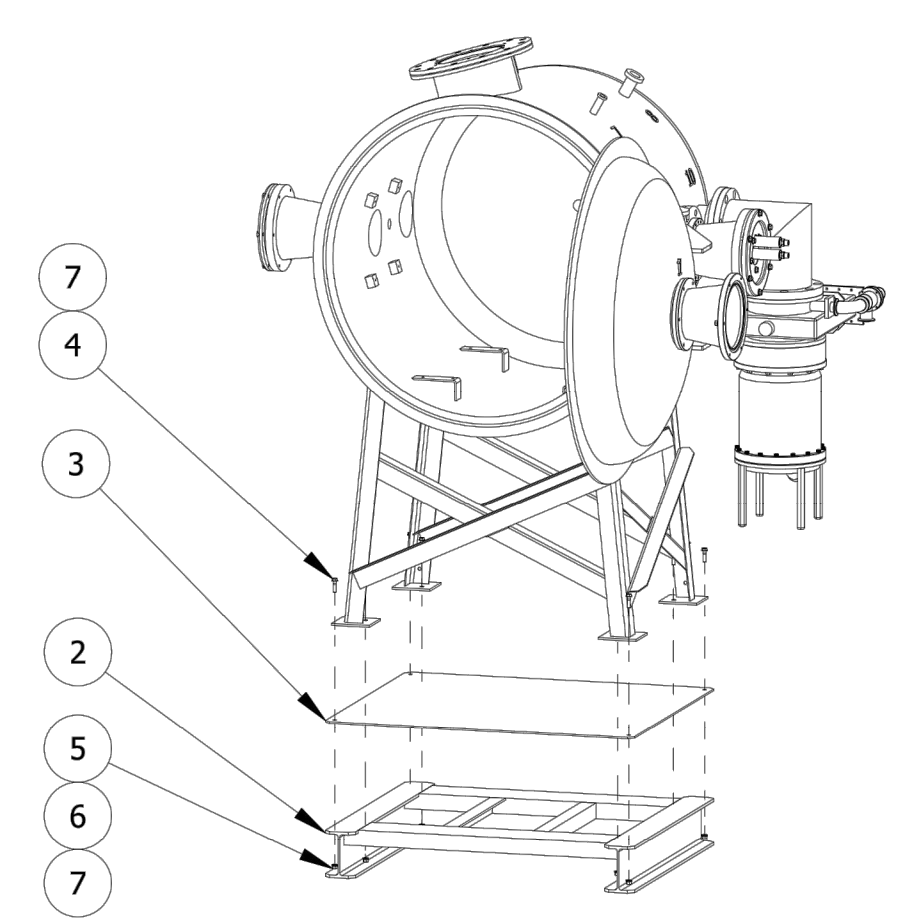
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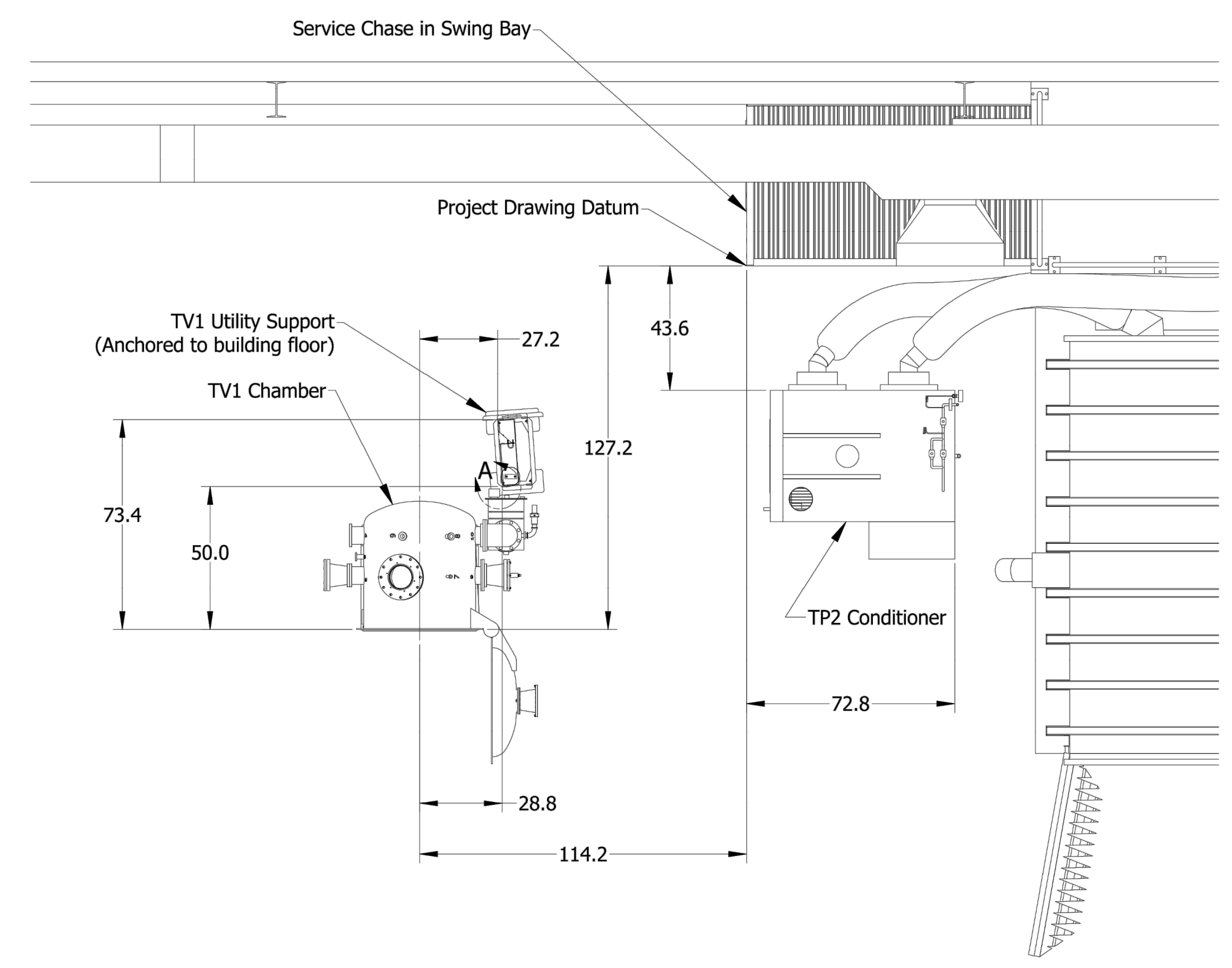


DETAIL A
(Keep Utility Support at least 1.2" away from TV1 Gate Valve Control)

| | | PARTS LIST | |
|------|-----|--|-------------|
| ITEM | QTY | PART NAME | SUPPLIED BY |
| 2 | 1 | TV1 Base Weldment Assembly | Owner |
| 3 | 1 | TV1 Base Cover Sheet | Owner |
| 4 | 8 | 3/8"-16 UNC SS Hex Head Bolt 1.5" Length | Contractor |
| 5 | 8 | 3/8"-16 UNC SS Hex Head Nut | Contractor |
| 6 | 8 | 3/8" SS Split Washer | Contractor |
| 7 | 16 | 3/8" SS Flat Washer | Contractor |



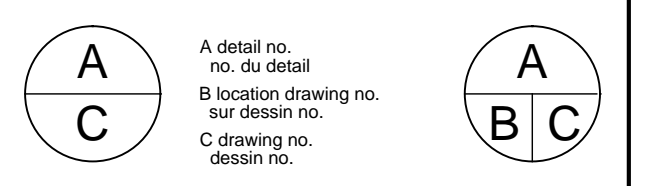
Preparation of TV1



New Positions of TV1 and TP2 Conditioner

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project
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TQF TV1 / TP2 REFIT

drawing
EQUIPMENT LOCATION & ANCHORAGE

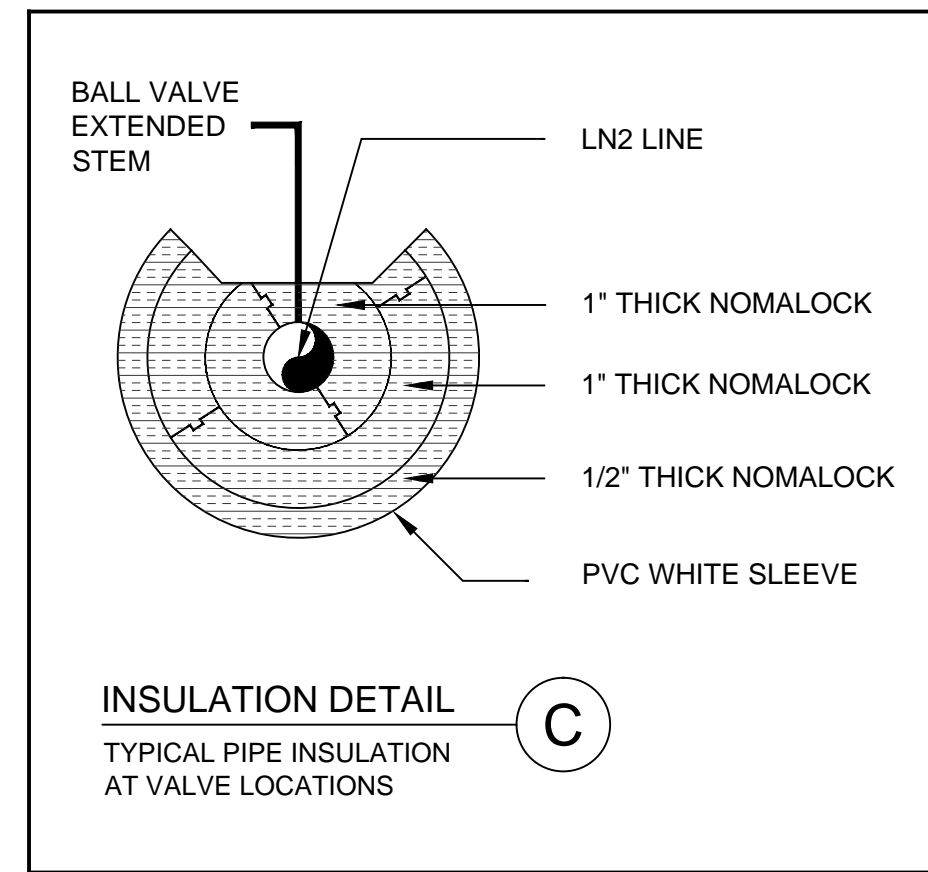
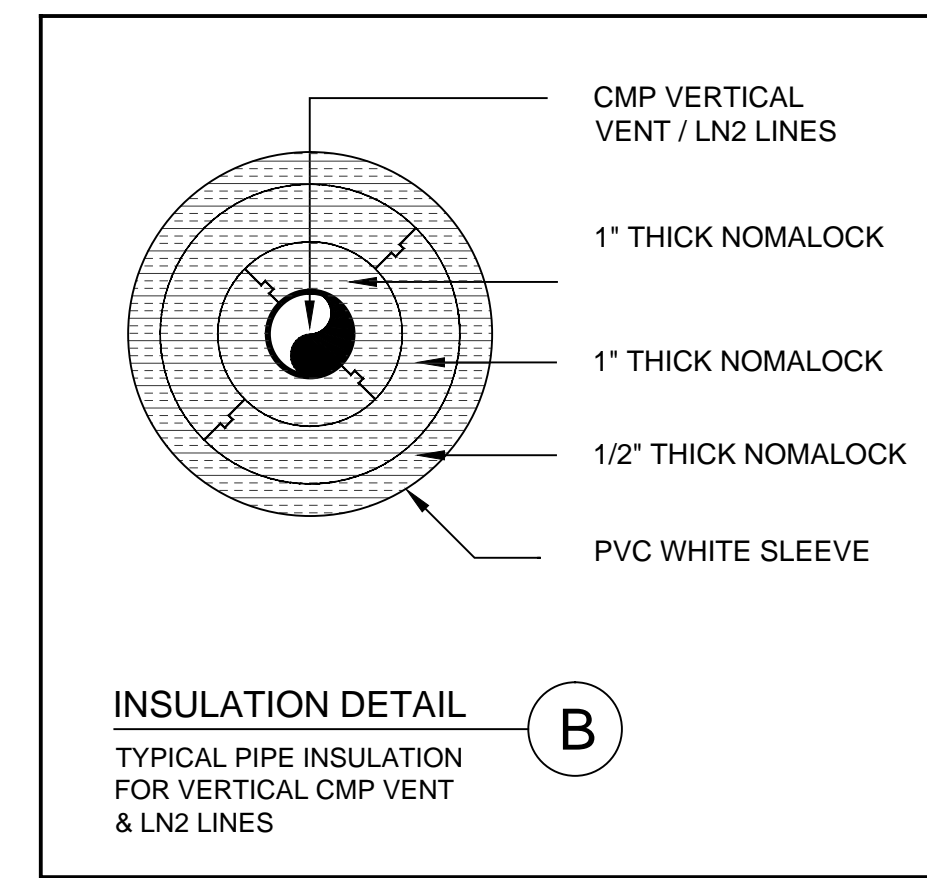
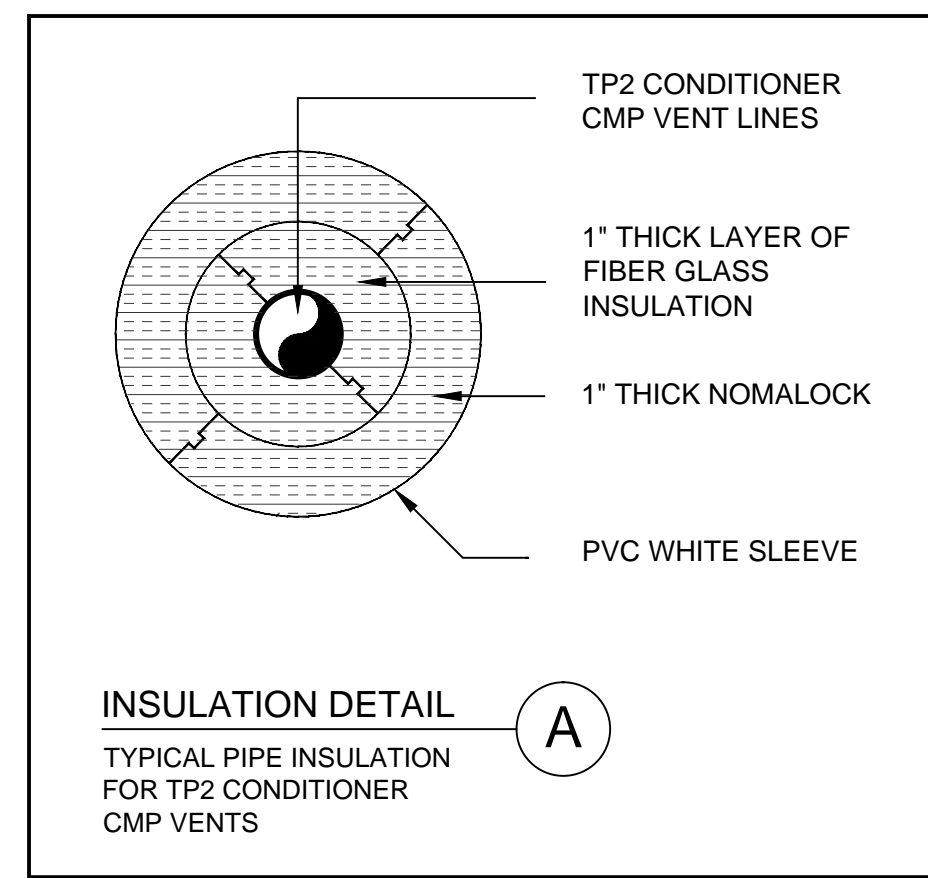
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| designed | TQF | conçu |
| date | | |
| drawn | TQF / B-OPS | dessiné |
| date | | |
| reviewed | TQF | examiné |
| date | | |
| approved | TQF | approuvé |
| date | | |
| scale | N.T.S. | |

project no. **CSA13-G1** no. du projet

drawing no. **A3** no. du dessin

GENERAL MECHANICAL NOTES:

- THESE DRAWINGS MUST BE READ IN CONJUNCTION WITH ALL ISSUED CONTRACT DOCUMENTS, INCLUDING DRAWINGS & SPECIFICATIONS. EXCEPT WHERE REPLACED OR CHANGED BY DIRECTIVE OR CORRECTIVE ADDENDA OR REVISED DRAWINGS AND SPECIFICATIONS.
- ALL WORK SHALL CONFIRM TO THE LATEST CODE REQUIREMENTS OF THE ONTARIO BUILDING CODE, MUNICIPAL BYLAWS AND AUTHORITIES HAVING JURISDICTION. THE INSTALLATION SHALL BE IN ACCORDANCE TO THE STANDARDS OF C.S.A. & U.L.C. FOLLOW ALL RECOMMENDATIONS OUTLINED BY THE MANUFACTURER.
- EXAMINE THE SITE TO DETERMINE THE FULL EXTENT OF THE PROJECT. REFER TO BOUNDARIES ON THE PLAN. CONTRACTOR IS STRONGLY RECOMMENDED TO VISIT THE SITE BEFORE BIDDING THE PROJECT TO DETERMINE THE EXTENT OF ANY REMOVALS, MODIFICATIONS AND NEW WORK.
- IF ANY DISCREPANCY OCCURS ON THE ENGINEER'S DRAWINGS, THE CONTRACTOR SHALL, DURING TENDERING, ASSUME THE LARGER / GREATER. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
- ALL DIMENSIONS SHALL BE VERIFIED ON SITE. DIMENSIONS SHOWN ON DRAWINGS ARE IN INCHES.
- EXACT LOCATION OF EQUIPMENT AND PIPING IS SUBJECT TO SITE MEASUREMENTS. CONTRACTOR TO SUBMIT SHOP DRAWINGS FOR APPROVAL TO ENGINEER PRIOR TO COMMENCING, FABRICATION, MANUFACTURING OR ORDERING EQUIPMENT.
- PAY FOR ALL NECESSARY PERMITS REQUIRED TO BY LOCAL AUTHORITIES HAVING JURISDICTION, INCLUDING INSPECTION AND TESTING. APPLY FOR TSSA PERMIT APPLICATION FOR ALL WORK PERFORMED UNDER THIS CONTRACT THAT IS SUBJECT TO THE BOILER & PRESSURE VESSELS ACT. TURN OVER TO THE OWNER ORIGINAL APPROVAL DOCUMENTATION & CERTIFICATES.
- VERIFY LOCATION AND ELEVATION OF EXISTING SERVICES AND MAINS TO BE TIED INTO PRIOR TO COMMENCING WORK.
- ALL SHUTDOWNS MUST BE COORDINATED WITH CSA PROJECT MANAGER.
- IMMEDIATELY AFTER AWARDED THE CONTRACT, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER A DETAILED WORK SCHEDULE, IN THE FORM OF A COMPUTERIZED BAR CHART OUTLINING ALL PROJECT ACTIVITIES AND SCHEDULED SHUT DOWNS.
- DRAWINGS ARE NOT INTENDED TO SHOW THE DETAILS OF ALL PIPE ROUTES, OFFSETS, ETC. BE RESPONSIBLE FOR CAREFULLY EXAMINING THE WORK SITE PRIOR TO TENDER CLOSE OUT AND INCLUDE IN THE TENDER PRICE ALL NECESSARY LABOR AND MATERIAL REQUIRED FOR A FULLY OPERABLE SYSTEM AS INTENDED.
- ALL COPPER PIPING TO BE TYPE 'K' HARD COPPER INCLUDING (BUT NOT LIMITED TO) MANIFOLDS, VENTS & STRAIGHT RUNS. ALL JOINTS TO BE BRAZED USING SIL-FOS 15% SILVER WITH ARGON PURGE CRYOGENIC APPROVED PRODUCT, NO FLUX ON COPPER - COPPER CONNECTIONS, FLUX RECOMMENDED FOR COPPER - BRASS CONNECTIONS. THE CONTRACTOR SHALL SUBMIT BRAZER'S VALID CERTIFICATES, BRAZING / SOLDER PROCEDURE AND TWO BRAZING SAMPLES FOR REVIEW AND APPROVAL BY THE ENGINEER PRIOR TO MAKING ANY CONNECTIONS ON SITE.
- ALL WALL AND FLOOR PENETRATIONS SHALL BE SEALED BY THE CONTRACTOR IN ACCORDANCE WITH APPLICABLE CODES & THE ENGINEER'S REQUIREMENTS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROVISION (SUPPLY AND INSTALLATION) OF ALL PIPING, FIXTURES, ETC. SHOWN ON THE DRAWING OR SPECIFICATIONS UNLESS OTHERWISE INDICATED. ALL MATERIAL & EQUIPMENT TO BE NEW AND FREE FROM DEFECTS.
- CONTRACTOR SHALL ARRANGE FOR ALL NECESSARY HOT WORK PERMITS TO COMPLETE THE WORK.
- ALL THREADED FITTINGS & COMPRESSION FITTING MUST BE BRASS, KF FITTINGS TO BE STAINLESS STEEL.
- ALL THREADED SOLENOID VALVES TO BE PIPED WITH MALE BRASS NPT'S & ALL THREADED FITTINGS ARE TO BE SEALED WITH TEFLON TAPE.
- BRAZING OF COPPER - COPPER JOINTS WITH SIL-FOS 15 w/ ARGON PURGE, NO FLUX. BRAZING OF COPPER - BRASS JOINTS WITH SIL-FOS 15 w/ ARGON PURGE, APPROPRIATE FLUX
- PURGE ALL LINES AFTER INSTALLATION WITH ARGON TO PREVENT THE ENTRY OF DEBRIS FROM TRAVELING FURTHER INTO THE CLEAN SYSTEM COMPONENTS.
- ALL PIPING INSULATION TO BE INSTALLED AFTER LEAK TESTING IS COMPLETED.
- ALL INSULATION JOINTS TO BE STAGGERED. PROVIDE REMOVABLE INSULATION JOINTS AT ALL VALVES & UNIONS.
- CONTRACTOR TO PROVIDE 12" INSULATION PROTECTION GALVANIZED SHIELD PLATES / SADDLES AT EACH PIPE HANGER LOCATION.
- CONTRACTOR SHALL BE RESPONSIBLE FOR RELOCATING ANY SERVICES OBSTRUCTING THE PATH OF NEW PIPING AND EQUIPMENT AND SHALL DO SO AFTER THE ENGINEER'S APPROVAL AT NO ADDITIONAL COST TO THE PROJECT.
- ALL EQUIPMENT SHOWN TO BE REMOVED ON THESE DRAWINGS SHALL BE REMOVED IN THEIR ENTIRETY, INCLUDING BUT NOT LIMITED TO: ALL RELATED PIPING, FITTINGS, VALVES, PIPE HANGERS, CONTROLS AND INSULATION.
- SEVERAL SYSTEMS OR PART OF SYSTEMS WILL BE SUBJECT TO A MINIMAL SHUT DOWN PERIOD. BE RESPONSIBLE FOR HAVING ALL NECESSARY TOOLS, MANPOWER AND EQUIPMENT REQUIRED TO MAXIMIZE THE PRODUCTION DURING A SHUT DOWN. ALL SHUT DOWNS SHALL BE COORDINATED WITH CSA PROJECT MANAGER.
- ALL PIPING TO BE TESTED FOR A MINIMUM OF 24 HOURS. ALL TESTS TO BE OBSERVED & APPROVED BY CSA PM. DO NOT CONCEAL ANY PIPE UNTIL TESTED & INSPECTED. REFER TO TABLE ON M1 FOR MORE TESTING DETAILS.
- REFER TO NOTES 29, 30, 31 & 32 ON DRAWING A1 FOR ALL SERVICES SUPPORTS & HANGERS.
- CONTRACTOR TO FULLY INSTALL ALL OWNER SUPPLIED PIPING SUPPORTS.
- CONTRACTOR TO TEMPORARILY SUPPORT ALL REMAINING PIPING LEFT AFTER DEMOLITION OR MODIFICATION UNTIL NEW PIPING & BRANCHES ARE TIED IN & INSTALLED AND FINAL PERMANENT SUPPORTS ARE IN PLACE.
- PARTS NOTED ON DRAWINGS TO BE SUPPLIED BY OWNER SHALL BE FULLY INSTALLED & SUPPORTED BY CONTRACTOR.
- SMOKE EATERS & POWERED EXHAUST FANS TO BE USED DURING ALL BRAZING / WELDING / SOLDERING / CUTTING / GRINDING ACTIVITIES TO MINIMIZE CONTAMINATION & ODOR TO ADJACENT AREAS. ALL BUILDING HVAC RETURN GRILLS WITHIN CONSTRUCTION AREA TO BE BLOCKED AT ALL TIMES.
- WORK UNDER THIS PROJECT MAYBE CONDUCTED AT ELEVATIONS IN EXCESS OF 15 m± (50 ft ±). CONTRACTOR MUST ENSURE THAT ALL STAFF & SUB CONTRACTORS ARE TRAINED IN ELEVATED WORK AND FALL PROTECTION.
- DO NOT SUBJECT ANY PART OF THE BUILDING TO ANY NOISE, DUST OR ANY OTHER UNACCEPTABLE ENVIRONMENTAL CONDITIONS DURING THE COURSE OF THE PROJECT. ANY NOISY / DUSTY / SMELLY ACTIVITIES SHALL BE DONE AFTER HOURS OR AT WEEKENDS, COORDINATE WITH CSA PROJECT MANAGER WITH A MINIMUM NOTICE OF 48 HOURS.



SAMPLE IMAGE OF APPROVED 15% SIL-FOS ARGON PURGED BRAZED PIPING. CONTRACTOR TO PROVIDE TWO SIMILAR SAMPLES FOR ENGINEER APPROVAL.

| INFORMATION FOR CONTRACTOR USE & TSSA APPLICATION | | | | | | | | |
|---|----------|-------------|------------------------|--------------------|----------------|-------|----------|---------|
| SERVICE | MATERIAL | SIZE (Inch) | WORKING PRESSURE (PSI) | MAX PRESSURE (PSI) | TESTING | | | REMARKS |
| | | | | | PRESSURE (PSI) | MEDIA | DURATION | |
| TP2 VENTS | AL | 4 | 5 | 15 | 20 | AIR | 24 hrs | |
| TV1 CMP VENTS | CU | 1 1/2 | 5 | 15 | 20 | AIR | 24 hrs | |
| LN2 | CU | 1/2 | 50 | 50 | 65 | AIR | 24 hrs | |
| GN2 | CU | 1/2 | 20 - 50 | 100 | 125 | AIR | 24 hrs | |
| COMP. AIR | CU | 1/4 | 100 | 120 | 150 | AIR | 24 hrs | |

| MECHANICAL LEGEND | |
|-------------------|--|
| SYMBOL | DESCRIPTION |
| | PIPE TEE UP |
| | PIPE TEE DOWN |
| | PIPE TURNING DOWN |
| | BACKWATER VALVE |
| | BALANCING VALVE |
| | BALL VALVE |
| | BUTTERFLY VALVE |
| | CHECK VALVE, SWING |
| | PURGE VALVE |
| | COMBINATION BALANCING AND SHUT-OFF VALVE |
| | PUMP |
| | GATE VALVE |
| | GLOBE VALVE |
| | KNIFE-GATE VALVE |
| | NEEDLE VALVE |
| | PLUG VALVE |
| | PRESSURE RELIEF VALVE |
| | SOLENOID VALVE |
| | THERMAL VALVE |
| | 3 WAY TEMPERATURE REGULATOR VALVE w/ DIAL THERMOMETER & SENSING BULB |
| | TEMPRETURE GAUGE w/ ISOLATING BALL VALVE |
| | PRESSURE GAUGE w/ ISOLATING BALL VALVE |
| | CONCENTRIC REDUCER |
| | FLEXIBLE CONNECTION |

| PIPE AND DUCT IDENTIFICATION | |
|------------------------------|--|
| DUCT | 24"X12" - SAD - GALV |
| PIPE | 2" - CHWS - CS |
| SIZE | DUCT - (inch) INSIDE DIMENSIONS WITH FIRST FIGURE INDICATING DIMENSION SHOWN PIPE - (inch) NOMINAL DIAMETER |
| DUCT SERVICE DESIGNATIONS | EAD - EXHAUST AIR DUCT OAD - OUTSIDE AIR DUCT RAD - RETURN AIR DUCT SAD - SUPPLY AIR DUCT |
| PIPE SERVICE DESIGNATIONS | LN2 - LIQUID NITROGEN GN2 - GASEOUS NITROGEN GHe - GASEOUS HELIUM CHWS - CHILLED WATER SUPPLY CHWR - CHILLED WATER RETURN CR - COMPRESSED AIR |
| MISCELLANEOUS | F - STANDPIPE FP - FIRE PROTECTION NG - NATURAL GAS |
| MATERIAL DESIGNATIONS | AL - ALUMINUM CI - CAST IRON VJ - VACUUM JACKETED PIPE CS - CARBON STEEL CU - COPPER DI - DUCTILE IRON FRP - FIBBER REINFORCED PLASTIC GALV - GALVANIZED STEEL PVC - POLYVINYL CHLORIDE SST - STAINLESS STEEL |

Canadian Space Agency / Agence Spatiale Canadienne

YVES GUINDON
MANAGER, SECURITY AND FACILITIES

M. FARID, P. Eng.
PROJECT MANAGER

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| 5. | | |
| 4. | | |
| 3. | ISSUED FOR TENDER | SEPT, 14 |
| 2. | ISSUED FOR FINAL REVIEW | SEPT, 14 |
| 1. | ISSUED FOR REVIEW | AUG, 14 |
| No. | REVISION | Date |

PROFESSIONAL STAMP

A A detail no. no. de detail
C B location drawing no. sur dessin no.
C C drawing no. dessin no.

project project
DAVID FLORIDA LABORATORY
BUILDING No. 65, SHIRLEY'S BAY, ONTARIO

TQF TV1 / TP2 REFIT

drawing dessin
MECHANICAL NOTES, LEGEND & INSULATION DETAILS

designed TQF concu
date

drawn TQF / B-OPS dessine
date

reviewed TQF examine
date

approved TQF approuve
date

scale N.T.S.

project no. CSA13-G1 no. du projet
drawing no. M1 no. du dessin

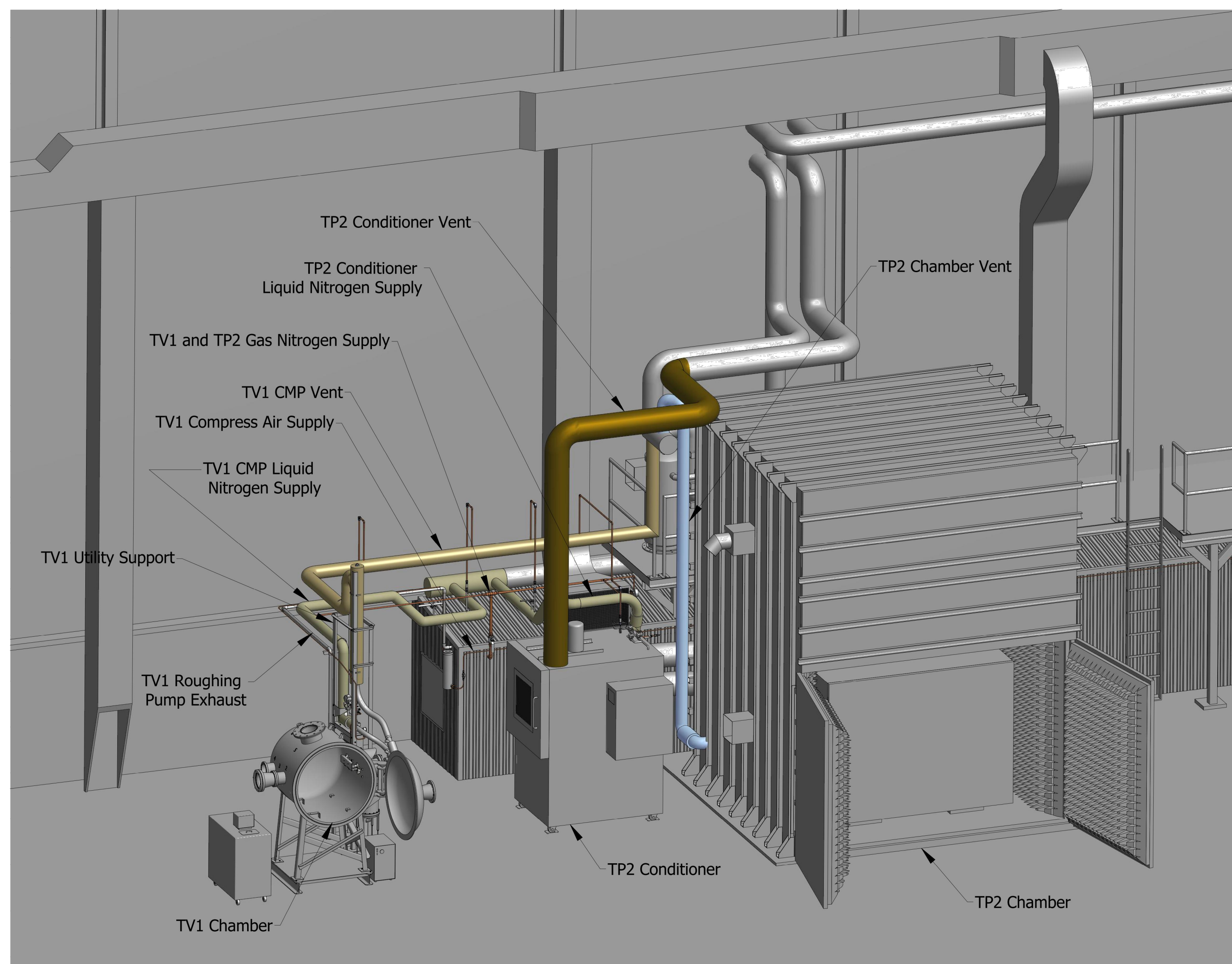
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MANAGER, SECURITY AND FACILITIES

M. FARID, P. Eng.
PROJECT MANAGER

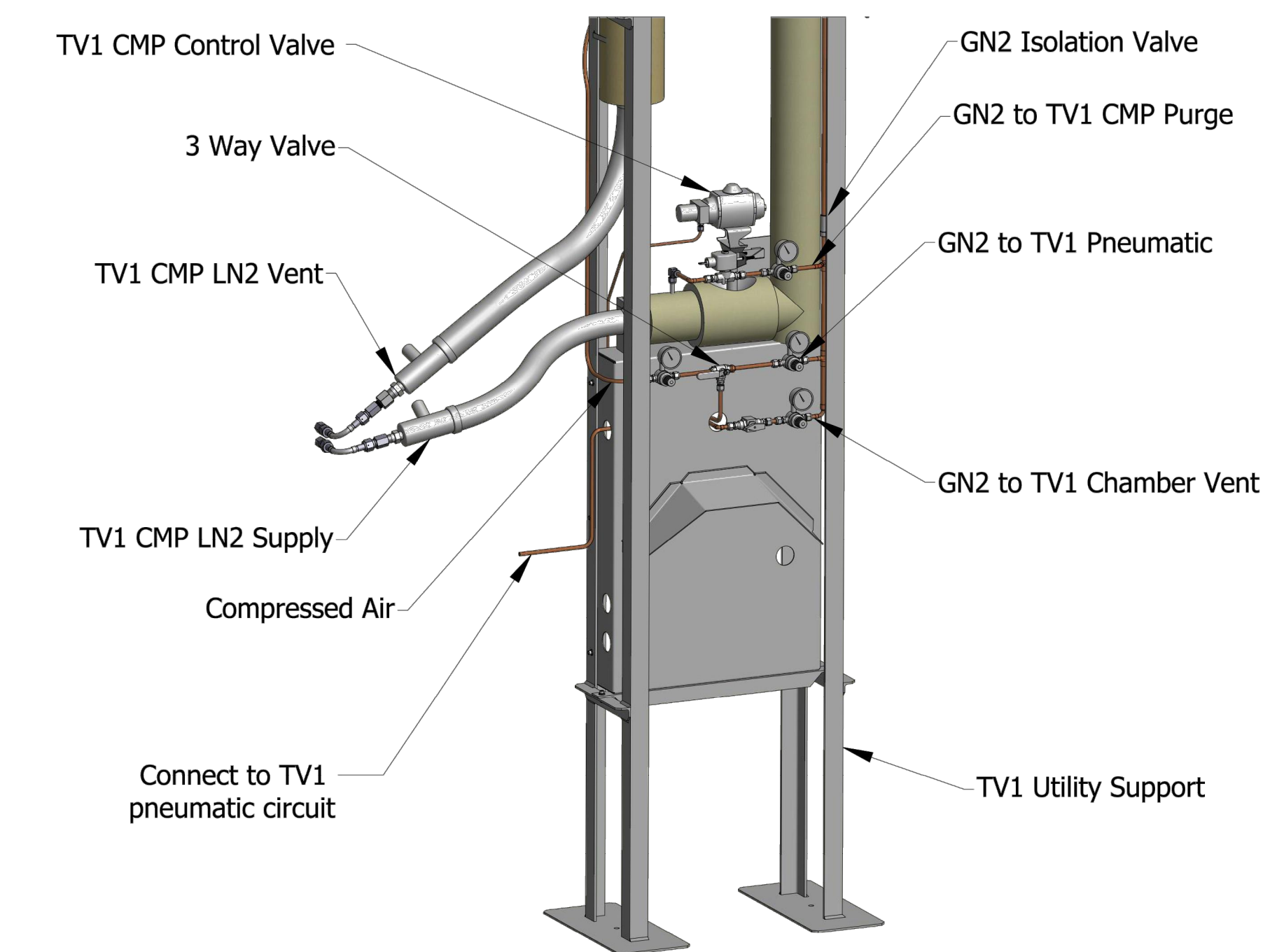
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TV1 and TP2 Plumbing Overall View



TV1 Utility Support
(Viewing from TP2)

- NOTES:**
1. ALL DIMENSIONS AND QUANTITIES SHOWN ARE A VERY ROUGH ESTIMATE AND FOR REFERENCE ONLY WITH NO CHANGE TO CONTRACT VALUE IF OTHERWISE FOUND DURING CONSTRUCTION, CONTRACTOR TO VERIFY ALL QUANTITIES & RUN LENGTHS ON SITE.
 2. ALL PARTS SUPPLIED BY OWNER TO BE FULLY INSTALLED BY CONTRACTOR.
 3. ALL BRAZING TO BE SIL-FOS 15% WITH ARGON PURGE.
 4. NO FLUX ON COPPER - COPPER CONNECTIONS.
 5. FLUX RECOMMENDED FOR COPPER - BRASS CONNECTIONS.

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| project | DAVID FLORIDA LABORATORY BUILDING No. 65, SHIRLEY'S BAY, ONTARIO | project |
| | TQF TV1 / TP2 REFIT | |
| drawing | TV1 & TP2 CONDITIONER PLUMBING | dessin |
| designed | TQF | conçu |
| date | | |
| drawn | TQF / B-OPS | dessiné |
| date | | |
| reviewed | TQF | examiné |
| date | | |
| approved | TQF | approuvé |
| date | | |
| scale | N.T.S. | |
| project no. | CSA13-G1 | no. du projet |
| drawing no. | M2 | no. du dessin |

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M. FARID, P. Eng.
PROJECT MANAGER

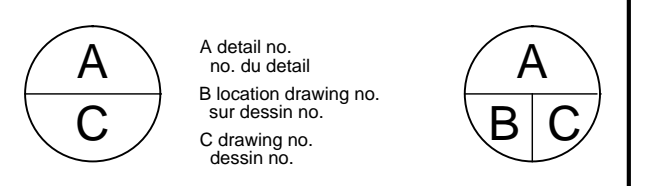
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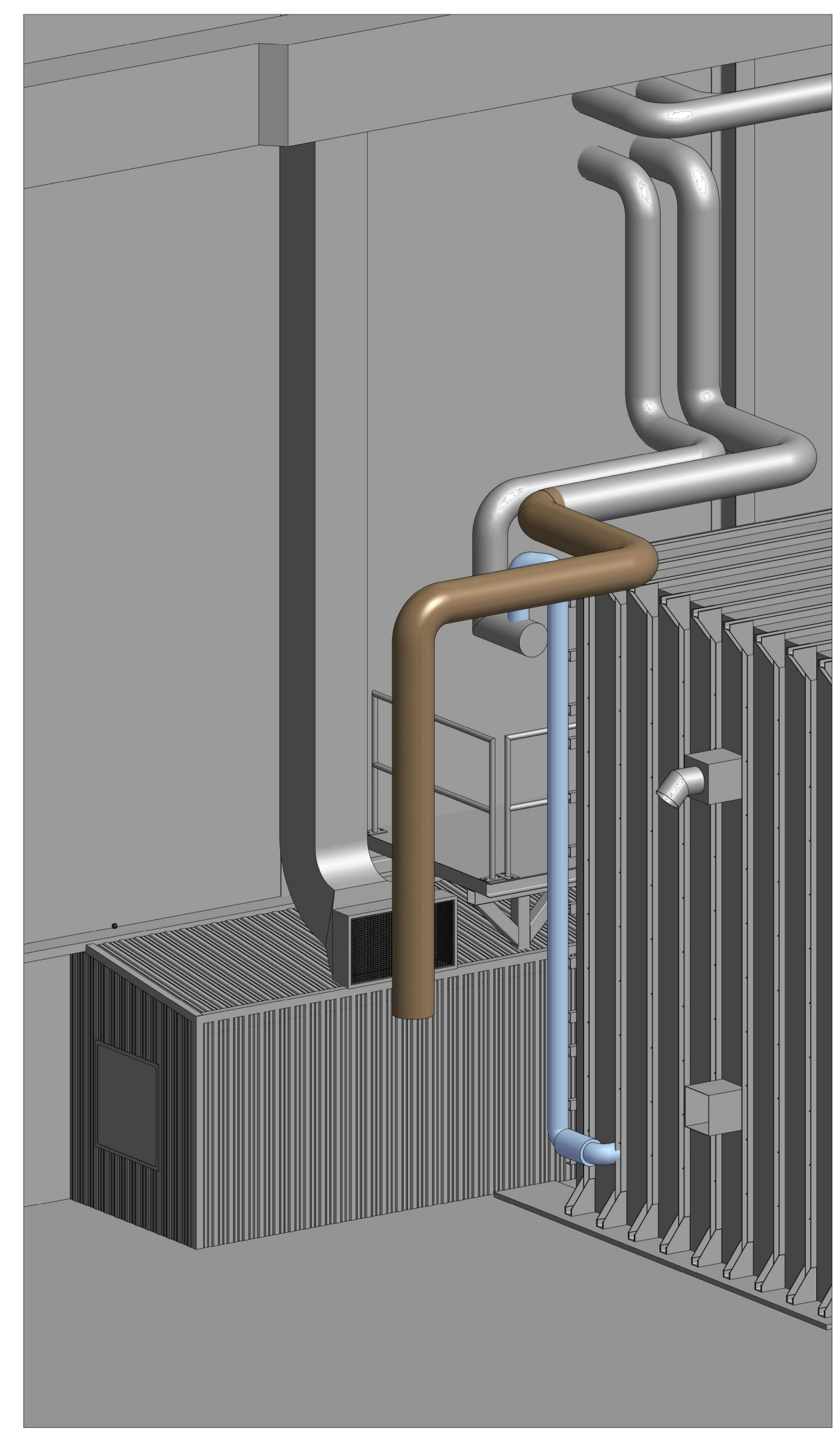
project / projet
DAVID FLORIDA LABORATORY
BUILDING No. 65, SHIRLEY'S BAY, ONTARIO
TQF TV1 / TP2 REFIT

drawing / dessin
TP2 CHAMBER & CONDITIONER VENTS

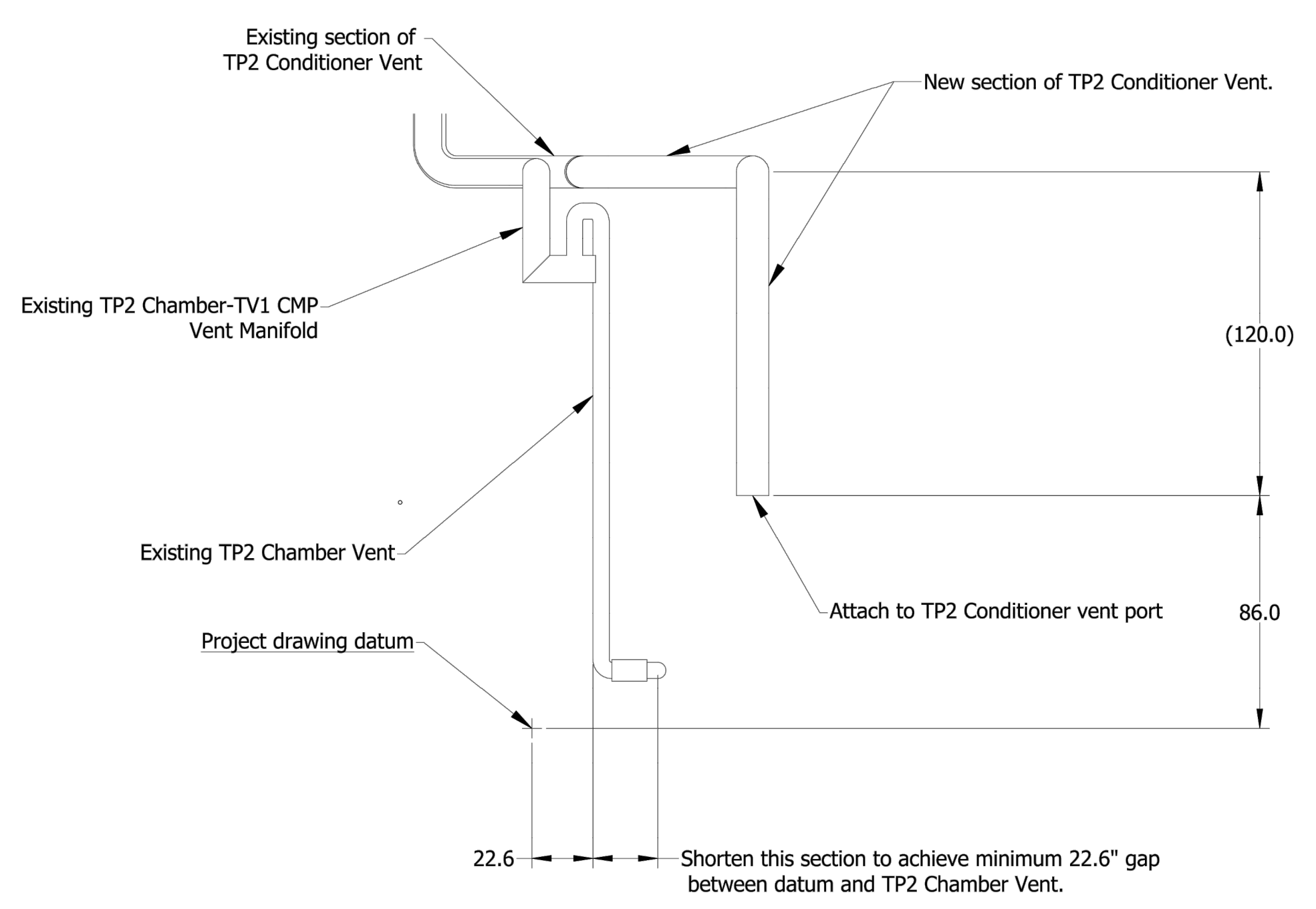
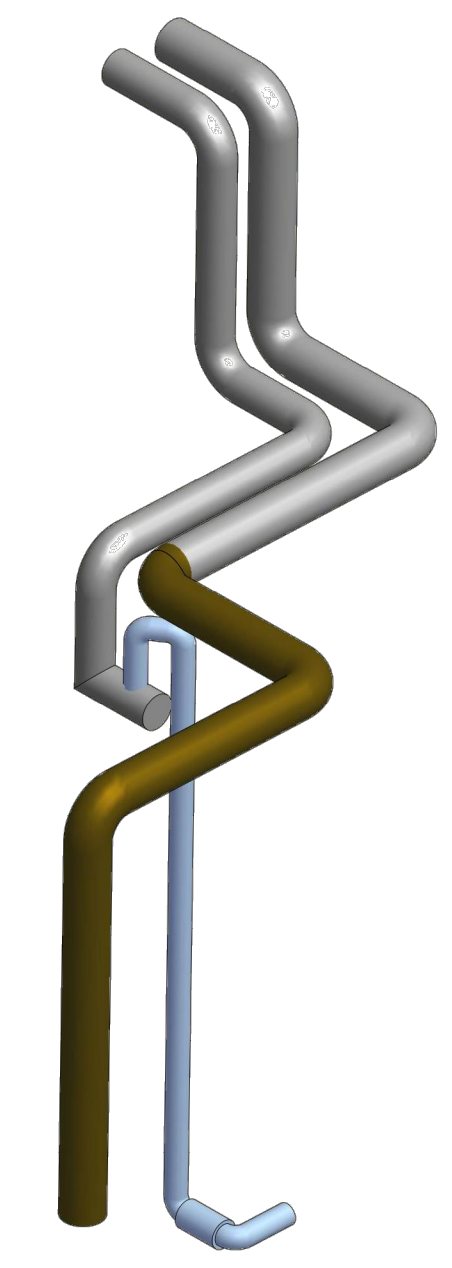
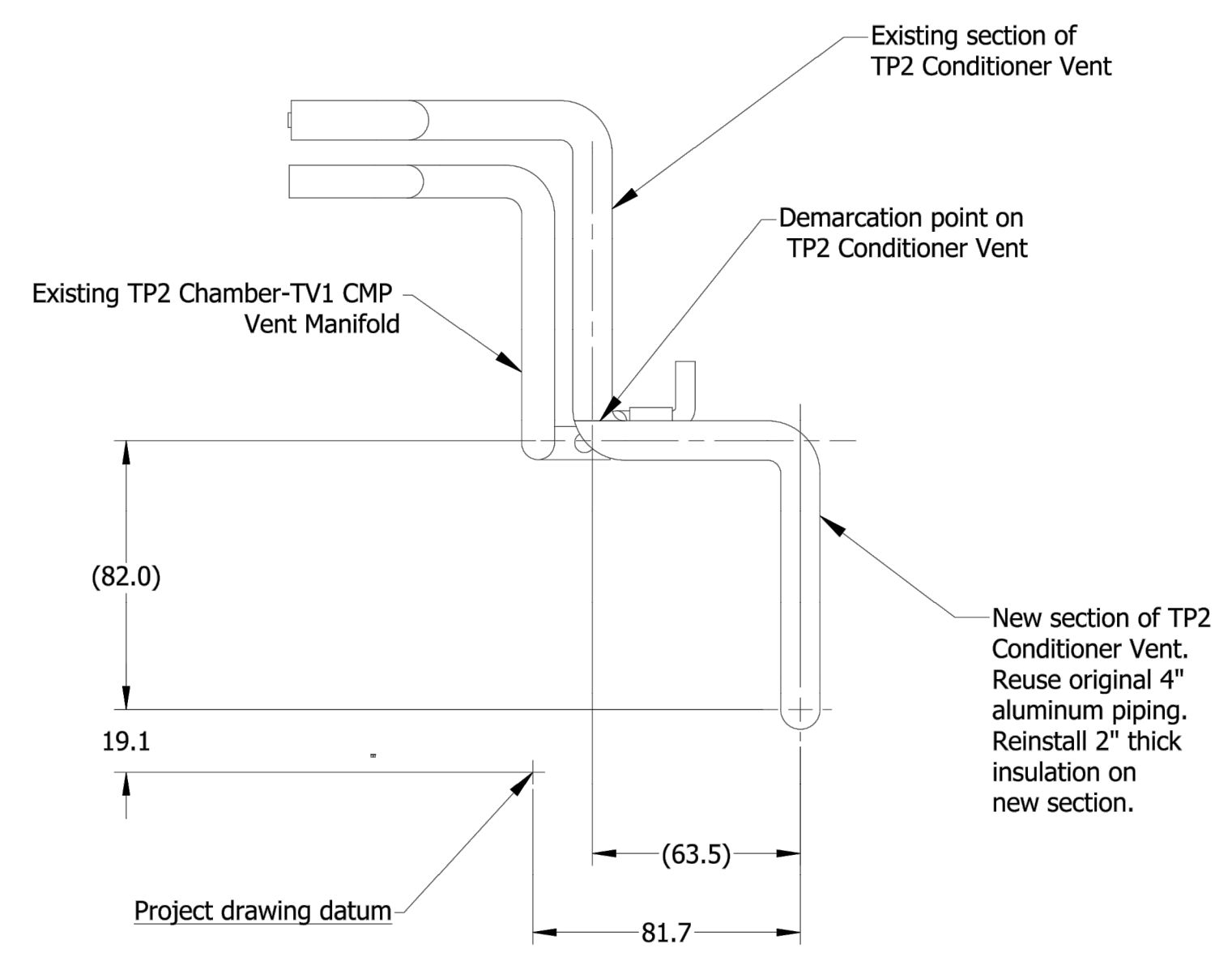
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| date | | |
| reviewed / examiné | TQF | |
| date | | |
| approved / approuvé | TQF | |
| date | | |
| scale | N.T.S. | |

project no. / no. du projet
CSA13-G1

drawing no. / no. du dessin
M3



TP2 Chamber and TP2 Conditioner Vents



- NOTES:**
1. ALL DIMENSIONS AND QUANTITIES SHOWN ARE A VERY ROUGH ESTIMATE AND FOR REFERENCE ONLY WITH NO CHANGE TO CONTRACT VALUE IF OTHERWISE FOUND DURING CONSTRUCTION, CONTRACTOR TO VERIFY ALL QUANTITIES & RUN LENGTHS ON SITE.
 2. ALL PARTS SUPPLIED BY OWNER TO BE FULLY INSTALLED BY CONTRACTOR.
 3. ALL BRAZING TO BE SIL-FOS 15% WITH ARGON PURGE.
 4. NO FLUX ON COPPER - COPPER CONNECTIONS.
 5. FLUX RECOMMENDED FOR COPPER - BRASS CONNECTIONS.

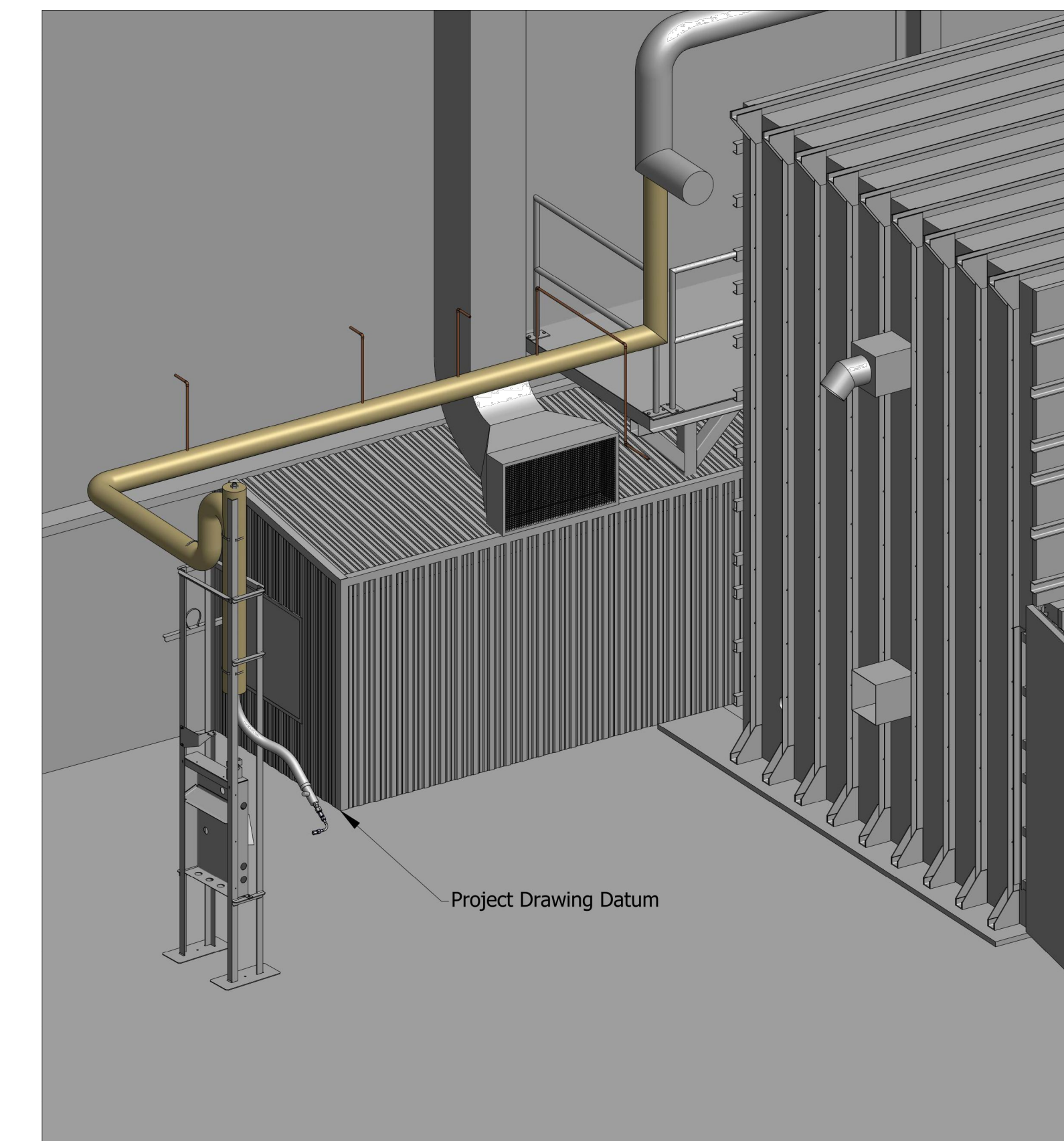
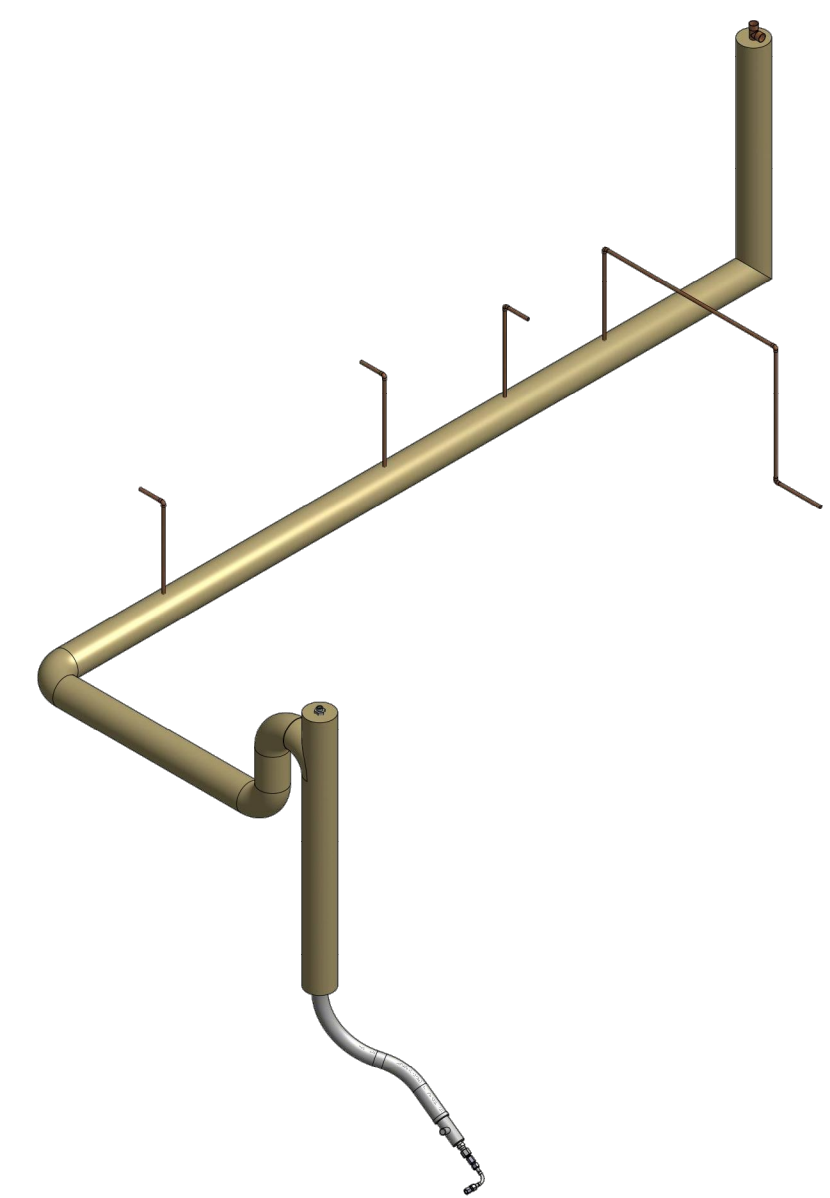
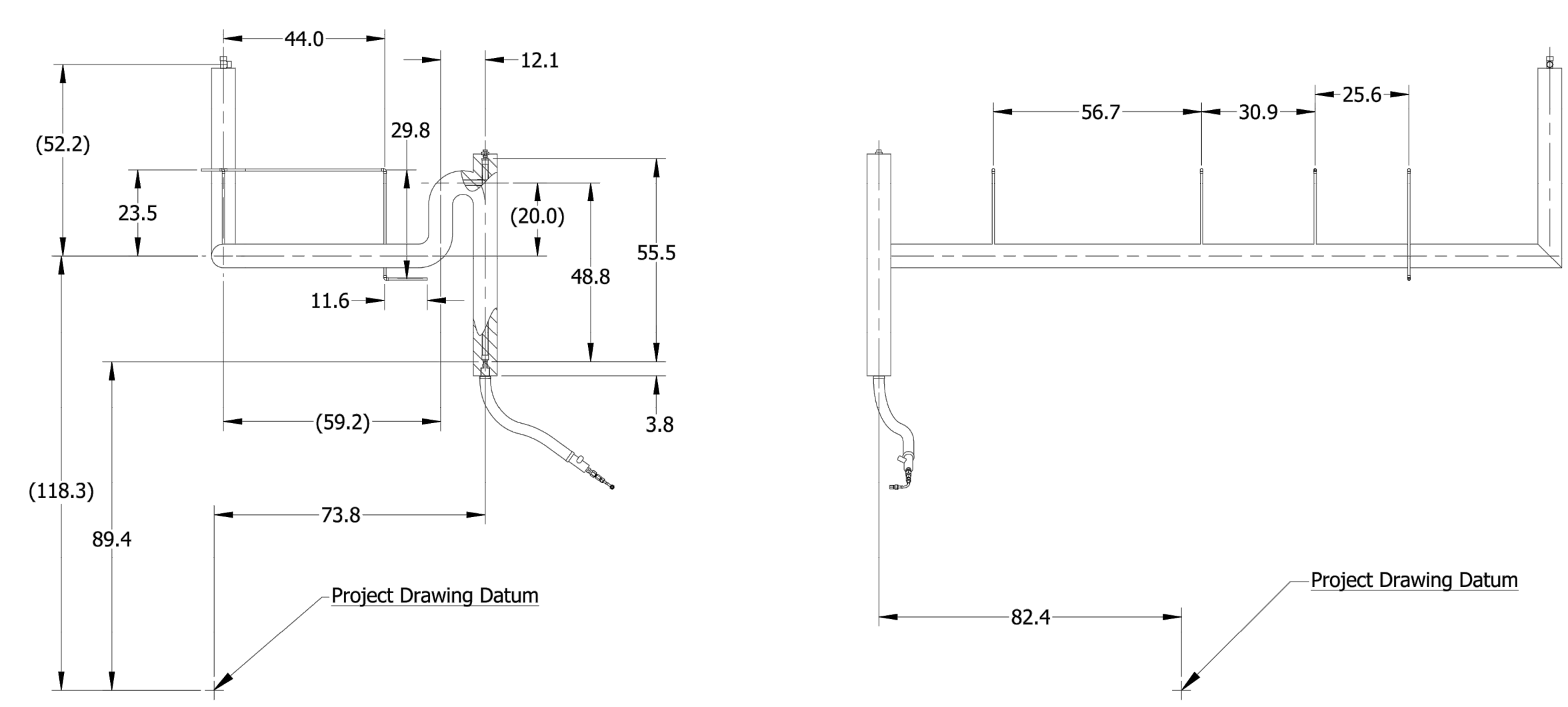
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MANAGER, SECURITY AND FACILITIES

M. FARID, P. Eng.
PROJECT MANAGER

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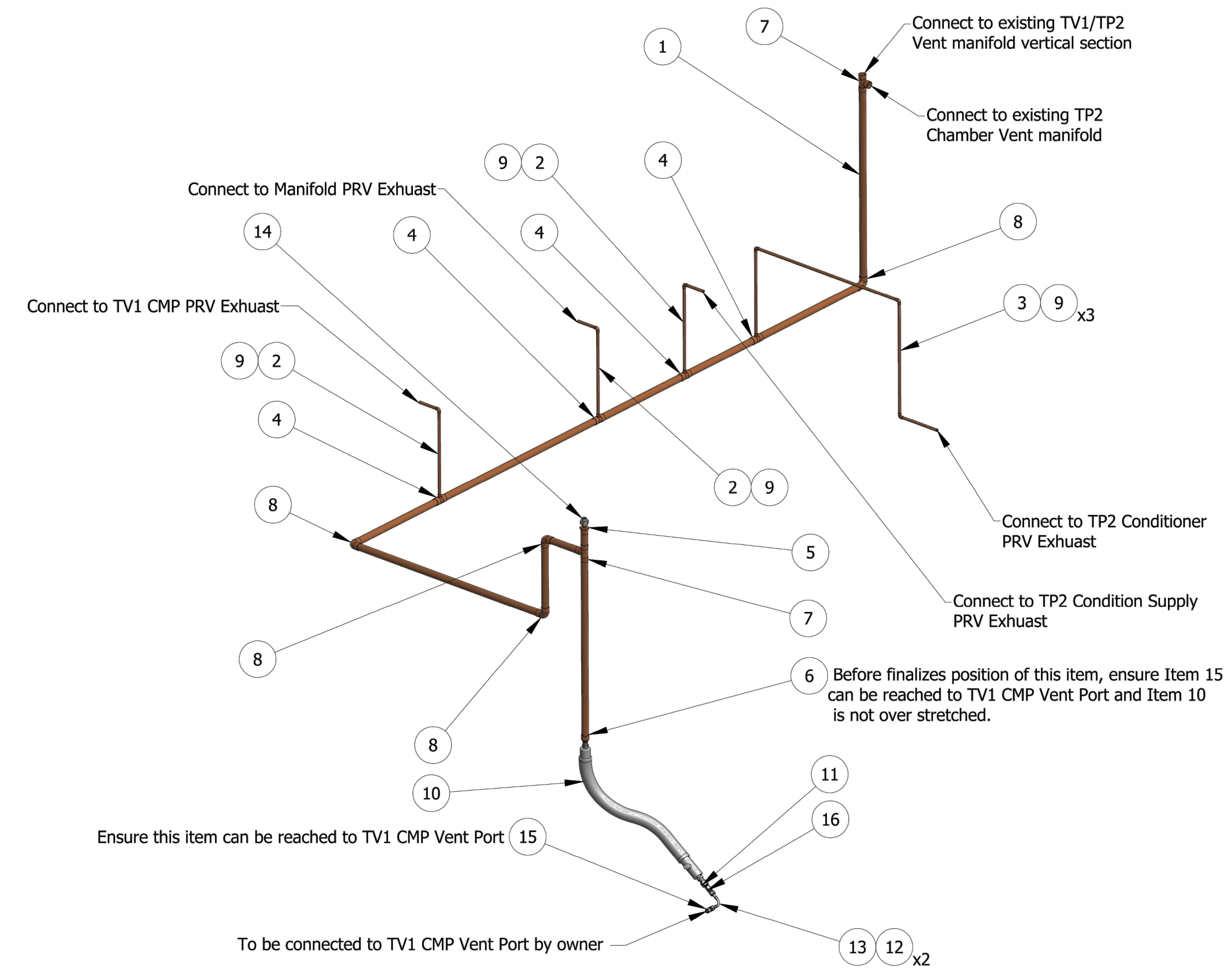
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TV1 CMP Vent

- NOTES:**
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 4. NO FLUX ON COPPER - COPPER CONNECTIONS.
 5. FLUX RECOMMENDED FOR COPPER - BRASS CONNECTIONS.



| PARTS LIST | | | |
|------------|------|---|-------------|
| ITEM | QTY | PART NAME | SUPPLIED BY |
| 1 | 31' | Type "K" 1-1/2" copper pipe on TV1 vent | Contractor |
| 2 | 2.5' | Type "K" 1/2" copper pipe on TV1 and Manifold PRVs exhaust to vent line | Contractor |
| 3 | 10' | Type "K" 1/2" copper pipe on TP2 Conditioner PRV exhaust to vent line. | Contractor |
| 4 | 4 | Copper reducing Tee 1-1/2" x 1-1/2" x 1/2" | Contractor |
| 5 | 1 | Copper adaptor 1-1/2" pipe X 1/2" MNPT | Contractor |
| 6 | 1 | Copper adaptor 1-1/2" pipe X 3/4" FNPT | Contractor |
| 7 | 2 | Copper Tee 1-1/2" | Contractor |
| 8 | 4 | Copper elbow 1-1/2" | Contractor |
| 9 | 6 | Copper elbow 1/2" | Contractor |
| 10 | 1 | TV1 CMP Vent SS 3/4" flexible VJ hose | Owner |
| 11 | 1 | SS adaptor 3/4" FNPT X 1/2" MNPT, McMaster 51205K324 | Owner |
| 12 | 2 | Swagelok 1/2" VCR Gasket SS-8-VCR-2-GR | Owner |
| 13 | 1 | TV1 CMP VCR 1/2" weld elbow assembly | Owner |
| 14 | 1 | SS Koncentric Union 1/2" with 1/2" FNPT ends, SSP 1/2 KUT | Owner |
| 15 | 1 | Swagelok VCR adaptor 3/8" FNPT X 1/2" MVC, SS-8-VCR-7-6 | Owner |
| 16 | 1 | Swagelok VCR adaptor 1/2" FNPT X 1/2" MVC, SS-8-VCR-7-8 | Owner |

| No. | REVISION | Date |
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| 2. | ISSUED FOR FINAL REVIEW | SEPT, 14 |
| 1. | ISSUED FOR REVIEW | AUG, 14 |

PROFESSIONAL STAMP

A detail no. / no. du detail
 B location drawing no. / sur dessin no.
 C drawing no. / dessin no.

project / projet
DAVID FLORIDA LABORATORY
 BUILDING No. 65, SHIRLEY'S BAY, ONTARIO
TQF TV1 / TP2 REFIT

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| TV1 CMP VENT | |
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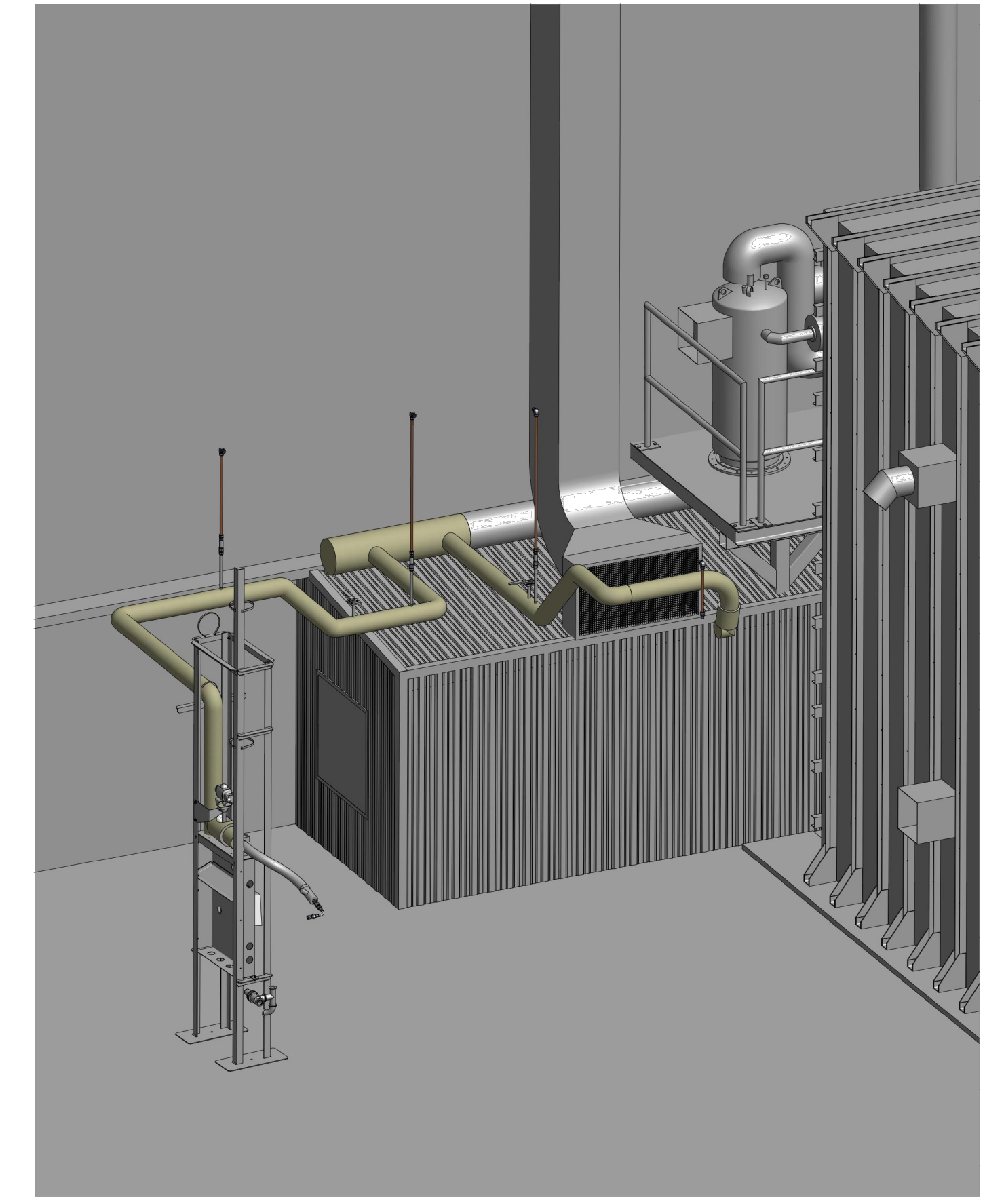
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MANAGER, SECURITY AND FACILITIES

M. FARID, P. Eng.
PROJECT MANAGER

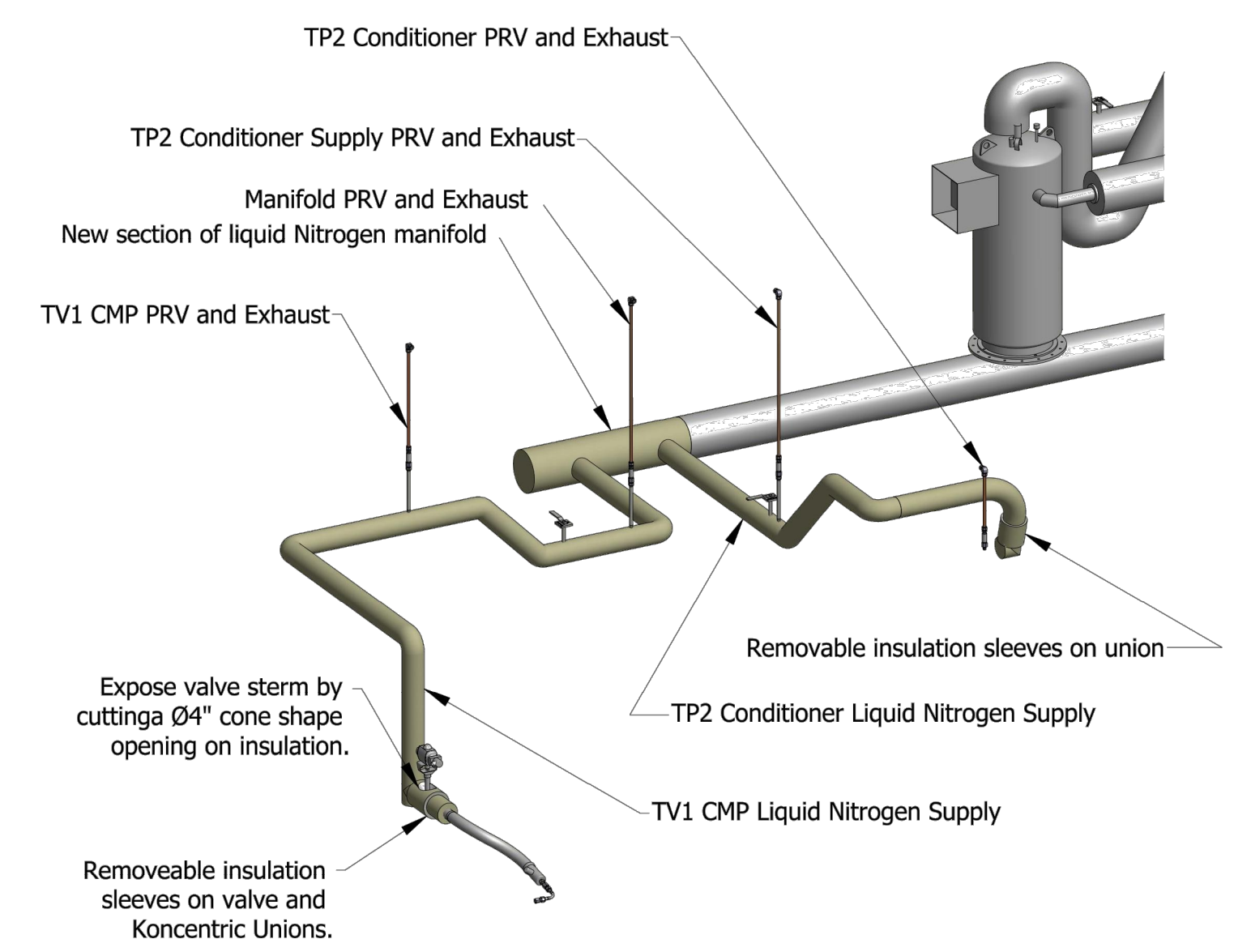
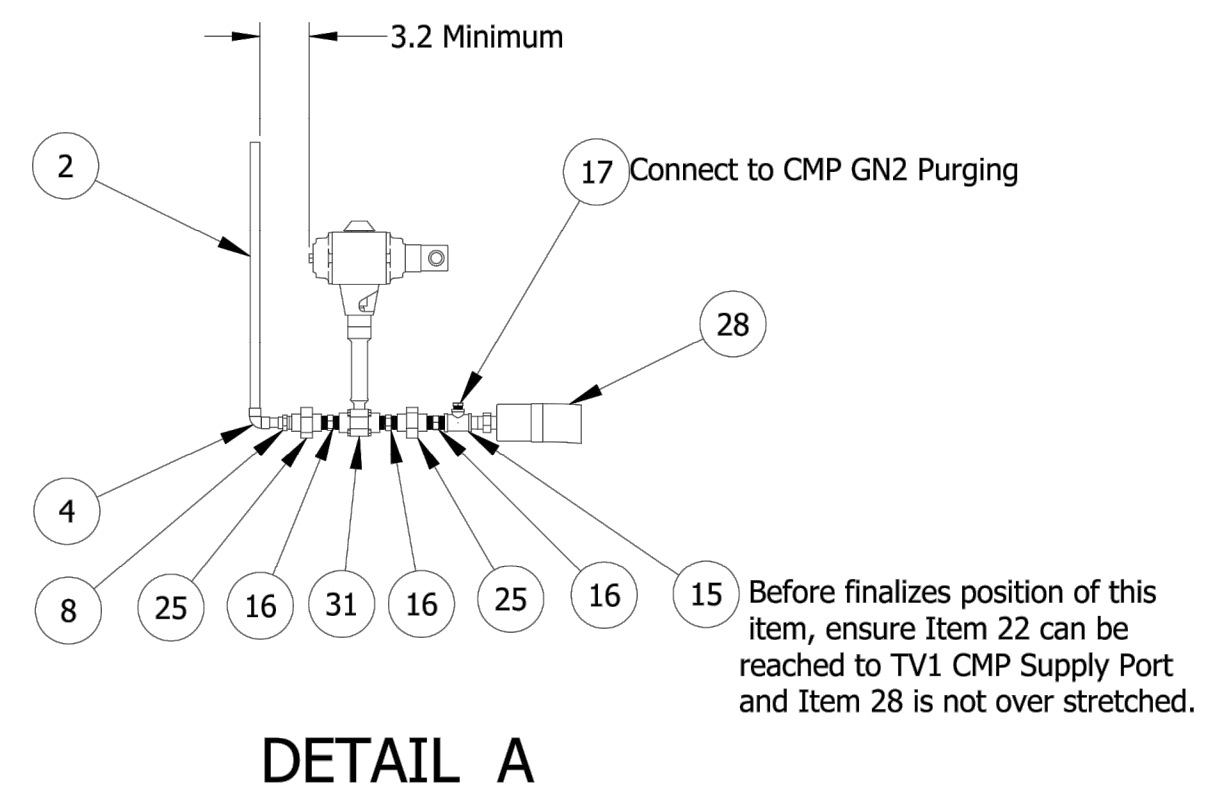
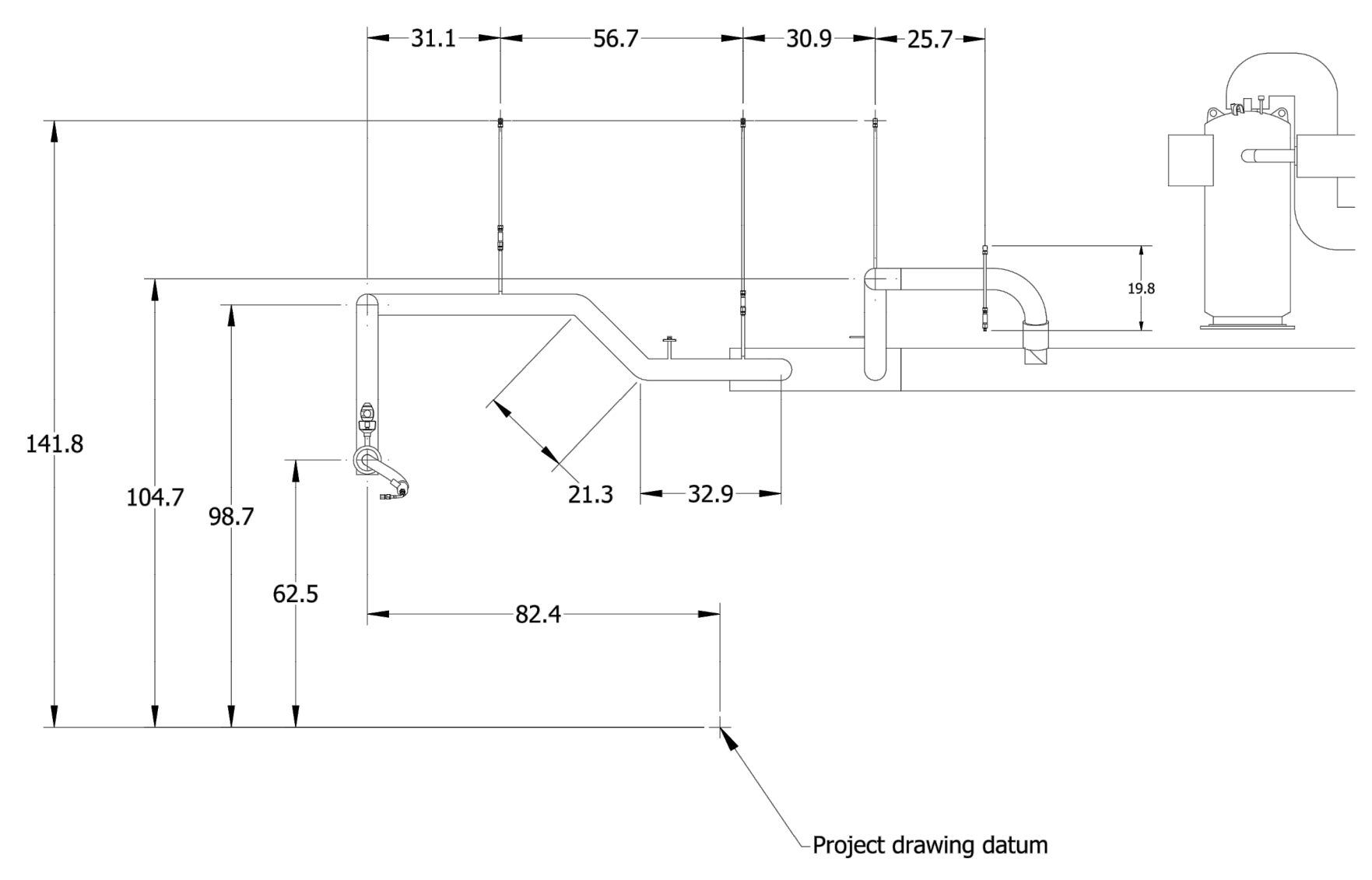
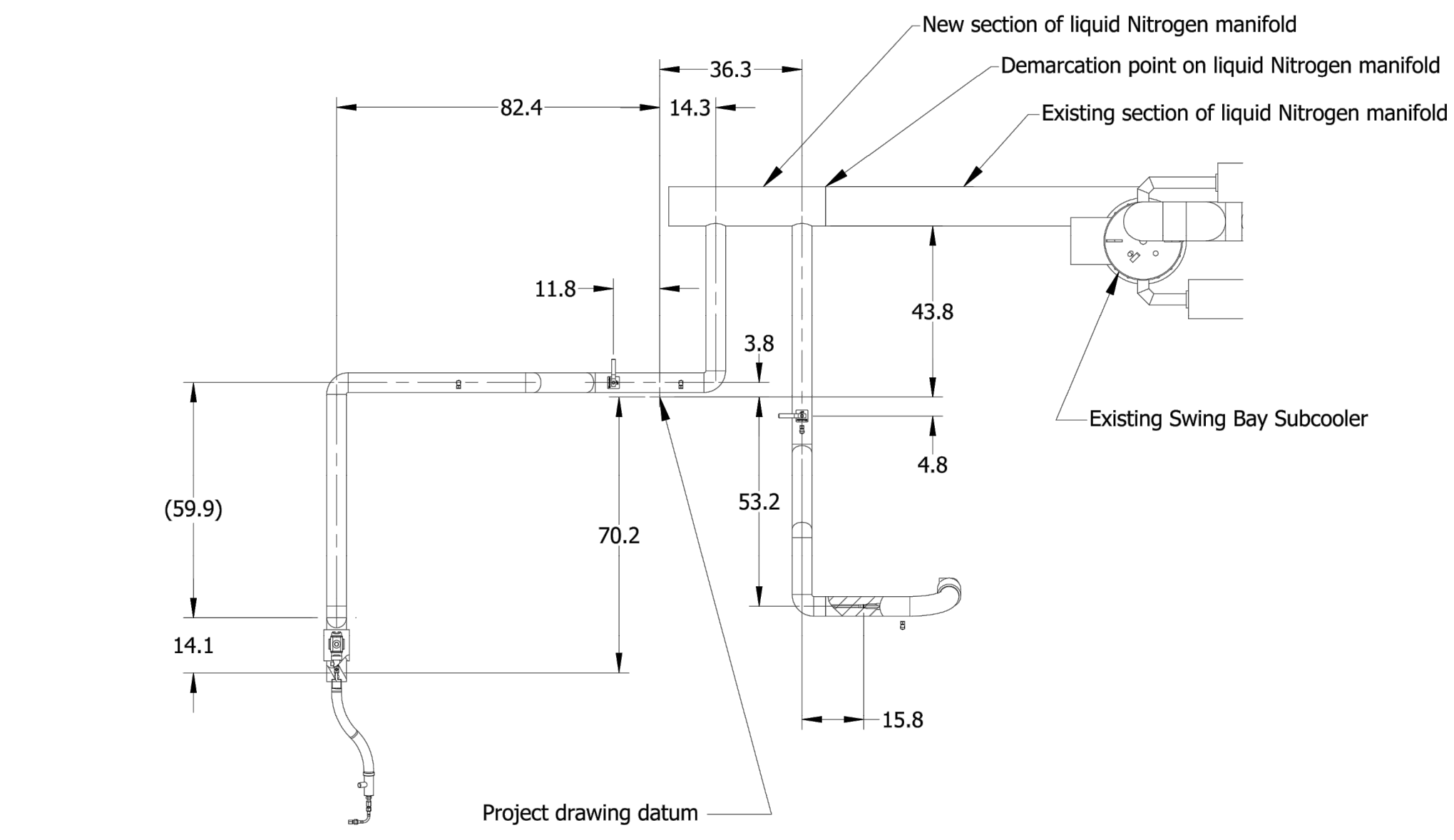
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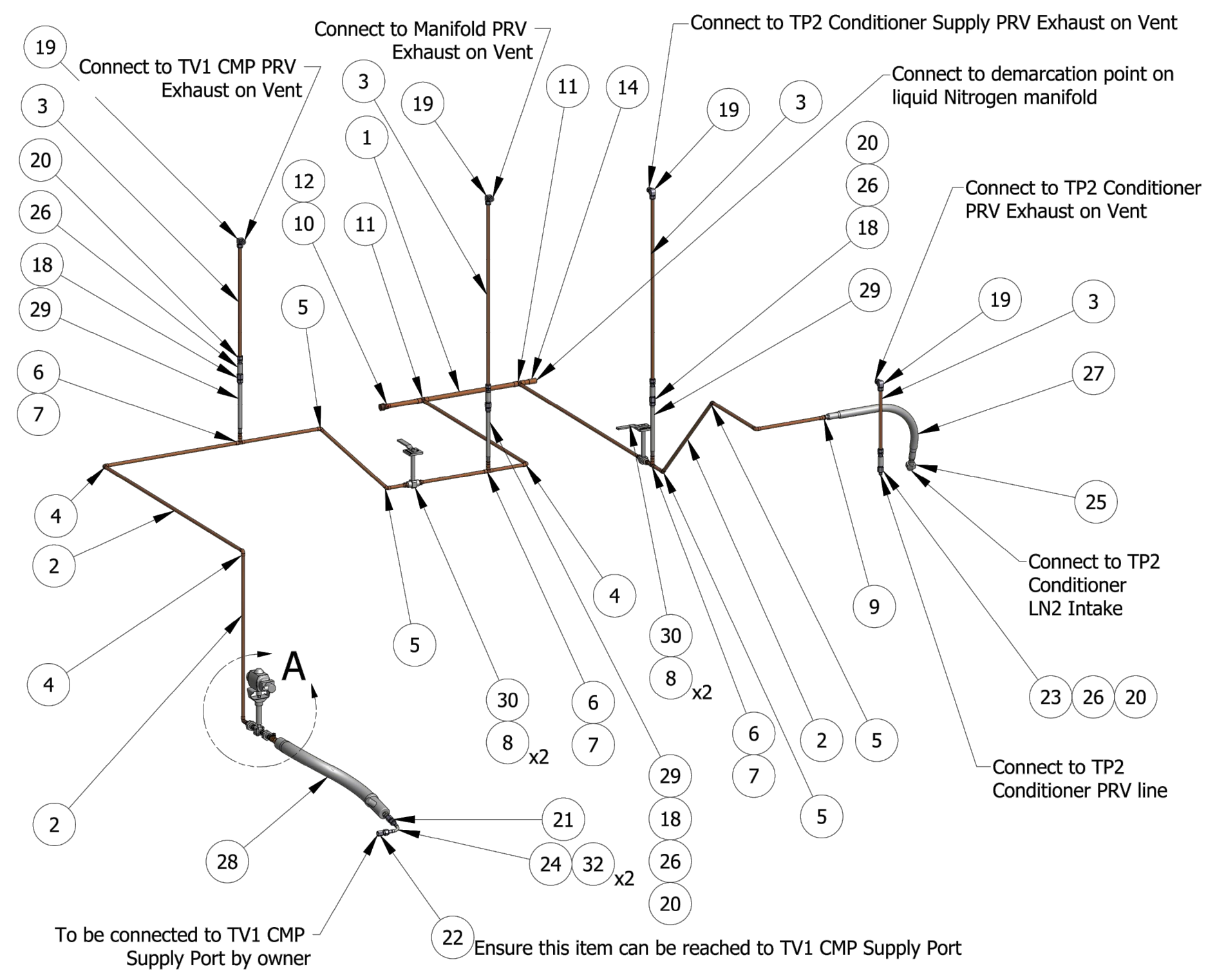
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TV1 CMP, TP2 Conditioner Liquid Nitrogen Supplies and PRVs



- NOTES:**
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 2. ALL PARTS SUPPLIED BY OWNER TO BE FULLY INSTALLED BY CONTRACTOR.
 3. ALL BRAZING TO BE SIL-FOS 15% WITH ARGON PURGE.
 4. NO FLUX ON COPPER - COPPER CONNECTIONS.
 5. FLUX RECOMMENDED FOR COPPER - BRASS CONNECTIONS.



| ITEM | QTY | PARTS LIST | SUPPLIED BY |
|------|------|---|-------------|
| 2 | 22 R | Type "K" 1/2" copper pipe on TV1 CMP and TP2 Conditioner liquid Nitrogen supplies | Contractor |
| 3 | 12 R | Type "K" 1/2" copper pipe on PRV exhaust lines | Contractor |
| 4 | 5 | 1/2" copper 90° elbow | Contractor |
| 5 | 4 | 1/2" copper 45° elbow | Contractor |
| 6 | 3 | 1/2" copper Tee | Contractor |
| 7 | 3 | Copper adaptor 1/2" pipe X 3/8 FNPT | Contractor |
| 8 | 5 | Copper adaptor 1/2" pipe X 1/2" MNPT | Contractor |
| 9 | 1 | Copper adaptor 1/2" pipe X 1/2" FNPT | Contractor |
| 10 | 1 | Copper adaptor 3/4" pipe X 3/4" MNPT | Contractor |
| 11 | 2 | Copper reducing Tee 3/4" X 3/4" X 1/2" | Contractor |
| 12 | 1 | 3/4" bronze cast cap | Contractor |
| 14 | 1 | 3/4" copper coupling | Contractor |
| 15 | 1 | Reducing Tee 1/2" x 1/2" x 1/4" | Contractor |
| 16 | 3 | 1/2" SS Hex Nipple 1-7/8" length | Contractor |
| 17 | 1 | SS Hex Reducing Bushing 1/4" Male X 1/8" Female | Contractor |
| 18 | 3 | Swagelok SS adaptor 5/8 Tube X 1/2" FNPT, SS-1010-7-8 | Owner |
| 19 | 4 | Swagelok 5/8" brass elbow, B-1010-9 | Owner |
| 20 | 4 | Swagelok brass adaptor 5/8" tube X 1/2" MNPT, B-1010-1-8 | Owner |
| 21 | 1 | Swagelok VCR adaptor 1/2" FNPT X 1/2" MVCR, SS-8-VCR-7-8 | Owner |
| 22 | 1 | Swagelok VCR adaptor 3/8" FNPT X 1/2" MVCR, SS-8-VCR-7-6 | Owner |
| 23 | 1 | Swagelok brass adaptor 1/4" Tube X 1/2" FNPT, B-400-7-8 | Owner |
| 24 | 1 | TV1 CMP VCR 1/2" weld elbow assembly | Owner |
| 25 | 3 | SS Concentric Union 1/2" with FNPT ends, SSP 1/2 KUT | Owner |
| 26 | 4 | Pressure Release Valve | Owner |
| 27 | 1 | 1/2" SS flexible hose for TP2 Conditioner LN2 supply | Owner |
| 28 | 1 | 1/2" SS flexible VJ hose for TV1 CMP LN2 supply | Owner |
| 29 | 3 | 3/4" OD PRV SS tube. Modified from McMaster 89895K762 | Owner |
| 30 | 2 | 1/2" Worcester manual isolation valve | Owner |
| 31 | 1 | 1/2" Worcester Control Valve 60° V Seat | Owner |
| 32 | 2 | Swagelok 1/2" VCR Gasket, SS-8-VCR-2-GR | Owner |

| 5. | | |
|-----|-------------------------|----------|
| 4. | | |
| 3. | ISSUED FOR TENDER | SEPT, 14 |
| 2. | ISSUED FOR FINAL REVIEW | SEPT, 14 |
| 1. | ISSUED FOR REVIEW | AUG, 14 |
| No. | REVISION | Date |

PROFESSIONAL STAMP

A detail no. / no. du détail
B location drawing no. / sur dessin no.
C drawing no. / dessin no.

project: DAVID FLORIDA LABORATORY
BUILDING No. 65, SHIRLEY'S BAY, ONTARIO

project: TQF TV1 / TP2 REFIT

| | | |
|----------|-------------------------------|----------|
| drawing | TV1 CMP & TP2 CONDITIONER LN2 | dessin |
| designed | TQF | conçu |
| date | | |
| drawn | TQF / B-OPS | dessiné |
| date | | |
| reviewed | TQF | examiné |
| date | | |
| approved | TQF | approuvé |
| date | | |
| scale | N.T.S. | |

project no. CSA13-G1 no. du projet
drawing no. M5 no. du dessin

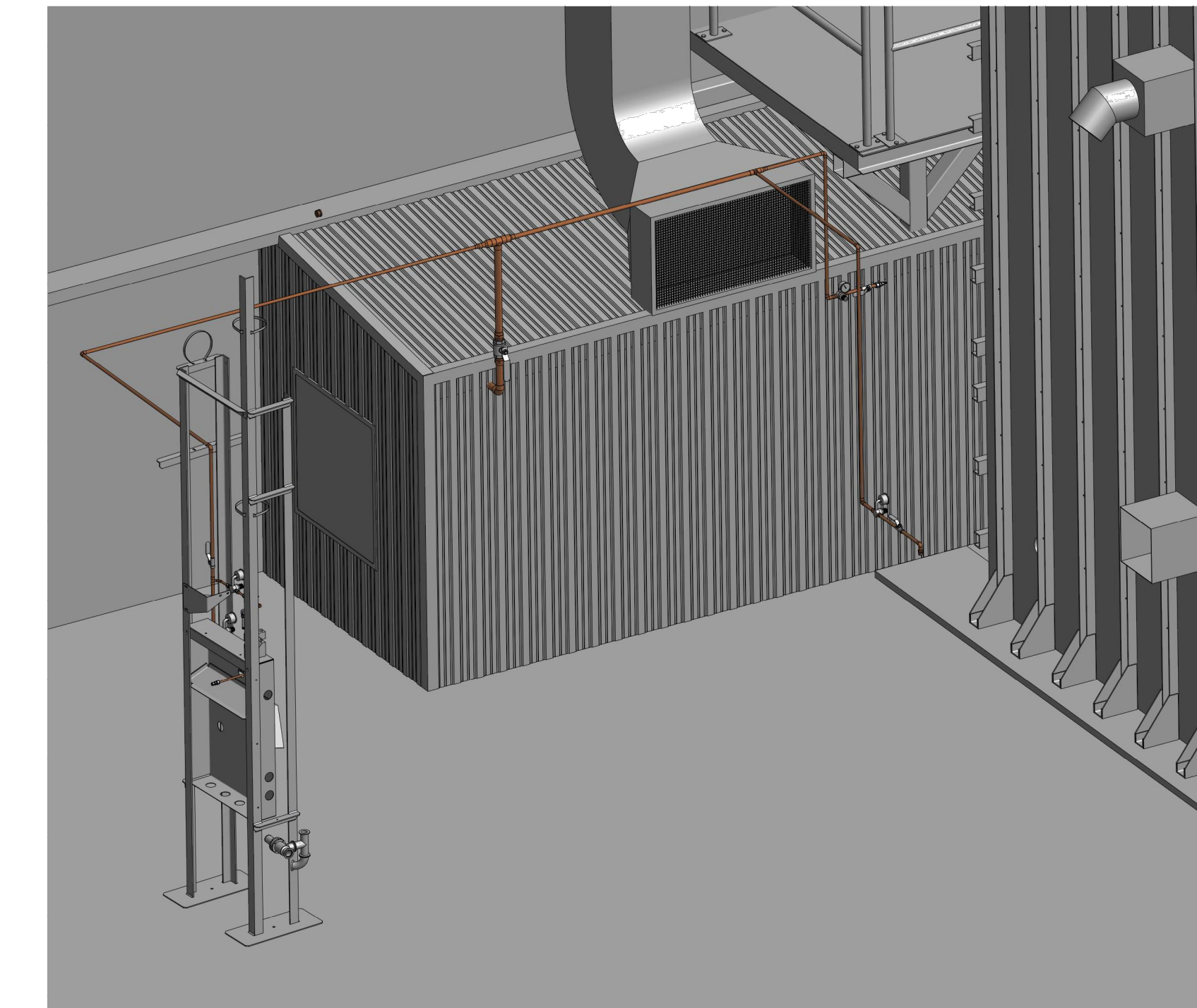
YVES GUINDON
MANAGER, SECURITY AND FACILITIES

M. FARID, P. Eng.
PROJECT MANAGER

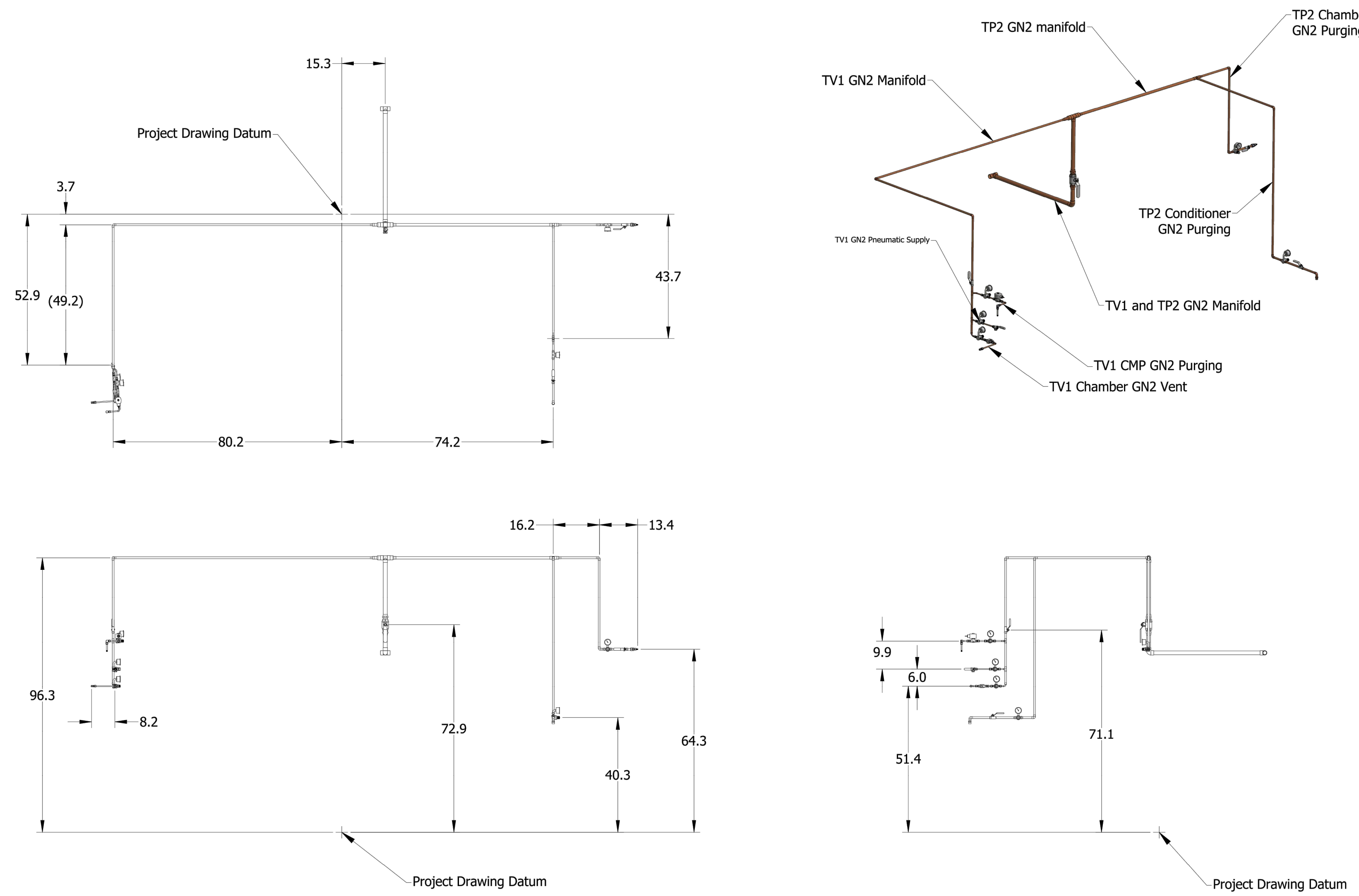
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TV1 and TP2 Gas Nitrogen Supplies



| ITEM | QTY | PARTS LIST | SUPPLIED BY |
|------|--------|--|-------------|
| 1 | 5.5 ft | 1-1/4" Type "K" copper pipe on GN2 supply manifold to TV1 and TP2 | Contractor |
| 2 | 5 ft | 3/4" Type "K" copper pipe on TP2 GN2 supply manifold | Contractor |
| 3 | 30 ft | 1/2" Type "K" copper pipe on TV1 GN2 manifold, TP2 Chamber Purge and TP2 Conditioner Purge | Contractor |
| 4 | 3 ft | 1/4" Type "K" copper pipe on TV1 CMP purge, TV1 Pnematcis and TV1 Chamber Vent | Contractor |
| 5 | 2 | Copper Tee 1-1/4" | Contractor |
| 6 | 2 | 1-1/4" to 3/4" Copper Reducing Coupling | Contractor |
| 7 | 2 | 3/4" to 1/2" Copper Reducing Coupling | Contractor |
| 8 | 1 | 3/4" X 3/4" X 1/2" Copper Reducing Tee | Contractor |
| 9 | 1 | 1-1/4" 90° Copper Elbow | Contractor |
| 10 | 7 | 1/2" Copper 90 Deg Elbow | Contractor |
| 11 | 2 | Copper Adaptor 1-1/4" pipe to 1-1/4" MNPT | Contractor |
| 12 | 1 | Copper Adapter 1/2" pipe to 1/2" MNPT | Contractor |
| 13 | 2 | Copper Reducing Tee 1/2" x 1/2" x 1/4" | Contractor |
| 14 | 1 | Copper Adapter 1/4" pipe to 3/8" MNPT | Contractor |
| 15 | 4 | Copper Adaptor 1/2" pipe to 1/4" MNPT | Contractor |
| 16 | 2 | 1/4" 90 Deg Copper Elbow | Contractor |
| 17 | 1 | 1/4" 45 degree Copper Elbow | Contractor |
| 18 | 1 | Copper Reducing Elbow 1/2" to 1/4" | Contractor |
| 20 | 1 | 1-1/4" GN2 Main isolation valve, McMaster 47865K26 | Owner |
| 21 | 3 | 1/2" Manual Isolation Valve, McMaster 47865K530 | Owner |
| 22 | 5 | 1/4" Miniture Regulator with Gauge, Parker R344-02CG | Owner |
| 23 | 1 | 3/8" Solenoid Valve, ASCO 8263G206LT | Owner |
| 24 | 1 | 3/8" Brass 3 Way Ball Valve, McMaster 4093T22 | Owner |
| 25 | 1 | SS Tube To CMP Purge Inlet, Modify from McMaster 9157K91 | Owner |
| 26 | 1 | 3/8" Brass Ball Valve FNPT End, McMaster 4114T25 | Owner |
| 27 | 1 | Swagelok Reducing Union 5/8" to 3/8", B-1010-6-6 | Owner |
| 28 | 1 | Swagelok Elbow for 3/8" OD Tube, SS-600-9 | Owner |
| 29 | 1 | Swagelok Soft Tube 3/8" ID Insert, B-815-6 | Owner |
| 30 | 1 | Swagelok 3/8" to 1/4" Reducing Union, B-600-6-4 | Owner |
| 31 | 4 | Swagelok Adaptor 3/8" tube to 3/8" MNPT, B-600-1-6 | Owner |
| 32 | 6 | Swagelok Adaptor 3/8" tube to 1/4" MNPT, B-600-1-4 | Owner |

| | | |
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| 5. | | |
| 4. | | |
| 3. | ISSUED FOR TENDER | SEPT, 14 |
| 2. | ISSUED FOR FINAL REVIEW | SEPT, 14 |
| 1. | ISSUED FOR REVIEW | AUG, 14 |
| No. | REVISION | Date |

PROFESSIONAL STAMP

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A detail no.
no. du detail
B location drawing no.
sur dessin no.
C drawing no.
dessin no.

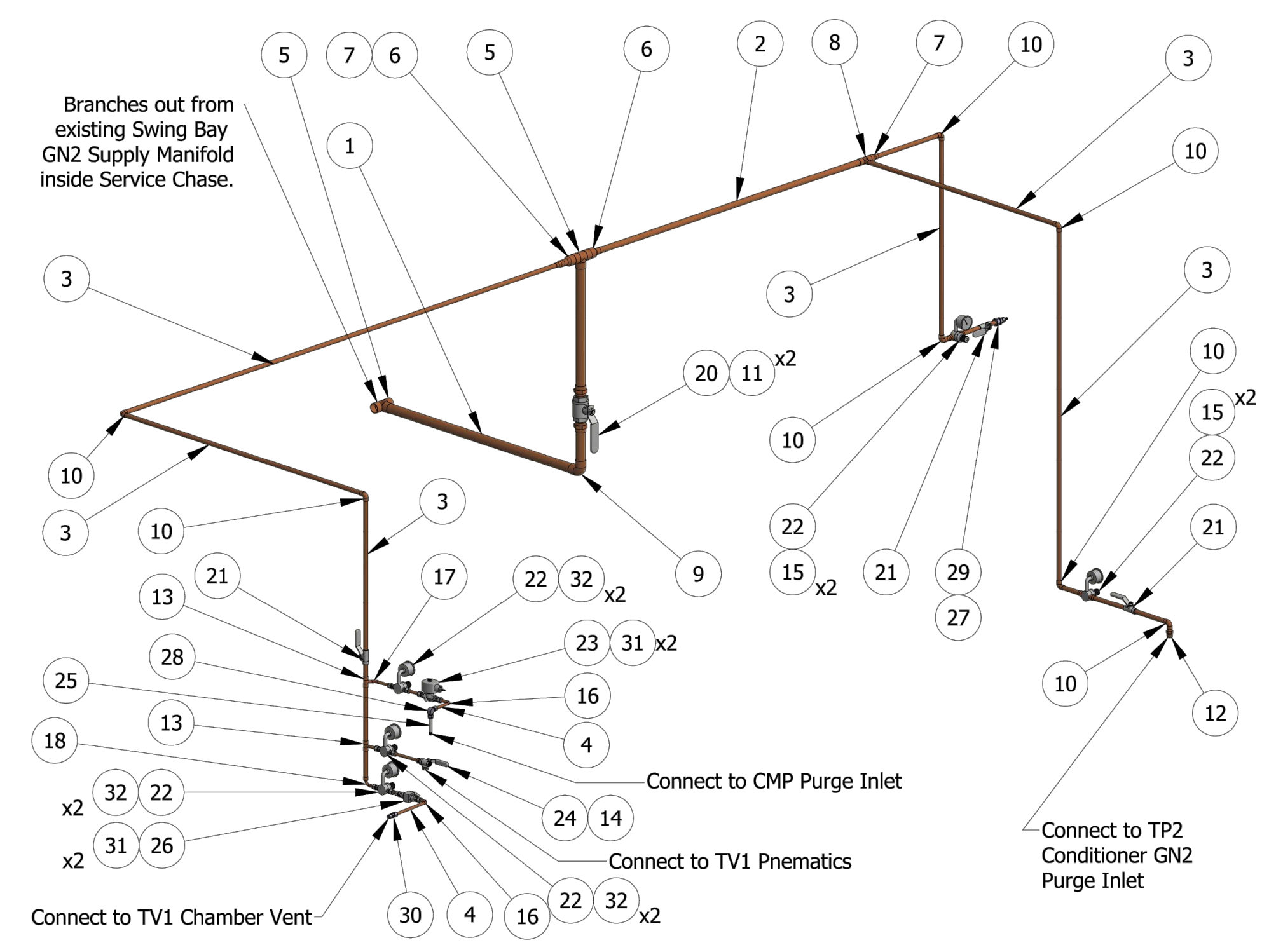
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project DAVID FLORIDA LABORATORY
BUILDING No. 65, SHIRLEY'S BAY, ONTARIO
TQF TV1 / TP2 REFIT

drawing TV1 & TP2 GN2 dessin

| | | |
|-------------|-------------|---------------|
| designed | TQF | concu |
| date | | |
| drawn | TQF / B-OPS | dessine |
| date | | |
| reviewed | TQF | examine |
| date | | |
| approved | TQF | approve |
| date | | |
| scale | N.T.S. | |
| project no. | CSA13-G1 | no. du projet |
| drawing no. | M6 | no. du dessin |

- NOTES:**
- ALL DIMENSIONS AND QUANTITIES SHOWN ARE A VERY ROUGH ESTIMATE AND FOR REFERENCE ONLY WITH NO CHANGE TO CONTRACT VALUE IF OTHERWISE FOUND DURING CONSTRUCTION. CONTRACTOR TO VERIFY ALL QUANTITIES & RUN LENGTHS ON SITE.
 - ALL PARTS SUPPLIED BY OWNER TO BE FULLY INSTALLED BY CONTRACTOR.
 - ALL BRAZING TO BE SIL-FOS 15% WITH ARGON PURGE.
 - NO FLUX ON COPPER - COPPER CONNECTIONS.
 - FLUX RECOMMENDED FOR COPPER - BRASS CONNECTIONS.



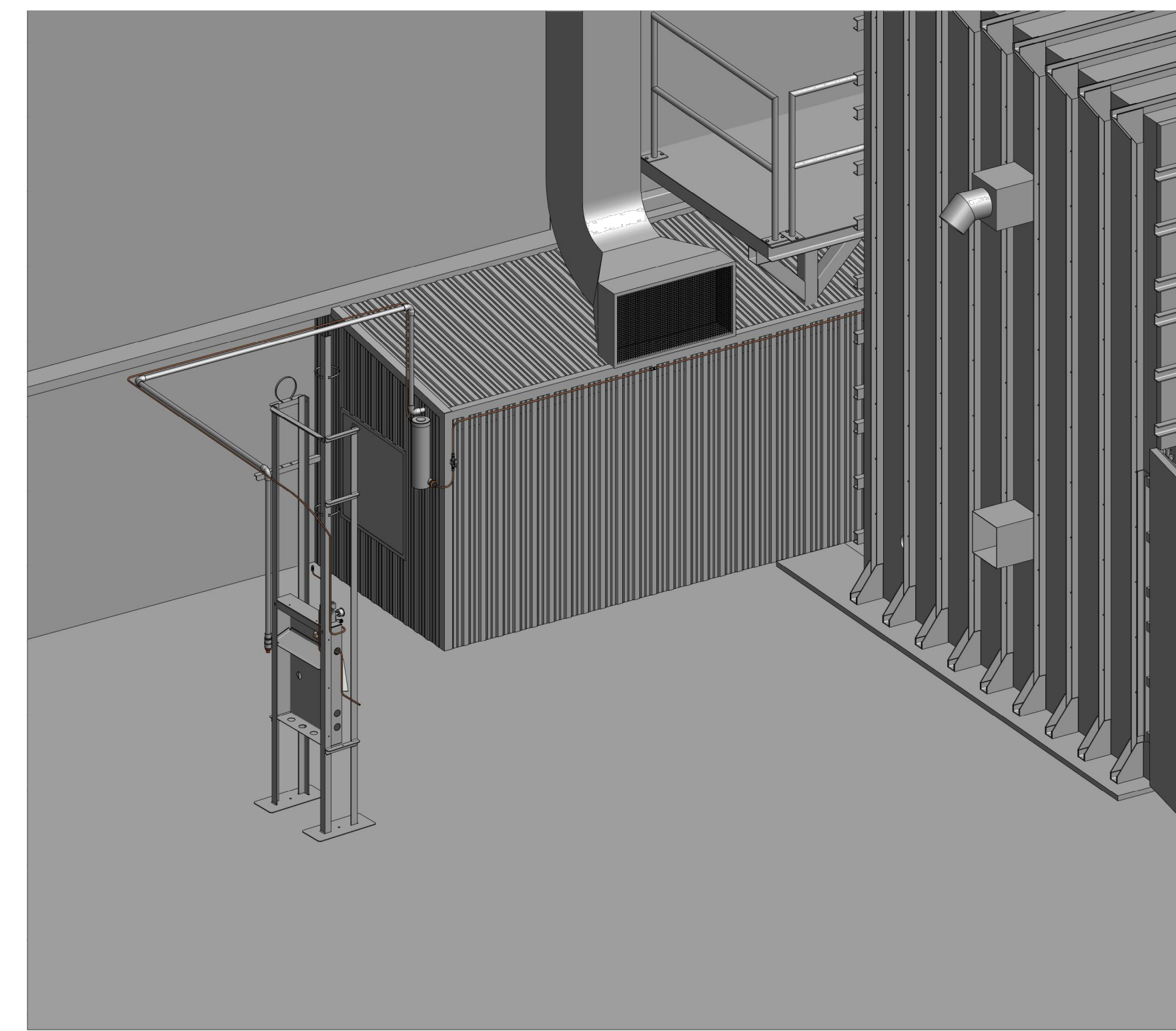
YVES GUINDON
MANAGER, SECURITY AND FACILITIES

M. FARID, P. Eng.
PROJECT MANAGER

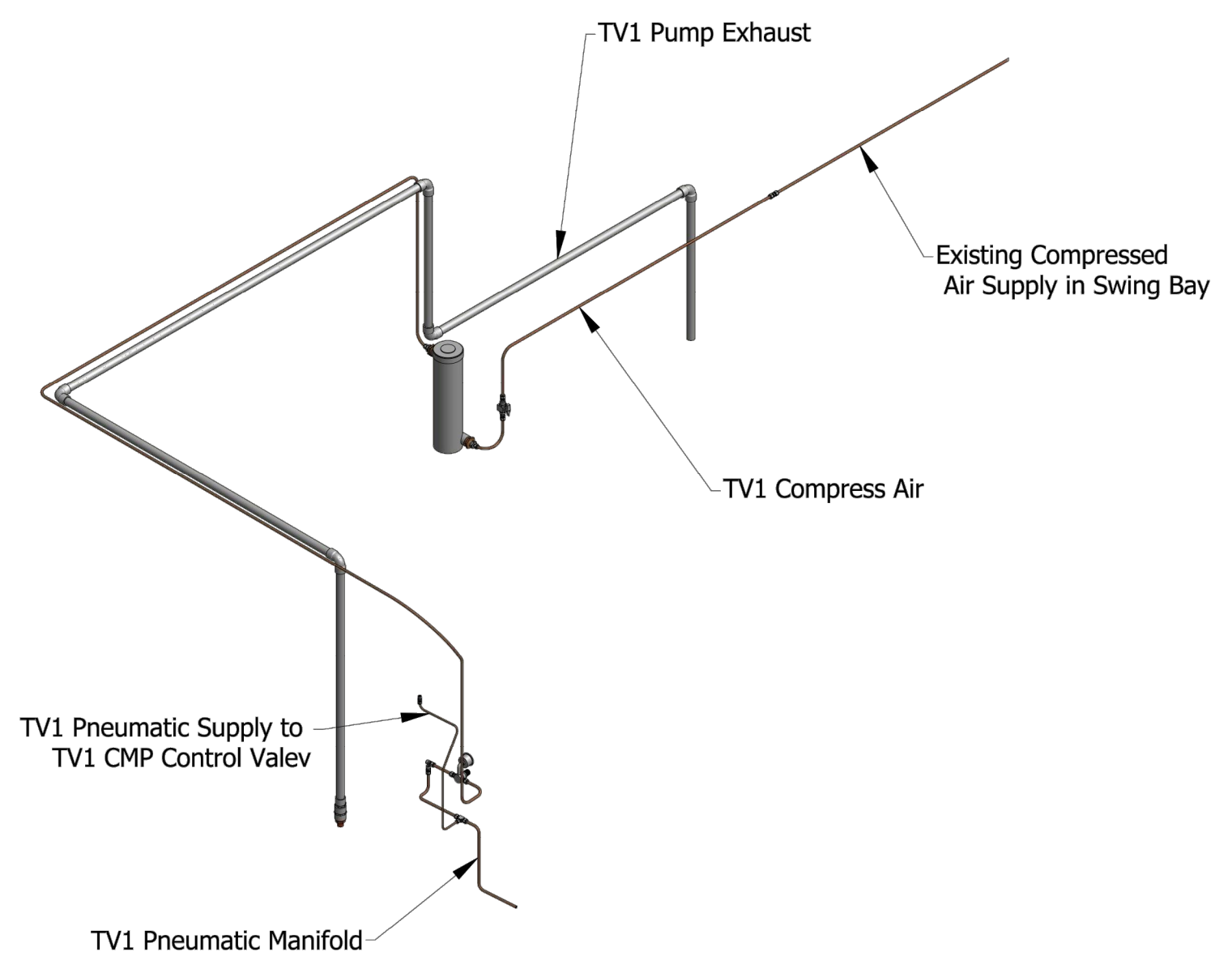
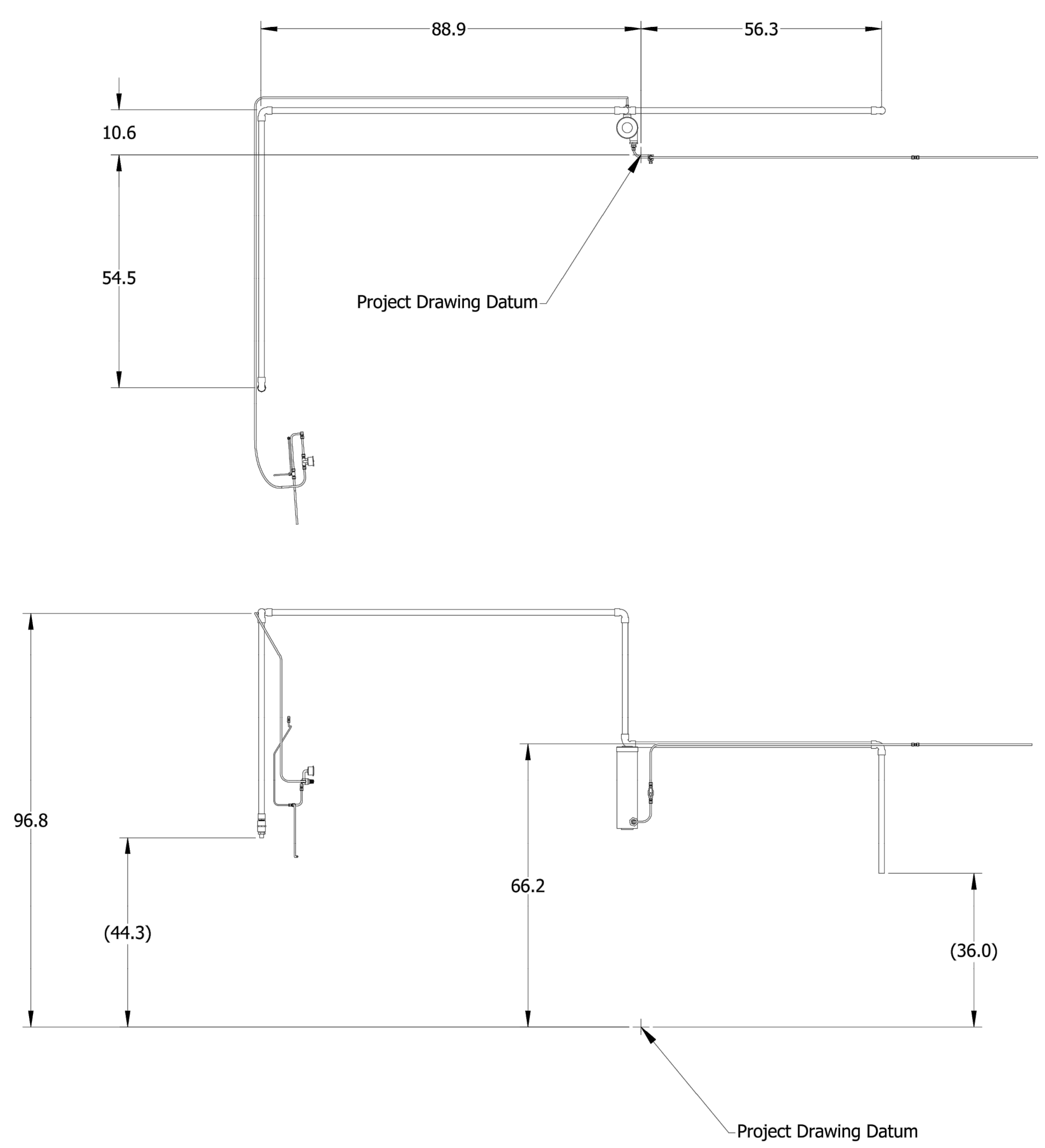
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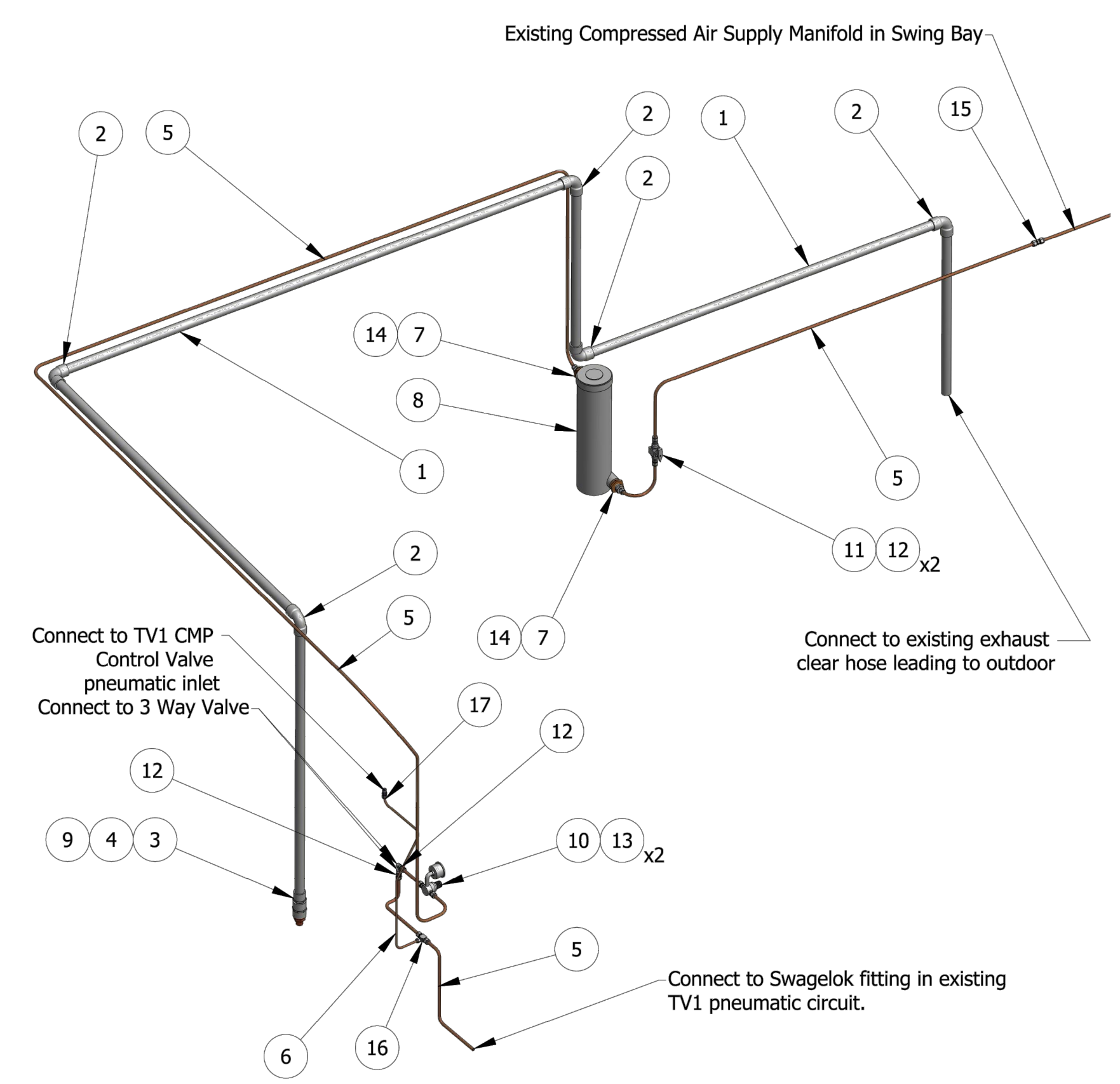
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TV1 Compressed Air, TV1 Pneumatics and TV1 Pump Exhaust



- NOTES:**
1. ALL DIMENSIONS AND QUANTITIES SHOWN ARE A VERY ROUGH ESTIMATE AND FOR REFERENCE ONLY WITH NO CHANGE TO CONTRACT VALUE IF OTHERWISE FOUND DURING CONSTRUCTION. CONTRACTOR TO VERIFY ALL QUANTITIES & RUN LENGTHS ON SITE.
 2. ALL PARTS SUPPLIED BY OWNER TO BE FULLY INSTALLED BY CONTRACTOR.
 3. ALL BRAZING TO BE SIL-FOS 15% WITH ARGON PURGE.
 4. NO FLUX ON COPPER - COPPER CONNECTIONS.
 5. FLUX RECOMMENDED FOR COPPER - BRASS CONNECTIONS.



| PARTS LIST | | | |
|------------|-------|--|-------------|
| ITEM | QTY | PARTNAME | SUPPLIED BY |
| 1 | 27 ft | 1" Standard Wall White PVC Pipe on TV1 Roughing Pump Exhaust | Contractor |
| 2 | 5 | 1 inch 90° White PVC Elbow | Contractor |
| 3 | 1 | PVC Adaptor 1" pipe to 1" MNPT | Contractor |
| 4 | 1 | PVC 1" FNPT Coupling | Contractor |
| 5 | 32 ft | 1/4" (3/8" OD) Copper Tubing on TV1 Compressed Air Supply and on TV1 Pneumatic | Contractor |
| 6 | 3 ft | 1/8" (1/4" OD) Copper Tubing on Pneumatic Supply to TV1 CMP Control Valve | Contractor |
| 7 | 2 | Bronze Reducing Bushing 1" MNPT to 3/4" FNPT | Contractor |
| 8 | 1 | Air Dryer | Contractor |
| 9 | 1 | Copper Adaptor 3/4" pipe to 1" MNPT | Contractor |
| 10 | 1 | 1/4" Miniature Regulator with Gauge, Parker R344-02CG | Owner |
| 11 | 1 | 3/8 Ball Valve FNPT End, McMaster 4114T25 | Owner |
| 12 | 4 | Swagelok Adaptor 3/8" tube to 3/8" MNPT, B-600-1-6 | Owner |
| 13 | 2 | Swagelok Adaptor 3/8" tube to 1/4" MNPT B-600-1-4 | Owner |
| 14 | 2 | Swagelok Adaptor 3/8" tube to 3/4" MNPT, B-600-1-12 | Owner |
| 15 | 1 | Swagelok Union 3/8", B-600-6 | Owner |
| 16 | 1 | Swagelok Reducing Tee 3/8" X 3/8" X 1/4", B-600-3-6-4 | Owner |
| 17 | 1 | Swagelok Adaptor 1/4" tube to 1/4" MNPT, B-400-1-4 | Owner |

| No. | REVISION | Date |
|-----|-------------------------|----------|
| 5. | | |
| 4. | | |
| 3. | ISSUED FOR TENDER | SEPT, 14 |
| 2. | ISSUED FOR FINAL REVIEW | SEPT, 14 |
| 1. | ISSUED FOR REVIEW | AUG, 14 |

PROFESSIONAL STAMP

A detail no. / no. du detail
 B location drawing no. / sur dessin no.
 C drawing no. / dessin no.

project / projet
DAVID FLORIDA LABORATORY
 BUILDING No. 65, SHIRLEY'S BAY, ONTARIO

TQF TV1 / TP2 REFIT

drawing / dessin
TV1 COMP AIR, PNEUMATIC & PUMP EXHAUST

designed / conçu
 date
TQF

drawn / dessiné
 date
TQF / B-OPS

reviewed / examiné
 date
TQF

approved / approuvé
 date
TQF

scale
N.T.S.

project no. / no. du projet
CSA13-G1

drawing no. / no. du dessin
M7

GENERAL ELECTRICAL NOTES:

- THESE DRAWINGS MUST BE READ IN CONJUNCTION WITH ALL ISSUED CONTRACT SPECIFICATIONS, ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL DRAWINGS, EXCEPT WHERE REPLACED OR CHANGED BY DIRECTIVE OR CORRECTIVE ADDENDA OR REVISED DRAWINGS AND SPECIFICATIONS.
- ALL WORK MUST BE IN FULL ACCORDANCE WITH THE CANADIAN ELECTRIC CODE PART 1 C22.1-02 AND THE LATEST EDITION OF THE ONTARIO SAFETY CODE.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROVISION (SUPPLY, INSTALLATION & WIRING) OF ALL EQUIPMENT SHOWN ON THE CONTRACT DRAWINGS AND SPECIFICATIONS UNLESS CHANGED OR REPLACED BY REVISED DRAWINGS, SPECIFICATIONS ADDENDA.
- THE SUCCESSFUL BIDDER SHALL ARRANGE AND PAY FOR ALL NECESSARY PERMITS AND WORK REQUIRED TO BE PERFORMED BY LOCAL AUTHORITIES INCLUDING INSPECTION BY ESA AND TESTING.
- ALL DIMENSIONS SHALL BE VERIFIED ON SITE. EXACT LOCATION OF EQUIPMENT IS SUBJECT TO SITE MEASUREMENTS. DIMENSIONS SHOWN ON DRAWINGS ARE IN INCHES.
- ALL BIDDERS AND THEIR SUB TRADES ARE STRONGLY ADVISED TO ATTEND THE SITE VISIT TO FAMILIARIZE THEMSELVES WITH THE SITE CONDITIONS AND EXACT SCOPE OF WORK.
- IF ANY DISCREPANCY OCCURS ON THE ENGINEER'S DRAWINGS, THE CONTRACTOR SHALL, DURING TENDERING, ASSUME THE LARGER / GREATER. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
- DRAWINGS ARE NOT INTENDED TO SHOW THE DETAILS OF CONDUIT ROUTES, OFFSETS, ETC. BE RESPONSIBLE FOR CAREFULLY EXAMINE THE WORK SITE PRIOR TO TENDER CLOSE-OUT AND INCLUDE IN THE TENDER PRICE ALL NECESSARY LABOR AND MATERIAL REQUIRED FOR A FULLY OPERABLE SYSTEM AS INTENDED.
- PARTS NOTED ON DRAWINGS TO BE SUPPLIED BY OWNER SHALL BE FULLY INSTALLED & SUPPORTED BY CONTRACTOR.
- ALL WIRING TO BE MINIMUM #12 AWG COPPER STRANDED WIRES UNLESS OTHERWISE STATED. CONDUITS & JUNCTION BOXES SHALL NOT BE LOADED MORE THAN 60% OF ITS MAXIMUM RATED CAPACITY.
- ALL ELECTRICAL RACEWAYS & EQUIPMENT TO BE SQUARE TO BUILDING LINES AND SHALL BE SEPARATELY SUPPORTED FROM BUILDING STRUCTURE. A GROUND CONDUCTOR IS REQUIRED IN ALL RACEWAYS.
- ALL CONNECTORS & COUPLINGS SHALL BE STEEL WITH INSULATED THROATS, ALL CONDUITS TO BE EMT, MINIMUM OF 3/4" UNLESS OTHERWISE STATED, ARMORED CABLE IS NOT A CONDUIT & PROJECT MANAGER MUST APPROVE THE USE OF IT.
- LOCATE ALL BOXES ON STRAIGHT RUNS, EACH BOX TO BE BONDED.
- ALL CONDUIT RUNS SHALL BE COLOR CODED TO BUILDING COLOR CODE, ALL CONDUITS TO BE MARKED AT THE START AND END OF EACH RUN & AT BOTH SIDES OF ANY WALL, STANDARD ELECTRIC TAPE IS TO BE USED FOR MARKING.
- ALL OUTLETS, SWITCHES, COMMUNICATION JACKS TO BE WHITE, DECORA STYLE W/ BRUSHED STAINLESS STEEL COVER PLATE UNLESS OTHERWISE STATED.
- USE OF TIE WRAPS OR TIE WIRE IS NOT ACCEPTABLE.
- 3D MODELS SHOWN ON DRAWINGS ARE FOR REFERENCE ONLY AND NOT INTENDED TO SHOW ALL ELECTRICAL PARTS SUCH AS JUNCTION BOXES, LB'S ETC. CONTRACTOR IS RESPONSIBLE FOR FULL INSTALLATION AS DIRECTED BY CODE.
- ALL CONDUITS RUNS LENGTH SHOWN ON DRAWINGS ARE FOR GENERAL REFERENCE ONLY, CONTRACTOR TO EXAMINE SITE TO DETERMINE EXACT ROUTE & DIMENSIONS.
- SOME CONDUIT RUNS ARE NOT SHOWN ON 3D MODELS. CONTRACTOR TO FOLLOW ALL LINE DIAGRAMS, SCHEMATICS, 3D MODELS & TABLES FOR FULL ELECTRICAL SCOPE.
- IMMEDIATELY AFTER AWARDED THE CONTRACT, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER A DETAILED WORK SCHEDULE, IN THE FORM OF COMPUTERIZED BAR CHART OUTLINING ALL PROJECT ACTIVITIES AND SCHEDULED SHUT DOWNS.
- CORE DRILL WALLS AND FLOORS FOR NEW SERVICES & WIRING. SEALING OF ALL EXISTING OPENINGS AFTER SERVICES ARE REMOVED SHALL FORM PART OF THIS CONTRACT.
- INSTALL EQUIPMENT IN FULL ACCORDANCE WITH THE MANUFACTURER RECOMMENDATIONS.
- REFER TO NOTES 29, 30, 31 & 32 ON DRAWING A1 FOR ALL SERVICES SUPPORTS & HANGERS.
- ALL WORK CARRIED OUT IN THE CLEAN ROOMS SHALL BE PRE-SCHEDULED AND SUBJECT TO CSA PROJECT MANAGER'S APPROVAL. MAINTAIN CLEAN ROOM CLASS 100,000 STANDARDS AT ALL TIMES.
- WORK UNDER THIS PROJECT MAYBE CONDUCTED AT ELEVATIONS IN EXCESS OF 15m± (50 ft ±), CONTRACTOR MUST ENSURE THAT ALL STAFF & SUB CONTRACTORS ARE TRAINED IN ELEVATED WORK AND FALL PROTECTION.
- ALL SERVICES OR EQUIPMENT THAT IS SHOWN TO BE REMOVED SHALL BE REMOVED IN THEIR ENTIRETY COMPLETE WITH ALL ASSOCIATED SERVICES, SUPPORTS, HANGERS ETC. ANY ABANDONED OR UNUSED COMPONENTS FOUND WITHIN THE SCOPE OF THIS PROJECT SHALL BE TERMINATED, REMOVED AND REMAINING IF ANY SHALL BE MADE SAFE.
- DRAWINGS ARE NOT INTENDED TO SHOW THE DETAILS OF EACH COMPONENT TO BE INSTALLED OR REMOVED. THEY ARE ONLY PROVIDING A GENERAL OVERVIEW OF THE PROJECT SCOPE. BE RESPONSIBLE TO REVIEW THE SITE CONDITIONS DURING THE TENDER PERIOD AND EXAMINE THE EXTENT OF THE DEMOLITION, REMOVALS & NEW INSTALLATIONS.
- OWNER SHALL BE GIVEN THE OPTION OF RETAINING ANY REMOVED COMPONENTS OR EQUIPMENT. COORDINATE AND HAND OVER AS NECESSARY. DISPOSE OF ANY REMAINING UNWANTED EQUIPMENT OR SERVICES AND REMOVE OFF SITE.
- DO NOT SUBJECT ANY PART OF THE BUILDING TO ANY NOISE, DUSTY / SMELLY ACTIVITIES SHALL BE DONE AFTER HOURS OR AT WEEKENDS, COORDINATE WITH CSA PROJECT MANAGER WITH A MINIMUM NOTICE OF 48 HOURS.



ITEMS TO BE REMOVED FROM SIDE OF SERVICE CHASE

VIEW 1
E1



TP2 CONDITIONER DISCONNECT

VIEW 2
E1



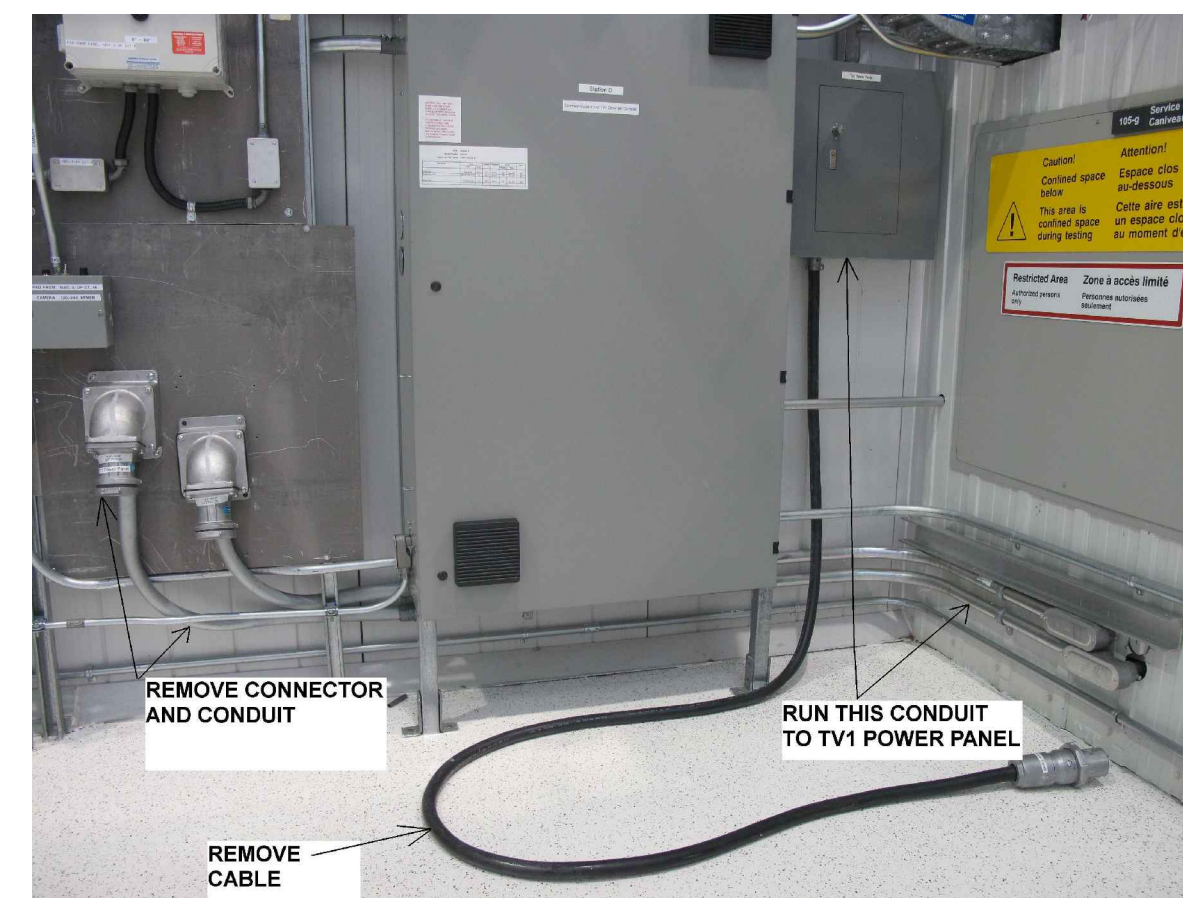
OVERALL VIEW, REMOVE WIRE TRAY

VIEW 3
E1



REMOVE EXISTING WIRE TRAY C/W ALL SUPPORTS & ACCESSORIES.

VIEW 4
E1



TV1 POWER CONNECTION

VIEW 5
E1



TV1 OLD ELECTRICAL PANEL

VIEW 6
E1

YVES GUINDON
MANAGER, SECURITY AND FACILITIES

M. FARID, P. Eng.
PROJECT MANAGER

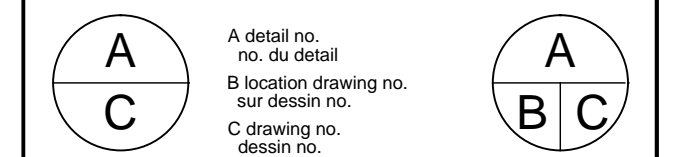
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| No. | REVISION | Date |
|-----|-------------------------|----------|
| 5. | | |
| 4. | | |
| 3. | ISSUED FOR TENDER | SEPT, 14 |
| 2. | ISSUED FOR FINAL REVIEW | SEPT, 14 |
| 1. | ISSUED FOR REVIEW | AUG, 14 |

PROFESSIONAL STAMP



project
DAVID FLORIDA LABORATORY
BUILDING No. 65, SHIRLEY'S BAY, ONTARIO
TQF TV1 / TP2 REFIT

drawing **ELECTRICAL NOTES, MODIFICATIONS AND DEMOLITION** dessin

designed **TQF** concu

date

drawn **TQF / B-OPS** dessine

date

reviewed **TQF** examine

date

approved **TQF** approuve

date

scale **N.T.S.**

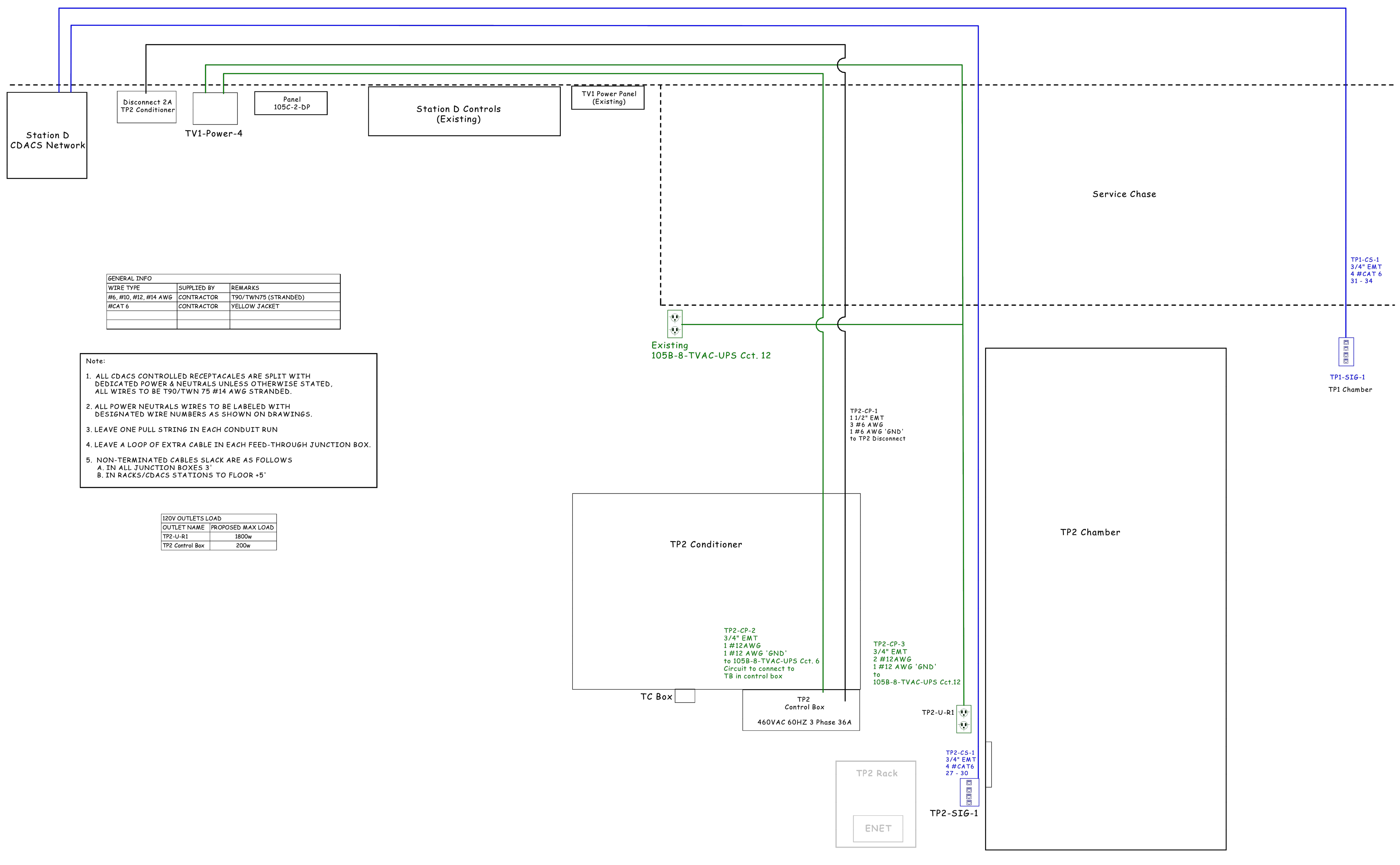
project no. **CSA13-G1** no. du projet

drawing no. **E1** no. du dessin

YVES GUINDON
MANAGER, SECURITY AND FACILITIES

M. FARID, P. Eng.
PROJECT MANAGER

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| GENERAL INFO | | |
|-----------------------|-------------|----------------------|
| WIRE TYPE | SUPPLIED BY | REMARKS |
| #6, #10, #12, #14 AWG | CONTRACTOR | T90/TWN75 (STRANDED) |
| #CAT 6 | CONTRACTOR | YELLOW JACKET |

- Note:
- ALL CDACS CONTROLLED RECEPTACLES ARE SPLIT WITH DEDICATED POWER & NEUTRALS UNLESS OTHERWISE STATED, ALL WIRES TO BE T90/TWN 75 #14 AWG STRANDED.
 - ALL POWER NEUTRALS WIRES TO BE LABELED WITH DESIGNATED WIRE NUMBERS AS SHOWN ON DRAWINGS.
 - LEAVE ONE PULL STRING IN EACH CONDUIT RUN
 - LEAVE A LOOP OF EXTRA CABLE IN EACH FEED-THROUGH JUNCTION BOX.
 - NON-TERMINATED CABLES SLACK ARE AS FOLLOWS
A. IN ALL JUNCTION BOXES 3'
B. IN RACKS/CDACS STATIONS TO FLOOR +5'

| 120V OUTLETS LOAD | |
|-------------------|-------------------|
| OUTLET NAME | PROPOSED MAX LOAD |
| TP2-U-R1 | 1800w |
| TP2 Control Box | 200w |

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PROFESSIONAL STAMP

A
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A detail no.
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dessin no.

A
B
C

project DAVID FLORIDA LABORATORY
BUILDING No. 65, SHIRLEY'S BAY, ONTARIO
TQF TV1 / TP2 REFIT

| drawing | dessein |
|--|---------------|
| TP2 CHAMBER & CONDITIONER WIRING SCHEMATIC | |
| designed | conçu |
| date | TQF |
| drawn | dessiné |
| date | TQF / B-OPS |
| reviewed | examiné |
| date | TQF |
| approved | approuvé |
| date | TQF |
| scale | N.T.S. |
| project no. | no. du projet |
| CSA13-G1 | |
| drawing no. | no. du dessin |
| E2 | |

YVES GUINDON
MANAGER, SECURITY AND FACILITIES

M. FARID, P. Eng.
PROJECT MANAGER

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| 5. | | |
| 4. | | |
| 3. | ISSUED FOR TENDER | SEPT, 14 |
| 2. | ISSUED FOR FINAL REVIEW | SEPT, 14 |
| 1. | ISSUED FOR REVIEW | AUG, 14 |

| PROFESSIONAL STAMP | |
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| A C | A detail no. no. du detail B location drawing no. sur dessin C drawing no. dessin no. |
| A B C | |

project **DAVID FLORIDA LABORATORY**
BUILDING NO. 65, SHIRLEY'S BAY, ONTARIO

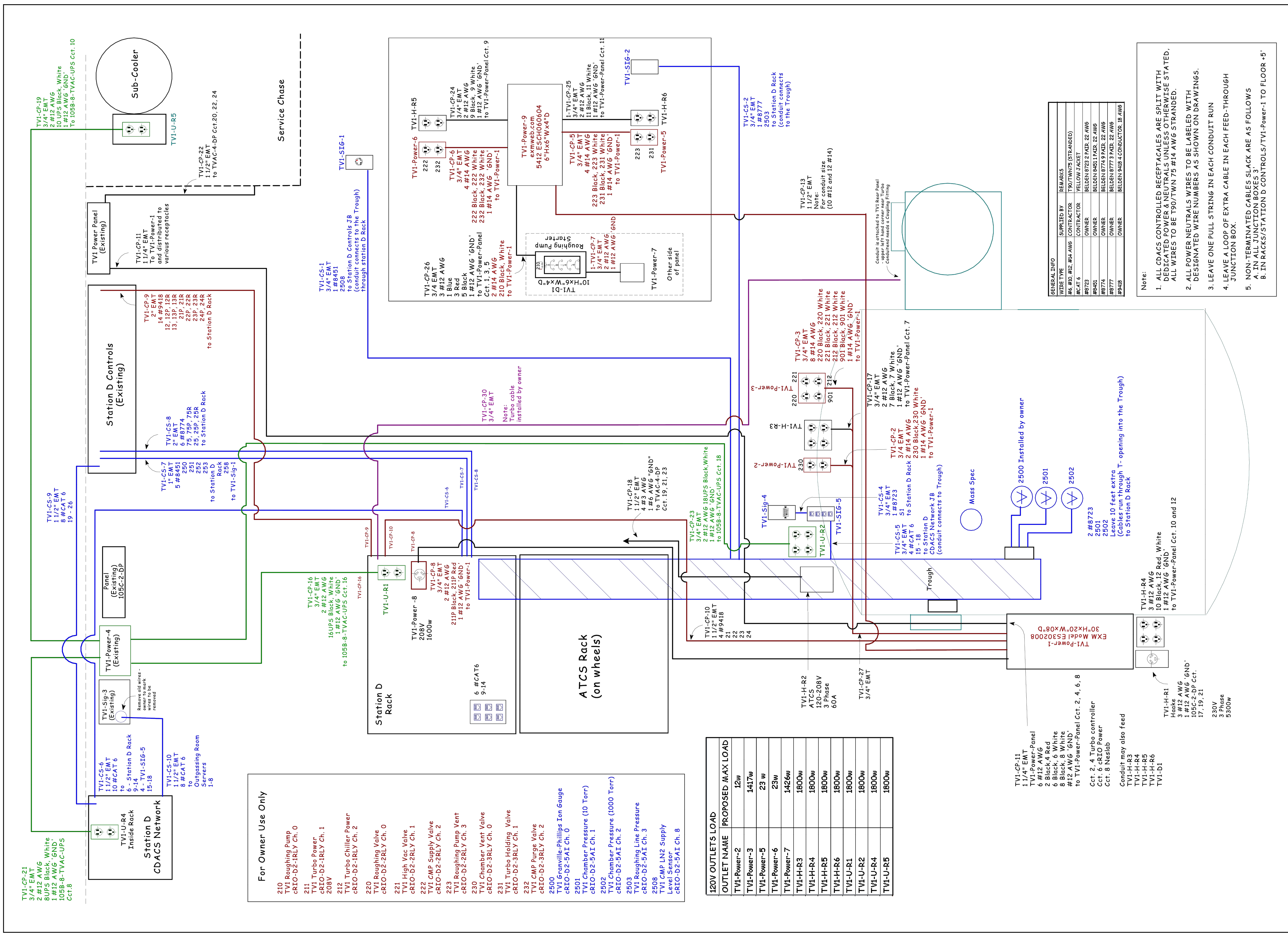
TQF TV1 / TP2 REFIT

drawing **TV1 WIRING SCHEMATIC** dessin

| designed | TQF | conçu |
|----------|-------------|----------|
| date | TQF / B-OPS | dessiné |
| drawn | TQF | examiné |
| date | TQF | approuvé |
| approved | TQF | scale |
| date | N.T.S. | |

project no. **CSA13-G1** no. du projet

drawing no. **E3** no. du dessin



| GENERAL INFO | WIRE TYPE | SUPPLIED BY | REMARKS |
|--------------|-----------|---------------------------------|---------|
| #6 | #12 AWG | T907/TW179 (STRANDED) | |
| #7 | #14 AWG | YELLOW JACKET | |
| #8 | #16 AWG | BELDEN 8723 2 PAIR, 22 AWG | |
| #9 | #18 AWG | BELDEN 8749 4 PAIR, 22 AWG | |
| #10 | #20 AWG | BELDEN 8773 3 PAIR, 22 AWG | |
| #11 | #22 AWG | BELDEN 9418 4 CONDUCTOR, 18 AWG | |

- Note:**
- ALL CDACS CONTROLLED RECEPTACLES ARE SPLIT WITH DEDICATED POWER & NEUTRALS UNLESS OTHERWISE STATED. ALL WIRES TO BE T90/TW179 #14 AWG STRANDED.
 - ALL POWER NEUTRALS WIRES TO BE LABELED WITH DESIGNATED WIRE NUMBERS AS SHOWN ON DRAWINGS.
 - LEAVE ONE PULL STRING IN EACH CONDUIT RUN
 - LEAVE A LOOP OF EXTRA CABLE IN EACH FEED-THROUGH JUNCTION BOX.
 - NON-TERMINATED CABLES SLACK ARE AS FOLLOWS
A. IN ALL JUNCTION BOXES 3'
B. IN RACKS/STATION D CONTROLS/TVI-Power-1 TO FLOOR +5'

For Owner Use Only

| | |
|------|----------------------------------|
| 210 | TVI Roughing Pump |
| | cRIO-D2-1RLY Ch. 0 |
| 211 | TVI Turbo Power |
| | cRIO-D2-1RLY Ch. 1 |
| 212 | TVI Turbo Chiller Power |
| | cRIO-D2-1RLY Ch. 2 |
| 220 | TVI Roughing Valve |
| | cRIO-D2-2RLY Ch. 0 |
| 221 | TVI High Vac Valve |
| | cRIO-D2-2RLY Ch. 1 |
| 222 | TVI CMP Supply Valve |
| | cRIO-D2-2RLY Ch. 2 |
| 223 | TVI Roughing Pump Vent |
| | cRIO-D2-2RLY Ch. 3 |
| 230 | TVI Chamber Vent Valve |
| | cRIO-D2-3RLY Ch. 0 |
| 231 | TVI Turbo Holding Valve |
| | cRIO-D2-3RLY Ch. 1 |
| 232 | TVI CMP Purge Valve |
| | cRIO-D2-3RLY Ch. 2 |
| 2500 | TVI Granville-Phillips Ion Gauge |
| | cRIO-D2-5AI Ch. 0 |
| 2501 | TVI Chamber Pressure (10 Torr) |
| | cRIO-D2-5AI Ch. 1 |
| 2502 | TVI Chamber Pressure (1000 Torr) |
| | cRIO-D2-5AI Ch. 2 |
| 2503 | TVI Roughing Line Pressure |
| | cRIO-D2-5AI Ch. 3 |
| 2508 | TVI CMP LN2 Supply |
| | cRIO-D2-5AI Ch. 8 |

| OUTLET NAME | PROPOSED | MAX LOAD |
|-------------|----------|----------|
| TVI-Power-2 | 12w | |
| TVI-Power-3 | 141.7w | |
| TVI-Power-5 | 23 w | |
| TVI-Power-6 | 23w | |
| TVI-Power-7 | 142.6w | |
| TVI-H-R3 | 1800w | |
| TVI-H-R4 | 1800w | |
| TVI-H-R5 | 1800w | |
| TVI-H-R6 | 1800w | |
| TVI-U-R1 | 1800w | |
| TVI-U-R2 | 1800w | |
| TVI-U-R4 | 1800w | |
| TVI-U-R5 | 1800w | |

TVI-CP-11
1 1/4" EMT
TVI-Power-Panel
6 #12 AWG
2 Black, 4 Red
6 Black, 6 White
8 Black, 8 White
#12 AWG 'GND'
to TVI-Power-Panel Cct. 2, 4, 6, 8
Cct. 2, 4 Turbo controller
Cct. 8 RTD power
Cct. 8 Nestab
Conduit may also feed
TVI-H-R3
TVI-H-R4
TVI-H-R5
TVI-H-R6
TVI-D1

YVES GUINDON
MANAGER, SECURITY AND FACILITIES
M. FARID, P. Eng.
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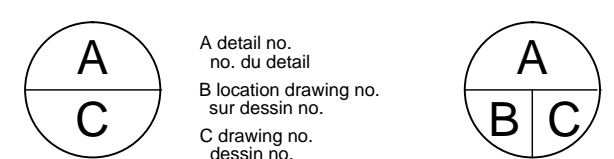
Junction Box List

| | Item | Part Name | Supplied By | Part Size | Box | | | Part # | Notes |
|--------------------------|------|--------------------------------|-------------|----------------------|------------|-----------|----------|-----------------|---|
| | | | | | # of Gangs | # of Hubs | Hub Size | | |
| Racks and Disconnects | 1 | Station D Instrumentation Rack | Owner | 19"W x 70"H x 23"D | | | | C2RR197023BK1 | Hammond, Rack |
| | 2 | Station D CDACS Network Rack | Owner | 23.62"Wx15.75"Dx25"H | | | | WM-5604 | Bud Industries, Wall mounted mini-rack |
| | 3 | TV1-D1 | Owner | Re-use | | | | | Roughing pump disconnect - Re-use |
| CDACS Controlled Outlets | 4 | TV1-Power-1 | Owner | 30"Wx20"Hx8"D | | | | 5412 ES302008 | |
| | 5 | TV1-Power-2 | Contractor | FS single gang | 1 | 1 | 3/4" | CIFS-1G-3/4 | 1x 125V 15A duplex Deccora type outlet - Grey - HBL215GY + Brushed stainless steel cover |
| | 6 | TV1-Power-3 | Contractor | FS double gang | 2 | 1 | 3/4" | CIFS-2G-3/4 | 2x 125V 15A duplex Deccora type outlet - Grey - HBL215GY + Brushed stainless steel cover |
| | 7 | TV1-Power-4 | Existing | n/a | | | | | UPS Power Distribution |
| | 8 | TV1-Power-5 | Contractor | FS single gang | 1 | 1 | 3/4" | CIFS-1G-3/4 | 1x 125V 15A duplex Deccora type outlet - Grey - HBL215GY + Brushed stainless steel cover |
| | 9 | TV1-Power-6 | Contractor | FS single gang | 1 | 1 | 3/4" | CIFS-1G-3/4 | 1x 125V 15A duplex Deccora type outlet - Grey - HBL215GY + Brushed stainless steel cover |
| | 10 | TV1-Power-7 | Owner | Re-use | | | | | Roughing Pump Receptacle - Re-use |
| | 11 | TV1-Power-8 | Contractor | FS single gang | | | | | Turbo Receptacle - Re-use |
| | 12 | TV1-Power-9 | Owner | 6"Wx6"Hx4"D | | | | 5412 ESCH060604 | |
| Standard Hydro Outlets | 13 | TV1-H-R1 | Contractor | FS single gang | | | | | Haaka Receptacle - Re-use |
| | 14 | TV1-H-R2 | Owner | Re-use | | | | | ATCS Receptacle - Re-use |
| | 15 | TV1-H-R3 | Contractor | FS double gang | 2 | 1 | 3/4" | CIFS-2G-3/4 | 2x 125V 15A duplex Deccora type outlet - White - HBL215WA + Brushed stainless steel cover |
| | 16 | TV1-H-R4 | Contractor | FS double gang | 2 | 1 | 3/4" | CIFS-2G-3/4 | 2x 125V 15A duplex Deccora type outlet - White - HBL215WA + Brushed stainless steel cover |
| | 17 | TV1-H-R5 | Contractor | FS Single gang | 1 | 1 | 3/4" | CIFS-1G-3/4 | TV1-Power-8 |
| | 18 | TV1-H-R6 | Contractor | FS Single gang | 1 | 1 | 3/4" | CIFS-1G-3/4 | 1x 125V 15A duplex Deccora type outlet - White - HBL215WA + Brushed stainless steel cover |
| UPS Outlets | 19 | TV1-U-R1 | Contractor | FS Single gang | 1 | 1 | 3/4" | CIFS-1G-3/4 | 1x 125V 15A duplex white outlet with lockable flap cover |
| | 20 | TV1-U-R2 | Contractor | FS double gang | 2 | 1 | 3/4" | CIFS-2G-3/4 | 2x 125V 15A duplex white outlet with lockable flap cover |
| | 21 | TV1-U-R4 | Contractor | FS Single gang | 1 | 1 | 3/4" | CIFS-1G-3/4 | 1x 125V 15A duplex white outlet with lockable flap cover |
| | 22 | TV1-U-R5 | Contractor | FS Single gang | 1 | 1 | 3/4" | CIFS-1G-3/4 | 1x 125V 15A duplex white outlet with lockable flap cover |
| | 23 | TP2-U-R1 | Contractor | FS Single gang | 1 | 1 | 3/4" | CIFS-1G-3/4 | 1x 125V 15A duplex white outlet with lockable flap cover |
| CDACS Signal | 24 | TV1-Sig-1 | Contractor | FS single gang | 1 | 1 | 3/4" | CIFS-1G-3/4 | Blank Cover |
| | 25 | TV1-Sig-2 | Contractor | FS single gang | 1 | 1 | 3/4" | CIFS-1G-3/4 | Blank Cover |
| | 26 | TV1-Sig-3 | Existing | n/a | | | | | Communications - may want to replace if possible |
| | 27 | TV1-Sig-4 | Contractor | FS single gang | 1 | 1 | 3/4" | CIFS-1G-3/4 | Blank Cover |
| | 28 | TV1-Sig-5 | Contractor | FS single gang | 1 | 2 | 3/4" | CIFS-1G-3/4 | Blank Cover |
| | 30 | TP1-Sig-1 | Contractor | FS single gang | 1 | 1 | 3/4" | CIFS-1G-3/4 | Blank Cover |
| | 31 | TP2-Sig-1 | Contractor | FS single gang | 1 | 1 | 3/4" | CIFS-1G-3/4 | Blank Cover |

Note: TV1-U-R3 - not used

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PROFESSIONAL STAMP



project project
DAVID FLORIDA LABORATORY
BUILDING No. 65, SHIRLEY'S BAY, ONTARIO
TQF TV1 / TP2 REFIT

drawing dessin
ELECTRICAL PART SCHEDULE

designed TQF concu

date

drawn TQF / B-OPS dessine

date

reviewed TQF examine

date

approved TQF approuve

date

scale N.T.S.

project no. CSA13-G1 no. du projet

drawing no. E4 no. du dessin

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MANAGER, SECURITY AND FACILITIES
M. FARID, P. Eng.
PROJECT MANAGER

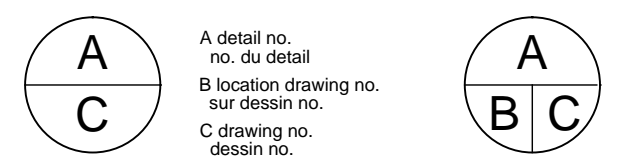
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project: **DAVID FLORIDA LABORATORY**
BUILDING No. 65, SHIRLEY'S BAY, ONTARIO

TQF TV1 / TP2 REFIT

drawing: **TV1 & TP2 POWER & SIGNAL**

designed: **TQF**

drawn: **TQF / B-OPS**

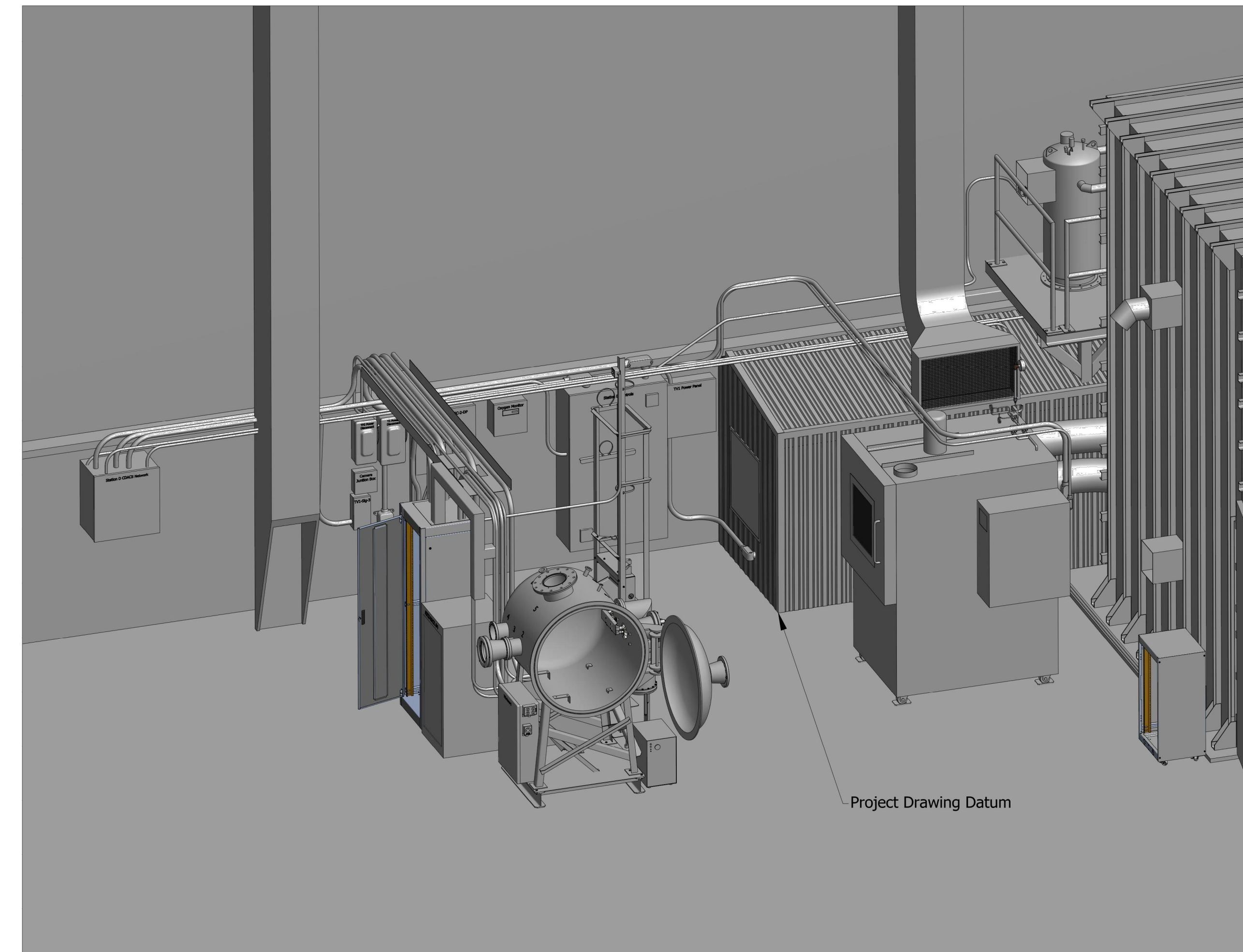
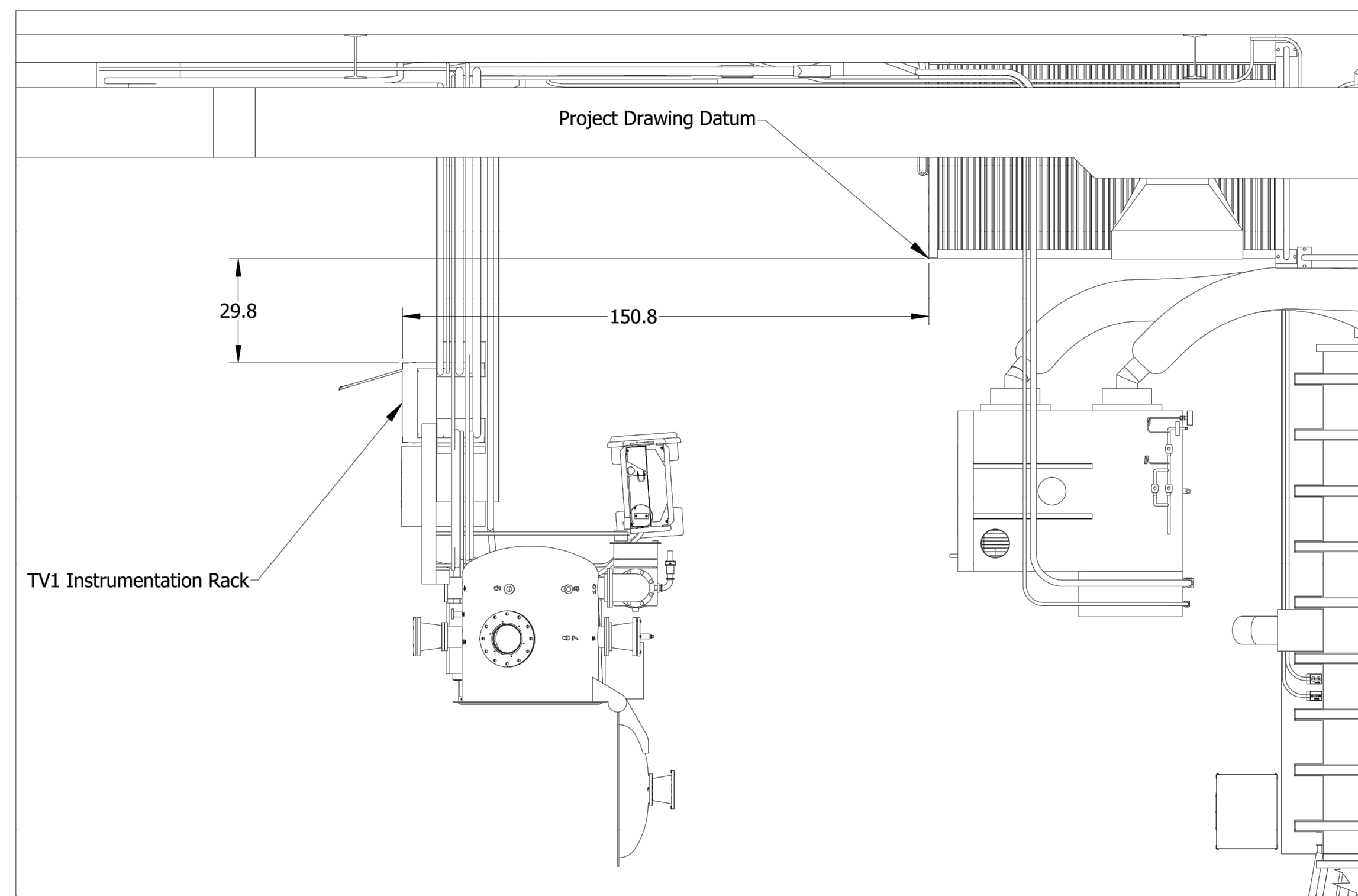
reviewed: **TQF**

approved: **TQF**

scale: **N.T.S.**

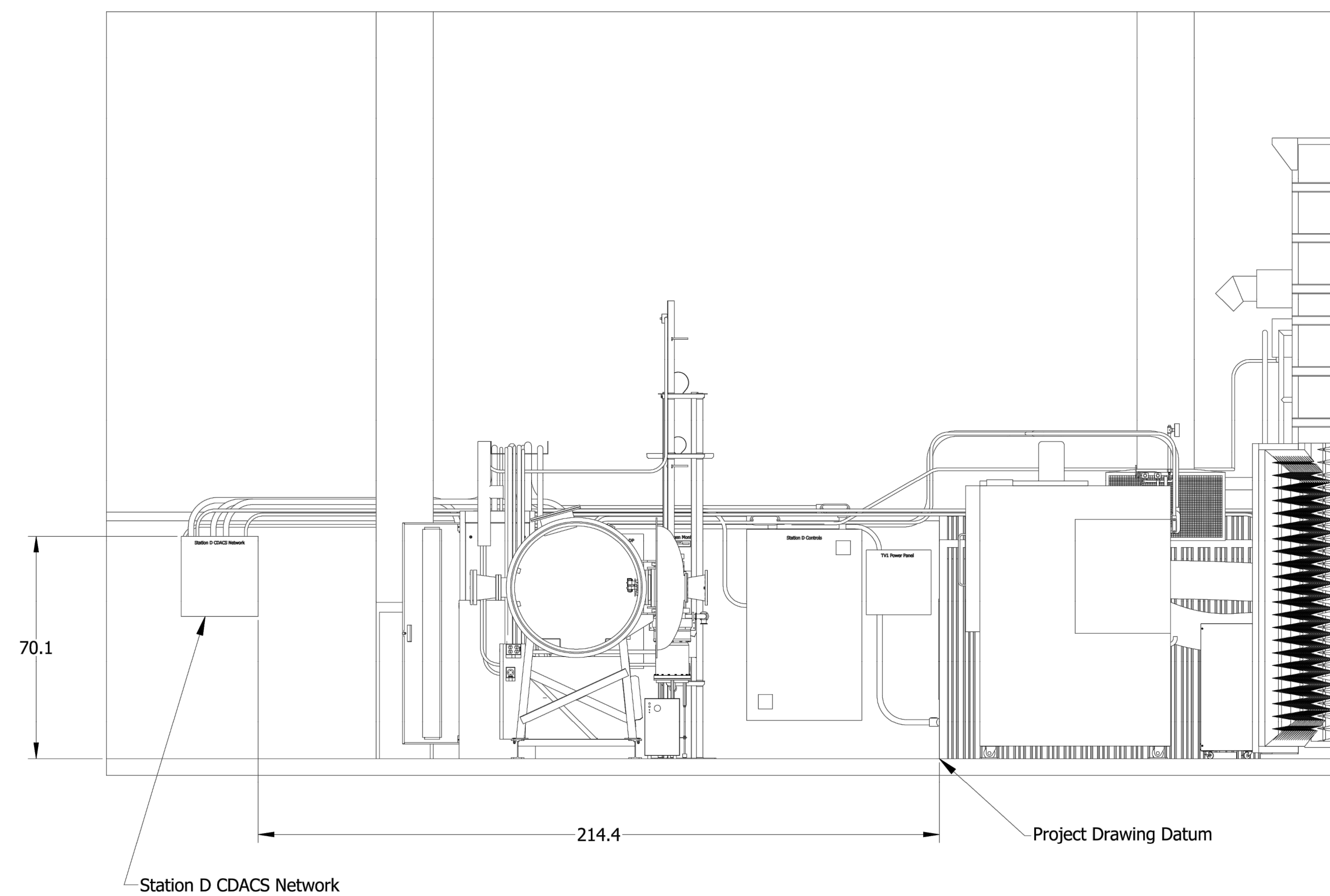
project no.: **CSA13-G1**

drawing no.: **E5**



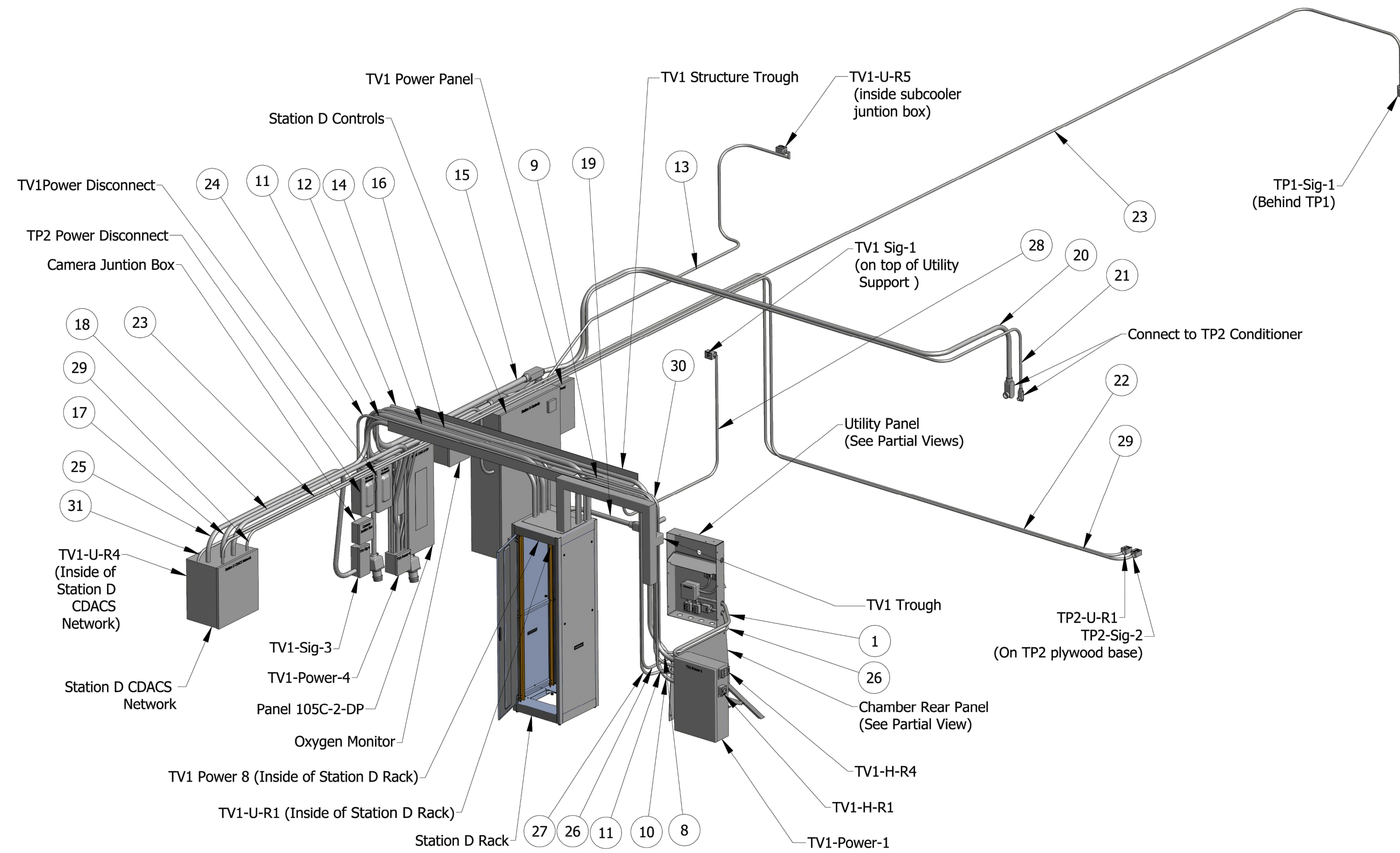
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- ALL PARTS SUPPLIED BY OWNER TO BE FULLY INSTALLED BY CONTRACTOR.



TV1 and TP2 Power And Signal in Swing Bay

Overall View from Front-Left



| CONDUIT LIST | | | | | | |
|--------------|--------------|----------|---------|-------------------------------------|------------------------------|--|
| ITEM | CONDUIT NAME | EMT SIZE | LENGTH | END 1 | END 2 | |
| 1 | TV1-CP-13 | 1-1/2" | 5.0 ft | TV1-Power-1 | TV1-Power-9 | |
| 2 | TV1-CP-6 | 3/4" | 0.7 ft | TV1-Power-6 | TV1-Power-9 | |
| 3 | TV1-CP-24 | 3/4" | 1.2 ft | TV1-H-R5 | TV1-Power-9 | |
| 4 | TV1-CP-5 | 3/4" | 0.2 ft | TV1-Power-5 | TV1-Power-9 | |
| 5 | TV1-CP-25 | 3/4" | 0.2 ft | TV1-H-R6 | TV1-Power-9 | |
| 6 | TV1-CP-27 | 3/4" | 5.0 ft | TV1-Power-3 | TV1-Power-1 | |
| 7 | TV1-CP-7 | 3/4" | 0.3 ft | TV1-D1 | TV1-Power-7 | |
| 8 | TV1-CP-10 | 1-1/2" | 11.1 ft | TV1-Power-1 | Station D Rack | |
| 9 | TV1-CP-8 | 3/4" | 11.5 ft | TV1-Power-1 | Station D Rack | |
| 10 | TV1-CP-11 | 1-1/4" | 31.5 ft | TV1-Power-1 | TV1 Power Panel | |
| 11 | TV1-CP-23 | 3/4" | 27.0 ft | TV1-U-R2 | TV1-Power-4 | |
| 12 | TV1-CP-18 | 1-1/2" | 17.8 ft | TV1-H-R2 | TVAC-4-DP | |
| 13 | TV1-CP-19 | 3/4" | 28.0 ft | TV1-Power-4 | TV1-U-R5 (Subcooler) | |
| 14 | TV1-CS-8 | 2" | 18.0 ft | Station D Control | Station D Rack | |
| 15 | TV1-CP-9 | 2" | 20.8 ft | Station D Control | Station D Rack | |
| 16 | TV1-CS-7 | 1" | 19.0 ft | Station D Control | Station D Rack | |
| 17 | TV1-CS-6 | 1-1/2" | 17.2 ft | Station D CDACS Network | Station D Rack | |
| 18 | TV1-CS-9 | 1-1/2" | 18.0 ft | Station D CDACS Network | TV1-Power-4 | |
| 19 | TV1-CP-22 | 1-1/2" | 8.4 ft | TV1 Power Panel | Service Chase | |
| 20 | TP2-CP-1 | 1-1/2" | 34.6 ft | TP2 Power Disconnect | TP2 Conditioner | |
| 21 | TP2-CP-UPS | 3/4" | 30.0 ft | TP2 Conditioner | TV1-Power-4 | |
| 22 | TP2-CP-3 | 3/4" | 40.0 ft | TP2-U-R1 | TV1-Power-4 | |
| 23 | TP1-CS-1 | 3/4" | 61.3 ft | Station D CDACS Network | TP1-Sig-1 | |
| 24 | TV1-CP-16 | 3/4" | 15.7 ft | TV1-Power-4 | Station D Rack | |
| 25 | TV1-CS-10 | 1-1/2" | 16.1 ft | Station D CDACS Network | TV1-Sig-3 | |
| 26 | TV1-CS-2 | 3/4" | 11.5 ft | TV1-Sig-2 | Trough | |
| 27 | TV1-CS-5 | 3/4" | 9.0 ft | TV1-Sig-5 | Trough | |
| 28 | TV1-CS-1 | 3/4" | 9.4 ft | TV1-Sig-1 | Trough | |
| 29 | TP2-CS-1 | 3/4" | 40 ft | TP2-Sig-2 | Station D CDACS Network | |
| 30 | TV1-CP-30 | 3/4" | 12.6 ft | Station D Rack | TV1 Turbo | |
| 31 | TV1-CP-21 | 3/4" | 14.3 ft | TV1-U-R4 in Station D CDACS Network | TV1-Power-4 | |
| 32 | TV1-CP-26 | 3/4" | 0.5 ft | TV1-Power-9 | TV1 Roughing Pump Disconnect | |
| 33 | TV1-CS-4 | 3/4" | 0.1 ft | TV1-Sig-4 | TV1-Sig-5 | |
| 34 | TV1-CP-2 | 3/4" | 0.8 ft | TV1-Power-2 | TV1-CP-27 | |
| 35 | TV1-CP-17 | 3/4" | 0.8 ft | TV1-H-R3 | TV1-CP-27 | |
| 36 | TV1-CP-3 | 3/4" | 0.2 ft | TV1-Power-3 | TV1-CP-27 | |

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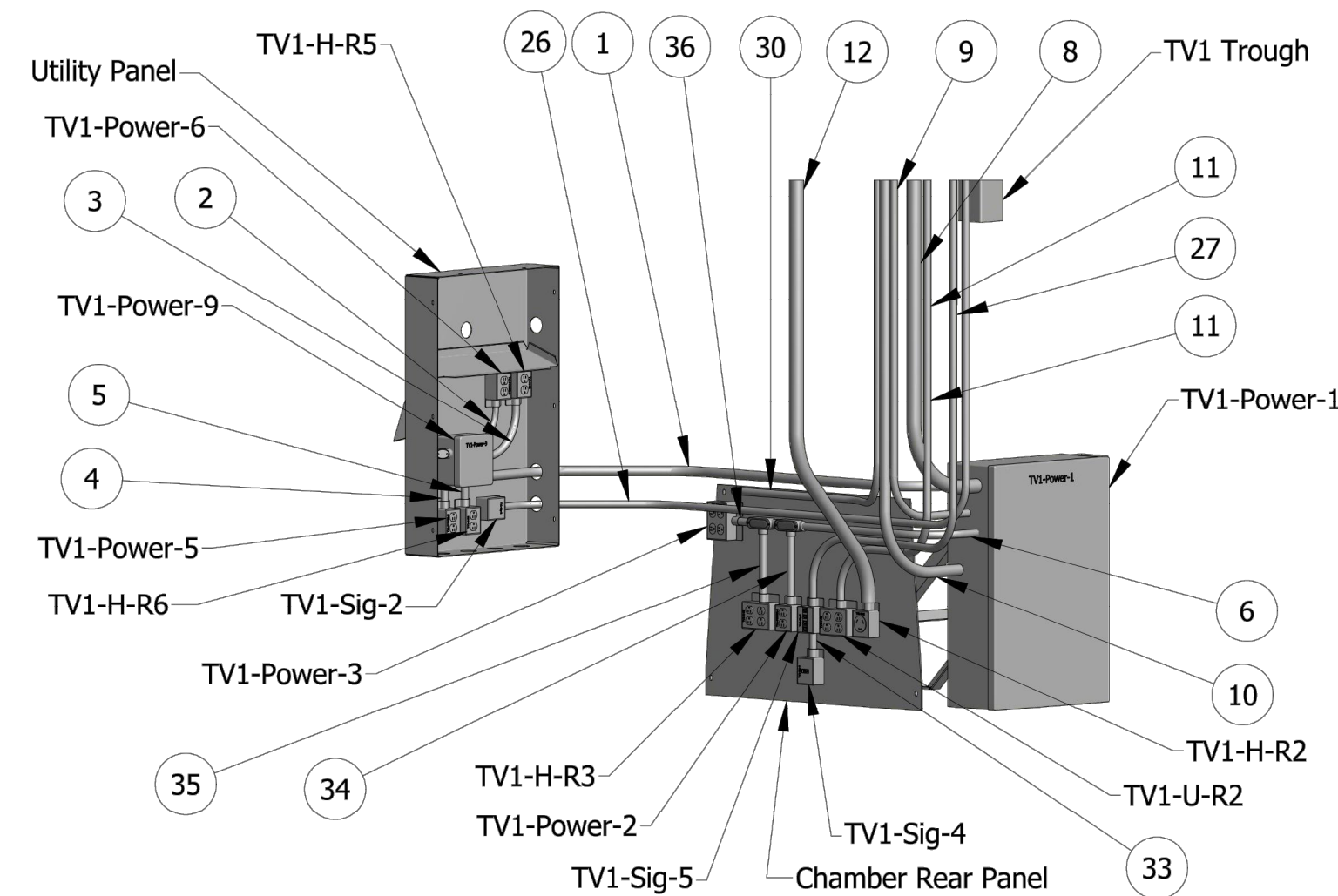
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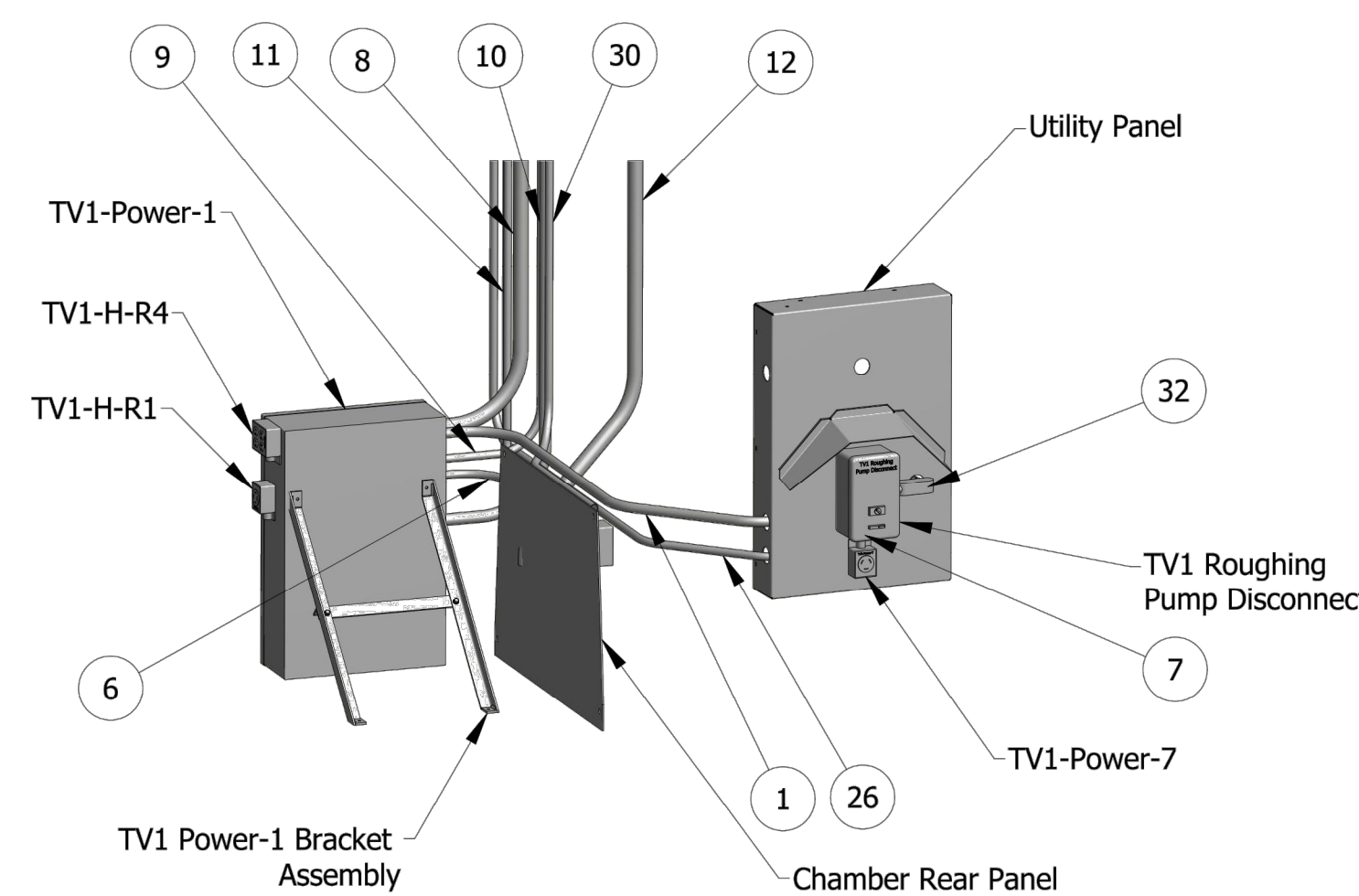
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| | A detail no. / no. du détail | |
| | B location drawing no. / sur dessin no. | |
| | C drawing no. / dessin no. | |
| project | DAVID FLORIDA LABORATORY | project |
| | BUILDING No. 65, SHIRLEY'S BAY, ONTARIO | |
| | TQF TV1 / TP2 REFIT | |
| drawing | TV1 & TV2 POWER & SIGNAL | dessin |
| designed | TQF | conçu |
| date | | |
| drawn | TQF / B-OPS | dessiné |
| date | | |
| reviewed | TQF | examiné |
| date | | |
| approved | TQF | approuvé |
| date | | |
| scale | N.T.S. | |
| project no. | CSA13-G1 | no. du projet |
| drawing no. | E6 | no. du dessin |

Partial View from Rear-Left



Partial View from Rear-Right



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