

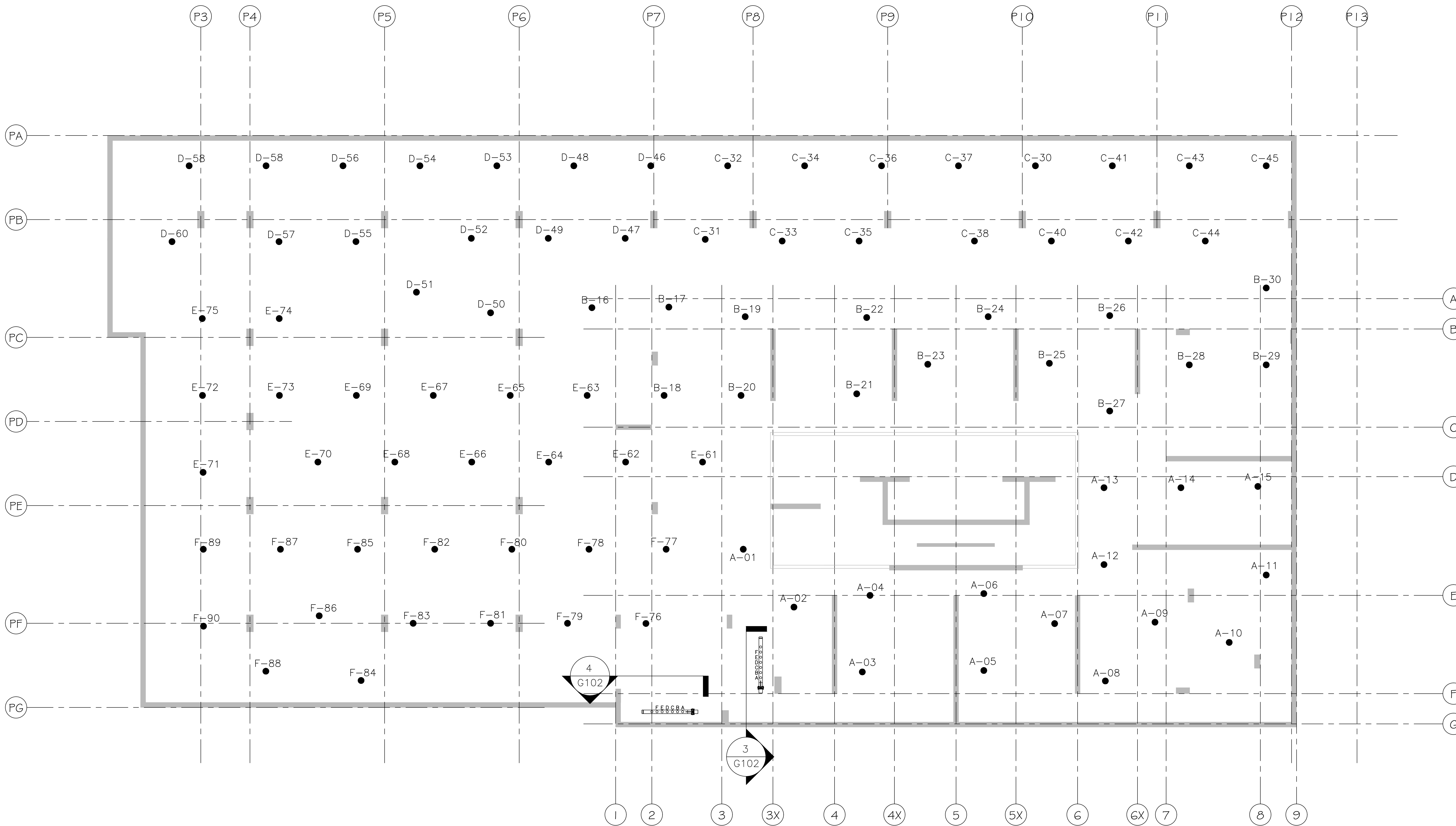
GENERAL NOTES:

- THE GROUND HEAT EXCHANGER (GHX) CONSISTS OF 90 VERTICAL BOREHOLES. EACH BOREHOLE IS TO BE 182.9m (600') IN NET DEPTH, WITH 32mm (1.25") HDPE SDR11 PE4710 PIPE FOR A TOTAL OF 16,461m (54,000') OF VERTICAL DRILLING [32,922m (108,000') OF PIPING]. VERTICAL BOREHOLES ARE CONNECTED BY 6 Pairs OF 100mm [4"] RUNOUT PIPES, WITH 15 BOREHOLES PER CIRCUIT, AND TO MAINTAIN A MINIMUM OF 4.6m (15') ON CENTRE SPACING, UNLESS OTHERWISE NOTED.
- BOREHOLE LABELING SCHEME IS: RUNOUT LETTER - CIRCUIT #.
- HEAT TRANSFER FLUID TO BE USED IS 25% BY VOLUME PROPYLENE GLYCOL, PREMIXED WITH SUITABLE CORROSION INHIBITORS BY MANUFACTURER, MIXTURE TO HAVE A FREEZE PROTECTION TO -10°C [14°F].
- AVOID SHARP BENDS IN PIPING. MINIMUM BEND RADIUS IS 25 TIMES THE OUTER DIAMETER FOR ANY PIPE CURVATURE. USE ELBOWS FOR ALL SMALLER RADI.
- NO PETROLEUM BASED PRODUCTS ARE TO BE IN CONTACT WITH HDPE PIPE.
- ALL PIPES AND FITTINGS ARE TO BE PE 4710 RESIN.
- SOCKET FUSION (NOT GREATER THAN 51mm (2")), BUTT FUSION, OR ELECTROFUSION, AS PER MANUFACTURERS INSTRUCTIONS, ARE THE ONLY ACCEPTABLE METHODS OF JOINING HDPE PIPE.
- FUSIONS ARE TO BE PERFORMED BY ACCREDITED FUSION INSTALLERS.
- ALL INDIVIDUAL CIRCUITS TO BE CAPPED WITH PERMANENT PLUGS IMMEDIATELY AFTER INSTALL TO PREVENT DEBRIS FROM ENTERING.
- BEFORE BACKFILL ALL PIPING MUST BE PRESSURE TESTED TO 690 kPa [100 psig] FOR 48 HOURS. PRESSURE TESTING START AND FINISH PRESSURES AND TIMES TO BE WITNESSED BY CONSULTANT OR DESIGNATED REPRESENTATIVE.
- A METALLIC TRACER WIRE, CAPABLE OF BEING FOUND BY CONVENTIONAL TRACING EQUIPMENT MUST BE INSTALLED WITH ALL CIRCUIT PIPING.
- TRENCH EXCAVATION MAY INCLUDE REMOVAL OF SHALE ROCK TO ACHIEVE DEPTH. REFER TO GRADE PLAN AND GEOTECH REPORT.
- EXPOSED SHALE ROCK MUST BE PROTECTED AT ALL TIMES AS SPECIFIED IN GEOTECH REPORT.
- ALL TRENCHES TO BE BACKFILLED USING EXCAVATED SPOILS OR OTHER NATIVE SOIL IF SUITABLE FOR BACKFILL.
- CONTRACTOR TO INSTALL SYSTEM AS PER CSA STANDARD C448-13.
- CONTRACTOR RESPONSIBLE FOR ON-SITE CLEANLINESS, AND DISPOSING OF ANY EXCESS WATER AND DRILLING CUTTINGS.
- CONTRACTOR IS RESPONSIBLE FOR ALL COSTS RELATED TO MAINTAINING THE WORK PLAN, INCLUDING DELAYS OF UP TO 24 HOURS DUE TO VENTING OF ANY NATURAL GAS FOUND ON-SITE DURING DRILLING AND DELAYS RELATED TO THE MINIMUM EXPECTATIONS OF THE MINISTRY OF THE ENVIRONMENT FOR ENVIRONMENTAL COMPLIANCE APPROVAL (ECA) RELATING TO THE CONSTRUCTION OF A VERTICAL CLOSED LOOP GROUND SOURCE HEAT EXCHANGER AS DEFINED IN THE O.R.E.G. 98/12 MADE UNDER THE ENVIRONMENTAL PROTECTION ACT (EPA).

18. BOREHOLE LITHOLOGY:

FORMATION DESCRIPTION	DEPTH (FT)	PENETRATION RATE
LOOSE SAND & GRAVEL	0 - 10	65 MIN/100 FEET
GREY LIMESTONE (FRACTURED)	10 - 67	65 MIN/100 FEET
GREY LIMESTONE (SOFT, DARK GREY)	67 - 200	65 MIN/100 FEET
GREY LIMESTONE (MEDIUM TO HARD, DARK GREY)	200 - 280	95 MIN/100 FEET
GREY LIMESTONE (HARD, GREY) W/ GREY SANDSTONE	280 - 605	90 MIN/100 FEET

- \* CONFINED FRACTURE IN THE GREY SANDSTONE ZONE AT 287 FEET (WITH 13 GPM).
- \*\* THE APPROXIMATE PENETRATION RATES OF THE TEST BOREHOLE ARE FOR REFERENCE PURPOSES ONLY. THE CONTRACTOR BEARS ALL RESPONSIBILITY FOR ACTUAL TIME REQUIRED TO DRILL BASED ON ACTUAL CONDITIONS ENCOUNTERED USING RESPECTIVE EQUIPMENT AND INSTALLATION TECHNIQUES.



1 GHX BOREHOLE LAYOUT  
Scale: 1:100

no.	date	revision

It is the responsibility of the appropriate contractor to check and verify all dimensions on site and report all errors and/or omissions to the engineer.  
All contractors must comply with all  
Do not scale drawings.  
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**GROUND HEAT EXCHANGER BOREHOLE LAYOUT**

DRAWN	DATE	SCALE
A.T.	07/31/18	1:100

PROJECT	DRAWING NO.
1759	<b>G101</b>