

REVISION	DATE	COMMENTS
1	02/06/07	LEED WOODS

KEY PLAN:

PROJECT:  
GREEN WOODLANDS  
BARN/HOUSE PROJECT

ISSUED:  
CONSTRUCTION DOCUMENTS

DRAWING TITLE:  
BASEMENT  
PLUMBING PLAN

PROJECT NOS: 570 DATE: 09/28/06  
SHEET NUMBER:

**P1.00**

**PLUMBING DRAINBACK PROCEDURE**

DURING LONG UNOCCUPIED PERIODS, IT IS ADVISABLE TO PROTECT THE PLUMBING SYSTEM FROM DAMAGE ASSOCIATED WITH FREEZING. ACCORDINGLY, THE FOLLOWING STEPS SHALL BE TAKEN:

- MANIFOLDS & MAINS**
- 1) CLOSE AND LOCK ISOLATION VALVES ON DOMESTIC COLD WATER SUPPLY MANIFOLDS (DWM-1) AND DOMESTIC COLD ISOLATION VALVES ON THE DOMESTIC HOT WATER SUPPLY MAINS.
  - 2) OPEN THE DRAIN VALVES ON THE DOMESTIC COLD WATER SUPPLY MANIFOLDS AND ON THE DOMESTIC HOT WATER SUPPLY MAINS.

**FEATURES:**

- 1) OPEN ALL VALVES ON LAUNDRIES, SHOWERS, AND KITCHEN SINK.
- 2) DISCONNECT AND DRAIN THE WATER IN THE DOMESTIC HOT WATER DEBRID PUMP (DWP-1).
- 3) DISCONNECT SIPPET HOSE FROM WATER CLOSERS (TO ALLOW DRAINBACK OF SIPPET LINE).
- 4) OPEN WATER FROM TUB/SHOWER AND BUCKET AND POUR DOWN SINK DRAIN.
- 5) OPEN WATER FROM TUB/SHOWER AND BUCKET AND POUR DOWN SINK DRAIN.
- 6) DISCONNECT SUPPLY HOSE FROM LAUNDRY MACHINE.

**TRAPS:**

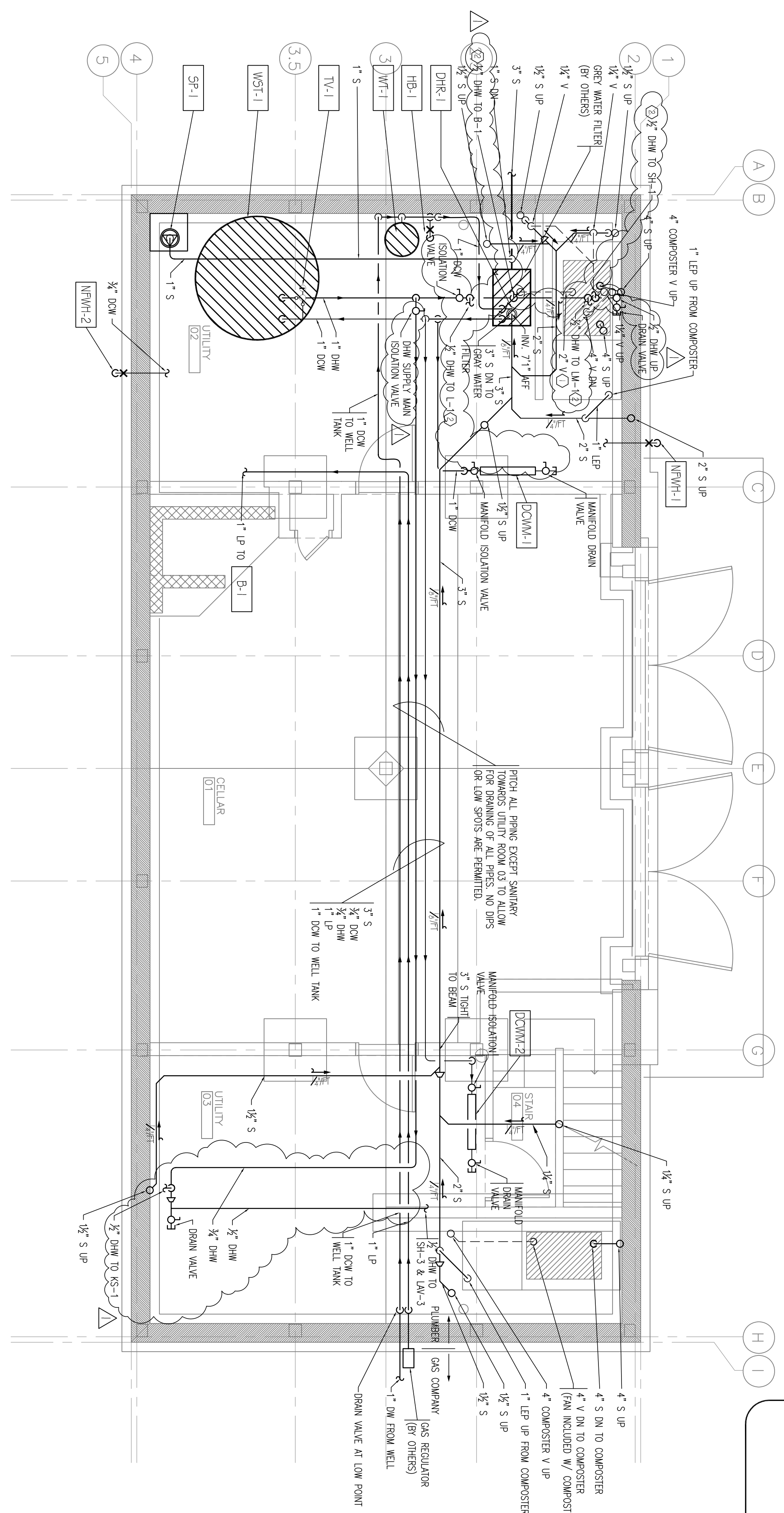
- 1) ADD A SMALL AMOUNT OF PROPYLENE GLYCOL TO EACH TRAP (LAUNDRY, KITCHEN SINK, SHOWER AND BATH DRAINS). THIS WILL MAINTAIN THE SEAL OF THE TRAP AND PREVENT THE WATER FROM FREEZING.
- ONCE ALL WATER HAS BEEN DRAIN FROM THE SUPPLY SYSTEM, CLOSE ALL VALVES, AND RECONNECT HOSES.

**SPECIFIC NOTES**

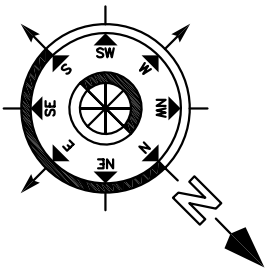
- 1) CONNECT 2" VENT FROM GRAY WATER FILTER UNIT TO COMPOSTER.
- 2) 2" AIR SUPPLY MAINS MUST BE 1/2" OR LESS FROM FEATURES TO WHICH MAINS SHALL INCLUDE BALL VALVES (NOT SHOWN FOR CLARITY).

**GENERAL NOTES**

1. SEE PLUMBING DRAINBACK NOTES FOR INSTRUCTIONS ON PREPARING THE PLUMBING SYSTEM FOR LONG UNOCCUPIED PERIODS.
2. ALL DW & DHW PIPING TO BE COPPER TO MANIFOLDS & FPD FROM MANIFOLDS TO FIXTURES.

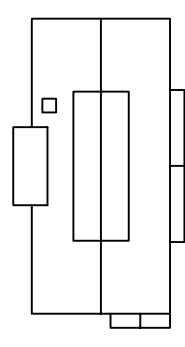


1 BASEMENT PLUMBING PLAN  
1/8" = 1'-0"



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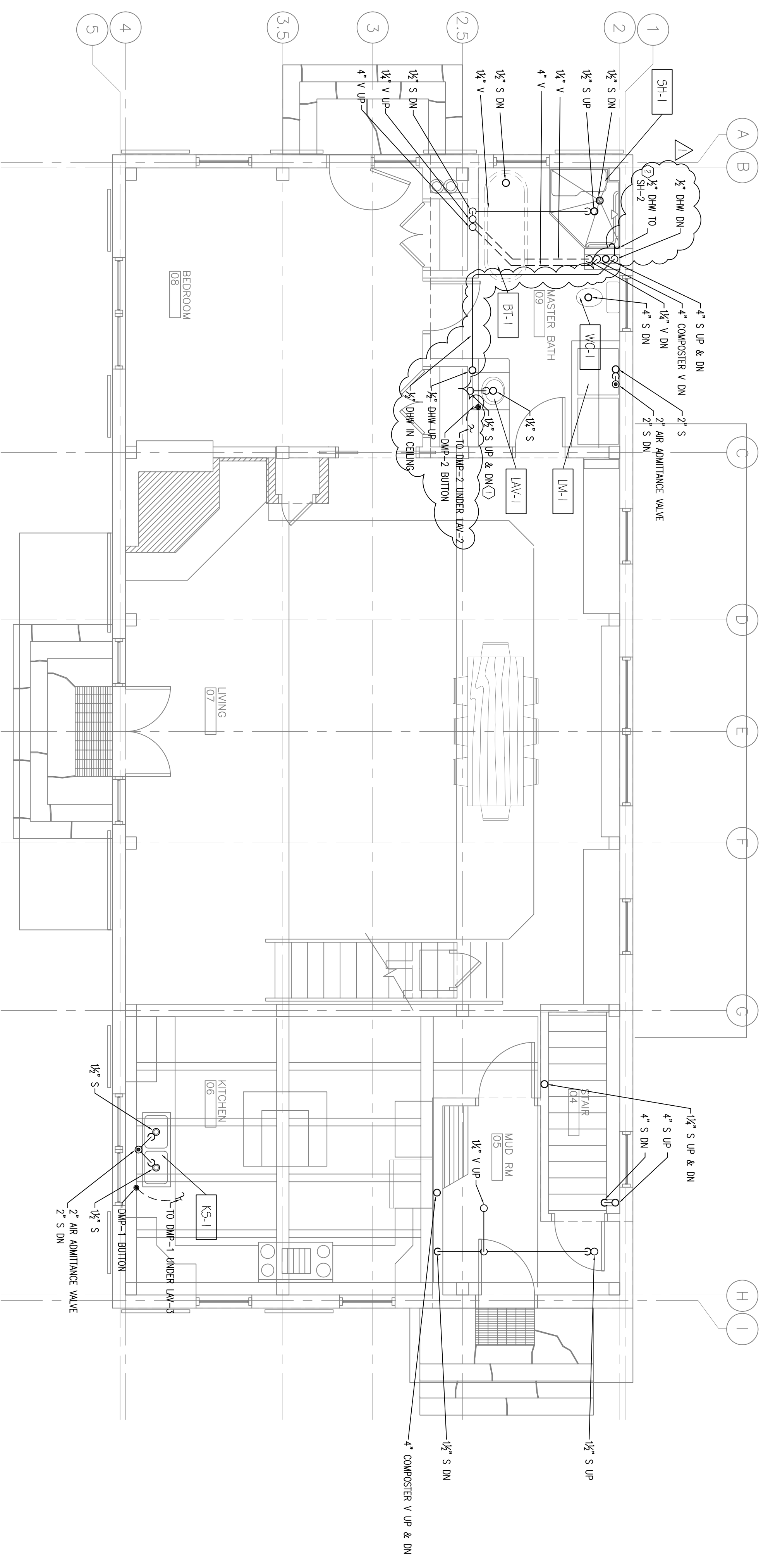
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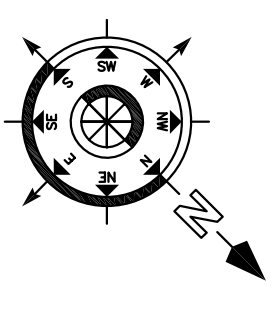
DRAWING TITLE:  
FIRST FLOOR  
PLUMBING PLAN

PROJECT NOS: 570 DATE: 09/28/06

SHEET NUMBER:  
**P1.01**



1.1 FIRST FLOOR PLUMBING PLAN  
1/16\"/>



**SPECIFIC NOTES**  
1. THE 1/2\"/>

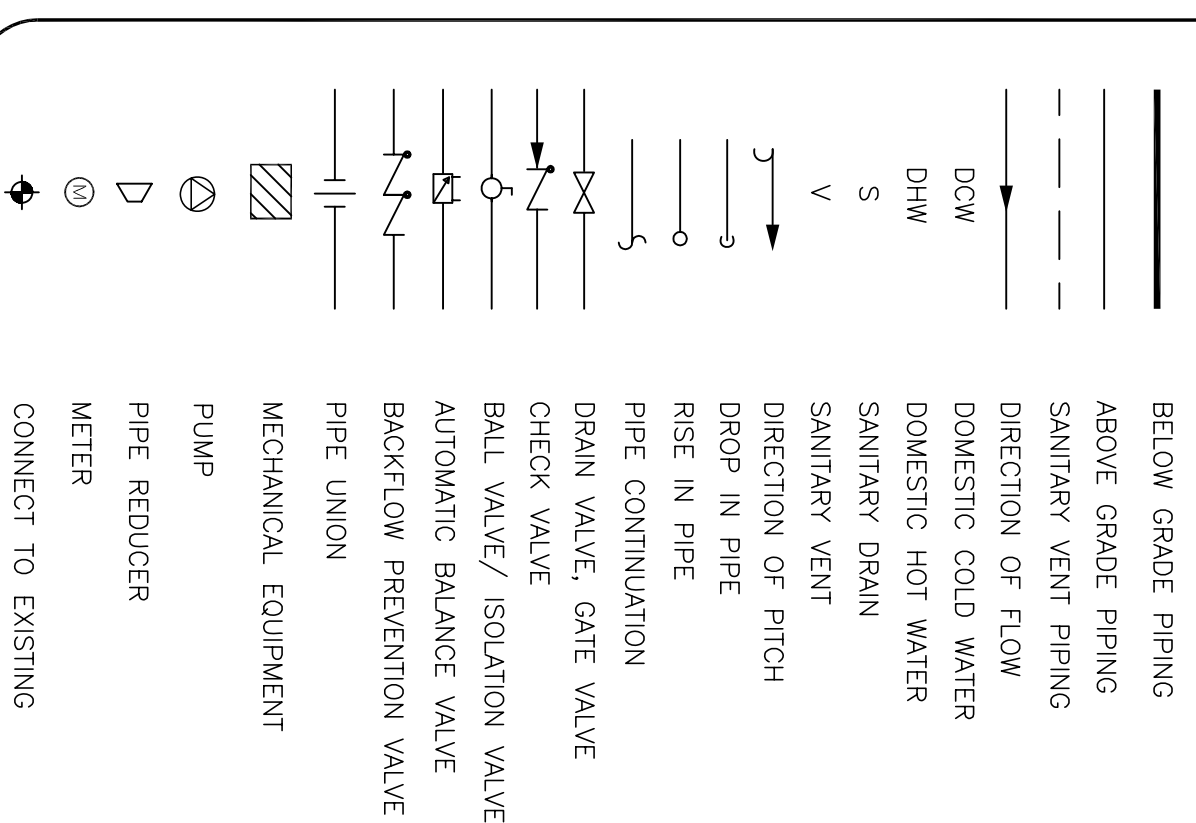
**GENERAL NOTES**  
SEE DRAWING P1.00 FOR INSTRUCTIONS ON PREPARING THE PLUMBING SYSTEM FOR LONG UNOCCUPIED PERIODS.



PLUMBING SPECIFICATION:

- SUMMARY OF WORK  
THESE DRAWINGS DENOTE THE INSTALLATION OF PLUMBING SYSTEMS TO SERVE THE STUDENT HOUSING. IT IS THE INTENT OF THESE DRAWINGS THAT ALL NECESSARY COMPONENTS BE INCLUDED FOR COMPLETE PLUMBING SYSTEMS AS SHOWN.
- COMPLETE SYSTEMS  
ON SITE INSTALLATION OF THESE DRAWINGS AND SPECIFICATIONS THAT EVERY ITEM NECESSARY FOR COMPLETE SYSTEMS BE SHOWN. THE CONTRACTOR'S WORK SHALL INCLUDE LABOR, MATERIALS AND EQUIPMENT REQUIRED FOR A HIGH QUALITY, COMPLETE INSTALLATION. OMISSIONS AND/OR CHANGES IN ELEVATION OF PIPES AND DUCTS DUE TO UNPREDICTED INTERFERENCES SHALL BE PROVIDED AT NO ADDITIONAL COST.
- SHOP DRAWINGS  
SIX (6) SETS OF SHOP DRAWINGS SHALL BE SUBMITTED FOR APPROVAL FOR ALL EQUIPMENT AND MATERIALS.
- PERMITS, FEES AND REGULATIONS  
THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL REQUIRED PERMITS AND CERTIFICATES.
- OPERATION TO SUBSTANTIAL COMPLETION  
THE CONTRACTOR SHALL PROVIDE THREE (3) BOUND COPIES OF PRINTED OPERATIONS INSTRUCTIONS AND MAINTENANCE INFORMATION FOR EQUIPMENT AND SYSTEMS PROVIDED UNDER THIS CONTRACT, INCLUDING PREVENTATIVE MAINTENANCE PROCEDURES.
- DRAWINGS  
DRAWINGS SHOW APPROXIMATE LOCATION OF EQUIPMENT, DUCTS AND PIPES. THE EXACT LOCATION SHALL BE DETERMINED BASED ON FIELD CONDITIONS. EQUIPMENT, DUCT WORK AND PIPING SHALL FIT INTO THE SPACES SHOWN ON DRAWINGS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS, FEES AND REGULATIONS. THE BEST PRACTICES OF THE TRADE AND TO THE COMPLETE SATISFACTION OF THE ENGINEER SHALL BE FURNISHED WITHOUT ADDITIONAL RECOVERY.  
AUTOCAD RECORD DRAWINGS SHALL BE PREPARED BY THE CONTRACTOR AT THE COMPLETION OF THE PROJECT SHOWING THE AS-BUILT ARRANGEMENT OF THE SYSTEMS. THE ENGINEER'S AUTOCAD FILES WILL BE PROVIDED AT NO COST TO THE CONTRACTOR.
- STORAGE OF MATERIALS  
THE CONTRACTOR SHALL COORDINATE STORAGE OF HIS MATERIALS AND EQUIPMENT WITH THE GENERAL CONTRACTOR AND SHALL BE RESPONSIBLE FOR ALL LOSS AND DAMAGE.
- GUARANTEE  
THE CONTRACTOR SHALL GUARANTEE ALL WORK FOR A PERIOD OF ONE (1) YEAR AFTER SUBSTANTIAL COMPLETION. THE CONTRACTOR SHALL RETURN OR CORRECT THE WORK WITHIN NINE (9) DAYS OF WRITTEN NOTIFICATION. IF THE CONTRACTOR DOES NOT CORRECT, THE OWNER MAY HAVE THE WORK CORRECTED AND CHARGE ALL COST TO THE CONTRACTOR.
- REFERENCE STANDARDS AND INDUSTRY SPECIFICATIONS  
REFER ANY MATERIAL OR OPERATION SPECIFIED BY REFERENCE TO PUBLISHED SPECIFICATIONS OF A MANUFACTURER, SOCIETY, ASSOCIATION, CODE OR OTHER PUBLISHED STANDARD. SHALL COMPLY WITH REQUIREMENTS OF THE LATEST EDITION OF THE PRODUCT OR HAVE JURISDICTION.  
  - 2000 INTERNATIONAL MECHANICAL CODE (IMC)
  - 2002 NFPA 13 STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS
  - AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
  - AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
  - UNDERWRITERS LABORATORY (UL)
  - AMERICAN SOCIETY OF TESTING MATERIALS (ASTM)
  - NATIONAL SOCIETY OF MECHANICAL ENGINEERS (NSME)
  - ASSOCIATED AIR BALANCE ASSOCIATION (AABA)
  - NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
  - SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION (SMACNA)
  - AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR CONDITIONING ENGINEERS (ASHRAE)
- WORKMANSHIP  
ALL WORK SHALL BE EXECUTED IN A WORKMANLIKE MANNER BY EXPERIENCED MECHANICS OF THE TRADE IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS AND THE MOST MODERN TRADE PRACTICE AND SHALL PRESENT A NEAT APPEARANCE.
- SITE INSPECTION  
BEFORE BEGINNING WORK, THE CONTRACTOR SHALL INSPECT THE SITE AND SURVEY THE CONDITIONS TO BE ENCOUNTERED IN THE PERFORMANCE OF THE WORK. FAILURE TO FAMILIARIZE HIMSELF WITH THE CONDITIONS SHALL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR FULL COMPLETION OF THE WORK IN ACCORDANCE WITH THESE SPECIFICATIONS.
- COORDINATION  
IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THEIR WORK WITH ALL OTHER TRADES SUCH THAT ALL BUILDING SYSTEMS AND COMPONENTS CAN BE ASSEMBLED WITHOUT CONFLICT AND IN CONFORMANCE WITH ALL CONSTRUCTION DOCUMENTATION, INCLUDING THOSE OF OTHER TRADES.
- DISCREPANCIES AND CLARIFICATIONS  
IN THE EVENT OF A DISCOVERED DISCREPANCY OR AMBIGUITY, IT SHALL BE BROUGHT TO THE ARCHITECT'S ATTENTION IN WRITING AND IN A TIMELY FASHION. THE CONTRACTOR SHALL NOT PROCEED WITH RELATED WORK WITHOUT A WRITTEN RESOLUTION CLARIFICATION FROM THE ARCHITECT.
- ON-SITE SUPERVISION  
THE CONTRACTOR SHALL MAINTAIN ON-SITE SUPERVISION OF HIS OWN WORK FORCE AND HIS SUB-SUBCONTRACTORS.
- PLUMBING  
DOMESTIC COLD AND HOT WATER PIPING SHALL BE ASTM B 88 TYPE L, DRAWN TEMPER COPPER WITH ASTM B 32 LEAD-FREE-ALLOW SOLID JOINTS OR PER TIBERG, ASTM F 876 AND F 877 DOMESTIC COLD WATER MANIFOLDS WILL BE USED. ALL PIPING SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF THE MECHANICAL CODE. ALL PIPING WILL BE LOCATED IN THE MECHANICAL ROOM AND UNITS OF UNIT PER TIBERG. TO INDIVIDUAL UNITS, ABOVEGROUND AND UNDERGROUND WASTE AND VENT AND LEAD PIPING SHALL BE SCH 40 AFS, ASTM F 698 OR ASTM D 2861. ALTERNATE MATERIAL IS CAST IRON.
- INSULATION  
DRAIN, WASH AND DHW (GPH, COPPER AND PE) PIPING, AS WELL AS SANITARY DRAINS FROM SHOWERS TO AND INCLUDING GREASE TRAP SHALL BE INSULATED WITH 1" MINIMUM THICKNESS OF POLYISOCYANURATE (PIR) INSULATION. INSULATION SHALL HAVE A FLAME SPREAD RATING OF 25 OR LESS AND A SMOKE DEVELOPED RATING OF 50 OR LESS AS TESTED IN ACCORDANCE WITH ASTM E 84. CAREFULLY SEAL ALL JOINTS WORK TIGHT ON DOW PIPING.
- EQUIPMENT  
EQUIPMENT IS BASE OF DESIGN. ALTERNATE MANUFACTURERS WILL BE CONSIDERED, BUT MUST BE EQUAL (AS DETERMINED BY PEERSON ENGINEERING).
- FRESHSTOPPING  
PROVIDE FRESHSTOPPING AT ALL PENETRATIONS THROUGH FIRE BARRIERS.

PLUMBING LEGEND



PLUMBING BASIS OF DESIGN

- DOMESTIC HOT WATER LOAD ASSUMED OCCUPANCY: 4 PEOPLE
- SHOWERS
- THE SHOWERS WILL BENEFIT MOST FROM THE DRAIN HEAT RECOVERY (DHR--1) BECAUSE OF THE SIMULTANEOUS DEMAND & RECOVERY.
  - ASSUME:
    - 1.5 WASTE SHOWERS (PER 2003 ASHRAE APPLICATIONS HANDBOOK, 49.14)
    - 1.5 WASTE SHOWERS (PER 2003 ASHRAE APPLICATIONS HANDBOOK, 49.14)
    - FINAL WATER TEMPERATURE OF 110°F OUT OF SHOWERHEAD
    - 95°F DRAIN WATER TEMPERATURE
    - 45% DHR--1 EFFICIENCY
    - 40°F DOW TEMPERATURE FROM WELL
- FIRST CALCULATE THE BTH DOWING DOWN THE DRAIN:  
(1.5 GAL/MIN)(6.33 LBS/GAL)(60 MIN/HR)(95°F - 40°F) = 41,235 BTUH
- APPLYING THE DHR--1 EFFICIENCY:  
(41,235 BTUH)(45% EFFICIENCY) = 18,555 BTUH RECOVERED.
- APPLYING THIS TO THE DRAINING WATER TEMPERATURE:  
18,555 BTUH (1.0 GAL/MIN)(6.33 LBS/GAL)(60 MIN/HR) - 40°F  
18,555 BTUH / 1 = 65°F
- (4 SHOWERS/DWY)(1.5 GAL/MIN)(7.5 MIN/SHOWER)(0.818 RATIO OF 120°F TO 65°F) = 37.2 GAL/DAY OF 120°F WATER
- DOMSWASHING
- PER 2003 ASHRAE APPLICATIONS HANDBOOK, 49.9, TABLE 3, HAND DOWSWASHING REQUIRES 1 GALLON PER PER OF 40°F WATER WHILE DOWSWASHING REQUIRES 5 GALLONS. REQUIRES 3 DISHWASHERS PER REPLY AVAILABLE THAT ONLY USE 4 GALLONS PER TASK AND PER AN ARTICLE IN HOME ENERGY MAGAZINE MAY/JUNE 2004, ENTITLED "IS A MACHINE MORE EFFICIENT THAN THE HAND?", HAND DOWSWASHING CONSUMES, ON AVERAGE, MUCH MORE THAN AUTOMATIC DISHWASHERS.
  - ASSUME TWO LOADS OF DOWSWASHING PER DAY FOR A TOTAL OF 8 GALLONS PER DAY.
- (4 GALLONS/LOAD)(2 LOADS/DAY) = 8 GAL/DAY OF 120°F WATER
- LAUNDRY
- ASSUME 3 LOADS OF LAUNDRY PER WEEK AND A LAUNDRY MACHINE THAT USES 21 GALLONS PER LOAD. THE TOTAL LAUNDRY GALLONS OF 120°F WATER IS 9 GALLONS PER DAY.
  - (3 LOADS/WEK)(1 WEEK/7 DAYS)(21 GAL/LOAD) = 9 GAL/DAY OF 120°F WATER
- COOKING
- ASSUME AN AVERAGE OF TWO MEALS PER DAY REQUIRING HOT WATER FOR PREPARATION. PER 2003 ASHRAE APPLICATIONS HANDBOOK, 49.9, TABLE 3, EACH MEAL PREPARATION REQUIRES 3 GALLONS OF HOT WATER, FOR A TOTAL OF 6 GALLONS PER DAY.
  - (3 GAL/MEAL)(2 MEALS/DAY) = 6 GAL/DAY OF 120°F WATER
- MISCELLANEOUS
- ASSUME THAT EACH PERSON WILL WASH HIS OR HER FACE AND HANDS ON AVERAGE SIX TIMES PER DAY FOR 30 SECONDS WITH HOT WATER.
  - (4 PPL)(6 WASHES/PEP/DAY)(0.5 MIN/WASH)(0.5 GAL/MIN) = 6 GAL/DAY OF 120°F WATER
- THE POSSIBLE MAXIMUM HOURLY DEMAND CAN BE ESTIMATED BY MULTIPLYING THE AGGREGATE DAILY HOT WATER USAGE (TOTAL OF 66 GAL/DAY) BY A DEMAND FACTOR OF 0.3 TO GET 20 GALLONS PER HOUR.

DOMESTIC HOT WATER DEMAND PUMP

IN ORDER TO AVOID THE WASTED ENERGY ASSOCIATED WITH A RECIRCULATION PUMP, AND TO AVOID WASTING WATER AND THE WASTING OF HOT WATER AT THE MOST REMOTE FIXTURES (LAV-3, SH-3, AND KS-1), A DOMESTIC HOT WATER DEMAND PUMP WILL BE UTILIZED. THIS PUMP IS LOCATED IN THE GARAGE BETWEEN LAV-3 AND IS ACTIVATED WITH A MOMENTARY RESET BUTTON AT LAV-3 OR THE KITCHEN SINK. THE DEMAND PUMP FLUSHES THE COOLED WATER IN THE DOMESTIC HOT WATER LINE BACK INTO THE COLD WATER SUPPLY LINE. IT ELIMINATES THE NEED FOR HOT WATER IN THESE FIXTURES.

SUMP PUMP

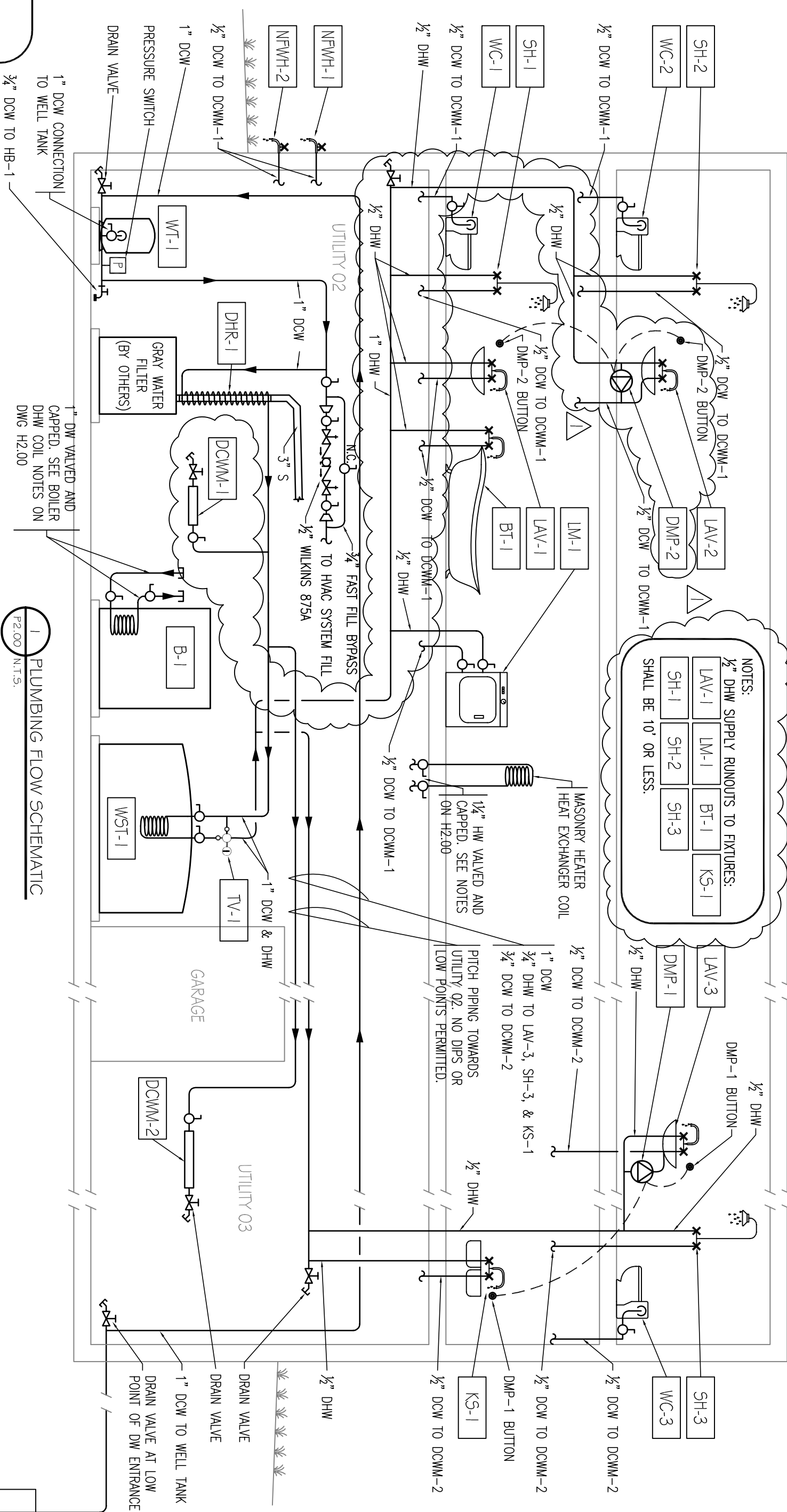
A SUMP PUMP WILL BE LOCATED IN THE MECHANICAL ROOM FOR PROTECTION AGAINST FLOODING FROM A BROKEN WATER PIP. A LEAK IN THE STORAGE TANK, OR ANY OTHER LEAKS.

DRAINBACK CAPABILITY

THE SYSTEM IS DESIGNED TO ALLOW FOR SIMPLE DRAINING OF THE PLUMBING SYSTEM FOR EXTENDED UNOCCUPIED PERIODS. REFER TO DRAWING P100 FOR DETAILS.

WELL TANK AND PUMP

THE WELL TANK AND PUMP SYSTEM IS DESIGNED TO OPERATE AT CONSTANT PRESSURE. THE PUMP USES A VFD TO LOWER ELECTRICAL CONSUMPTION AND PRODUCE PRESSURE AND FLOW "AS DEMAND". THIS SYSTEM REQUIRES LESS STORAGE, AND THIS, A SMALLER WELL TANK. THE MAXIMUM FLOW FROM THE WELL IS 5 GPM.



DOMESTIC WATER MANIFOLD SCHEDULE

TAG	MANIFOLD SUPPLY	FIXTURE	PIPE CONNECTIONS	FITTINGS/ACCESSORIES	SERVICE NOTES
DHW-1	1" CU	1/2" PEK	SH-1, SH-2, LAV-1, LAV-2	BT-1, LW-1	DHW
DOWM-1	1" CU	1/2" PEK	SH-1, SH-2, LAV-1, LAV-2	BT-1, LW-1, WC-1, WC-2, NFWM-1, NFWM-2	DOW
DOWM-2	3/4" CU	1/2" PEK	LAV-3, KS-1, WC-3, SH-3		DOW

PLUMBING FIXTURE SCHEDULE

TAG	DESC.	MANUFACTURER	SOIL	DOW	TRAP	WATER USE	NOTES
WS1-1	WATER STORAGE TANK	SEE DWG H201	-	-	-	-	-
B-1	BOILER	SEE DWG H201	-	-	-	-	-
DHR-1	DRAIN HEAT RECOVERY	S3-40	3"	3/4"	-	-	-
DHW-1	DHW DEMAND PUMP	TOO DOWM	-	1/2"	1/2"	-	FOR REQUIRES ONLY ONE STARTER BUTTON (TWO ARE REQUIRED) "TAP" USE KIT INCLUDES ONLY ONE STARTER BUTTON (TWO ARE REQUIRED) "TAP" KIT INCLUDES TWO 1/2" TEES AND TWO 1/2" FLEX LINES FOR EASE OF INSTALLATION.
TH-1	THEMOSMIX	5-140	-	1"	1"	-	-
SH-1	SHOWER	ARCHITECT	-	1-1/2"	1/2"	1-1/2"	1.5 GPM
SH-2	SHOWER	ARCHITECT	-	1-1/2"	1/2"	1-1/2"	1.5 GPM
SH-3	SHOWER	ARCHITECT	-	1-1/2"	1/2"	1-1/2"	1.5 GPM
LAV-1	LAVATORY	ARCHITECT	-	1-1/4"	1/2"	1-1/4"	0.5 GPM
LAV-2	LAVATORY	ARCHITECT	-	1-1/4"	1/2"	1-1/4"	0.5 GPM
LAV-3	LAVATORY	ARCHITECT	-	1-1/4"	1/2"	1-1/4"	0.5 GPM
BT-1	BATHUB	OWNER	-	1-1/4"	1/2"	1-1/4"	1.5 GPM
LAV-1	LAVATORY	ARCHITECT	-	1-1/2"	1/2"	1-1/2"	1.0 GPM
WC-1	FOAM FLUSH TOILET	NEFON	4"	1/2"	-	-	3 OZ/FLUSH
WC-2	FOAM FLUSH TOILET	NEFON	4"	1/2"	-	-	3 OZ/FLUSH
WC-3	FOAM FLUSH TOILET	NEFON	4"	1/2"	-	-	3 OZ/FLUSH
NFWM-1	NON-FREEZE WALL HOBDRANT	ZURN	-	1/2"	-	-	-
NFWM-2	NON-FREEZE WALL HOBDRANT	ZURN	-	1/2"	-	-	-
HB-1	HOSE BIBB	ZURN	-	1/2"	-	-	-

PUMP SCHEDULE

TAG	MAKE	MODEL	TYPE	SYSTEM	FLUID	FLOW (GPM)	CALC. HEAD (FT.)	PUMP HEAD (FT.)	SUCTON (IN.)	DISCHARGE (IN.)	DISCHARGE AMPS	WATTS	MOTOR HP	VOLTAGE
WP-1	GRUNDFOS	5500S-180	WELL PUMP	POTABLE WATER	WATER	5.0	185	180	-	1" NPT	4.9/9.8	-	1/2	220/115
SP-1	GRUNDFOS	SU 252	SUMP PUMP	POTABLE WATER	WATER	13	12	12	-	1-1/2" NPT	8.5	675	1/4	115

ASSUMPTIONS: 25' MAX DYNAMIC WATER LEVEL, 300' OF 1" PIPING BETWEEN PUMP & TANK, 10' OF FRICTION LOSS BETWEEN PUMP & TANK, 60 PSI MAX TANK PRESSURE.

CONTROLS: FRANKLIN ELECTRIC MONOPHASE, CONSTANT PRESSURE CONTROLLER FOR SINGLE-PHASE PUMPS.

WELL TANK SCHEDULE

TAG	MAKE	MODEL	DIMENSIONS	SYSTEM CONNECTION	NOTES
WT-1	WILLIAMS	WM-4	16"x26"H	1" WALE NPT	



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FLOW SCHEMATIC, &  
SPECIFICATIONS

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