Final Water Design Report
"Minnezona Condominiums"
7314 E Minnezona
Scottsdale, Arizona 85250

September 1, 2022

Prepared By:

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Job No. 21-08-010-00

FINAL Basis of Design Report
☑ APPROVED
☐ APPROVED AS NOTED
☐ REVISE AND RESUBMIT

CITY OF SCOTTSDALE
SCOTTSDALE WATER
9379 E San Salvador Dr.
Scottsdale, AZ 85258

Disclaimer: If approved; the approval is granted under the condition that the final construction documents submitted for city review will match the information herein. Any subsequent changes in the water or sewer design that materially impact design criteria or standards will require re-analysis, re-submittal, and approval of a revised basis of design report prior to the plan review submission.; this approval is not a guarantee of construction document acceptance.
For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY apritchard DATE 9/26/2022

Prepared for:

Kontexture
3334 N 20th Street
Phoenix, Arizona 85016
Contact: Mark Cunningham

The City of Scottsdale
Permit # 5827-20

Signature:

Geoffrey A. Markowski, PE

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Introduction:

The purpose of this Water Design Report is to provide an analysis of the proposed water and fire suppression supply for the new multi-family site located at 7314 E Minnezona, Scottsdale Arizona. The water design for the site shall comply with the water and waste water requirements of the City of Scottsdale. The report and analysis calculations are based on the Arizona Administrative Code Title 18, Chapter 9-E301, the City of Scottsdale Water Services Department Design Standards Manual, dated, January, 2020, the current adopted City of Scottsdale Fire Code and the 2018 Uniform Plumbing Code (UPC).

Property Description:

The legal description of the site is the original lots 38 and 39 of the Final Plat for "Daryl Estates – Unit 2" according to Book 61 of Maps, Page 48, records of Maricopa County, Arizona. This development site is the two lots which will be combined with a Condominium Plat. Currently, each lot has an existing building structure on it with multi-family units. Both lots will be demolished, along with existing pools, hardscaping and landscaping. Refer to Appendix A for Aerial Photographs and Vicinity Map.

The site is currently zone R-5 for high density residential development.

Project Description:

The development of this lot will consist of the construction of a three (3) new buildings. The north building will have five (5) living units. The south two (2) buildings will have two (2) living units each for a total of nine (9) individual living units on the property. Each unit will have a separate domestic service and sewer service to the unit. All nine units will receive domestic service from separate taps from the existing 6-inch water main in Minnezona. A separate master meter for site landscaping will also be provided from the 6-inch main along Minnezona.

Fire suppression will be provided via a domestic system that will tap the new domestic services just after the meter. The fire suppression system will be a deferred submittal by the fire sprinkler contractor. Also, a new public fire hydrant will be installed near the southeast corner of the property to ensure adequate hydrant coverage of the overall site. This will be provided by the existing hydrant located approximately 90-feet northwest along North 73rd Street, as well as the new hydrant at the southeast corner of the site. Refer to Appendix B for On-site Utility Plans to see connection location and detailing for all on-site and off-site water and fire services to the site.

Domestic Design Flows:

Minimal domestic flows will be required for the site for landscaping, and new domestic demand for the nine (9) new living units. Based on the square footage of each unit and the water demand provided by the Plumbing Engineer, each unit will require a 1" water meter with a 1-1/2-inch service tap to the main. The supply for these demands will be made via separate domestic service taps to the existing 6-inch main in Minnezona.

According to City of Scottsdale Design Standards, Chapter 6, Section H, the water demand for the site can be determined by the land use table in Figure 6-1.2. Since the site has nine (9) dwelling units (DU), the

table row for 8-11.9 DU/ac should be used. Therefore, the inside and outside total use per DU is 0.33 (0.22 + 0.11). Refer to Plumbing Plans for the new buildings in Appendix E for the building Plumbing Plans. So, the average daily demand for the overall site development on the existing 6-inch main located in Minnezona is 2.97-gpm (0.33 * 9 = 2.97).

The peak demand the site generates is as follows:

Peak factor of 3.5 -> 3.5 * 2.97 = 10.4-gpm total landscape/domestic demand on the existing system.

Per the City DSPM requirements for maximum demand, the average flow will be multiplied by 2.0. Therefore, the maximum daily demand is approximately 6.0-gpm for the overall site.

Therefore, the average daily domestic demand for the overall development will be 2.97-gpm. The peak hour domestic demand for the overall development will be 10.4-gpm and the maximum demand is 6.0-gpm. Fire flow will be discussed in later sections of this report.

Fire Design Flows:

The site fire flow requirements for the condominium complex will be based on the total square footage of the larger building on the site which is approximately 3,905-square feet. The building construction type is V-B. Based on fire design flow tables in the International Fire Code, the required fire flow for the site will be 1,750-gpm for 2-hours. However, since the system being installed is a “wet pipe” system per NFPA 13, the required fire flow for fire suppression to the building can be reduced by 50% per City Fire Code and Fire Marshal approval. However, the absolute minimum per Fire Code is 1,500-gpm for 2-hours. Therefore, the required potential fire flow needed for the building will be 1,500-gpm for 2-hours at a minimum residual pressure of 30-psi per NFPA standards as well as the City DSPM minimum requirements.

Fire flow testing has been performed on the existing fire hydrants along Minnezona east of the site. The test results of the hydrant flow test are provided in Appendix C of this report.

As mentioned, the fire suppression system for each dwelling unit will be a domestic system that will be tapped from the new domestic water service. This system will be a deferred submittal by the fire sprinkler contractor. Design analysis and calculations for this system shall be provided by the Plumbing Engineer and Fire Sprinkler Contractor at the time of permit submittal and approval.

Otherwise, site fire suppression will be provided via the new hydrant assembly installed at the southeast corner of the site. This new hydrant will be tapped from the existing 6-inch water main, along with a new 6-inch line and valve to the hydrant. Pressure loss information for the new hydrant system is as follows:

<u>Fireline Pressure Loss:</u>

- 1 ~ tapping sleeves and valves – 1.5
- 1 ~ 90 degree bend - 1.5
- 51 lineal feet of 6-inch DIP, CL350 waterline – 7.72-psi

Total pressure drop = 10.72-psi. Therefore, 42-psi residual – 10.72-psi = 31.28-psi of available pressure at the tested flow rate of 1,750-gpm. The pressure in the system is still greater then 30-

psi. Flow rate at the test hydrant near the site is greater then 1,750-gpm. Therefore, the new fireline loop system will adequately supply the required fire flow for the demand requirement based on the City Code.

Fire Flow Results:

Static Pressure: 100-psi
Residual Pressure: 42-psi
Pito Pressure: 17-psi
Flow: 1,772 gpm
Flow at 20-psi: 1,670 gpm with safety factor added

WaterCad was also used to evaluate the overall existing and proposed water systems for the new development. Demands were placed at appropriate nodes and junctions of the model to evaluate the four (4) scenarios that the City DSPM requires to analyze, those being the average domestic demand, the peak domestic demand, the maximum daily demand which includes domestic and fire flow and finally the domestic demand with a minimum pipe pressure of 30-psi at the highest and farthest fixture unit of the development. The results for these analyses are provided in Appendix F of this report. All scenarios were performed with the domestic demand placed at the highest level fixture unit for each dwelling unit. In all four scenarios the minimum requirements for system pressures were met based on the required demand loading. No further analysis or improvements to the system are required.

Conclusion:

The existing water supply provided by the City within the existing 6-inch water main located in Minnezona will provide adequate domestic water demand as well as fire suppression for the new condominium complex. The maximum required fire flow of 1,500-gpm for the overall site will be met by the new fire hydrant installed in the southeast corner of the site. The maximum domestic demand and fire flow were met with greater pressures then required for the overall system. The new improvements will not negatively impact the existing system adjacent to the new site.

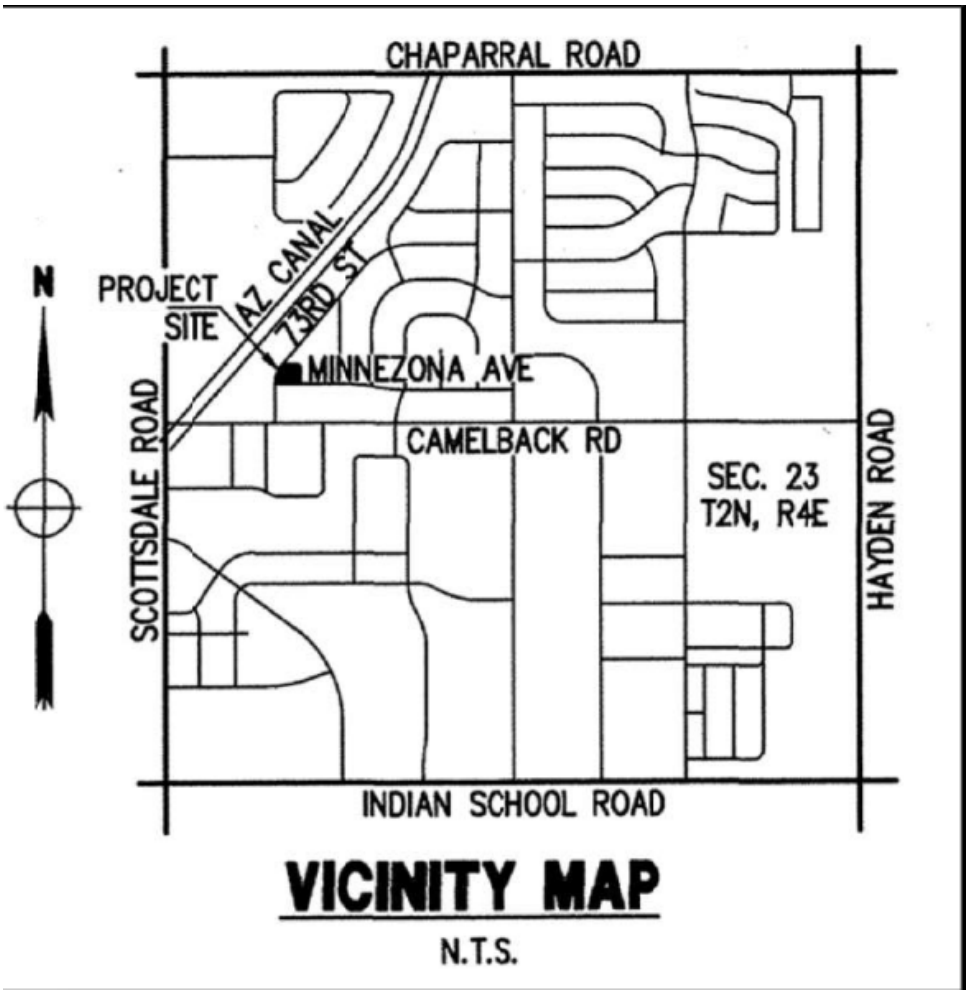
The proposed domestic/landscape services and fire suppression systems have been designed to effectively provide adequate demand flows and fire flows to the new development site, without negatively impacting the proposed or existing facilities. All calculations are based on the on-site conditions with the completion of the overall site development.

References:

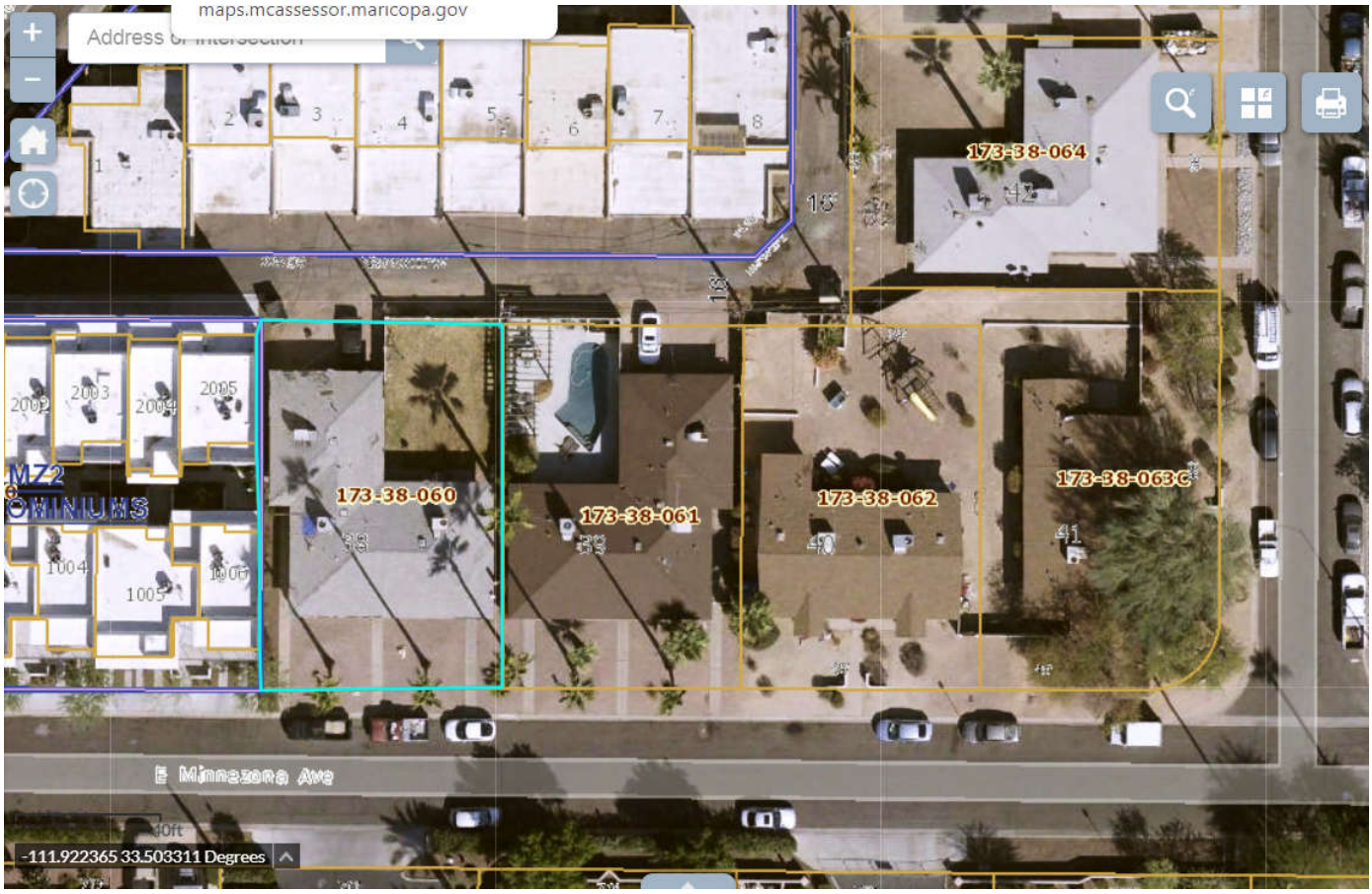
- City of Scottsdale Design Standards and Policies Manual, 2018
- Arizona Administrative Code Title 18, Chapter 9-E301
- City of Scottsdale Water Services Department Design Standards Manual, dated, January, 2020
- City of Scottsdale Fire Code 2018
- Uniform Plumbing Code (UPC).
- Bentley WaterCad

APPENDIX A

Vicinity Map



2021 Maricopa County GIS Aerial Photograph



APPENDIX B

CIVIL IMPROVEMENT PLANS
for
"MINNEZONA CONDOMINIUMS"
7314 E. MINNEZONA AVENUE
SCOTTSDALE, ARIZONA 85251

CIVIL ENGINEERING GENERAL NOTES

1. IF THE CONTRACTOR FINDS ANY DISCREPANCY OR OMISSION, THE ENGINEER SHALL BE NOTIFIED BEFORE ANY INTERPRETATION IS MADE.
2. QUANTITIES SHOWN ARE FOR PERMIT PURPOSES ONLY AND ARE NOT FOR BIDDING OR CONTRACTING PURPOSES. THE CONTRACTOR IS RESPONSIBLE FOR BIDDING HIS OWN QUANTITY TAKE-OFF.
3. THE BUILDING MATERIALS CONTAINING ASBESTOS WILL NOT BE USED ON THIS PROJECT.
4. THE CONTRACTOR SHALL MAKE NO CLAIM FOR QUANTITY ADJUSTMENT UNLESS ALL CONSTRUCTION SURVEY STAKES ARE MAINTAINED FOR VERIFICATION.
5. NOTHING IN THE CONTRACT DOCUMENTS SHALL CREATE ANY CONTRACTURAL RELATIONSHIP BETWEEN THE ENGINEER AND THE CONTRACTOR OR THE ENGINEER AND THE SUBCONTRACTOR.
6. THE ENGINEER WILL NOT BE RESPONSIBLE FOR CONSTRUCTION OR SAFTEY MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES UTILIZED IN CONNECTION BY THE CONTRACTOR OR SUBCONTRACTORS.
7. CHANGE ORDERS SHALL BE EXECUTED IN WRITING BY THE OWNER OR HIS REPRESENTATIVE. VERBAL CHANGES WILL NOT BE HONORED.
8. SEE ARCHITECTURAL DRAWINGS FOR ALL ON-SITE:
   A. HORIZONTAL CONTROL & BUILDING LOCATIONS.
   B. DETAILS AND HORIZONTAL LOCATION OF CURBS AND SIDEWALKS.
   C. PARKING LOT LAYOUT.
9. IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO LOCATE ALL EXISTING UNDERGROUND UTILITY FACILITIES BOTH HORIZONTALLY AND VERTICALLY PRIOR TO CONSTRUCTION AND TAKE ALL NECESSARY PRECAUTIONS TO AVOID ANY DAMAGE TO EXISTING UNDERGROUND FACILITIES. CALL BLUE STAKE CENTER (602) 263-1100 OR A PRIVATE UNDERGROUND UTILITY LOCATION COMPANY 48 HOURS PRIOR TO EXCAVATING. THE ENGINEER AND/OR OWNER CANNOT GUARANTEE ANY ELEVATIONS OR LOCATIONS OF EXISTING UNDERGROUND UTILITIES SHOWN ON THESE PLANS.
10. UNDERGROUND INFORMATION AND UTILITIES SHOWN HAVE BEEN OBTAINED FROM INFORMATION PROVIDED ON QUARTER SECTION MAPS FROM THE UTILITY COMPANIES LOCATED WITHIN THE AREA. THUS, UNDERGROUND INFORMATION MUST BE FIELD VERIFIED BEFORE CONSTRUCTION.
11. UTILITY COMPANIES SERVING THIS AREA ARE:
    WATER: CITY OF SCOTTSDALE
    SEWER: CITY OF SCOTTSDALE
    TELEPHONE: CENTURYLINK
    ELECTRIC: ARIZONA PUBLIC SERVICE
    GAS: SOUTHWEST GAS
    CABLE TV: COX COMMUNICATIONS
12. LOCATION OF THE IRRIGATION SYSTEM IS THE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR WILL BE RESPONSIBLE FOR ALL DAMAGES AT HIS COST.
13. THE TOPOGRAPHIC INFORMATION SHOWN ON THIS DRAWING WAS OBTAINED FROM A TOPOGRAPHIC SURVEY PREPARED G-MAR, LLC, DATED, AUGUST 6, 2021 AND UPDATED, APRIL 27, 2022, PH: 602-524-7877.
14. BOUNDARY INFORMATION SHOWN ON THIS PLAN WAS OBTAINED FROM A CONDOMINIUM PLAT PREPARED BY OUTER LIMITS LAND SURVEYING, PROJECT NO. 21123, DATED, 11-15-2021. BOUNDARY INFORMATION SHOWN ON THIS DRAWING IS NOT CERTIFIED BY THE ENGINEER OF RECORD. CONTRACTOR SHALL CONTACT THE ENGINEER OF RECORD PRIOR TO LAYING OUT NEW CONSTRUCTION IF DISCREPANCIES ARE FOUND IN THE FIELD.
15. THE CONTRACTOR SHALL VISIT THE SITE TO VERIFY THE SITE SURVEY INFORMATION AND OBSERVE ANY CHANGES.

GRADING & DRAINAGE NOTES

1. SOIL REPORT PREPARED BY VANN ENGINEERING, INC., PROJECT NO. 29271, DATED, JANUARY 26, 2022.
2. SUBGRADE SOIL PREPARATION, SITE GRADING, FILL AND COMPACTION SHALL CONFORM TO MAG SECTION 301, EXCEPT AS MODIFIED BY THE SOILS REPORT.
3. FOUNDATIONS ARE DESIGNED FOR DRY CONDITIONS AND MUST REMAIN DRY DURING AND AFTER CONSTRUCTION.
4. THE CONTRACTOR SHALL COMPLETE SPECIAL COMPACTION FOR ALL OF THE SIDE SLOPES OF EACH RETENTION BASIN. THIS COMPACTION MUST NOT INCLUDE THE BOTTOM OF THE RETENTION BASIN, BUT WILL INCLUDE AN AREA EXTENDING A MINIMUM OF TEN (10) FEET AWAY FROM THE TOP OF THE RETENTION BASIN SIDE SLOPES IN ALL DIRECTIONS FROM THE RETENTION BASIN.
5. DURING LANDSCAPING ACTIVITIES, RETENTION BASIN SIDE SLOPES SHOULD BE PROTECTED BY A PERMANENT EROSION-PREVENTIVE LAYER TO MINIMIZE THE POTENTIAL FOR EROSION. IF THIS LAYER IS ANTICIPATED TO BE THICKER THAN THREE (3) INCHES, THE RETENTION BASIN SLOPES MUST BE OVER-EXCAVATED SO THAT THE SURFACE OF THE IN-PLACE EROSION-PREVENTIVE LAYER IS IN CONFORMANCE WITH THE RETENTION BASIN'S DESIGN DIMENSIONS AND FINISHED GRADE ELEVATIONS.
6. ALL DEBRIS AND EXCESS EXCAVATION SHALL BE REMOVED FROM THE SITE.
7. NO IMPORTED MATERIAL SHALL BE INCORPORATED INTO THE PROJECT WITHOUT PRIOR TESTING AND APPROVAL. ALL IMPORT MATERIAL MUST BE TESTED FOR ENVIRONMENTAL CONTAMINATION.
8. THE SITE SHALL BE GRADED TO A SURFACE WHICH IS REASONABLY SMOOTH, COMPACTED AND FREE FROM IRREGULAR SURFACE CHANGES.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ADJUSTMENT TO FINISH GRADE OF ALL UTILITY VALVE COVERS, CLEANOUTS AND MANHOLE CASTINGS.
10. ALL WALKWAYS AND/OR A.C. PAVING LOCATED FIVE (5) FEET FROM BUILDING THRESHOLDS WILL BE CONSTRUCTED 0.1 FEET BELOW FINISHED FLOORS UNLESS NOTED OTHERWISE. SEE ARCHITECTURAL PLANS FOR INFO. WITHIN THE FIVE (5) FEET THRESHOLD AND THE BUILDING.
11. RELOCATE ITEMS PER MAG SPEC. 350. CONTRACTOR RESPONSIBLE FOR FEES OR RELOCATION COSTS.
12. SPOT ELEVATION SHOWN ON PLANS ARE FINISHED SURFACE ELEVATIONS.
13. ALL ELEVATIONS SHOWN ON DETAIL CUT SECTIONS ARE AT LOCATION INDICATED ON DRAWINGS. SEE SPOT ELEVATIONS ON PLANS FOR OTHER LOCATIONS.

GENERAL PAVING NOTES

1. THE FOLLOWING MARICOPA ASSOCIATION OF GOVERNMENTS (MAG) SPECIFICATION SHALL APPLY TO THE GRADING & DRAINAGE PLANS UNLESS OTHERWISE NOTED:
   A. ASPHALTIC PAVEMENT PER MAG SPEC. 321, 710, & 711 (R19 MM OR C-3/4 MIX DESIGN).
   B. BITUMINOUS TACK COAT PER MAG SPEC. 321.4.
   C. CONCRETE PAVEMENT PER MAG SPEC. 725.
   D. BASE COURSE PER MAG SPEC. 310 & 702.2 (A25MM).
   E. SAWCUT AND REMOVAL PER MAG SPEC. 336.
   F. JOINT SEALANT PER MAG SPEC. 729.
   G. ASPHALT CONCRETE OVERLAY PER MAG SPEC. 322.
   H. BITUMINOUS PRIME COAT PER MAG SPEC, 315.
   J. FOG SEAL COAT PER MAG SPEC. 333.
2. RELOCATE ITEMS PER MAG SPEC. 350. CONTRACTOR RESPONSIBLE FOR FEES AND RELOCATION COSTS.
3. THE PAVING CONTRACTOR SHALL BE RESPONSIBLE FOR THE ADJUSTMENT TO FINISH GRADE OF ALL UTILITY VALVE COVERS, CLEANOUTS AND MANHOLE CASTINGS.
4. PAVEMENT SEALANT SPECIFICATIONS:
   A. SWEEP AND CLEAN SURFACE.
   B. TREAT OIL SPOTS WITH PETRO SEAL OR APPROVED EQUAL.
   C. CLEAN AND FILL CRACKS WITH BREWER FLEX OR APPROVED EQUAL.
   D. FURNISH AND APPLY TWO COATS OF HUNTSEAL OR APPROVED EQUAL.
5. PAVEMENT MARKING MATERIALS SHALL BE FED. SPEC. TT-P-115 WITHOUT GLASS SPHERES; WHITE OR YELLOW AS INDICATED ON DRAWINGS.
   APPLICATION SHALL BE AS FOLLOWS:
   APPLY PAINT WHERE INDICATED TO A 15 MIL WET THICKNESS x 4 INCHES WIDE AND TO DIMENSIONS SHOWN ON DRAWINGS. LINES TO BE STRAIGHT AND TRUE TO LINE WITH SHARP, CLEAN EDGES. INCLUDE ALL STRIPING, DIRECTIONAL ARROWS, CROSSWALKS, LETTERING, HANDICAP DESIGNATIONS AND ALL OTHER TRAFFIC CONTROL MARKINGS SHOWN OR REQUIRED.
   EQUIPMENT:
   SPECIFICALLY DESIGNED AND MANUFACTURED TO APPLY PAVEMENT PAINT.

CITY OF SCOTTSDALE: GENERAL CONSTRUCTION NOTES FOR PUBLIC WORKS CONSTRUCTION

1. ALL CONSTRUCTION IN THE PUBLIC RIGHTS-OF-WAY OR IN EASEMENTS GRANTED FOR PUBLIC USE MUST CONFORM TO THE LATEST MARICOPA ASSOCIATION OF GOVERNMENTS (MAG) UNIFORM STANDARD SPECIFICATIONS AND UNIFORM STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION AS AMENDED BY THE LATEST VERSION OF THE CITY OF SCOTTSDALE SUPPLEMENTAL STANDARD SPECIFICATIONS AND SUPPLEMENTAL STANDARD DETAILS. IF THERE IS A CONFLICT, THE CITY'S SUPPLEMENTAL STANDARD DETAILS WILL GOVERN.
2. THE CITY ONLY APPROVES THE SCOPE, NOT THE DETAIL, OF ENGINEERING DESIGNS; THEREFORE, IF CONSTRUCTION QUANTITIES ARE SHOWN ON THESE PLANS, THEY ARE NOT VERIFIED BY THE CITY.
3. THE APPROVAL OF PLANS IS VALID FOR SIX (6) MONTHS. IF AN ENCROACHMENT PERMIT FOR THE CONSTRUCTION HAS NOT BEEN ISSUED WITHIN SIX MONTHS, THE PLANS MUST BE RESUBMITTED TO THE CITY FOR RE-APPROVAL.
4. A PUBLIC WORKS INSPECTOR WILL INSPECT ALL WORKS WITHIN THE CITY OF SCOTTSDALE RIGHTS-OF-WAY AND IN EASEMENTS. NOTIFY INSPECTION SERVICES 24 HOURS PRIOR TO BEGINNING CONSTRUCTION BY CALLING 480-312-5750.
5. WHENEVER EXCAVATION IS NECESSARY, CALL THE BLUE STAKE CENTER, 602-263-1100, TWO (2) WORKING DAYS BEFORE EXCAVATION BEGINS. THE CENTER WILL SEE THAT THE LOCATION OF THE UNDERGROUND UTILITY LINES IS IDENTIFIED FOR THE PROJECT. CALL "COLLECT" IF NECESSARY.
6. RIGHT-OF-WAY PERMITS ARE REQUIRED FOR ALL WORK IN PUBLIC RIGHTS-OF-WAY AND EASEMENTS GRANTED FOR PUBLIC PURPOSES. A RIGHT-OF-WAY PERMIT WILL BE ISSUED BY THE CITY ONLY AFTER THE REGISTRANT HAS PAID A BASE FEE PLUS A FEE FOR INSPECTION SERVICES. COPIES OF ALL PERMITS MUST BE RETAINED ON-SITE AND BE AVAILABLE FOR INSPECTION AT ALL TIMES. FAILURE TO PRODUCE THE REQUIRED PERMITS WILL RESULT IN IMMEDIATE SUSPENSION OF ALL WORK UNTIL THE PROPER PERMIT DOCUMENTATION IS OBTAINED.
7. ALL EXCAVATION AND GRADING THAT IS NOT IN THE PUBLIC RIGHTS-OF-WAY OR NOT IN EASEMENTS GRANTED FOR PUBLIC USE MUST CONFORM TO APPENDIX J, GRADING, OF THE LATEST EDITION OF THE INTERNATIONAL BUILDING CODE. A PERMIT FOR THIS GRADING MUST BE SECURED FROM THE CITY FOR A FEE ESTABLISHED BY THE CITY.

G-MAR GENERAL WATER & SEWER (ON-SITE)

MATERIALS:

1. WATER PIPE MATERIAL SHALL CONFORM TO 2012 UNIFORM PLUMBING CODE (UPC) 604.0 (CIP/DIP, GALVANIZED, COPPER, POLYETHYLENE PIPE) OR EQUAL.
2. PRIVATE SEWER LINES SHALL BE CONSTRUCTED PER THE UPC. PUBLIC SEWER LINES WHICH LAY WITHIN PUBLIC RIGHTS-OF-WAY AND EASEMENTS SHALL BE CONSTRUCTED PER M.A.G. ON-SITE SEWER PIPE MATERIAL SHALL BE PVC PIPE (SDR 35).
3. FIRELINE AND WATERLINE PIPE MATERIAL AND FITTINGS (4 IN. AND LARGER) SHALL CONFORM BE DUCTILE IRON PIPE, CLASS 350 MINIMUM.
4. IN ACCORDANCE WITH AAC R18-4-119, ALL MATERIALS WHICH MAY COME INTO CONTACT WITH DRINKING WATER SHALL CONFORM TO NATIONAL SANITATION FOUNDATION STANDARDS 60 AND 61. THE WATER, SEWER AND FIRE SPRINKLER SERVICE LINE CONNECTION POINT(S).

INSTALLATION:

THE CONTRACTOR SHALL VERIFY CIVIL PLANS AND PLUMBING PLANS FOR HORIZONTAL AND VERTICAL LOCATIONS PRIOR TO CONSTRUCTION OF THE
5. WATER, SEWER AND FIRE SPRINKLER SERVICE LINE CONNECTION POINTS(S). ALL ON-SITE WATER AND SEWER CROSSINGS SHALL CONFORM TO UPC 720.0. ALL WATER AND SEWER LINES CROSSING GAS LINE MUST HAVE A MINIMUM OF
6. 12" CLEARANCE. CONTRACTOR MUST COMPLY WITH G&A GENERAL NOTE #7
7. AND MUST HAND DIG CAREFULLY AT MARKED CROSSING LOCATION UNTIL GAS LINE IS FOUND AND EXPOSED. SEWER CLEANOUTS SHALL CONFORM TO UPC 719.0. SEWER BACKFLOW PREVENTION DEVICES SHALL CONFORM TO UPC 710.6.
8.
9. ALL ON-SITE TRENCHES SHALL REMAIN OPEN FOR CITY INSPECTION AND UNTIL AS-BUILT INFORMATION IS COMPLETED.

BACKFILL:

10. A NO. 12 BARE COPPER WIRE WILL BE INSTALLED FOR TRACING ALONG WITH THE MARKING TAPE SUCH THAT IT CAN BE DETECTED WITH STANDARD SURVEY
11. TYPE METAL DETECTORS OR UTILITY LOCATORS TO A DEPTH OF 6 FEET. IT WILL TERMINATE AT EACH VALVE BOX COVER, MANHOLE OR CLEANOUT. CONTINUITY MUST BE CHECKED IN THE PRESENCE OF THE INSPECTOR AND AFTER BACKFILL IS COMPLETED. DURING BACKFILL OPERATIONS THE CONTRACTOR WILL INSTALL MARKING TAPE A MAXIMUM DISTANCE OF 12 INCHES ABOVE THE PIPE CROWN. THE TAPE
12. SHALL BE 3 INCHES WIDTH, ACID ALKALI RESISTANT, REINFORCED WITH A 100 LB. TENSILE STRENGTH MATERIAL, COLORED CODED - BLUE FOR WATER AND GREEN FOR SEWER - IMPRINTED WITH THE WORDING "CAUTION" AT 2 FOOT INTERVALS (MAXIMUM) AND ALSO IDENTIFYING THE UTILITY LINE IT IS PROTECTING.

NO CONFLICT SIGNATURE BLOCK

Utility Company	Representative	Date Sent	Date Signed
ARIZONA PUBLIC SERVICE COMPANY	CCWCONTROLDESK@APSC.COM	-	
COX COMMUNICATIONS	PHX.TMC@COX.COM	-	
CENTURYLINK'	MAPS@CENTURYLINK.COM	-	
SOUTHWEST GAS CORPORATION	VALERIE GALLARDO	-	
EL PASO NATURAL GAS. CO.	JENNIFER ANGELES	-	
CITY OF SCOTTSDALE, WATER		-	
CITY OF SCOTTSDALE, SEWER		-	

Engineer's Certification

I, GEOFFREY MARKOWSKI, being the person responsible for designing the facilities necessary to serve this development, hereby certify that all of the utility companies listed above, have reviewed this project proposal. Conflict Forms have been obtained from each utility company and are not included with this submittal. I also certify that all on site transformers, cable boxes and any other public/private utility appurtenances are placed such that they do not impact the use or intended use of any dedicated easements or facilities developed with this project including but not limited to stormwater storage basins, sight distance easements and NAOS or other open space easements.

Signature ______ 2-27-18 Date

LEGAL DESCRIPTION

LOT 38 AND 39 OF THE FINAL PLAT OF "DARYL ESTATES - UNIT TWO" AS RECORDED IN BOOK 61 OF MAPS, PAGE 48, RECORDS OF MARICOPA COUNTY, ARIZONA.

PROJECT DESCRIPTION

DEMOLITION OF EXISTING STRUCTURES AND POOL. CONSTRUCTION OF A NEW MULIT-FAMILY BUILDING STRUCTURES ALONG WITH NEW LANDSCAPING, WALKWAYS, PATIOS, POOL AND GRADING AND DRAINAGE IMPROVEMENTS. NEW STRUCTURES WILL BE PLACED SO THAT THE FINISHED FLOOR IS FREE FROM ANY INUNDATION FROM THE 100-YEAR DESIGN STORM EVENT AND AT LEAST 12-INCHES ABOVE NEAREST ADJACENT EXISTING GRADE. ALL GRADING AROUND THE FOUNDATION OF THE NEW STRUCTURE WILL ALLOW DRAINAGE TO FLOW AWAY FROM THE FOUNDATION. NO OTHER ON-SITE GRADING IMPROVEMENTS REQUIRED.

RETENTION REQUIREMENTS - PRE. VS. POST DEVELOPMENT

PER CITY OF SCOTTSDALE DRAINAGE & DESIGN STANDARDS & POLICIES MANUAL. (MARICOPA COUNTY DRAINAGE DESIGN MANUAL, VOLUME II AND III)

Vr = A(P/12)C
V = Volume of retention required (cubic feet or acre-feet)
C = Runoff factor for tributary areas
P = 100-year, 2-hour rainfall from NOAA Atlas 14(in inches)
A = Drainage area (square feet or acres)

PRE DEVELOPMENT	POST DEVELOPMENT
A = 13,000 S.F.	A = 13,000 S.F.
P = 2.26 INCHES	P = 2.26 INCHES
C = 0.85 R-5 ZONING	C = 0.91 WEIGHTED
Vr = 2,021 CUBIC FEET	**Vr = 2,227 CUBIC FEET**

Vr = 2,227 - 2,021 = 146 CUBIC FEET

RETENTION REQUIREMENTS - 1ST FLUSH STORM EVENT

SITE IS CONSIDERED "IN-FILL" DEVELOPMENT. THE GREATER OF PRE VS. POST OR 1ST FLUSH RETENTION REQUIRED ON-SITE. BASED ON ANALYSIS, 1ST FLUSH STORM EVENT IS LARGER RETENTION VOLUME REQUIREMENT.

Vr = A(P/12)C
V = Volume of retention required (cubic feet or acre-feet)
C = Runoff factor for tributary areas
P = 100-year, 2-hour rainfall from NOAA Atlas 14(in inches)
A = Drainage area (square feet or acres)

A = 13,000 S.F.
P = 0.5 INCHES
C = 1.0 R-5 ZONING
Vr = 542 CUBIC FEET

ON-SITE RETENTION PROVIDED

UST #1 VOLUME CALCULATIONS

Volume = ((D^2)*(PI/4 * L))
D = 4 FT.
L = 45 FT.
Vp = 565 CU.FT.

VOLUME PROVIDED = 565 CUBIC FEET
VOLUME REQUIRED = 542 CUBIC FEET
EXCESS VOLUME PROV. = 23 CUBIC FEET

ESTIMATED QUANTITIES

OFF-SITE QUANTITIES:

Item	Quantity
1" DOMESTIC LANDSCAPE SERVICE	45 L.F.
1-1/2" DOMESTIC SERVICE	405 L.F.
3/4" LANDSCAPE METER	1 EA.
1" DOMESTIC METER	9 EA.
6"x6" TAPPING SLEEVE, VALVE & COVER	2 EA.
6" DIP (CL 350) WATERLINE	74 L.F.
FIRE HYDRANT ASSEMBLY	1 EA.
EXISTING WATER SERVICE REMOVAL	2 EA.
STREET LIGHT & PULL BOX	1 EA.

NOTE: QUANTITIES SHOWN ARE FOR CITY PERMIT PURPOSES ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR HIS/HER OWN QUANTITY TAKE-OFF FOR BID PURPOSES.

OWNER/DEVELOPER

SCOTT GRADEN
8144 E. DEL BARQUERO DR.
SCOTTSDALE, ARIZONA 85258
PH: 602-875-6221
CONTACT: SCOTT GRADEN

ARCHITECT/DESIGNER

KONTEXTURE
3334 N. 20TH STREET
PHOENIX, ARIZONA 85016
PH: 602-875-6221
CONTACT: DANIEL ISTRATE

DATUM

ADD 1200 TO SPOT ELEVATIONS SHOWN ON PLAN (NAVD '88 DATUM).

BENCHMARK

GDAC UNIQUE PID: 24574-1

DESCRIPTION: FOUND 3" CITY OF SCOTTSDALE BRASS CAP IN HANDHOLE, 0.8' DOWN AT THE INTERSECTION OF CAMELBACK AND SCOTTSDALE ROAD WITH AN ELEVATION OF 1277.516' (NAVD '88)

ZONING: R-5

A.P.N.: 173-38-060 & 173-38-061
NET LOT AREA: 13,000 S.F. (0.298 AC)
Q.S. #18-45

SETBACKS: FRONT = 3'
REAR = 3'
LEFT = 3'
RIGHT = 3'

TOTAL DISTURBED AREA: ±13,000 S.F.

EARTHWORK QUANTITIES

CUT 120 C.Y.
FILL 330 C.Y.
NET FILL: 210 C.Y.

QUANTITIES ARE FOR PERMIT PURPOSES ONLY. CONTRACTOR SHALL MAKE HIS/HER OWN TAKE-OFF FOR CONSTRUCTION.

SITE DATA:

NET AREA: 13,000 S.F. (0.30 AC.)
GROSS AREA: 16,246 S.F. (0.37 AC.)
DISTURBED AREA: 13,000 S.F. (0.30 AC.)

SHEET INDEX:

SHEET NO.	PAGE NO.	TITLE
C1	1	COVER SHEET & CIVIL NOTES
C2	2	DETAILS & SECTIONS
C3	3	DETAILS & SECTIONS
C4	4	GRADING & DRAINAGE PLAN
C5	5	ON-SITE UTILITY PLAN

AS-BUILT CERTIFICATION

I HEREBY CERTIFY THAT THE "RECORD DRAWING" MEASUREMENTS AS SHOWN HEREON WERE MADE UNDER MY SUPERVISION OR AS NOTED AND ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

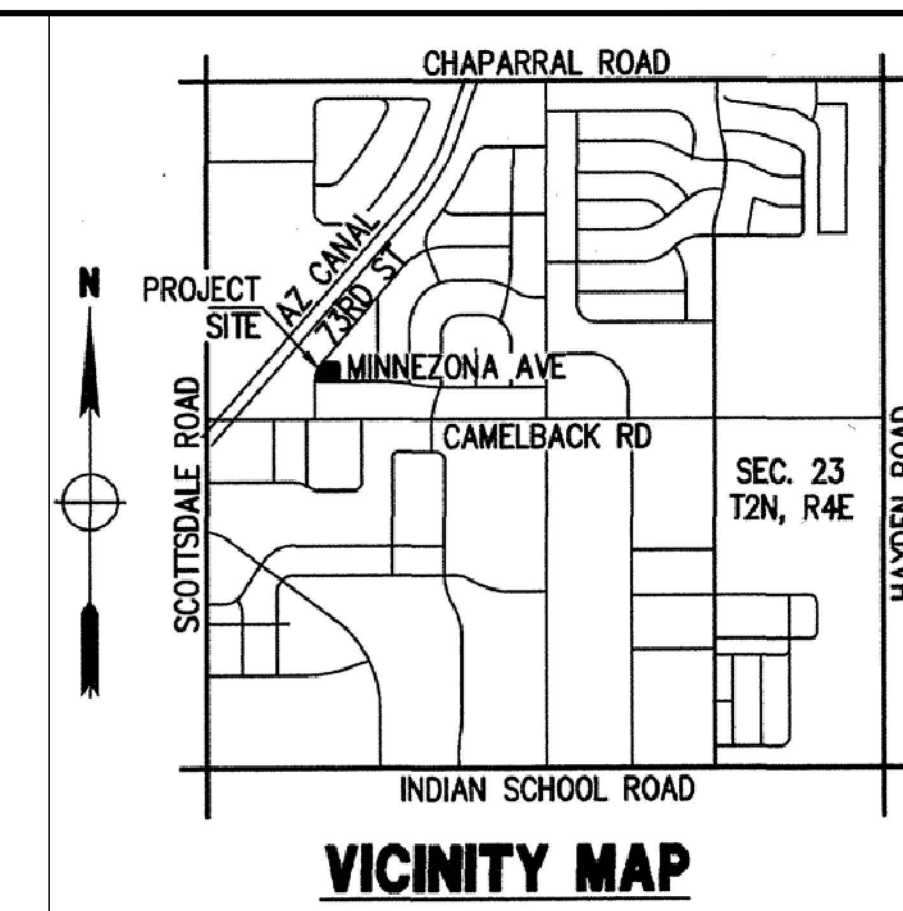
REGISTERED ENGINEER/LAND SURVEYOR ______ DATE ______

REGISTRATION NUMBER ______

ABBREVIATIONS

(SOME ABBREVIATIONS MAY NOT APPLY TO THESE DRAWINGS)

BOTT.	BOTTOM
B/C	BACK OF CURB
C.F.	CUBIC FEET
CLF	CHAIN LINK FENCE
CONC.	CONCRETE
C.Y.	CUBIC YARD
D.E.	DRAINAGE EASEMENT
D/W	DRIVEWAY
ESMT.	EASEMENT
EXIST.	EXISTING
F.F.	FINISHED FLOOR
FND.	FOUND
FT.	FEET
MAS.	MASONRY
ML	MONUMENT LINE
N.T.S.	NOT TO SCALE
PVMT.	PAVEMENT
PL	PROPERTY LINE
PROP.	PROPOSED
P.U.E.	PUBLIC UTILITY EASEMENT
R/W	RIGHT OF WAY
S/W	SIDEWALK
TYP.	TYPICAL
U.N.O.	UNLESS NOTED OTHERWISE



VICINITY MAP
N.T.S.

LEGEND

(SOME ITEMS MAY NOT APPLY TO THESE DRAWINGS)

BOUNDARY LINE
MONUMENT LINE
PROPERTY CORNER
EASEMENT LINE
PROPOSED NAOS BOUNDARY

EXISTING / PROPOSED

MAS. FENCE
VERT. CURB & GUTTER
CONCRETE CURB
BUILDING
CONCRETE
BRASSCAP IN HANDHOLE
BRASSCAP FLUSH
SIGN
GM — GAS METER
TR — TELEPHONE RISER
TV — CABLE RISER
PP — POWER POLE
ELECTRICAL GUY DOWN
STREET LIGHT OR LIGHT POLE
WM — WATER METER
N — BACK FLOW PREVENTION ASSEMBLY
DRYWELL/CATCH BASIN
SCB — SPRINKLER CONTROL BOX
WATER VALVE
FIRE HYDRANT
W — WATER
C — UNDERGROUND CABLE TV
T — OVERHEAD TELEPHONE
OH — UNDERGROUND TELEPHONE
OH — OVERHEAD ELECTRICAL
E — UNDERGROUND ELECTRICAL
S — SANITARY SEWER
GAS — GAS
STORM DRAIN
W — FIRE LINE
90.3 — NATURAL GROUND ELEV.
TC90.30 — TOP OF CURB ELEV.
P90.30 — PAVER ELEV.
G90.30 — GUTTER ELEV.
FF99.30 — APPROX. FINISHED FLOOR ELEV.
C99.30 — CONCRETE ELEV.
RIM99.30 — RIM ELEV.
INV99.30 — INVERT ELEV.
DRAINAGE SLOPE
90.3 — EXTREME OUTFALL

FIRM DATA

COMMUNITY NUMBER	PANEL # PANEL DATE	SUFFIX	DATE OF FIRM (INDEX DATE)	FIRM ZONE	BASE FLOOD ELEV. (IN AO ZONE, USE DEPTH)
045012	1770 7/20/21	M	7/20/21	X	N/A

THIS SITE IS NOT IN A SPECIAL FLOOD HAZARD ZONE. IT IS LOCATED IN FLOOD ZONE 'X'. NO OTHER OFF-SITE FLOWS IMPACT THE SITE. FINISHED FLOOR ELEVATIONS ARE AT LEAST 14" ABOVE THE EXTREME OUTFALL TO THE SITE AND AT LEAST 1-FOOT ABOVE NEAREST FLOOD ZONE BASE WATER SURFACE ELEVATION. THIS SITE OUTFALLS TO THE SOUTHEAST TO EXISTING RIGHT-OF-WAY AT AN ELEVATION OF APPROXIMATELY 1269.35 REFERENCED TO PROJECT BENCHMARK.

ENGINEER'S CERTIFICATION
THE LOWEST FLOOR ELEVATIONS AND/OR FLOOD PROOFING ELEVATIONS FOR THE ADDITION ON THIS PLAN ARE SUFFICIENTLY HIGH TO PROVIDED PROTECTION FROM FLOODING CAUSED BY A 100-YEAR STORM, AND ARE IN ACCORDANCE WITH SCOTTSDALE REVISED CODE, CHAPTER 37 - FLOODPLAIN AND STORMWATER REGULATIONS.

CALL BEFORE YOU DIG
Avoid cutting underground utility lines. It's costly.
CALL 811
OR
1-800-263-1100
OR
1-800-STAKE IT
(OUTSIDE MARICOPA COUNTY)

g-mar
consulting engineers, llc
18223 west orchid lane
waddell, arizona 85355
fax: 623.242.6221 • ph: 623.242.6220

PROJECT: MINNEZONA CONDOMINIUMS
7314 E. MINNEZONA AVENUE
SCOTTSDALE, ARIZONA

CLIENT: KONTEXTURE
3334 N. 20TH STREET, PHOENIX, ARIZONA 85016

PR	8-18-2021	1ST PRELIM SUBMITTAL
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PR	9-1-22	4TH PRELIM SUBMITTAL

DATE ISSUED: 2 AUG 2021
DRAWN BY: GM
CHECKED BY: GM

SHEET DESCRIPTION:
COVER SHEET & CIVIL NOTES

SHEET C1 OF

C.O.S. #45-DR-2021

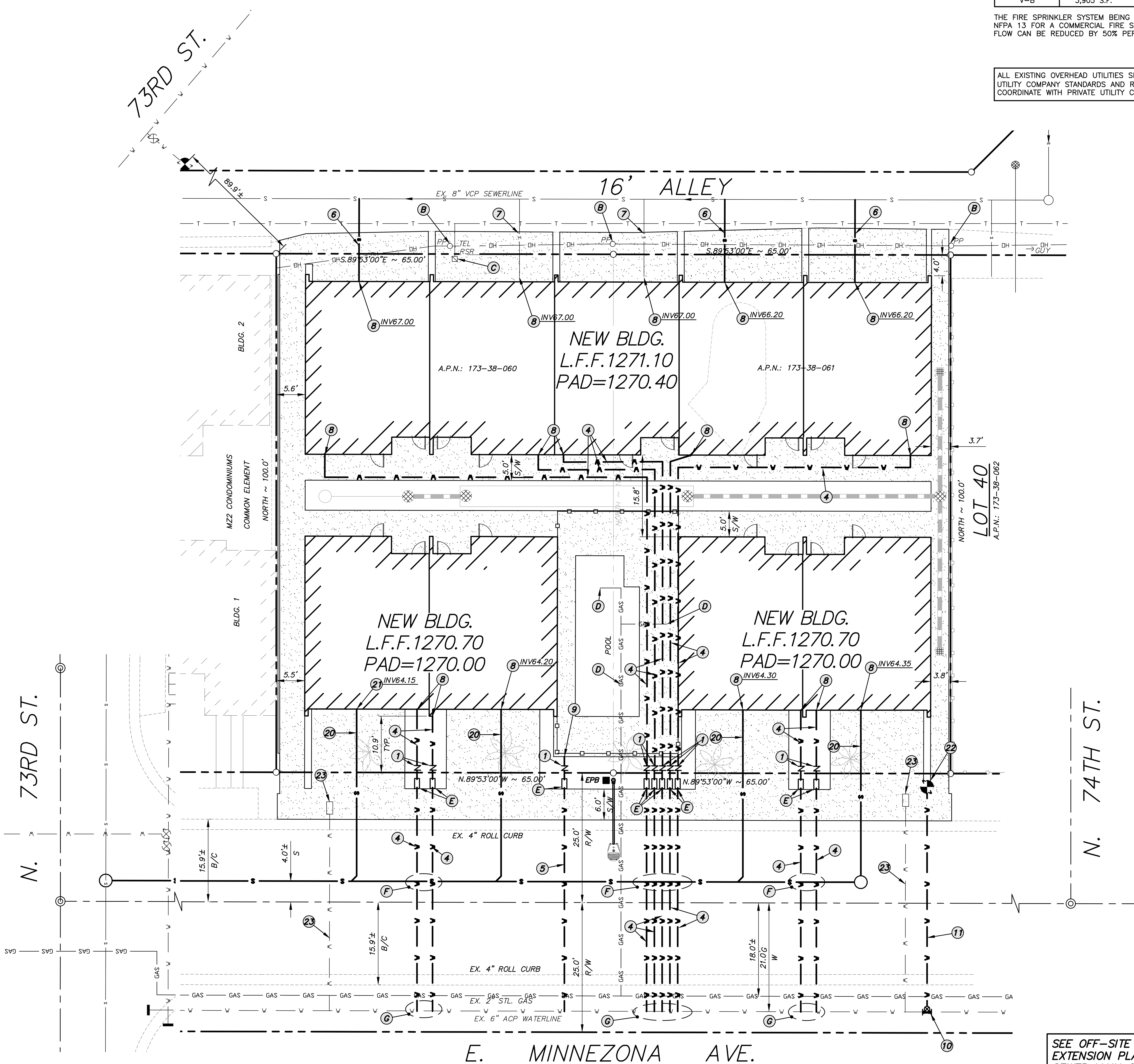
JOB NO. 21-08-010-00

BACKFLOW PREVENTION REQUIREMENTS

BUILDING TYPE	BLDG. SQ. FOOTAGE	FLOW DURATION	FIRE FLOW REQ'D.
V–B	3,130 S.F.	2 HOURS	1,500 GPM
V–B	3,905 S.F.	2 HOURS	1,750 GPM

THE FIRE SPRINKLER SYSTEM BEING INSTALLED IS A "WET PIPE SYSTEM" PER NFPA 13 FOR A COMMERCIAL FIRE SUPPRESSION SYSTEM. REQUIRED DEMAND FLOW CAN BE REDUCED BY 50% PER FIRE CODE.

ALL EXISTING OVERHEAD UTILITIES SHALL BE UNDERGROUNDED PER PRIVATE UTILITY COMPANY STANDARDS AND REQUIREMENTS. OWNER/DEVELOPER SHALL COORDINATE WITH PRIVATE UTILITY COMPANIES.



SEE OFF-SITE SEWER MAIN EXTENSION PLAN SHEETS FOR NEW SEWER MAIN CONSTRUCTION DETAILING – PER SEPARATE PERMIT.

ON-SITE WATER & SEWER CONST. NOTES

1. INSTALL NEW 1-1/2" FEBCO LF-850 DOMESTIC REDUCED PRESSURE PRINCIPLE BACKFLOW ASSEMBLY PER C.O.S. STD. DET. 2354.
2. INSTALL 1" FEBCO LF-850 LANDSCASPE REDUCED PRESSURE PRINCIPLE BACKFLOW ASSEMBLY PER C.O.S. STD. DET. 2354.
3. NOT USED.
4. INSTALL NEW 1-1/2" DOMESTIC COPPER WATERLINE (TYPE K) AND TRENCHING PER IPC STANDARDS. REFER TO PLUMBING PLANS TYPE AND MATERIAL.
5. 1" LANDSCAPE COPPER WATERLINE (TYPE K) AND TRENCHING PER IPC STANDARDS. REFER TO LANDSCAPE PLANS.
6. 6" PVC SEWERLINE AT 1.04% PER IPC STANDARDS. MAINTAIN 3-FEET OF COVER OVER SEWER LINE UNDER RETENTION BASIN.
7. CONNECT TO EXISTING SEWER SERVICE TAP. CONTRACTOR TO FIELD VERIFY VERTICAL AND HORIZONTAL LOCATION OF EXISTING SERVICE PRIOR TO TRENCHING AND CONNECTION.
8. REFER TO BUILDING & PLUMBING PLANS FOR CONTINUATION OF UTILITIES INTO BUILDING.
9. REFER TO LANDSCAPE PLANS FOR CONTINUATION.
10. INSTALL 6"x 6" TEE, VALVE & COVER PER M.A.G. STD. DETAIL 391-1, TYPE 'A'. EXISTING ACP MAIN SHALL BE REMOVED AND REPLACED WITH D.I.P. PER DSPM SEC. 6-1.408.
11. CONSTRCUT 6" D.I.P. (PRESSURE CLASS 350 MIN. OR APPROVED EQUAL) FIRELINE.
13. WATER/SEWER CROSSING AND ENCASEMENT PER M.A.G. STD. DET. 404-3.
14. INSTALL 6" PVC CLEANOUT WITH QYE FITTING PER I.P.C. STANDARDS. ADJUST RIM TO FINISHED GRADE.
15. REFER TO FIRE SPRINKLER PLANS FOR CONTINUATION.
20. 4" PVC SEWERLINE AT 2.08% PER IPC STANDARDS.
21. INSTALL 4" DIA. PVC 45° BEND WITH SEWER CLEANOUT PER I.P.C. STANDARDS. ADJUST RIM TO FINISHED GRADE.
22. INSTALL FIRE HYDRANT ASSEMBLY COMPLETE PER M.A.G. STD. DET. 360-1.
23. EXISTING WATER SERVICE TAP AND METER TO BE ABANDONED PER CITY STANDARDS AND SPECS.

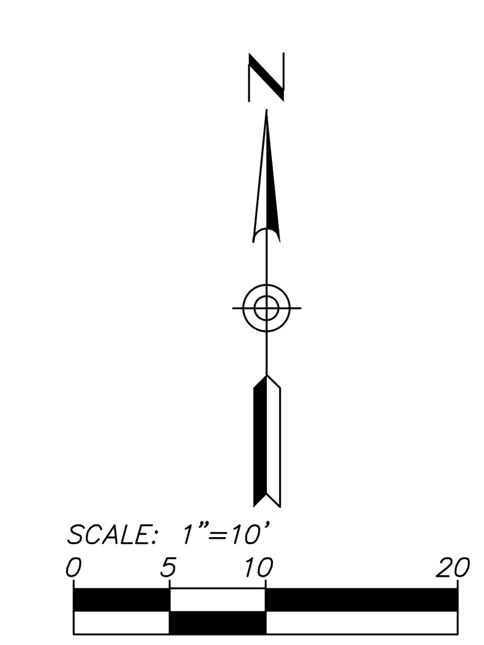
OFF-SITE STREET LIGHTING NOTES:

A. INSTALL NEW STREET LIGHT POLE. PROVIDE 25-FOOT TALL GALVANIZED STREETLIGHT POLE WITH 6-FT LUMINAIRE ARM PER C.O.S. STD. DETS. 2171-1 & 2171-2 WITH SIGNIFY LUMEC RFS-35W16LED3K-G2-R2M LUMINAIRE WITH CITYTOUCH CONNECTOR NODE, MODEL 127-277-CTCN.

OFF-SITE UTILITY CONSTRUCTION NOTES:

B. REMOVE EXISTING POWER POLE. UNDERGROUND EXISTING UTILITIES PER PRIVATE UTILITY COMPANY STANDARDS.
C. REMOVE AND RELOCATE EXISTING COMMUNICATION RISER PER PRIVATE UTILITY COMPANY STANDARDS.
D. EXISTING GAS LINE AND METER TO BE ABANDONED AND REMOVED PER PRIVATE UTILITY COMPANY STANDARDS.
E. INSTALL NEW 1" WATER METER, BOX & COVER PER C.O.S. STD. DET. 2362-1 AND SPECS BY CITY FORCES.
F. NEW WATER SERVICE LINES SHALL BE AT LEAST 2-FEET SEPARATION ABOVE NEW SEWER MAIN. SEE SEWER MAIN PLAN AND PROFILE FOR DISTANCE CALLOUTS BETWEEN MAIN AND SERVICE LINES.
G. EXISTING ACP MAIN SHALL BE REMOVED AND REPLACED WITH D.I.P. PER DSPM SEC. 6-1.408.

vertical



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waddell, arizona 85355
fax: 623.242.6221 • ph: 623.242.6220

Registered Professional Engineer (Civil) CERTIFICATE NO. 46858 GEOFFREY A. MARKOWSKI Date Signed ARIZONA U.S.A. EXP. 09/30/2022

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DATE ISSUED: 2 AUG 2021
DRAWN BY: GM
CHECKED BY: GM

SHEET DESCRIPTION: ON-SITE UTILITY PLAN

SHEET C5 OF

C.O.S. #45-DR-2021

JOB NO. 21-08-010-00

APPENDIX C

Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name:	Minnezona Condominiums
Project Address:	7314 East Minnezona Avenue, Scottsdale, Arizona, 85251
Client Project No.:	Not Provided
Arizona Flow Testing Project No.:	21586
Flow Test Permit No.:	C66638
Date and time flow test conducted:	November 4, 2021 at 8:10 AM
Data is current and reliable until:	May 4, 2022
Conducted by:	Floyd Vaughan – Arizona Flow Testing, LLC (480-250-8154)
Witnessed by:	Ray Padilla –City of Scottsdale-Inspector (602-541-0586)

Raw Test Data

Static Pressure: **100.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **42.0 PSI**
(Measured in pounds per square inch)

Pitot Pressure: **17.0 PSI**
(Measured in pounds per square inch)

Diffuser Orifice Diameter: One 4-inch Pollard Diffuser
(Measured in inches)

Coefficient of Diffuser: .9

Flowing GPM: **1,772 GPM**
(Measured in gallons per minute)

GPM @ 20 PSI: **2,108 GPM**

Data with 28 PSI Safety Factor

Scottsdale requires a maximum Static Pressure of 72 PSI for AFES Design.

Static Pressure: **72.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **14.0 PSI**
(Measured in pounds per square inch)

Distance between hydrants: Approx.: 580 Feet

Main size: Not Provided

Flowing GPM: **1,772 GPM**

GPM @ 20 PSI**:** **1,670 GPM**

Flow Test Location **North**

Project Site
7314 East Minnezona Avenue

Static/Residual Pressure taken from number one test port at backflow assembly

North 74th Place

East Minnezona Avenue

Flow Fire Hydrant

APPENDIX D

TABLE B105.1
MINIMUM REQUIRED FIRE-FLOW AND FLOW DURATION FOR BUILDINGS

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute)[b]	FLOW DURATION (hours)
Type IA and IB[a]	Type IIA and IIIA[a]	Type IV and V-A[a]	Type IIB and IIIB[a]	Type V-B[a]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.
a. Types of construction are based on the *International Building Code*.
b. Measured at 20 psi residual pressure.

Pressure Drop Online-Calculator

Calculation output

Flow medium:	Water 20 °C / liquid
Volume flow::	1750 gal/min
Weight density:	62.4 lb./cu.ft.
Dynamic Viscosity:	1.00161 mPa s
Element of pipe:	circular
Dimensions of element:	Diameter of pipe D: 6 in. Length of pipe L: 51 ft.
Velocity of flow:	19.86 ft./s
Reynolds number:	920516
Velocity of flow 2:	-
Reynolds number 2:	-
Flow:	turbulent
Absolute roughness:	.024 in.
Pipe friction number:	0.03
Resistance coefficient:	2.91
Resist.coeff.branching pipe:	-
Press.drop branch.pipe:	-
Pressure drop:	1111.61 lbw./sq.ft. 7.72 psi

Note: The pressure drop was calculated by the online calculator of www.pressure-drop.com. We can not warrant the correctness of this software. The software is produced carefully. But no computer software is without bugs. Therefore the calculations are your own risk.

****

Important notice: The new version of the Online-Calculator is available: www.pressure-drop.online

****

Do you know our software SF Pressure Drop 10.x for Excel?
Information: www.pressure-drop.com

****

APPENDIX E

PLUMBING SYMBOLS

NOTE: THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS, ETC. ARE NECESSARILY USED ON THE DRAWINGS.

ANNOTATION

- (1) PLUMBING PLAN NOTE CALLOUT
- (1) PLUMBING EQUIPMENT DESIGNATION. (CONTRACTOR FURNISHED AND INSTALLED). REFER TO PLUMBING FIXTURE SCHEDULES.
- [1] EQUIPMENT DESIGNATION (OWNER FURNISHED, CONTRACTOR INSTALLED)
- CU 1 MECHANICAL EQUIPMENT DESIGNATION (CONTRACTOR FURNISHED AND INSTALLED UNLESS NOTED OTHERWISE)
- CONNECTION POINT OF NEW WORK TO EXISTING
- 1 / P1 DETAIL REFERENCE UPPER NUMBER INDICATES DETAIL NUMBER LOWER NUMBER INDICATES SHEET NUMBER

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR	MAX	MAXIMUM
AFG	ABOVE FINISHED GRADE	MBH	1000 BTU PER HOUR
BFF	BELOW FINISHED FLOOR	MIN	MINIMUM
BFG	BELOW FINISHED GRADE	ORD	OVERFLOW ROOF DRAIN
BOP	BOTTOM OF PIPE	PDI	PLUMBING DRAINAGE INSTITUTE
BOS	BOTTOM OF STRUCTURE	PVC	POLYVINYL CHLORIDE
BTU	BRITISH THERMAL UNIT	PRV	PRESSURE REDUCING VALVE
CPVC	CHLORINATED POLYVINYL CHLORIDE	RD	ROOF DRAIN
DN	DOWN	RPM	REVOLUTIONS PER MINUTE
DS	DOWNSPOUT	SF	SQUARE FEET, SUPPLY FAN
ETR	EXISTING TO REMAIN	SP	SUMP PUMP
FFA	FROM FLOOR ABOVE	TDH	TOTAL DYNAMIC HEAD
FFB	FROM FLOOR BELOW	TFA	TO FLOOR ABOVE
FF	FINISHED FLOOR	TFB	TO FLOOR BELOW
FLA	FULL LOAD AMPS	TYP	TYPICAL
FLR	FLOOR	UL	UNDERWRITERS LABORATORIES,INC.
GPM	GALLONS PER MINUTE	VS	VENT STACK
HD	HEAD, HUB DRAIN	VTR	VENT THROUGH ROOF
IE	INVERT ELEVATION	W/	WITH
IN WC	INCHES OF WATER COLUMN	W/O	WITHOUT
kW	KILOWATT	WC	WATER COLUMN
MAU	MAKE-UP AIR UNIT	WS	WASTE STACK

PIPING

- DOMESTIC COLD WATER (CW)
- SCW — SOFTENED COLD WATER (SCW)
- FW — FILTERED COLD WATER (FW)
- DOMESTIC HOT WATER (HW)
- DOMESTIC HOT WATER RECIRC. (HWR)
- 140° — 140° DOMESTIC HOT WATER (140°)
- T — TRAP PRIMER LINE (T)
- S — SOIL PIPING – ABOVE FLOOR (S)
- S — SOIL PIPING – BELOW FLOOR (S)
- W — WASTE PIPING – ABOVE FLOOR (W)
- W — WASTE PIPING – BELOW FLOOR (W)
- GW — GREASE WASTE – ABOVE FLOOR (GW)
- GW — GREASE WASTE – BELOW FLOOR (GW)
- ST — STORM DRAIN – ABOVE FLOOR (ST)
- ST — STORM DRAIN – BELOW FLOOR (ST)
- OST — OVERFLOW STORM DRAIN – ABOVE FLOOR (OST)
- VBG — VENT BELOW GRADE (VBG)
- VBF — VENT BELOW FLOOR (VBF)
- CD — CONDENSATE DRAIN (CD)
- SPD — SUMP OR SEWAGE PUMP DISCHARGE (SPD)
- G — NATURAL GAS (G)
- G — NATURAL GAS ON ROOF (G)
- MPG — MEDIUM PRESSURE NATURAL GAS (MPG)
- MPG — MEDIUM PRESSURE NATURAL GAS ON ROOF (MPG)
- LPG — LIQUIFIED PETROLEUM GAS (LPG)
- EXISTING PIPING TO BE REMOVED
- ETR — EXISTING PIPING TO REMAIN (ETR)
- V — VENT PIPING (V)
- BALL VALVE
- CONTROL VALVE
- SHUTOFF VALVE
- CHECK VALVE
- BALANCING VALVE WITH PRESSURE PORTS
- WATER METER
- STRAINER
- STRAINER WITH BLOWOFF
- RELIEF/SAFETY VALVE
- SOLENOID VALVE
- PRESSURE REDUCING VALVE
- GAS PRESSURE REGULATOR
- THERMOSTATIC MIXING VALVE
- BACKFLOW PREVENTER
- PRESSURE GAUGE
- THERMOMETER
- UNION
- FLANGE CONNECTION
- HOSE BIBB (HB)
- NONFREEZE WALL HYDRANT (NW)
- MANUAL/AUTOMATIC AIR VENT OR RELIEF VALVE
- CLEANOUT
- CAP
- WALL CLEANOUT (WCO)
- FLOOR CLEANOUT (FCO)
- EXTERIOR CLEANOUT (ECO)
- ELBOW UP
- ELBOW DOWN
- TEE UP
- TEE DOWN
- WATER HAMMER ARRESTER (WHA)
- RECIRCULATION PUMP
- P–TRAP
- GAS COCK
- TRAP PRIMER
- TRAP PRIMER WITH DISTRIBUTION UNIT

GENERAL PLUMBING NOTES:

A. DRAWINGS ARE DIAGRAMMATIC ONLY AND REPRESENT THE GENERAL SCOPE OF THE WORK. PRIOR TO SUBMITTING BID, VISIT THE JOB SITE TO OBSERVE THE EXISTING CONDITIONS OF THE PROJECT. REVIEW THE GENERAL NOTES, SPECIFICATIONS AND PLANS FOR ADDITIONAL REQUIREMENTS THAT MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY OWNER'S CONSTRUCTION MANAGER OF ANY CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.

B. PROVIDE A CONSTRUCTION RECORD SET OF "AS–BUILT" DOCUMENTS TO THE OWNER'S CONSTRUCTION MANAGER REFLECTING ANY VARIANCES OF INSTALLED PIPING LOCATIONS OR EQUIPMENT CONTRARY TO THE CONSTRUCTION DOCUMENTS, REFER TO SPECIFICATIONS.

C. PROVIDE TO THE OWNER'S CONSTRUCTION MANAGER A COPY OF INSPECTION REPORTS AND APPROVAL CERTIFICATES FROM LOCAL AND STATE INSPECTIONS, REFER TO SPECIFICATIONS.

D. INSTALLATION SHALL COMPLY WITH LEGALLY CONSTITUTED CODES AND THE REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION AND ALSO MEET ALL REQUIREMENTS OF THE LANDLORD. OBTAIN A COPY OF THE LANDLORD'S REQUIREMENTS AND REVIEW PRIOR TO SUBMITTING BID.

E. PLANS AND SPECIFICATIONS GOVERN WHERE THEY EXCEED CODE REQUIREMENTS.

F. VERIFY LOCATION AND DEPTH OF UTILITIES AT POINTS OF CONNECTION BEFORE START OF PIPING INSTALLATION.

G. REFER TO ARCHITECTURAL PLANS FOR EXACT LOCATION AND MOUNTING HEIGHTS OF PLUMBING FIXTURES.

H. DO NOT SCALE FLOOR PLANS FOR EXACT HORIZONTAL LOCATION OF PIPE ROUTING.

I. INSTALL CONCEALED PIPING TIGHT TO THE STRUCTURE AND AS HIGH AS POSSIBLE. INSTALL EXPOSED PIPING TIGHT TO THE STRUCTURE, WALL OR CEILING AND AS HIGH AS POSSIBLE. COORDINATE WITH OTHER TRADES TO AVOID CONFLICTS.

J. VALVES SHALL BE LINE SIZE UNLESS OTHERWISE NOTED.

K. PIPING IN FINISHED AREAS SHALL BE ROUTED CONCEALED; EXPOSED PIPING, WHERE NECESSARY, SHALL BE ROUTED AS HIGH AS POSSIBLE AND TIGHT TO WALLS.

L. COORDINATE ALL WORK WITH OTHER TRADES AND CONTRACTORS.

M. COORDINATE PIPING INSTALLATION WITH STRUCTURAL GRADE BEAMS, FOOTINGS, COLUMN PIERS, ETC. SLEEVE PIPING THROUGH GRADE BEAMS, FOOTING, ETC. WHERE REQUIRED AND AS NOTED ON PLANS. COORDINATE SLEEVE INSTALLATIONS WITH THE ARCHITECT, STRUCTURAL ENGINEER, STRUCTURAL CONTRACTOR AND GENERAL CONTRACTOR BEFORE CONCRETE IS INSTALLED.

N. CLEAN FAUCET AERATORS AND PIPE STRAINERS PRIOR TO TURNING BUILDING OVER TO THE OWNER.

O. PROVIDE TRAP PRIMERS WHERE REQUIRED BY LOCAL AUTHORITIES.

P. COORDINATE PIPE ROUTING AWAY FROM ELECTRICAL PANELS. DO NOT INSTALL PIPING OVER ELECTRICAL PANELS.

Q. PAINT ALL EXPOSED GAS AND WATER PIPING USING RUST INHIBITOR PAINT. PAINT AND COLOR SHALL BE COORDINATED WITH THE ARCHITECT AND / OR OWNER.

R. COORDINATE ALL ROOF PENETRATIONS WITH OTHER TRADES. MAINTAIN 10' MINIMUM CLEARANCE FROM ALL AIR INTAKES. MAINTAIN 2' CLEARANCE FROM ALL OTHER EQUIPMENT.

S. INSULATE PIPING ROUTED IN EXTERIOR BUILDING WALLS WITH MINIMUM 2" BATT INSULATION TO PREVENT FREEZING.

T. SEAL ALL PENETRATIONS THROUGH RATED WALLS AND CEILINGS.

U. EXAMINE THE CONTRACT DRAWINGS AND ALL AVAILABLE INFORMATION CONCERNING EXISTING INSTALLATION, STRUCTURE, AND LOCAL CONDITIONS. VISIT THE SITE TO UNDERSTAND THE NATURE AND SCOPE OF ALL WORK TO BE PERFORMED AND VERIFY EXISTING CONDITIONS. THE SUBMISSION OF A BID WILL BE TAKEN AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE AND THAT ALL EXISTING CONDITIONS HAVE BEEN CONSIDERED. NO ALLOWANCES WILL BE MADE AFTER THE PROJECT HAS BEEN AWARDED FOR FAILURE TO VERIFY EXISTING CONDITIONS. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES BETWEEN ACTUAL FIELD CONDITIONS AND THAT OF THESE DRAWINGS PRIOR TO BEGINNING CONSTRUCTION.

PLUMBING FIXTURE SCHEDULE:

FIXTURES IN THIS SCHEDULE OR THEIR APPROVED EQUIVALENT ARE PROVIDED BY THE PLUMBING CONTRACTOR. SUBMIT SHOP DRAWINGS ON EACH OF THESE ITEMS. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION AND INSTALLATION REQUIREMENTS. VERIFY ROUGH–IN REQUIREMENTS WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS AND INSTALL PER MANUFACTURER'S RECOMMENDATIONS. REFER TO THE ARCHITECTURAL DRAWINGS FOR THE PLUMBING FIXTURE MOUNTING HEIGHTS.

(AAV–1) AIR ADMITTANCE VALVE: STUDOR "MINI–VENT" # 20301, MEETING ASSE 1051 TYPE "A", POLYSTYRENE PROTECTIVE COVER, ABS VALVE WITH ELASTROMERIC MEMBRANE AND PVC CONNECTOR, 2" INLET, AND ATMOSPHERIC PORT. MULTI–PURPOSE RECESS BOX: STUDOR "MULTI–PURPOSE RECESS BOX" # 20306, 7–3/4" SQ. x 3–3/4" DEEP POLYSTYRENE BOX WITH REMOVABLE METAL LOUVER. MOUNT FLUSH IN WALL.

(AAV–2) AIR ADMITTANCE VALVE: STUDOR "MAXI–VENT" # 20302 MEETING ASSE 1050 TYPE "A", POLYSTYRENE PROTECTIVE COVER, ABS VALVE WITH ELASTROMERIC MEMBRANE AND PVC CONNECTOR, 2" INLET, AND ATMOSPHERIC PORT.

(RPZ) REDUCED PRESSURE ZONE BACKFLOW PREVENTER: WATTS # LF–919QT–S, LEAD FREE CAST BRONZE BODY, QUARTER TURN TEST COCKS, QUARTER TURN BALL VALVES, BRONZE STRAINER, AND # 909AGF AIR GAP FITTING. MEETS ASSE 1013 STANDARDS.

(ECO) EXTERIOR CLEANOUT: JAY R. SMITH # 4261L SERIES DUCO CAST IRON DOUBLE FLANGED HOUSING WITH HEAVY DUTY SECURED SCORIATED CAST IRON COVER WITH LIFTING DEVICE AND CLEANOUT BODY WITH ABS PLASTIC PLUG WITH GASKET SEAL AND PUSH–ON JOINT. REFER TO SPECIFICATIONS FOR INSTALLATION.

(WCO) WALL CLEANOUT: JAY R. SMITH # 4530S, CAST IRON CLEANOUT TEE, COUNTER SUNK PLUG, STAINLESS STEEL ROUND COVER AND SCREW, AND IRON PLUG WITH GASKET SEAL. REFER TO SPECIFICATIONS FOR INSTALLATION.

(ET) EXPANSION TANK: AMTROL "THERM–X–TROL" # ST–12, WELDED STEEL PRESSURE TANK, POLYPROPYLENE LINING, FLEXIBLE BUTYL DIAPHRAGM, AIR CHARGING VALVE, 150 PSI MAXIMUM WORKING PRESSURE, 4.5 GALLON CAPACITY, 0.45 MAXIMUM ACCEPTANCE FACTOR, 3/4" PIPE CONNECTION. SET THE AIR CHARGE PRESSURE TO MATCH EXISTING WATER SYSTEM PRESSURE.

(FD) FUNNEL FLOOR DRAIN: JAY R. SMITH # 3510L (–B), CAST IRON BODY, ADJUSTABLE, SIX INCH SQUARE, NICKEL BRONZE STRAINER WITH 4" HIGH FUNNEL, SEDIMENT BUCKET, BOTTOM OUTLET, SEEPAGE PAN, AND MEMBRANE FLASHING CLAMP. USE PUSH–ON JOINT OF OUTLET SIZE AS SHOWN ON PLANS.

(LV) LAVATORY: SELECTED BY OWNER/ARCHITEC. MAX. FLOW 0.5 GPM.

(RD) ROOF DRAIN: JAY R. SMITH # 1010Y (–E0X–C–R–CID), 15" DIAMETER CAST IRON BODY, FLASHING CLAMP, GRAVEL STOP, UNDERDECK CLAMP, SUMP RECEIVER, HUBLESS OUTLET, FIXED EXTENSION – HEIGHT AS REQUIRED BY INSTALLED INSULATION THICKNESS, AND CAST IRON DOME BOLTED OR LOCKED DOWN. PROVIDE OUTLET SIZE AS SHOWN ON PLANS.

(ORD) OVERFLOW ROOF DRAIN: JAY R. SMITH # 1080Y (–E0X–C–R–CID), 15" DIAMETER CAST IRON BODY, FLASHING CLAMP, GRAVEL STOP, UNDERDECK CLAMP, SUMP RECEIVER, HUBLESS OUTLET, FIXED EXTENSION – HEIGHT AS REQUIRED BY INSTALLED INSULATION THICKNESS, CAST IRON DOME BOLTED OR LOCKED DOWN AND 2" HIGH WATER DAM. PROVIDE OUTLET SIZE AS SHOWN ON PLANS.

(SH) SHOWER STALL/TUB: SELECTED BY OWNER/ARCHITECT. MAX FLOW 2.0GPM.

(SK) SINK: SELECTED BY OWNER/ARCHITEC. MAX. FLOW 1.5 GPM.

(GD) GARBAGE DISPOSER: IN–SINK–ERATOR "BADGER 5" RESIDENTIAL DISPOSER WITH 1/2 H.P. MOTOR WITH POWER CORD, PLASTIC GRIND CHAMBER, GALVANIZED STEEL CUTTING ELEMENT, AND PERMANENTLY LUBRICATED UPPER AND LOWER BEARINGS.
TRIM: WASTE DISCHARGE KIT AND DISHWASHER TAILPIECE.
ELECTRICAL REQUIREMENTS: 120–VOLT, 6.9 FULL LOAD AMPS.

(WMB) WASHING MACHINE BOX: GUY GRAY MODEL # B200, 20 GAUGE GALVANIZED STEEL BOX, 20 GAUGE STEEL FACEPLATE, BOTTOM INLET WATER SUPPLIES WITH ANGLED WHEEL HANDLE 3/4" HOSE BIBBS, AND 2" BOTTOM OUTLET DRAIN.
TRIM: PROVIDE 24" LONG TAIL PIECE AND 2" DIAMETER P–TRAP.

(WC) FLOOR–MOUNTED WATER CLOSET: SELECTED BY OWNER/ARCHITEC. MAX. FLOW 1.6 GPF.
VIDE PDI SIZES "A" THROUGH "F" AS SHOWN ON PLANS.

(TS) TRAP SEAL: ProSet SYSTEMS "TRAP GUARD" INSERT FOR ACTUAL FLOOR DRAIN MODEL AND SIZE PROVIDED, FLEXIBLE ELASTOMERIC PVC MATERIAL MOLDED INTO SHAPE OF DUCK'S BILL, OPEN ON TOP WITH CURL CLOSURE AT BOTTOM. ALLOWS WASTEWATER TO OPEN AND ADEQUATELY DISCHARGE FLOOR DRAIN THROUGH ITS INTERIOR. CLOSES AND RETURNS TO ORIGINAL MOLDED SHAPE AFTER WASTEWATER DISCHARGE IS COMPLETE. TRAP SEAL SHALL BE 1072 ASSE COMPLIANT.

PLUMBING PIPE MATERIAL SCHEDULE

PIPING SYSTEM	ABBREVIATION	PIPING MATERIAL
SANITARY DRAINAGE & VENT (ABOVE GRADE)	S, W, GW OR V	HUBLESS CAST IRON (PVC DWV OPTIONAL)
STORM DRAINAGE (ABOVE GRADE)	ST OR OST	HUBLESS CAST IRON (PVC DWV OPTIONAL)
SANITARY DRAINAGE & VENT (BELOW GRADE)	S, W, GW OR V	SERVICE WEIGHT CAST IRON (PVC DWV OPTIONAL)
STORM DRAINAGE (BELOW GRADE)	ST	SERVICE WEIGHT CAST IRON (PVC DWV OPTIONAL)
POTABLE WATER (ABOVE GRADE)	CW, HW OR HWR	TYPE L HARD DRAWN COPPER (PEX TUBING UP TO 2" OPTIONAL)
POTABLE WATER - 2" & SMALLER (BELOW GRADE)	CW, HW OR HWR	TYPE K SOFT ANNEALED COPPER (CPVC SCHEDULE 80 OPTIONAL)
CONDENSATE DRAIN - 1" & SMALLER	CD	TYPE M HARD DRAWN COPPER (PVC DWV OPTIONAL)

REFER TO SPECIFICATIONS FOR FITTINGS, INSTALLATION REQUIREMENTS AND FURTHER INFORMATION. PIPING MATERIALS WITHIN AIR PLENUMS SHALL BE NONCOMBUSTIBLE OR SHALL BE LISTED AND LABELED AS HAVING A FLAME SPREAD INDEX OF NOT MORE THAN 25 AND A SMOKE-DEVELOPED INDEX OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH ASTM E84 OR UL 723.

RECIRCULATION PUMP SCHEDULE

MARK	MANUFACTURER / MODEL#	SERVICE	GPM	HEAD (FT.)	SUCTION & DISCHARGE SIZE	IMPELLER SIZE (IN.)	ELECTRICAL DATA			NOTES
							VOLTS	PHASE	FLA	
RP-A	BELL & GOSSETT # NBF-9U/LW	WH-A	1	7.0	1/2"	N/A	120	1	0.40	A-D

NOTES:
A. ALL BRONZE BOOSTER.
B. PROVIDE WITH STRAINER UPSTREAM OF PUMP.
C. PROVIDE ADJUSTABLE, SURFACE MOUNTED AQUASTAT - HONEYWELL L6006C OR EQUIVALENT.
D. SET AQUASTAT TO SHUT OFF RECIRCULATION PUMP AT WATER HEATER SET POINT AND ON AT 10F BELOW SET POINT.

GAS WATER HEATER SCHEDULE

MARK	MANUFACTURER/ MODEL#	AREA SERVED	ENERGY SOURCE	TANK SIZE (GALLONS)	INPUT MBH	RECOVERY RATE (GPH)	THERMAL EFFICIENCY	NOTES
WH-A	BRADFORD WHITE ULG2PV50H563N	RESIDENCE	NATURAL GAS	48	56	65	79%	A

NOTES:
A. 60°F TEMPERATURE RISE WITH 120°F OPERATING TEMPERATURE.
B. FURNISH WITH FACTORY CONCENTRIC COMBUSTION AIR INTAKE AND EXHAUST KIT.

LOW PRESSURE GAS PIPE SIZING CHART

PIPE SIZE	LOAD (CFH)
3/4"	87
1"	164

OPERATING PRESSURE ("WC) =	7
PRESSURE DROP ("WC) =	0.5
DEVELOPED LENGTH (FEET) =	**140**
TOTAL LOAD (CFH) =	**136.0**

BASED ON NFPA 54 EQUATION 4-1

IPC WATER & WASTE FIXTURE UNITS - TYPICAL UNIT

FIXTURE TYPE	QTY	D.F.U. (EA)	TOTAL D.F.U.	HOT S.F.U (EA)	COLD S.F.U. (EA)	COMBINED S.F.U. (EA)	TOTAL S.F.U (HOT)	TOTAL S.F.U (COLD)	TOTAL SERVICE S.F.U.
PRIVATE BATHROOM GROUP (1.28 GPF FLUSH TANK)	3	5.0	15.0	1.50	2.70	3.60	4.5	8.1	10.8
PRIVATE CLOTHES WASHER RESIDENTIAL (8 IB)	1	2.0	2.0	1.00	1.00	1.40	1	1	1.4
DISHWASHER (RESIDENTIAL)	1	2.0	2.0	1.40	0.00	1.40	1.4	0	1.4
PRIVATE SINK (BAR, KITCHEN OR BREAKROOM)	1	2.0	2.0	1.00	1.00	1.40	1	1	1.4
PRIVATE LAVATORY	1	1.0	1.0	0.50	0.50	0.70	0.5	0.5	0.7
PRIVATE WATER CLOSET (1.28 GPF FLUSH TANK)	1	3.0	3.0	0.00	2.20	2.20	0	2.2	2.2
TOTAL UNITS:	8		25.0				8.4	12.8	17.9

WATER CALCULATIONS-TYP. UNIT

TOTAL WATER SUPPLY FIXTURE UNITS	17.9
WATER GPM	12.5
PREDOMINANT WATER CLOSET FIXTURE TYPE	FLUSH TANK
PIPE SIZE (IN.)	1"
PIPING DEVELOPED LENGTH W/ 25% FOR FITTINGS (FT)	120
PRESSURE AT WATER METER (PSI)	64
0.75" METER LOSS INCLUDING TAP (PSI)	-2.2
0.75" BACKFLOW PREVENTER LOSS (PSI)	-14.0
HIGHEST FIXTURE ELEVATION (FT)	30
STATIC PRESSURE LOSS TO HIGHEST FIXTURE (H x 0.434)	-13.0
PRESSURE REQUIRED AT MOST REMOTE FIXTURE (PSI)	-25.0
TOTAL PRESSURE AVAILABLE FOR FRICTION LOSS	9.8
ALLOWABLE FRICTION FACTOR (9.78 PSI / 120 FT) x 100	8.2
USE 8 PSI PER 100 FEET PRESSURE DROP CHART	

WATER PIPE SIZING CHART

FIXTURE UNITS VS. PRESSURE LOSS

IN PSI / 100 FEET WITH Copper Type L PIPING MATERIAL

	COLD WATER @ 8 PSI / 100'				HOT WATER @ 8 PSI / 100'		
PIPE SIZE	FLUSH TANK SFU (CW)	FLUSH VALVE SFU (CW)	VELOCITY FEET / SEC	FLOW GPM	FLUSH TANK SFU (HW)	VELOCITY FEET / SEC	FLOW GPM
1/2"	3.6	N/A	5.0	3.6	3.6	5.0	3.6
3/4"	12.2	N/A	6.1	9.2	9.1	5.0	7.5
1"	26.6	N/A	7.1	18.3	17.7	5.0	12.9

FIXTURE BRANCH CONNECTION SCHEDULE

FIXTURE TYPE	COLD WATER	HOT WATER	WASTE	VENT
RESIDENTIAL WATER CLOSET	1/2"	--	3	1-1/2"
LAVATORY/ HAND SINK	1/2"	1/2"	2"	1-1/2"
BATH TUB & SHOWER VALVE	1/2"	1/2"	2"	1-1/2"
WASHING MACHINE BOX	1/2"	1/2"	2"	2"

NOTE:
PIPE SIZES SHOWN ARE MINIMUM.

TOTAL CONNECTED NATURAL GAS LOAD

MECHANICAL EQUIPMENT - TYPICAL UNIT

EQUIPMENT DESIGNATION	DESCRIPTION	CFH (EACH)
	RANGE	80
WH-1	WATER HEATER	56
	TOTAL CONNECTED LOAD =	136

NATURAL GAS SYSTEM OPERATING PRESSURE OF **7 INCHES WC**
NATURAL GAS SYSTEM SIZED WITH TOTAL DEVELOPED LENGTH FROM GAS METER TO MOST REMOTE PIECE OF EQUIPMENT OF **140'** WITH A PRESSURE DROP OF **0.5 INCHES W.C.**

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SEALS AND SIGNATURES

KEYPLAN

DRAWING TITLE
PLUMBING SCHEDULES

SCALE

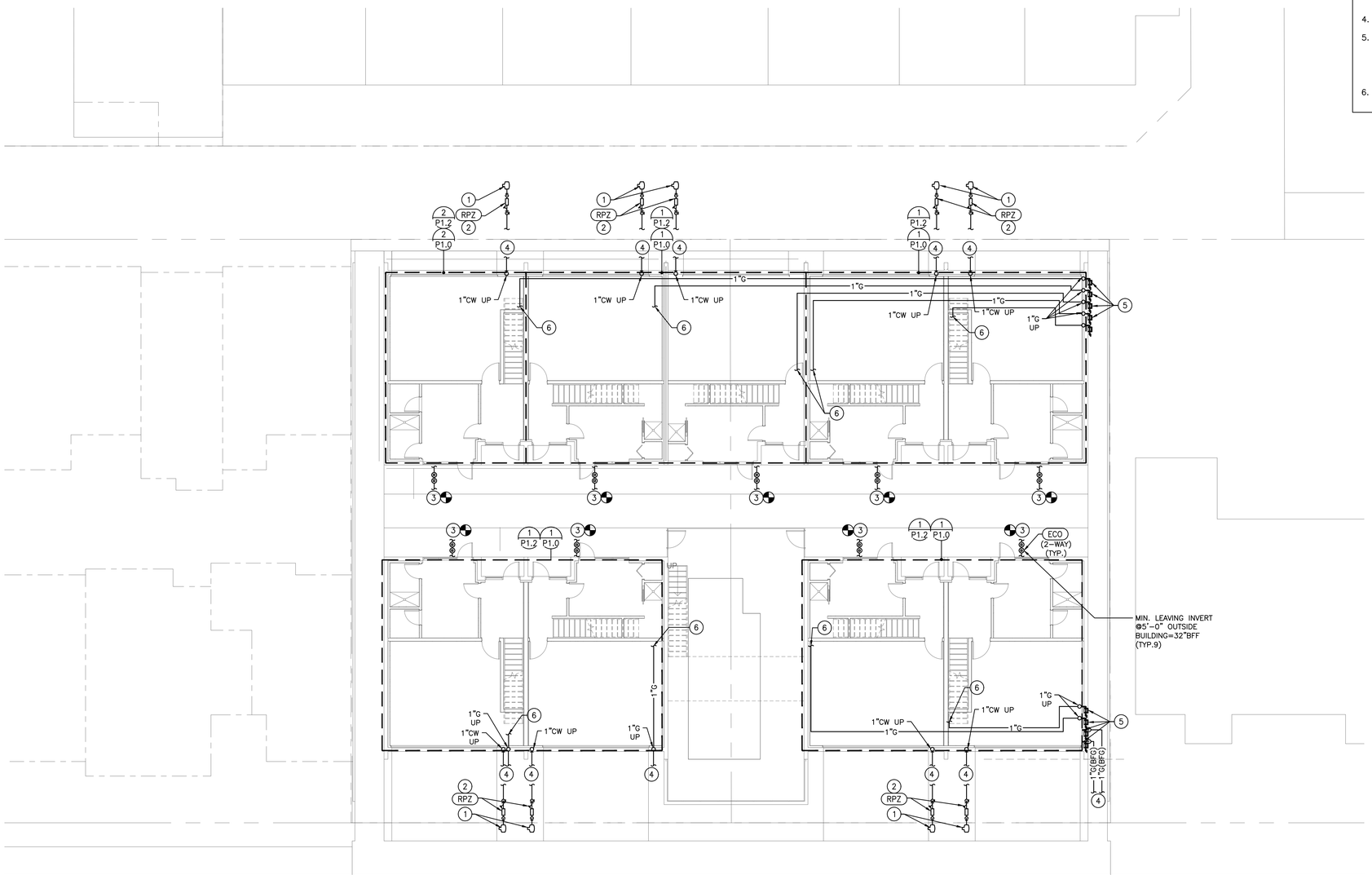
PROJECT NUMBER

P0.1

DRAWING NUMBER

PLUMBING PLAN NOTES:

1. NEW 3/4" WATER METER BELOW FINISHED GRADE. REFER TO CIVIL PLANS FOR EXACT LOCATION OF WATER METER.
2. 3/4" NEW BACK FLOW PREVENTER ABOVE GRADE, INSIDE BOX. REFER TO CIVIL PLANS FOR EXACT LOCATION OF BACK FLOW PREVENTER.
3. CONNECT SNITARY WASTE LINE TO EXISTING SANITARY WASTE LINE, REFER TO CIVIL PLANS FOR CONTINUATION OF WASTE LINE ROUTING.
4. REFER TO CIVIL PLANS FOR CONTINUATION OF ROUTING.
5. NEW GAS METER TO SERVE NEW GAS FIRED EQUIPMENT. CONTRACTOR TO COORDINATE EXACT LOCATION WITH GAS COMPANY AND TO PROVIDE A NEW GAS METER AT GAS METER BANK. REFER TO GAS PIPE SIZING CHART FOR GAS METER SIZING REQUIREMENTS.
6. SEE ENLARGED PLANS FOR CONTINUATION OF GAS ROUTING.



E MINNEZONA AVENUE

1 PLUMBING SITE PLAN
SCALE: 1/10"=1'-0"

N

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Registered Professional Engineer
CERTIFICATE NO.
53566
FAISAL H
ELHALIS
Date Signed 1/25/22
ARIZONA U.S.A.

KEYPLAN

DRAWING TITLE
PLUMBING
SITE PLAN

SCALE

PROJECT NUMBER
P0.2

DRAWING NUMBER

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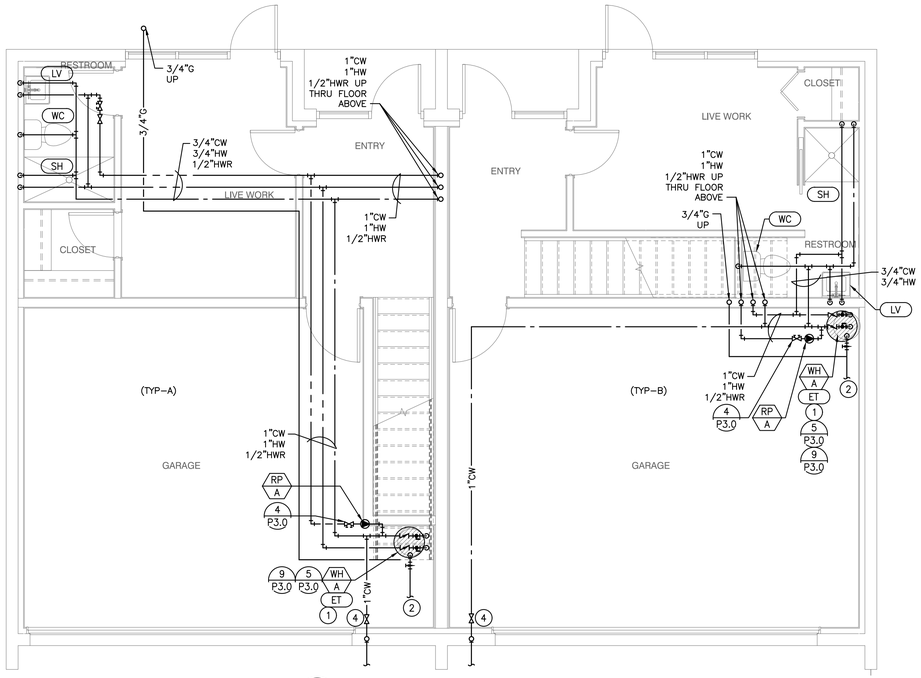
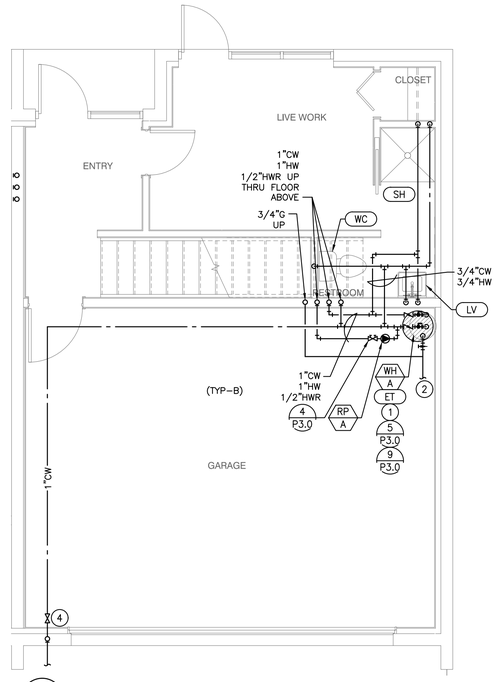
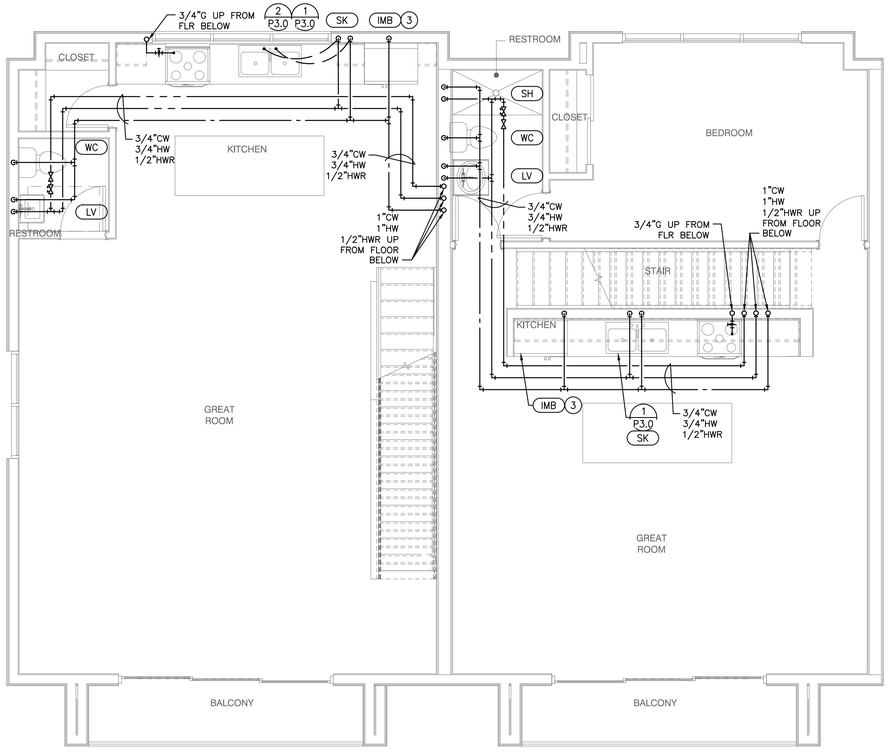


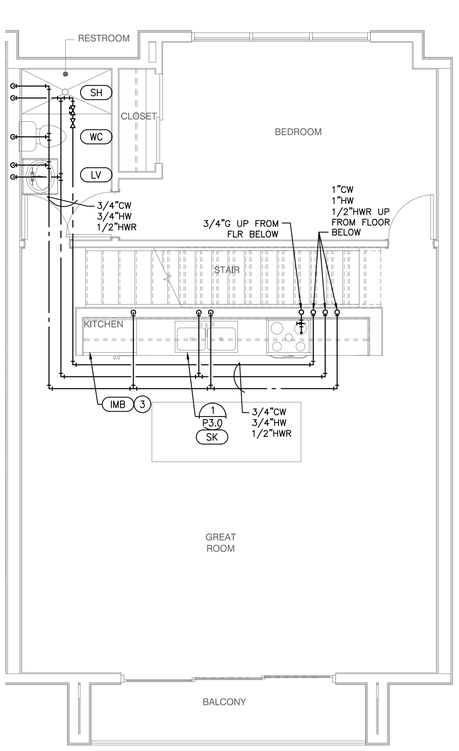
1 WATER & GAS 1ST FLOOR PLAN
SCALE: 1/4"=1'-0"



2 WATER & GAS FLOOR 1ST PLAN – CENTER UNIT
SCALE: 1/4"=1'-0"



3 WATER & GAS 2ND FLOOR PLAN
SCALE: 1/4"=1'-0"



4 WATER & GAS 2ND FLOOR PLAN – CENTER UNIT
SCALE: 1/4"=1'-0"

PLUMBING PLAN NOTES:

1. PROVIDE AND INSTALL ELECTRIC WATER HEATER W/ 20" ALUMINUM HOLDRITE #GP-20 QUICK PAN PAN BELOW. PROVIDE AND INSTALL EXPANSION TANK SECURELY FASTENED TO WALL. ROUTE FULL SIZE T&P AND SECONDARY DRAIN TO HUB FUNNEL AND TERMINATE 2" ABOVE FLOOD LEVEL. INSTALL PER MANUFACTURER'S WRITTEN INSTRUCTION.
2. SEE SHEET P0.2 SITE PLAN FOR CONTINUATION OF GAS ROUTING.
3. PROVIDE AND INSTALL COLD WATER BOX FOR REFRIGERATOR WATER DISPENSER.
4. PROVIDE AND INSTALL 1" COLD WATER SUPPLY LINE WITH SHUT-OFF BALL TO SERVE PLUMBING FIXTURES. PROVIDE WATER SUB-METER WITH REMOTE READ OUT PER LANDLORD REQUIREMENTS.

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Mechanical Professional Engineer CERTIFICATE NO 53566 FAISAL H ELHALIS Date signed 11/30/22 ARIZONA U.S.A.

KEYPLAN

DRAWING TITLE
PLUMBING
WATER & GAS
FLOOR PLANS

SCALE

PROJECT NUMBER
P1.0

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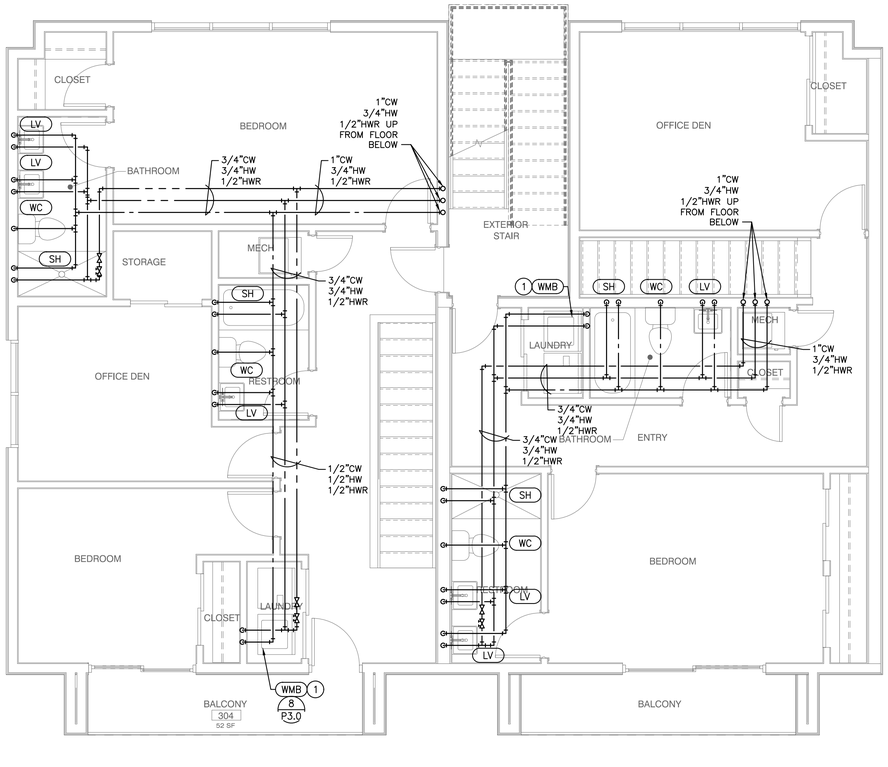
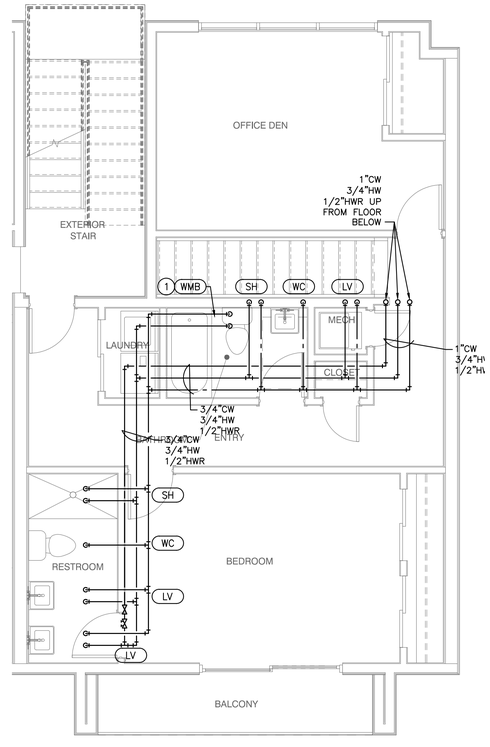


1 WATER & GAS 3RD FLOOR PLAN
SCALE: 1/4"=1'-0"



2 WATER & GAS 3RD FLOOR PLAN – CENTER UNIT
SCALE: 1/4"=1'-0"

PLUMBING PLAN NOTES:

1. PROVIDE AND INSTALL CLOTHES WASHER BOX MOUNTED IN WALL ±37" A.F.F. AT TYPICAL UNITS. AT TYPICAL "A" TYPE UNITS, DIRECTLY BEHIND CLOTHES WASHER. VERIFY MOUNTING HEIGHT WITH MANUFACTURER'S WRITTEN SPECIFICATION. PROVIDE AND INSTALL WATER HAMMERS ON COLD AND HOT WATER PIPING.

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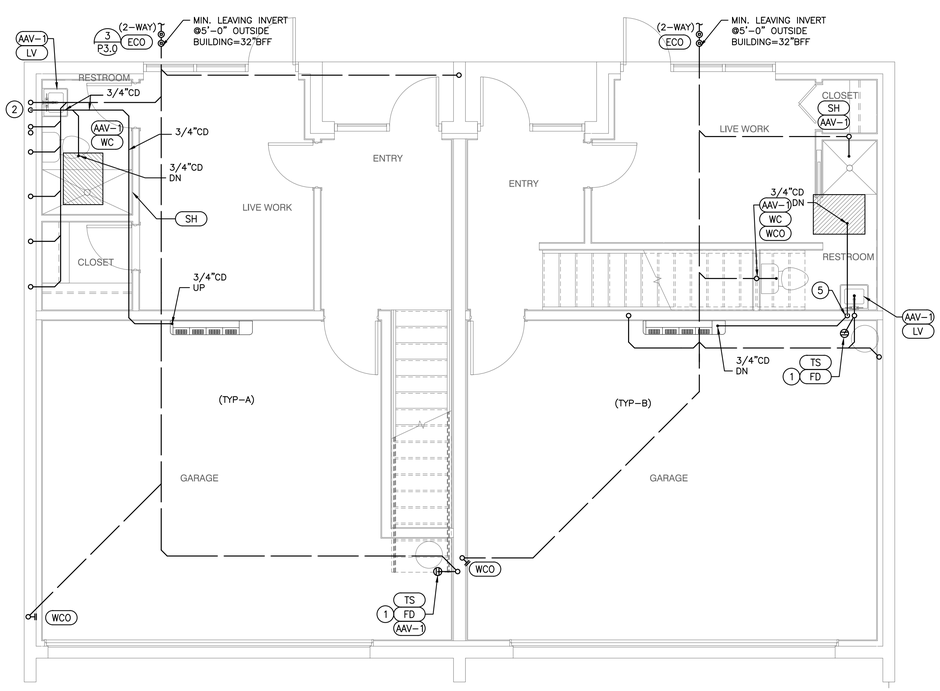
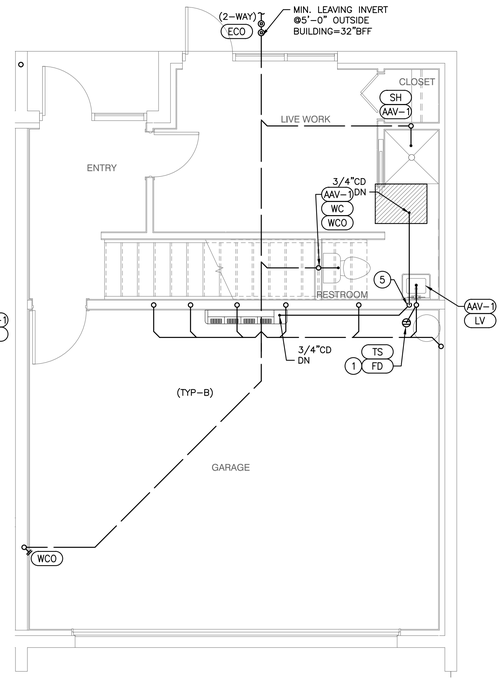
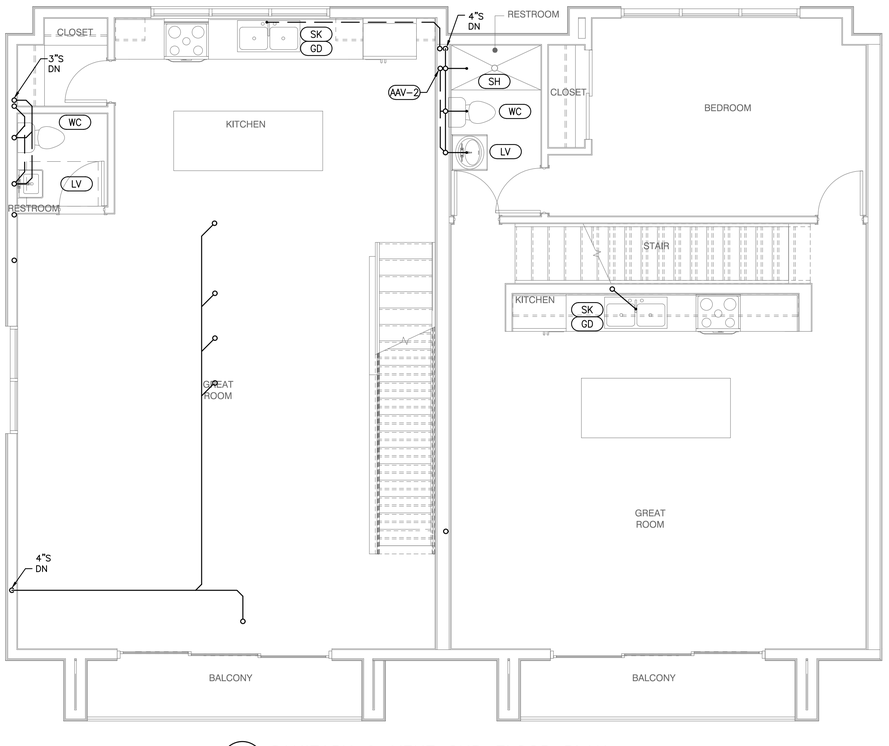


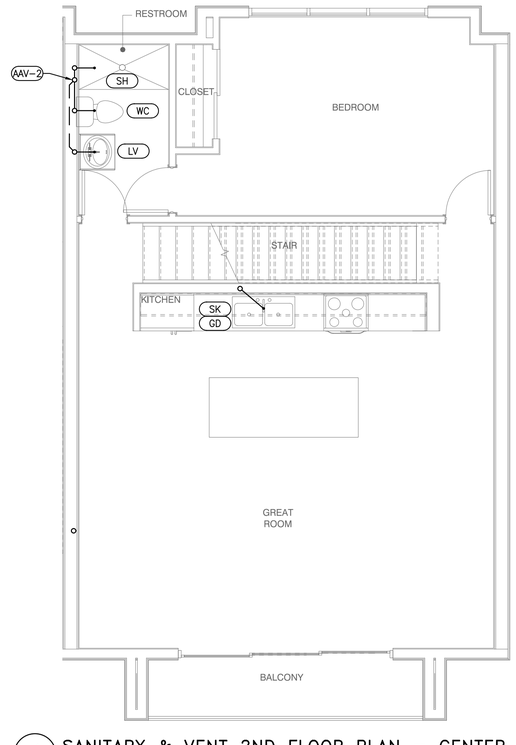
1 SANITARY & VENT 1ST FLOOR PLAN
SCALE: 1/4"=1'-0"



2 SANITARY & VENT 1ST FLOOR PLAN – CENTER UNIT
SCALE: 1/4"=1'-0"



3 SANITARY & VENT 2ND FLOOR PLAN
SCALE: 1/4"=1'-0"



4 SANITARY & VENT 2ND FLOOR PLAN – CENTER UNIT
SCALE: 1/4"=1'-0"

PLUMBING PLAN NOTES:

1. PROVIDE AND INSTALL HUB FUNNEL W/ INLINE FLOOR DRAIN TRAP SEALER. MANUFACTURER: SURESEAL, MODEL:SS2009.
2. ROUTE NEW 3/4" CONDENSATE LINE DOWN IN WALL AND CONNECT TO TAILPIECE.

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ISSUED FOR	REV	DATE

SEALS AND SIGNATURES

Registered Professional Engineer
CERTIFICATE NO.
53566
FAISAL H
ELHALIS
Date Signed 12/31/24
ARIZONA U.S.A.

KEYPLAN

DRAWING TITLE
PLUMBING
SANITARY &
VENT FLOOR
PLANS

SCALE

PROJECT NUMBER
P1.2

DRAWING NUMBER

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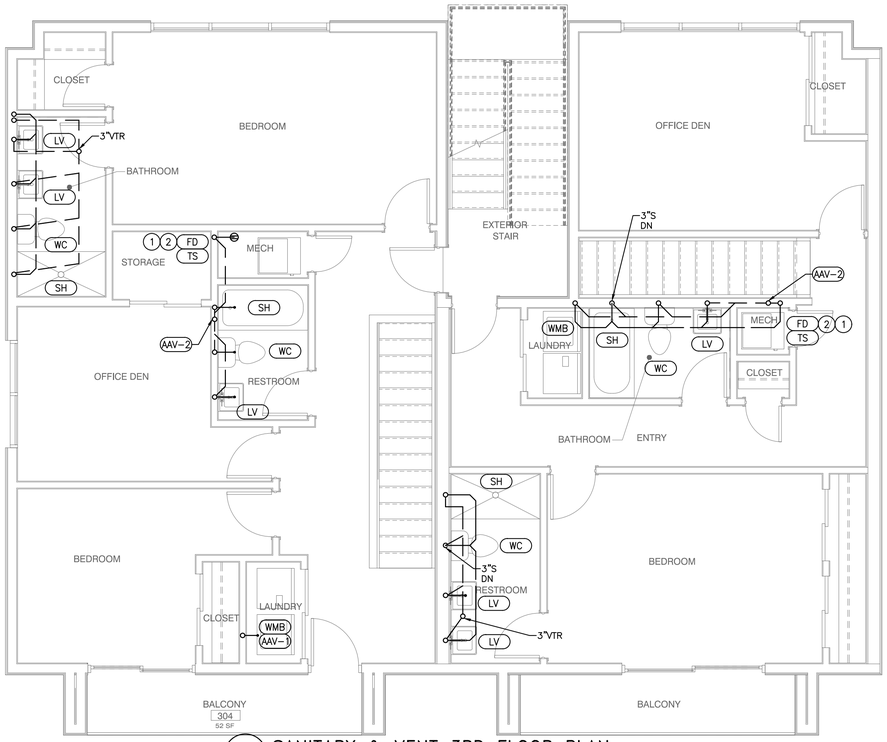
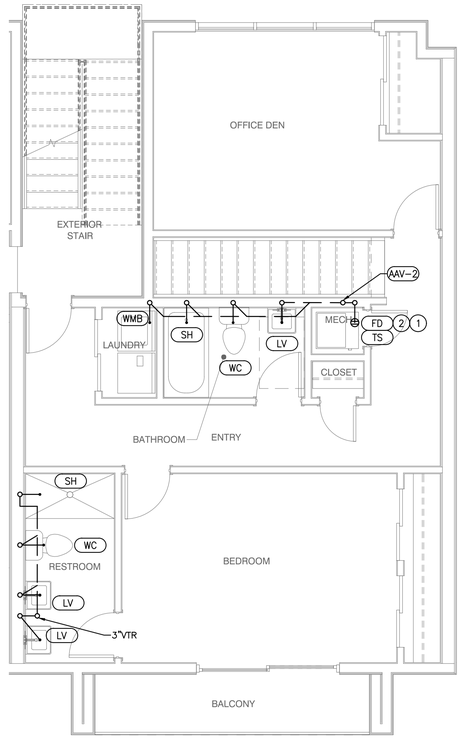


1 SANITARY & VENT 3RD FLOOR PLAN
SCALE: 1/4"=1'-0"



2 SANITARY & VENT 3RD FLOOR PLAN – CENTER UNIT
SCALE: 1/4"=1'-0"

PLUMBING PLAN NOTES:

1. PROVIDE AND INSTALL HUB FUNNEL W/ INLINE FLOOR DRAIN TRAP SEALER. MANUFACTURER: SURESEAL, MODEL:SS2009.
2. ROUTE CONDENSATE DOWN IN WALL AND DISCHARGE OVER FUNNEL DRAIN WITH AIR GAP PER CODE.

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SEALS AND SIGNATURES

KEYPLAN

DRAWING TITLE
PLUMBING
SANITARY &
VENT PLANS

SCALE

PROJECT NUMBER
P1.3

DRAWING NUMBER

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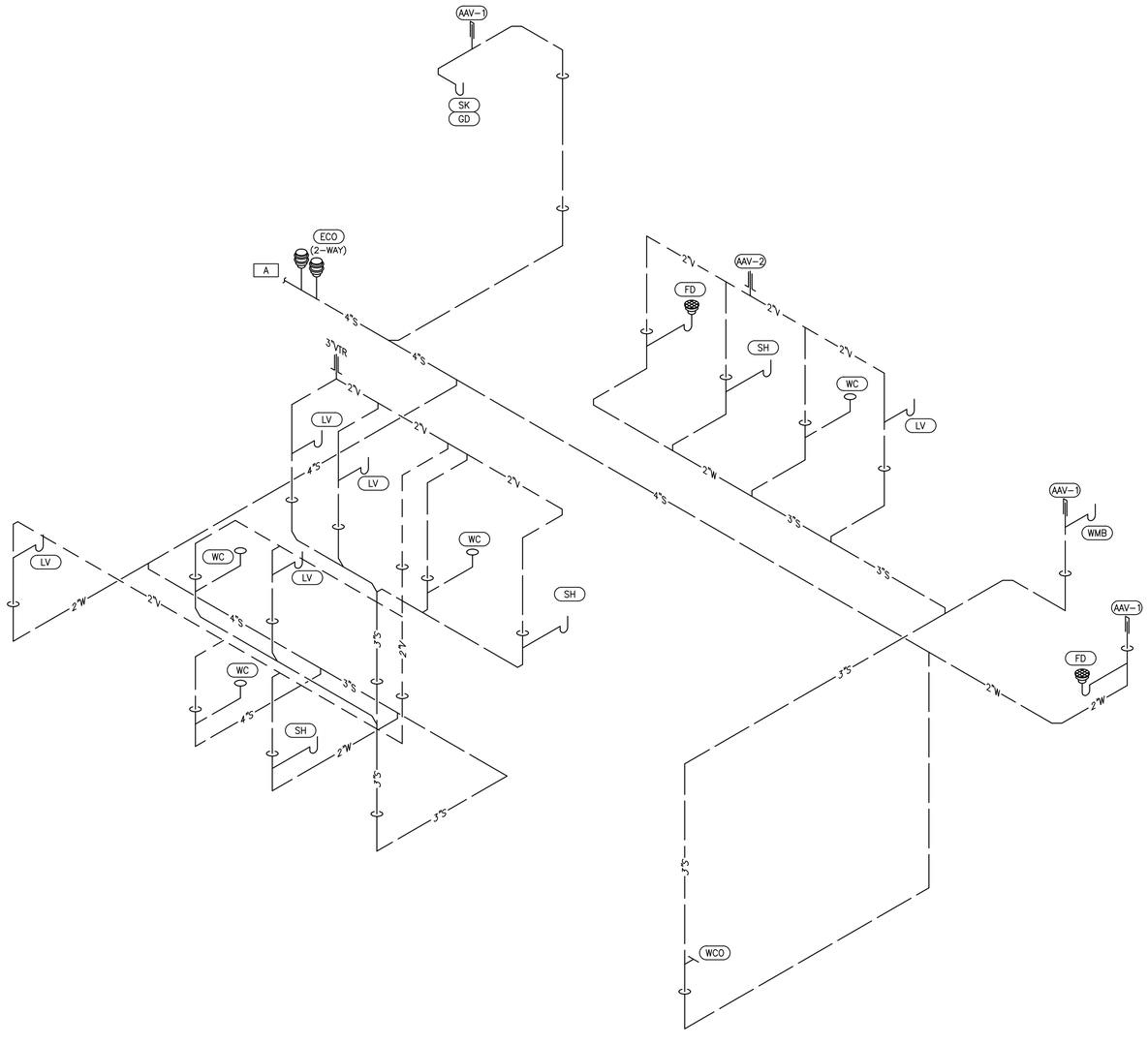

1 SANITARY & VENT RISER DIAGRAM (UNIT TYPE-A)
SCALE: NONE

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SEALS AND SIGNATURES

53566
FAISAL H
ELHALIS
Date Signed 11-29-23
ARIZONA U.S.A.

KEYPLAN

DRAWING TITLE
PLUMBING
RISER
DIAGRAMS

SCALE

PROJECT NUMBER
P2.0

DRAWING NUMBER

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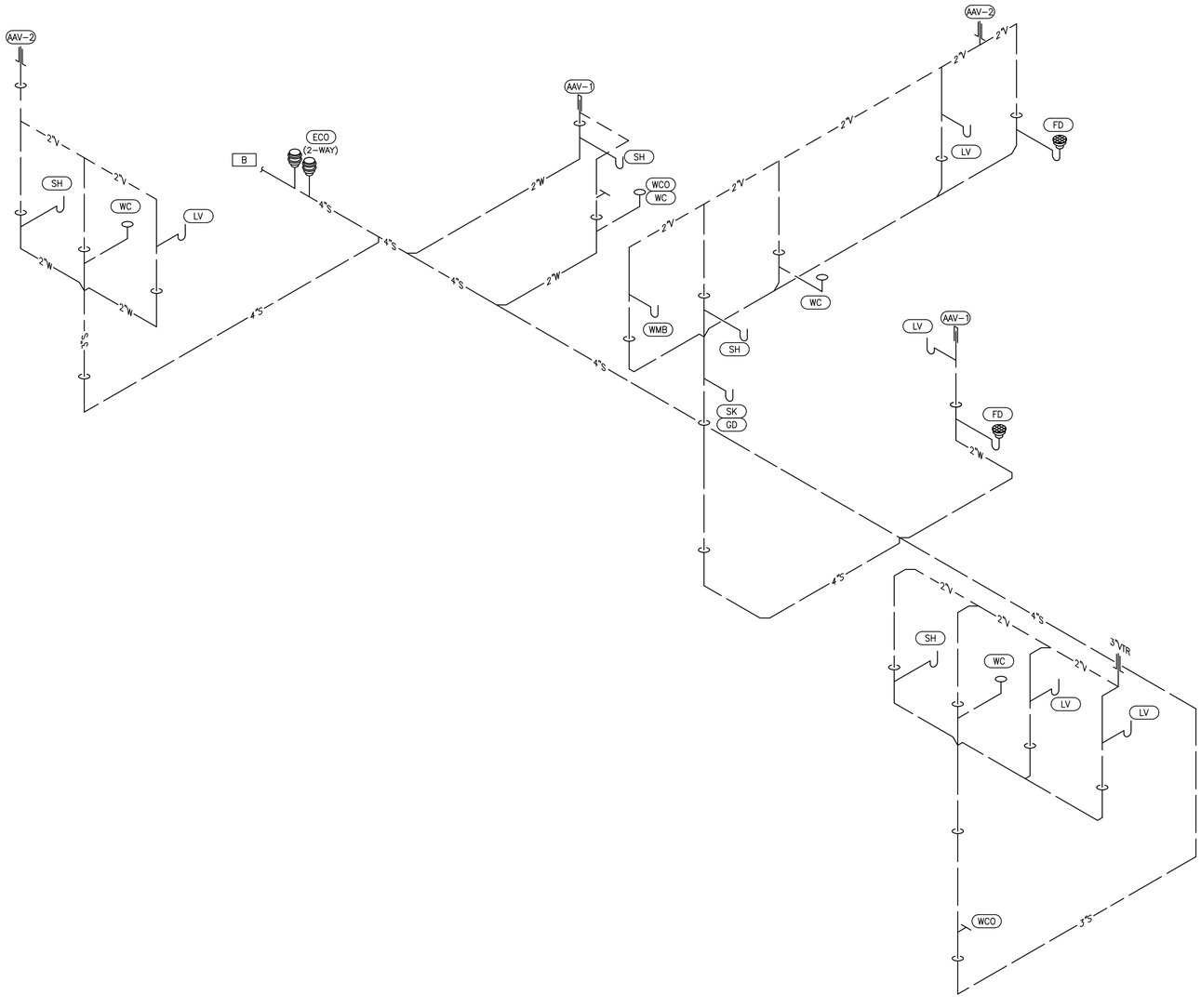

1 SANITARY & VENT RISER DIAGRAM (UNIT TYPE–B)
SCALE: NONE

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SEALS AND SIGNATURES

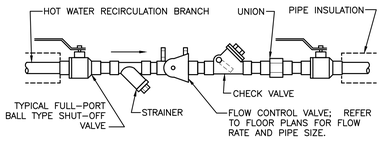
KEYPLAN

DRAWING TITLE
PLUMBING
RISER
DIAGRAMS

SCALE

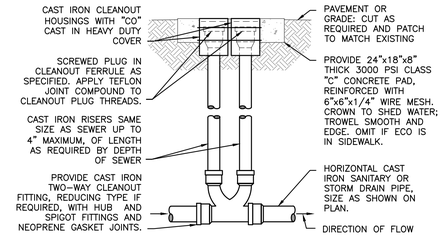
PROJECT NUMBER
P2.1

DRAWING NUMBER



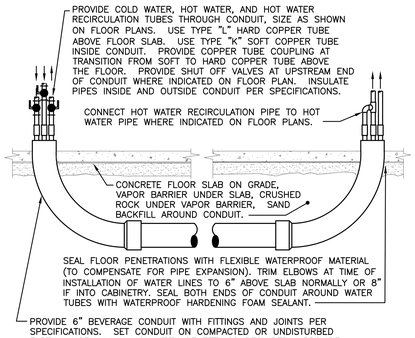
REFER TO SPECIFICATIONS, SCHEDULES, AND NOTES FOR MORE INFORMATION. MAKE CONNECTIONS AND PROVIDE INSTALLATION PER MANUFACTURER'S RECOMMENDATIONS. ARRANGEMENT SHOWN IS SCHEMATIC. PROVIDE REDUCERS AND ADAPTERS AS REQUIRED.

4 FLOW CONTROL VALVE DETAIL
NO SCALE

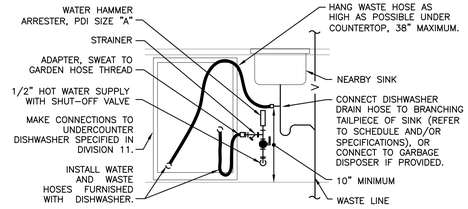


LOCATE EXTERIOR TWO-WAY CLEANOUT AT EXIT OF BUILDING DRAINS AND WHERE SHOWN ON PLAN. VERIFY SOIL/ROCK CONDITIONS WITH GEOTECHNICAL REPORT OR SITE EXAMINATION. PROVIDE EARTH BACKFILL AND COMPACTION PER ARCHITECTURAL SPECIFICATIONS. REFER TO SPECIFICATIONS AND SCHEDULES FOR MORE INFORMATION.

3 EXTERIOR TWO-WAY CLEANOUT
NO SCALE

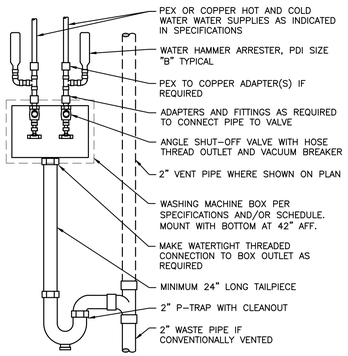


2 WATER CONDUIT BELOW SLAB
NO SCALE



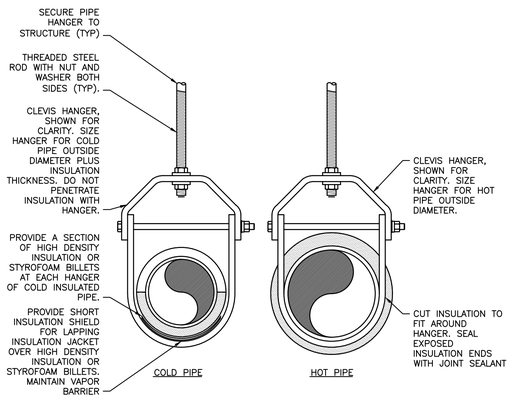
PIPING ARRANGEMENT SHOWN IS SCHEMATIC. ADJUST TO SUIT FIELD CONDITIONS. PROVIDE CONNECTIONS AND INSTALLATION AS RECOMMENDED BY EQUIPMENT MANUFACTURER. REFER TO PLUMBING FIXTURE SCHEDULE AND SPECIFICATIONS FOR ACCESSORIES SHOWN. IF SINK IS ADA, DO NOT ENCROACH ON ACCESSIBILITY ZONE.

1 RESIDENTIAL DISHWASHER CONNECTION
NO SCALE



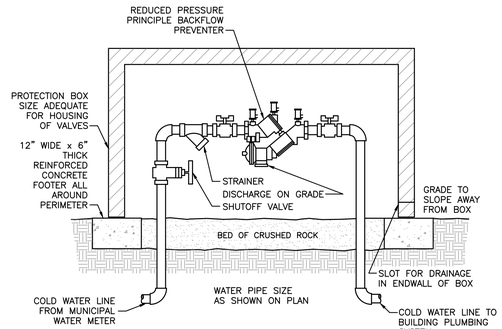
PIPING ARRANGEMENT SHOWN IS SCHEMATIC: ADJUST TO SUIT FIELD CONDITIONS. PROVIDE CONNECTIONS AS RECOMMENDED BY EQUIPMENT MANUFACTURER.

8 WASHING MACHINE BOX
NO SCALE



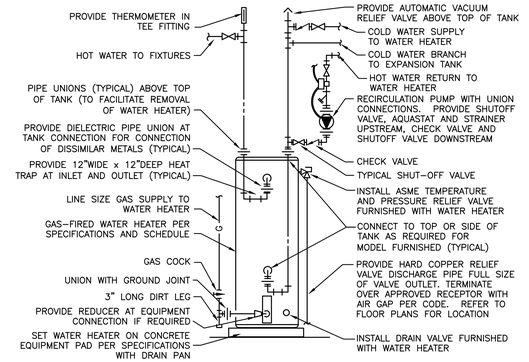
REFER TO SPECIFICATIONS FOR INSULATION TYPES, INSULATION THICKNESSES, HANGER TYPES, HANGER ROD CONNECTIONS TO SRUCTURE AND HANGER SPACING.

7 INSULATED PIPE HANGER DETAIL
NO SCALE



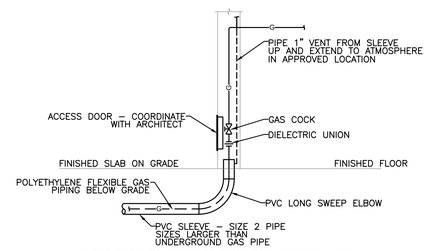
ARRANGEMENT SHOWN IS SCHEMATIC. ADJUST TO SUIT FEILD CONDITIONS. VALVING SHALL BE SAME SIZE AS SERVICE PIPE. REFER TO PLANS FOR SERVICE LINE SIZE. PROVIDE TEST AND CERTIFICATION OF BACKFLOW PREVENTER TO LOCAL AUTHORITIES.

6 BACKFLOW PREVENTER IN BOX
NO SCALE



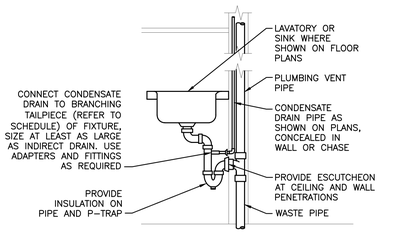
REFER TO SPECIFICATIONS, SCHEDULES, AND NOTES FOR MORE INFORMATION. PIPING ARRANGEMENT SHOWN IS SCHEMATIC; ADJUST TO SUIT FIELD CONDITIONS. VERIFY CONNECTION SIZES AND LOCATIONS WITH WATER HEATER FURNISHED. REFER TO FLOOR PLANS FOR PIPE SIZES AND CONTINUATIONS. PROVIDE SEISMIC STRAP OR BRACING AND FLEXIBLE CONNECTORS ON PIPE WHEN REQUIRED BY LOCAL AUTHORITIES. PROVIDE HEAT TRAP ON COLD WATER SUPPLY WHEN REQUIRED BY LOCAL AUTHORITIES. POWER WIRING AND DISCONNECT SWITCH ARE SPECIFIED BY ELECTRICAL. INTERLOCK OF AQUASTAT WITH RECIRCULATION PUMP IS SPECIFIED BY ELECTRICAL.

5 GAS WATER HEATER & PUMP
NO SCALE



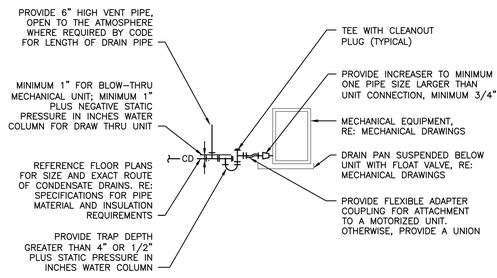
1. GAS PIPING BELOW GRADE SHALL BE INSTALLED IN GAS TIGHT CONDUIT. EXPOSED GAS PIPING SHALL BE KEPT MINIMUM 6" ABOVE FINISHED GRADE.
2. PIPING SHALL BE KEPT MINIMUM 6" ABOVE FINISHED GRADE. FLEXIBLE GAS PIPING BELOW GRADE SHALL BE REMOVABLE FROM EITHER END OF SLEEVE.

12 GAS PIPING BELOW GRADE DETAIL
NO SCALE



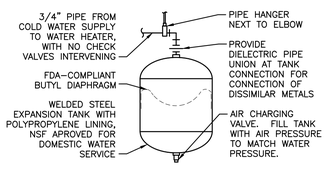
PIPING ARRANGEMENT SHOWN IS SCHEMATIC: ADJUST TO SUIT FIELD CONDITIONS. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION ABOUT PIPES, INSULATION, AND ESCUTCHEONS. PROVIDE PIPE SIZES OF INDIRECT DRAINS AS SHOWN ON PLANS, AND PIPE MATERIALS AS SPECIFIED. DO NOT DISCHARGE WATER HEATER T&P RELIEF VALVE DISCHARGE INTO SINK OR TAILPIECE. PROVIDE ENGRAVED PLASTIC LABELS ATTACHED TO WALL NEXT TO WALL PENETRATIONS: "CONDENSATE DRAIN", "AUXILIARY CONDENSATE DRAIN", "WATER HEATER DRAIN PAN", ETCETERA AS APPROPRIATE. PROVIDE MULTIPLE CONNECTIONS TO TAILPIECE IF INDICATED ON FLOOR PLAN.

11 CONDENSATE DRAIN TO SINK TAILPIECE
NO SCALE



PIPING ARRANGEMENT SHOWN IS SCHEMATIC: ADJUST AS REQUIRED TO SUIT ACTUAL INSTALLATION CONDITIONS. REFER TO LOCAL CODE FOR INDIRECT DRAIN REQUIREMENTS. REFER TO MECHANICAL DRAWINGS FOR EQUIPMENT OPERATING PRESSURE.

10 AIR HANDLING UNIT WITH CONDENSATE DRAIN AND DRAIN PAN
NO SCALE



PIPING ARRANGEMENT SHOWN IS SCHEMATIC. ADJUST TO SUIT FIELD CONDITIONS. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION PROCEDURE. VERIFY PROPER OPERATION WHEN INSTALLED. PROVIDE SEISMIC STRAP OR BRACING WHEN REQUIRED BY LOCAL AUTHORITIES.

9 SMALL EXPANSION TANK
NO SCALE

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SEALS AND SIGNATURES

KEYPLAN

DRAWING TITLE
PLUMBING DETAILS

SCALE

PROJECT NUMBER
P3.0

DRAWING NUMBER

PLUMBING SPECIFICATIONS

GENERAL REQUIREMENTS

REQUIREMENTS UNDER DIVISION ONE AND THE GENERAL AND SUPPLEMENTARY CONDITIONS OF THESE SPECIFICATIONS SHALL BE A PART OF THIS SECTION. THE CONTRACTOR SHALL BE RESPONSIBLE TO BECOME THOROUGHLY ACQUAINTED WITH ITS CONTENTS AS TO REQUIREMENTS THAT AFFECT THIS DIVISION OR SECTION. WORK REQUIRED UNDER THIS SECTION INCLUDES MATERIAL, EQUIPMENT, APPLIANCES, TRANSPORTATION, SERVICES AND LABOR REQUIRED TO COMPLETE THE ENTIRE PLUMBING SYSTEM AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS.

THE SPECIFICATIONS AND THE DRAWINGS ARE COMPLEMENTARY, AND ANY PORTION OF WORK DESCRIBED IN ONE SHALL BE PROVIDED AS IF DESCRIBED IN BOTH. IN THE EVENT OF DISCREPANCIES ON THE DRAWINGS AND SPECIFICATIONS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF SAME PRIOR TO PROCEEDING WITH THE WORK INVOLVED, IN ORDER THAT CORRECT PROGRESS OF THE WORK MAY BE PERFORMED.

DEFINITIONS

FURNISH: "TO SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION AND SIMILAR OPERATIONS."

INSTALL: "TO PERFORM ALL OPERATIONS AT THE PROJECT SITE INCLUDING, BUT NOT LIMITED TO, THE ACTUAL UNLOADING, UNPACKING, ASSEMBLING, ERECTING, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, TESTING, COMMISSIONING, STARTING UP AND SIMILAR OPERATIONS, COMPLETE, AND READY FOR THE INTENDED USE."

PROVIDE: "TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE."

FURNISHED BY OWNER OR FURNISHED BY OTHERS: "AN ITEM FURNISHED BY THE OWNER OR UNDER OTHER DIVISIONS OR CONTRACTS, AND INSTALLED UNDER THE REQUIREMENTS OF THIS DIVISION, COMPLETE, AND READY FOR THE INTENDED USE, INCLUDING ALL ITEMS AND SERVICES INCIDENTAL TO THE WORK NECESSARY FOR PROPER INSTALLATION AND OPERATION. INCLUDE THE INSTALLATION UNDER THE WARRANTY REQUIRED BY THIS DIVISION."

AHJ: THE LOCAL CODE AND/OR INSPECTION AGENCY (AUTHORITY) HAVING JURISDICTION OVER THE WORK.

THE TERMS "APPROVED EQUAL", "EQUIVALENT", OR "EQUAL" ARE USED SYNONYMOUSLY AND SHALL MEAN "ACCEPTED BY OR ACCEPTABLE TO THE ENGINEER AS EQUIVALENT TO THE ITEM OR MANUFACTURER SPECIFIED". THE TERM "APPROVED" SHALL MEAN LABELED, LISTED, OR BOTH, BY AN NRTL, AND ACCEPTABLE TO THE AHJ OVER THIS PROJECT.

COORDINATION

COORDINATE WORK WITH THAT OF OTHER TRADES SO THAT THE VARIOUS COMPONENTS OF THE SYSTEMS WILL BE INSTALLED AT THE PROPER TIME, WILL FIT THE AVAILABLE SPACE, AND WILL ALLOW PROPER SERVICE ACCESS TO THOSE ITEMS REQUIRING MAINTENANCE. COMPONENTS WHICH ARE INSTALLED WITHOUT REGARD TO THE ABOVE SHALL BE RELOCATED AT NO ADDITIONAL COST TO THE OWNER.

UNLESS NOTED ELSEWHERE, GENERAL CONTRACTOR WILL PROVIDE CHASES AND OPENINGS IN BUILDING CONSTRUCTION REQUIRED FOR INSTALLATION OF THE SYSTEMS SPECIFIED HEREIN. CONTRACTOR SHALL FURNISH THE GENERAL CONTRACTOR WITH INFORMATION REGARDING CHASES AND OPENINGS WHEN REQUIRED. CONTRACTOR SHALL KEEP INFORMED AS TO THE WORK OF OTHER TRADES ENGAGED IN THE CONSTRUCTION OF THE PROJECT AND SHALL EXECUTE HIS WORK IN SUCH A MANNER AS NOT TO INTERFERE WITH OR DELAY THE WORK OF OTHER TRADES.

FIGURED DIMENSIONS SHALL BE TAKEN IN PREFERENCE TO SCALED DIMENSIONS. CONTRACTOR SHALL TAKE HIS OWN MEASUREMENTS AT THE BUILDING, AS VARIATIONS MAY OCCUR. CONTRACTOR WILL BE HELD RESPONSIBLE FOR ERRORS WHICH COULD HAVE BEEN AVOIDED BY PROPER CHECKING AND VERIFICATION.

PROVIDE MATERIALS WITH TRIM THAT WILL PROPERLY FIT THE TYPES OF CEILING, WALL, OR FLOOR FINISHES ACTUALLY INSTALLED. MODEL NUMBERS LISTED IN THE SPECIFICATIONS OR SHOWN ON THE DRAWINGS ARE NOT INTENDED TO DESIGNATE THE REQUIRED TRIM.

GUARANTEE

THE WORK TO BE PERFORMED UNDER THIS CONTRACT SHALL INCLUDE THE FURNISHING, INSTALLATION, AND CONNECTION OF PLUMBING SYSTEMS INDICATED ON THE DRAWINGS AND IN THE SPECIFICATIONS. BY SIGNING THE CONTRACT, THE CONTRACTOR ACKNOWLEDGES THAT HE HAS ACQUAINTED HIMSELF WITH THE SITE AND THE EXISTING CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED, AND THE DRAWINGS AND SPECIFICATIONS PERTAINING THERETO, AND HE INDICATES THAT HE WILL COMPLY WITH THE REQUIREMENTS AND INTENT OF PERTINENT DOCUMENTS IN THE PERFORMANCE OF THE WORK.

GUARANTEE THAT THE PLUMBING INSTALLED UNDER THIS CONTRACT IS FREE OF DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF JOB ACCEPTANCE BY THE OWNER. THIS SHALL INCLUDE A GUARANTEE OF FREE CIRCULATION OF LIQUIDS THROUGHOUT THE SYSTEM AS INTENDED WITHOUT LEAKS, EXCESSIVE NOISE, OR WATER HAMMER.

IF DEFECTS OCCUR DURING THE ONE YEAR GUARANTEE PERIOD, REPAIR OR REPLACE SUCH DEFECTS AT NO EXPENSE TO THE OWNER, AND TO THE SATISFACTION OF THE OWNER, ARCHITECT AND ENGINEER.

WARRANTIES

WARRANT EACH SYSTEM AND EACH ELEMENT THEREOF AGAINST ALL DEFECTS DUE TO FAULTY WORKMANSHIP, DESIGN OR MATERIAL FOR A PERIOD OF 12 MONTHS FROM DATE OF SUBSTANTIAL COMPLETION, UNLESS SPECIFIC ITEMS ARE NOTED TO CARRY A LONGER WARRANTY IN THE CONSTRUCTION DOCUMENTS OR MANUFACTURER'S STANDARD WARRANTY EXCEEDS 12 MONTHS. REMEDY ALL DEFECTS, OCCURRING WITHIN THE WARRANTY PERIOD(S). WARRANTIES SHALL INCLUDE LABOR AND MATERIAL. MAKE REPAIRS OR REPLACEMENTS WITHOUT ANY ADDITIONAL COSTS TO THE OWNER. PERFORM THE REMEDIAL WORK PROMPTLY, UPON WRITTEN NOTICE FROM THE ENGINEER OR OWNER.

AT THE TIME OF SUBSTANTIAL COMPLETION, DELIVER TO THE OWNER ALL WARRANTIES, IN WRITING AND PROPERLY EXECUTED, INCLUDING TERM LIMITS FOR WARRANTIES EXTENDING BEYOND THE ONE YEAR PERIOD, EACH WARRANTY INSTRUMENT BEING ADDRESSED TO THE OWNER AND STATING THE COMMENCEMENT DATE AND TERM.

EXCAVATION AND BACKFILLING

PERFORM EXCAVATION AND BACKFILL REQUIRED FOR INSTALLATION OF UNDERGROUND WORK UNDER THIS CONTRACT. TRENCHES SHALL BE OF SUFFICIENT WIDTH. CRIB OR BRACE TRENCHES TO PREVENT CAVE-IN OR SETTLEMENT. DO NOT EXCAVATE TRENCHES CLOSE TO COLUMNS AND WALLS OF NEW BUILDING WITHOUT PRIOR CONSULTATION WITH THE ARCHITECT. USE PUMPING EQUIPMENT IF REQUIRED TO KEEP TRENCHES FREE OF WATER. BACKFILL TRENCHES IN MAXIMUM 6" LAYERS OF WELL-TAMPED DRY EARTH IN A MANNER TO PREVENT FUTURE SETTLEMENT.

COMMON EXCAVATION SHALL COMPRISE THE SATISFACTORY REMOVAL AND DISPOSITION OF MATERIAL OF WHATEVER SUBSTANCES AND OF EVERY DESCRIPTION ENCOUNTERED, INCLUDING ROCK, IF ANY, WITHIN THE LIMITS OF THE WORK AS SPECIFIED AND SHOWN ON THE DRAWINGS. EXCAVATION SHALL BE PERFORMED TO THE LINES AND GRADES INDICATED ON THE DRAWINGS. EXCAVATED MATERIALS WHICH ARE CONSIDERED UNSUITABLE FOR BACKFILL, AND SURPLUS OF EXCAVATED MATERIAL, WHICH IS NOT REQUIRED FOR BACKFILL, SHALL BE DISPOSED OF BY THE CONTRACTOR AT HIS OWN EXPENSE AND RESPONSIBILITY, AND TO THE SATISFACTION OF THE ARCHITECT.

CUTTING AND PATCHING

OBTAIN PERMISSION FROM THE ARCHITECT BEFORE CUTTING WALLS, FLOORS, CEILINGS, ETC. AS REQUIRED BY THE PROJECT. DO NOT DISTURB STRUCTURAL MEMBERS WITHOUT PRIOR APPROVAL FROM THE ARCHITECT. CUT HOLES AS SMALL AS POSSIBLE. GENERAL CONTRACTOR SHALL PATCH WALLS, FLOORS, ETC. AS REQUIRED BY WORK UNDER THIS SECTION. PATCHING SHALL MATCH ORIGINAL MATERIAL AND CONSTRUCTION. REPAIR AND REFINISH AREAS DISTURBED BY WORK TO THE CONDITION OF ADJOINING SURFACES IN A MANNER SATISFACTORY TO THE ARCHITECT.

CONCRETE BASES

PROVIDE CONCRETE BASES FOR HIS EQUIPMENT WHERE INDICATED ON THE DRAWINGS. CONCRETE BASES SHALL HAVE CHAMFERED EDGES. SIZE OF PAD SHALL BE A MINIMUM OF 4" GREATER THAN THE FOOTPRINT OF THE EQUIPMENT THAT IT IS SUPPORTING.

CONSTRUCT EQUIPMENT BASES AND HOUSEKEEPING PADS OF A MINIMUM 28 DAY, 4000 PSI CONCRETE CONFORMING TO AMERICAN CONCRETE INSTITUTE STANDARD BUILDING CODE FOR REINFORCED CONCRETE (ACI 318-19) AND THE LATEST APPLICABLE RECOMMENDATIONS OF THE ACI STANDARD PRACTICE MANUAL. CONCRETE SHALL BE COMPOSED OF CEMENT CONFORMING TO ASTM C 150 TYPE I, AGGREGATE CONFORMING TO ASTM C33, AND POTABLE WATER. EXPOSED EXTERIOR CONCRETE SHALL CONTAIN 5 TO 7 PERCENT AIR ENTRAINMENT.

PROVIDE GALVANIZED ANCHOR BOLTS FOR EQUIPMENT PLACED ON CONCRETE EQUIPMENT BASES AND HOUSEKEEPING PADS OR ON CONCRETE SLABS. ANCHOR BOLTS SIZE, NUMBER AND PLACEMENT SHALL BE AS RECOMMENDED BY THE MANUFACTURER OF THE EQUIPMENT.

ACCESS DOORS

PROVIDE ACCESS DOORS IN CEILINGS AND WALLS WHERE INDICATED OR REQUIRED FOR ACCESS TO CONCEALED VALVES AND EQUIPMENT INSTALLED UNDER THIS SECTION. PROVIDE CONCEALED HINGES, SCREWDRIVER-TYPE LOCK, ANCHOR STRAPS; MANUFACTURED BY MILCOR, ZURN, TITUS, OR EQUAL. OBTAIN ARCHITECT'S APPROVAL OF TYPE, SIZE, LOCATION, AND COLOR BEFORE ORDERING.

PENETRATIONS

PROVIDE SLEEVES FOR PIPES PASSING THROUGH ABOVE GRADE CONCRETE OR MASONRY WALLS, CONCRETE FLOOR OR ROOF SLABS. SLEEVES ARE NOT REQUIRED FOR CORE DRILLED HOLES IN EXISTING MASONRY WALLS, CONCRETE FLOORS OR ROOFS. PROVIDE 10 GAUGE GALVANIZED STEEL SLEEVES FOR SLEEVES 6" AND SMALLER. PROVIDE GALVANIZED SHEET METAL SLEEVES FOR LARGER THAN 6". SCHEDULE 40 PVC SLEEVES ARE ACCEPTABLE FOR INSTALLATION IN AREAS WITHOUT RETURN AIR PLENUMS.

SEAL ELEVATED FLOOR, EXTERIOR WALL AND ROOF PENETRATIONS WATERTIGHT AND WEATHERTIGHT WITH NON-SHRINK, NON-HARDENING COMMERCIAL SEALANT. PACK WITH MINERAL WOOL AND SEAL BOTH ENDS WITH MINIMUM OF 1/2" OF SEALANT.

SEAL AROUND PENETRATIONS OF FIRE RATED ASSEMBLIES. COORDINATE FIRE RATINGS AND LOCATIONS WITH THE ARCHITECTURAL DRAWINGS. REFER TO ARCHITECTURAL SPECIFICATIONS FOR FIRE STOPPINGS. PROVIDE A PRODUCT SCHEDULE FOR UL LISTING, LOCATION, WALL OR FLOOR RATING AND INSTALLATION DRAWING FOR EACH PENETRATION FIRE STOP SYSTEM.

EXTEND PIPE INSULATION FOR INSULATED PIPE THROUGH FLOOR, WALL AND ROOF PENETRATIONS, INCLUDING FIRE RATED WALLS AND FLOORS. THE VAPOR BARRIER SHALL BE MAINTAINED. SIZE SLEEVE FOR A MINIMUM OF 1" ANNULAR CLEAR SPACE BETWEEN INSIDE OF SLEEVE AND OUTSIDE OF INSULATION.

SEAL CONCRETE OR MASONRY EXTERIOR WALL PENETRATIONS BELOW GRADE WITH "WALL PIPES" AND MECHANICAL SLEEVE SEALS. PROVIDE CAST IRON "WALL PIPES" WITH INTEGRAL WATERSTOP RING MANUFACTURED BY JOSAM, JAY R. SMITH, WADE, WATTS OR ZURN. PROVIDE MODULAR MECHANICAL SLEEVE SEALS, MANUFACTURED BY THUNDERLINE / LINK SEAL, CALPICO, INC. AND METRAFLEX.

SEAL ELEVATED CONCRETE SLAB WITH WATERPROOF MEMBRANE PENETRATIONS WITH "WALL PIPES" AND WATER PROOF SEALANT. SECURE WATERPROOF MEMBRANE FLASHING BETWEEN "WALL PIPE" CLAMPING FLANGE AND CLAMPING RING. PROVIDE CAST IRON "WALL PIPES" WITH INTEGRAL WATERSTOP RING MANUFACTURED BY JOSAM, JAY R. SMITH, WADE, WATTS OR ZURN.

PROVIDE SLEEVES FOR HORIZONTAL PIPE PASSING THROUGH OR UNDER FOUNDATION. SLEEVES SHALL BE CAST IRON SOIL PIPE TWO NOMINAL PIPE SIZES LARGER THAN THE PIPE SERVED.

PROVIDE SCHEDULE 40 PVC PIPE SLEEVES FOR VERTICAL PRESSURE PIPE PASSING THROUGH CONCRETE SLAB ON GRADE. SLEEVES SHALL BE ONE NOMINAL PIPE SIZE LARGER THAN THE PIPE SERVED AND TWO PIPE SIZES LARGER THAN PIPE SERVED FOR DUCTILE IRON PIPES WITH RESTRAINING RODS. SEAL WATER-TIGHT WITH SILICONE CAULK.

PROVIDE 1/2" THICK CELLULAR FOAM INSULATION AROUND PERIMETER OF NON-PRESSURE PIPE PASSING THRU CONCRETE SLAB ON GRADE. INSULATION SHALL EXTEND TO 2" ABOVE AND BELOW THE CONCRETE SLAB.

ELECTRICAL WIRING

LINE VOLTAGE WIRING SHALL BE PROVIDED BY ELECTRICAL. LINE VOLTAGE CONTROL AND INTERLOCK WIRING FOR PLUMBING SYSTEMS SHALL ALSO BE PROVIDED BY ELECTRICAL CONTRACTOR. LOW VOLTAGE CONTROL WIRING SHALL BE PROVIDED BY THE MECHANICAL CONTRACTOR. FURNISH WIRING DIAGRAMS TO THE ELECTRICAL CONTRACTOR AS REQUIRED FOR PROPER EQUIPMENT HOOKUP. COORDINATE WITH THE ELECTRICAL CONTRACTOR THE ACTUAL WIRE SIZING AMPS FOR PLUMBING EQUIPMENT (FROM THE EQUIPMENT NAMEPLATE) TO ENSURE PROPER INSTALLATION.

SYSTEM TESTING AND ADJUSTING

UPON COMPLETION OF EACH PHASE OF THE INSTALLATION, TEST EACH SYSTEM IN CONFORMANCE WITH LOCAL CODE REQUIREMENTS AND AS NOTED BELOW. FURNISH LABOR AND EQUIPMENT REQUIRED TO TEST PLUMBING WORK INSTALLED UNDER THIS CONTRACT, AND ASSUME COSTS INVOLVED IN MAKING THE TESTS, AND REPAIRING AND/OR REPLACING DAMAGE RESULTING THEREFROM.

NOTIFY THE ARCHITECT AND THE AUTHORITY HAVING JURISDICTION, THREE (3) WORKING DAYS PRIOR TO MAKING PLUMBING SYSTEM TESTS. LEAVE CONCEALED WORK UNCOVERED UNTIL THE REQUIRED TESTS HAVE BEEN COMPLETED, BUT IF NECESSARY DUE TO CONSTRUCTION PROCEDURE, TESTS ON PORTIONS OF THE WORK MAY BE MADE, AND WHEN SATISFACTORY, THE WORK MAY BE CONCEALED. TEST PIPING BEFORE INSULATION IS INSTALLED, AND BEFORE BACKFILL. PIPES, JOINTS, FLANGES, VALVE STEMS, ETC., SHALL BE LEAK TIGHT. REPAIR OR REPLACE SYSTEM DEFECTS WITH NEW MATERIALS. CAULKING OF DEFECTIVE JOINTS, CRACKS OR HOLES WILL NOT BE PERMITTED. REPEAT TESTS AFTER DEFECTS HAVE BEEN ELIMINATED. MAKE TESTS IN THE PRESENCE OF THE ADMINISTRATIVE AUTHORITY AND/OR THE OWNER'S AUTHORIZED REPRESENTATIVE.

UPON COMPLETION OF THE SYSTEMS INSTALLATION, AND PRIOR TO ACCEPTANCE BY THE ARCHITECT AND ENGINEER, MAKE GENERAL OPERATING TESTS TO DEMONSTRATE THAT EQUIPMENT AND SYSTEMS ARE IN PROPER WORKING ORDER, AND ARE FUNCTIONING IN CONFORMANCE WITH THE INTENT OF THE DRAWINGS AND SPECIFICATIONS. AS A PART OF THESE TESTS, OPEN EVERY WATER OUTLET TO ENSURE COMPLETE SYSTEM FLUSHING, REMOVE AND CLEAN FAUCET AERATORS, CLEAN STRAINERS, LIGHT PILOT LIGHTS, AND OPERATE EVERY PIECE OF EQUIPMENT FURNISHED UNDER THIS CONTRACT TO DEMONSTRATE PROPER FUNCTIONING.

TEST THE DRAINAGE AND VENT SYSTEM BY PLUGGING OPENINGS WITH TEST PLUGS, EXCEPT THOSE AT THE TOP OF THE STACKS. FILL THE SYSTEM WITH WATER; TEST RESULTS WILL BE SATISFACTORY IF THE WATER LEVEL REMAINS STATIONARY FOR NOT LESS THAN ONE (1) HOUR. SUBJECT THE DRAINAGE AND VENT SYSTEM TO A PRESSURE OF AT LEAST TEN (10) FEET OF WATER. IF LEAKS DEVELOP, REPAIR THEM AND REPEAT THE TEST.

TEST THE DOMESTIC WATER SYSTEM BY FILLING IT WITH WATER AND THEN ISOLATING THE SYSTEM FROM ITS SOURCE. KEEP THE SYSTEM CLOSED FOR A PERIOD OF TWENTY-FOUR HOURS, WITH NO FIXTURE BEING USED. THE PRESSURE DIFFERENTIAL FOR THIS TEST PERIOD SHALL NOT EXCEED 10 PSIG. TEST WATER PIPING TO A 125 PSI HYDROSTATIC PRESSURE.

FOR LOW PRESSURE NATURAL GAS SYSTEMS, SUBJECT THE PIPE TO 10 PSIG AIR PRESSURE FOR A PERIOD OF ONE HOUR. THE RESULTANT PRESSURE DIFFERENTIAL FOR THIS PERIOD SHALL BE 0 PSIG. TEST PER GAS COMPANY REQUIREMENTS WHERE REQUIRED. FOR WELDED NATURAL GAS SYSTEMS AND SYSTEMS WITH AN OPERATING PRESSURE IN EXCESS OF 14" WATER COLUMN, SUBJECT THE PIPE TO 60 PSIG AIR PRESSURE FOR A PERIOD OF ONE HOUR. THE RESULTANT PRESSURE DIFFERENTIAL FOR THIS PERIOD SHALL BE 0 PSIG. TEST PER GAS COMPANY REQUIREMENTS WHERE REQUIRED.

PLUMBING PIPING MATERIALS

MATERIALS SPECIFIED OR NOTED ON THE DRAWINGS ARE SUBJECT TO THE APPROVAL OF LOCAL CODE AUTHORITIES. VERIFY APPROVAL BEFORE INSTALLING ANY MATERIAL OR JOINING METHOD.

DOMESTIC WATER (COLD, HOT AND HOT WATER RECIRCULATION): DOMESTIC WATER PIPING INSTALLED ABOVE THE FLOOR SLAB INSIDE THE BUILDING SHALL BE TYPE "L" HARD TEMPER COPPER TUBE WITH WROUGHT COPPER FITTINGS AND SOLDERED CONNECTIONS MADE UP WITH 95/5 SOLDER. BRAZED MECHANICALLY FORMED TEE CONNECTIONS (T-DRILL) MAY BE USED IN COPPER LINES WHERE APPROVED BY CODE; CONNECTION SHALL BE MADE WITH BRAZED SILVER SOLDER (SILFOS) JOINTS IN CONFORMANCE WITH MANUFACTURER'S INSTRUCTIONS. FOR 2" AND SMALLER APPROVED LINKED POLYETHYLENE (PEX) TUBING MEETING ASTM F876, ASTM F877, NSF 14, AND NSF 61, WITH A PRESSURE RATING OF 160PSI AT 73°F AND BLUE OR RED COLOR CODED. DO NOT INSTALL PEX TUBING IN THE RETURN AIR PLENUM CEILING. PEX TUBING MAY BE INSTALLED IN THE RETURN AIR PLENUM CEILING IF INSULATED WITH PLENUM WRAP WHERE APPROVED BY THE AUTHORITY HAVING JURISDICTION.

UNDERGROUND DOMESTIC WATER PIPING 2" AND SMALLER SHALL BE TYPE "K" SOFT TEMPER COPPER TUBING WITH FLARED COPPER ALLOY FITTINGS AND CONNECTIONS, OR TYPE "K" HARD TEMPER COPPER TUBING WITH CONVENTIONAL WROUGHT COPPER FITTINGS AND SILVER SOLDER (SILFOS) JOINTS. INSTALL AS FEW UNDERGROUND COPPER PIPING JOINTS AS POSSIBLE. AT BUILDING SERVICE ENTRANCE, NO JOINTS SHALL BE INSTALLED UNDER OR WITHIN 5 FEET OF THE BUILDING. INSTALL DOMESTIC WATER PIPING BELOW GRADE OUTSIDE BUILDING AT ADEQUATE DEPTH TO PREVENT FREEZING.

INTERIOR WASTE AND VENT BELOW SLAB: WASTE AND VENT PIPE BELOW SLAB INSIDE BUILDING SHALL BE SERVICE WEIGHT CAST IRON SOIL PIPE WITH HUB AND SPIGOT FITTINGS WITH NEOPRENE GASKET JOINTS, MEETING ASTM A74, MANUFACTURED BY AB & I FOUNDRY, CHARLOTTE OR TYLER PIPE AND BEARING THE TRADEMARK OF THE CISPI AND NSF. HUBLESS WASTE AND VENT PIPE IS NOT PERMITTED BELOW BASE SLAB. PVC SCHEDULE 40 DWV ASTM D2665 PIPE WITH PVC MEETING ASTM B1784, "SOLID WALL" CELL CLASS 12454-B WITH ASTM 2665 SOCKET FITTINGS WITH SOLVENT WELD JOINTS IS ALSO PERMITTED WHERE APPROVED BY CODE.

INTERIOR WASTE AND VENT ABOVE SLAB: WASTE AND VENT PIPE ABOVE SLAB INSIDE BUILDING SHALL BE HUBLESS CAST IRON SOIL PIPE AND FITTINGS, MEETING ASTM A888 AND CISPI 301, MANUFACTURED BY AB & I FOUNDRY, CHARLOTTE OR TYLER PIPE AND BEARING THE TRADEMARK OF THE CISPI AND NSF. PVC SCHEDULE 40 DWV ASTM D2665 PIPE WITH PVC MEETING ASTM B1784, "SOLID WALL" CELL CLASS 12454-B WITH ASTM 2665 SOCKET FITTINGS WITH SOLVENT WELD JOINTS IS ALSO PERMITTED WHERE APPROVED BY CODE. (NOTE: PVC PIPING IS NOT ALLOWED IN CEILING RETURN AIR PLENUMS)

INTERIOR STORM: INSIDE BUILDING SHALL BE SAME AS SPECIFIED FOR INTERIOR WASTE AND VENT PIPE.

NATURAL GAS: GAS PIPING ABOVE GROUND SHALL BE SCHEDULE 40 BLACK STEEL WITH MALLEABLE IRON SCREWED FITTINGS, OR STANDARD WELDED FITTINGS. UNDERGROUND GAS PIPING SHALL BE HIGH DENSITY OR ULTRAHIGH DENSITY POLYETHYLENE PIPE AS REQUIRED BY THE GAS UTILITY COMPANY. POLYETHYLENE PIPE SHALL CONFORM TO ASTM D1248, D3350 AND D2513, AS APPROPRIATE. POLYETHYLENE PIPE SHALL BE PHILLIPS DRISCOPIPE SERIES 6500, OMEGA ENGINEERING, PEPCO, OR APPROVED EQUAL. INSTALLATION SHALL BE IN CONFORMANCE WITH UTILITY COMPANY RULES. PROVIDE POLYETHYLENE TO STEEL PIPE TRANSITION FITTINGS BY PERFECTION CORPORATION, R W LYALL OR CENTRAL PLASTICS AT TRANSITIONS FROM BELOW GRADE TO ABOVE GRADE. FACTORY ASSEMBLED AND PRESSURE TESTED ONE PIECE DESIGN, WITH STEEL HALF OF SCHEDULE 40 STEEL PIPE WITH BEVELED EDGE FOR WELDING AND POLYETHYLENE HALF SHALL BE OF AMPLE LENGTH FOR MAKING WELDS. STEEL PIPE SHALL HAVE EPOXY PROTECTIVE COATING.

CONNECTIONS TO PLUMBING FIXTURES AND EQUIPMENT: 1-1/4" AND LARGER WASTE CONNECTIONS FROM FIXTURE TRAPS TO CAST IRON PIPE SHALL BE "DWV" COPPER WITH WROUGHT COPPER DRAINAGE PATTERN FITTINGS WITH COPPER SWEAT OR COMPRESSION JOINTS AT FIXTURE TRAP CONNECTIONS AND THREADED JOINTS AT CONNECTIONS TO CAST IRON PIPE.

INDIRECT AND CONDENSATE DRAIN INSIDE BUILDING: INDIRECT AND CONDENSATE DRAIN PIPE INSTALLED INSIDE THE BUILDING SHALL BE TYPE "M" HARD COPPER WITH WROUGHT COPPER FITTINGS FOR 1" AND SMALLER AND "DWV" COPPER WITH WROUGHT COPPER DRAINAGE PATTERN FITTINGS FOR 1-1/4" AND LARGER HARD TEMPER COPPER TUBE AND SOLDERED CONNECTIONS MADE WITH 95/5 SOLDER OR SCHEDULE 40 PVC PIPE AND FITTINGS WITH SOLVENT WELD JOINTS WHERE ALLOWED BY CODE. (NOTE: PVC PIPING IS NOT ALLOWED IN CEILING RETURN AIR PLENUMS). INSTALL CLEANOUTS AT ELBOWS GREATER THAN 45 DEGREES.

INDIRECT AND CONDENSATE DRAIN OUTSIDE BUILDING: INDIRECT AND CONDENSATE DRAIN PIPE INSTALLED OUTSIDE THE BUILDING ABOVE GROUND SHALL BE TYPE "M" FOR 1" AND SMALLER AND "DWV" FOR 1-1/4" AND LARGER HARD TEMPER COPPER TUBE WITH WROUGHT COPPER DRAINAGE PATTERN FITTINGS AND SOLDERED CONNECTIONS MADE WITH 95/5 SOLDER. TERMINATE AT NEAREST ROOF DRAIN, GUTTER OR OTHER LOCATION AS SHOWN DRAWINGS. INSTALL CLEANOUTS AT ELBOWS GREATER THAN 45 DEGREES.

SUMP PUMP DISCHARGE: SUMP PUMP DISCHARGE PIPING ABOVE GRADE SHALL BE ASTM A53 SCHEDULE 40 GALVANIZED STEEL PIPE WITH GALVANIZED MALLEABLE IRON FITTINGS. SUMP PUMP DISCHARGE PIPING BELOW GRADE SHALL BE ASTM D-1785 SCHEDULE 40 PVC PIPE WITH SOCKET WELD PRESSURE FITTINGS.

PIPING AND EQUIPMENT INSULATION

INSULATE DOMESTIC COLD WATER, HOT WATER, HOT WATER RECIRCULATION, WITH ONE-PIECE FIBERGLASS COVERING FOR WITH FIRE-RESISTANT JACKET WITH SELF-SEALING LAP TO PROVIDE A CONTINUOUS VAPOR BARRIER BY CERTAINTEED, OWENS-CORNING OR ARMSTRONG. INSULATE INTERIOR CONDENSATE DRAINPIPE (WITHIN BUILDING) AND INTERIOR HORIZONTAL STORM DRAIN PIPING, THAT IS CONCEALED ABOVE THE CEILING WITH, 1" THICK ONE-PIECE FIBERGLASS COVERING. FOR HOT PIPING, PROVIDE PIPE HANGERS AND RISER CLAMPS SIZED FOR THE OUTSIDE DIAMETER OF PIPING. BUTT INSULATION TO HANGER OR RISER CLAMP FOR VERTICAL PIPE. SEAL EXPOSED INSULATION WITH INSULATION SEALER. EXCEPTION FOR VERTICAL PIPING: PROVIDE CLAMPS SIZED FOR THE OUTSIDE DIAMETER OF THE VERTICAL PIPE AND EXTEND CLAMP THROUGH INSULATION. SEAL PENETRATIONS OF INSULATION AND VAPOR BARRIER WITH WET COAT OF VAPOR BARRIER LAP CEMENT. FOR COLD PIPING AT HANGERS PROVIDE 8" LONG SECTIONS OF HIGH DENSITY, HIGH TEMPERATURE CALCIUM SILICATE BY JOHNS-MANVILLE, FIBERGLASS BY KNAUF, OR 8" LONG STYROFOAM BILLETS BY DOW OR FLEXIBLE UNICELLULAR PIPING INSULATION MEETING ASTM C 534-01A, TYPE I WITH INTEGRAL HIGH DENSITY PIPE SUPPORTS AND ENCASED IN STEEL INSULATION SHIELD BY COOPER B-LINE / ARMACELL OR APPROVED EQUAL. INSULATION SHALL BE CONTINUOUS ALONG THE PIPE SURFACE, EXCEPT AT VALVES, UNIONS, AND WHERE PIPING IS EXPOSED AT FIXTURES. PROVIDE INSULATION PROTECTION SHIELD AT EACH HANGER FOR INSULATED PIPING.

FOR HOT AND COLD WATER PIPING INSTALLED INSIDE MASONRY UNITS OF WALLS, PROVIDE FLEXIBLE UNICELLULAR INSULATION BY ARMACELL.

COVER FITTINGS WITH ZESTON, KNAUF, OR EQUAL ONE-PIECE PVC PREMOLDED INSULATING COVERS. FITTING COVERS, JACKETS AND ADHESIVES SHALL NOT EXCEED FLAME SPREAD RATING OF 25 AND SMOKE DEVELOPMENT RATING OF 50 PER ASTM E84. AT ALL ELBOWS AND TEES, FILL VOIDS BETWEEN COVERS AND PIPING WITH FIBERGLASS INSULATION AND TAPE JOINTS. INSTALL PIPE INSULATION IN COMPLIANCE WITH MANUFACTURER'S RECOMMENDATIONS. WHERE PREMOLDED INSULATING FITTINGS ARE NOT APPROVED BY LOCAL AUTHORITIES, MITER INSULATION AT FITTINGS.

PROVIDE 1" THICK FIBERGLASS INSULATION ON VENT PIPING WITHIN SIX FEET OF VENT THROUGH THE OF ROOF.

PIPING JOINTS

COPPER TUBING: JOINTS IN HARD TEMPER TUBING SHALL BE SOLDERED JOINTS USING LEAD-FREE 95/5 SOLDER EXCEPT WHERE TUBING IS INSTALLED BELOW GRADE OR BELOW THE BASE SLAB, IN WHICH CASE JOINTS SHALL BE SOLDERED WITH SILVER SOLDER (SILFOS). JOINTS IN SOFT TEMPER COPPER TUBING SHALL BE OF THE FLARED TYPE INSTALLED IN COMPLIANCE WITH THE FITTING MANUFACTURER'S RECOMMENDATIONS.

THREADED STEEL PIPE: THREADED JOINTS SHALL BE FULL AND CLEAN, CUT WITH NOT MORE THAN THREE (3) THREADS EXPOSED BEYOND THE FITTINGS. MAKE JOINTS TIGHT WITH GRAPHITE BASE PIPE JOINT COMPOUND AND PAINT EXPOSED THREADS OF FERROUS PIPE WITH ACID-RESISTING PAINT AFTER PIPING HAS BEEN TESTED AND PROVEN TIGHT. NO CAULKING, LAMP-WICK OR OTHER MATERIAL WILL BE PERMITTED FOR CORRECTION OF DEFECTIVE JOINTS.

WELDED STEEL PIPE: WELDED JOINTS SHALL BE OF THE BUTT WELDED SINGLE "VEE" TYPE. BEVEL PIPE AT A 45 DEGREE ANGLE TO WITHIN 1/16" OF THE INSIDE WALL AND BUILD UP THE WELD TO ONE FOURTH GREATER DEPTH THAN THE PIPE WALL THICKNESS. WELDING SHALL BE EITHER ELECTRIC OR OXY-ACETYLENE, PERFORMED IN CONFORMANCE WITH THE ASME CODE FOR PRESSURE PIPE WELDING, AND ONLY BY EXPERIENCED CERTIFIED WELDERS.

CAST IRON PIPE BELOW GRADE: JOINTS IN BELL AND SPIGOT CAST IRON WASTE AND VENT PIPE SHALL BE NEOPRENE COMPRESSION GASKETS, TYSEAL OR EQUAL.

CAST IRON PIPE ABOVE GRADE: JOINTS IN HUBLESS PIPE SHALL BE STANDARD CISPI 310 NSF CERTIFIED BY ANACO, IDEAL, MISSON OR TYLER. JOINTS IN STORM PIPING, INCLUDING CONNECTIONS TO ROOF DRAINS, SHALL BE HEAVY DUTY COUPLINGS MEETING ASTM C1540 AND FM 1680, ANACO HUSKY #SD-4000 OR CLAMP-ALL "HI TORQUE" 125-IN.LB.

PVC PIPE: CLEAN JOINTS FREE FROM DEBRIS AND MOISTURE. APPLY PVC PRIMER MEETING ASTM F656 TO EACH JOINT. APPLY SOLVENT CEMENT MEETING ASTM D2564 AND MAKE JOINT WHILE WET AND IN ACCORDANCE WITH ASTM D2855.

PEX TUBE: THE FITTINGS ARE ENGINEERED POLYMER AND LEAD-FREE BRASS COLD EXPANSION TYPE WITH PEX REINFORCING RINGS IN COMPLIANCE WITH ASTM F1960. PEX HOSE BARB FITTINGS MEETING ASTM 1807 OF BRASS FOR USE WITH PEX TUBING WITH COPPER CRIMP RING. CUT ENDS OF TUBING STRAIGHT AND TRUE. MANUFACTURED BY IPEX PLUMBETTER PEX TUBING, VIEGA, WIRSBO OR ZURN INDUSTRIES.

PIPE ADAPTERS: MAKE CONNECTION OF NEW WASTE PIPE TO NEW OR EXISTING DISSIMILAR WASTE PIPE USING ADAPTER COUPLINGS. PROVIDE FERNCO, PROFLEX 3000 SERIES OR MISSION FLEXSEAL MR56 SERIES WITH NEOPRENE ADAPTER GASKET WITH STAINLESS STEEL SHIELD AND HOSE CLAMPS FOR CONNECTING DISSIMILAR PIPES ABOVE GRADE. PROVIDE FERNCO, 1056 SERIES OR MISSION SEWER COUPLINGS WITH NEOPRENE ADAPTER GASKET AND HOSE CLAMPS FOR CONNECTING DISSIMILAR PIPES BELOW GRADE AND COAT STAINLESS STEEL BANDS WITH MASTIC.

CPVC PIPE: CLEAN JOINTS FREE FROM DEBRIS AND MOISTURE. APPLY CPVC PRIMER MEETING ASTM F656 TO EACH JOINT. APPLY SOLVENT CEMENT MEETING ASTM F493 AND MAKE JOINT WHILE WET AND IN ACCORDANCE WITH ASTM D2855.

PIPING INSTALLATION

GENERAL: CLEAN PIPE THOROUGHLY PRIOR TO INSTALLATION. REAM ENDS OF PIPE TO REMOVE BURRS. CUT PIPE ACCURATELY TO MEASUREMENTS TAKEN ON THE JOB. INSTALL WITH ADEQUATE CLEARANCE FOR INSTALLATION OF COVERINGS WHERE REQUIRED. PIPE SHALL NOT BE SPRUNG OR BENT. NEATLY ALIGN PIPE, CONNECT IT SECURELY, AND SUPPORT IT FROM THE BUILDING STRUCTURE WITH HANGERS AS SPECIFIED BELOW. PROVIDE CHROME-PLATED ESCUTCHEONS ON PIPES PASSING THROUGH CEILINGS, FLOORS OR WALLS OF FINISHED SPACES. RUN PIPES FREELY THROUGH FLOOR AND WALL PENETRATIONS USING PIPE SLEEVES. DO NOT GROUT IN PLACE UNLESS REQUIRED FOR STRUCTURAL FIRE INTEGRITY. INSTALL PIPE CONCEALED IN FINISHED SPACES WHEREVER POSSIBLE. USE A DIELECTRIC UNION WHERE FERROUS AND COPPER PIPE CONNECT. DIELECTRIC UNION SHALL HAVE A ZINC-PLATED STEEL BODY, A THREADED NYLON INSERT, AND INSULATING PRESSURE GASKET. NO FERROUS METAL-TO-COPPER CONNECTION MADE WITHOUT INSULATING UNIONS WILL BE ALLOWED.

HANGER & SUPPORTS: PIPE HANGERS SHALL BE AS DESCRIBED IN THE SPECIFICATIONS BY B-LINE OR EQUAL BY ANVIL, MICHIGAN, TRUSCON, OR UNISTRUT. CONNECT HANGERS TO THE STRUCTURE WITH SIDE BEAM CONNECTORS AND ALL THREAD HANGER RODS. PROVIDE ENGINEERED SUPPORT STRUTS BETWEEN JOISTS AND OTHER STRUCTURAL MEMBERS AS REQUIRED TO PROVIDE A RIGID HANGING INSTALLATION. DO NOT HANG PIPES FROM OTHER PIPES, CONDUIT OR DUCTWORK. PROVIDE HANGER RODS AND SPACE HANGERS AT INTERVALS AS SPECIFIED IN "HANGER SPACING". PROVIDE SUPPORT WITHIN 1' OF EACH ELBOW AND TEE. PROVIDE SUPPORTS WITHIN 1' OF EACH EQUIPMENT CONNECTION. PROVIDE TWO NUTS ON THREADED SUPPORTS TO SECURELY FASTEN THE SUPPORT. INSTALL HANGER TYPES OR SUPPORTS FOR VARIOUS PIPING AS FOLLOWS:

PEX TUBE: PEX TUBING SHALL NOT BE INSTALLED WITHIN THE FIRST 18 INCHES OF PIPING CONNECTED TO THE HOT WATER HEATER. PEX TUBING SHALL NOT BE INSTALLED WITHIN 6 INCHES HORIZONTALLY OR WITHIN 12 INCHES VERTICALLY FROM ANY SOURCE OF HEAT, SUCH AS GAS APPLIANCE VENTS, LIGHT FIXTURES, HEATING APPLIANCES, ETC. PEX TUBING SHALL NOT BE INSTALLED IN LOCATIONS WHERE EXPOSED TO DIRECT SUNLIGHT. THESE TUBES SHALL NOT BE DEFORMED OR KINKED. TUBING PASSING THROUGH DRILLED OR NOTCHED METAL STUDS OR JOIST OR HOLLOW SHELL MASONRY WALLS SHALL BE PROTECTED FROM ABRASION DUE TO THERMAL EXPANSION AND CONTRACTION BY ELASTOMERIC OR PLASTIC SLEEVES. TUBING PENETRATING FRAMING MEMBERS WITHIN ONE INCH OF THE EXPOSED FRAMING SHALL BE PROTECTED BY STEEL NAIL PLATES NOT LESS THAN 18 GAUGE IN THICKNESS. THE STEEL PLATE SHALL EXTEND ALONG THE FRAMING A MINIMUM OF 1-1/2 INCHES BEYOND THE OUTSIDE DIAMETER OF THE PIPE OR TUBING. PEX TUBING GREATER THAN 3/4 INCH INSTALLED WITHIN AIR PLENUM SHALL BE INSULATED WITH 1/2" INCH THICK MASON ALLEY-K, ARMAFLEX COMPOSITE, JOHNS MANVILLE MICRO-LOK, JOHN MANVILLE MICRO-LOK HP, OWENS COMING VAPOR WICK OR OWENS COMING FIBERGLASS INSULATION. TUBING WITH A MAXIMUM NOMINAL DIAMETER OF 3/4 INCH MAY BE INSTALLED WITHOUT INSULATION SO LONG AS A MINIMUM SPACING OF 18 INCHES IS KEPT BETWEEN ADJACENT RUNS OF TUBING.

COPPER TUBE: ADJUSTABLE BAND HANGERS FOR BARE COPPER TUBE 3" AND SMALLER SHALL BE B-LINE #B3170 CT COPPER PLATED ADJUSTABLE BAND SWIVEL RING TYPE. ADJUSTABLE BAND HANGERS FOR INSULATED COPPER TUBE AND 3" SMALLER SHALL BE B-LINE #B3170 NF ADJUSTABLE BAND SWIVEL RING TYPE. CLEVIS HANGERS FOR INSULATED COPPER TUBE 4" AND LARGER SHALL BE B-LINE #B3100 GALVANIZED STEEL CLEVIS TYPE. SUPPORT EXPOSED COPPER TUBE 2" AND SMALLER TO WALLS OR IN CHASES WITH B-LINE #B3198RCT COPPER COATED EXTENSION SPLIT RING PIPE CLAMPS, 3/8" THREADED ROD AND B-LINE #B3199CT CEILING FLANGES. SUPPORT COPPER TUBE IN CHASES AND WALLS AT PLUMBING FIXTURES WITH PLASTIC OR COPPER BRACKETS SECURED TO STRUCTURE AND U-BOLTS SIZED TO BARE ON THE PIPE. RISER CLAMPS TO SUPPORT VERTICAL COPPER TUBE SHALL BE B-LINE #B3373CT COPPER COATED STEEL, CUT INSULATION, SEAL VAPOR BARRIER, AND ATTACH TO BARE TUBE.

STEEL PIPE: ADJUSTABLE BAND HANGERS FOR 2" AND SMALLER SHALL BE B-LINE #B3170 NF ADJUSTABLE BAND SWIVEL RING TYPE. CLEVIS HANGERS FOR 2-1/2" AND LARGER SHALL BE B-LINE #B3100 GALVANIZED STEEL CLEVIS TYPE. RISER CLAMPS TO SUPPORT VERTICAL PIPE SHALL BE B-LINE #B3373 GALVANIZED STEEL.

CAST IRON PIPE: ADJUSTABLE BAND HANGERS FOR 2" AND SMALLER. CLEVIS HANGERS FOR 3" AND LARGER SHALL BE B-LINE #B3100 GALVANIZED STEEL CLEVIS TYPE. RISER CLAMPS TO SUPPORT VERTICAL PIPE SHALL BE B-LINE #B3373 GALVANIZED STEEL.

PVC PIPE: ADJUSTABLE BAND HANGERS FOR 3" AND SMALLER. CLEVIS HANGERS FOR 4" AND LARGER SHALL BE B-LINE #B3100 GALVANIZED STEEL CLEVIS TYPE. RISER CLAMPS TO SUPPORT VERTICAL PIPE SHALL BE B-LINE #B3373 GALVANIZED STEEL.

INSULATION PROTECTION SHIELDS: B-LINE #B3151 OF 18 GAUGE GALVANIZED SHEET METAL. SHIELD SHALL COVER HALF OF THE CIRCUMFERENCE OF THE PIPE AND SHALL BE OF LENGTH INDICATED BY MANUFACTURER FOR PIPE SIZE AND THICKNESS OF INSULATION.

HANGER SPACING, ROD SIZES & CONNECTORS: CONNECT RODS TO STEEL BEAMS OR JOISTS WITH B-LINE #B3031 OR #B3033BEAM CLAMPS AS REQUIRED. CONNECT RODS TO CONCRETE WITH B-LINE #3014 MALLEABLE IRON SINGLE TYPE INSERTS WITH MALLEABLE IRON NUT. CONNECT RODS IN WOOD CONSTRUCTION WITH B-LINE #B3058 SIDE BEAM CONNECTORS. HANG AND SUPPORT PIPING WITH SPACING AND ROD SIZES AS FOLLOWS:

PEX TUBE: PEX TUBING 1" AND SMALLER SHALL BE SUPPORTED AT 32" INTERVALS FOR HORIZONTAL RUNS. PEX TUBING 1-1/4" AND LARGER SHALL BE SUPPORTED AT 4 FEET INTERVALS FOR HORIZONTAL RUNS. ALL SIZE TUBING SHALL BE SUPPORTED AT THE BASE AND AT EACH FLOOR FOR VERTICAL RUNS. FURTHERMORE, VERTICAL RUNS SHALL BE PROVIDED WITH MID-STORY GUIDES.

COPPER TUBE: 1-1/2" AND SMALLER – EVERY 6' WITH 3/8" HANGER RODS; 2" EVERY 10' WITH 3/8" HANGER RODS; 2-1/2" EVERY 10' WITH 3/8" HANGER RODS; 3" EVERY 10' WITH 1/2" RODS, 4" EVERY 10' WITH 5/8" HANGER RODS. SUPPORT VERTICAL COPPER TUBE EVERY 10'.

STEEL PIPE: 1" AND SMALLER – EVERY 8' WITH 3/8" HANGER RODS; 1-1/4" TO 2" EVERY 10' WITH 3/8" HANGER RODS; 2-1/2" AND 3" EVERY 10' WITH 1/2" HANGER RODS, 4" EVERY 10' WITH 5/8" HANGER RODS. SUPPORT VERTICAL STEEL PIPE EVERY 10'.

CAST IRON PIPE: EVERY 10' AND WITHIN 1' OF EACH JOINT. 2" AND SMALLER WITH 3/8" HANGER RODS; 3" WITH 1/2" HANGER RODS; 4" WITH 5/8" HANGER RODS; 6" WITH 3/4" HANGER RODS; 8" AND LARGER WITH 7/8" HANGER RODS. SUPPORT VERTICAL CAST IRON PIPE EVERY 15'.

PVC PIPE: SUPPORT ALL PIPES SIZES EVERY 4'. 1-1/2" AND SMALLER WITH 3/8" HANGER RODS; 2" WITH 1/2" HANGER RODS; 2-1/2" AND 3" WITH 1/2" HANGER RODS, 4" AND LARGER WITH 5/8" HANGER RODS. SUPPORT VERTICAL PVC PIPE EVERY 4'.

SUPPORTS ON ROOF: SUPPORT PIPING ON ROOF WITH PRE-ENGINEERED ROOF PIPE SUPPORTS MANUFACTURED BY B-LINE, ERICO, MIRO OR PORTABLE PIPE HANGERS: 4" X 4" X 12" LONG CLOSED CELL POLYETHYLENE BLOCKS WITH EMBEDDED PRE-ENGINEERED SUPPORT STRUT OR PRE-ENGINEERED SUPPORT STRUTS WITH FACTORY PLASTIC BASES. TWO PIECE STRAPS SHALL BE CAPTIVATED AT THE SHOULDER WHEN ATTACHMENT NUT IS TIGHTENED AND DESIGNED FOR USE WITH STRUT SYSTEM. ALL NUTS, BRACKETS AND CLAMPS SHALL HAVE THE SAME FINISH AS THE CHANNELS. SUPPORT PIPE WITH SPACING AS DESCRIBED ABOVE AT A MINIMUM 7" ABOVE THE ROOF. SET SUPPORTS ON 18" X 18" X 3/16" THICK ROOF WALKWAY MATERIAL COMPATIBLE WITH ACTUAL ROOF MATERIAL.

SUPPORTS ON FLOOR: SUPPORT PIPING FROM THE FLOOR WHERE REQUIRED FOR FERROUS PIPE OR INSULATED COPPER TUBE, SHALL BE B-LINE B3093 GALVANIZED STEEL WITH PIPE SADDLE, THREADED SHANK FOR HEIGHT ADJUSTMENT AND FLOOR STAND SECURED TO THE FLOOR.

UNDERGROUND WARNING TAPE: UNDERGROUND WARNING TAPE SHALL BE MARKING SERVICES INCORPORATED # 52205 FOR FERROUS SEWER PIPE AND # 52206 FOR DOMESTIC WATER PIPE OR EQUAL BY BRADY IDENTOLINE AND SETON. PROVIDE 4MIL THICK NON-ADHESIVE POLYETHYLENE TYPE TAPE. DETECTABLE UNDERGROUND WARNING TAPE SHALL BE MARKING SERVICES INCORPORATED # 52216 FOR PLASTIC GAS PIPE AND # 52218 FOR PLASTIC SEWER PIPE. PROVIDE NON-ADHESIVE 4MIL THICK TYPE TAPE WITH 18 AWG COPPER OR ALUMINUM TRACER WIRE SUITABLE FOR DETECTION UP TO 3'-0" OF BURIAL.

BELOW GROUND INSTALLATION FOR SOIL, WASTE AND STORM: INSTALL SOIL AND WASTE PIPING TO A UNIFORM SLOPE OF NOT LESS THAN 1/8" PER FOOT FOR PIPING 4" OR LARGER, AND NOT LESS THAN 1/4" PER FOOT FOR GREASE WASTE PIPING OR PIPING 3" OR SMALLER. SLOPE STORM PIPING AT A SLOPE INDICATED ON FLOOR PLANS. LAY PIPE AT UNIFORM SLOPE, FREE FROM SAGS, WITH HUB END UPSTREAM. MAKE CHANGES IN DIRECTION FROM HORIZONTAL TO VERTICAL, AT FIXTURE BRANCHES AND OTHER BRANCH CONNECTIONS WITH SANITARY "TEES" OR SHORT SWEEP "ELLS". MAKE CHANGES IN DIRECTION FROM VERTICAL TO HORIZONTAL OR HORIZONTAL TO HORIZONTAL WITH LONG RADIUS FITTINGS, LONG SWEEPING "ELLS", COMBINATION "Y AND 1/8 BEND" FITTINGS, OR 45 DEGREE "ELLS" (1/8 BEND FITTINGS), 1/6 BEND OR 1/16 BEND AND "Y" FITTINGS. INSTALL PIPE WITH THE BARREL OF THE PIPE ON FIRM, SOLID EARTH FOR ITS ENTIRE LENGTH, AND EXCAVATE HOLES FOR THE PIPE BELLS. LAY PIPE IN A STRAIGHT LINE AND INSTALL WITH UNIFORM GRADE TO LINE WITH BATTEN BOARDS SET NOT MORE THAN 24'-0" APART. CLOSE OPEN ENDS OF PIPE WITH A STOPPER WHEN PIPE LAYING IS NOT IN PROGRESS. CENTER SPIGOTS ACCURATELY IN BELLS FOR UNIFORM CAULKING. PROVIDE A SMOOTH AND UNIFORM INVERT IN THE SYSTEM. DRILLING OR TAPPING OF SOIL AND WASTE LINES, AND SADDLE HUBS AND BANDS ARE NOT PERMITTED. LOCATE AND INSTALL SOIL AND WASTE LINES AS INDICATED ON THE DRAWINGS. DETERMINE EXACT LOCATIONS IN SUCH A MANNER AS TO MAINTAIN PROPER CLEARANCE. PRIOR TO INSTALLATION OF ANY BUILDING DRAINPIPE, VERIFY ELEVATION OF CONNECTION POINT OF EXISTING SEWER, SERVICE LINE OR EXISTING TENANT CONNECTIONS INDICATED ON THE DRAWINGS.

ABOVE GROUND INSTALLATION FOR SOIL, WASTE AND STORM: INSTALL SOIL AND WASTE PIPING TO A UNIFORM SLOPE OF NOT LESS THAN 1/8" PER FOOT FOR PIPING 4" OR LARGER, AND NOT LESS THAN 1/4" PER FOOT FOR GREASE WASTE PIPING OR PIPING 3" OR SMALLER. SLOPE STORM PIPING AT SLOPE INDICATED ON FLOOR PLANS. LAY PIPE AT UNIFORM SLOPE FREE FROM SAGS. SUPPORT PIPE WITHIN 12" OF EACH JOINT. MAKE CHANGES IN DIRECTION FROM HORIZONTAL TO VERTICAL, AT FIXTURE BRANCHES AND OTHER BRANCH CONNECTIONS WITH SANITARY "TEES" OR SHORT SWEEP "ELLS". MAKE CHANGES IN DIRECTION FROM VERTICAL TO HORIZONTAL OR HORIZONTAL TO HORIZONTAL WITH LONG RADIUS FITTINGS, LONG SWEEPING "ELLS", COMBINATION "Y AND 1/8 BEND" FITTINGS, OR 45 DEGREE "ELLS" (1/8 BEND FITTINGS), 1/6 BEND OR 1/16 BEND AND "Y" FITTINGS. PROVIDE A SMOOTH AND UNIFORM INVERT IN THE SYSTEM. DRILLING OR TAPPING OF SOIL AND WASTE LINES, AND SADDLE HUBS AND BANDS ARE NOT PERMITTED. LOCATE AND INSTALL SOIL AND WASTE LINES AS INDICATED ON THE DRAWINGS. DETERMINE EXACT LOCATIONS IN SUCH A MANNER AS TO MAINTAIN PROPER CLEARANCE.

PLUMBING VENT: CONNECT PLUMBING VENT PIPES TO FIXTURE DRAINPIPES AS INDICATED ON THE DRAWINGS OR AS REQUIRED BY THE INSTALLATION PRACTICES ADOPTED AND ENFORCED BY LOCAL CODES OFFICIAL AND EXTEND VENT PIPES FULL SIZE THROUGH THE ROOF LINE. GRADE PIPE TO A UNIFORM SLOPE SO AS TO DRAIN BACK BY GRAVITY TO THE DRAINAGE PIPING SYSTEM. VENTS PASSING THROUGH THE ROOF SHALL BE MINIMUM 3" SIZE EXCEPT IN TROPICAL CLIMATES, PER LOCAL CODES. TURN FLASHING DOWN INTO STACKS AT LEAST 2" AND EXTEND FLASHING 24" IN ALL DIRECTIONS FROM THE PIPE AT THE ROOF LINE. APPLY WHITE LEAD PIPE DOPE ON MALE STEEL PIPE THREADS. VENT LINES SHALL BE AIR AND WATERTIGHT. VENT FLOOR DRAINS INDIVIDUALLY OR CONNECT THEM TO A HORIZONTALLY VENTED LINE AS SHOWN ON THE DRAWINGS.

DOMESTIC WATER: ARRANGE COLD, HOT, AND HOT WATER RECIRCULATION PIPING TO DRAIN AT THE LOWEST POINT IN EACH SYSTEM. INSTALL AT LEAST ONE PIPE UNION ADJACENT TO ALL SHUTOFF VALVES, AT CONNECTION POINTS OF EACH PIECE OF EQUIPMENT, AND ELSEWHERE IN THE SYSTEM WHERE REQUIRED TO ALLOW PROPER MAINTENANCE. PROVIDE UNIONS OF THE GROUND JOINT TYPE. MAKE ALLOWANCE FOR EXPANSION AND CONTRACTION WHERE REQUIRED BY THE INSTALLATION. WHERE WATER PIPING OCCURS IN EXTERIOR WALLS, HOLD PIPE AS CLOSE AS POSSIBLE TO THE INTERIOR FACE OF WALL AND INSTALL INSULATION BATT OR OTHER INSULATION (MINIMUM R8) BETWEEN PIPING AND THE EXTERIOR WALL FACE. INSTALL PLASTIC UNDERGROUND WARNING TAPE WITH NAME OF SERVICE INDICATED CONTINUOUSLY ALONG ITS LENGTH FOR DOMESTIC WATER PIPE FIVE FEET OUTSIDE THE BUILDING.

NATURAL GAS: PITCH NATURAL GAS PIPING AND PROVIDE ACCESSIBLE DIRT LEGS AT THE LOW POINTS. TAKE BRANCH PIPES OFF THE TOP OR SIDES OF MAIN PIPES, TO PREVENT ACCUMULATION OF WATER IN THE BRANCHES. INSTALL GAS PIPING VALVES AND UNIONS ONLY IN ACCESSIBLE LOCATIONS. DO NOT INSTALL GAS PIPE BELOW THE BASE SLAB.

PIPING SANITIZATION

SANITIZE THE ENTIRE DOMESTIC WATER PIPING SYSTEM (COLD, HOT, AND HOT WATER RETURN) WITH A SOLUTION CONTAINING NOT LESS THAN 50 PPM AVAILABLE CHLORINE. KEEP SOLUTION IN THE SYSTEM FOR A MINIMUM OF 24 HOURS, WITH EACH VALVE BEING OPERATED SEVERAL TIMES DURING THE PERIOD. AFTER COMPLETION, FLUSH SYSTEM WITH CITY WATER UNTIL CHLORINE RESIDUAL IS LOWERED TO INCOMING CITY WATER LEVEL.

PIPE AND VALVE MARKERS

PROVIDE MANUFACTURER'S STANDARD PRE-PRINTED, SEMI-RIGID SNAP-ON OR PERMANENT ADHESIVE, PRESSURE-SENSITIVE VINYL PIPE MARKERS. PIPE MARKERS SHALL BE COLOR-CODED COMPLYING WITH ANSI A13.1.

INSTALL PIPE MARKERS ON EACH PLUMBING PIPING SYSTEM AND INCLUDE ARROWS TO SHOW NORMAL DIRECTION OF FLOW.

LOCATE PIPE MARKERS AND COLOR BANDS WHEREVER PIPING IS EXPOSED TO VIEW IN OCCUPIED SPACES, MACHINE ROOMS, ACCESSIBLE MAINTENANCE SPACES (SHAFTS, TUNNELS, PLENUMS) AND EXTERIOR NON-CONCEALED LOCATIONS.

PROVIDE PLASTIC LAMINATE OR BRASS VALVE TAG ON EVERY VALVE, COCK AND CONTROL DEVICE IN EACH PLUMBING PIPING SYSTEM; EXCLUDE CHECK VALVES, VALVES WITHIN FACTORY-FABRICATED EQUIPMENT UNITS, PLUMBING FIXTURE FAUCETS, CONVENIENCE AND LAWN-WATERING HOSE BIBBS, AND SHUT-OFF VALVES AT PLUMBING FIXTURES AND SIMILAR ROUGH-IN CONNECTIONS OF END-USE FIXTURES AND UNITS.

PLUMBING SPECIALTIES

CLEANOUTS, FLOOR DRAINS AND ROOF DRAINS SHALL BE BY ONE MANUFACTURER IF POSSIBLE. PROVIDE LONG SWEEP FITTINGS FOR CLEANOUT EXTENSIONS; SHORT SWEEPS AT START OF RUNS OR CHANGE IN DIRECTION AND COMBINATION WYE AND EIGHT BEND FITTINGS IN HORIZONTAL RUNS. INSTALL CLEANOUTS WITH A MINIMUM OF 18" CLEAR ALL AROUND, CONSULT LOCAL CODES FOR OTHER REQUIREMENTS, FOR EASY SYSTEM MAINTENANCE. INSTALL PLUG WITH TEFLON JOINT COMPOUND.

FLOOR CLEANOUTS: INSTALL CLEANOUTS AT POINTS AS NOTED ON THE DRAWINGS, AT THE BUILDING EXIT; AT A MINIMUM OF EVERY 50 FEET IN HORIZONTAL SOIL AND WASTE LINES; AND AT TURNS OF PIPE GREATER THAN 45 DEGREES CLEANOUTS SHALL BE FULL SIZE OF THE PIPE UP TO 4", AND 4" SIZE FOR PIPES LARGER THAN 4". DETERMINE THE TYPE OF FLOOR COVERING TO BE USED AT EACH FLOOR CLEANOUT LOCATION AND PROVIDE TOP WITH VARIATIONS SUITABLE FOR FLOOR COVERING (CARPET MARKERS, RECESSED FOR TILE AND SCORIATED FOR UNFINISHED FLOOR). ROUGH-IN AND INSTALL EACH FLOOR CLEANOUT FLUSH WITH THE FINISHED FLOOR CONSTRUCTION.

EXTERIOR CLEANOUTS: INSTALL CLEANOUTS AT POINTS AS NOTED ON THE DRAWINGS, AT THE BUILDING EXIT; AT A MINIMUM OF EVERY 100 FEET IN HORIZONTAL SOIL, WASTE AND STORM SERVICE LINES. EMBED EACH EXTERIOR CLEANOUT IN AN 18" X 18" X 8" BLOCK OF CONCRETE, FLUSH WITH FINISHED GRADE.

WALL CLEANOUTS: INSTALL WALL CLEANOUTS AT POINTS AS NOTED ON THE DRAWINGS; AT THE FOOT OF EACH SOIL, WASTE OR INTERIOR DOWNSPOUT STACK; AT HORIZONTAL SOIL AND WASTE BRANCHES LONGER THAN FIVE FEET NOT SERVED BY A FLOOR CLEANOUT; CONSULT LOCAL CODES FOR INSTALLATION AT SPECIFIC FIXTURE TYPES. INSTALL WALL CLEANOUTS ABOVE THE FLOOD RIM OF THE FIXTURE SERVED WITHIN FOUR FEET OF THE FLOOR AND INSTALL EXTENSIONS FROM THE CLEANOUT TEE TO THE WALL TO LOCATE THE PLUG WITHIN 2" OF THE WALL WHERE REQUIRED. INSTALL CLEANOUTS ON URINALS AND SINKS WHERE REQUIRED BY CODE.

ROOF DRAINS: PROVIDE WITH ROOF SUMP RECEIVER, EXTENSION, SECONDARY FLASHING CLAMPS AND UNDERDECK CLAMP AS REQUIRED; PROVIDE EXPANSION JOINTS WHERE REQUIRED. PROVIDE OVERFLOW ROOF DRAINS WHERE INDICATED ON THE DRAWINGS WITH INLET FLOW LINE 2" ABOVE THE PRIMARY ROOF DRAIN INLET.

VALVES, STRAINERS, AND UNIONS

PLUMBING SYSTEM VALVES SHALL BE CRANE COMPANY OR NIBCO OF MODELS HEREIN SPECIFIED, OR APPROVED EQUAL BY HAMMOND, MILWAUKEE, STOCKHAM OR MUELLER VALVES. VALVES SHALL BE OF THE BEST QUALITY, DESIGNED FOR 125 PSI STEAM WORKING PRESSURE. INSTALL VALVES ON THE HOT AND COLD-WATER LINES AT THE WATER HEATER CONNECTIONS AND OTHER ITEMS OF EQUIPMENT, AT BRANCHES FROM MAINS SERVING GROUPS OF FIXTURES, AND AT OTHER PLACES INDICATED OR REQUIRED BY THE INSTALLATION TO ALLOW EASE OF FUTURE MAINTENANCE.

GATE VALVES: CLASS 125, SIZE 2" AND SMALLER SHALL BE NIBCO #S-113-LF NON-RISING STEM, SOLDERED LEAD FREE BRONZE BODY AND PARTS, WITH WEDGE DISC. GATE VALVES 2-1/2" AND LARGER SHALL BE NIBCO #617-0, O.S. & Y., IRON BODY FLANGED WEDGE GATE WITH BRASS SEATS AND STEM.

BALL VALVES (MAY BE USED IN LIEU OF GATE VALVES UP TO 2"): 2" AND SMALLER, NIBCO #S-685-80-LF; TWO PIECE LEAD FREE BRONZE BODY, WITH SOLDERED ENDS, CHROME PLATED BRONZE BALL WITH CONVENTIONAL PORT, 600 PSI, BLOW-OUT PROOF STEM.

GLOBE VALVES: GLOBE VALVES SHALL BE CLASS 125. GLOBE VALVES 2" AND SMALLER SHALL BE NIBCO #T-211 OR MILWAUKEE #UP1502, SCREWED LEAD FREE BRONZE BODY AND BRASS DISC. GLOBE VALVES 2-1/2" AND LARGER SHALL BE CRANE #351 IRON BODY FLANGED VALVE WITH BRASS TRIM.

CHECK VALVES: CHECK VALVES SHALL BE CLASS 125. CHECK VALVES FOR INSTALLATION IN HORIZONTAL PIPE RUNS SHALL BE OF THE "SWING DISC" DESIGN. HORIZONTAL CHECK VALVES 2" AND SMALLER SHALL BE MILWAUKEE #UP1509 OR NIBCO #S-413-Y-LF WITH SOLDERED LEAD FREE BRONZE BODY AND BRONZE DISC. HORIZONTAL CHECK VALVES 2-1/2" AND LARGER SHALL BE CRANE #373 OR NIBCO F-918 IRON BODY FLANGED VALVE WITH BRASS TRIM. CHECK VALVES FOR INSTALLATION IN VERTICAL PIPE RUNS SHALL BE OF THE "VERTICAL LIFT" SPRING LOADED DESIGN. VERTICAL CHECK VALVES 2" AND SMALLER SHALL BE MILWAUKEE #UP1548T OR NIBCO #S-480-Y-LF WITH SOLDERED LEAD FREE BRONZE BODY AND BRONZE DISC. VERTICAL CHECK VALVES 3" AND LARGER SHALL BE CENTER GUIDED.

GAS COCKS: GAS COCKS 2" AND SMALLER SHALL BE HOMESTEAD #611, SCREWED IRON BODY WITH BRASS TRIM AND FLAT HEAD. GAS COCKS 2-1/2" AND LARGER SHALL BE HOMESTEAD #612 FLANGED SEMI-STEEL BODY WITH IRON TRIM AND SQUARE HEAD. APPROVED EQUAL ARE FLOWSERVE-NORDSTROM OR RM ENERGY SYSTEMS "HERCULES".

GAS LINE PRESSURE REGULATORS: GAS LINE PRESSURE REGULATORS SHALL BE BY AMERICAN METER COMPANY, FISHER, ITRON, MAXITROL OR SENSUS WITH CAPACITIES AS SCHEDULED ON THE DRAWINGS. REGULATORS SHALL BE SINGLE STAGE, STEEL JACKETED, CORROSION-RESISTANT TYPE WITH INTERSTITIAL RELIEF VALVE WITH ATMOSPHERIC VENT, ELEVATION COMPENSATOR; WITH THREADED ENDS, FOR INLET AND OUTLET.

STRAINERS: STRAINERS 2" AND SMALLER SHALL BE WATTS #LFS777SI WITH SOLDERED LEAD FREE BRONZE, BRASS CAP AND MONEL 40 MESH SCREEN. STRAINERS 2-1/2" AND LARGER SHALL BE WATTS #77F-DI-FDA-125 WITH FLANGED IRON BODY WITH FUSED FDA EPOXY COATING, BOLTED IRON CAP AND STAINLESS STEEL SCREEN WITH 1/16" PERFORATIONS. STRAINERS SIZE 2-1/2" AND LARGER SHALL HAVE A 1" BLOW-OFF LINE WITH A 1" GATE VALVE CONNECTED TO THE BLOW-OFF CONNECTION AND SHALL BE EXTENDED TO THE NEAREST FLOOR DRAIN.

UNIONS: FERROUS UNIONS SHALL BE CRANE OR EQUAL, COMBINATION IRON AND BRASS, GROUND JOINT WITH SCREWED ENDS. COPPER UNIONS SHALL BE STREAMLINE OR EQUAL, CAST BRONZE SWEAT TYPE WITH GROUND JOINT. FERROUS TO COPPER UNIONS SHALL BE UNIVERSAL CONTROLS OR EQUAL, DIELECTRIC TYPE WITH THREADED NYLON INSERT.

FLOW CONTROL VALVES: FOR INSTALLATION IN HOT WATER RECIRCULATION LINES, SHALL BE BELL & GOSSETT #CB "CIRCUIT SETTER" LEAD FREE OR EQUAL BY ARMSTRONG OR NIBCO WITH BRONZE BODY, BRASS BALL, TFE SEAT RINGS, CALIBRATED ORIFICE, MEMORY STOP, READOUT VALVES WITH INTERNAL CHECK VALVES, DRAIN PORT AND SWEAT CONNECTIONS. PROVIDE BALL VALVE, STRAINER AND CHECK VALVE UPSTREAM AND UNION AND BALL VALVE DOWNSTREAM OF EACH FLOW CONTROL VALVE. SET THE FLOW CONTROL VALVES TO THE FLOWS AS INDICATED ON THE DRAWINGS.

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ISSUED FOR	REV	DATE

SEALS AND SIGNATURES

53566
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4/29/22

KEYPLAN

DRAWING TITLE

PLUMBING
SPECIFICATIONS

SCALE

PROJECT NUMBER

DRAWING NUMBER

P4.0

APPENDIX F

"Minnezona Condominiums" Watercad Analysis for On-site Waterline / Fireline
7314 E Minnezona
Scottsdale, Arizona

Job No. 21-08-010-
Date 9/1/2022

Watercad Junction Flow Results for Average Demand

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
31	J-1	0	<None>	<Collection: 0 items>	0	219.95	95
32	J-2	0	<None>	<Collection: 0 items>	0	219.93	95
33	J-3	35	<None>	<Collection: 1 item>	3	219.86	80
41	J-4	0	<None>	<Collection: 0 items>	0	219.94	95
44	J-5	0	<None>	<Collection: 0 items>	0	219.94	95
47	J-6	0	<None>	<Collection: 0 items>	0	219.93	95
50	J-7	0	<None>	<Collection: 0 items>	0	219.93	95
53	J-8	0	<None>	<Collection: 0 items>	0	219.93	95
56	J-9	0	<None>	<Collection: 0 items>	0	219.94	95
59	J-10	0	<None>	<Collection: 0 items>	0	219.94	95
62	J-11	0	<None>	<Collection: 0 items>	0	219.94	95
65	J-12	35	<None>	<Collection: 1 item>	3	219.87	80
66	J-13	35	<None>	<Collection: 1 item>	3	219.87	80
67	J-14	35	<None>	<Collection: 1 item>	3	219.79	80
68	J-15	35	<None>	<Collection: 1 item>	3	219.77	80
69	J-16	35	<None>	<Collection: 1 item>	3	219.77	80
70	J-17	35	<None>	<Collection: 1 item>	3	219.77	80
71	J-18	35	<None>	<Collection: 1 item>	3	219.77	80
72	J-19	35	<None>	<Collection: 1 item>	3	219.77	80

"Minnezona Condominiums" Watercad Analysis for On-site Waterline / Fireline
7314 E Minnezona
Scottsdale, Arizona

Job No. 21-08-010-
Date 9/1/2022

Watercad Junction Flow Results for Max Demand

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
31	J-1	0	<None>	<Collection: 0 items>	0	117.68	51
32	J-2	0	<None>	<Collection: 0 items>	0	117.63	51
33	J-3	35	<None>	<Collection: 2 items>	6	117.34	36
41	J-4	0	<None>	<Collection: 0 items>	0	117.66	51
44	J-5	0	<None>	<Collection: 0 items>	0	117.66	51
47	J-6	0	<None>	<Collection: 0 items>	0	117.63	51
50	J-7	0	<None>	<Collection: 0 items>	0	117.63	51
53	J-8	0	<None>	<Collection: 0 items>	0	117.64	51
56	J-9	0	<None>	<Collection: 0 items>	0	117.64	51
59	J-10	0	<None>	<Collection: 0 items>	0	117.64	51
62	J-11	0	<None>	<Collection: 0 items>	0	117.64	51
65	J-12	35	<None>	<Collection: 2 items>	6	117.39	36
66	J-13	35	<None>	<Collection: 2 items>	6	117.39	36
67	J-14	35	<None>	<Collection: 2 items>	6	117.1	36
68	J-15	35	<None>	<Collection: 2 items>	6	117.03	35
69	J-16	35	<None>	<Collection: 2 items>	6	117.03	35
70	J-17	35	<None>	<Collection: 2 items>	6	117.03	35
71	J-18	35	<None>	<Collection: 2 items>	6	117.02	35
72	J-19	35	<None>	<Collection: 2 items>	6	117.02	35

"Minnezona Condominiums" Watercad Analysis for On-site Waterline / Fireline
7314 E Minnezona
Scottsdale, Arizona

Job No. 21-08-010-
Date 9/1/2022

Watercad Junction Flow Results for Peak Demand

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
31	J-1	0	<None>	<Collection: 0 items>	0	219.44	95
32	J-2	0	<None>	<Collection: 0 items>	0	219.31	95
33	J-3	35	<None>	<Collection: 2 items>	11	218.47	79
41	J-4	0	<None>	<Collection: 0 items>	0	219.4	95
44	J-5	0	<None>	<Collection: 0 items>	0	219.38	95
47	J-6	0	<None>	<Collection: 0 items>	0	219.31	95
50	J-7	0	<None>	<Collection: 0 items>	0	219.31	95
53	J-8	0	<None>	<Collection: 0 items>	0	219.32	95
56	J-9	0	<None>	<Collection: 0 items>	0	219.32	95
59	J-10	0	<None>	<Collection: 0 items>	0	219.33	95
62	J-11	0	<None>	<Collection: 0 items>	0	219.34	95
65	J-12	35	<None>	<Collection: 2 items>	11	218.62	79
66	J-13	35	<None>	<Collection: 2 items>	11	218.6	79
67	J-14	35	<None>	<Collection: 2 items>	11	217.81	79
68	J-15	35	<None>	<Collection: 2 items>	11	217.6	79
69	J-16	35	<None>	<Collection: 2 items>	11	217.59	79
70	J-17	35	<None>	<Collection: 2 items>	11	217.58	79
71	J-18	35	<None>	<Collection: 2 items>	11	217.58	79
72	J-19	35	<None>	<Collection: 2 items>	11	217.57	79

"Minnezona Condominiums" Watercad Analysis for On-site Waterline / Fireline
7314 E Minnezona
Scottsdale, Arizona

Job No. 21-08-010-00
Date 9/1/2022

Watercad Hydrant Flow Results

ID	Label	Hydrant Status	Include Lateral Loss?	Emitter Coefficient (gpm/psi^n)	Lateral Length (ft)	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
34	H-1	Open	FALSE	0	20	0	<None>	<Collection: 1 item>	1500	104.33	45

"Minnezona Condominiums" Watercad Analysis for On-site Waterline / Fireline
7314 E Minnezona
Scottsdale, Arizona

Job No. 21-08-010-00
Date 9/1/2022

Watercad Pipe Flow Results for Max Demand

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Has Check Valve?	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Has User Defined Length?	Length (User Defined) (ft)
35	P-1	113	R-1	J-1	6	Asbestos Cement	140	FALSE	1.5	1554	17.63	0.157	TRUE	650
37	P-3	45	J-2	J-3	1.5	Copper	135	FALSE	3.5	6	1.09	0.006	TRUE	50
38	P-4	36	J-1	H-1	6	Ductile Iron	130	FALSE	1.5	1500	17.02	0.318	TRUE	42
42	P-5	26	J-1	J-4	6	Asbestos Cement	140	FALSE	1.5	54	0.61	0.001	TRUE	19
45	P-7	12	J-4	J-5	6	Asbestos Cement	140	FALSE	1.5	48	0.54	0.003	TRUE	3
49	P-10	16	J-6	J-2	6	Asbestos Cement	140	FALSE	1.5	6	0.07	0	TRUE	3
52	P-12	28	J-7	J-6	6	Asbestos Cement	140	FALSE	1.5	12	0.14	0	TRUE	42
55	P-14	11	J-8	J-7	6	Asbestos Cement	140	FALSE	1.5	18	0.2	0	TRUE	3
58	P-16	10	J-9	J-8	6	Asbestos Cement	140	FALSE	1.5	24	0.27	0.001	TRUE	3
61	P-18	9	J-10	J-9	6	Asbestos Cement	140	FALSE	1.5	30	0.34	0.001	TRUE	3
63	P-19	22	J-5	J-11	6	Asbestos Cement	140	FALSE	1.5	42	0.48	0	TRUE	30
64	P-20	10	J-11	J-10	6	Asbestos Cement	140	FALSE	1.5	36	0.41	0.001	TRUE	3
73	P-21	46	J-6	J-19	1.5	Copper	135	FALSE	3.5	6	1.09	0.005	TRUE	120
74	P-22	59	J-7	J-18	1.5	Copper	135	FALSE	3.5	6	1.09	0.005	TRUE	120
75	P-23	59	J-8	J-17	1.5	Copper	135	FALSE	3.5	6	1.09	0.005	TRUE	120
76	P-24	58	J-9	J-16	1.5	Copper	135	FALSE	3.5	6	1.09	0.005	TRUE	120
77	P-25	60	J-10	J-15	1.5	Copper	135	FALSE	3.5	6	1.09	0.005	TRUE	120
78	P-26	59	J-11	J-14	1.5	Copper	135	FALSE	0	6	1.09	0.005	TRUE	120
79	P-27	38	J-5	J-13	1.5	Copper	135	FALSE	3.5	6	1.09	0.006	TRUE	45
80	P-28	38	J-4	J-12	1.5	Copper	135	FALSE	3.5	6	1.09	0.006	TRUE	45

"Minnezona Condominiums" Watercad Analysis for On-site Waterline / Fireline
7314 E Minnezona
Scottsdale, Arizona

Job No. 21-08-010-00
Date 9/1/2022

Watercad Pipe Flow Results for Peak Demand

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Has Check Valve?	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Has User Defined Length?	Length (User Defined) (ft)
35	P-1	113	R-1	J-1	6	Asbestos Cement	140	FALSE	1.5	54	0.61	0	TRUE	650
37	P-3	45	J-2	J-3	1.5	Copper	135	FALSE	3.5	6	1.09	0.006	TRUE	50
38	P-4	36	J-1	H-1	6	Ductile Iron	130	FALSE	1.5	0	0	0	TRUE	42
42	P-5	26	J-1	J-4	6	Asbestos Cement	140	FALSE	1.5	54	0.61	0.001	TRUE	19
45	P-7	12	J-4	J-5	6	Asbestos Cement	140	FALSE	1.5	48	0.54	0.003	TRUE	3
49	P-10	16	J-6	J-2	6	Asbestos Cement	140	FALSE	1.5	6	0.07	0	TRUE	3
52	P-12	28	J-7	J-6	6	Asbestos Cement	140	FALSE	1.5	12	0.14	0	TRUE	42
55	P-14	11	J-8	J-7	6	Asbestos Cement	140	FALSE	1.5	18	0.2	0	TRUE	3
58	P-16	10	J-9	J-8	6	Asbestos Cement	140	FALSE	1.5	24	0.27	0.001	TRUE	3
61	P-18	9	J-10	J-9	6	Asbestos Cement	140	FALSE	1.5	30	0.34	0.001	TRUE	3
63	P-19	22	J-5	J-11	6	Asbestos Cement	140	FALSE	1.5	42	0.48	0	TRUE	30
64	P-20	10	J-11	J-10	6	Asbestos Cement	140	FALSE	1.5	36	0.41	0.001	TRUE	3
73	P-21	46	J-6	J-19	1.5	Copper	135	FALSE	3.5	6	1.09	0.005	TRUE	120
74	P-22	59	J-7	J-18	1.5	Copper	135	FALSE	3.5	6	1.09	0.005	TRUE	120
75	P-23	59	J-8	J-17	1.5	Copper	135	FALSE	3.5	6	1.09	0.005	TRUE	120
76	P-24	58	J-9	J-16	1.5	Copper	135	FALSE	3.5	6	1.09	0.005	TRUE	120
77	P-25	60	J-10	J-15	1.5	Copper	135	FALSE	3.5	6	1.09	0.005	TRUE	120
78	P-26	59	J-11	J-14	1.5	Copper	135	FALSE	0	6	1.09	0.005	TRUE	120
79	P-27	38	J-5	J-13	1.5	Copper	135	FALSE	3.5	6	1.09	0.006	TRUE	45
80	P-28	38	J-4	J-12	1.5	Copper	135	FALSE	3.5	6	1.09	0.006	TRUE	45

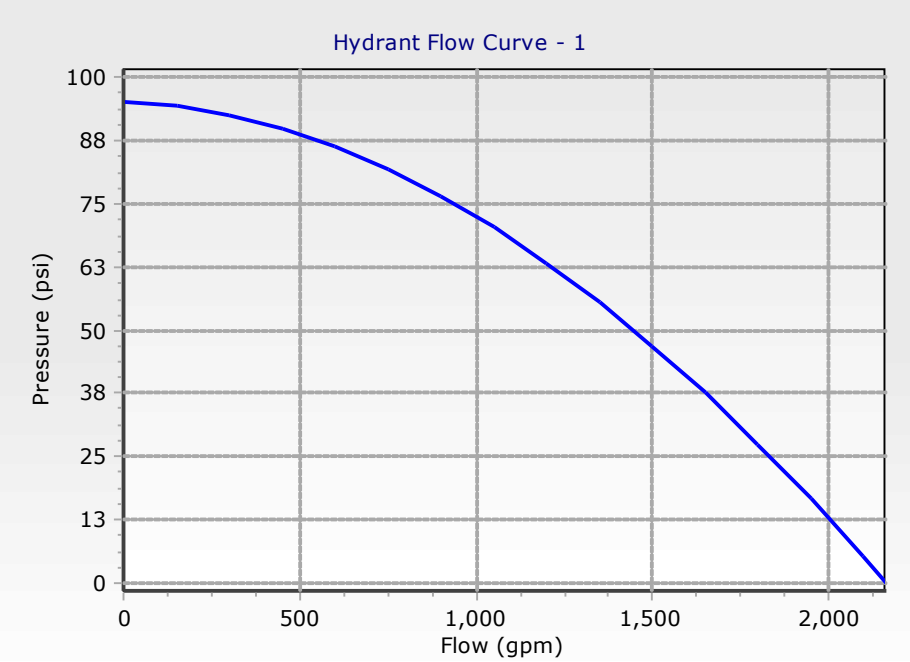
Hydrant Flow Curve Detailed Report - Hydrant Flow Curve - 1

Element Details			
Label	Hydrant Flow Curve - 1	Nominal Hydrant Flow	1,500 gpm
Hydrant/Junction	H-1	Number of Intervals	10

Time (hours)
0.000

0.000 hours Flow (gpm)	0.000 hours Pressure (psi)
0	95
150	94
300	93
450	90
600	86
750	82
900	76
1,050	70
1,200	63
1,350	55
1,500	47
1,650	38
1,800	28
1,950	17
2,100	5
2,163	0

Hydrant Flow Curve Detailed Report - Hydrant Flow Curve - 1



Scenario: Base