



# Commercial Meterset Design

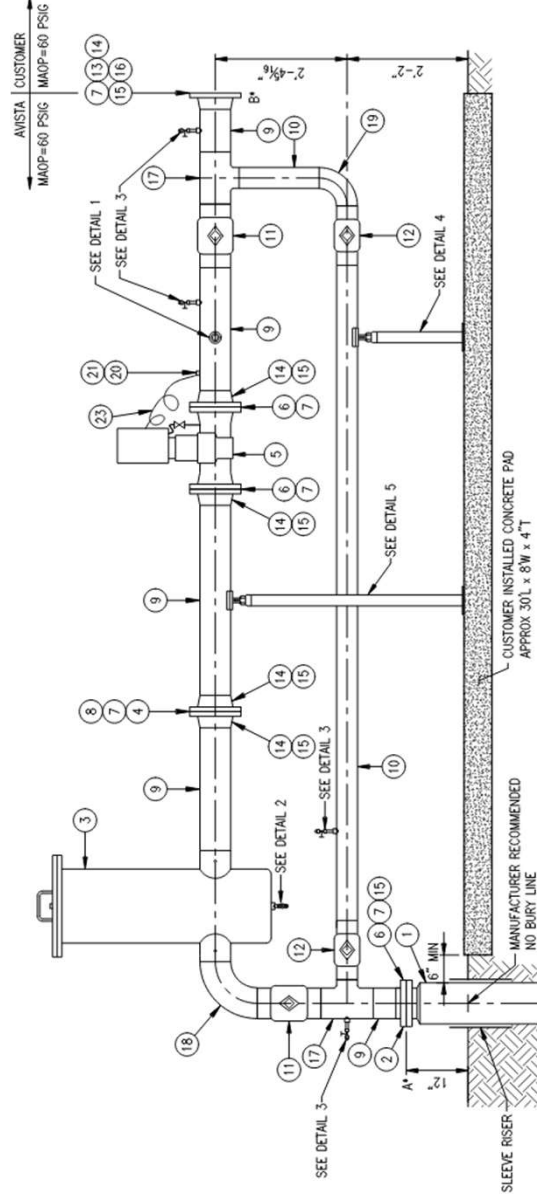
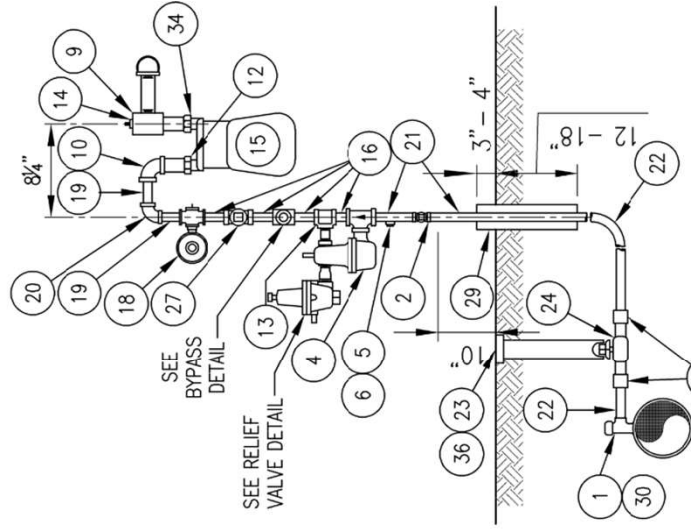
WGMSC 2024

Bryan Phillips, PE

# Why talk about commercial metering?



# There is a lot of variation



## What do we need the meterset to do?

- Reduce pressure to delivery pressure.
- Protect from an overpressure condition.
- Provide pressure relief in the event of a regulator failure.
- Protect the meter from debris/contamination.
- Record and communicate gas usage.
- Reliable, Accurate and Safe.

## Determine Inlet Conditions:

- Inlet MAOP
- Minimum Inlet Pressure – gas planning/ historical data
- Customer Load
- Inlet Velocity

## Determine Outlet Conditions

- Customer's system MAOP
- Delivery Pressure
- Customer Load

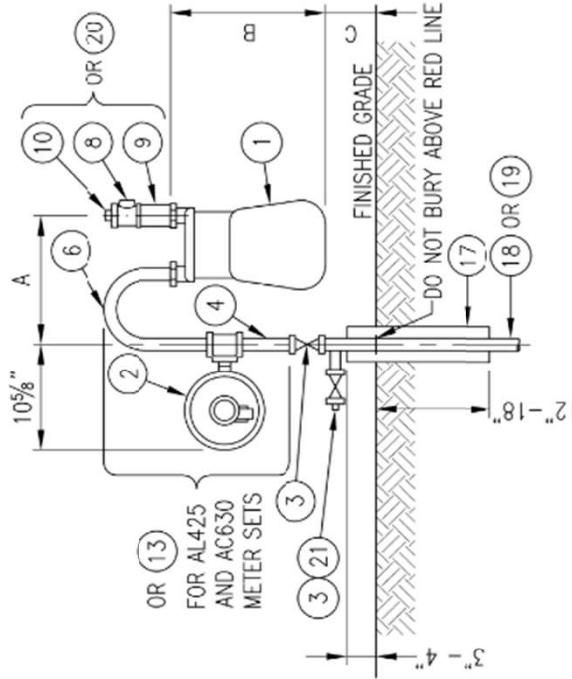
# Meterset Components

- Regulator(s)
- Meter
- Relief Valve
- Strainer/filter
- Index, communications, telemetry, etc.





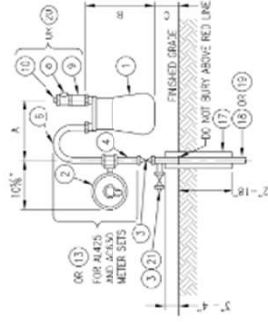
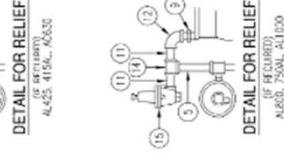
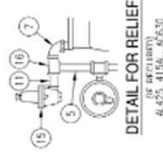
# Small Diaphragm



**TYPICAL SMALL METER SET**  
AL425, 415AL, AC630, AL800  
750AL, AL1000

## MATERIAL LIST

| DESCRIPTION                  | AL425 | WATER SERVICE | AL800 | AL1000 |
|------------------------------|-------|---------------|-------|--------|
| 1. SHANK, RISE TO METER GAIT | 15K   | 15K           | 15K   | 15K    |
| 2. METER SET                 | 15K   | 15K           | 15K   | 15K    |
| 3. METER SET                 | 15K   | 15K           | 15K   | 15K    |
| 4. METER SET                 | 15K   | 15K           | 15K   | 15K    |
| 5. METER SET                 | 15K   | 15K           | 15K   | 15K    |
| 6. METER SET                 | 15K   | 15K           | 15K   | 15K    |
| 7. METER SET                 | 15K   | 15K           | 15K   | 15K    |
| 8. METER SET                 | 15K   | 15K           | 15K   | 15K    |
| 9. METER SET                 | 15K   | 15K           | 15K   | 15K    |
| 10. METER SET                | 15K   | 15K           | 15K   | 15K    |
| 11. METER SET                | 15K   | 15K           | 15K   | 15K    |
| 12. METER SET                | 15K   | 15K           | 15K   | 15K    |
| 13. METER SET                | 15K   | 15K           | 15K   | 15K    |
| 14. METER SET                | 15K   | 15K           | 15K   | 15K    |
| 15. METER SET                | 15K   | 15K           | 15K   | 15K    |
| 16. METER SET                | 15K   | 15K           | 15K   | 15K    |
| 17. METER SET                | 15K   | 15K           | 15K   | 15K    |
| 18. METER SET                | 15K   | 15K           | 15K   | 15K    |
| 19. METER SET                | 15K   | 15K           | 15K   | 15K    |
| 20. METER SET                | 15K   | 15K           | 15K   | 15K    |
| 21. METER SET                | 15K   | 15K           | 15K   | 15K    |



**TYPICAL SMALL METER SET**  
AL425, 415AL, AC630, AL800  
750AL, AL1000

## NOTE:

1. RISE ON REGULATOR SHOULD BE IN THE DOWNWARD POSITION TO PREVENT WATER ACCUMULATION OR NEED TO TURN ALL A TIGHT ELBOW REPAIRED IN A DOWNWARD POSITION.
2. AFTER INSTALLATION REMOVE, CUT DOWN OR PADLOCK 3-WAY VALVE HANDLE.

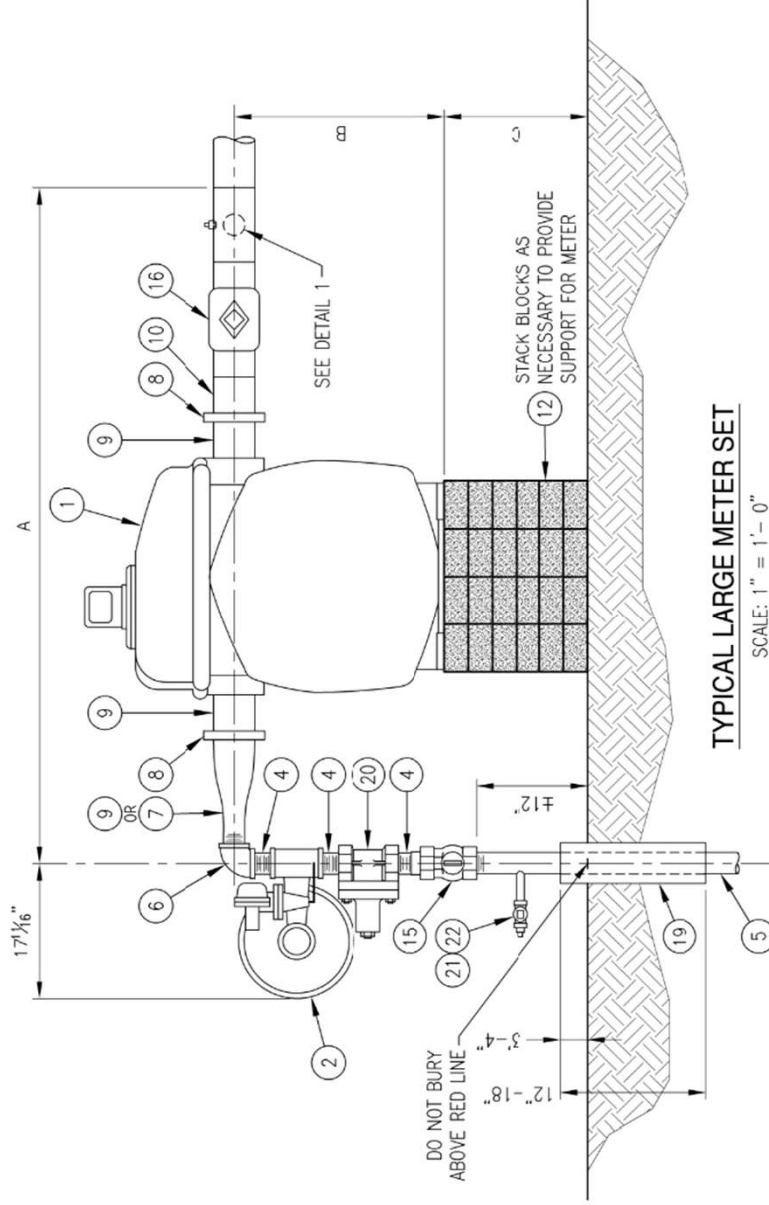
SUPPLIES 8-30308 SHI 1, DATED 2-28-84

DISTRIBUTION: GAS  
METER SETS ON  
STANDARD METER SET  
TYPICAL SMALL DIAPHRAGM METER SETS

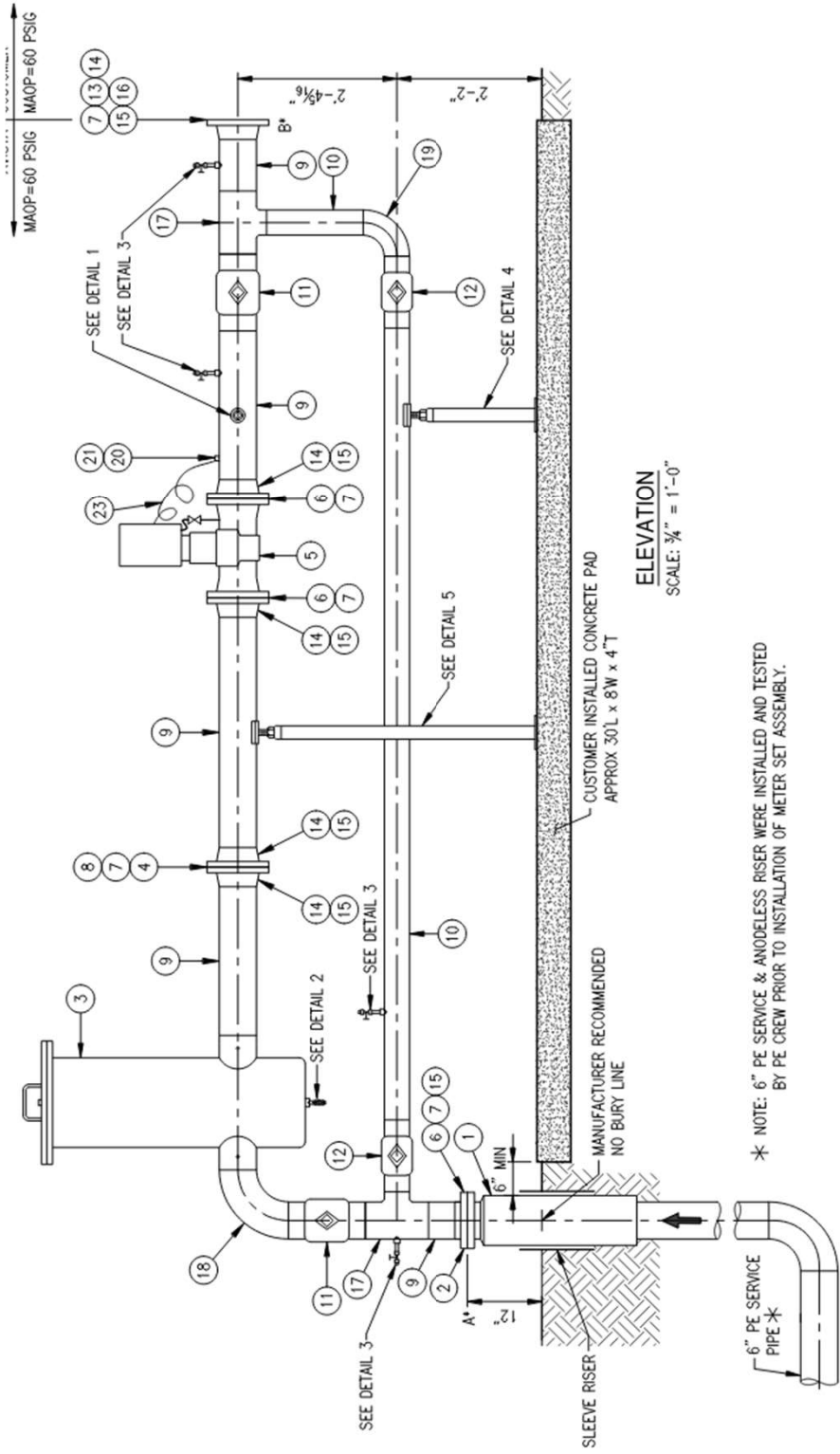
| NO. | DATE     | DESCRIPTION                                     | BY | CHKD. | APP. |
|-----|----------|---|----|-------|------|
| 11  | 8-2-83   | UPGRADE METER VALVE                             |    |       |      |
| 12  | 8-24-82  | REMOVE 20.1 METER SET ASSEMBLY TO MATERIAL LIST |    |       |      |
| 13  | 10-12-81 | UPGRADE THROUGH PLYD                            |    |       |      |
| 14  | 11-15-79 | ADD 4-1 VALVE FOR AL425 METER                   |    |       |      |
| 15  | 9-18-75  | STANDARDIZE UPWARD                              |    |       |      |
| 16  |          |   |    |       |      |
| 17  |          |   |    |       |      |
| 18  |          |   |    |       |      |
| 19  |          |   |    |       |      |
| 20  |          |   |    |       |      |
| 21  |          |   |    |       |      |



# Large Diaphragm



# Turbine



\* NOTE: 6" PE SERVICE & ANODELESS RISER WERE INSTALLED AND TESTED BY PE CREW PRIOR TO INSTALLATION OF METER SET ASSEMBLY.

# Turbine





# Turbine



**DETAIL 1**  
SCALE: NONE  
(1) REQUIRED

**WALL HANGER SECTION A-A**  
SCALE: NONE  
(2) PREFERRED  
(1) REQUIRED NEAR CUSTOMER TE-IN POINT

| MATERIAL LIST |          |     |   |
|---------------|----------|-----|---|
| ITEM          | SIZE     | QTY | STOCK NO DESCRIPTION                                    |
| 1             | 2"       | 1   | METER SHOP ROTARY METER, 3500TC, 3000TC OR 2000TC       |
| 2             | 2"       | 1   | METER SHOP REGULATOR, CLASS "C" (REF: "REG CAP TABLES") |
| 3             | 3/4"     | 1   | SERVICE RISER W/ 3/4" BYPASS                            |
| 4             | 3/4"     | 8   | BOLT, 2" LONG, GRADE 8, YELLOW ZINC PLATED              |
| 5             | 3/4"     | 2   | METER VALVE, 100 PSI, THD, INSULATED, WITH BYPASS PORT  |
| 6             | 2"       | 1   | 3-WAY VALVE, DIVERTER, THD, 400 PSIG                    |
| 7             | 3/4"     | 1   | PLUG, THREADED, CL 3000                                 |
| 8             | 2"       | 1   | U-BEND, 2" NPT x 2" FLAT FACE FLANGE, ANSI 150          |
| 9             | 2"       | 1   | UNION, THD, WALL IRON, CL 150, INSULATED                |
| 10            | 2 x 3/4" | 1   | SWAGE, THD x THD, SCH 80                                |
| 11            | 4"       | 2   | CORRUGATED PVC  |
| 12            | 2"       | 1   | DRESSER TYPE 351 STRAINER, THD, 175 PSIG                |
| 13            | 1/2"     | 1   | VALVE, BALL, THD, 600 PSIG                              |
| 14            | 2"       | 2   | PIPE, NIPPLE, 4" LONG, THD x THD, SCH 40                |
| 15            | 2"       | 1   | PLUG, THREADED, CL 3000                                 |
| 16            | 2"       | 1   | FLANGE, THD, ANSI 150, FLAT FACED                       |
| 17            | 2"       | 2   | GASKET, ANSI 150, TYPE E, FLAT FACED                    |
| 18            | 2"       | 1   | PIPE, NIPPLE, 6" LONG, THD x THD, SCH 40                |
| 19            | 2"       | 1   | METER SHOP REGULATOR, CLASS "D" (REF: "REG CAP TABLES") |
| 20            | 1/2"     | 1   | THREAD-O-LET, CL 3000                                   |
| 21            | 3/4"     | 1   | PETE'S PLUG, 1,000 PSIG                                 |
| 22            | 3/4"     | 1   | INSULATING MATERIAL                                     |
| 23            | 1/2"     | 1   | NIPPLE, THD, 1/2" L, SCH 80                             |

**CONSTRUCTION NOTES**

SUBJECT TO 80 PSI MIN. PRESSURE TEST PRIOR TO INSTALLATION OF REGULATORS.  
TEST W/SPRING GAGE FOR 1 HR MIN. SOAP TEST AT OPERATING PRESSURE AFTER GAS TURN ON.

REMOVE ALL RUST AND SCALE, APPLY ONE COAT OF PRIMER AND TWO COATS OF GRAY METER ENAMEL.

BRACES TO BE FABRICATED IN THE FIELD. IF UNABLE TO CONNECT BRACE TO BUILDING, USE A GROUND SUPPORT.

NOTES CLEAN INTERNAL PIPE OF WELD SLAG PRIOR TO INSTALLATION OF METER.

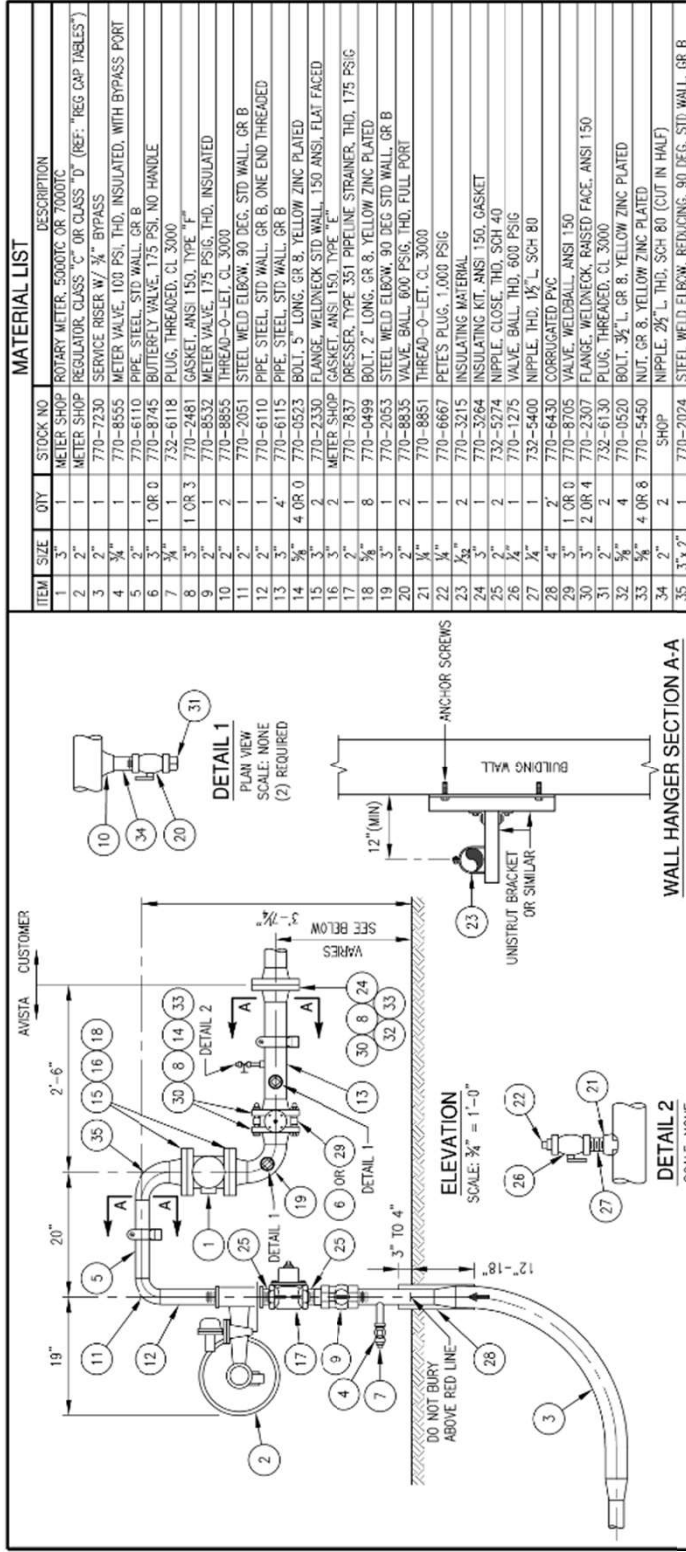
LEVEL MTR LEVEL METER TO WITHIN 1/8" PER FOOT.

REG VENT VENT ON REGULATOR SHOULD BE IN DOWNWARD POSITION TO PREVENT WATER ACCUMULATION OR A VENT ELBOW INSTALLED IN THE DOWNWARD POSITION.

SUPPLEMENTAL VALVE IS ALSO REQUIRED. REFER TO THE GAS STANDARDS MANUAL SPECIFICATION 2.24 METER SET REGULATOR TABLES FOR INFORMATION ON SELECTING THE CORRECT RELIEF VALVE.

| DISTRIBUTION - GAS                                       |     |      |         |
|--|-----|------|---------|
| STANDARD METER SET FOR 2000, 3000 AND 3500 ROTARY METERS |     |      |         |
| INTERMEDIATE DELIVERY PRESSURE: 7" WC, 2 OR 5 PSI        |     |      |         |
| TJH  | NRS | DATE | 3-03-93 |
| TJH  | NRS | DATE | 3-03-93 |
| CGD  | NRS | DATE | 3-03-93 |
| CGD  | NRS | DATE | 3-03-93 |
| TLB  | NRS | DATE | 3-03-93 |
| BY   | CKD | DATE | 3-03-93 |





| MATERIAL LIST |   |
|---------------|---|
| ITEM          | DESCRIPTION   |
| 1             | 1 MEYER SHOP ROTARY METER, 5000TC OR 7000TC                           |
| 2             | 1 MEYER SHOP REGULATOR CLASS "C" OR CLASS "D" (REF: "REG CAP TABLES") |
| 3             | 1 SERVICE RISER W/ 3/4" BYPASS  |
| 4             | 1 METER VALVE, 100 PSI, THD, INSULATED, WITH BYPASS PORT              |
| 5             | 1 PIPE, STEEL, STD WALL, GR B   |
| 6             | 1 BUTTERFLY VALVE 175 PSI, NO HANDLE                                  |
| 7             | 1 PLUG, THREADED, CL 3000   |
| 8             | 1 GASKET, ANSI 150, TYPE "F"  |
| 9             | 1 METER VALVE, 175 PSI, THD, INSULATED                                |
| 10            | 1 THREAD-O-LET, CL 3000   |
| 11            | 1 STEEL WELD ELBOW, 90 DEG, STD WALL, GR B                            |
| 12            | 1 PIPE, STEEL, STD WALL, GR B, ONE END THREADED                       |
| 13            | 1 PIPE, STEEL, STD WALL, GR B   |
| 14            | 1 BOLT, 1/2" LONG, GR 8, YELLOW ZINC PLATED                           |
| 15            | 1 FLANGE, WELDNCK, STD WALL, 150 ANSI, FLAT FACED                     |
| 16            | 1 MEYER SHOP GASKET, ANSI 150, TYPE "E"                               |
| 17            | 1 DRESSER, TYPE 351 PIPELINE STRAINER, THD, 175 PSI                   |
| 18            | 1 BOLT, 2" LONG, GR 8, YELLOW ZINC PLATED                             |
| 19            | 1 STEEL WELD ELBOW, 90 DEG STD WALL, GR B                             |
| 20            | 1 VALVE, BALL, 600 PSIG, THD, FULL PORT                               |
| 21            | 1 THREAD-O-LET, CL 3000   |
| 22            | 1 PETE'S PLUG, 1,000 PSIG   |
| 23            | 1 INSULATING MATERIAL   |
| 24            | 1 NIPPLE, CLOSE, THD, SCH 40  |
| 25            | 1 NIPPLE, CLOSE, THD, SCH 40  |
| 26            | 1 VALVE, BALL, THD, 600 PSIG  |
| 27            | 1 NIPPLE, THD, 1/2" L, SCH 80   |
| 28            | 1 CORRUGATED PVC  |
| 29            | 1 VALVE, WELDNCK, ANSI 150  |
| 30            | 1 FLANGE, WELDNCK, RAISED FACE, ANSI 150                              |
| 31            | 1 PLUG, THREADED, CL 3000   |
| 32            | 1 BOLT, 3/8" L, GR 8, YELLOW ZINC PLATED                              |
| 33            | 1 SHOP NIPPLE, 2 1/2" L, THD, SCH 80 (CUT IN HALF)                    |
| 34            | 1 STEEL WELD ELBOW, REDUCING, 90 DEG, STD WALL, GR B                  |
| 35            | 1 STEEL WELD ELBOW, REDUCING, 90 DEG, STD WALL, GR B                  |

**CONSTRUCTION NOTES**

- SUBJECT TO 90 PSI MIN. PRESSURE TEST PRIOR TO INSTALLATION OF REGULATORS, TEST W/SPRING GAGE FOR 1 HR. MIN. SOAP TEST AT OPERATING PRESSURE AFTER GAS TURN ON.
- REMOVE ALL RUST AND SCALE. APPLY ONE COAT OF PRIMER AND TWO COATS OF GRAY METER ENAMEL.
- BRACES TO BE FABRICATED IN THE FIELD. IF UNABLE TO CONNECT BRACE TO BUILDING, USE A GROUND SUPPORT.
- CLEAN INTERNAL PIPE OF WELD SLAG PRIOR TO INSTALLATION OF METER.
- LEVEL METER TO WITHIN 1/8" PER FOOT.
- VENT ON REGULATOR SHOULD BE IN DOWNWARD POSITION TO PREVENT WATER ACCUMULATION OR A VENT ELBOW INSTALLED IN THE DOWNWARD POSITION.
- IF A CL-31-IMRV OR CL-38-2IMRV REGULATOR IS USED, A SUPPLEMENTAL RELIEF VALVE IS ALSO REQUIRED. REFER TO THE GAS STANDARDS MANUAL SPECIFICATION 2.24 METER SET REGULATORS FOR INFORMATION ON SELECTING THE CORRECT RELIEF VALVE.

**WALL HANGER SECTION A-A**  
SCALE: NONE  
(2) PREFERRED  
(1) REQUIRED NEAR CUSTOMER TIE-IN POINT

**DETAIL 1**  
SCALE: NONE  
(2) REQUIRED

**DETAIL 2**  
SCALE: NONE  
(1) REQUIRED

**REVISION**

| NO | DATE     | BY  | CHK | DO  | NO | OF |
|----|----------|---|-----|-----|----|----|
| 13 | 9-5-23   | UPDATE RISER BYPASS PORT VALVE            | TJH | JRS |    |    |
| 12 | 8-24-22  | UPDATE RISER STOCK NUMBER                 | TJH | JRS |    |    |
| 11 | 10-12-21 | UPDATED THREADED PLUG                     | CGD | JRS |    |    |
| 10 | 10-10-19 | ADDED PROVER PORT AND REVISED WALL HANGER | CGD | JRS |    |    |
| 9  | 8-31-18  | ADD SUPPLEMENTAL RELIEF VALVE NOTE        | TJB | CGD |    |    |

**APPROVED**  
DATE: 3-03-23  
DATE: 3-03-23  
DATE: 3-03-23

**NOTE:**  
SEE A-34175 FOR GROUND PIPE SUPPORT STANDARDS  
OUTLET PIPING TO GRADE: 7000 = 22.5" 5000 = 25.5"

**DIMENSIONS**  
OUTLET PIPING TO GRADE: 7000 = 22.5" 5000 = 25.5"

**DISTRIBUTION - GAS STANDARD METER SET 5000 AND 7000 ROTARY METERS INTERMEDIATE DELIVERY PRESSURE: 7" WC, 2 OR 5 PSI**

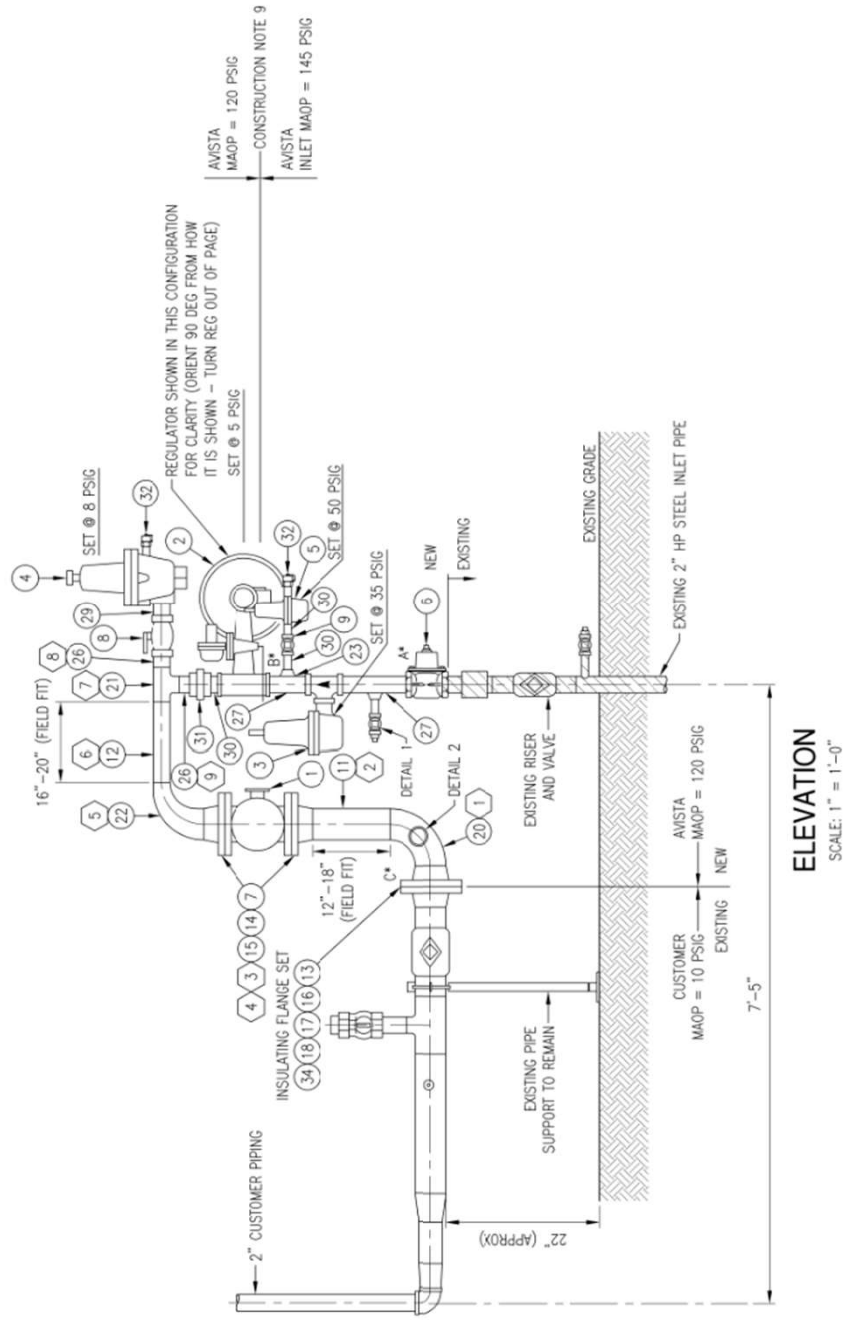
AVISTA CORP  
SPOKANE, WASHINGTON

# A Challenging Rotary Design





# A Challenging Rotary Design



## Additional Considerations

- Maintenance Access
- Clearances / Area Class
- Cathodic Protection
- Supports
- Meterset Protection

## Design Aid – 3D Scanner (iPhone)



18 SiteScape LiDAR scanner app for iPhone - A quick, accurate way to gather field data.

# Questions?