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 REUSE OF DOCUMENTS: THESE DOCUMENTS AND DESIGNS PROVIDED BY PROFESSIONAL SERVICE, INCORPORATED HEREIN, ARE THE PROPERTY OF CDM SMITH AND ARE NOT TO BE USED, IN WHOLE OR PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF CDM SMITH.

| PROCESS MECHANICAL SYMBOLS AND ABBREVIATIONS | |
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| | UNCLASSIFIED, TYPE AS SHOWN ON THE DRAWING ADJACENT TO SYMBOL |
| | GATE VALVE (GV) |
| | KNIFE GATE VALVE (VKG) |
| | GLOBE VALVE (GLV) |
| | BALL VALVE (VB) |
| | 3-WAY BALL VALVE (BV3) |
| | 4-WAY BALL VALVE (BV4) |
| | RECYCLE CONTROL VALVE (RCV) |
| | CONE VALVE (CNV) |
| | NEEDLE VALVE (NV) |
| | PINCH VALVE (PNV), (PIV) |
| | DIAPHRAGM VALVE (DV) |
| | BUTTERFLY VALVE (VBF) |
| | PLUG VALVE (NORMALLY OPEN) (VPG) |
| | PLUG VALVE (NORMALLY CLOSED) (VPG) |
| | 3-WAY PLUG VALVE (PV3) |
| | 4-WAY PLUG VALVE (PV4) |
| | SWING CHECK VALVE (VCK) |
| | BALL CHECK VALVE (VBM) |
| | DOUBLE DOOR CHECK VALVE (DDCV) |
| | SOLENOID VALVE (SV) |
| | MOTOR OPERATED VALVE (MOV) |
| | 3-WAY SOLENOID VALVE (SV3) |
| | 4-WAY SOLENOID VALVE (SV4) |
| | ANGLE VALVE (AV) |
| | QUICK CONNECT COUPLING (QCC) |
| | ELASTOMER CHECK VALVE (ECV) |
| | SLIDE GATE (SLG) |
| | WEIR SLIDE GATE (WG) |
| | STOP PLATE GUIDES (SPG) |
| | FLAP VALVE (FLV), (FV) |
| | SHEAR GATE (SHG) |
| | MUD VALVE (MV) |
| | PRESSURE REDUCING REGULATOR SELF CONTAINED (PCV) |
| | PRESSURE VACUUM RELIEF VALVE (PVRV) |
| | LEVEL INDICATING TRANSMITTER (LIT) |

| PROCESS MECHANICAL SYMBOLS | |
|----------------------------|--|
| | DIAPHRAGM, SPRING OPPOSED |
| | DIAPHRAGM, SPRING OPPOSED WITH POSITIONER |
| | DIAPHRAGM, PRESSURE-BALANCED |
| | ROTARY MOTOR, (SHOWN TYPICALLY WITH ELECTRIC SIGNAL MAY BE HYDRAULIC OR PNEUMATIC) |
| | SOLENOID |
| | CYLINDER, SINGLE-ACTING SPRING OPPOSED WITHOUT POSITIONER OR PILOT |
| | CYLINDER, DOUBLE ACTING, WITHOUT POSITIONER OR PILOT |
| | EXAMPLE OF CYLINDER WITH POSITIONER |
| | ANY CYLINDER THAT IS ASSEMBLED WITH A PILOT SO THAT ASSEMBLY IS ACTUATED BY ONE CONTROLLED INPUT, PILOT MAY BE POSITIONER SOLENOID VALVE, SIGNAL CONVERTER |
| | FLOAT ACTUATOR |
| | FLOAT ACTUATOR WITH PILOT VALVE |
| | PNEUMATIC |

| EQUIPMENT TAG* | |
|----------------|----------------|
| | EQUIPMENT TAG* |

| VALVE TAG* | |
|------------|------------|
| | VALVE TAG* |

| PIPE TAG | |
|----------|----------|
| | PIPE TAG |

| PROCESS VALVE LOOP IDENTIFICATION | |
|-----------------------------------|---|
| | INDICATES DEVICE FURNISHED BY EQUIPMENT VENDOR |
| | FUNCTION IDENTIFICATION CONFORMING TO CURRENT ISSUE OF "ISA STD. ISA-SS-1" (EX: FLOW CONTROL VALVE) |
| | INSTRUMENT LOOP NUMBER |

| TYPICAL INSTRUMENTATION AND LOOP TAG | |
|--------------------------------------|--------------------------------------|
| | TYPICAL INSTRUMENTATION AND LOOP TAG |

| PIPE AND FITTING SYMBOLS | |
|---------------------------|---|
| DOUBLE LINE PIPING | SINGLE LINE PIPING |
| | PROCESS PIPING |
| | EXISTING PROCESS PIPING |
| | FUTURE PROCESS PIPING |
| | WELDED JOINT |
| | FLANGED JOINT SIMPLIFIED REPRESENTATION (SEE NOTE 1) |
| | FLANGED JOINT (SEE NOTE 1) |
| | COUPLING FOR GROOVED END JOINTS |
| | ⓕ FLEXIBLE Ⓡ RIGID |
| | MECHANICAL JOINT (SEE NOTE 1) |
| | PUSH ON JOINT OR CAULKED BELL & SPIGOT JOINT (SEE NOTE 1) |
| | FLANGED x PLAIN END PIPE COUPLING (FLANGE ADAPTOR) |
| | PIPE COUPLING (SLEEVE-TYPE) |
| | RESTRAINED COUPLING |
| | FLEXIBLE COUPLING OR EXPANSION JOINT (SLEEVE TYPE) |
| | FLEXIBLE COUPLING OR EXPANSION JOINT (BELLOWS TYPE) |
| | FLANGE GUARD |

| PIPE AND FITTING SYMBOLS NOTES: | |
|---------------------------------|---|
| 1. | GENERIC JOINT SYMBOL IS USED FOR ALL SINGLE LINE PIPING SHOWN ON THE INTERIOR AND EXTERIOR PIPING DRAWING. |
| 2. | BOTH DETAILED AND SIMPLIFIED FLANGE REPRESENTATION SYMBOL MAY BE SHOWN ON THE DRAWING. |
| 3. | UNLESS MODIFIED BY THE GENERAL PROJECT NOTES OR DETAILED ON THE LAYOUT AND SCHEMATIC DRAWINGS PIPE AND FITTING JOINT REQUIREMENTS FOR THE VARIOUS PIPE MATERIALS ARE DEFINED IN THE SPECIFICATIONS AND ARE INDICATED ON THE PROCESS PIPE SCHEDULES. |

| LEGENDS SYMBOLS AND ABBREVIATIONS SHOWN ON GENERAL SHEETS INDICATE STANDARD SYMBOLS AND ABBREVIATIONS AND ARE PERTINENT TO THE CONDITIONS ON THIS SET OF DRAWINGS TO THE EXTENT APPLICABLE. | |
|---|--|
| ADDITIONAL LEGENDS AND/OR ABBREVIATIONS MAY APPEAR IN THIS SET OF CONTRACT DOCUMENTS TO INDICATE SPECIFIC CONDITIONS. | |

| PROCESS PIPE IDENTIFICATION* | |
|------------------------------|----------------------------------|
| PROCESS FLOW STREAMS | |
| AFF | ABOVE FINISHED FLOOR |
| BS | BLENDED SLUDGE |
| C | CONDENSATE PIPING |
| CW | COLD WATER, CITY WATER |
| CWS | CHILLED WATER/GLYCOL SUPPLY |
| CWR | CHILLED WATER/GLYCOL RETURN |
| D, DR | DRAIN |
| DG | DIGESTER GAS |
| DS | DIGESTED SLUDGE |
| EFF | EFFLUENT |
| EW | EMERGENCY WATER |
| EX | EXHAUST |
| FA | FOUL AIR |
| FD | FILTRATE DRAIN |
| FILL | FILL LINE |
| GS | GAS |
| GTO | GRAVITY THICKENER OVERFLOW |
| HRTF | HIGH RATE TRICKLING FILTER |
| HWR | HOT WATER RETURN |
| HWS | HOT WATER SUPPLY |
| INF | INFLENT |
| IRR | IRRIGATION |
| LPA | LOW PRESSURE AIR (FROM BLOWERS) |
| LRTF | LOW RATE TRICKLING FILTER |
| NG | NATURAL GAS |
| NPW | NON POTABLE WATER |
| OC, ODC | ODOR CONTROL |
| OV | OVERFLOW |
| POLD | POLYMER DRY |
| POLS | POLYMER SOLUTION |
| POT | POTABLE |
| PSL | PRIMARY SLUDGE |
| PW | PROTECTED WATER |
| QCC | QUICK CONNECT COUPLING |
| RCSL | RECIRCULATED SLUDGE |
| REC | RECYCLE |
| RL | RAIN WATER LEADER |
| RP | RECYCLE PUMP |
| RW | RAW WATER |
| SA | SUPPLEMENTAL AIR |
| SAM | SAMPLE |
| SAN,SSW | SANITARY SEWER |
| SCUM | SCUM |
| SL | SLUDGE |
| SLD | SLUDGE DRAIN |
| SMP | SCUM PUMP DISCHARGE |
| SNT | SUPERNATANT |
| SPT | SEPTAGE |
| STW | STORM WATER |
| TWAS | THICKENED WASTE ACTIVATED SLUDGE |
| TKD | TANK DRAIN |
| TS | THICKENED SLUDGE |
| V,VT,VNT | VENT |
| WAW | WASHWATER |
| WAS | WASTE ACTIVATED SLUDGE |
| WSL | WASTE SLUDGE |

| PIPE MATERIALS | |
|----------------|------------------------------------|
| BS | BLACK STEEL PIPE |
| CI | CAST IRON |
| CISP | CAST IRON SOIL PIPE |
| CPVC | CHLORINATED POLYVINYL CHLORIDE |
| CU | COPPER |
| DI | DUCTILE IRON |
| FRP | FIBERGLASS REINFORCED PLASTIC |
| GLDI | GLASS LINED DUCTILE IRON |
| GS | GALVANIZED STEEL |
| HDPE | HIGH DENSITY POLYETHYLENE |
| KCU | TYPE K COPPER |
| LCU | TYPE L COPPER |
| PCCP | PRESTRESSED CONCRETE CYLINDER PIPE |
| PVC | POLYVINYL CHLORIDE PRESSURE PIPE |
| POLYP | POLYPROPYLENE |
| PPSTL | POLYPROPYLENE LINED STEEL PIPE |
| PWHPE | PROFILE WALL HDPE |
| RCP | REINFORCED CONCRETE SEWER PIPE |
| RUB | RUBBER |
| SS | STAINLESS STEEL |
| STL | STEEL |
| SVHCI | SV HUB AND SPIGOT CAST IRON |

| PIPE JOINTS | |
|-------------|------------------|
| FLG | FLANGE |
| PE | PLAIN END |
| MJ | MECHANICAL JOINT |

* REFER TO PIPING SPECIFICATIONS FOR ADDITIONAL DETAILS

| PROCESS MECHANICAL NOTES | |
|--------------------------|--|
| 1. | PROCESS EQUIPMENT DIMENSIONS, LOCATIONS, CONNECTIONS, AND PIPING SYSTEM LAYOUTS ARE BASED ON EQUIPMENT SELECTED AND SPECIFIED BY THE ENGINEER. IF THE CONTRACTOR PROPOSES TO FURNISH EQUIPMENT THAT REQUIRES AN ARRANGEMENT, CONNECTIONS, OR SPACE DIFFERING FROM THAT INDICATED ON THE DRAWINGS OR SPECIFIED, THE CONTRACTOR SHALL PREPARE AND SUBMIT TO THE OWNER AND THE ENGINEER FOR APPROVAL. DETAILED ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING, INSTRUMENTATION, HVAC AND ELECTRICAL DRAWINGS AND EQUIPMENT LISTS SHOWING ALL NECESSARY CHANGES AND EMBODYING ALL FEATURES OF THE EQUIPMENT AND/OR PROCESS SYSTEM PROPOSED. THIS INFORMATION SHALL INCLUDE BUT NOT BE LIMITED TO PLANS, SECTIONS, DETAILS AND SCHEMATICS OF ALL APPURTENANCES REQUIRED. SUCH CHANGES, IF ACCEPTED BY THE ENGINEER, SHALL BE AT NO EXTRA COST TO THE OWNER AND SHALL NOT PRODUCE A TIME DELAY OF THE PROJECT. THE CONTRACTOR SHALL ASSUME THE COST OF, AND THE RESPONSIBILITY FOR SATISFACTORILY ACCOMPLISHING ALL THE NECESSARY CHANGES REQUIRED FOR THE DIMENSIONS AND CHARACTERISTICS OF THE EQUIPMENT SUBMITTED AND ACCEPTED BY THE ENGINEER WITHIN THE CONTRACT TIME LIMITS. REFER TO SPECIFICATIONS FOR FURTHER DETAILS. |
| 2. | OPERATION OF EXISTING FACILITIES: ANY VALVE, GATE, PUMP OR OTHER EQUIPMENT OR CONTROL DEVICE ON EXISTING FACILITIES SHALL ONLY BE OPERATED BY PERSONNEL FROM THE OWNER. THE CONTRACTOR SHALL NOT OPERATE ANY EXISTING ITEMS EXCEPT IN AN EMERGENCY. WHEN THE OPERATION OF ANY EXISTING EQUIPMENT IS REQUIRED FOR CONSTRUCTION, THE ITEM'S OWNER SHALL BE GIVEN A WRITTEN REQUEST A MINIMUM OF 72 HOURS IN ADVANCE. |
| 3. | SIZES OF EQUIPMENT FOUNDATIONS AND EQUIPMENT PADS INDICATED ON THE DRAWINGS ARE APPROXIMATE. EXACT DIMENSIONS SHALL BE DETERMINED BY THE CONTRACTOR FOR THE EQUIPMENT FURNISHED. ALL FLOOR MOUNTED EQUIPMENT SHALL BE SET ON CONCRETE PADS CONFORMING TO DETAILS SHOWN ON THE STRUCTURAL AND/OR MECHANICAL DRAWINGS. |
| 4. | APPLICABLE EXTERIOR PIPING IS SHOWN ON THE SITE PLAN. |
| 5. | PROTECTED WATER SUPPLY CONNECTIONS TO PROCESS EQUIPMENT AND PROCESS PIPES ARE SHOWN ON THE MECHANICAL DRAWINGS. DETAILS OF CONTROL VALVE STATIONS, MAKE-UP WATER CONNECTIONS, AND FLUSHING CONNECTIONS ETC, ARE SHOWN ON THE MECHANICAL DRAWINGS. IF APPLICABLE, LIMITS OF WORK ARE SHOWN ON THE MECHANICAL DRAWINGS. |
| 6. | DIELECTRIC COUPLINGS, FLANGES OR UNIONS SHALL BE INSTALLED AT ALL CONNECTIONS OF COPPER PIPE OR DISSIMILAR PIPE TO OTHER TYPES OF METALLIC PIPING. |
| 7. | MECHANICAL PLANS AND SECTIONS DO NOT SHOW ALL VALVES, GAUGES, SWITCHES, OPERATORS, DRAINS, VENTS, ETC. REQUIRED FOR THE COMPLETE SYSTEM. CERTAIN SMALL DIAMETER PROCESS PIPING RUNS (3" AND SMALLER) MAY NOT BE SHOWN IN THEIR ENTIRETY. GENERALLY SMALL PIPING IS SHOWN DIAGRAMMATICALLY IN THE PROCESS SCHEMATICS. FIELD ROUTE TO AVOID INTERFERENCES, SUBJECT TO THE APPROVAL OF THE ENGINEER. |
| 8. | THE CONTRACTOR SHALL FURNISH, AND INSTALL ALL PIPING SYSTEMS AND TEST AS INDICATED ON THE PROCESS & INSTRUMENTATION DIAGRAMS AND/OR AS DEFINED BY PROCESS PIPING SCHEDULES TO PROVIDE THE COMPLETE SYSTEM. |
| 9. | UNLESS OTHERWISE SHOWN ON THE MECHANICAL DRAWINGS ALL FLOOR SLAB, WALL AND TANK PENETRATIONS SHALL BE AS SHOWN ON THE PENETRATION DETAILS INCLUDED IN THE MECHANICAL CONSTRUCTION DETAILS. ABOVE GROUND EXTERIOR WALL AND ROOF PENETRATIONS SHALL BE AS SHOWN ON THE MECHANICAL DRAWINGS. IF APPROVED BY ENGINEER, THE CONTRACTOR MAY SUBSTITUTE ALTERNATE METHODS PROVIDING THEY MEET INTENDED DESIGN REQUIREMENTS AND HAVE NO CHANGE IN CONTRACT PRICE OR SCHEDULE. |
| 10. | NOT ALL AND ONLY CERTAIN TYPES OF PIPE SUPPORTS ARE SHOWN ON THE DRAWINGS, PIPE SUPPORTS INDICATED ON THE DRAWINGS ARE SHOWN ONLY TO CONVEY THE INTENT OF THE DESIGN FOR A PARTICULAR LOCATION AND ARE NOT INTENDED TO REPRESENT A COMPLETE SYSTEM. ALL PIPE SUPPORTS - INCLUDING THOSE SHOWN CONCEPTUALLY ON THE DRAWINGS - SHALL BE DESIGNED, FURNISHED, AND INSTALLED BY THE CONTRACTOR AS SPECIFIED AND TO THE APPROVAL OF THE ENGINEER. NOTE THAT ALL PIPING ADJACENT TO EQUIPMENT, VALVES, COUPLINGS, INSTRUMENT DEVICES AND OTHER APPURTENANCES SHALL BE PROPERLY SUPPORTED AND/OR ANCHORED ACCORDING TO MANUFACTURERS RECOMMENDATIONS. |
| 11. | ALL EQUIPMENT BASES AND PIPING HAVING DRAIN OUTLETS SHALL BE PIPED TO THE NEAREST OPEN END DRAIN (OED) OR TRENCH DRAIN USING SCH 80 PVC PIPE OF APPROPRIATE DIAMETER AS INDICATED ON THE DRAWINGS OR AS RECOMMENDED BY THE EQUIPMENT MANUFACTURER. |
| 12. | UNLESS OTHERWISE NOTED ALL PIPES UNDER CONCRETE SLABS OR FOUNDATIONS SHALL BE ENCASED IN CONCRETE AS SHOWN ON THE PROCESS MECHANICAL DRAWINGS. ALL PIPING ENCASED IN CONCRETE SHALL HAVE MECHANICAL JOINTS AT ALL STRUCTURAL EXPANSION JOINTS. |
| 13. | NOT ALL VALVE AND GATE OPERATORS ARE SHOWN (I.E. HANDWHEELS, CRANKS, CHAINWHEELS, MOTORS OR LEVERS). OPERATORS SHALL BE LOCATED TO ALLOW SAFE, CONVENIENT OPENING AND CLOSING OF VALVES OR GATES. ORIENTATION OF OPERATORS SHALL BE TO APPROVAL OF OWNER AND ENGINEER. |
| 14. | PIPING SHALL BE INSTALLED SO THAT ANY PIPE, LAYER OF PIPING OR EQUIPMENT CAN BE REMOVED WITHOUT DISTURBING REMAINING PIPES AND SUPPORTS. |
| 15. | THE NUMBER OF UNIONS AND OTHER TYPES OF DISMANTLING COUPLINGS SHOWN IS APPROXIMATE. THE CONTRACTOR SHALL PROVIDE UNIONS OR DISMANTLING COUPLINGS WHETHER THEY ARE SHOWN ON THE DRAWINGS OR NOT ON ALL PIPELINES WITH WELDED, THREADED OR SOLVENT CEMENTED JOINTS: AT ALL EQUIPMENT CONNECTIONS, AT A MINIMUM EVERY 50 FEET AND IN BRANCH LINES TO ALLOW CONVENIENT REMOVAL OF PIPING, EQUIPMENT AND APPURTENANCES. |
| 16. | FURNISH AND INSTALL ESCUTCHEON PLATES OF SUITABLE SIZE ON ALL PROCESS LINES PASSING THROUGH INTERIOR WALLS OF NON-PROCESS AREAS SUCH AS OFFICES, LABS, LOCKER ROOMS, TOILETS AND PUBLIC CORRIDORS. ESCUTCHEON PLATES SHALL BE INSTALLED ON THE INTERIOR SIDE OF THE NON-PROCESS ROOMS. EXTERIOR, ABOVE GROUND WALL PENETRATIONS SHALL SPLIT AND BE MADE OF 316 SS. |
| 17. | THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD LOCATING AND TAGGING ALL PROCESS PIPING VALVES AND EQUIPMENT. PROCESS IDENTIFICATION SYSTEM SHALL BE AS DETAILED IN THE SPECIFICATIONS. |
| 18. | AREA CLASSIFICATIONS (INCLUDING CORROSION) ARE SHOWN ON THE ELECTRICAL DRAWINGS. ALL PROCESS MECHANICAL EQUIPMENT, INSTALLATION, AND CONNECTIONS SHALL COMPLY WITH THE AREA CLASSIFICATION REQUIREMENTS (INCLUDING CORROSION RESISTANCE) FOR THE SPACE THEY ARE LOCATED IN. |
| 19. | PORTIONS OF NON-PROCESS PIPING (HVAC & PLUMBING) MAY BE SHOWN FOR CLARITY AND FOR COORDINATION BETWEEN DISCIPLINES. REFER TO APPROPRIATE DRAWINGS AND SPECIFICATIONS. |
| 20. | FOR PUMP SEAL WATER, VENT, DRAIN, PRESSURE GAGE, VALVING, AND PIPING SEE PROCESS MECHANICAL DETAILS. |
| 21. | ALL PIPING AND PROCESS SYSTEMS SHALL BE CAPABLE OF BEING VENTED AND DRAINED. TYPICAL LOCATIONS ARE INDICATED BY (V, VT, VNT) OR (D, DR) ON THE DRAWINGS. |
| 22. | WHERE PIPES CHANGE DIRECTION FROM HORIZONTAL TO VERTICAL VIA A BEND, A WELDED OR CAST BASE ELBOW SUPPORT SHALL BE INSTALLED. |



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| DESIGNED BY: _____ | K. ROOD |
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CITY OF WICHITA, KANSAS
 WATER AND SEWER DEPARTMENT
**SEWAGE TREATMENT PLANT NO.2 IMPROVMENTS
 UV DISINFECTION**

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| MECHANICAL NOTES, LEGEND AND ABBREVIATIONS | |
| PROJECT NO. | 2395-104609 |
| FILE NAME: | MGNPL001 |
| SHEET NO. | M-1 |