April 16, 2019

Ms. Nina Ruiz
El Paso County Community Services Department
Planning Division
2880 International Circle, Suite 110
Colorado Springs, CO 80910

Subject: Security Construction Drawings – Response to EPC Comments

Dear Ms. Ruiz,

With regards to the comments provided on the construction drawings, AECOM will make the following revisions / additions to the project:

- AECOM will implement relevant EPC standards for areas impacted within EPC ROW. Attached are the highlighted standards from Appendix F that are applicable to the construction of the Security Drinking Water Mitigaiton System. The drawing standards will be provided to the contractor prior to the start of construction.
- Security Water District has directed the pipeline to be installed 4 feet below grade, and not at a buried depth of 5 feet. This direction was provided to AECOM as part of the 30% design review comments through GMS, Inc Consulting Engineers who is retained by Security Water District for engineering services. Please see comment E.1.a for documentation of the acceptable pipe cover. Therefore, the pipeline will be constructed at a buried depth of 4 feet based on the direction provided by Security Water District.

Sincerely,

Bill Wemmert

Bill Wemmert, PE

Attachment

Attachment A – Annotated Appendix F

Attachment B – Security Water District's 30% Design Comments

APPENDIX F STANDARD DRAWINGS

Note: Drawings are listed by chapter and then sequential (intentional gaps in the numbering have been placed to allow for future additions). These Standard Drawings remain products in progress and will continue to be updated as necessary through an administrative process. Only those with listed Approval Dates shall be considered a standard and all others are presented for "reference" purposes only until such date that they are fully accepted by the ECM Administrator.

File Name	Detail/Description	Approval Date
SD_2-1	Urban Local Roadway (low volume)	12/31/2005
SD_2-2	Urban Local Roadway	12/31/2005
SD_2-3	Urban NonResidential Collector Roadway	12/31/2005
SD_2-4	Urban Residential Collector Roadway	12/31/2005
SD_2-5	Urban Minor Arterial Roadway	12/31/2005
SD_2-6	Urban Principal 4-Lane Arterial Roadway	12/31/2005
SD_2-7	Urban Principal 6-Lane Arterial Roadway	12/31/2005
SD_2-8	Urban Expressway 4-Lane Roadway	08/11/2011
SD_2-9	Urban Expressway 6-Lane Roadway	08/11/2011
SD-2-10	Rural Gravel Local Roadway	12/31/2005
SD_2-11	Rural Local Roadway	12/31/2005
SD-2-12	Rural Minor Collector Roadway	12/31/2005
SD_2-13	Rural Major Collector Roadway	12/31/2005
SD_2-14	Rural Minor Arterial Roadway	12/31/2005
SD_2-15	Rural Principal 4-Lane Arterial Roadway	12/31/2005
SD_2-16	Rural Principal 6-Lane Arterial Roadway	12/31/2005
SD_2-17	Rural Expressway 4-Lane Roadway	12/31/2005
SD_2-18	Rural Expressway 6-Lane Roadway	12/31/2005
SD_2-20	Typical Curb and Gutter Details	08/11/2011
SD_2-21	Patterned Concrete Median Paving	01/18/2011
SD_2-22	Plowable Median Nose Detail	1/12/2016
SD-2-23	Driveway Cut Detail	08/11/2011
SD-2-24	Driveway Detail w/ Attached Sidewalk	08/11/2011
SD_2-25	Driveway Detail w/ Detached Sidewalk	08/11/2011
SD_2-26	Typical Cross Pan Layout Detail	08/11/2011
SD_2-40	Pedestrian Intersection Ramp Detail	09/16/2010
SD_2-41	Pedestrian Intersection Ramp Detail	01/18/2011
SD_2-42	Truncated Dome Detail	01/01/2008
SD_2-50	Parallel Pedestrian Ramp Detail	08/11/2011
SD_2-70	Type C Aluminum Bridge Railing	08/11/2011
SD_2-71	Oklahoma TR-1 Bridge Railing	08/11/2011
SD_2-72	Nevada Concrete Safety Bridge Railing	08/11/2011
SD_2-73	Safety Shaped Concrete Bridge Railing	08/11/2011
SD_2-74	Texas Type TT Bridge Railing	08/11/2011
SD_2-75	Urban Cul-de-Sac Details	01/01/2008
SD_2-76	Rural Cul-de-Sac Details	01/01/2008
SD_2-77	Urban Knuckle	07/09/2009
SD_2-78	Urban Local Low-Volume Knuckle	07/09/2009
SD_3-1	Storm Sewer Manhole Detail Type I	07/09/2009
SD-3-2	Storm Sewer Manhole Detail Type II	11/10/2004
SD_3-3	Storm Sewer Manhole Detail Type III	08/11/2011

File Name	Detail/Description	Approval Date
SD_3-5	Storm Sewer Manhole Lid Detail	09/16/2010
SD_3-7	Storm Sewer Manhole Riser and Cover Detail	08/11/2011
SD-3-8	Grate Inlet for Common Areas (guidance)	08/11/2011
SD_3-14	Driveway Access on Rural Local Roadway	08/11/2011
SD_3-24	Sidewalk Underdrain w/ Curb Outlet Detail	08/11/2011
SD_3-25	Curb Opening w/ Drainage Chase Detail 1 of 2	08/11/2011
SD_3-25A	Curb Opening w/ Drainage Chase Detail 2 of 2	08/11/2011
SD_3-30	Desilting Basin Outlet	08/11/2011
SD_3-31	Temporary Desilting Basin at Inlet	08/11/2011
SD_3-32	Temporary Desilting Basin at Sump	08/11/2011
SD_3-33	On Street Temporary Desilting Basin Detail	
SD_3-34	Temporary Desilting Basin Detail (guidance)	08/11/2011
SD_3-35	Debris Cage for Desilting Basin Riser	08/11/2011
SD_3-36	Desilting Basin Riser Detail	08/11/2011
SD_3-41	Lined Ditch Splashwall Detail (plan and section)	08/11/2011
SD_3-44	Lined Ditch Behind Retaining Wall Detail	08/11/2011
SD_3-48	Beehive Grate Detail (guidance)	08/11/2011
SD_3-60	Temporary Street Sandbag Detail and Section	08/11/2011
SD_3-62	Typical Check Dam Detail	08/11/2011
SD_3-71	Canyon Subdrain Detail	08/11/2011
SD_3-81	Lug Connection Detail (cast in place concrete pipe)	08/11/2011
SD_3-82	Plan and Section of an Extended Detention Basin Sedimentation Facility	01/01/08
SD_3-83	Typical WQCV Outlet Structure Profiles Including 100-Year Detention	01/01/08
SD_3-84	Concrete Washout Structure	01/01/08
SD_3-85	Erosion Log Check Dams	01/01/08
SD_3-86	Culvert Inlet and Outlet Protection Erosion Logs Above Inlets and Outlets for Slope 3:1 or Steeper	01/01/08
SD_3-87	Erosion Log Barrier	01/01/08
SD_3-88	Cut Back Swale	12/13/2016
SD_4-1	Urban Local Roadway - Utility Placement	08/11/2011
SD_4-2	Urban Residential Minor Collector Roadway - Utility Placement	08/11/2011
SD_4-3	Urban NonResidential Collector Roadway - Utility Placement	08/11/2011
SD_4-4	Urban Residential Major Collector Roadway - Utility Placement	08/11/2011
SD_4-5 & 4-5A	Urban Minor Arterial Roadway - Utility Placement	08/11/2011
SD_4-6 & 4-6A	Urban Principal 4-Lane Arterial Roadway - Utility Placement	08/11/2011
SD_4-7 & 4-7A	Urban Principal 6-Lane Arterial Roadway - Utility Placement	08/11/2011
SD_4-8 & 4-8A	Urban Expressway 4-Lane Roadway - Utility Placement	08/11/2011
SD_4-9 & 4-9A	Urban Expressway 6-Lane Roadway - Utility Placement	08/11/2011
SD-4-10	Rural Gravel Local Roadway- Utility Placement	08/11/2011
SD_4-11	Rural Local Roadway - Utility Placement	08/11/2011

File Name	Detail/Description	Approval Date
SD-4-12	Rural Minor Collector Roadway - Utility Placement	08/11/2011
SD_4-13	Rural Major Collector Roadway - Utility Placement	08/11/2011
SD_4-14 & 4-14A	Rural Minor Arterial Roadway - Utility Placement	08/11/2011
SD_4-15 & 4-15A	Rural Principal 4-Lane Arterial Roadway - Utility Placement	08/11/2011
SD_4-16 & 4-16A	Rural Principal 6-Lane Arterial Roadway - Utility Placement	08/11/2011
SD_4-17 & 4-17A	Rural Expressway 4-Lane Roadway - Utility Placement	08/11/2011
SD_4-18 & 4-18A	Rural Expressway 6-Lane Roadway - Utility Placement	08/11/2011
SD_4-20	Utility Trench Repair Detail (asphalt pavement)	08/11/2011
SD_4-21	Utility Trench Repair Detail (newly overlayed pavement)	08/11/2011
SD_4-22	Utility Trench Repair Detail (concrete pavement)	08/11/2011
SD_4-23	Utility Trench Repair Detail (flowable fill)	08/11/2011

GMS, INC.
CONSULTING ENGINEERS
611 NORTH WEBER, SUITE 300
COLORADO SPRINGS, COLORADO 80903-1074

TELEPHONE (719) 475-2935
TELEFAX (719) 475-2938

EDWARD D. MEYER, P.E.
ROGER J. SAMS, P.E.
JASON D. MEYER, P.E.
DAVID R. FRISCH, P.L.S.

THOMAS A. McCLERNAN, P.E.
MARK A. MORTON, P.E.
KEN L. WHITE, P.L.S.

MEMORANDUM

TO: Mr. Roy Heald, General Manager
Ms. Dian White, Assistant General Manager
Mr. Rick Davis, Superintendent
Security Water District

DATE: December 11, 2018

FROM: Mr. Tom McClernan, P.E.
Mr. Roger J. Sams, P.E.
GMS, Inc., Consulting Engineers

RE: Security Water District
PFC/PFAS Mitigation 30% Document Review Comments

GMS, Inc. has received the drawings itemized below for the PFC/PFAS Drinking Water Mitigation project.

1. Sheets G201 through G205, Cover Sheet, General Notes, Drinking Water Mitigation System Plan, Process Flow Diagram and DWMF Site Plan, prepared by URS Group, Inc., dated November 30, 2018
2. Sheets S200 through S202, Structural General Notes, DWMS Building Structural Plan and Sections, prepared by URS Group, Inc., dated November 30, 2018
3. Sheets PP201 and PP202, DWMF Process Plan and Sections, prepared by URS Group, Inc., dated November 30, 2018
4. Sheets PL200 and PL207 through PL225, Collection Plan and Profiles, prepared by URS Group, Inc., dated November 30, 2018
5. Sheets PL226 through PL234, PL240 and PL241, Zone 1 Distribution Plan and Profiles, Zone 2 Collection Plan and Profiles, and Typical Jack and Bore Detail, prepared by URS Group, Inc., dated November 30, 2018
6. Sheet E204, Motor Control Schematics, prepared by URS Group, Inc., dated November 30, 2018
7. Sheets I001 and I201 through I203, Legend and Abbreviations, Raw Water Tank P&ID, AIX Trains P&ID, and Piping and Instrumentation Diagram, prepared by URS Group, Inc., dated November 30, 2018
8. Basis of Design Report, prepared by AECOM, dated November 30, 2018
9. Technical Specifications Table of Contents, dated November 30, 2018

Based on our review of the documents itemized above, we have the following observations, comments and recommendations pertaining to this project.

I. CONSTRUCTION DRAWINGS

A. General

1. All Drawings: Revise “Security Water and Sanitation District” to “Security Water District”. There is no entity known as the Security Water and Sanitation District.

B. Project Concept: General: G-Series Drawings

1. The concept of equipment redundancy needs to be defined from a design and operational standpoint. Redundant pumping systems are provided in the design, however, redundant prefilters and AIX vessels are not.

2. Differential pressure indicators and transmitters are needed on each prefilter to maximize cartridge capacity and allow for staggered cartridge replacement.

3. A prefilter bypass is needed between the raw water pumps (RWP) and the AIX influent header.

4. Flow meters and transmitters are needed on each process train for backwash influent (BWI) to set prewash flow rate, backwash flow rate, standby flow rate, and track backwash volume.

5. Backwash needs to be available for a downflow flush and an upflow flush.

6. The backwash effluent needs to discharge to an equalization tank to provide a limited discharge to the sanitary sewer system of no more than 100 gpm, or a pumped discharge back to the inlet side of raw water wet well. Both discharges, recycle or sewer, need to be metered.

7. The Zone 2 booster pumps (Z2BP) need to be increased in capacity to 2,600 gpm (3.7 mgd) to make up for the deletion of the Yucatan WTP capacity of 1.7 mgd as proposed in the AECOM design approach.

8. This process flow diagram (PFD) has eliminated the standby/backwash pumps as shown in the previous PFD dated 10/23/18. Prewash flow and backwash flow is proposed to be provided from the Zone 2 system. This flow stream must be metered and shown and recorded in the control system, i.e., SCADA system.

9. A vessel standby low flow is required when an AIX train, or all trains are not in service. This low flow is required to maintain the viability of the mass transfer zone of the media bed. Please provide the minimum flow rate, duration and frequency recommended by Calgon for this operational condition. It is a concern that the 2,260 gpm RWPs will be able to reasonably produce the required low flow and head conditions needed for vessel standby flow.

C. Structural: S-Series Drawings

1. Sheet No. S-200
   a. Please consider deleting Note 5.L addressing welded wire fabric in slabs on grade. The foundation plan notes at Sheet S-201 specifically call for reinforcing steel in the floor slab throughout the building. We concur with that approach, including the addition being requested by Security Water District. It is our opinion that the project is better served with the use of reinforcing bar and not welded wire fabric.
   b. General Structural Note 5.H addresses horizontal control and construction joints. At the 30% level of completion, the construction documents do not yet reflect the location of construction and control joints.

c. Refer to General Structural Note 8.B. It is our opinion, based on the current Pikes Peak Regional Building Code, that the 2015 International Building Code (IBC) is applicable to this project.
d. Please provide description, designation and authorities and responsibilities of the, "Special Inspector" described in Section 8, Field Observations.

2. Sheet No. S-201
   a. Specify the rate of slope and spot elevations on the floor slab to attain satisfactory drainage.
   b. Specify the construction and material details for grout and/or polypropylene support pads under the contactor tank legs and pipe and other equipment supports so as to be uniformly supported on the sloped floor.
   c. We take no exception to Foundation Plan Note 5, specifying control joints and construction joints enclosing no more than 225 square feet of floor area. In addition, we request that the length to width ratio of any floor slab panel be less than 1.8 to 1.
   d. Please reference the location on the drawings and/or reference a specific specification section as to the subgrade preparation under the floor slab and the design bearing pressure for both live and dead loads and any special reinforcing applicable to the point loadings by the contactor tank legs.

3. Sheet No. S-202
   a. In subsequent submittals, please provide for specification of the subgrade preparation requirements under the foundation elements with definition of maximum allowable bearing pressures, subgrade preparation requirements and potential removal and replacement of subgrade soil.

D. Water Quality Mitigation Process: PP-Series Drawings

1. Sheet No. PP-201
   a. Z2BP piping size may need to be revised to accommodate the revised Pump flow rate.
   b. Please contact GMS, Inc. to discuss the Construction Note 1 addressing complete concrete encasement of below slab welded steel piping.
   c. Please modify Note 3 to provide for monorail hoisting arrangements over all pumps, not only raw water feed pumps.
   d. Please review the pedestrian doors (30x70) in the AIX contactor area so as to provide optimum access for removal and replacement of resin.
   e. Revise the Zone 2 discharge piping from the facility as the 8-inch diameter pipe is not satisfactory. Based on cursory hydraulic analysis, 16-inch diameter discharge piping is preferred.
   f. The Security Water District and GMS, Inc. will have additional comments on access to the feed pumps for removal and replacement with subsequent, more detailed construction drawings.
   g. Please provide for an effective splash containment at the air gap between the wastewater discharge and the connection to the wastewater collection system, exterior to the building. A 24-inch vertical air gap will be difficult to contain splash unless specific arrangements are made.

2. Sheet No. PP-202
   a. Graphically represent the air and vacuum release assemblies at the top of each contactor tank. Dimension the relationship to low steel and define the access provisions to those valve assemblies.

b. Modify the finished water piping connected to the Zone 2 transmission and distribution system to be 16-inch diameter.
c. The contactor tank and AIX system has not been provided to the District or GMS, Inc. for review as of the writing of these comments. Additional comments will be made as to the "valve tree" at each contactor train upon receipt and study of those documents.

E. Raw Water Collection & Distribution System: PL-Series Drawings

1. Sheet No. PL-207
   a. Throughout the PL drawings, the minimum pipe soil cover may be 4-feet in lieu of the 5-feet minimum shown on the drawings.
   b. Please provide a detailed profile at each crossing of the storm water ditch paralleling the BNSF Railway.
   c. Provide line valves at the upstream side of each tee fitting, at the collection pipeline tee branch and at no more than 1,000 foot intervals uniformly spaced.
   d. In the plan and profile document, specify the elevation and station at grade breaks, so as to provide detailed expectations as to the pipeline installation, elevations and operations conditions.
   e. Revise the piping connection at Well S-10 to intercept the well discharge directly into the new transmission line. The domestic water distribution system on this site must remain in operation as the existing pipeline shown connects the distribution system on the west side of Highway 85 to the existing distribution system in Security Boulevard.
   f. Assure there is an operable gate valve on the Well S-10 discharge into the collection pipeline.
   g. Install a line valve south of the tee to Well R-2 and on the branch to that well.
   h. Install a line valve south of the tee to Well S-9 and on the branch to that well.
   i. The SWD and GMS, Inc. would request that the design professional examine the potential for use of butt fused HDPE carrier pipe in the steel casing pipes crossing Colorado Highway 85 and the BNSF Railway. The HDPE pipe may simply lay in the bottom of the casing pipe without casing skids or spacers. We suggest that the HDPE may be DR11 pressure rated with an internal diameter equivalent to the specified internal diameter of the equivalent ductile iron pipe diameter. In most cases we suggest that the casing pipe may be four to six inches larger in internal diameter than the outside diameter of the HDPE, this marginal space being sufficient to account for a minor amount of debris in the casing pipe.
   j. It is understood that the location of the collection pipeline may vary depending upon the actual location of the biosolids force main owned and operated by Colorado Springs Utilities. To the best of our knowledge, the Colorado Springs Utilities pipeline does not have an easement on real estate owned by the Security Water District in this area.
   k. The scope of work to disconnect Well No. S-9 from the existing pipeline which is connected to the distribution system shall include the following:
      - Cut the existing well discharge pipeline to the distribution system at a location where a plug with a concrete reverse anchor can be inserted in an existing bell joint with new gasket near the well installation.
      - Excavate the tee connection of the well discharge pipeline into the transmission and distribution system in Security Boulevard. It will be planned that the SWD will close the existing gate valve on the branch of that tee.

- Remove no less than 2-feet of pipeline outside the existing valve, furnish and install a ductile iron plug with a new gasket, and mechanical joint hardware. Tie the mechanical joint plug to the existing tee fitting with no less than two 3/4" diameter anchor rods.
- Prior to backfill, wrap the entire tee/valve and plug assembly with polyethylene wrap in accordance with the SWD standard specifications.

2. Sheet No. PL-208
   a. Refer to applicable comments previously provided.
   b. Provide for a line valve south of the tee branch to Well R-1 and a valve on the branch at the tee.
   c. It does not appear necessary to provide a 14-inch diameter pipeline between the collection pipeline and Well R-1. An 8-inch diameter DIP or 10-inch diameter HDPE will be satisfactory.

3. Sheet No. PL-209
   a. Provide a line valve at Sta. 24+00 on the proposed 16-inch diameter collection pipeline.

4. Sheet No. PL-210
   a. Provide for a line valve south of the tee branch to Well S-17, and a valve on the tee branch at the collection pipeline.
   b. Revise the pipeline sizing of the lateral pipeline to Well S-17 as a 16-inch diameter pipeline does not appear to be required. Provide for an 8-inch diameter DIP or a 10-inch diameter HDPE, DR11. Modify the casing size accordingly.
   c. Provide for a line valve south of the tee branch for Well FV-4 and a valve on the branch of the tee.
   d. Further examination of the connection to the discharge from Well FV-4 as shown on the detail on this sheet is required of the District.
   e. Provide a detail of the connection to the discharge from Well S-17 utilizing the S-17 yard piping information previously provided by the SWD.

5. Sheet No. PL-211
   a. Please obtain information and locate the existing 144-inch diameter storm water pipeline crossing Security Boulevard, the BNSF Railway and State Highway 85, generally in the vicinity of Crawford Avenue and Center Valley Drive.
   b. Provide for a line valve at approximately Sta. 45+60 on the collection pipeline.
   c. Provide for a line valve south of the tee to provide for connection to Wells S-2 and S-16. Provide for a valve at the east and north sides of the tee to service Well S-16. Provide the "disconnection" assembly for the pipeline at Well S-16 to the similar extent as explained for the pipeline on Well S-9.

6. Sheet No. PL-213
   a. Please provide for a bore and jack pipe installation under the intersection of Main Street and Highway 85.
   b. Provide for a line valve south of the tee servicing Well S-15 and a valve on the branch of that tee at the collection pipeline.
   c. Excavate the tee connection from Well S-15 connecting to the existing transmission and distribution system and install a mechanical joint plug with anchor rods to the existing tee fitting, complete with polyethylene encasement.
   d. The plan shows a leader pointing to the existing Security Sanitation District pipeline between approximately Sta. 66+50 and the match line at Sta. 70+00. That is labeled as, "Possible mislocation of Colorado Springs Utilities sludge

line". Based on our review of this 30% drawing, we do not believe that to be the case. There is an existing 15-inch diameter wastewater pipeline owned and operated by the Security Sanitation District at approximately this location. The project survey shall locate all manholes on this pipeline. The construction drawings for this wastewater pipeline have been furnished to AECOM by the SWD.

7. Sheet No. PL-214
   a. Provide pothole information and details of design to demonstrate the horizontal and vertical separation between the proposed collection pipeline and the existing 15-inch diameter wastewater pipeline. It is essential that the horizontal relationship between these two pipelines be such that either can be excavated without damaging or interference with the other pipeline. This horizontal relationship should be such that a 1 to 1 excavated slope could be accomplished from the top of the sewer pipe to the side of the proposed collection pipeline.
   b. Provide for a line valve south of the tee servicing Well S-8 and a valve on the branch to that tee.
   c. The SWD and GMS, Inc. will attempt to examine the yard piping at Well S-8 to better define the connection requirements and the resulting modifications to the existing pipeline servicing this well.
   d. Please refer to prior comment regarding the, "Possible Mislocation of Colorado Springs Utilities Sludge Line," on this drawing.

8. Sheet No. PL-215
   a. Please modify the connection to the Venetucci WTP to connect to the northwesterly 45 degree bend in the finished water pipeline. Remove the diagonal (northwest-southeast) pipeline segment and install a sampling hydrant in a tapped plug with a concrete reverse anchor on the existing potable water pipeline.
   b. Install a line valve on the collection pipeline south of the tee servicing the Venetucci WTP and a valve on the branch of that tee, approximately Sta. 81+50.
   c. Refer to previous notes regarding the flagged note on this drawing saying, "Possible Mislocation…Sludge Line." That leader is directed to the Security Sanitation District 15-inch diameter sanitary sewer. The field survey shall locate all manholes on that pipeline to accurately and precisely locate the centerline of the pipeline. Potholes may be necessary at water pipeline crossings depending on the vertical separation calculated from adjacent manhole elevations.
   d. Install a line valve upstream/south of the tee servicing Well S-4. Provide a line valve in the branch of that tee to the line servicing Well S-4.
   e. The Security Water District and GMS, Inc. will prepare a sketch of the desired connection at Well S-4 once field survey provides accurate and precise locations of site features at this connection.

9. Sheet No. PL-216
   a. Please provide for the utilization of 22 ½ degree bends in the collection pipeline in lieu of 45 degree bends shown at the Well S-7 facility.
   b. Determine the horizontal relationship of the proposed collection pipeline and the existing Colorado Springs Utilities' sludge pipeline. The 30% drawing shows it to be superimposed on top of each other which is not acceptable to either utility.
   c. Security Water District desires that AECOM arrange for and provide for installation of a 16-inch diameter steel casing pipe under State Highway 85 opposite the distribution pipeline existing under the BNSF Railway. The SWD and GMS, Inc. will define a casing pipe elevation at that location.

d. Based on the 30% drawings shown, it appears that the collection pipeline is proposed to involve removal of a portion of the SWD distribution system pipeline as the new pipeline is superimposed exactly on top of the existing pipeline. Please provide a detailed site survey plan showing all underground and existing surface infrastructure.
e. Please complete the field survey and accurately locate the existing Security Sanitation District sanitary sewer. It <u>does not</u> go under the Well S-7 building as shown on this drawing.
f. Refer to other notes in this memorandum regarding the sanitary sewer pipeline and the CSU sludge force main.
g. Provide for a line valve south of the tee servicing Well S-7. Provide for a valve at the branch of that tee servicing Well S-7.
h. Provide for a line valve at Sta. 100+00 on the collection pipeline.

10. Sheet PL-217
    a. Please show a line valve at Sta. 100+00.
    b. Provide for a line valve five feet west of the BNSF Railway right-of-way and at approximately Sta. 111+25.
    c. The SWD and GMS, Inc. will provide pipeline alignment details at this BNSF crossing upon further review and prior to issuance of the 60% construction documents. The main item to be addressed will be the alternatives to the 90 degree bends in the pipeline and the potential for utilization of an alternative carrier pipe material and bend configurations.
    d. Please revise the vertical design of the BNSF Railway crossing as that shown on the 30% documents does not appear to account for actual topographic conditions at this site. There are significant differences to be addressed in an adequate pipeline design.

11. Sheet PL-218
    a. Please provide the precise location of the existing sanitary sewer infrastructure shown on this document based on field survey. This will be necessary in order to adequately respond to the horizontal and vertical relationship of the collection pipeline as required by the Security Water District and the Security Sanitation District. Please precisely show the dry utilities in this area, including communications and Colorado Springs Utilities electric distribution system.
    b. When the final predesign survey is available representing the location of the existing Security Sanitation District wastewater pipeline between approximately Sta. 113+00 and 120+00, it may be suggested that the collection pipeline be located further westerly in the SWD ownership. This may result in the collection pipeline being located on the west side of Well S-11.

12. Sheet PL-219
    a. Refer to the comment for Sheet PL-218 regarding the horizontal location of the collection pipeline and the existing wastewater pipeline.
    b. When the final predesign survey is completed and existing pipelines are precisely represented, the SWD and GMS, Inc. will provide input as to the optimum connection between Well S-11 and the collection pipeline.
    c. Provide for the pipeline now connecting Well S-11 to the SWD distribution system to be excavated at that connection in Chimayo Drive. Remove no less than two feet of pipe material at the branch of the tee to permit a mechanical joint plug to be installed and anchored with all thread rod to the pipe fitting in Chimayo Drive.

d. Utilizing the .dwg files provided to AECOM by SWD representing existing conditions at the Cactus WTP, please detail the collection system pipeline alignment and its relationship to all existing infrastructure, above and below ground. Detail the connection to the high service pump discharge. Please do not plan to accomplish those connections directly on top of the existing wastewater pipeline.
e. Provide for a corporation stop connection, no less than 2-inches in diameter in the bottom one-quarter of the collection pipeline for use as a sampling port for raw water turbidity conditions in the collection system pipeline. That connection should be made downstream from the connection from the Cactus WTP so as to be able to monitor raw water conditions from all contributing wells, other than the Windmill Gulch Wells.
f. Provide for a line valve south of the tee servicing Well S-11 and a line valve on the branch of that tee.
g. Provide for a line valve south of the connection from the Cactus WTP (Wells S-12, S-13, S-14 and P-13). The tee connection may likewise require a valve on the branch of the fitting. That line valve will be in the vicinity of Sta. 129+00 to 130+00.

13. Sheet No. PL-220
    a. Please provide for a line valve on the collection pipeline at Sta. 140+00.
    b. Please provide for the horizontal location of the collection pipeline tube no less than 5-feet clear between the outside of the pipe and the lip of gutter. This space is required in order to adequately excavate the pipeline for operation, maintenance, renewals and repair.

14. Sheet No. PL-221
    a. Please revise the pipeline alignment between Sta. 143+50 and 145+50 to eliminate the need for the small easement area on private property.
    b. Please precisely locate the northerly right-of-way line for Bradley Road. Based on information available to GMS, Inc., we are not aware that the existing 12-inch diameter potable water pipeline is not in the Bradley Road right-of-way.
    c. Upon determination of the Bradley Road right-of-way, determine the need, or not, for an easement for the 24-inch diameter proposed collection pipeline on adjacent private property. Please recognize that there is ground water quality remediation infrastructure in this area, i.e. injection wells, which may influence the location of this pipeline. It may be most appropriate to have this pipeline within the travelled surface of Bradley Road no later than January 14, 2019 so that easement procurement may proceed expeditiously. At that time, please provide a final horizontal and vertical alignment of the collection pipeline which has been vetted with the leasee of a portion of the property north of Bradley Road, Schlage Lock Company, so as to have reached their concurrence as to the proximity of a proposed pipeline to their existing infrastructure associated with ground water remediation.

15. Sheet No. PL-222
    a. Provide for a line valve at Sta. 150+00 and 160+00 on the collection pipeline.
    b. Unless there are conflicting infrastructure or other planimetric or topographic factors, we suggest that the pipeline between approximately Sta. 156+10 and 160+00 parallel the easterly boundary of the private property upon which this pipeline will be located. This will facilitate construction staking, future location determination and easement definition and management.

c. It is requested that the Security Water District and AECOM review the location of the existing 12-inch diameter potable water pipeline in Bradley Road east of approximately Sta. 152+30. GMS, Inc. is not aware that this pipeline was not constructed in the Bradley Road right-of-way.
d. Please specify the dimensional limits perpendicular to the pipeline where a temporary construction easement will be required to accommodate construction between approximately Sta. 145+50 and 176+40.

16. Sheet No. PL-223
    a. At 60% design documents, please provide for a vertical pipe alignment that would eliminate the high point in the pipeline at approximately Sta. 162+60. Presuming the ground surface profile is reasonably precise, it appears as if a top of pipe elevation of approximately 5836.5 (4-feet of cover) can be attained at approximately Sta. 159+20. That same pipe elevation should be maintained to approximately Sta. 171+00 with the pipe being installed with a minimum of cover of 4-feet. It appears the maximum cover will be approximately 6.5-feet in order to eliminate the high point and avoid design, construction, operation, renewal and replacement of an air-vacuum release station.
    b. It is understood that the predesign survey will locate all planimetric, topographic and infrastructure improvements between Sta. 150+00 and 170+00 that will influence the horizontal and vertical alignment of this pipeline. Please provide that information to the SWD and GMS, Inc. no later than January 14 so that final design intent can be assessed and easement requirements ascertained and easement procurement immediately commenced.

17. Sheet PL-224
    a. Refer to the vertical alignment of the collection pipe discussed in the item above in order to eliminate the need for an air-vacuum release station.
    b. Provide for a line valve on the collection pipeline at Sta. 180+00.

18. Sheet No. PL-225
    a. Provide for a line valve on the collection pipeline on either side of the influent pipe to the raw water wet well/tank; i.e. drinking water mitigation facility (DWMF).
    b. Recognizing that the final location of the DWMF may be such that it is not shown on this drawing, it is essential that security fencing around the DWMF be represented on these documents. Please define the limits of the security fencing necessary to provide for suitable security and at the same time, adequate access for operation, maintenance, renewals and replacement and management of site conditions, including storm water runoff.

19. Sheet No. PL-226 (Transmission Pipeline)
    a. Please review the pipeline sizing provided on this document. The pipeline should be sized to provide for conveyance of the total drinking water mitigation facility capacity to the Zone 1 system of the SWD.
    b. When the detailed predesign survey of planimetric, topographic and under and above ground infrastructure has been completed, please revise the design of the pipeline between approximately Sta. 6+00 and 9+50, so as to eliminate parallel and conflicting alignments with the existing potable water pipeline. It is essential that the requirements for an easement in this area be identified no later than January 31, 2019 so that easement procurement may commence, if required.
    c. Please modify the pipeline vertical and horizontal alignment between Sta. 0+00 and 2+00 to eliminate the low point in the pipeline and the 90 degree bend.

d. Utilizing the site plan for the SWD Zone 1 water storage tank provided by SWD, please detail the proposed vertical and horizontal alignment of the connection to the existing system and provide to SWD for review and comment. Based on the design conference discussion of December 14, 2018, please provide a revised 30% document for the transmission pipeline between Sta. 10+00 and 20+00 at your earliest possible convenience.

20. Sheet No. PL-227
    a. Review and revise the transmission pipeline sizing as discussed above.

21. Sheet No. PL-228
    a. Prior to January 18, 2019, GMS, Inc. will provide an exhibit representing revised property and ownership boundaries represented on this document as a result of the procurement of land for this project by the Security Water District.
    b. Review and revise the transmission pipeline sizing as discussed above.
    c. Please examine the required street section to be constructed on Lincoln Plaza Drive, north of Bradley Road. Locate the transmission pipeline so as to provide suitable access for operation, maintenance, renewals and replacement. It should not be located under curb and gutter or in close proximity to infrastructure which would require removal and replacement in order to maintain the water pipeline.
    d. Provide for a fire hydrant assembly to be installed at approximately Sta. 21+30 at the southeasterly extent of the intersection of Lincoln Plaza Drive and Bradley Road in order to suitably "blow off" the low point in this pipeline.
    e. Revise the pipeline alignment between approximately Sta. 26+50 and 28+80 to eliminate the 90 degree bend and reduce quantity of pipe. A 45 degree bend fitting can be installed at approximately Sta. 26+50 and at Sta. 28+80, exterior to the DWMF.
    f. Please provide for line valves on this transmission line generally located at Sta. 0+10, 10+00, 21+50 in association with the fire hydrant tee fitting and at Sta. 28+85.
    g. It is understood that the raw water tank assembly may be located closer to the DWMF yet located in the site plan to provide suitable and adequate access for all vehicular movements required for drinking water quality mitigation operations.
    h. It is expected that the 60% documents will define the required security fencing for the DWMF, including limitations on public access from Lincoln Plaza Drive and Bradley Road and facilitation of District operational access.

22. Sheet No. PL-229
    a. Provide for the Zone 2 collection pipeline to be located no less than 10-feet clear distance adjacent to the existing SWD potable water transmission line.
    b. Provide for bend fittings in this pipeline at approximately Sta. 6+00 and 7+75. Provide for a line valve in the collection pipeline at approximately Sta. 0+10 and 10+00.

23. Sheet No. PL-230
    a. Provide for a detail for the pipeline crossing of the Fountain Mutual Irrigation Ditch and property between approximately Sta. 7+00 and 18+00. GMS, Inc. will furnish the documents required by the FMIC for consideration of permitting the construction and operation of the infrastructure on the FMIC property. Provide for line valves on the collection pipeline on either side of the FMIC ditch.
    b. Provide for the collection pipeline to be no less than 10-feet clear distance from the District's existing potable water pipeline.

c. Provide for a steel casing pipe extending under the FMIC irrigation ditch with end extents no less than a ratio of one to one (1:1) beyond the shoulder of the ditch at existing ground elevation.
d. Revise the collection pipeline alignment between approximately Sta. 18+00 and 20+00 to facilitate perpendicular and parallel construction adjacent to the District's existing potable pipelines, including bend facilities at the present 90 degree deflection.
e. Please recognize that this portion of Clearview Drive has been platted although not accepted for operation, maintenance, renewals and replacements by El Paso County as a street or road right-of-way. It is a platted right-of-way of record and permitting will be required in accordance with El Paso County Public Works determinations.

24. Sheet No. PL-231
    a. Provide for the location of the new collection pipeline to be no less than 5-feet clear from the right-of-way line to permit excavation, maintenance, operation, renewals and replacements without encroaching onto private property.
    b. Please provide vertical and horizontal details of all construction accommodations for crossings of existing water and wastewater service lines of the proposed collection pipeline. In addition, a potable water pipeline will cross near the westerly right-of-way of Hancock Expressway.
    c. It is requested that the pipeline crossing Hancock Expressway be constructed in a casing pipe with suitable design and construction accommodations. This casing pipe could be directionally drilled and the casing pipe constructed of HDPE. The carrier pipe may utilize HDPE material. The casing pipe in this instance appears that it may be approximately 120-140 feet in length so as to cross beneath or over the existing potable pipeline with suitable protections at the westerly extent of Hancock Expressway. Provide for a line valve on the collection pipeline at approximately Sta. 27+80 to 28+00.

25. Sheet No. PL-232
    a. Refer to other notes in this memorandum regarding design accommodations for crossings of the collection pipeline with potable water mains and services.
    b. Provide for a line valve at Sta. 37+80.
    c. Provide for this collection pipeline to be located no less than 5-feet from the lip of gutter so as to permit adequate access for excavation, operation, maintenance, renewal and replacement without mandating removal of concrete curb and gutter.

26. Sheet No. PL-233
    a. Provide for a line valve at Sta. 48+00.
    b. Provide for accommodations of crossing of the collection pipeline with the SWD's existing potable water distribution system pipelines and the Security Sanitation District's wastewater collection system.
    c. Please critically examine the location of the pipeline as previously discussed so as to maintain no less than a 5-foot margin between the outside of the pipe and adjacent concrete gutter street improvements.
    d. Please critically examine the locations of existing potable water distribution system shown between Sta. 47+00 and 50+00, together with the absence of pipeline between Sta. 47+20 and 37+50. Without reviewing detailed records, there are two potable water pipelines existing in Yucatan Drive. What may be a located pipeline shown on this Sheet PL-233 is not labeled as a water pipeline.

27. Sheet No. PL-234
    a. Refer to comments on the previous drawing pertaining to redundant pipelines and unlabeled pipelines shown on this document. At the 60% submittal, provide assurance that all existing utilities are precisely located.
    b. Please relocate the connection of the new collection pipeline to the existing pipeline from the Windmill Gulch wells to be adjacent to the westerly boundary of the vacant District owned parcel. This will facilitate elimination of a high point in the proposed collection pipeline in Yucatan Drive and better utilize site conditions on the District's property.
    c. The District may request additional accommodations to monitor raw water from the Windmill Gulch wells prior to its introduction into the collection pipeline and the drinking water quality mitigation facility. Provide for 1/8 degree bends (45 degrees) between Sta. 56+00 and 57+00 in lieu of the ¼ bends.
    d. Prior to preparation of the 60% drawings, please arrange for excavation of the existing Windmill Gulch well pipeline at the proposed location of connection to ascertain pipe material, size, and connection requirements.
    e. Provide line valves on each side of the tee fitting which will be inserted into the existing Windmill Gulch pipeline.

28. Sheet No. PL-240
    a. Provide for a detail as it may be developed for the 60% submittal utilizing HDPE carrier pipe without spacers or skids inside steel casing pipe. Provide for the steel carrier pipe to be no less than 4-inches greater in inside diameter than the outside diameter of the HDPE carrier pipe.

29. Sheet No. PL-241
    a. Please modify the typical connection to the well piping so as to eliminate the vertical pipe represented in this detail. The connection to the existing well discharge pipeline should be in a horizontal plane with suitable valves. Revise and resubmit prior to the 60% submittal for review and comment by the SWD.
    b. It is requested that each well connection be detailed separately. It does not appear likely that this typical bore and jack will apply uniformly to any more than potentially one or two of the proposed installations.
    c. Please provide a detail of construction for the air release valve assemblies proposed adjacent to the connections to the collection pipelines represented on this document. The Security Water District will review and assess the relative need and benefits of the air release valve at each well connection as compared to providing for air release at the raw water facility without a high point in the pipeline elsewhere. There certainly may be a need and benefit of the air release valve assemblies, however, they must be critically examined as to the relative benefit and operation, maintenance, renewal and replacement requirements.

F. Electrical: E-Series Drawings

1. Sheet No. E-204
    a. Revise the sizing of the raw water feed pumps shown on the one line diagram. In addition, bring the one line diagram consistent with the process diagram. There are discrepancies between the two for furnished equipment.
    b. It is requested that the design professional of record assess the power requirements as quickly as possible prior to completion of the 60% design and contact be made with Colorado Springs Utilities, Electric Division, to assess the manner in which required power supply will be brought to the site. Timing of a major primary distribution system extension will be critical to the project.

2. RWP are 150hp as shown on Drawing G-204.

3. Disconnects or E-stops will be required at all pump motors.

4. Z2BPs will require VFDs or reduced voltage starters.

G. Process and Piping Instrumentation: I-Series Drawings

1. Sheet No. I-001
   a. There is insufficient detail for process design to assess the sufficiency of this document.

2. Sheet No. I-201
   a. GMS, Inc. has no comments on this document at this time. Further review with the SWD staff will be accomplished and comments provided to the design professional of record.

3. Sheet No. I-203
   a. Based on the design team conference of December 14, 2018, please modify and resubmit this document to reflect the disinfection process as discussed and the appropriate instrumentation associated with control and monitoring of the disinfection process.

II. BASIS OF DESIGN REPORT

A. Revise “Security Water and Sanitation District” and “SWSD” to “Security Water District” and “SWD”. There is no entity known as the Security Water and Sanitation District.

B. Page 7, 1. Cover Page: Contact GMS, Inc. for assistance in completing the, "TBD," data.

C. Table 1, Line 8 - Rated Capacity. Revise the "Design Peak Hour Flow = 6,800 gpm" to the "Design Peak ***Day*** Flow = 6,800 gpm."

D. Page 8, Project Summary and Scaled Map: Revise the number of wells to 24.

E. Page 15, Process Flow Diagram: GMS, Inc. and the SWD will provide the design water surface elevations in the Zone 1 and Zone 2 tanks for use in design. See subsequent comments in this memorandum.

F. Page 16, Table 2, Mitigation Processes, Ion Exchange: Please confirm that the prewash and backwash flow rate of 133 gpm (1.2 gpm/sf), as presented in the BDR is sufficient to rinse the media and provide the required bed expansion for backwashing. Also, add a description of the required standby flow condition.

   The pipeline will be designed for a design flow rate of 8.1 mgd from the "S-Wells" and 1.7 mgd from the Windmill Gulch Wells.

   Critically examine the head conditions for the raw water feed pumps recognizing that the head loss through the ion exchange contactors is on the order of 80-feet. We question whether piping losses amount to approximately 100-feet.

Revise the Zone 2 booster pump design flow rate to be no less than 3.7 mgd, 2,570 gpm.

Examine the Zone 1 disinfection criteria. The system must be designed to accommodate full mitigation facility flow to Zone 1, i.e. 6,800 gpm. The disinfectant dosing and contact time design should be designed accordingly.

Please examine and revise the Zone 2 disinfection criteria. We see no reason to change the minimum dose from 0.7-0.8 mg/l. Modify the peak flow to be as designed at a rate of 3.7 mgd, 2,570 gpm, with contact piping sized as required.

G. Page 17, Ground Water Wells and Conveyance, Table 3: Revise the total number of wells to 24. The Venetucci WTP serves wells V-4, V-5, V-6, and V-7. The Cactus WTP serves Wells S-12, S-13, S-14, and CS-13 (aka P-13) (these appear to be double counted). Modify the footnotes accordingly.

   Modify the flow rate from the Venetucci Wells (BDR Well IDs 11-14) to be 1,950 gpm. This is the output capacity of the high service pumps in the Venetucci facility.

   Modify the output of the Cactus facility to have a flow rate at Zone 1 distribution pressure of 1,500 gpm. That is the capacity of the high service pumps in the existing Cactus facility.

H. Page 19, Table 5 - Feed Pump Design: The Zone 1 tank MWL elevation shown may be modified based on the following:
   - Storage tank overflow elevation = 5880.3
   - Storage tank design low water level = 5865.00
   - All elevations are based on NGVD 1929 elevation datum

   Zone 2 static hydraulic grade line elevation
   - Storage tank overflow 6000
   - Design low water level 5985
   - All elevations are based on NGVD 1929 elevation datum

I. Page 19, Ion Exchange: Add a description of the needed standby flow operating condition. Please confirm that the *CalRes2109*® resin is not adversely affected by sodium bisulfate.

J. Page 20, Zone 2 Booster Pumps: The design peak flow to Zone 1 shall be the full throughput capacity of 6,800 gpm. The design peak flow to Zone 2 shall be 2,570 gpm. The Zone 2 flow rate is based on the PWS having 2.0 mgd from the LJR WTP and 1.7 mgd from the Yucatan WTP.

K. Page 20, Disinfection System: The minimum chlorine residual at the Zone 2 entry point at 1.34 mg/l exceeds the District's current average entry point residual of 0.7 mg/l. Additional contact volume is required.

L. Page 20, Table 8, Chemical Dose and Storage: Revise the design flow rates for Zone 1 and Zone 2 under the peak day design condition. Note that the peak use system criteria at 6,800 gpm may either be 100% to Zone 1 or a reduced volume to Zone 1 and a maximum of 3.7 mgd to Zone 2.

M. Page 21, Paragraph 9. Residuals Handling Plan: The SWD and GMS, Inc. respectfully request the opportunity to discuss the residual disposals from the water quality mitigation facility as described in this document. We are of the opinion that there is an alternative means of disposing of the residual chlorine and nitrate analyzer discharges other than discharge to the sanitary sewer. It is respectfully requested that the chlorine system be reagentless, i.e. a Hach CLF10 sc and CLT10 sc, which will permit the recycle of the continuous discharge. It will be necessary that further examination of the manner in which the nitrate analysis will be accomplished prior to making a determination as to the more appropriate equipment and disposal of residuals.

   Please describe the means by which any discharge to the sanitary sewer shall be limited to no more than 100 gallons per minute from this facility with flow metering rate and total volume measurement and recording instrumentation.

N. Page 21, Section 10 - Preliminary Plan of Operation: Please identify the water plant classification in accordance with WQCC Regulation No. 100 that will be applicable to this facility.

III. TECHNICAL SPECIFICATIONS TABLE OF CONTENTS

A. Please add a Division 1 specification section for warranties, such as the roofing assembly and coatings.

B. It is recognized that a few Division 2 specifications sections may be deemed unnecessary once the geotechnical investigation and foundation design has been accomplished.

C. Please be sure that either Section 02730, Sanitary Sewerage System, includes gravity pipeline testing and internal pipe inspections.

D. We suggest that there be separate specification sections for formwork and reinforcing steel. In addition, we suggest there be a separate specification section for precast concrete to include potential precast structures for the wastewater flow equalization function. Standard sanitary sewer manholes can be included in the appropriate Division 2 section.

E. We respectfully request that Specification Section 07115 be identified as Bituminous **Waterproofing**.

F. Please add a Division 7 section for the perimeter foundation insulation which may consist of rigid insulation affixed to the interior of the perimeter stem wall. This installation feature is not an integral part of the pre-engineered metal building. It is assumed that the building wall and roof insulation will be specified in Division 13. We note that the pre-engineered metal building is proposed to be specified in Division 5. That may, or may not be, the appropriate Division.

G. We suggest that Specification Section 08510, Steel Windows, be modified for use of FRP window assemblies. This will eliminate corrosion and coating issues utilizing an FRP product in lieu of steel.

H. Please add a Division 13 specification section for polyethylene chemical storage tanks and accessories.

I. At this point in the project, we do not recognize the requirement for a fire alarm system nor an integral fire suppression system. Standard Class A, B, and C fire extinguishers, manually operated, may be specified as a furnishing in Division 12.

J. We suggest that a Division 13 section be developed for a, "Utility Control System" or more commonly referred to as SCADA system. The building intrusion detection along with other environmental detection recording and alarm systems will be included in the building related SCADA system, including monitoring and operation of the heating, ventilating and temperature control systems.

K. Please assure that Specification Section 16010 includes appropriate lockout/tag out devices and supply storage cabinet.

L. Please provide a Specification Section, either Division 13 or Division 16, for the lightning protection system.

M. We suggest that either Specification Section 15145 include basic domestic water piping materials and accessories or a separate section be provided for basic domestic water piping materials with specialties continuing to be specified at Section 15145.

N. We will assume that the engine driven on-site power generation equipment will include an integral fuel tank and a separate fuel tank assembly will not be required.

These are the majority of our comments based on review of the 30% documents provided on November 30, 2018. Should the reviewers of this memorandum have any questions or desire clarification, please contact GMS, Inc. at the earliest possible convenience.