BEFORE THE PUBLIC UTILITIES COMMISSION OF NEVADA

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In the Matter of: Application of Great Basin Water Co., Pahrump, Spring Creek, Cold Springs, Pahrump, and Spanish Springs Divisions for Approval of its 2024 Integrated Resource Plan and to designate certain system improvement projects as eligible projects for which a system improvement rate may be established, and for relief properly related thereto.	Docket No. 24-______________

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All applicable mixing requirements specified herein for concrete mixed at the site shall govern transit-mixed concrete and the Owner shall have free access to the batching plant at all times. For concrete mixed in top-loading truck mixers, each batch shall be turned not less than 40 and no more than 300 revolutions of the mixer drum at mixing speed when the fine and coarse aggregate are charged into the mixer simultaneously (cement and water may be charged separately). When the fine and coarse aggregate are charged into the mixer separately, each batch shall be turned not less than 60 and not more than 300 revolutions of the drum at mixing speeds.

For concrete mixed in end-loading truck mixers, each batch shall be turned not less than 60 and not more than 300 revolutions of the mixer drum at mixing speed when the mixer is loaded in excess of 50 percent of the gross drum volume as provided hereinafter. When the mixer is loaded (not to exceed 50 percent of the gross drum volume) the provisions specified for top-loading truck mixers will apply.

Truck mixers shall be loaded in accordance with manufacturer's capacity ratings, but in no case shall the volume of mixed concrete exceed 50 percent of the gross volume of the drum for top-loading mixers and 58 percent of the gross volume of the drum for end-loading truck mixers.

Mixing speed shall be in accordance with manufacturer's recommendations, but in no case shall the speed be less than 4 revolutions per minute or greater than a speed resulting in a peripheral velocity of the drum of 225 feet per minute. The power unit shall be equipped with a governor to insure constant speed. Each truck mixer shall be equipped with a device for counting the number of revolutions of the drum, which device shall be interlocked so as to prevent the discharge of concrete from the drum before the required number of turns. After the drum is once started, it shall be revolved continuously until it has completely discharged its batch. Water shall not be admitted to the mix until the drum has started revolving. The right is reserved to increase the required minimum number of revolutions or to decrease the designated maximum number of revolutions allowed, if necessary, to obtain satisfactory mixing, and the Contractor will not be entitled to additional compensation because of such increase or decrease.

B. Mixing Water Limitations. If water is added at the batching plant, ready-mixed concrete shall not be held in the mixer for more than one and one-half hours from the time the water is added. When temperature of concrete is 85°F or above, reduce holding time to 45 minutes. Do not deliver ready-mixed concrete to job with total specified amount of water incorporated therein. Withhold 2½ gallons of water per cubic yard, then incorporate in mix before concrete is discharged from mixer truck. If no water is added at the batching plant, measured quantities of water shall be added at the site and a minimum of fifteen minutes mixing given, or mixing to overcome segregation. Adding of water shall be under observation of Inspector. Each mixer truck shall arrive at the job site with its water container full. In event container is not full or concrete tests to a greater slump than specified, the load is subject to rejection.

C. Job Mixed Concrete. Contractor shall obtain the approval of the Owner for equipment and procedures proposed for job mixed concrete.

D. Consistency and Slump. Adjust quantity of water so concrete does not exceed maximum slumps specified when placed or specified water/cement ratio; use minimum necessary for workability required by the part of the structure being cast. Measure consistency of concrete in accordance with ASTM C143. Concrete exceeding maximum slump will be rejected.

Part of Structure	Maximum Slump
Footings and mass concrete not reinforced	3 inches

Slabs, and floors and reinforced footings	2 to 3 inches
Columns, walls over 8 inches thick	3 to 4 inches
Walls up to 8 inches thick	3½ to 4 inches
Equipment bases	3 to 5 inches

3.0 EXECUTION

3.01 PREPARATION BEFORE PLACING. Remove excess water from forms before concrete is deposited. Divert any flow of water without washing over freshly deposited concrete. Remove hardened concrete, debris, and foreign materials from interior of forms and from inner surfaces of mixing and conveying equipment.

A. Forms. Prior to placing concrete, forms shall meet the requirements of Section 03150, as approved by the Engineer. Concrete to be poured on earthwork such as slabs or stairs on grade shall meet the same requirements for approval prior to pouring as above specified for the approval of forms.

B. Reinforcement. Reinforcement shall have been secured under work of Sections 03150 and 03200, and inspected and approved. Embedded metal shall be free of old mortar, oils, mill scale, and other encrustations or coatings that might reduce bond. Wheeled concrete-handling equipment shall not be wheeled over reinforcing nor shall runways be supported on reinforcing.

"Break-out" bars or dowels bent for forming, for subsequent straightening prior to adjacent pour, will be allowed with bars of #5 maximum size, only where specifically called out on the Drawings, and only where kinks or breaks are not likely as a result of straightening. This does not imply approval of cold joints where none designed, or any deviation from construction joint requirements elsewhere in these specifications.

C. Wetting. Wet wood forms sufficiently to tighten up cracks. Wet other materials sufficiently to reduce suction and maintain concrete workability.

D. Earth Subgrade. Lightly dampened 24 hours in advance of concrete placing, but not muddied. Re-roll as necessary for smoothness, and remove all loose materials.

E. Aggregate Fill Base. Prepare same as earth subgrade. Center 30-mil plastic sheeting or roofing cap sheet on base course under indicated waterstop joints to retain mix fines within mix and prevent their percolation into base course.

3.02 WATERSTOPS. Heat fuse joints and connections in strict compliance with manufacturer's instructions including heating tools and devices. Waterstops shall be continuous in joints, following offsets and angles in joints until spliced to waterstops at intersecting joints, completely sealing the structure. Waterstops shall be aligned and centered in joints. Secure flanges of waterstops to reinforcing bars with 18 gage wire ties spaced maximum 18 inch center. All waterstops, splices, joints, intersections, and welds shall be tested with an approved holiday spark tester before concrete is placed. Locate waterstops where shown on drawings and in all water-bearing walls and slabs where common to: earth-bearing or earth-support; occupied areas; or above-grade exposed surfaces.

Waterstop shall be positioned correctly during installation and all splices in length or at intersections shall be performed by heat sealing and in accordance with manufacturer's recommendations.

Waterstop joints shall conform to Drawing requirements, if requirements are shown on the Drawings, and, whether or not requirements are shown on the Drawings, shall be properly heat-spliced at ends and crosses to preserve continuity. All splicing shall be done using mitered joints. Forms for construction joints shall be constructed in such manner as to prevent injury to waterstops. Waterstops shall be securely held in position in the construction joints by wire ties.

In narrow walls requiring both rebar and waterstop, the rebar shall be offset to one side and the keyway and/or waterstop shall be offset to the opposite side sufficiently to allow placement of both rebar and waterstop without contact. In order to accommodate such an offset, double curtain steel may be replaced by one properly designed larger bar upon approval by the Engineer.

All in-place waterstop installations including locations and joints shall be approved by Owner prior to placement of concrete.

3.03 JOINTS IN CONCRETE. Locate joints in concrete where indicated unless otherwise approved. Obtain approval of points of stoppage of any pour, prior to scheduling of pour.

A. Construction Joints. Unless otherwise shown, all construction joints shall be provided with suitable keyways of other keying methods. Clean and roughen contact surfaces of construction joints by removing entire surface and exposing clean aggregate solidly embedded in mortar matrix. Use mechanical chipping, sandblasting, or application of surface mortar retarder followed by washing and scrubbing with stiff broom. Cover and protect waterstops and other inserts from damage. The hardened concrete shall be watered and kept wet for at least 24 hours before placing new concrete. At construction joints not containing waterstops, the coarseness amplitude of the prepared surface shall be 1/4 inch minimum in accordance with the latest edition of ACI 318, Section 11.7.9. Provide sealant for construction joints where shown on the shop drawings and/or which will be immersed or intermittently immersed in water or sewage. Sealant shall be per Section 03300, Part 2, 2.01, H. Where construction joints are not indicated on the Drawings, provide slabs and walls with construction joints at intervals not greater than 30 feet.

   Starter walls shall be used unless detailed otherwise. Where utilized, starter walls shall extend a minimum of 3 1/2 inches.

   Where "break-out" bars are required by the contract drawings for future structure extensions, except where other methods are specifically set forth on the contract drawings a required mortar-tight enclosure of the reinforcing dowels shall be provided by installing the break-out bars in capped PVC pipe embedded 1 inch minimum into the structural concrete.

B. Expansion Joints. Provide where indicated, 1/2 inch width unless otherwise detailed. Except where synthetic rubber (sealant) sealed joints are shown or specified, provide expansion joint filler and joint sealer, filler head down 1/2 inch to 3/4 inch and sealer finished flush with surface. At synthetic rubber sealed joints, hold filler down 1/2 inch unless otherwise shown, ready to receive sealant.

   1. Location of joints in interior slabs on grade shall be as detailed on the Drawings. Sawed control joints shall be as approved by the Engineer.

   2. Control joints in exterior slabs shall be located as indicated on the Drawings, or as follows if not noted:

      a. Provide bond breaker with 1/2 inch expansion joint material at junction of walls, bases, columns, etc.

      b. Provide 1/2 inch expansion joints at changes in direction of slabs, or abrupt changes in width and not greater than twenty (20) feet apart on slabs without control joints.

      c. Control joints in exterior slabs shall be sealed with the specified sealer.

C. Roof and Floor Slabs. Pour slabs in alternating checkerboard fashion between indicated construction joints, as approved. Slabs in place shall be cured as required elsewhere in these specifications a minimum of seven (7) days before adjoining slabs are cast.

D. Intermediate Screed Strips. Intermediate screed strips shall be required for all slab pours unless otherwise approved. Such approval for the omission of intermediate screeds shall be for each individual pour and no blanket approval shall be given.

E. Gasket Seals. At joints between precast concrete manhole and/or wet well units, clean mating surfaces of both members. Then within groove, place and lay continuous rod of specified compressible gasket to provide watertight installation after placement of matching tongued concrete member and compression of the gasket.

F. Joining Existing Structures. Where a construction joint to an existing structure requires a waterstop and none is found in the existing structure, Contractor shall join the old structure by chamfering the new concrete at the joint and filling the chamfer with specified epoxy sealant.

Where required reinforcing is not found protruding from the existing structure, required reinforcing shall be placed by drilling and placing dowels of the proper size and spacing.

Where required waterstop and reinforcing is found in the existing structure, joints shall be treated as other construction joints under Articles 3.01 and 3.02.

G. Concrete for Buried Electrical. Buried electrical conduits shall be encased in concrete. Immediately after pouring concrete, red mineral oxide shall be evenly sprinkled on top of concrete to a minimum of 3/8" thick and then lightly raked into top of wet concrete encasement. Red coloring shall be pure mineral oxide, limeproof and nonfading. Amount and type of coloring agent used shall not reduce the quality of concrete below that specified.

3.04 CONVEYING AND PLACING CONCRETE.

A. Do not pour concrete until reinforcing steel and forms have been inspected and approved. Notify Any concrete not in accordance with these specifications, out of line, level, or plumb; or showing cracks, rock pockets, voids, stalls, honeycombing, exposure of reinforcing, or any other damage which will be detrimental to the work will be considered defective and must be corrected and replaced as directed by the Engineer at no additional cost to the Owner. Any concrete work that is not formed as indicated; is not true within 1/250th of the span; is not true to intended alignment; is not plumb or level where so intended; is not true to intended grades and levels; has voids or honeycombs that have been cut, resurfaced or filled, unless under the direction of the Engineer; has any sawdust, shavings, wood or embedded debris; or does not fully conform to the contract provisions, shall be deemed to be defective and shall be removed from the site.

1. Handle or pump no concrete utilizing aluminum equipment.

2. Delivery tickets shall show the following:

   a. Batch number.

   b. Mix by compressive strength with maximum aggregate size.

   c. Types and amount of admixtures included.

   d. Air content.

   e. Slump.

   f. Time of loading and discharge.

   g. Amount of water put in at batch plant.

h. Location in the work.

i. Specification class of concrete.

j. Date of delivery.

3. If any water is added at the job site, it shall be approved by the Engineer and the delivery ticket noted as to the amount of water added. One copy of each delivery ticket shall be submitted daily to the Engineer.

B. Weather. Do not place concrete during rain or freezing weather unless approved measures are taken to prevent damage to concrete. Concrete placed during periods of dry winds, low humidity, high temperatures, and other conditions causing rapid drying shall be initially cured with a fine fog spray of water applied immediately after finishing and maintained until final curing operations are started. Also under hot weather conditions, steps shall be taken to reduce concrete temperatures and water evaporation by proper attention to ingredients, production methods, handling, placing, protection, and curing.

1. Preventative measures taken for concrete placement during hot or cold weather shall be approved by the Engineer. There shall be no placing of concrete when ambient temperatures are below 35°F or above 100°F, or when such will be the case within 24 hours of the pour. Any concrete previously placed shall be protected from freezing.

C. Conveying. Do not drop concrete from its point of release at mixer, hopper, tremies, or conveyances more than 6 feet, nor through reinforcing bars in a manner that causes segregation. Provide form windows, tremies, elephant trunks, and equivalent devices as required. The use of chutes for conveying or depositing concrete is not allowed except for small isolated portions of the work and only with prior approval. Deposit concrete directly into conveyances and from conveyances to final points of repose. Deposit concrete so that the surface is kept level throughout, a minimum being permitted to flow from one portion to another.

D. Placing Concrete. Concrete shall be placed and compacted within 90 minutes after water is first added to the mix, and no concrete shall be placed after there is evidence of initial set. This placing time shall be reduced to 45 minutes when the temperature of the concrete is 85°F or above. Retempering of concrete is not allowed.

1. Horizontal Construction Joints. Horizontal surfaces of previously placed and hardened concrete shall be wet and covered with a 6 inch thick layer of concrete of the design mix with 50% of coarse aggregate omitted just before balance of concrete is placed.

2. Lifts. Pour concrete into forms immediately after mixing in a manner that will prevent separation of ingredients. Except as interrupted by joints, all formed concrete shall be placed in continuous, approximately horizontal layers, the depths of which generally shall not exceed 18 inches.

a. Walls. Pour walls of water-containing structures, including tank exterior walls, as one continuous operation from footing to top of wall between indicated construction joints at the specified pour rate.

Each section of wall shall be in place at least seven (7) days before the adjoining wall section is cast. Shear walls and columns within tanks and other walls may have horizontal construction joints at approved locations.

b. Slabs. Pour slabs as one continuous operation between indicated or approved construction joints. Cure in-place slabs not less than seven (7) days prior to pouring alternate slabs. Then continue to cure until required curing time is attained.

c. Beams and Slabs. Pouring of all beams and slabs must be continuous and monolithic with the floor system where so shown on the Drawings. At least two (2) hours must elapse after depositing concrete in walls or columns before pouring beams, etc. supported thereon.

3. Pumping Concrete. No increase in the specified slumps will be allowed and required water/cement ratios shall be maintained for concrete pumping. Aluminum tubes are not acceptable for conveying concrete. Equipment shall be capable of maintaining the specified pour rates. Conform with requirements of ACI 304.2R-96, except as more stringent requirements are specified herein. Minimum conduit (tube) diameter shall be 4 inches.

4. Pour Rates.

a. Vertical Elements. Place concrete in lifts as specified at a rate that does not overstress forms nor allows the top of a lift to begin to harden before the next lift is placed. Cold joints are not acceptable.

b. Slabs. Place concrete at a rate that ensures all deposits are joined to concrete that is still plastic and within 10 minutes of the previous pour. Concrete adjoining alternate slabs shall not be placed until the adjoining concrete has cured as required elsewhere in this specification for at least seven days unless otherwise approved by the Engineer.

5. Field Tests. During the progress of construction, the Owner will have tests made to determine whether the concrete, as being produced, complies with the standards of quality specified herein. These tests will be made in accordance with ASTM C3l and ASTM C39.

Each test will consist of a minimum of four cylinders, and the Owner, at his discretion, may take such tests as frequently as necessary to prove the quality of the concrete. In no case shall less than one test be made of each day's pour or of each 50 yards of concrete. The Contractor shall furnish the concrete for such tests but the remaining testing expense will be borne by the Owner. Specimens will be cured under job conditions.

For all concrete, the standard age of test will be 28 days, but the 7-day test may be used provided that the relation between the 7 and 28 strengths of the concrete is established by tests for the materials and proportions used.

Slump tests will be in accordance with ASTM Cl43.

Enforcement of Strength Requirement. Concrete is expected to reach a higher compressive strength than that indicated as minimum compressive strength. At least the specified minimum cement shall be used, and more cement shall be used, if necessary, to meet all minimum and maximum requirements shown in the table. Failure to meet these conditions shall be considered failure of the concrete.

One test shall consist of the results of testing three (3) standard specimens in accordance with ASTM C3l and C39, except that if one specimen in a test shows manifest evidence of improper sampling, molding, or testing, it shall be discarded and the remaining two strengths averaged. Should more than one specimen presenting a given test show defects due to improper sampling, molding, or testing, the entire test shall be discarded.

If the concrete fails to meet the specifications in the preceding paragraph, the Owner shall have the right to ask for additional curing of the affected portion followed by cores taken in accordance with ASTM C42 all at the Contractor's expense. If the additional curing does not bring the average of three cores taken in the affected area to at least the strength specified, the Owner may require strengthening of the affected portions of the structures by means of additional concrete or steel, or he may require replacement of these affected portions, all at the Contractor's expense. Core tests for below-strength concrete shall be paid for by the Contractor even though such core tests indicate the concrete has obtained the required minimum compressive strength.

E. Compaction. Effective compaction shall be obtained by vibration, agitation, spading, and rodding until the concrete is free from voids, air bubbles, or rock pockets. Vibrators shall not be used to transport concrete within the forms. No less than one spare vibrator for each two vibrators in use on a pour, each in good working condition shall be kept on the job during pours. One experienced workman shall be assigned to the operation of each vibrator as his only duty. Operations not deemed to be satisfactory by the Owner shall be immediately corrected.

1. Vibration. All concrete, with the exception of concrete slabs 4 inches or less in depth, shall be compacted with high frequency, internal mechanical vibrating equipment supplemented by hand spading and tamping. Concrete slabs 4 inches or less in depth shall be consolidated by wood or metal grid tampers, spading and settling with a heavy leveling straight edge. Carefully vibrate concrete around waterstops and ensure the waterstops are not bent or damaged.

a. Vibrators. Vibrators shall be designed to operate with vibratory element submerged in the concrete, and shall have a frequency of not less than 7,000 impulses per minute when submerged. The vibrating equipment shall be adequate at all times in number of units and power of each unit to consolidate the concrete to the maximum practicable density so that it is free from air pockets, honeycomb, entrapped air and so it closes snugly against all surfaces of forms and embedded items.

b. Operation of Vibrators. Do not allow vibrators to contact forms or reinforcing. In vibrating a freshly placed layer of concrete, the vibrator shall be inserted vertically through the preceding layers that are still completely plastic and slowly withdrawn, producing the maximum obtainable density in the concrete without creating voids. Under no circumstances shall the vibrator enter or disturb concrete that has stiffened or partially set. The interval of vibrator placing shall not exceed two-thirds the effective visible vibration diameter of the submerged vibrator. Avoid excessive vibration that causes concrete segregation or causes an inordinate amount of entrained air to move to the face of the forms, which shall be causes for rejection of the concrete pour.

c. Re-Vibration of Retarded Concrete. Concrete containing retarding admixture for structural walls and columns shall be placed by a schedule that allows each layer of concrete to be in place and compacted for at least 30 minutes before the next layer of concrete is placed. Bleed water on the surface of the concrete shall be removed before additional concrete is placed and the concrete in place re-vibrated before the next lift is placed. At tops of walls and columns concrete containing excess water or fine aggregate caused by vibration shall be removed while plastic, and the space filled with compacted concrete of the correct proportions, vibrated in place.

F. Slabs. Set screeds at maximum 8 foot centers, as approved, and verify correct elevations with instrument level, and consideration for any camber in the form. Compact and tamp concrete to bring 3/8 inch mortar to surface, and wood float to straightedges and screeds. Make finished surfaces level or sloped as detailed, with maximum deviation of 1/4 inch from 10 feet straightedge for exposed finishes, and there shall be no low spots to impound water. Do not use steel or plastic floats of any kind of initial floating operations. Unless otherwise specified, do not apply hereinafter specified finishes until surface water disappears and surface is sufficiently hardened. Remove all bleed water and laitance as it appears.

G. Tolerances.

1. Forms, sleeves, and inserts shall be set, and concrete shall be cast, to the lines and grades indicated on the plans and as detailed in these specifications. The maximum deviation from true line and grade shall not exceed the tolerances listed in the following table.

Item	Maximum Tolerance
Sleeves and inserts	+1/8 inch -1/8 inch
Projected ends of anchor bolts	+1/4 inch -0.0 inch
Anchor bolt setting	+1/16 inch -1/16 inch

2. Formed surface tolerances for concrete shall meet requirements for ACI surface classes as follows, unless otherwise specified herein or in the Special Provisions.

Class "A". Exposed interior and exterior concrete to be coated or painted. Abrupt irregularities must meet a modified requirement of 1/16 inch maximum.*

Class "B". Coarse textured concrete intended to receive plaster, stucco or wainscoting.

Class "C". Exposed interior and exterior concrete not requiring coating or painting.

Class "D". Permanently concealed surfaces below permanent ground level or operating water surface.

Permitted Irregularities in Formed Surfaces

Checked with a 5-foot Template.

Type of Irregularity	ACI Surface Tolerance Class of Surface A	B	C	D
Gradual	1/8 inch	1/4 inch	2 inch	1 inch
Abrupt	*1/16 inch	1/4 inch	1/4 inch	1 inch

3. Deviation in alignment of slabs or walls shall not exceed a rate of l/8 inch in l0 feet within the tolerances specified.

4. Slabs shall be uniformly sloped to drain.

5. Regardless of the tolerances listed herein, it shall be the responsibility of the Contractor to limit deviations in line and grade to tolerances which will permit proper installation and operation of mechanical equipment and piping.

3.05 CURING FORMED CONCRETE. Maintain forms containing concrete in a thoroughly wet condition until forms are removed. Maintain all concrete in a continuously moist condition for not less than 7 consecutive days after pouring (l4 days on projects subject to Federal Wage Determination). Keep concrete moist with fine fog spray until protected by curing materials. Use water curing method, specified liquid membrane-forming compound, or concrete curing paper or mats, all subject to approval for each specific use. Vertical surfaces shall not be cured by sprinkling method unless specifically approved by the Engineer.

3.06 PLACING GROUT.

A. Grout all steel bearing plates, columns, and other structural parts set to hardened concrete using nonshrink grout. Use an approved premixed grout, adding only water in the amount recommended by the manufacturer.

B. Generally, use driest practicable mix and pack into place so no voids remain between steel and the supporting concrete.

C. When necessary, use sufficient water to produce a flowable mixture, and pour, first forming sand dams to retain the grout until partially set. When sufficient set is attained, remove dams and pack grout to refusal on all four sides, to eliminate voids; fill any resulting edge voids with drier mix.

D. In all locations where the surface of the grout will be exposed to view or in an area of high humidity, nonshrink grout shall be recessed to approximately one-half inch back of the exposed surface and the recessed area filled with cement mortar grout.

3.07 ANCHORS, SLEEVES, STAIR NOSINGS, ETC.

A. Install in forms, in accordance with layout information provided by their suppliers, all necessary anchors, anchorage inserts, sleeves, slots, etc., required for fastening or passing the work of other Sections; also all such surface items as edge angles, manhole frames and other castings, trench cover frames or gratings, access panels, expansion joint covers, stair nosings, etc., having anchorage features requiring that they be installed before concrete is placed.

B. All such items shall be accurately located, carefully plumbed and leveled, securely fastened in place so that alignment and level will not be disturbed during concreting, and protected from damage until concreting is completed.

C. Provide all openings and chases in concrete, shown on the Drawings or as otherwise required.

3.08 EQUIPMENT BASES. Provide all concrete bases or foundations shown for equipment or fixtures included in other Sections of the work unless the Drawings or Specifications indicate that bases are to be furnished as part of the equipment.

A. Material. In general, use 3,000 psi concrete as required by Article 1.04, unless otherwise specified on the Drawing.

B. Installation of Nuts and Bolts. Work from approved setting Drawings. Use steel or plywood templates and apply nuts above and below, to hold bolts in vertical position. During the course of the placement of any concrete, the Contractor shall have sufficient personnel, of whatever skill or trade required, available to check the location of all embedded anchor bolts, edge angles for grating, or any other item which may be deemed appropriate by the Engineer. This check shall be made immediately after the work has progressed to a point such that the item shall not be subject to disturbance and prior to the concrete having obtained sufficient set such that adjustment of the items, if necessary, cannot be made with unacceptable damage to the concrete. If the operation is such that repeated checks are required, they shall be made.

C. Size. Generally, the size indications and dimensions of bases shown on Drawings are approximate. The actual size, in all cases, shall be determined from the equipment furnished. Work from approved equipment supplier's drawings.

3.09 FINISHING FORMED CONCRETE.

A. Within 5 days following the removal of forms, the following finishing operations shall be performed. No other finishing operations are required for permanently concealed concrete (i.e., concrete below permanent ground surface or operating water level). When specifically approved by the Engineer, finishing of concrete may be performed by units, (i.e. a complete wall, a complete structure, etc.), in which case 10% minimum concrete payment shall be retained for the finishing operation.

Finishing operations to be performed:

1. Remove projections and offsets.

2. Saturate form tie holes with water and fill voids with mortar of same mix as concrete (less coarse aggregate), cure and dry; white bonding glue manufactured for this purpose may be added to the mix in accordance with the manufacturer's instructions.

3. Patch all damaged areas due to spalling, voids, rock pockets and bleeding of cement (generally caused by form leaks) with mortar over a concrete adhesive bonding agent manufactured for this purpose and applied in accordance with the manufacturer's instructions. Cut out all rock pockets to sound concrete, edges square to the surface and back beveled, and patch with tempered mortar applied over an approved epoxy concrete adhesive. Large areas (as determined by the Engineer), and all other damaged areas over 1/2 inch in depth shall be repaired similarly. Other damaged areas less than 1/2 inch in depth shall be similarly repaired, but an approved white concrete bonding agent may be used in place of epoxy concrete adhesive.

4. Finish patches flush with adjoining surfaces and cure the same as the original concrete.

   Attention is directed to the need for properly curing the repair patches, and for utilizing the proper bonding agent for a given situation (i.e., below operating water level). Information regarding the manufacturer's recommended use shall be furnished to the Engineer for his evaluation.

   Pursuant to the specifications, all concrete must be cured for seven (7) days after pouring or patching, including sacked concrete, except concrete sacked after 7 days following pouring or patching needs no further curing.

5. Small air holes may be considered those which would be covered over by sacking, and need not be repaired on external walls being waterproofed or other areas not required to be sacked under the specifications. Air holes larger than this shall be considered voids.

   Minor cement paste leaks are those not exposing aggregate and which can be covered over by sacking, and should be treated similarly to small air holes. Anything larger shall be considered a rock pocket or a bleed hole, depending upon the condition. Some small bleed holes may, at the discretion of the Engineer, not need to be chipped out, but may be merely sandblasted to sound concrete prior to patching.

B. All exposed interior and exterior formed concrete (i.e., concrete not permanently concealed from direct visible exposure under facility operating conditions, including gallery and equipment room walls and ceilings), and all concrete to be coated in the finished structure shall, in addition to the foregoing, be Brush-Off Blast Cleaned (SSPC-SP7-63) to open all paste and air holes and to remove curing compound and dust. It shall then be rubbed with cement of consistent color and burlap and/or with brick and water to eliminate pockets and produce reasonable smooth surfaces suitable for painting. A reasonable smooth surface shall be defined as a surface with no projections or form marks greater than 1/16 of an inch and no indentations after finishing. Chamfers and fillets shall be made straight and true, and uniform.

Concrete to be temporarily concealed until facility is expanded shall be considered exposed concrete.

3.10 FINISHING SLABS AND FLATWORK. As specified above, initially compact, bring 3/8 inch mortar to surface and float surfaces. Finished surfaces shall be "puddle-free" and level or sloped as indicated to above specified maximum deviation limits. Surfaces which are not within these limits shall be removed and replaced at no additional cost to Owner; patching is not acceptable. Keep surface moist with fine fog spray of water to prevent drying during finishing operations and until curing media is applied. Dusting with cement or sand during finishing operations is not permitted.

A. Precautions. Slabs have not been designed for heavy construction loads. Contractor shall repair or replace damaged slabs resulting from his use of heavy equipment or loadings as directed by the Engineer.

B. Rough Slabs. Broom surfaces of slab after initial set of concrete leaving coarse aggregate slightly exposed. Apply on following areas and surfaces:

1. Concrete to receive deferred concrete, grout or mortar.

2. Tops of footings for masonry.

C. Monolithic Trowel Finish. For all floor, slab, and flatwork surfaces not otherwise indicated or specified. After surface water disappears and floated surface is sufficiently hardened, steel trowel and re-trowel to smooth surface. After concrete has set enough to ring trowel, re-trowel to a smooth uniform finish free of trowel marks or other blemishes. Avoid excessive troweling that produces burnished areas.

D. Steel Float Finish. Same as monolithic trowel finish, except omit second re-troweling. Apply on following area and surfaces:

1. Apply on floor slab surfaces in water-bearing structures.

2. Areas scheduled to receive resilient floor coverings.

E. Swirl Non-Slip Finish. Prepare same as steel float finish, then perform final troweling with circular motion and slightly lift trowel to produce uniform swirl (sweat trowel) non-slip finishes matching sample selected by Owner from Contractor-prepared 2-foot square sample panels. Unless otherwise specified, provide uniform coarse texture on exterior walking surfaces.

F. Wood Float Finish. Float to screeds. When ready, finish with wood floats to a uniformly textured surface. Apply on following areas and surfaces:

1. Exterior walking surfaces exceeding 1:10 slope.

G. Floor Hardener Application.

1. Floor hardener shall be applied by dust-on method to all interior exposed concrete floors, and to other specifically designated floors using specified materials and rates of coverage.

2. Prior to application, the Contractor shall consult with the manufacturer's field representative in regard to application of floor hardener under prevailing job conditions.

3. Float and trowel floor hardener into the surface of freshly floated concrete floors shall be in strict accordance with the manufacturer's printed instructions.

4. Cure as work progresses using method conforming to hardener manufacturer's printed directions.

3.11 CURING SLABS AND FLATWORK. Apply curing media as soon as feasible after finishing operations without marring surfaces, and in any case on same day. Keep surfaces moist until curing is applied. Upon approval of liquid compounds, apply in strict accordance with material manufacturer's published application rates; apply two (2) spray coats, second coat sprayed at right angle direction from first coat. Carefully mask and protect adjoining surfaces where compound is used.

A. Curing Period and Protection. Maintain curing materials in proper sealed condition for minimum of 7 days (14 days on projects subject to Federal Wage Determination) after application. Keep traffic on curing surfaces to the minimum possible, and completely off liquid compound cured surfaces. Immediately restore any damaged or defective curing media.

B. Restriction. Do no use liquid membrane-forming curing compound within water-bearing structures, or on surfaces to receive deferred concrete or masonry, or on surfaces to receive fluid-applied protective coatings or waterproofing.

C. Liquid Membrane-Forming Curing Compound. Upon approval, and except as restricted above, use liquid curing compound for all slabs, floors, and flatwork. On slabs having floor hardener treatment, cure such slabs in strict conformance with printed recommendations of floor hardener manufacturer. Other special precautions may be required if concrete is exposed to freezing or otherwise adverse weather conditions during the curing period.

D. Sheet Curing. Use concrete curing sheet material on surfaces where liquid curing is not permitted, and on all joints sealed with pressure sensitive tape; immediately repair any tears during curing period. Verify that surfaces remain damp for full curing period; if necessary or directed, lift sheeting and wet surfaces with clean water, and replace sheeting.

E. Water Curing. Alternate to either liquid curing compound or sheet curing method where approved. Keep concrete continuously wet by ponding, sprinklers, or equivalent for entire curing period.

3.12 FORMED STAIRS AND TREADS. Stair nosings are required on all stairs. Accurately place cast abrasive nosings and screed tread surface flush and level. Cut riser back as indicated. At exterior and wet interior locations, apply coarse textured swirl non-slip abrasive finish on surface of treads and landings. Strip protective tape from the nosings on completion of cement finishing operations.

3.13 CHAMFERS AND FILLETS. Unless otherwise shown on the drawings or directed by the Engineer, exposed edges of formed concrete structure shall be provided with a 45°, 3/4 inch x 3/4 inch chamfer. Where fillets are shown on the drawings, they shall be formed with a 45°, 3/4 inch x 3/4 inch form chamfer, formed with a 3/8 inch radius form, or tooled with a 3/4 inch radius rounding tool. Where project is an expansion of an existing facility, chamfer selected shall be compatible with chamfer of existing facility.

3.14 JOINTS WITH SEALANT. Sandblast joints to clean sound concrete, using oil-free air to provide surfaces free of oil, foreign materials, and moisture. Mix and place primer, and sealant in accordance with manufacturer's printed instructions. Install foam backing in joints so sealant depth is between one-half and two-thirds of joint width. Isolate backing from sealant using a bond breaker such as polyethylene tape, aluminum foil, or wax paper.

A. Manufacturer's Supervision. A technical representative of the sealant manufacturer shall be present at the time sealant operations are started to supervise and approve preparation, sealant mixing, and sealant applications procedures and applicators. The representative shall make frequent visits to the site to ensure that sealant installations conform to the manufacturer's instructions, and shall issue a written report to Owner covering each visit.

B. Crack Sealing. Before and after backfilling of the tanks, all cracks over 0.01 inch wide in concrete surfaces of tanks and other water-containing structures shall be cutout as detailed and the groove filled with backing, primer, and sealant.

C. Joint Sealer. Unless specified otherwise, IGAS type joint sealer shall be used where joint depth is equal to or greater than twice the joint width. Colma type joint sealer shall be used where the depth to width ratio is less than 2:1.

D. Sealant. All sealant shall be placed in strict accordance with the manufacturer's printed specifications by a firm specializing in this type of work for not less than five (5) years, or by the Contractor under direct supervision of the manufacturer's representative.

E. Sealant Locations. All locations where sealant is placed must be cleaned by sandblasting and be free from oil, foreign materials, and moisture. Lower surfaces of joints shall be isolated with a bond breaker such as polyethylene, wax paper, aluminum foil or polyethylene tape.

3.15 INSTALLATION OF PIPELINES THROUGH CONCRETE STRUCTURES.

A. Whenever a pipeline or any material terminates or extends at or through a structural wall or sump, the Contractor shall install in advance of pouring the concrete the fitting or special casting required for the particular installation. Otherwise, prepare and submit shop/erection drawings of other installation methods and obtain approvals in advance of commencement of work.

B. Whenever any run of pipe is installed per approved shop/erection drawings subsequent to placing of concrete, the Contractor shall accurately position the opening in the concrete for such pipelines. Unless otherwise required, all pipes penetrating fluid containing or earth-supporting portions of the structure shall be ring flanged.

1. Opening shall be of sufficient size to permit a perfect final alignment of pipelines and fittings without deflection of any part and to allow adequate space for satisfactory packing where pipe passes through wall to insure watertightness around openings so formed.

2. The boxes or cores shall be provided with continuous keyways to hold the filling material in place and to insure a watertight joint.

3. Boxes or cores shall be filled with nonshrink grout or nonshrink concrete.

3.16 FIELD QUALITY CONTROL.

A. Concrete Tests. At Owner's expense, Owner's selected Testing Laboratory shall perform the concrete tests:

1. Compression Tests. Make one set of at least four standard test cylinders from each day's placing and each 150 cubic yards, or fraction thereof, each class of concrete. Date cylinder, number and tab, indicating location in structure from which sample was taken. Indicate slump test result of sample. Do not make more than one set of test cylinders from any one location or batch of concrete.

2. Test Cylinders. Provide for testing by Owner or Testing Laboratory to take test cylinders at the job in accordance with ASTM C31. Test specimens in accordance with ASTM C39 at the age of 7 and 28 days. Contractor shall furnish labor and assistance for casting test cylinders, and shall furnish moist curing cabinets, as required, conforming to ASTM C31 at the site.

3. Core Tests. Should strength of concrete, as indicated by tests, fall below required minimum, then additional tests of concrete which the unsatisfactory samples represent may be required by Owner. Testing Laboratory will make such test in accordance with ASTM C42. Contractor shall fill the holes made by cutting cores with dry pack concrete. Tests for below-strength concrete shall be paid for by the Contractor even though such tests indicate the concrete has obtained the required minimum compressive strength.

4. Air Content. At time that compression test cylinders are cast, test a sample of the same concrete for air content in accordance with ASTM C231.

3.17 WATERTIGHTNESS OF CONCRETE STRUCTURES.

A. All concrete structures designed to contain or convey fluid shall be tested for watertightness by the Contractor by filling with water to levels approximating what will be attained during operation and measuring the drop in level due to leakage, if any. These tests shall be made under the direction of the Owner, and if necessary, the tests shall be repeated until watertightness is insured.

B. Rate of filling shall be limited to minimize shock-effect to new concrete construction. Water shall be held under each condition long enough to satisfy the Owner that the structures are watertight. Structures shall be free of internal or external water leakage.

C. The total loss of water-level in any basin or flume shall not exceed 1/2 inch depth in 24 hours. Leakage shall be located and stopped and the structure again tested until this requirement is met. If the structure does not meet the test, the Contractor shall repair or replace at his own expense, such part of the work as may be necessary to secure the desired results, as approved by the Owner.

D. Regardless of the rate of leakage, there shall be no visible leakage from any concrete structure.

3.18 ALTERATIONS AND REWORK. Existing concrete surfaces to receive new concrete shall be heavily sandblasted to expose coarse aggregate and produce clean coarse textured surface. Such prepared surfaces shall be coated with epoxy bonding compound immediately prior to placing concrete. The compound shall be an approved equivalent to Sika Chemical Company's "Sikastix Adhesive", Hunt Process Company's "HB Series Epoxy Mortar", or equal of type, mix and application in strict accordance with manufacturer's printed recommendations and directions for various conditions.

3.19 QUALITY OF WORK. Concrete work which is found to be in any way defective or out of tolerance may be ordered by the Owner to be removed and replaced. Should this occur, all costs shall be paid by the Contractor.

END OF SECTION

SECTION 03470

PRECAST CONCRETE VAULTS

PART 1 GENERAL

1.01 DESCRIPTION

A. This section specifies the concrete work and appurtenances required for precast concrete vaults. Vaults shall be constructed of reinforced concrete sections and shall conform to the minimum dimensions shown on the Plans. Cast-in-place vaults will be considered acceptable only after approval is granted by the ENGINEER.

1.02 SUBMITTALS

A. The CONTRACTOR shall submit to ENGINEER 4 sets of shop drawings showing size and placement of reinforcing steel, wall opening locations, etc., and structural calculations for the vault design sealed by a licensed Civil Engineer.

B. The CONTRACTOR shall submit shop drawings of the proposed structure for review prior to construction. Drawings must provide information for complete review including dimensions, reinforcement design calculations and layout, etc.

PART 2 PRODUCTS

2.01 MATERIALS

A. Precast Concrete Sections

1. Precast sections shall be cast in a yard specializing in precast concrete materials.

2. All vaults shall be inspected during casting by an independent, certified testing laboratory, approved by the ENGINEER, to establish the strength of the concrete and the adequacy of curing, to certify the date the vaults were cast, and to confirm that the steel has been properly placed. This testing shall be performed by the laboratory at the CONTRACTOR's manufacturing plant, prior to shipment.

3. At least three cylinders shall be taken each day that vaults are cast, with batch samples to be designated by the laboratory representative. At least one set of cylinders shall be taken for each nine cubic yards of concrete used in the construction of the precast vaults. These samples shall be tested for strength. If the samples fail to meet minimum concrete strength requirements set forth in the Specifications, all vault sections manufactured from the concrete from which the cylinders were made will be considered rejected.

4. In addition, the OWNER reserves the right to core vaults either at the site or point of delivery to validate strength of concrete and placement of steel. If cores fail to demonstrate the required strength or indicate incorrect placement of reinforcing steel, all sections not previously tested will be considered rejected until sufficient additional cores

are tested, at the CONTRACTOR's expense, to substantiate conformance to these requirements.

B. Concrete

1. All concrete used in the construction of vaults shall be capable of obtaining a 28-day compressive strength of 4,000 psi.

C. Curing

1. All concrete shall be cured in accordance with any one of the methods specified in ASTM 478. The facilities for curing shall, however, be subject to the review and prior approval of the ENGINEER. No precast concrete shall be delivered to the job site until the specified minimum compressive strength of 4,000 psi, as determined by crushing tests on cured concrete cylinders, has been obtained.

D. Access Opening

1. The access opening shall be equipped with double leaf adjustable torsion spring assisted door as shown on the Plans.

E. Access Doors

1. Access door and frame shall be 1/4-inch steel diamond pattern. Door shall be equipped with heavy forged brass hinges, stainless steel pins, spring operators for easy operation and an automatic hold open arm with release handle. A snap lock with removable handle shall be provided. Cast in portion of frame shall be coated with bituminous paint prior to casting into concrete. Where double leaf doors are required, a safety chain shall be installed on the doors.

F. Joint Sealing Compound

1. Precast sections shall be jointed with a preformed joint sealing compound, "Ram-Nek", manufactured by K. T. Snyder Company, Inc., Houston, Texas, "Quikset" manufactured by Quikset Utility Vaults, Santa Ana, California, or equal, applied in accordance with the manufacturer's instructions.

PART 3 EXECUTION

3.01 INSTALLATION

A. Transportation and Delivery

1. Every precaution shall be taken to prevent injury to the precast sections during the transportation and unloading of the sections. The precast sections shall be unloaded using skids, pipe hooks, rope slings, or suitable power equipment, if necessary and the sections shall be under perfect control at all times. Under no conditions shall the precast sections be dropped, dumped or dragged.

2. If any precast section is damaged in the process of transportation, or handling, such section shall be rejected and immediately removed from the site and replaced at the CONTRACTOR's expense.

B. Excavation and Backfill

1. Excavation and backfill shall be done in accordance with the provisions of Section 02200 of these specifications and the Plans.

C. Joint Sealing Compound

1. The sealing compound shall be applied as follows:

2. The joint shall be cleaned with a brush.

3. The Silicon treated protective paper shall be removed from one side of the preformed rope and preformed rope shall be laid paper side up on the cleaned joint surface. The surface shall be pressed firmly end-to-end around the entire joint making 1-inch laps where necessary.

4. The protective paper shall be removed from the preformed rope and the next section shall be lowered into place.

5. Sufficient preformed joint sealing compound shall be installed so as to completely fill the joint and show a "squeeze-out" on the inside and outside of the joint.

D. Pipe and Fittings

1. All pipe and fittings, including installation shall conform to the provisions of the specifications of the designated pipe and fittings.

E. Pipe Penetrations

1. The pipe penetrations shall incorporate Link Seal assemblies, Model C LS 575 with WS-18-375 Steel Sleeve as per the Plans.

F. Elevation and Installation

1. Each section shall be set perfectly plumb. Riser sections of various heights shall be used in order to bring the top of the vault access opening to the required elevation.

2. The elevations at which access openings are to be set shall conform to the requirements set forth on the Plans, but in all cases shall be governed by the ENGINEER in the field. Where the access opening is within the roadway or shoulder, it is to be placed flush with the existing surface. Where the structure is outside the limits of the traveled shoulder, but not in roadside ditch, it should be placed 1/10 foot or more above the existing ground surface. Where the access opening falls within the existing roadside ditch or right of way, it is to be placed approximately 1-1/2 feet above the existing ground surface or as directed by the ENGINEER.

G. Concrete Finish

a. Concrete walls, roof and floor shall have surface defects repaired and have a minimum rough form finish as specified in the ACI (American Concrete Institute) Manual of Concrete Practice Section 301, Chapters 9 and 10.

H. Cleaning

1. Vaults walls, floor and ceiling shall be cleaned of any foreign debris, including forms, tape, form oil, etc., prior to final acceptance. All vaults shall be thoroughly cleaned of any accumulation of silt, debris, or foreign matter of any kind.

2. Access openings shall be cleaned of foreign matter to insure a satisfactory fit and appearance prior to final acceptance.

I. Testing

1. It is the intent of the Plans and Specifications that vaults be as watertight and free from infiltration as possible. Any evidence of leakage throughout the warranty period shall be repaired to the satisfaction of the OWNER at the sole expense of the CONTRACTOR.

END OF SECTION

SECTION 11312

SELF-PRIMING EFFLUENT PUMP

PART 1 GENERAL

1.01 DESCRIPTION

The work covered in this Section includes furnishing of all related materials, installation, and testing of the self-priming effluent pump for the mechanical screen flush water supply. The system consists of the self-priming pump and weighted low level float switch to stop the pump upon a low sump level. The ON/OFF control signals will be provided from the mechanical screen controls and the motor starter is provided in the motor control panel for the wastewater treatment plant.

Install the pump in the adjacent to the effluent manhole as shown on the drawings.

1.02 SUBMITTALS

A. Self-priming pump: Performance and material specifications conforming to the requirements of this Section.
B. Submittal shall be delivered to Engineer in accordance with Section 01300 - Submittals of the Technical Specifications.

1.03 REFERENCES

A. ASTM A 48 - Standard Specification for Gray Iron Castings

1.04 DESIGN REQUIREMENTS

The pump shall be equipped with a 1 HP, 460 volt, 3 phase, and 60 hertz electric motor. Pump shall be capable of delivering 15 GPM at 102 ft. TDH.

1.05 PUMP OPERATION DESCRIPTION

Provide a weighted low level float switch to stop the pump upon a low sump level and allow operation at higher sump levels. The ON/OFF control signals will be provided from the mechanical screen controls.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery, storage, and handling of self-priming pump shall be conducted in a manner that prevents damage to the structure.

PART 2 MATERIALS

2.01 SELF-PRIMING EFFLUENT PUMP

A. Provide a Meyers Quick Prime Self-Priming Centrifugal Pump WP10-3 with a 1 HP, 3 phase, 480 volt, and 60 hertz motor. Pump shall be capable of delivering 15 GPM at 102 ft. TDH.

B. MECHANICAL SEAL

C. Equip pump with a carbon/ceramic shaft seal.

2.02 PIPING AND VALVES

A. Equip pump station with 1 ½ inch suction and discharge pipes, flexible Fernco type coupling in suction line, discharge check valve, and isolation valve.

2.03 CONTROLS

Provide a weighted low level float switch to stop the pump upon a low sump level and allow restart of the pump at high level. Remote ON/OFF control signals will be provided from the mechanical screen controls and the motor starter is provided in the motor control panel for the wastewater treatment plant.

2.04 EFFLUENT SUMP

Install 5 ft. diameter manhole, cover, and access MH frame and lid as shown on the drawings. Install schedule 80 PVC suction line and install the float switch in the manhole.

Provide manhole connectors for the two inlet pipes from the treatment modules and the outlet connector for the effluent line.

Provide Link-Seal for the 1 ½ inch pump suction line penetration in the MH wall.

PART 3 EXECUTION

3.01 EXCAVATING, BACKFILLING AND COMPACTING

A. Excavating, trenching, backfilling and compacting shall be performed in accordance with Section 02200.

3.02 TESTING

A. Test the completed pump installation and repair all suction and discharge leaks and verify that the pump is performing in accordance with the manufactures performance criteria.

END OF SECTION

SECTION 11390 PACKAGE WASTEWATER TREATMENT

Factory-Built Aerobic Fast® Treatment Plant
Spring Mountain Motorsports Ranch
Pahurmp, Nv

GENERAL
There shall be furnished one (1) Smith & Loveless Factory-Built treatment system. Treatment system shall be as shown on the drawings and specified herein.

The treatment plant structure shall be completely factory-built, shippable as a unit, with bottom, side walls, end plates, partitions and other shell tankage of not less than ¼" thick structural grade steel plate reinforced to withstand all hydrostatic pressures. The structural reinforcing shall be accomplished by forming the sides, partitions and end plates with V-shapes. The use of reinforcing beams will not be allowed. The corners of the "V" shall be rounded to a minimum radius of 3/8" to eliminate sharp corners to provide better adhesion of the protective coating system. The V-shape shall have a minimum section modulus of 2.8 in^3 to provide adequate rigidity.

All welded steel structural members shall be joined by electric arc welding with fillets of adequate section for the joint involved. Where required for additional strength or watertight integrity, such welds shall be continuous inside and out. Inlet and outlet connections shall be as shown on the drawings.

All major treatment and holding tanks shall be completely dewaterable, independently, when installed on grade or buried to a depth of 8 ½ feet, as follows:

- Equalization and Sludge Holding/Digester – Buried to 8 ½ ft.
- **FAST®** Process Tank – Installed on Grade

The system shall be comprised of two (2) tanks one for the flow equalization and sludge holding and one for the anoxic, aeration, and clarification (note that the clarifier may be a separate tank from the **FAST®** process tank). Aeration zone shall employ fixed activated sludge treatment (**FAST®**) to remove biologically degradable contaminants from the waste. This removal shall be accomplished by biological means alone and, provided proper levels of nitrogen, phosphorus, carbon, and alkalinity are present for biological stability, no chemical or chemical additives shall be required.

OPERATING CONDITIONS
The **FAST®** Treatment System shall be designed to treat 113 lbs. BOD_5, 122 lbs. TSS, and 18 lbs. TKN down to 30 mg/L BOD_5, 30 mg/L TSS, and 10 mg/L total nitrogen based on an average daily flow rate of 54,250 GPD.

FLOW EQUALIZATION TANK
The flow equalization zone shall have a capacity 3,633 ft^3 (27,174 gallons). Dimensions shall be as shown on the drawings. Two submersible pumps (one duty and one standby) shall be used to deliver the wastewater to anoxic tank 1 for the initial **FAST®** treatment module. Pumps shall be installed on guide rails for removal access. The pumps will be controlled using VFDs, a level transduced, and a controller to equalize the variable influent flow to a uniform flow to the anoxic tank. A high tank level alarm and low level alarm with SCADA contacts will be provided along with redundant float alarm switches. The high level alarm will also start the second standby pump, if needed and the low level will shut off the pumps until the level reaches an ON setting. An adjustable manual speed setting will be provided to accomplish the near constant pump rate. Upon reaching a high level the pump speed will increase to full speed at a level ½ ft below the high alarm and upon

reaching a low tank level 1 ft. above the low level cut off, the pump speed will decrease to minimum RPM and then shut off at the low level cut off.

> *[Upon installation of the second **FAST**® module, the piping will be revised to discharge one pump to module 1 and the second pump to module 2. An uninstalled backup pump will be provided to install quickly if one of the pumps fail.]*

Galvanized drop pipes with diffusers shall be provided with all necessary air control valves to provide necessary aeration and mixing.

- EQ Basin Overflow: Provide an overflow from the EQ basin to the sludge holding tank for emergency overflow in case of pump transfer pump failure.
- Sludge Holding Tank Overflow: Provide an 8-inch over flow pipe connection from the sludge holding tank to connect to the emergency overflow to the emergency holding pond to be connected by the owner.

OBEX™ SPIRAL FINE SCREEN

An automatic **OBEX™** Spiral Fine Screen shall be mounted on the flow equalization zone, as shown on the drawings. The mechanism shall consist of a combination of a fine screen and screenings auger. The screen shall consist of perforated metal trough with mesh a maximum of 6 mm opening. The screen shall be capable of passing a peak flow rate of 200,000 GPD. Cleaning brushes are fixed on the outside diameter of the shaftless screw over the entire length of the screen area. Provide a spray wash system for the screen, transport tube and/or compaction areas. The system will consist of a solenoid valve and spray header mounted to the screen. The auger shall be a shaftless spiral to convey solids up to the discharge chute and into a bagger mechanism. All components shall be of 304 stainless steel with the conveying screw of high tensile steel.

The installing contractor shall wire the fine screen motor, limit switch, level transducer, and flush water pump including related conduit work to junction box and disconnect switch and connect the piping to and from the fine screen. The installing contractor shall also install the screenings discharge chute provided by the manufacturer. The screenings receptacle is to be supplied by the installing contractor.

Screen Bypass:

A screen bypass will be provided for the OBEX™ Spiral Fine Screen to prevent over flow if the screen becomes plugged. Provide a manual bar screen in the bypass channel allow manual screened sewage to flow around the screen basket and into the downstream treatment process.

Water Flush Spray Nozzles:

The installing contractor will provide a plant effluent flush water pump system. The manufacturer shall supply suitable screen flush nozzles capable of passing system effluent flush water. Wash water requirements are a minimum of 15 GPM at 35 psi (1 L/sec at 2.5 Bar).

PRE-AERATION ANOXIC

The anoxic tank shall have a capacity of 1,514 ft^3 (11,320 gallons), and be divided into two (2) equally sized compartments. Dimensions shall be as shown on the drawings. Each anoxic compartment shall include a submersible mixer with a 2.2 HP, 3-phase, 480 volt, 60 cycle motor. The mixers shall be installed on guide rails for removal access. An 8” recycle airlift shall be installed in the second anoxic compartment, capable of pumping 350 GPM in to the **FAST**® tank.

DIFFUSED AERATION/MIXING SYSTEM

The **FAST**® aeration zone shall incorporate fixed media as a site for microbial growth, and a diffused air distribution system to circulate and transfer oxygen into the waste. The system shall be completely mixed and designed to supply optimum aeration and contact for continual exposure of the waste being treated to the bacteria in use.

The air distribution system shall consist of an air header pipe assembly with galvanized drop pipes and S&L **MULTIFUSER®** diffuser(s). The air distribution system shall be designed such that the air carries the wastewater upward with sufficient force to distribute the waste over the entire media surface in order to provide even growth conditions without dead spots or anoxic conditions. Water shall then be re-circulated through the media for efficient oxygenation throughout the aeration tank. The media shall be completely submerged within the aeration zone allowing an 8” depth of wastewater over the media.

The media shall be supported above the tank bottom to allow for effective re-circulation of the wastewater. It shall be installed at the factory prior to shipment of the plant. Installation shall ensure that sloughed solids immediately descend through the media to the bottom of the aeration tank.

MEDIA

The **FAST®** media shall be rigid PVC honeycomb bio-filter type providing approximately 38 ft^2 of surface area per cubic foot of media. It shall be supported by internal structural members. Microorganisms shall attach themselves and grow rapidly to cover all media surfaces. The media volume shall be 3,680 ft^3.

FAST PROCESS BLOWERS (INCLUDES AIR FOR ALL AIR LIFT PUMPS)

Air Blowers - Roots 5”URAI (W/Enclosure)-Vertical Airflow

Provide 2 FAST® process blowers, one duty and one standby. The blowers shall be a Roots 56 URAI Rotary Positive Displacement Type blower designated for continuous service with a minimum B10 bearing life of 300,000 hours when operating at the design condition Unit to be designed and manufactured to ISO certified quality standards. The maximum gear speed cannot exceed 4,000 FPM and the allowable differential pressure on the blower cannot exceed 80% of the allowable pressure of the blower. The blower performance shall be guaranteed with an allowable tolerance of plus/minus 4 percent at the design condition.

Blower Performance:

Standard Inlet Volume:	371 SCFM
Barometric Pressure:	13.21 PSIA
Inlet Temperature:	100ºF
Relative Humidity:	30%
Inlet Losses:	0.3 PSI
Discharge Losses:	0.2 PSI
System Discharge Pressure:	7.0 PSIG
Blower Differential Pressure:	7.5 PSI
Maximum Blower Speed:	2,500 RPM
Minimum Motor Horsepower:	30
Maximum Motor RPM:	1,800

Construction:

1. **Casing:** The blower casing shall be of one-piece construction, with separate headplates, and shall be made of close-grained cast iron suitably ribbed to prevent distortion under the specified operating conditions.
2. **Impellers & shafts:** Each impeller shall be made from a cast iron casting. The impellers shall be of the straight, two-lobe involute type, and shall operate without rubbing or liquid seals or lubrication. The impellers shall be statically and dynamically balanced by removing metal from the

impeller body and shall be center-timed to permit rotation in either direction. The blower shafts shall be alloy steel, and shall be pressed into the impeller body and pinned.

3. **Impeller/shaft assemblies:** Each impeller and shaft assembly shall be supported by oversized anti-friction bearings engineered for long-service life and fixed to control the axial location of the impeller/shaft in the unit. A cylindrical roller bearing shall be provided at the drive shaft designed to handle the stresses of V-belt drive, while single-row ball bearings shall be used at all other locations.
4. **Timing gears:** The impeller shall be timed by a pair of carburized and ground steel spur gears, mounted on the shafts with a tapered fit, and secured by a locknut
5. **Lubrication:** Each bearing shall be provided with a positive lip-type oil seal designed to prevent lubricants from entering the air stream. Further provision shall be made to vent the impeller side of the oil seal to atmosphere to eliminate any possible carry-over of lubricant into the air stream. The drive end bearings shall be grease lubricated, and shall be provided with grease fittings. The timing gears and the gear end bearings shall be lubricated by splash from the gears dipping into the oil.
6. **Warranty:** The blower(s) are covered under warranty for 30 months from date of shipment or 24 months from date of installation, whichever comes first, if an authorized Roots distributor furnishes the blowers.

Blower Accessories:

1. **Inlet Filter:** One inlet filter shall be supplied with each blower. The filter media must have an efficiency of 99% or better at 10 microns. The inlet filter shall be suitable for outdoor installation. The maximum air velocity shall not exceed 6000 feet/min.
2. **Inlet Silencer:** One inlet silencer shall be supplied with each blower. The inlet silencer shall be a combination chamber and absorptive design for maximum sound attenuation. The maximum air velocity shall not exceed 6000 feet/min.
3. **Discharge Silencer:** One discharge silencer shall be supplied with each blower. The silencer shall be a combination chamber and absorptive design for maximum sound attenuation. The maximum air velocity shall not exceed 6000 feet/min.
4. **Motor: Provide Inverter Ready** Motors to operate on 230/460Volts, 3Phase, 60Hertz, 1800RPM totally enclosed, fan cooled. The motor shall have a service factor of 1.15. Motor shall be of NEMA B classification, normal starting torque and normal starting current. All frame sizes shall be NEMA standard. The motor shall be mounted on a sliding base with twin adjusting screws.
5. **V-Belt Drive:** V-belt drive shall be of the high capacity type, oil and heat resistance. Drive shall be designed to allow a minimum of 1.4-service factor based on the motor horsepower
6. **Base:** A fabricated steel elevated base shall be provided under each blower and motor. The accessories such as V-belt drive, inlet filter, inlet silencer, discharge silencer, relief valve, check valve and pressure gauge shall be mounted on the base. The only connection the contractor shall make is to connect the discharge piping to the blower assembly and the electric power to the motor.
7. **Guard:** One V-drive guard shall be supplied. Guard shall be of sheet metal and shall be totally enclosed to conform to applicable OSHA codes. The front shall be removable for access to the v-belts.
8. **Relief Valve:** One spring-loaded type pressure relief valve shall be installed on the discharge silencer. Relief valve shall have a cast iron body and bronze internals.
9. **Check Valve:** One check valve shall be installed on the discharge line of each blower package. The check valve shall be of the straight threaded design. The body shall be steel and the internals shall be Aluminum. Seal material shall be EPDM.
10. **Butterfly Valve:** One discharge isolation butterfly valve shall be installed on the discharge line of each blower package, downstream of the check valve. The butterfly valve shall be of the wafer type design. The body shall be ductile iron and the disc and stem shall be stainless steel. Seal material shall be EPDM. The butterfly valve shall be shipped loose for mounting in the field.

11. **Temperature Switch:** A temperature switch shall be provided to shut down the blower package in the event that the temperature inside the acoustic enclosure exceeds the maximum allowable temperature. The switch shall be an Ashcroft T400 NEMA4 single pole double throw type.
12. **Pressure Gauge:** One pressure gauge shall be supplied to measure the discharge pressure. The pressure gauge shall read 0-15 PSI and shall be liquid filled. Each pressure gauge shall be supplied with pulsation snubber and isolation valve.
13. **Test:** One complete mechanical test shall be performed with all the accessories installed on the base. The blower assembly shall be tested at the design conditions.
14. **Enclosure:** A galvanized steel acoustical/weather enclosure is to be mounted over the blower assembly (includes the inlet filter, inlet silencer, blower, motor, v-belt drive, discharge silencer, and relief valve), providing both noise abatement and protection from inclement weather. There will be removable doors on three sides of the enclosure with latches and seals. A 120 Volt AC single-phase exhaust fan, sized for a minimum of six air changes a minute is provided and will be mounted in the removable roof. The sound attenuation material is to be mineral wool, with a density of 8 lb/ft^3 and a thickness of 2", permanently attached to the inside of the walls, doors, and roof. A noise level of 85 dBA or less at a distance of 3 feet is guaranteed. The enclosure shall be installed over the blower package on a formed steel sub-base.

EQ and Sludge Holding/Digester Blowers

Roots 3"URAI (W/Enclosure) Vertical Airflow

Provide three blowers, one duty EQ basin blower, one duty sludge holding/digester tank blower and one unit as a standby for either duty units. The blowers shall be a Roots 33 URAI Rotary Positive Displacement Type blower designated for continuous service with a minimum B10 bearing life of 300,000 hours when operating at the design condition Unit to be designed and manufactured to ISO certified quality standards. The maximum gear speed cannot exceed 4,000 FPM and the allowable differential pressure on the blower cannot exceed 80% of the allowable pressure of the blower. The blower performance shall be guaranteed with an allowable tolerance of plus/minus 4 percent at the design condition.

Blower Performance:

Standard Inlet Volume:	87 SCFM
Barometric Pressure:	13.21 PSIA
Inlet Temperature:	100ºF
Relative Humidity:	30%
Inlet Losses:	0.3 PSI
Discharge Losses:	0.2 PSI
System Discharge Pressure:	7.0 PSIG
Blower Differential Pressure:	7.5 PSI
Maximum Blower Speed:	2,550 RPM
Minimum Motor Horsepower:	10
Maximum Motor RPM:	1,800

Construction:

1. **Casing:** The blower casing shall be of one-piece construction, with separate headplates, and shall be made of close-grained cast iron suitably ribbed to prevent distortion under the specified operating conditions.
2. **Impellers & shafts:** Each impeller shall be made from a cast iron casting. The impellers shall be of the straight, two-lobe involute type, and shall operate without rubbing or liquid seals or lubrication. The impellers shall be statically and dynamically balanced by removing metal from the

impeller body and shall be center-timed to permit rotation in either direction. The blower shafts shall be alloy steel, and shall be pressed into the impeller body and pinned.

3. **Impeller/shaft assemblies:** Each impeller and shaft assembly shall be supported by oversized anti-friction bearings engineered for long-service life and fixed to control the axial location of the impeller/shaft in the unit. A cylindrical roller bearing shall be provided at the drive shaft designed to handle the stresses of V-belt drive, while single-row ball bearings shall be used at all other locations.
4. **Timing gears:** The impeller shall be timed by a pair of carburized and ground steel spur gears, mounted on the shafts with a tapered fit, and secured by a locknut
5. **Lubrication:** Each bearing shall be provided with a positive lip-type oil seal designed to prevent lubricants from entering the air stream. Further provision shall be made to vent the impeller side of the oil seal to atmosphere to eliminate any possible carry-over of lubricant into the air stream. The drive end bearings shall be grease lubricated, and shall be provided with grease fittings. The timing gears and the gear end bearings shall be lubricated by splash from the gears dipping into the oil.
6. **Warranty:** The blower(s) are covered under warranty for 30 months from date of shipment or 24 months from date of installation, whichever comes first, if an authorized Roots distributor furnishes the blowers.

Blower Accessories:

1. **Inlet Filter:** One inlet filter shall be supplied with each blower. The filter media must have an efficiency of 99% or better at 10 microns. The inlet filter shall be suitable for outdoor installation. The maximum air velocity shall not exceed 6000 feet/min.
2. **Inlet Silencer:** One inlet silencer shall be supplied with each blower. The inlet silencer shall be a combination chamber and absorptive design for maximum sound attenuation. The maximum air velocity shall not exceed 6000 feet/min.
3. **Discharge Silencer:** One discharge silencer shall be supplied with each blower. The silencer shall be a combination chamber and absorptive design for maximum sound attenuation. The maximum air velocity shall not exceed 6000 feet/min.
4. **Motor:** Motor shall operate on 230/460 Volts, 3 Phase, 60 Hertz, 1800 RPM totally enclosed, fan cooled. The motor shall have a service factor of 1.15. Motor shall be of NEMA B classification, normal starting torque and normal starting current. All frame sizes shall be NEMA standard. The motor shall be mounted on a sliding base with twin adjusting screws.
5. **V-Belt Drive:** V-belt drive shall be of the high capacity type, oil and heat resistance. Drive shall be designed to allow a minimum of 1.4-service factor based on the motor horsepower
6. **Base:** A fabricated steel elevated base shall be provided under each blower and motor. The accessories such as V-belt drive, inlet filter, inlet silencer, discharge silencer, relief valve, check valve and pressure gauge shall be mounted on the base. The only connection the contractor shall make is to connect the discharge piping to the blower assembly and the electric power to the motor.
7. **Guard:** One V-drive guard shall be supplied. Guard shall be of sheet metal and shall be totally enclosed to conform to applicable OSHA codes. The front shall be removable for access to the v-belts.
8. **Relief Valve:** One spring-loaded type pressure relief valve shall be installed on the discharge silencer. Relief valve shall have a cast iron body and bronze internals.
9. **Check Valve:** One check valve shall be installed on the discharge line of each blower package. The check valve shall be of the straight threaded design. The body shall be steel and the internals shall be Aluminum. Seal material shall be EPDM.
10. **Butterfly Valve:** One discharge isolation butterfly valve shall be installed on the discharge line of each blower package, downstream of the check valve. The butterfly valve shall be of the wafer type design. The body shall be ductile iron and the disc and stem shall be stainless steel. Seal material shall be EPDM. The butterfly valve shall be shipped loose for mounting in the field.

11. **Temperature Switch:** A temperature switch shall be provided to shut down the blower package in the event that the temperature inside the acoustic enclosure exceeds the maximum allowable temperature. The switch shall be an Ashcroft T400 NEMA4 single pole double throw type.
12. **Pressure Gauge:** One pressure gauge shall be supplied to measure the discharge pressure. The pressure gauge shall read 0-15 PSI and shall be liquid filled. Each pressure gauge shall be supplied with pulsation snubber and isolation valve.
13. **Test:** One complete mechanical test shall be performed with all the accessories installed on the base. The blower assembly shall be tested at the design conditions.
14. **Enclosure:** A galvanized steel acoustical/weather enclosure is to be mounted over the blower assembly (includes the inlet filter, inlet silencer, blower, motor, v-belt drive, discharge silencer, and relief valve), providing both noise abatement and protection from inclement weather. There will be removable doors on three sides of the enclosure with latches and seals. A 120 Volt AC single-phase exhaust fan, sized for a minimum of six air changes a minute is provided and will be mounted in the removable roof. The sound attenuation material is to be mineral wool, with a density of 8 lb/ft^3 and a thickness of 2”, permanently attached to the inside of the walls, doors, and roof. A noise level of 85 dBA or less at a distance of 3 feet is guaranteed. The enclosure shall be installed over the blower package on a formed steel sub-base.

CLARIFIER

The clarifier shall be a welded steel structure, rectangular in plan section, and shall have one or more sludge hoppers. The walls shall be structural grade steel plate not less than 1/4” thick. All structural shapes used for reinforcing and bracing shall have 1/4” minimum thickness in the thinnest section. All welded steel structural members shall be joined by electric arc welding with fillets of adequate strength or watertight integrity; such welds shall be continuous inside and out. Coating shall be as specified herein. Inlet and outlet connections shall be as shown on the drawings.

The sludge return from each clarifier hopper shall incorporate a 3” diameter airlift. Each airlift pump shall have an air inlet flow regulating ball valve. Sludge return piping, surface skimmer, waste sludge piping, control baffles and valves shall be as shown on the drawings.

The clarified liquid shall pass over the edges of the effluent weir into the effluent trough that shall be connected to the clarifier outlet pipe. The adjustable weir plate shall be 1/8” aluminum plate and shall have 1” deep 90 degree V-notches spaced approximately 4” apart. The scum baffle shall be 1/4” steel plate by 6” deep welded to the tank wall.

The clarifier surface area shall be 144 ft^2 minimum.

SLUDGE HOLDING TANK

The sludge holding tank shall have a capacity of 2,906 ft^3 (21,740 gallons). Air shall be distributed to the sludge holding tank through galvanized drop pipes with diffusers. A 3” decanting airlift and all necessary air control valves shall be provided. Dimensions shall be as shown on the drawings.

WELDING

All steel structural members shall be joined by electric arc welding with fillets of adequate section for the joint involved. Where required for additional sectional strength, such welds shall be continuous inside and out.

PROTECTION AGAINST CORROSION AND ABRASION

After welding, all steel surfaces shall be blasted to remove rust, mill scale, weld slag, etc. All weld spatter and surface roughness shall be removed by grinding. Following cleaning, a single heavy inert coating shall be applied to all surfaces. This coating shall be of **VERSAPOX**® epoxy resin especially formulated by Smith &

Loveless for abrasion and corrosion resistance. The dry coating shall contain a minimum of 85% epoxy resin with the balance being pigments and thixotropic agents. The dry coating shall be a minimum of 6 mils (0.15 mm) in thickness.

All stainless steel, aluminum and other corrosion-resistant surfaces shall not be coated.

A touch-up kit shall be provided for repair of all scratches or mars occurring during installation. This kit shall contain detailed instructions for use and shall be a material, which is compatible with the original coatings.

CATHODIC PROTECTION
For cathodic protection of the EQ and Digester tank installed below ground, a minimum of eight (three on each side and one at each end) packaged magnesium anodes similar or equal to International Metal Company, 17-pound anodes shall be buried around each structure and securely connected thereto by heavy insulated copper wires in good electrical contact with the steel treatment plant.

WALKWAYS, STAIRS AND RAILINGS
Provide walkways and stair access for both sides of the pre aeration/anoxic and FAST system tank that is set on grade. Configure the stairs and railing on the side common with the future second module to accommodate access to the future module. Construct grating of 1" aluminum bar grating, handrails of 1 1/2" anodized aluminum w/ aluminum handrail fittings, and anodized aluminum kickplate.

ELECTRICAL CONTROLS
The electrical components shall be furnished by the treatment plant manufacturer in a NEMA 4X enclosure with stand. The cabinet and stand shall be mounted by the purchasing contractor on a concrete pad.

1. A separate thermal magnetic circuit breaker and VFD controllers shall be furnished for each of the FAST® process blower motors. Blower starters shall be controlled by a selector switch. Starters for 3-phase circuits shall have overload and under-voltage release protection on each conductor. VFD controllers may be installed in the MCC or in a separate panel enclosure, as required.
    a. Dissolved Oxygen (DO) Controls: Provide a Rosemount Analytical 56 Dual Input Analyzer and dissolved oxygen probe, or equal, with a 4-20 output to control the VFD FAST® process blower motors to maintain an adjustable DO set point within the FAST® aeration zone. Mount DO probe in the FAST® aeration basin with easy access for removal and maintenance of the DO probe.
2. Running time meters will be for the blowers and the EQ basin transfer pumps.
3. Transfer pumps will be equipped with VFD controllers including HOA switches and running time meters. Refer to the above section FLOW EQUALIZATION TANK for a description of the transducer level and speed controls for the transfer pumps along with the redundant high and low level switches.
4. Provide a starter for the 1 HP, 480 volt, 3 phase, 60 hertz flush water pump with control contacts from the mechanical screen and low level shut down from the level switch in the effluent sump.
5. A separate 115-volt, single-phase supply circuit breaker shall be provided for control circuits and auxiliary equipment. A manual starter with thermal overload protection shall be provided for all auxiliary motor-driven devices furnished with the treatment plant.
6. SCADA Interface Coordination: Provide dry contacts for all starters for monitoring of equipment operation and failure by the SCADA system and provide 4-20 ma output for analog parameters. Coordinate with the OWNERS electrical and SCADA contractors. The SCADA system is based on Modicon PLCs and Modbus TCP protocol.

Wiring in the control shall be color-coded and shall be in accordance with the National Electrical Code.

All conduit and wiring between the electrical control panel enclosure and the various motors furnished with the treatment plant and between the panel and the power utility pole shall be furnished and installed by the purchasing contractor.

INSTALLATION AND ERECTION

The purchasing contractor shall install the **FAST®** Treatment Plant in accordance with the Installation Instructions manual provided by the Manufacturer. The Manufacturer shall provide these instructions prior to shipment of the plant equipment. Installation shall specifically include, but not be limited to, the following:

1. All excavation, dewatering, backfilling, grading and fencing.
2. Construction of all necessary concrete foundations, grout and grouting of piping connections where required.
3. Unloading and, when applicable, hauling from the nearest unloading area to the job site.
4. Furnishing and installing all influent, effluent, drain and interconnecting piping.
5. Furnishing and installing all electrical wire and conduit between the electrical control panel and the motors, etc., of all power-operated equipment.
6. Furnishing and installing the electric power service pole, main disconnect and service wiring and conduit.
7. Installation of the access ladder, blower-motor units and electrical control panel.
8. Field touch-up paint and painting as required.
9. All field labor and supervision.
10. Installation of all diffusers and drop pipes.
11. Field joining of the circular clarifier sections, when applicable, and installation of the scraper, bridge and drive mechanism.
12. Furnishing and installing all equipment and accessories not specifically designated as the responsibility of the treatment plant manufacturer.

OPERATION AND MAINTENANCE INSTRUCTIONS

The manufacturer shall provide a complete and detailed operation and maintenance manual. This manual shall include detailed operation and maintenance procedures regarding proper process control of the treatment plant and troubleshooting guide for specific process problems. The manual shall also provide operation, maintenance and servicing procedures of the major individual components provided with the treatment plant.

MANUFACTURER'S INSURANCE

ALL EQUIPMENT MANUFACTURERS, either direct or subcontractors to the general or mechanical contractors, SHALL HAVE in effect at TIME OF BID, CONTRACT AWARD, CONTRACT PERFORMANCE, and WARRANTY TERM, PRODUCT AND COMPREHENSIVE LIABILITY INSURANCE, INCLUDING SUDDEN AND ACCIDENTAL POLLUTION COVERAGE, in the amount of FIVE MILLION DOLLARS ($5,000,000) through an insurance company with a minimum rating of A+ (SUPERIOR) XV according to the BEST'S INSURANCE REPORTS. All policies must be written on an OCCURRENCE BASIS. Policies written on a CLAIMS MADE BASIS are not acceptable. The CERTIFICATE OF INSURANCE attesting to the specified coverage issued by the responsible carrier naming the ENGINEER OF RECORD and the OWNER as ADDITIONAL INSURED, must be presented to the named additional insured prior to contract award. A FAILURE TO COMPLY with this requirement BY THE BIDDER will require DISQUALIFICATION of the BID and CONTRACT AWARD.

STARTUP

The Manufacturer shall provide the services of a factory-trained representative for a maximum period of two (2) days on-site to assist with the initial startup, and to instruct the Owner's operating personnel in the operation and maintenance of the equipment.

WARRANTY
The Manufacturer of the equipment shall warrant for one (1) year from date of startup, not to exceed eighteen (18) months from date of shipment, that all equipment he provides will be free from defects in material and workmanship.

In the event a component fails to perform as specified, or is proven defective in service during the warranty period, the Manufacturer shall repair or replace, at his discretion, such defective part. He shall further provide, without cost, such labor as may be required to replace, repair or modify major components. After startup service has been performed, the labor to replace accessory items shall be the responsibility of others.

The repair or replacement of those items normally consumed in service such as seals, grease, light bulbs, etc., shall be considered as part of routine maintenance and upkeep.

It is not intended that the Manufacturer assume responsibility for contingent liabilities or consequential damages of any nature resulting from defects in design, material, workmanship or delays in delivery, replacement or otherwise.

PROCESS WARRANTY
The wastewater treatment equipment supplied will provide the required effluent as stated in Table 1 Section B based on the influent characteristics as given in Table 1 Section A. Note that it is understood that the initial plant flows may be as low as 15% of the design flow listed in Table 1-B. This warranty is only applicable if the system is installed according to the manufacturer's recommendations and operated properly from a mechanical and process standpoint as defined in the operation and maintenance manual.

The owner must properly operate and maintain all equipment related to the overall wastewater treatment system, including equipment supplied by the manufacturer, for this warranty to remain in effect. Failure to properly operate and maintain all equipment shall void this warranty.

When covered by the warranty, the manufacturer will repair or replace any part of the Work found to be defective in design due to the failure of the Work to meet the performance. This warranty shall be valid for 36 months from start-up, excluding a period of two months from the initial start-up to provide for required bacterial acclimation.

TABLE 1
SPRING MOUNTAIN MOTORSPORTS RANCH
PAHRUMP, NV
FAST® PROCESS DESCRIPTION PHASE 1
April 27, 2015

A. Design Influent Characteristics
    Q 54,350-gpd
    BOD5 250-mg/L 113-lbs BOD/Day
    TSS 250-mg/L 113-lbs TSS/Day
    TKN 40-mg/L 18-lbs TKN/Day
    Temperature 15 Deg C

B. Effluent Characteristics
    BOD5 30-mg/L
    TSS 30-mg/L
    TN 10-mg/L
    pH 6.0 to 9.0 Range

Golder Associates Inc.
595 Double Eagle Ct., Suite 1000
Reno, NV 89521
Tel: 775-828-9604
Fax: 775-828-9645

Great Basin Water Co.™

PAHRUMP DIVISION

SPRING CREEK DIVISION

FATS, OILS AND GREASE (FOG)

CONTROL PROGRAM

APPLICABLE TO

FOOD SERVICE ESTABLISHMENTS

February 14, 2018

Table of Contents

Appendices

1. INTRODUCTION

1.1 Applicability

These regulations are applicable to all Food Service Establishments (FSEs) and any commercial entities within the boundaries of the Great Basin Water Co. (GBWC or Utility service area, including, without limitation, those operating in a permanently or temporarily constructed structure such as a room, building or place, or portion thereof, maintained, used, or operated for the purpose of storing, preparing, serving, or manufacturing, packaging, or otherwise handling food for sale to other entities, or for consumption by the public, its members or employees, and which has any process or device that uses or produces FOG, or grease vapors, steam, fumes, smoke or odors that are required to be removed by a Type I or Type II hood.

1.2 GBWC Service Areas – Pahrump Division and Spring Creek Division

Pahrump Division provides water and sewer service to the Pahrump Valley through approximately 4,253 sewer connections. This service area includes approximately 43 square miles. See Appendix A for a map of the Pahrump Division Service Area.

Spring Creek Division provides water and sewer service to Spring Creek, NV, through approximately 117 sewer connections. This service area includes approximately 3.5 miles. See Appendix A for a map of the Spring Creek Division Service Area.

1.3 Background / Purpose

The purpose of this Fats, Oils and Grease (FOG) Control Program is to facilitate the maximum beneficial use of GBWC's sewer services and facilities while preventing blockages of sewer lines and interference with the biological processes of the wastewater treatment plant resulting from discharges of fats, oils and grease (FOG) to the sewer facilities, and to specify appropriate FOG discharge requirements for FSE.

Sanitary sewer overflows (SSO) are often caused by discharges of wastewater containing high levels of FOG, suspended solids, pathogenic organisms, and other pollutants.

The Nevada Division of Environmental Protection (NDEP) requires all public sanitary sewer providers to implement a FOG Control Program. This plan establishes the quantity and quality of standards on all wastewater and/or waste discharges containing FOG, which may alone or collectively cause or contribute to FOG accumulation in the sewer facilities causing or potentially causing or contributing to the occurrence of SSO and/or interference with the biological processes of a wastewater treatment facility.

This FOG Control Program focuses on educating the managers of businesses that introduce FOG into GBWC's sewer system of the proper FOG disposal and Best Management Practices for a commercial kitchen. The installation of a grease trap or interceptor does not assure compliance with the FOG limit. This program is to help monitor businesses to ensure that grease traps and grease interceptors are properly maintained and cleaned on a regular basis. Business owners and managers are responsible for maintaining grease traps or interceptors, documenting the cleaning schedule, and training staff on Best Management Practices. Documentation must be available at the time of inspections that are conducted by GBWC or their designated representative.

The FOG Control Program is managed by the FOG Control Program Manager and the inspection and enforcement activities are conducted by GBWC staff or by outside contractors under the Program Manager's supervision. The program is integrated with the collection system maintenance program, specifically the hot spot sewer cleaning and video inspection activities. GBWC's Sanitary Sewer Management Plan (SSMP) is attached as Appendix B.

1.4 Legal Authority

A GBWC Sewer Tariff is approved by the Public Utilities Commission of the State of Nevada (PUCN) as the effective rates and rules of the utility and is regularly updated. The Sewer Tariff includes a Waste Water Discharge Permit (Sewer Tariff Rule No. 19) for the sewer tariff which identifies the specific discharge prohibitions for the GBWC sewer system. Included in this permit is the prohibition of solid or viscous substances that may obstruct flow of waste water through the sanitary sewer system as well as the requirement for grease traps/grease interceptors. The tariff also contains right of entry and enforcement requirements.

Nothing in this document is intended to supersede the PUCN approved GBWC Tariffs 1-W (Water) and 1-S (Sewer) sheets with the most current date, and nothing in this document is intended to expand or modify GBWC responsibilities with respect to any FOG or other chemicals in or discharged from the premises of any Customer or other.

1.5 Glossary of Abbreviations

BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
CWA	Clean Water Act
DHHS	Nevada Department of Health and Human Services
DOS	Discontinuance of Service
FOG	Fats, Oils and Grease
FSE	Food Service Establishment
GRE	Grease Removal Equipment
GBWC	Great Basin Water Co.
NDEP	Nevada Division of Environmental Protection
NOD	Notice of Deficiency
NOV	Notice of Violation
PUCN	Public Utilities Commission of Nevada
SSO	Sanitary Sewer Overflows
TSS	Total Suspended Solids
UPC	Uniform Plumbing Code

1.6 Glossary of Definitions

Best Management Practices	Schedules of activities, prohibitions of practices, maintenance procedures and other kitchen management practices to prevent or reduce the introduction of FOG to the sewer facilities as set forth in Section 2.4 of these regulations.
Change in Operations	Any change in the ownership, food types, or operational procedures which may have the potential to increase the amount of FOG generated and/or discharged and/or the discharge of emulsifying or otherwise harmful substance by FSE in an amount that alone or collectively causes or creates a potential for SSO to occur.
Composite Sample	A collection of individual samples obtained at selected intervals based upon an increment of either flow or time. The resulting mixture (composite sample) forms a representative sample of the waste stream discharged during the sample period.
Customer	The person in whose name service is rendered as evidenced by the signature on the application or contract for service, or in the absence of a signed instrument, by the receipt and payment of bills regularly issued in the name regardless of the identity of the actual user of the services.
Emulsifier	A material which helps to suspend one liquid in another, such as oil in water.
Discharger	Any person who discharges or causes a discharge of wastewater directly or indirectly to the public sewer. Discharger shall mean the same as Customer or User.

Fats, Oils & Grease (FOG)	Any substance such as a vegetable or animal product that is used in, or is a byproduct of, the cooking or food preparation process, and that turns or may turn viscous or solidifies with a change in temperature or other conditions.
FOG Control Program	This document in conjunction with Tariff 1-S (Sewer) Rule No. 19.
FOG Control Program Manager	The individual designated by GBWC authorizing the permittee, customer or discharger to discharge wastewater into the Utility's facilities or into sewer facilities which ultimately discharge into a GBWC facility.
FOG Heavy Concentration	The limit for FOG concentration being discharged from a Food Service Establishment is 100 mg/L.
Food Service Establishment	Food Service Establishment means any room, building or place or portion thereof, located within the boundaries of the GBWC service territory, which is maintained, used or operated by any profit or non-profit entity for the purpose of storing, preparing, serving, manufacturing, packaging, transporting, salvaging or otherwise handling and distributing food and beverages (including prepackaged items), which have any process or device that uses or produces FOG. By example, FSE shall include, but not be limited to, facilities and activities as defined above which are operated and maintained by restaurants, lunch counters, refreshment stands, bars, schools, hospitals, convalescent/healthcare homes, community centers, private or public community club houses, fire stations and casinos.
Food Grinder	Any device installed in the plumbing or sewage system for the purpose of grinding food waste or food preparation byproducts for the purpose of disposing it in the sewer system.

Grab Sample	A sample taken from a waste stream on a one-time basis without regard to the flow in the waste stream and without consideration of time.
Grease Interceptor	A multi-compartmental GRE which is constructed in different sizes and is generally to be located underground between a Food Service Establishment and the connection to the sewer system. These devices primarily use gravity to separate FOG from the wastewater as it moves from one compartment to the next. These devices must be cleaned, maintained and have the FOG removed and disposed of in a proper manner on regular intervals by the customer to be effective.
Grease Removal Equipment	Any grease interceptor, grease trap or other mechanism, device or process which attaches to or is applied to wastewater plumbing fixtures and lines; the purpose of which is to trap, collect or treat FOG prior to it being discharged into the sewer system. Grease Removal Equipment (GRE) may also include other proven methods to reduce FOG to the approval of GBWC. These devices must be cleaned, maintained and have the FOG removed and disposed of in a proper manner on regular intervals by the customer to be effective.
Grease Trap	GRE which is used to serve individual fixtures and have limited effect and should only be used in those cases where a grease interceptor or other GRE is determined by the Utility in writing and signed by the FOG Control Program Manager to be impossible or impractical.
Hot Spots	Areas in sewer lines that have experienced sanitary sewer overflows or that must be cleaned or maintained frequently to avoid blockages of the sewer system.

Inflow	Water entering a sewer system through a direct or indirect connection to the sanitary sewer which may cause an almost immediate increase in wastewater flows.
Infiltration	Water entering a sewer system, including sewer connections, from the ground through such means as defective pipes, pipe joints, connections or manhole walls.
Inspector	A person authorized by GBWC to inspect any existing or proposed wastewater generation, conveyance, processing and disposal facilities.
Interceptor	A grease interceptor
Interference	Any discharge which alone or in conjunction with discharges from other sources inhibits or disrupts the Utility's sewer systems, treatment processes or operations; or is a cause of violation of the Utility's Wastewater Discharge Permit, tariff or prevents compliance with sludge use or disposal.
Log	A record of grease interceptor cleaning and maintenance activities and/or Best Management Practices, activities and training.
New Construction	Any structure planned or under construction for which a sewer connection permit has not been issued, or any expanded service for which a permit modification will be needed.
Permittee	A person who has received a permit to discharge wastewater into the Utility's sewer facilities subject to the requirements and conditions established by GBWC through the PUCN's approval.
Person	Any individual, partnership, firm, association, corporation or public agency, including the State of Nevada and the United States of America.

Public Agency	The State of Nevada and/or any town, county, special district, other local government or public body of or within this State
Public Sewer	Sewer owned and operated by GBWC, or other agency which is a tributary to GBWC's sewer facilities.
Regulatory Agencies	Regulatory Agencies shall mean those agencies having regulatory jurisdiction over the operations of GBWC, including, but not limited to: a) The Nevada Division of Environmental Protection (NDEP) b) Public Utilities Commission of Nevada (PUCN) c) Nevada Department of Health and Human Services (DHHS) d) The Nevada Division of Water Resources
Rule No. 19	Rule No. 19, Pretreatment Program Wastewater Discharge Permit, of the GBWC Tariff 1-S (Sewer)
Sample Point	A location approved by GBWC from which wastewater can be collected that is representative in content and consistency of the entire flow of wastewater being sampled.
Sampling Facilities Management Plan	Structure(s) provided at the Customer's expense for the utility or customer to measure and record wastewater constituent in mass, concentrations, collect a representative sample, or provide access to plug or terminate the discharge.
Sanitary Sewer	GBWC's collection system management plan to clean the sewer collection system and identify hot spots through jetting and videoing sewer mains.
Sanitary Sewer Overflow (SSO)	The unauthorized discharge of wastewater from GBWC's designated sewer collection and conveyance facilities.

Service Territory	GBWC's certificated service areas. (See Appendix A.)
Sewage	The liquid and water-carried wastes of the community and all constituents thereof, whether treated or untreated, discharged into or permitted to enter a public sewer. Sewage shall be the same as Wastewater.
Sewer Facilities or System	Any and all facilities used by GBWC for collecting, conveying, pumping, treating, recycling, reuse, transportation and/or disposing of wastewater or sludge.
Sewer Lateral	The wastewater piping connection between the building's wastewater facilities and the Utility's sewer system.
Sludge	Any solid, semi-solid or liquid decant, subnate or supernate from a manufacturing process, utility service or pretreatment facility.
Strong Waste	Strong waste is wastewater having concentration of levels greater than 400 mg/L for BOD and/or TSS.
Tariff	GBWC's PUCN approved Tariffs 1-S (Water) and 1-S (Sewer). It contains the rules and regulations applying to service provided by GBWC. Under the law of the State, BWC is not permitted to supply service to any Customer who does not comply with all of the rules contained therein, and no officer, inspector, solicitor, agent, or employee of the Utility has any authority to waive, alter, or amend in any respect, these rules and regulations or any part thereof.
25% Rule	The requirement for grease interceptors to be maintained by the customer such that the combined FOG and solids accumulation does not exceed twenty-five percent (25%) of the design

hydraulic depth of the grease interceptor. This is to ensure that the minimum hydraulic retention time and required available hydraulic volume is maintained effectively to intercept and retain FOG discharged from the FSE.

User	Any person who discharges or causes a discharge of wastewater directly or indirectly to the sewer system. User shall be the same as Discharger or Customer.
Waste	Sewage and any and all other waste substances, liquid, solid, gaseous or radioactive, associated with human habitation or of human or animal nature, including such wastes placed within containers of whatever nature prior to and for the purpose of disposal.
Waste Minimization Practices	Plans or programs intended to reduce or eliminate discharges to the sewer system or to conserve water, including, but not limited to, product substitutions, housekeeping practices, inventory control, employee education, and other steps as necessary to minimize wastewater produced.
Waste Hauler	Any person licensed to carry on or engage in vehicular transport of waste as part of, or incidental to, any business for that purpose.
Wastewater	The liquid and water-carried wastes of the community and all constituents thereof, whether treated or untreated, discharged into or permitted to enter a public sewer. Wastewater shall be the same as Sewage.
Wastewater Constituents and Characteristics	The individual chemical, physical, bacteriological, and other parameters, including volume and flow rate and such other parameters that serve to define, classify or measure the quality and quantity of wastewater.

2 GENERAL LIMITATIONS, PROHIBITIONS AND REQUIREMENTS ON FOG DISCHARGES

2.1 FOG Discharge Requirement

No Food Service Establishment (FSE) shall discharge or cause to be discharged into the sewer system FOG that exceeds the FOG Heavy Concentration level of 100 mg/L or Strong Waste as having concentration of levels greater than 400 mg/L for BOD and/or TSS or which may accumulate and/or cause or contribute to blockages in the sewer system, sewer lateral, or interfere with normal plant operations.

2.2 Prohibitions

The following prohibitions shall apply to all Food Service Establishments:

2.2.1 Food grinder discharge to Grease Removal Equipment (GRE);

2.2.2 Introduction of any additives into a Food Service Establishment's wastewater system for the purpose of emulsifying FOG or biologically/chemically treating FOG for grease remediation or as a supplement to interceptor maintenance;

2.2.3 Disposal of waste cooking oil into drainage pipes; (All waste cooking oils shall be collected and stored properly in receptacles such as barrels or drums for recycling or other acceptable methods of disposal.);

2.2.4 Discharge of wastewater from dishwashers to any GRE;

2.2.5 Discharge of wastewater with temperatures in excess of 140°F to any GRE;

2.2.6 Discharge of wastes from toilets, urinals, wash basins, and other fixtures containing fecal materials to sewer lines intended for a GRE service, or vice versa;

2.2.7 Discharge of any waste including FOG and solid materials removed from the grease control device to the sewer system; (Grease removed from grease interceptors shall be waste-hauled periodically as part of the operation and maintenance requirements for grease interceptors.)

2.2.8 Operation of grease interceptors with FOG and solids accumulation exceeding 25% of the total operating depth of the grease interceptor (25% Rule);

2.2.9 Discharge of any waste including FOG and solid materials removed from floor mats and/or kitchen appliances;

2.2.10 Any waste water containing toxic substances or pollutants in sufficient quantity, either alone or by interaction with other pollutants, to injure or interfere with any waste water treatment process, constitute a hazard to humans or animals, create a toxic effect in the receiving waters of the treatment facility, or which cause treatment processes to fail;

2.2.11 Waste with a pH of less than 6.0 or greater than 9.0; (The customer discharging into the sanitary sewer system, will be required to control PH levels from their place of business, at their own expense, by use of equipment or approved devices or chemicals. The installed devices must be approved in writing by GBWC. and the Nevada State Health Department or the Nevada Division of Environmental Protection.)

2.2.12 Noxious or malodorous substances in quantities sufficient to cause a public nuisance or pose a health hazard;

2.2.13 Any wastewater which poses a toxic condition, or which cannot be treated at the wastewater treatment facility;

2.2.14 Untreated whole blood products from customers, including, without limitation, medical facilities, laundries servicing medical facilities or funeral homes; (Such products will require treatment before discharge into the sanitary sewer system. Such treatment may be accomplished by use of bleach or other approved chemicals, or filtering systems.)

2.2.15 Explosive, reactive or corrosive substances.

2.3 FOG Wastewater Discharge Permit Required

No person shall discharge, or cause to be discharged any wastewater from Food Service Establishments directly or indirectly into the sewer system without first obtaining a FOG Wastewater Discharge Permit pursuant to these Regulations. The permit form is attached as Appendix C. (See Section 3.)

2.4 Best Management Practices for Kitchens Required

All Food Service Establishments shall implement Best Management Practices in its operation to minimize the discharge of FOG to the sewer system. (See Section 4.3.)

2.5 FOG Pretreatment Required

Food Service Establishments are required to install, operate and maintain an approved type and adequately sized grease interceptor necessary to maintain compliance with the objectives of these Regulations, subject to the variance and waiver provisions of Section 2.6. The grease interceptor shall be adequate to separate and remove FOG contained in wastewater discharges from Food Service Establishments prior to discharge to the sewer system. Fixtures, equipment, and drain lines located in the food preparation and clean up areas of Food Service Establishments that are sources of FOG discharges shall be connected to the grease interceptor. Requirements for a GRE will be based on the current Uniform Plumbing Code (UPC). (See Appendix D.) Compliance shall be established as follows:

2.5.1 New Construction of Food Service Establishments

New construction of Food Service Establishments, including remodels or tenant improvements that change the classification of an establishment to a Food Service Establishment, shall include and install grease interceptors prior to commencing discharges of wastewater to the sewer system. GRE for new construction is governed by the Nevada Department of Health and Human Services (DHHS).

2.5.2 Existing Food Service Establishments

2.5.2.1 For existing Food Service Establishments, the requirement to install and to properly operate and maintain a grease interceptor may be conditionally stayed, that is, delayed in its implementation by GBWC for a maximum period of three years from the effective date of these Regulations. Terms and conditions for application of a stay to a Food Service Establishment shall be set forth in the permit

2.5.2.2 Existing Food Service Establishments, which have caused or contributed to a grease-related blockage in the sewer system, or which have been determined to contribute significant FOG to the sewer system by GBWC based on inspection or sampling, shall be deemed to have reasonable potential to adversely impact the sewer system, and shall install grease interceptors within 90 days upon notification by the Utility.

2.5.2.3 Existing Food Service Establishments or Food Service Establishments that change ownership, that undergo remodeling or a change in operations as defined in the definitions section of these Regulations, shall be required to install a grease interceptor.

2.6 Variance and Waiver of Grease Interceptor Requirement

2.6.1 Variance from Grease Interceptor Requirement

An existing Food Service Establishment may obtain a variance from the grease interceptor requirement to allow alternative pretreatment technology that is, at least, equally effective in controlling the FOG discharge in lieu of a grease interceptor, if the Food Service Establishment demonstrates that it is impossible or impracticable to install, operate or maintain a grease interceptor. The Fog Control Manager's determination to grant a variance must be in writing and will be based upon, but not limited to, evaluation of the following conditions:

2.6.1.1 There is no adequate space for installation and/or maintenance of a grease interceptor.

2.6.1.2 There is no adequate slope for gravity flow between kitchen plumbing fixtures and the grease interceptor and/or between the grease interceptor and the private collection lines or the public sewer.

2.6.1.3 The Food Service Establishment can justify to the GBWC FOG Control Manager's satisfaction that the alternative pretreatment technology is equivalent or better than a grease interceptor in controlling its FOG discharge. In addition, the Food Service Establishment must be able to demonstrate, after installation of the proposed alternative pretreatment, its effectiveness to control FOG discharge through downstream visual monitoring of the sewer system, for at least three months, at its own expense. A Variance may be granted if the results show no visible accumulation of FOG in its lateral and/or tributary downstream sewer lines.

2.6.2 Conditional Waiver from Installation of a Grease Interceptor

An existing Food Service Establishment may obtain a conditional waiver from installation of a grease interceptor, if the Food Service Establishment demonstrates to GBWC's satisfaction that it has negligible FOG discharge and insignificant impact to the sewer system. Although a waiver from installation of grease interceptor may be granted, the Food Service Establishment may be required to provide space and plumbing segregation for future installation of grease interceptor. The FOG Control Program Manager's determination to grant or revoke a conditional waiver shall be based upon, but not limited to, evaluation of the following conditions:

2.6.2.1 Quantity of FOG discharge as measured or as indicated by the size of Food Service Establishment based on seating capacity, number of meals served, menu, water usage, amount of on-site consumption of prepared food and other conditions that may reasonably be shown to contribute to FOG discharges.

2.6.2.2 Adequacy of implementation of Kitchen Best Management Practices and compliance history.

2.6.2.3 Sewer size, grade, condition based on visual information, FOG deposition in the sewer by the Food Service Establishment, and history of maintenance and sewage spills in the receiving sewer system.

2.6.2.4 Changes in operations that significantly affect FOG discharge.

2.6.2.5 Any other condition deemed reasonably related to the generation of FOG discharges by the FOG Control Program Manager.

2.6.3 Application for Waiver or Variance of Requirement for Grease Interceptor

A Food Service Establishment may submit an application for waiver or variance from the grease interceptor requirement to the FOG Control Program Manager. The Food Service Establishment bears the burden of demonstrating, to the FOG Control Program Manager's reasonable satisfaction, that the installation of a grease interceptor is not feasible or applicable. Upon written notification of a determination by the FOG Control Program Manager that reasons are sufficient to justify a variance or waiver, the permit will be issued or revised to include the variance or waiver and relieve the Food Service Establishment from the requirement.

2.6.4 Terms and Conditions

A variance or waiver shall contain terms and conditions that serve as basis for its issuance. A waiver or variance may be revoked at any time when any of the terms and conditions for its issuance is not satisfied or if the conditions upon which the waiver was based change so that the justification for the waiver no longer exists. The waiver or variance shall be valid so long as the Food Service Establishment remains in compliance with their terms and conditions until the expiration date specified in the variance or waiver. Any costs to determine the viability of a variance and or/waiver including, but not limited to, video inspection, sampling, and/or engineering will be borne by the Customer.

2.7 Sewer System Overflows, Public Nuisance, Abatement and Cleanup Costs

Food Service Establishments found to have contributed to a sewer blockage, SSOs or any sewer system interferences resulting from the discharge of wastewater or waste containing FOG or other prohibition as defined in Sections 2.1 and 2.2, hereby consent to being ordered to install and maintain a grease interceptor by the PUCN, DHHS, Nye County Public Works Director, and Elko County Public Works Director, NDEP, or a court of competent jurisdiction, and may be subject to a requirement to abate the nuisance and prevent any future health hazards created by sewer line failures and blockages, SSOs or any other sewer system interferences. Furthermore, sewer lateral failures and SSO caused by Food Service Establishments alone or collectively, are the responsibility of the Customer. If GBWC must act immediately to contain and clean up an SSO caused by blockage of a private or public sewer lateral or system serving a Food Service Establishment, or at the request of the property owner or operator of the Food Service Establishment, or because of the failure of the property owner or Food Service Establishment to abate the condition causing immediate threat of injury to the health, safety, welfare, or property of the public, GBWC's costs for such abatement shall be entirely borne by the Customer and become due and payable upon the GBWC's request for reimbursement of such costs. Customer shall indemnify and hold harmless GBWC from any and all damages, costs, claims or other expense relating to or arising out of GBWC's action taken to mitigate or abate such an SSO.

3. FOG WASTEWATER DISCHARGE PERMITS FOR FOOD SERVICE ESTABLISHMENTS

3.1 FOG Wastewater Discharge Permit Required

3.1.1 Food Service Establishments proposing to discharge or currently discharging wastewater into the GBWC's sewer system shall obtain a FOG Wastewater Discharge Permit from the Utility.

3.1.2 FOG Wastewater Discharge Permits shall be expressly subject to all provisions of these Regulations and all other regulations, charges for use, and fees established by GBWC and approved by the PUCN. The conditions of FOG Wastewater Discharge Permits shall be enforced by GBWC in accordance with these Regulations and applicable local, State and Federal Regulations.

3.2 FOG Wastewater Discharge Permit Application

3.2.1 Any FSE required to obtain a FOG Wastewater Discharge Permit shall complete and file with GBWC prior to commencing or continuing discharges, an application in a form prescribed by GBWC. The applicant shall submit, in units and terms appropriate for evaluation, the following information at a minimum:

3.2.1.1 Customer Name, address, telephone number, assessor's parcel number(s), description of the Food Service Establishment, operation, cuisine, service activities, or clients using the applicant's services.

3.2.1.2 FSE Kitchen contact name, address, telephone number and other contact information.

3.2.1.3 If an established FSE, records of grease interceptor cleaning and maintenance logs with backup documentation, and BMP log.

3.2.1.4 Size and location of grease interceptor.

3.2.2 Applicants may be required to submit site plans, floor plans, mechanical and plumbing plans, and details to show all sewers, FOG control devices, grease interceptor or other pretreatment equipment and appurtenances by size, location, and elevation for evaluation.

3.2.3 Other information related to the applicant's business operations and potential discharge may be requested to properly evaluate the permit application.

3.2.4 After evaluation of furnished complete application and all information GBWC deems necessary, GBWC may issue a FOG Wastewater Discharge Permit, subject to terms and conditions set forth in these Regulations and as otherwise determined by the FOG Control Program Manager to be appropriate to protect GBWC's sewer system.

3.3 Non-Transferability of Permits

FOG Wastewater Discharge Permits issued under these Regulations are for a specific Food Service Establishment and Customer, for a specific operation and create no vested rights.

3.3.1 No permit holder shall assign, transfer, or sell or otherwise convey any FOG Wastewater Discharge Permit issued under these Regulations, nor use any such permit for or on any premises or for facilities or operations or discharges not expressly encompassed within the underlying permit.

3.3.2 Any permit that is transferred to a new owner, operator, Customer or to a new facility is void.

4. FACILITIES REQUIREMENTS

4.1 Drawing Submittal Requirements

Upon request by GBWC:

4.1.1 Applicants may be required to submit site plans, floor plans, mechanical and plumbing plans, and details to show all sewers, FOG control devices, grease interceptor or other pretreatment equipment and appurtenances by size, location, and elevation for evaluation.

4.1.2 Food Service Establishments may be required to submit a schematic drawing of the FOG control device, grease interceptor or other pretreatment equipment, piping and instrumentation diagram, and wastewater characterization report.

4.1.3 GBWC may require the drawings be prepared by a Nevada Registered Civil, Chemical, Mechanical, or Electrical Engineer.

4.2 Grease Interceptor Requirements

4.2.1 All Food Service Establishments shall provide wastewater acceptable to GBWC, under the requirements and standards established herein before discharging to any public sewer. Any Food Service Establishment required to provide FOG pretreatment shall install, operate, and maintain an approved type and adequately sized grease interceptor necessary to maintain compliance with the objectives of these Regulations at their own expense.

4.2.2 Grease interceptor sizing and installation shall conform to the current edition of the current Uniform Plumbing Code. Grease interceptors shall be constructed in accordance with the design approved by the DHHS and shall have a minimum of two compartments with fittings designed for grease retention.

4.2.3 The grease interceptor shall be installed at a location where it shall be at all times easily accessible for inspection, cleaning, and removal of accumulated grease.

4.2.4 Access manholes, with a minimum diameter of 24 inches, shall be provided over each grease interceptor chamber and sanitary tee. The access manholes shall extend at least to finished grade and be designed and maintained to prevent water inflow or infiltration. The manholes shall also have readily removable covers to facilitate inspection, grease removal, and wastewater sampling activities.

4.3 Grease Trap Requirements

4.3.1 Food Service Establishments may be required to install grease traps in the waste line leading from drains, sink, and other fixtures or equipment where grease may be introduced into the sewer system in quantities which can cause blockage.

4.3.2 Sizing and installation of grease traps shall conform to the current edition of the Uniform Plumbing Code subject to approval by the FOG Control Program Manager (and DHHS).

4.3.3 Customers shall maintain grease traps in efficient operating conditions by removing accumulated grease on a daily basis.

4.3.4 Customers shall maintain grease traps free of all food residues and any FOG waste removed during the cleaning and scraping process.

4.3.5 Grease traps shall be inspected by Customer periodically to check for leaking seams and pipes, and for effective operation of the baffles and flow regulating device. Grease traps and their baffles shall be maintained by Customer free of all caked-on FOG and waste. Removable baffles shall be removed and cleaned during the maintenance process.

4.3.6 Dishwashers and food waste disposal units shall not be connected to or discharged into any grease trap.

4.4 Requirements for Best Management Practices

4.4.1 All Food Service Establishments shall implement Best Management Practices in accordance with the requirements and guidelines established by GBWC under its FOG Control Program in an effort to minimize the discharge of FOG to the sewer system.

4.4.2 All Food Service Establishments shall be required, at a minimum, to comply with the following Kitchen Best Management Practices:

4.4.2.1 <u>Installation of drain screens.</u> Drain screens shall be installed on all drainage pipes in food preparation areas.

4.4.2.2 <u>Segregation and collection of waste cooking oil</u>. All waste cooking oil shall be collected and stored properly in recycling receptacles such as barrels or drums. Such recycling receptacles shall be maintained properly to ensure that they do not leak. Licensed waste haulers or an approved recycling facility must be used to dispose of waste cooking oil.

4.4.2.3 Employee training. Employees of the Food Service Establishment shall be trained by ownership/management periodically as specified in the permit, on the following subjects:

4.4.2.3.1 How to "dry wipe" pots, pans, dishware and work areas before washing to remove grease.

4.4.2.3.2 How to properly dispose of food waste and solids in enclosed plastic bags prior to disposal in trash bins or containers to prevent leaking and odors.

4.4.2.3.3 The location and use of absorption products to clean under fryer baskets and other locations where grease may be spilled or dripped.

4.4.2.3.4 How to properly dispose of grease or oils from cooking equipment into a grease receptacle such as a barrel or drum without spilling.

Training shall be documented and employee signatures retained indicating each employee's attendance and understanding of the practices reviewed. Training records shall be available for review at any reasonable time by the FOG Control Program Manager or a designated GBWC Inspector. Training records shall be retained for a minimum of three (3) years. Please See Appendix E, FSE Logs.

4.4.2.4 Maintenance of kitchen exhaust filters. Filters shall be cleaned by the Customer as frequently as necessary to be maintained in good operating condition. The wastewater generated from cleaning the exhaust filter shall be disposed properly.

4.4.2.5 Kitchen signage. Best management and waste minimization practices shall be posted conspicuously in the food preparation and dishwashing areas at all times by the Customer. A sample poster is attached as Appendix F.

4.4.2.6 Maintenance of floor mats and kitchen appliances. The wastewater generated from floor mat or kitchen appliance washing operations must be disposed of properly in compliance with these Regulations.

4.5 Grease Interceptor Maintenance Requirements

4.5.1 Grease Interceptors shall be maintained in efficient operating condition by the Customer by periodic removal of the full content of the interceptor which includes wastewater, accumulated FOG, floating materials, sludge and solids.

4.5.2 All existing and newly installed grease interceptors shall be maintained by the Customer in a manner consistent with a maintenance frequency approved by the FOG Control Program Manager pursuant to this section.

4.5.3 No FOG that has accumulated in a grease interceptor shall be allowed to pass into any sewer lateral, sewer system, storm drain, or public right of way during maintenance activities.

4.5.4 The maintenance frequency for all Food Service Establishments with a grease interceptor shall be determined in one of the following methods:

4.5.4.1 25% Rule. Grease interceptors shall be fully pumped out and cleaned at a frequency such that the combined FOG and solids accumulation does not exceed 25% of the total design hydraulic depth of the grease interceptor. This is to ensure that the minimum hydraulic retention time and required available hydraulic volume is maintained to effectively intercept and retain FOG discharged to the sewer system.

4.5.4.2 Annually. If the accumulation of combined FOG and solids in a grease interceptor does not reach 25% of the total design hydraulic depth of the grease interceptor within 1 year, then the grease interceptor shall be fully pumped out annually. The 25% Rule supersedes the annual requirement.

4.5.5 Wastewater, accumulated FOG, floating materials, sludge/solids, and other materials removed from the grease interceptor shall be disposed off site properly by waste haulers in accordance with federal, state and/or local laws. FSE are required to obtain and maintain a copy of the waste hauler's documentation which must include:

4.5.5.1 Name of Hauling Company;

4.5.5.2 Date and nature of maintenance performed

4.5.5.3 Name and Signature of Operator performing the pump-out;

4.5.5.4 Documentation of full pump-out with volume of water and FOG removed (e.g. 1,500 gallons);

4.5.5.5 Documentation of the level of floating FOG and Settable Solids (to determine if volume exceeds 25% capacity of grease removal equipment); and

4.5.5.6 Documentation if repairs to the Grease Interceptor are required;

4.5.5.7 Identification of the facility where the waste hauler is planning to dispose of the waste.

5. MONITORING, REPORTING, NOTIFICATION AND INSPECTION REQUIREMENTS

5.1 Monitoring and Reporting Requirements and Conditions

5.1.1 Monitoring and Reporting for Compliance with Permit Conditions

5.1.1.1 As a requirement of the Wastewater Discharge Permit, the Permittee is required to annually report, at the address listed on the Permit, the status of implementation of Best Management Practices, in accordance with the FOG Control Program, no later than the 20th of January following the calendar year. This will be in the form of a log pursuant to Section 4.4.2.3.4.

5.1.1.2 As a requirement of the Wastewater Discharge Permit, the Permittee is required to annually report, at the address listed on the Permit, the status the Grease Interceptor Maintenance Requirements, in accordance with the FOG Control Plan, no later than the 20th of January following the calendar year. This will be in the form of a log pursuant to Section 4.5 inclusive.

5.1.1.3 The FOG Control Program Manager may require visual monitoring at the sole expense of the Permittee at Tariff rate to video inspect the actual conditions of the Food Service Establishment's sewer lateral and/or downstream sewer lines, if the Permittee has been issued an Notice of Violation (NOV). A sample notice is attached as Appendix I.

5.1.1.4 The FOG Control Program Manager may require reports for self-monitoring of wastewater constituents and FOG characteristics of the Permittee needed for determining compliance with any conditions or requirements as specified in the FOG Wastewater Discharge Permit or these Regulations, if the Permittee has been issued a Notice of Violation (NOV). Monitoring reports of the analyses of wastewater constituents and FOG characteristics shall be in a manner and form approved by the FOG Control Program Manager and shall be submitted upon request of the FOG Control Program Manager. Failure by the Permittee to perform any required monitoring, or to submit monitoring reports required by the FOG Control Program Manager constitutes a second violation of these Regulations and may be cause for GBWC to initiate all necessary tasks and analyses to determine the wastewater constituents and FOG characteristics for compliance with any conditions and requirements specified in the FOG Wastewater Discharge Permit or in these Regulations. The Permittee shall be responsible for any and all expenses of GBWC in undertaking such monitoring analyses and preparation of reports.

5.1.1.5 Other reports may be required by Permittee such as compliance schedule progress reports, FOG control monitoring reports, and any other reports deemed reasonably appropriate by the FOG Control Program Manager to ensure compliance with these Regulations in temperance with any Notice(s) of Deficiency or Notice(s) of Violation. A sample notice is attached as Appendix I.

5.1.2 Record Keeping Requirements

The Permittee shall be required to keep all manifests, receipts and invoices of all cleaning, maintenance, grease removal of/from the grease control device, disposal carrier, disposal site location, and evidence of BMP and training for no less than three years. The Permittee shall, upon request, make the manifests, receipts, logs and invoices available to any GBWC representative, or Inspector. Please see Appendix E, FSE Logs.

These records may include, but are not limited to:

5.1.2.1 A log of grease interceptor, grease trap or grease control device cleaning and maintenance practices.

5.1.2.2 A log of Best Management Practices being implemented including employee training.

5.1.2.3 Copies of records and manifests of waste-hauling interceptor contents.

5.1.2.4 Records of sampling data and sludge height monitoring for FOG and solids accumulation in the grease interceptors.

5.1.2.5 Records of any spills and/or cleaning of the lateral or sewer system.

5.1.2.6 Any other information deemed appropriate or necessary by the FOG Control Program Manager to ensure compliance with these Regulations.

5.1.3 Falsifying Information or Tampering with Process

Any false statement, representation, record, report, plan or other document that is submitted to or discovered by GBWC, or to tamper with or knowingly render inoperable any grease control device, monitoring device or method or access point required under these Regulations may be grounds to immediately terminate service if not corrected within 10 days notice of termination.

5.2 Right of Entry

Persons or occupants of premises where wastewater is created or discharged shall allow the FOG Control Program Manager, or GBWC representative(s), reasonable access to all parts of the wastewater generating and disposal facilities for the purposes of inspection and sampling during all times the discharger's facility is open, operating, or any other reasonable time. The FOG Control Program Manager or GBWC Representative(s) will have proper identification upon arrival at the facility. No person shall interfere with, delay, resist or refuse entrance to GBWC Representative(s) attempting to inspect any facility involved directly or indirectly with a discharge of wastewater to the Utility's sewer system. In the event of an emergency involving actual or imminent sanitary sewer overflow, GBWC's representatives may access adjoining businesses or properties that share a sewer system with a Food Service Establishment in order to prevent or remediate an actual or imminent sanitary overflow.

5.3 Inspection and Sampling Conditions

5.3.1 The FOG Control Program Manager may inspect or order the inspection and sample the wastewater discharges of any Food Service Establishment to ascertain whether the intent of these Regulations is being met and the Permittee is complying with all requirements. The Permittee shall allow GBWC access to the Food Service Establishment premises, during normal business hours, for purposes of inspecting the Food Service Establishment's grease control devices or interceptor, reviewing the manifests, receipts and invoices relating to the cleaning, maintenance and inspection of the grease control devices or interceptor.

5.3.2 In order for the FOG Control Program Manager to determine the wastewater characteristics of the discharged wastewater for purposes of determining compliance with permit requirements, the Permittee shall make available for inspection all notices, monitoring reports, waste manifests, and records including, but not limited to, those related to wastewater generation, and wastewater disposal without restriction. All such records shall be kept by the Permittee a minimum of three (3) years.

5.3.3 To inspect for compliance with the FOG Control Program requirements, GBWC has developed certain FSE inspections including the following:

5.3.3.1 Initial Inspections. These inspections are conducted to identify and classify each FSE's potential to generate FOG and its potential to discharge the FOG to the sanitary sewer system. If not adequately controlled, this FOG can lead to sewer blockages, SSOs and interference of the wastewater treatment plant processes. The inspection identifies the type of food, equipment, and kitchen practices that contribute to FOG discharges and the equipment (e.g., grease interceptors, grease traps) that may reduce the discharge of FOG to the sewer. These initial inspections also provide the opportunity to educate the FSEs on the impact of their grease discharges, what they can do to minimize grease discharges, and how the regulation could potentially impact them.

5.3.3.2 BMP Inspections. These inspections are conducted to evaluate compliance with the facility's best management practices requirements. Please see Appendix G, FSE BMP Inspection Report.

5.3.3.3 GRE Inspections. These inspections are conducted to evaluate compliance with the facility's grease removal equipment requirements.

5.3.3.4 Compliance Inspections. These inspections are conducted where it is determined by the FOG Control Program Manager that a follow-up inspection is required for a Non-Compliance issue that has been identified in previous BMP, GRE or FOG Source Sewer Line Inspections.

5.3.3.5 Enforcement Inspections. These inspections are conducted when elevated enforcement of the Permit requirements are required or when the revocation of the FSE's grease interceptor installation Conditional Waiver, Waiver or Variance is required.

The inspection strategy is to focus GBWC resources on FSEs in the vicinity and upstream of Sewer Hot Spots and on FSEs that have been identified with a greater potential to generate FOG and discharge FOG to the sanitary sewer system. Generally, FSE inspections will be conducted on an annual basis with re-inspections for deficiency occurring more frequently.

5.4 Notification of Spill

5.4.1 In the event a Permittee is unable to comply with any permit condition due to a breakdown of equipment, accidents, or human error or the Permittee has reasonable opportunity to know that his/her/its discharge will exceed the discharge provisions of the FOG Wastewater Discharge Permit or these Regulations, the discharger shall immediately notify

GBWC by telephone at the number specified in the Permit. If the material discharged to the sewer has the potential to cause or result in sewer blockages or SSO, or other threat to the health and welfare of the community, the discharger shall immediately notify the Sheriff's Department, Fire Department and DHHS.

5.4.2 Confirmation of this notification shall be made in writing to GBWC at the address specified in the Permit no later than five (5) working days from the date of the incident. The written notification shall state the date of the incident, the reasons for the discharge or spill, what steps were taken to immediately correct the problem, and what steps are being taken to prevent the problem from recurring.

5.4.3 Such notification shall not relieve the Permittee of any expense, loss, damage or other liability which may be incurred as a result of damage or loss to GBWC or any other damage or loss to person or property; nor shall such notification relieve the Permittee of any fees or other liability which may be imposed by these Regulations or other applicable law.

5.5 Notification of Planned Changes

Permittee shall notify GBWC and DHHS at least 60 days in advance prior to any facility expansion/remodeling, or process modifications that may result in new or substantially increased FOG discharges or a change in the nature of the discharge. Permittee shall notify GBWC & DHHS in writing of the proposed expansion or remodeling and shall submit any information requested by GBWC for evaluation of the effect of such expansion on Permittee's FOG discharge to the sewer system. Permittee shall not complete such modification until approved in writing by GBWC.

6. ENFORCEMENT

GBWC has developed an enforcement response plan to non-compliant issues identified during the inspection process. The enforcement response will be based on the severity of the non-compliance and the history of non-compliance of the commercial or industrial customer. This plan has been developed for guidance and is not intended to create legal rights or obligations, or to limit the enforcement discretion of the United States

Environmental Protection Agency, Nevada Department of Health and Human Services, Nye County Code enforcement, and Elko County Code enforcement or any other governmental entity with jurisdiction or any rights of GBWC.

6.1 Enforcement Actions Available on this FOG Control Program

The enforcement philosophy of GBWC is progressive, in that problems are addressed at the lowest level and with the least formality possible consistent with the specific violation. However, no enforcement procedure is contingent upon the completion of any "lesser" activity.

INFORMAL ENFORCEMENT NOTIFICATION/ACTIONS	
Action	Description
Notice of Deficiency (NOD)	Written notice that a violation/deficiency has occurred and should be corrected. In general, NODs are used for minor violations or as an initial step leading to an escalated enforcement response. NODs are documented and kept on file. Sample NOD attached as Appendix H.
Enforcement Meeting	Informal meeting used to gather information concerning noncompliance, discuss steps to alleviate noncompliance and determine the commitment level of the customer.
Re-inspection	Follow-up inspection(s) by GBWC (or GBWC designee) to ensure corrective action(s) have occurred. These are normally performed within 30 days. Conditions which have not been corrected by the second inspection may be subject to a re-inspection fee of $75 and/or a violation fee.

FORMAL ENFORCEMENT NOTIFICATION/ACTIONS	
Action	Description
Notice of Violation (NOV)	A NOV is a written notice to the noncompliant customer that a violation has occurred. A NOV includes a description of the violation(s) and the date the violation was discovered. A NOV may require a response from the food service establishment that details the cause of the violation(s) and the corrective action(s) taken to correct the violation(s) and prevent similar violation(s). In general, a NOV is considered to be more serious enforcement action than a NOD. Both the Nevada Department of Health and Human Services, Nye County, and Elko County will be copied. A sample final NOV letter is attached as Appendix I.
2nd Notice of Violation (2NOV)	This is a follow-up to an NOV if a corrective actions(s) is not occurring. It may include specific actions to be taken by the customer within a specific time period at the customer's expense. Both the Nevada Department of Health and Human Services, Nye County, and Elko County will be copied.
10 Day Notice	The 10 Day Notice is to warn the customer in violation that sewer service will be terminated pursuant with GBWC's Tariff 1-S (Sewer), Rule No. 6 in 10 days if the specified remedial action has not occurred. Both the Nevada Department of Health and Human Services and Nye County, and Elko County will be copied.
2 Day Notice (48 Hour)	The 2 Day Notice is to warn the customer in violation that sewer service will be terminated pursuant with GBWC's Tariff 1-S (Sewer), Rule No. 6 in 2 days (48 Hour) if the specified remedial action has not occurred. Both the Nevada Department of Health and Human Services, Nye County, and Elko County will be copied.

Discontinuance of Service (DOS)	Discontinuance of Service is the revocation of a customer's privilege to discharge wastewater into the sanitary sewer system. (DOS) is used when discharge from a customer's establishment presents imminent endangerment to the health or welfare of persons, or the environment or threatens to interfere with the operations of GBWC's wastewater and collections systems. DOS is also used as an escalating enforcement action when a noncompliant establishment fails to respond adequately to previous enforcement actions. Notwithstanding, DOS may happen with or without notice depending on the threat to health and welfare at GBWC's discretion. DOS may be accomplished by the installation of an elder valve and physical severance to the sanitary sewer system or by discontinuance of water service pursuant to GBWC's Tariff 1-S (Sewer), Rule No. 6.
Remediation/Clean-up Costs	Notice to pay GBWC the costs associated with the clean-up or decontamination of a site after the discharge of substances into the sanitary sewer system and/or the environment which cause interference, pass-through or sanitary sewer blockage, and or interference with wastewater treatment plant operations.

Violation Fees	
Action	Description
Minor Violation Uncorrected within 30 Days	A $25 violation fee may be imposed if a Minor Violation is not corrected within 30 days of written notification. Each day or portion thereof during which a violation continues may constitute a separate offense.
Intermediate Violation Uncorrected within 30 Days.	A $50 violation fee may be imposed if an Intermediate Violation is not corrected within 30 days of written notification. Each day or portion thereof during which a violation continues may constitute a separate offense.

Major Violation	A $100 violation fee may be imposed if a major Violation is not corrected within the specified timeframe of the written notification. Each day or portion thereof during which a violation continues may constitute a separate offense.
Discontinuance of Service (DOS)	A $250 violation fee may be imposed if a DOS is issued to the Customer. Each day or portion thereof during which a violation continues may constitute a separate offense.
Because, each day or portion thereof during which a violation continues may constitute a separate offense, if in GBWC's opinion, the violator is not taking action to remediate the violation, the Violation Fee schedule may be escalated to the next highest level. The imposition of a Violation Fee does not negate the imposition of any other enforcement methodology and vice verse.	

6.2 Investigation of Noncompliance

GBWC may investigate compliance with the FOG Control Program and GBWC's Tariff 1-S (Sewer) Rule No. 19 in the following ways:

6.2.1 Onsite inspections of commercial and industrial customers' premises, including scheduled and unscheduled visits;

6.2.2 Review of documentation of required cleaning/maintenance of grease interceptors;

6.2.3 Review of records/activities required to be documented and maintained by the customer;

6.2.4 Review of procedures and implementation of Best Management Practices;

6.2.5 Investigation of sewer hot spots, SSOs and illegal discharges.

6.3 Enforcement Tier Levels

ENFORCEMENT TIER LEVELS/ACTIONS	
Tier	Description
Tier I	Notice of Deficiency (NOD)
Tier II	Notice of Violation (NOV)
Tier III	10 Day Notice (Final Notice of Violation)
Tier IV	Discontinuance of Service (DOS)

6.4 Types of Violations

6.4.1 Minor Violation

6.4.1.1 Inspection hindrance (equipment related)
6.1.4.2 Failure to maintain onsite record
6.1.4.3 Failure to pump/clean grease trap/interceptor
6.1.4.4 Failure to follow BMP
6.1.4.5 Discharge prohibition

6.4.2 Intermediate Violation

6.4.2.1 A reoccurrence of any Minor Violation
6.4.2.2 Failure to maintain Equipment

6.4.3 Major Violation

6.4.3.1 A reoccurrence of any Intermediation Violation
6.4.3.2 Denial of right of entry for inspection
6.4.3.3 Source of sewer blockage
6.4.3.4 Source of sewer blockage causing SSO
6.4.3.5 Falsification of maintenance records
6.4.3.6 Discharge FOG that interferes with wastewater treatment plant processes

6.5 Recovery of Enforcement Costs

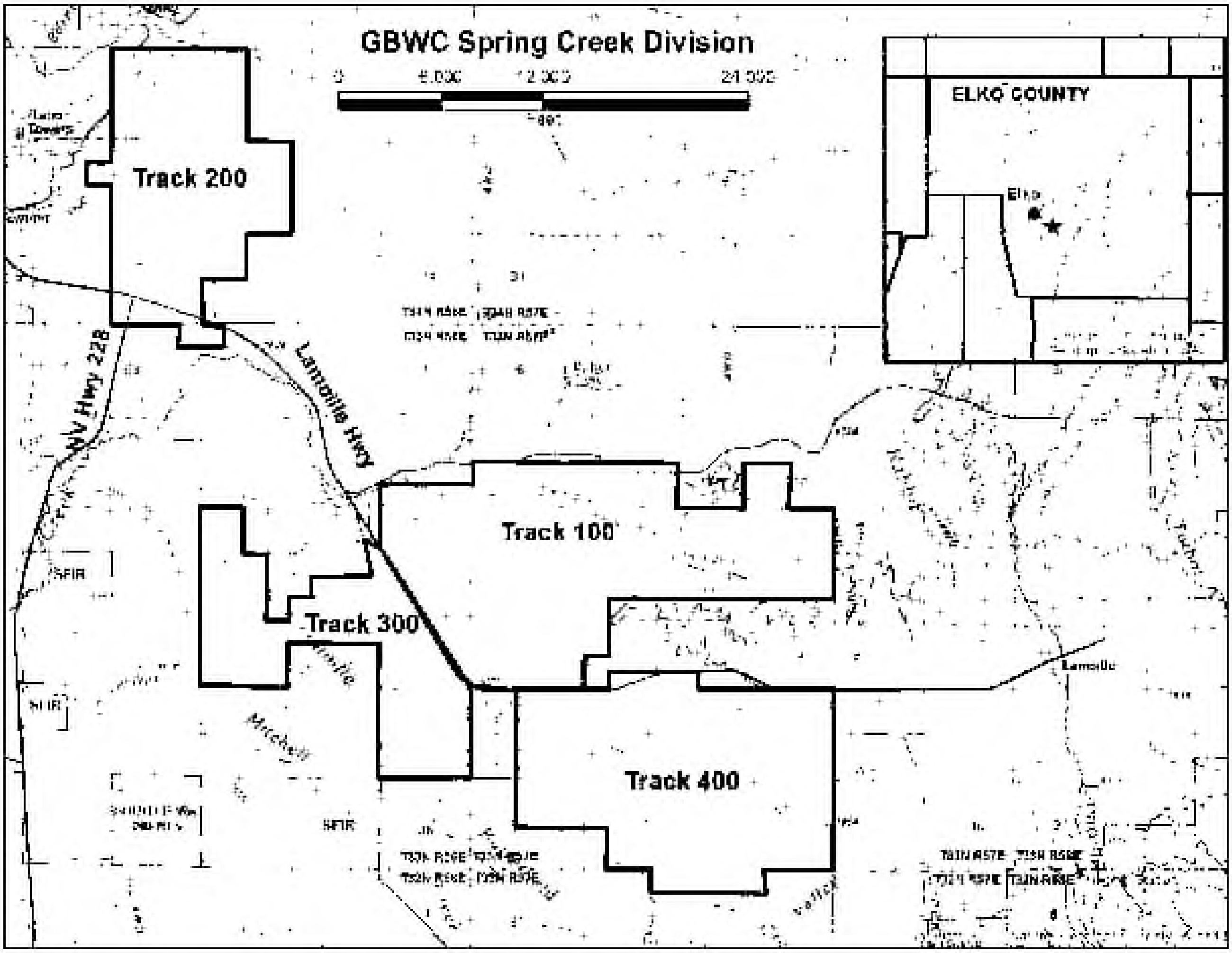
In the event a user fails to comply with any of the terms and conditions of this ordinance, wastewater discharge permit, administrative order, wastewater discharge permit suspension or revocation, or any other enforcement action, the GBWC shall be entitled to reasonable attorney's fees and costs which may be incurred during enforcement of any terms and conditions with or without filing proceedings in court.

Great Basin Water Co.
PAHRUMP DIVISION
SPRING CREEK DIVISION
Service Areas

Appendix A

February 14, 2018


GBWC Pahrump Division
Service Territory



GBWC Spring Creek Division
ELKO COUNTY
Elko
Track 200
Track 100
Track 300
Track 400
NV Hwy 228
Lamoille Hwy
Mitchell
Lamoille

Great Basin Water Co.
PAHRUMP DIVISION
SPRING CREEK DIVISION

Sanitary Sewer Management Plan

Appendix B

February 14, 2018

Purpose

Great Basin Water Co. (GBWC) has developed and is scheduled to implement the Sewer System Management Plan (SSMP) to manage, operate, and maintain all parts of the commercial sanitary sewer system part of the Fats Oils and Grease (FOG) control Program. The SSMP will help reduce and prevent sanitary sewer overflows (SSOs), as well as identify the hot spots in relation to Fats Oils and Grease, illegal discharges. UICN began the preventive maintenance program in 2011.

Commercial Sanitary Sewer System Description

GBWC does jetting and video inspections of the sanitary sewer commercial sectors to evaluate the conditions of the existing sewer infrastructure and to identify the hot spots related to illegal discharges of Fats, Oils and Grease (FOG). Reports of this operation will be issued to NDEP and the State Health Department to continue the implementation of the FOG program to all commercial establishments identified as commercial accounts connected to the sanitary commercial sector.

Commercial Accounts

GBWC – Each of these establishments possess the potential of illegally disposing of Fats, Oils and Grease to the sanitary sewer system.

Great Basin Water Co.
PAHRUMP DIVISION
SPRING CREEK DIVISION

Discharge Permit
(Blank)

Appendix C

March 17, 2015

RULE NO. 19
PRETREATMENT PROGRAM
WASTEWATER DISCHARGE PERMIT

In compliance with regulations of the Environmental Protection Agency, the commercial and industrial Customers located within the certificated service area of Great Basin Water Co., are required to insure that certain regulations are adhered to in the operations of its sanitary sewer system. Any and all commercial and industrial Customers located within the certificated service area of Great Basin Water Co. will be required to execute a Certification in the following form:

CERTIFICATION

I affirm that I have examined and understand the information contained in this Permit. I have read and understand the Permit and know that I can be held responsible for any violation contained in the Permit.

Any questions should be directed to:

____

[Insert name]

[Position]____

Great Basin Water Co.

____

[Insert name]

[Position]____

Great Basin Water Co.

READ AND SIGNED THIS _____DAY OF _____, 20__.

SIGNATURE ____

Upon execution of the Certification form, a waste water discharge permit will be issued by Great Basin Water Co. authorizing said Customer to discharge into Great Basin Water Co.'s sanitary sewer system. The following terms, conditions and restrictions are set forth with regard to the waste water discharge permit:

Great Basin Water Co.
PAHRUMP DIVISION
SPRING CREEK DIVISION

Grease Interceptors and Grease Interceptor Sizing

Appendix D

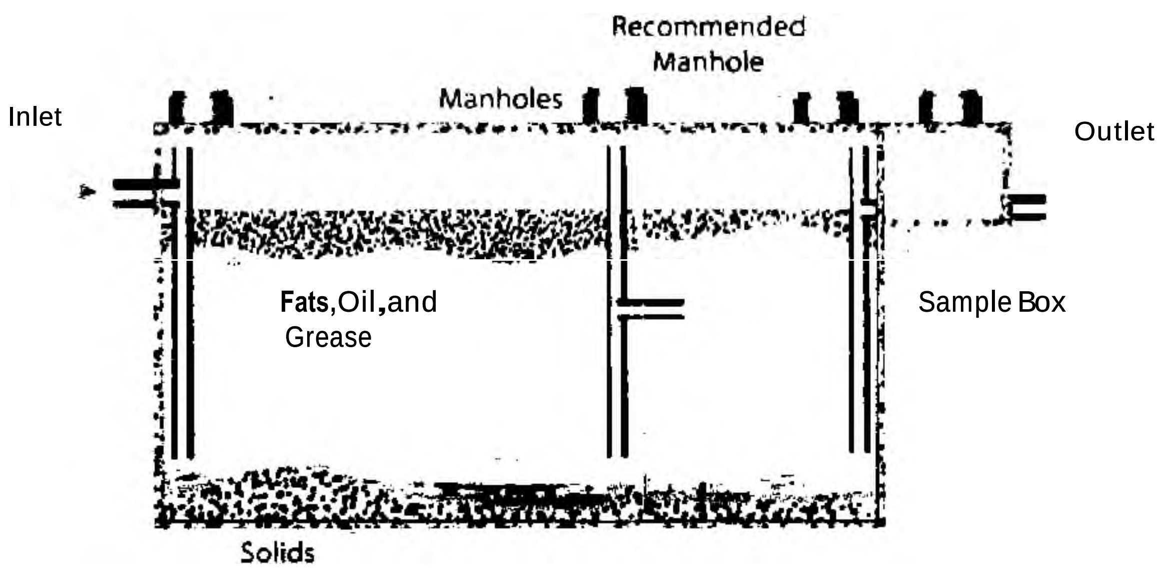
February 14, 2018

GREASE INTERCEPTORS AND GREASE INTERCEPTOR SIZING

Grease interceptors are underground or in-ground grease collection devices that separate FOG (or grease), solids, and water based on the principle of Stoke's law. Stoke's law describes the rising or settling of a particle in a fluid (water in this case). Simply put, under non-turbulent conditions in an interceptor given enough time, particles that are lighter then water (grease) will rise to the surface and particles that are heavier than water (solids) will settle to the bottom. A typical conceptual interceptor design is illustrated in Figure 1.

The proper plumbing and placement of baffles will provide the non-turbulent conditions. The proper dimensions and volume of the interceptor will provide sufficient retention time to allow the particles to fully rise or settle before they pass-through to the outlet of the interceptor. Over time, the grease and solids layers thicken and will eventually fill the first chamber if they are not removed. If the grease and solids are not removed regularly, the interceptor no longer functions for its intended purpose, and grease will be carried into the sewer system. Emulsified or partially emulsified particles will rise or settle slower, which is why soaps and other emulsifiers may cause some grease or solids to pass-through an interceptor and collect downstream of the interceptor.

Figure 1: Conceptual Interceptor Design



Tvpical Conceptual Grease Interceptor Design – Side View

Since an interceptor is not self-cleaning or free of maintenance, it is critical that an interceptor be suitably designed with manholes in the right locations to facilitate maintenance and that it be cleaned and pumped at a frequency that maintains its design removal efficiency.

SIZING

Upon review of a completed application, the G B W C FOG Control Program Manager will review and approve the sizing and installation of grease Interceptors. The FOG Control Manager will base the design and sizing of the grease interceptors on the current version of the Uniform Plumbing Code (UPC). The FOG Control Program Manager will also consider the potential for large grease interceptors to become septic (which may create nuisance odors and corrosive conditions) due to excessively long retention times. Thus, the UPC will be utilized with the following general considerations:

1) If the UPC sizing calculation exceeds 1,500 gallons, the calculation should be compared against formulas such as the Honolulu Formula to ensure that the interceptor is not over-sized. If the results are dramatically different, the FOG Control Program Manager will use utilize his/her best judgment based on other factors at the FSE (e.g.,cooking equipment, menu, frequency of use of the drainage fixture units) to determine the final size of the interceptor.

2) The floor of the interceptor should not be too deep to allow for proper cleaning and/or the individual interceptor should not be larger than 3,000 gallons for most installations. Multiple interceptors may be installed to satisfy very large flows.

3) An FSE calculation of 375 to 750 gallons should require an interceptor of 750 gallons.

Great Basin Water Co.
PAHRUMP DIVISION
SPRING CREEK DIVISION

FSE Logs

Appendix E

March 17, 2015

RECYCLABLE GREASE (YELLOW GREASE) PICKUP / DISPOSAL LOG		
Facility Name:		
DATE	PICKED UP BY:	SERVICE COMMENTS (Volume collection etc.)

LATERAL SEWER LINE MAINTENANCE LOG

Facility Name:

DATE:	SERVICED BY:	TYPE OF SERVICE (rodding, jetting, repair, etc.)	SERVICE COMMENTS (problems, observations, etc.)

EMPLOYEE BMP TRAINING LOG

Facility Name:		REFRESHER TRAINING			
EMPLOYEE NAME	INITIAL TRAINING DATE	DATE	DATE	DATE	DATE

Great Basin Water Co.
PAHRUMP DIVISION
SPRING CREEK DIVISION

FOG BMP POSTER

<u>Appendix F</u>

February 14, 2018

Great Basin Water Co.

BEST MANAGEMENT PRACTICES *
FATS, OIL & GREASE*

***BMP of *FOG FOR COMMERCIAL FOOD ESTABLISHMENTS (CFE) IN THE GREAT BASIN WATER CO. SERVICE TERRITORY**

Email. [illegible]
Website. www.GreatBasinWaterCo.com

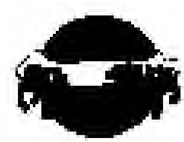
Divisions
Pahrump * Spring Creek

- **ALWAYS** dry-wipe FOG and food from pots, pans, utensils and dishware before washing.
- **ALWAYS** clean exhaust hoods regularly.
- **ALWAYS** keep outdoor grease containers and dumpsters tightly covered.
- **ALWAYS** recycle waste cooking oil whenever possible-Check your local phone listing for specialty waste haulers.
- **ALWAYS** clean FOG spills immediately and prevent FOG from entering floor drains.
- **ALWAYS** use absorbent materials to clean FOG spills. Dispose of recovered FOG in a proper disposal container such as a trash can or dumpster.

- **NEVER** pour fat, grease or oil into sink drains or toilets.
- **NEVER** put grease down a garbage disposal.
- **NEVER** pour food waste or excess food down a drain or into a toilet.
- **NEVER** allow water hotter than 140° F to enter a grease trap.
- **NEVER** discharge water from a mechanical dishwasher through a grease trap.
- **NEVER** dump FOG into a storm drain.
- **NEVER** rinse away outdoor FOG spills-use absorbent pads. Dispose of recovered FOG in a trash can or dumpster, NEVER use kitty litter or saw dust to absorb an outdoor spill-rain can rinse both into storm drains.

Great Basin Water Co. FOG CONTROL PROGRAM

Your Wastewater Discharge Permit Mandates Require that all FSEs.
CLEAN & SERVICE all Grease Removal Equipment (GRE) in accordance with the Great Basin Water Co. FOG Control Program.
Interceptors must not exceed 25% of capacity for combined solids and grease.
Traps must be cleaned daily.
MAINTAIN GRE CLEANING & MAINTENANCE LOGS on site for 3 years and post last cleaning date.
IMPLEMENT & TRAIN STAFF ON BEST MANAGEMENT PRACTICES for the Kitchen.
DISPLAY FOG CONTROL Posters and Signs.



SEE YOUR GREAT BASIN WATER CO. FOG CONTROL PROGRAM FOR COMPLETE INFORMATION.

THE GREASE TRAP AT THIS FACILITY WAS LAST CLEANED ON

Date of Cleaning	Condition of Trap	Cleaned By (Name of In-house Personnel or Waste Hauler)	Comments

Great Basin Water Co.
PAHRUMP DIVISION
SPRING CREEK DIVISION

FSE BMP Inspection Report and Interceptor/Trap Inspection Report

Appendix G

February 14, 2018

GBWC - FSE Best Management Practice (BMP) Inspection Report

Permit No: ______________________________ Inspection Date: ___________

Name of Facility: ___________________________ Inspection Type: ___________

Address: ________________________________ Inspector: _______________

City, NV ____________________________

Name and Title of Facility Contact: ____

FACILITY INSPECTION

1. Removal of food grinder	Installation/usage prohibited per ordinance
2. Drain Screens Installed/Maintained	Must be present and in working condition
3. Kitchen Signage (BMP Poster) posted	BMP Poster visible in food prep/dishwashing areas
4. Scraping practices	Pots, pans, plates to be scraped of food debris prior to washing
5. Food Waste Practices	Food waste to be placed in plastic bags for trash, not in sink(s)
6. Emergency Spill Response Materials	Grease absorbent materials present and accessible in event of a spill
7. Utilization of Additives	Additives for emulsifying or biological/chemically treating Fats, Oils and Grease (FOG) prohibited – unless approved by FOG Control Program Manager
8. Waste cooking oil are properly stored	Waste cooking oil not disposed of in drains; and waste grease container present, not leaking, and properly labeled
9. Grease Collection Log Maintained	Must be kept current and accessible at all times
10. Employee Training Log Maintained	Must be kept current and accessible at all times
11. Lateral Cleaning and Spill Log Maintained	Must be kept current and accessible at all times

Comments: ____

____

____

INSPECTION RESULTS

□ Facility is in COMPLIANCE. No corrective action is required at this time.

□ **NOTICE OF NONCOMPLIANCE**

Y N	Facility is in noncompliance of the items checked below:	Required corrective action includes any or all of the following:
□ □	Food grinder (garbage disposal) installed	□ Remove food grinder (garbage disposal)
□ □	Drain screens missing/damaged/clogged	□ Install/repair/clean drain screen(s)
□ □	BMP poster missing/obscured/damaged, etc.	□ Post/repair/replace BMP poster
□ □	Employees observed not following scraping practices	□ Train employees on scraping practices
□ □	Food waste in sink(s) and not in enclosed plastic bag or garbage	□ Train employees on proper disposal of food waste
□ □	Missing/inadequate or inaccessible absorbing materials	□ Make available/accessible grease absorbent grease material for spills
□ □	Additives utilized without approval of FOG Program Manager	□ Discontinue Additive use or obtain approval
□ □	Grease container leaking, not present, or improperly labeled	□ Provide, properly label, & maintain waste grease container
□ □	Evidence of waster cooking oils in drains	□ Train employees on proper disposal of FOG
□ □	Grease Collection Log missing or not current	□ Make available/accessible and update Grease Collection Log
□ □	Employee Training Log missing or not current	□ Train employees on all BMPs & update Training Log
□ □	Lateral Cleaning and Spill Log missing or not current	□ Make available/accessible and update Lateral Cleaning and Spill Log
□ □	Other: ______________________	□ Other: ______________________

The above checked item(s) must be corrected within _____ days of receipt of this Notice of Noncompliance.

ACKNOWLEDGEMENT OF RECEIPT OF INTERCEPTOR INSPECTION REPORT

________________________ _________ ________________________ _________

Signature of Facility Contact Date Signature of Inspector Date

GBWC - FSE Interceptor/Trap Inspection Report

Permit No: ____________________ Inspection Date: __________

Name of Facility: ____________________ Inspection Type: __________

Address: ____________________ Inspector: __________

City, State ____________________

Name and Title of Facility Contact: ____________________

Required Pumping Frequency: ____________________

Interceptor/Trap Location: ____________________

Interceptor Liquid Depth: __________ inches

FACILITY INSPECTION: Grease Removal Equipment (GRE)

12. Floating Fats, Oils, and Grease (FOG) Layer – (FF) Thickness: ______ inches
13. Set table Solids (SS) Thickness: ______ inches
14. Total FF and SS Thickness: ______ inches % Accumulated FOG and SS: ______%
15. Last cleaning/pump-out date: __________
16. Mechanical Condition: See Results for Deficiencies
17. GRE Pumping Record Keeping: See Results for Deficiencies

Comments: ____________________

____

____

INSPECTION RESULTS

□ Facility is in COMPLIANCE. No corrective action is required at this time.

□ **NOTICE OF NONCOMPLIANCE**

Y N	Facility is in noncompliance of the items checked below:	Required corrective action includes any or all of the following:
□ □	Interceptor/Trap is inaccessible for inspection	□ Promptly remove obstructions that do not allow access to interceptor/trap
□ □	Interceptor/Trap FOG and settable solids capacity exceeded	□ Pump out Interceptor/Trap completely
□ □	Excessive FOG in the sample box	□ Pump out sample box completely when GRE is serviced
□ □	Discharge (Effluent Line) restricted	□ Clean effluent line (Hydro-jet)
□ □	Baffle tubes plugged, submerged, damaged or missing	□ Repair or replace baffle tubes
□ □	Insufficient GRE record keeping	□ Maintain GRE records (log and/or hauling/pumping records)
□ □	Pumping Frequency not within required interval	□ Pump interceptor/trap within required frequency interval
□ □	Other: ____________________	□ Other: ____________________

The above checked item(s) must be corrected within _____ days of receipt of this Notice of Noncompliance.

ACKNOWLEDGEMENT OF RECEIPT OF BMP INSPECTION REPORT

____________________ __________

Signature of Facility Contact Date

____________________ __________

Signature of Inspector Date

Great Basin Water Co.
PAHRUMP DIVISION
SPRING CREEK DIVISION

Sample NOD Letter

Appendix H

February 14, 2018

NOTICE OF
DEFICIENCY

March 17, 2018

VIA U.S. Mail, First Class and Certified

Mr. John Doe Manager Taco Town
2124 S.1st Street
Pahrump, NV 89060

RE: Notice of Deficiency

Dear Mr. Doe,

This letter constitutes written notice of deficiency to Taco Town, 2124 S.1st Avenue, pursuant to Great Basin Water Co (GBWC) Fats, Oils and Grease (FOG) Control Program, GBWC's Tariff 1-S (Sewer) Rule 19 and Nevada Administrative Code 446.430.

Taco Town violated these requirements by failing to effectively monitor and control the levels of fat, oil, and grease (FOG) being discharged into the GBWC wastewater treatment system.

Taco Town is required, as a condition for service under the GBWC's FOG Control Program and Tariff, to ensure that wastewater discharges to not contain solid or viscous substances that may obstruct the flow of wastewater through the collection system or disrupt the normal operations of the wastewater treatment plant. It is the responsibility of each discharger to ensure that the wastewater being discharged from their facility meets local requirements at all times. Grease interceptors must be maintained and proper methods of grease disposal must be followed.

GBWC is now taking action in accordance with the FOG Control Program and Tariff to ensure that the customer discontinues the discharge of excessive concentrations of fats, oils and grease.

Explanation of deficiency:

Upon inspection of the grease interceptor at Taco Town, the grease interceptor contained more than 25% FOG and solids for the design capacity of the grease interceptor. Additionally, the maintenance log for the Taco Town grease interceptor indicated that cleaning had not occurred for ____ months. This is non-compliant with your permit to discharge into GBWC's sewer system which is your permit with GBC for your reference.

Please respond to this notice within ten days of receipt of this notice with an explanation and plan for the satisfactory correction and prevention thereof, including specific required actions. The submission of this plan in no way relieves the discharger of liability for any violations occurring before or after the receipt of this deficiency.

Should you wish to meet with GBWC to discuss the steps necessary to alleviate the deficiency, please call me at your earlier convenience to make an appointment (775.727.5941). Thank you for your prompt attention to this matter.

Sincerely,

Area Manager

Great Basin Water Co.
PAHRUMP DIVISION
SPRING CREEK DIVISION

Sample Final NOV Letter

Appendix I

February 14, 2018

FINAL NOTICE OF
VIOLATION

March 17, 2015

VIA U.S. Mail, First Class, and Certified

Mr. John Doe
Burger Ranch
1801 S. 1st St. Pahrump, NV
89048

RE: Final Notice of Violation

Dear Mr. Doe,

This letter constitutes written notice to Burger Ranch, 1801 S.1st Street, pursuant to Great Basin Water Co.'s (GBWC) 1-S Sewer Tariff Rule No. 19 that sewer service to your premise will be terminated for violation of GBWC's Rule No.19 Tariff regarding Fats, Oils, and Grease (FOG) Control Program.

Burger Ranch has violated and is continuing to violate these requirements by failing to effectively monitor and control the levels of FOG being discharged into the GBWC wastewater treatment system. As a result of Burger Ranch's failure to adhere to these requirements, "Final Notice of Violation" has been issued to you. A previous Notice of Violation had been issued to Burger Ranch dated March 1, 2018. Attachment enclosed.

Continued violation of the FOG discharge limit will constitute discontinuance of sewer service until the discharge of FOG is in compliance and all violations have been remedied to GBWC's satisfaction.

Thank you for your prompt attention to this matter. Should you have any questions, I can be reached at 775.727.5941 for an appointment. Should you take the necessary corrective actions, please call the same number for inspection to ensure your compliance.

Sincerely,

Area Manager

NDEP # 180427-04

Report Date: 4/27/2018 Report Time: 3:04 PM

Incident Date: 4/26/2018 Incident Time: 12:40 PM

Do You Want to Remain Anonymous? No

Complaint/Spill Report Form

State of Nevada

Telephone: (888) 331-6337

Fax: (775) 687-8335

Reporting Person: MARC ROHUS

Reporting Agency: Great Basin Water Co. - Spring Creek

Address: 448 Tonka Ln. #3 Phone: (775)397-8371

City: Spring Creek State: NV Zip: 89815

Discharger/Owner/Operator of Facility: Great Basin Water Co. - Spring Creek

Address: 239-255 Spring Creek Pkwy. DOT#:

City: Spring Creek State: NV Zip: 89815

Contact Person Marc Rohus/Eric Chittim Phone: (775)397-8371

APN#: UST Facility ID / BWPC Permit #: WWTP#1/NEV2002511

Facility Address if different from discharger: 239-255 Spring Creek Pkwy.

City: Spring Creek State: NV County: Carson City County

Location of Complaint/Spill: At the wastewater treatment facility/clarifier and aeration zone

Township: Range: Section: Q,Q2: Mile Marker:

Type of Material Discovered: After treatment effluent and mixed liquor

Concentration / Analytical Data:

Quantity Found: Less than 10 gallons Container: Unknown

Media Affected: Soil If UST, Confirmed Visually? No

Cause of Complaint/Spill:

Two very small hairline cracks were found to be seeping. One was located on the outside wall of the aeration zone and the other was located on the outside wall of the clarifier.

Remedial Action Taken:

The areas were sealed with a sealant to eliminate any future seepage. The soil areas that were wet from the seepage will be treated with a chlorine spray mixture and we will monitor the sealed repairs to make sure they are not leaking in the future.

Oversite/Enforcement: Email Address:

Comments:

Report Taken By: Online System

NEVADA DIVISION OF
ENVIRONMENTAL
PROTECTION

STATE OF NEVADA
Department of Conservation & Natural Resources
Steve Sisolak, Governor
Bradley Crowell, Director
Greg Lovato, Administrator

May 28, 2019

Marc Rohus, Regional Manager
Spring Creek Utilities Co.
3670 Grant Drive #103
Reno, NV 89850

RE: 2019 Inspection Report for the Spring Creek WTP #1 - Permit #NS2002511

Dear Mr. Rohus:

Enclosed please find a copy of the 2019 inspection report for the Spring Creek WTP #1. The Nevada Division of Environmental Protection (NDEP) conducted the inspection on April 18, 2019.

The NDEP concludes that the Spring Creek WTP #1 is in substantial compliance with permit conditions.

If the NDEP determines that other comments, recommendations, or requirements are warranted, you will be notified as soon as possible. If there are any questions about the inspection report, please contact me at (775) 687-9315, or ktullar@ndep.nv.gov.

Sincerely,

Katura Tullar
Staff Engineer, Technical Services and Compliance
Bureau of Water Pollution Control

Enclosure: 2019 Spring Creek WTP #1 Inspection Report

Ecc:
Katrina Pascual, P.E., NDEP-BWPC TCE Supervisor
Marc Rohus, marc.rohus@greatbasinwaterco.com

INSPECTION REPORT

Nevada Division of Environmental Protection
Bureau of Water Pollution Control

FACILITY PERMIT:	NS2002511
FACILITY TITLE:	SPRING CREEK WASTEWATER TREATMENT PLANT #1
FACILITY DESCRIPTION:	BNR PACKAGE PLANT & LEACH FIELD
FACILITY LOCATION:	SPRING CREEK PARKWAY, SPRING CREEK, NV 89815
APPROVED OUTFALLS:	001 EXTERNAL OUTFALL 002 MONITORING WELL
DATE OF INSPECTION:	4/18/2019
TYPE OF INSPECTION:	COMPLIANCE EVALUATION INSPECTION (CEI)
ATTENDEES:	MARC ROHUS, UTILITIES INC. ERIC CHITTIM, UTILITIES INC. RYAN FAHEY, NDEP KATURA TULLAR, NDEP
DISCHARGE RATE:	30,000 GPD
PERMITTED QUANTITY:	50,000 GPD
DATE OF REPORT:	5/28/2019

INTRODUCTIONS/FACILITY OVERVIEW

The Spring Creek Utility Company (SCU) owns a package wastewater treatment plant (WTP #1) that serves approximately 60 residential and commercial customers in Spring Creek, Nevada. The package plant may be described as an extended aeration activated sludge plant, with biological nitrogen removal (BNR). The design capacity of the WTP #1 is 50,000 GPD of domestic wastewater. Treated effluent is discharged to a leach field. Down-gradient of the leach field is the groundwater monitoring well.

DISCHARGE MONITORING REPORTS

DMR reports from the 2018 calendar year (CY) were reviewed for the preparation of this inspection report. No exceedance were noted in the 2018 CY. Summary tables of reported constituents and process parameters are attached.

Effluent Flow: Effluent flow from the WTP #1 ranged from 29,500 to 34,700 GPD (30-day average) which is in compliance with the permit limit of 50,000 GPD. The daily maximum effluent flow during the 2018 CY was 40,420 GPD (March 2018, M&R).

Effluent BOD: Maximum effluent BOD ranged from 0.0 - 11.0 mg/L for the 2018 CY (monthly sampling) and the facility is currently in compliance with the permit limit of 30 mg/L for BOD.

Effluent TSS: Maximum effluent TSS ranged from 0.0 - 30.0 mg/L during the 2018 CY (monthly sampling) which is in compliance with the permit limit of 30 mg/L.

Effluent Total Nitrogen (TN): Effluent TN ranged from 2.2 - 8.1 mg/L during the 2018 CY is currently in compliance with the permit limit of 10 mg/L.

Effluent pH: WTP #1 has been in compliance with effluent pH limits for the 2018 CY, with maximum values ranging from 7.58 - 8.12 S.U.

Monitoring Well: Total Nitrogen (TN) is the point-of-compliance constituent for the monitoring well. WTP #1 is required to only monitor and record chloride and TDS. Groundwater samples for the last 4 calendar quarters in 2018 are well below the TN permit limit of 10 mg/L, ranging from 2.5 - 3.0 mg/L during this time period.

Depth to groundwater during the last 4 calendar quarters in 2018 ranged from 28.3 to 33.8 feet below ground surface. Sampling and analysis of groundwater is required quarterly.

FACILITY WALKTHROUGH

NDEP staff met with Mr. Marc Rohus and Mr. Eric Chittim at Utilities, Inc. on April 18, 2019, at 1:00 PM for a pre-inspection meeting. Then NDEP followed Mr. Rohus and Mr. Chittim to WTP #1 which is located inside a fenced and locked 10-acre parcel. The NDEP noted that the entrance gate was posted. The flow to the collection system is gravity fed via a 4-inch line that transitions into an 8-inch line just before headworks. The main entrance to the WTP #1 is located off Spring Creek Parkway, near Spring Creek Towne Center.

Influent Lift Station: The influent lift station is located at the WTP #1 entrance. Two submersible pumps alternate for redundancy. The pump station wet well has a capacity to store 13,000 gallons of influent. The pump station has a back-up diesel generator (40 kW). The BWPC noted only minor scum on the surface of the influent at the bottom of the wet well. No problems were noted with the operation of the Lift Station.

Flow Meter: A new ultra sonic flow meter had just been installed and was going to be online in the next week or so.

Pre-Treatment: The WTP #1 is equipped with a bar screen for trapping coarse materials. It was noted that the screens were originally 1-inch wide but it was revealed that decreasing the size to ½-inch was more effective. Screenings are manually removed from the bar screen once dried, and discarded at the local landfill. No compliance issues were noted with the bar screen.

BNR Package Plant: The WTP #1 was designed by MAR-WOOD™ and consists of a front anoxic chamber (12,000 gallons), followed by an extended aeration tank (37,000 gallons), and then a tapered-bottom clarifier (10,300 gallons). Two alternately-cycled blowers (60 Hz) supply air to the aeration tank for BOD removal and nitrification.

Influent is cleaned of debris in the bar screen, which discharges to the anoxic chamber. Nitrified mixed liquor is recycled from the aeration tank to the anoxic chamber. Activated sludge from the clarifier may also be returned to the anoxic chamber, or wasted to the sludge digester (6,500 gallons). According to the operator, digester sludge is disposed of every quarter.

The 10,300 gallon clarifier has troughs for effluent screenings and scum, which are hosed off daily. The effluent from the clarifier appeared very clean, with no septic odors. The treated effluent discharges to a 3,500-gallon dosing tank, where it is routed to the leach field.

The inspection showed that the mixed liquor in the aeration tank had a brown color with very little foam, and there were no objectionable odors. The inspection also revealed minor floating floc on the surface of the clarifier, but the effluent discharge through the weirs, and observed in the effluent weir trough, was relatively clean.

Leach Field: Treated effluent is discharged to groundwater via percolation in a leach field, which is immediately northeast of the package plant. The leach field consists of 3,500 L.F. of infiltrator chambers and assorted distribution boxes. NDEP noted at the time of the inspection that a berm around the leach field had been constructed in 2018. Some weeds and shrubs were noted in the leach field, but they were not excessively high.

Groundwater Monitoring Well: A groundwater monitoring well (compliance point) is located about 150 feet down-gradient (north) from the edge of the leach field. Two other monitoring wells exist on the property, but are not used.

CONCLUSIONS

The changes noted during this inspection were a berm around the leach field constructed in 2018 and the installation of a new ultrasonic flow meter.

It was brought to the attention of NDEP that there was evidence of concrete degradation and a structural engineer was scheduled to assess the structural integrity. Due to this observation NDEP will need to be notified that that this assessment was conducted and a remedy solidified.

After the NPDES inspection and records review, the NDEP concludes that the Spring Creek Wastewater Treatment Plant #1 is in substantial compliance with permit conditions.

FINDINGS

None

RECOMMENDATIONS

None

Spring Creek Wastewater Treatment Plant #1 (NS2002511)

Pictures

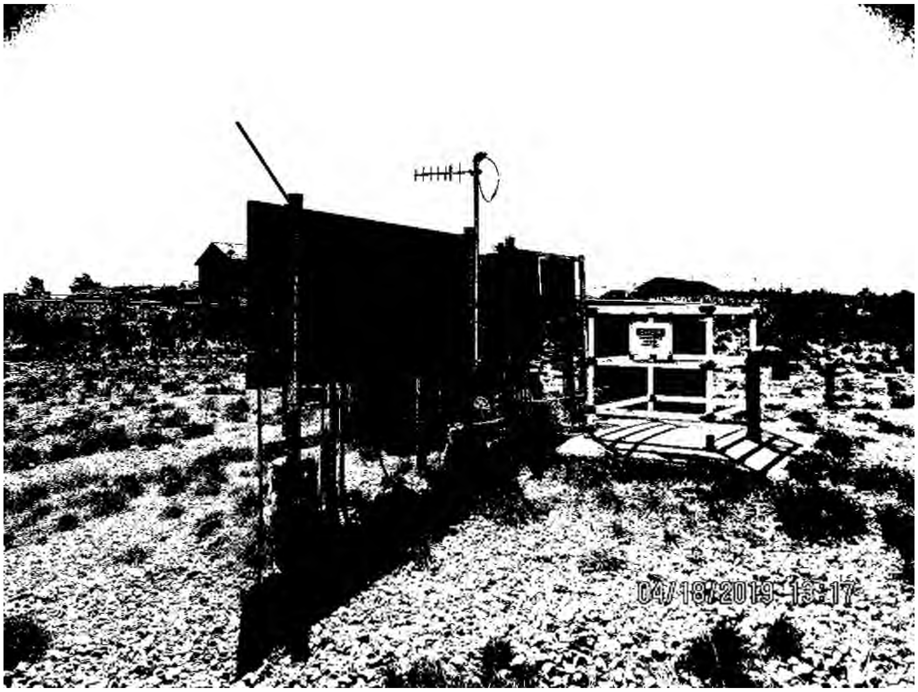


Figure 1: SCU Lift Station

Figure 2: Line to new Ultra Sonic Flow Meter

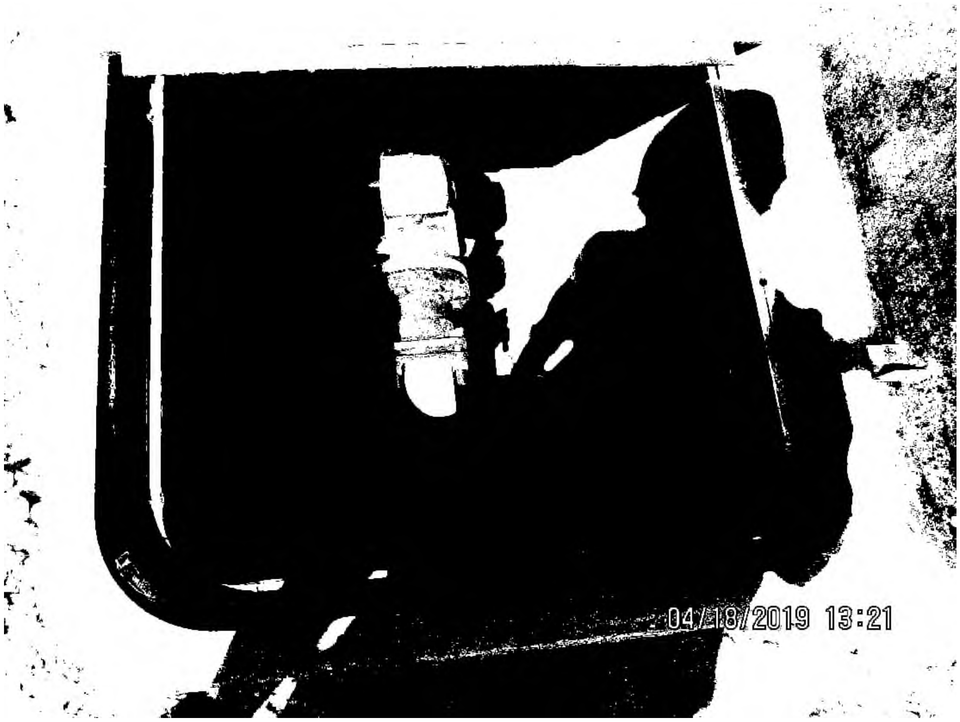


Figure 3: New Ultra Sonic Flow Meter

Figure 4: Leach Field

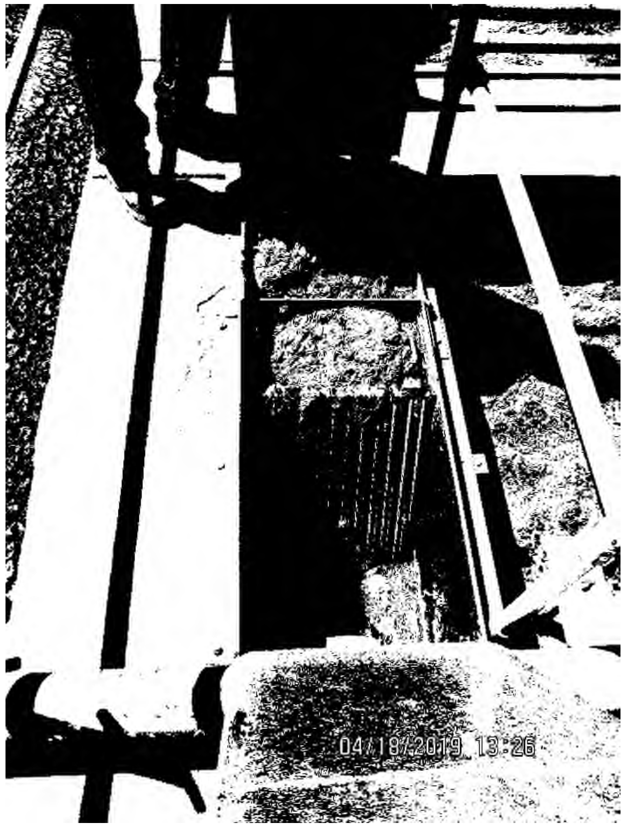


Figure 5: Bar Screen (debris manually removed once dried)

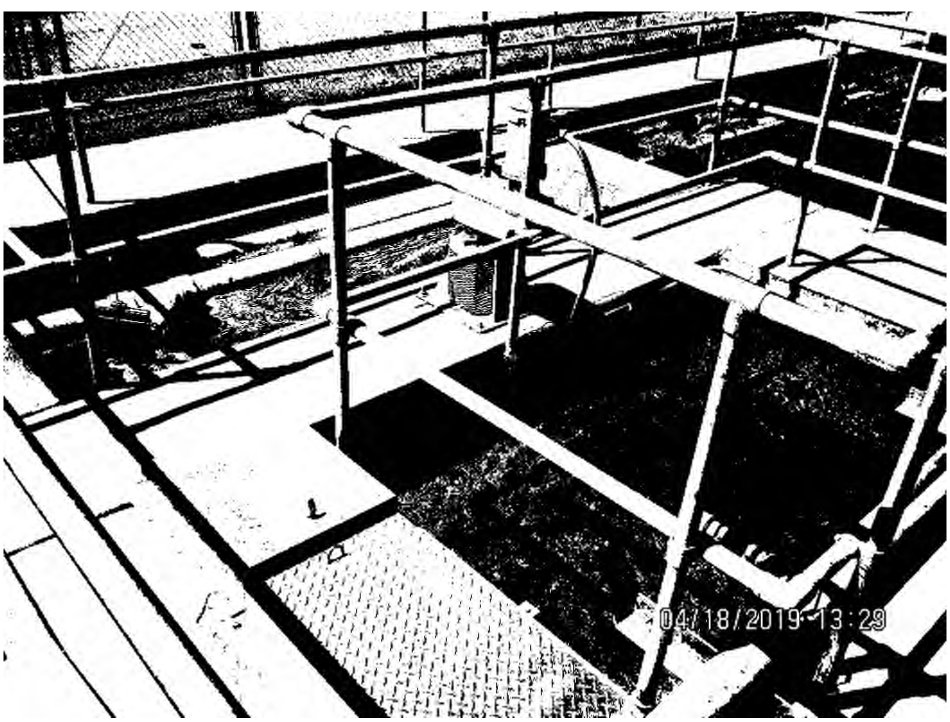


Figure 6: Anoxic Zone

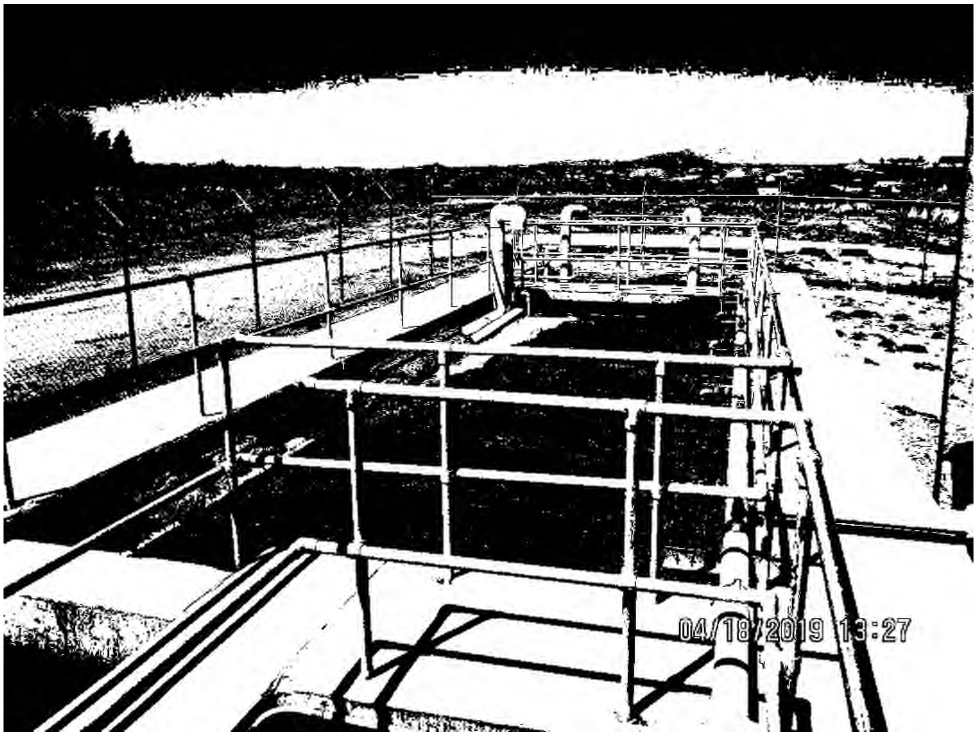


Figure 7: Aeration Zone

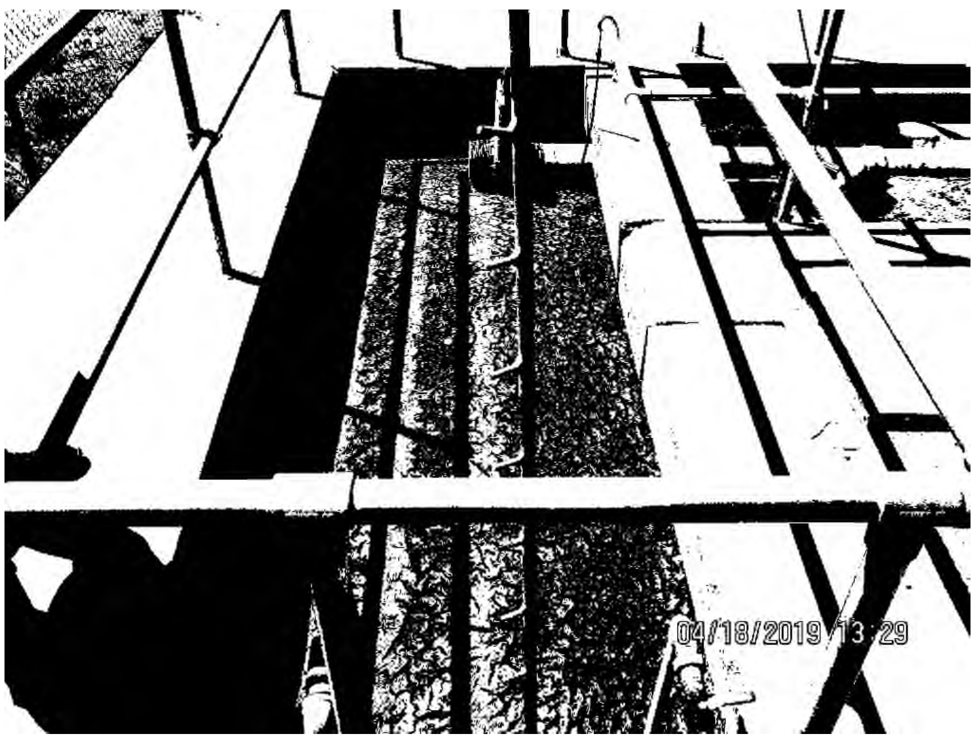


Figure 8: Sludge Basin

Figure 9: Clarifier

Figure 10: Weir

Figure 11: BNR Plant Layout

Figure 12: Blower Building

Figure 13: Blower

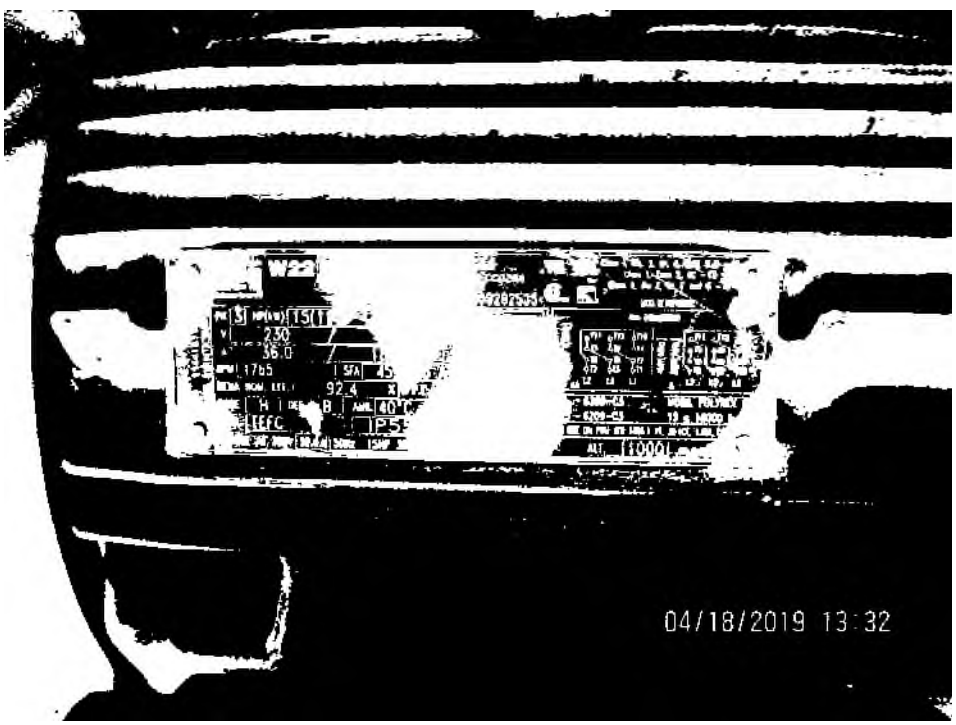


Figure 14: 60 HZ Blower details

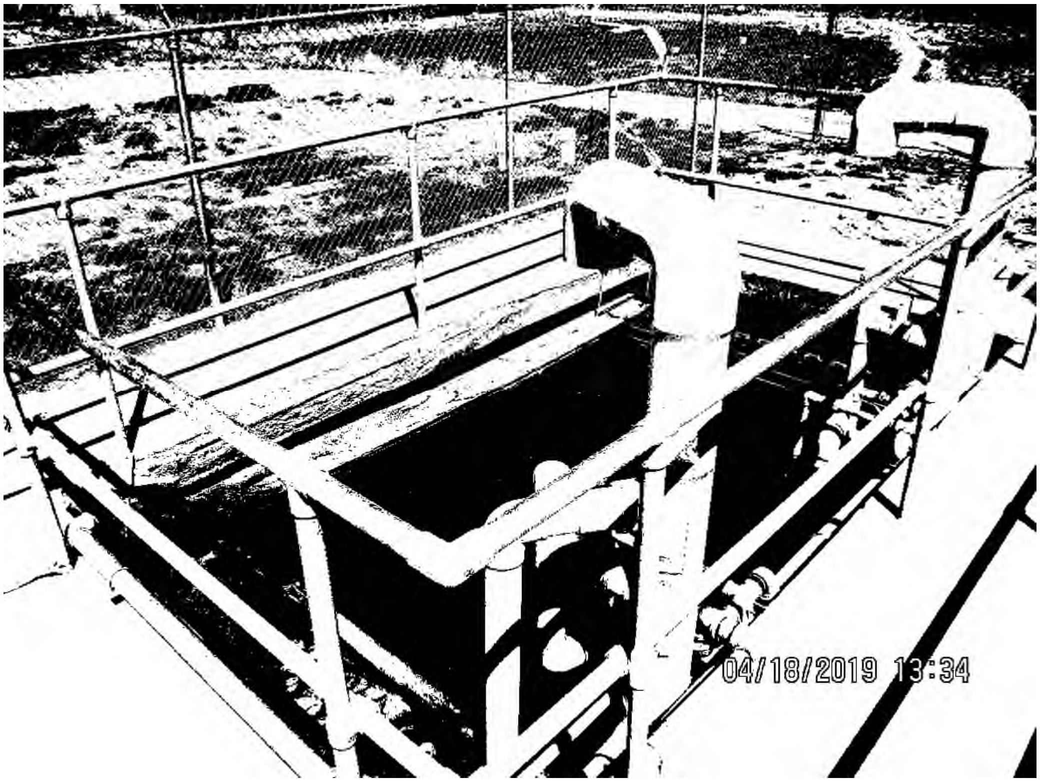


Figure 15: Concrete Degradation

Table 1: Spring Creek Utilities WTP #1						
DMR Report - Effluent Discharge to Leach Field						
Mo/Yr	Effl. Flow 30-Day Avg. (GPD)	Effl. Flow Daily Max (GPD)	Effl. BOD (mg/L)	Effl. TSS (mg/L)	Effl. TN (mg/L)	Effl. pH (S.U.)
Jan-18	29530	32234	0	4	5.3	7.58
Feb-18	31400	36525	3	4	5.4	7.65
Mar-18	34700	40420	4	5	4.7	7.68
Apr-18	32400	38420	4	1	3.4	7.67
May-18	31590	33416	6	7	3.3	7.91
Jun-18	31910	36038	7	19	4.3	7.91
Jul-18	31900	40158	11	0	8.1	7.79
Aug-18	31600	37225	6	2	2.9	7.75
Sep-18	34200	39338	4	4	3.1	8.12
Oct-18	33100	34843	4	2	2.2	8.07
Nov-18	30500	34572	7	30	2.5	7.95
Dec-18	29500	34158	5	4	4.4	7.58
Permit Limit	50,000 GPD	M&R GPD	30 mg/L	30 mg/L	10 mg/L	6.5 - 9.0 S.U.

Table 2: Spring Creek Utilities WTP #1				
DMR Report - Monitoring Well Downgradient of Leach Field				
Qtr/Yr	TN (mg/L)	Chloride (mg/L)	TDS (mg/L)	DTW (ft)
Q1 2018	2.6	59	320	28.3
Q2 2018	2.5	58	8	29.4
Q3 2018	2.9	57	380	33.8
Q4 2018	3	63	380	32.3
Permit Limit	10 mg/L	M&R mg/L	M&R mg/L	M&R ft
Note: The permittee is required to do quartely sampling and analysis. DTW = Depth of Water. 8 = Other (See Comments - We made a mistake and pulled a TSS sample and not the TDS sample that is needed quarterly for the monitoring well.)				

2017 Inspection Photos	

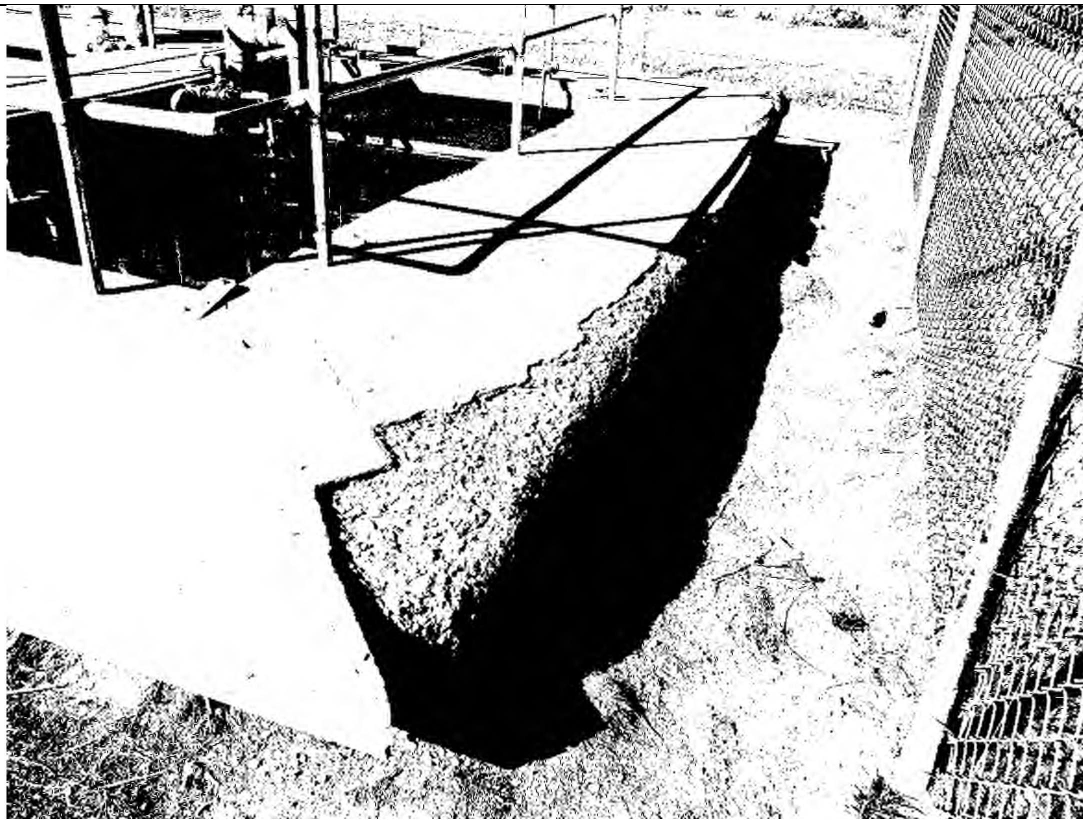
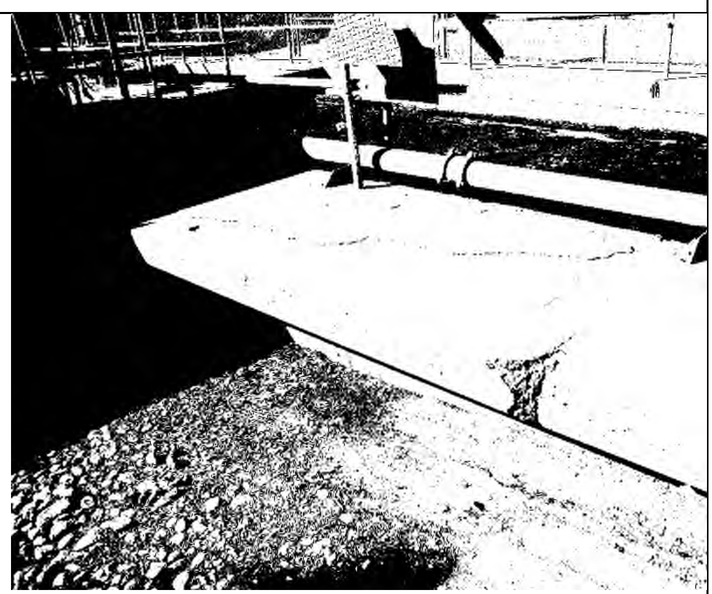



Photo 1 (9/13/2017) – Existing concrete cantilever walkway along north side of plant. Photo shows significant concrete deterioration including cracks, spalling, exposed aggregate, and exposed rebar.	
	
Photo 2 (9/13/2017) – Existing concrete cantilever walkway along east side of plant. Photo shows concrete cracks, spalling, and exposed aggregate.	Photo 3 (9/13/2017) – Existing concrete cantilever walkway along east side of plant. Photo shows concrete cracks, spalling, and exposed aggregate.

2018 Inspection Photos

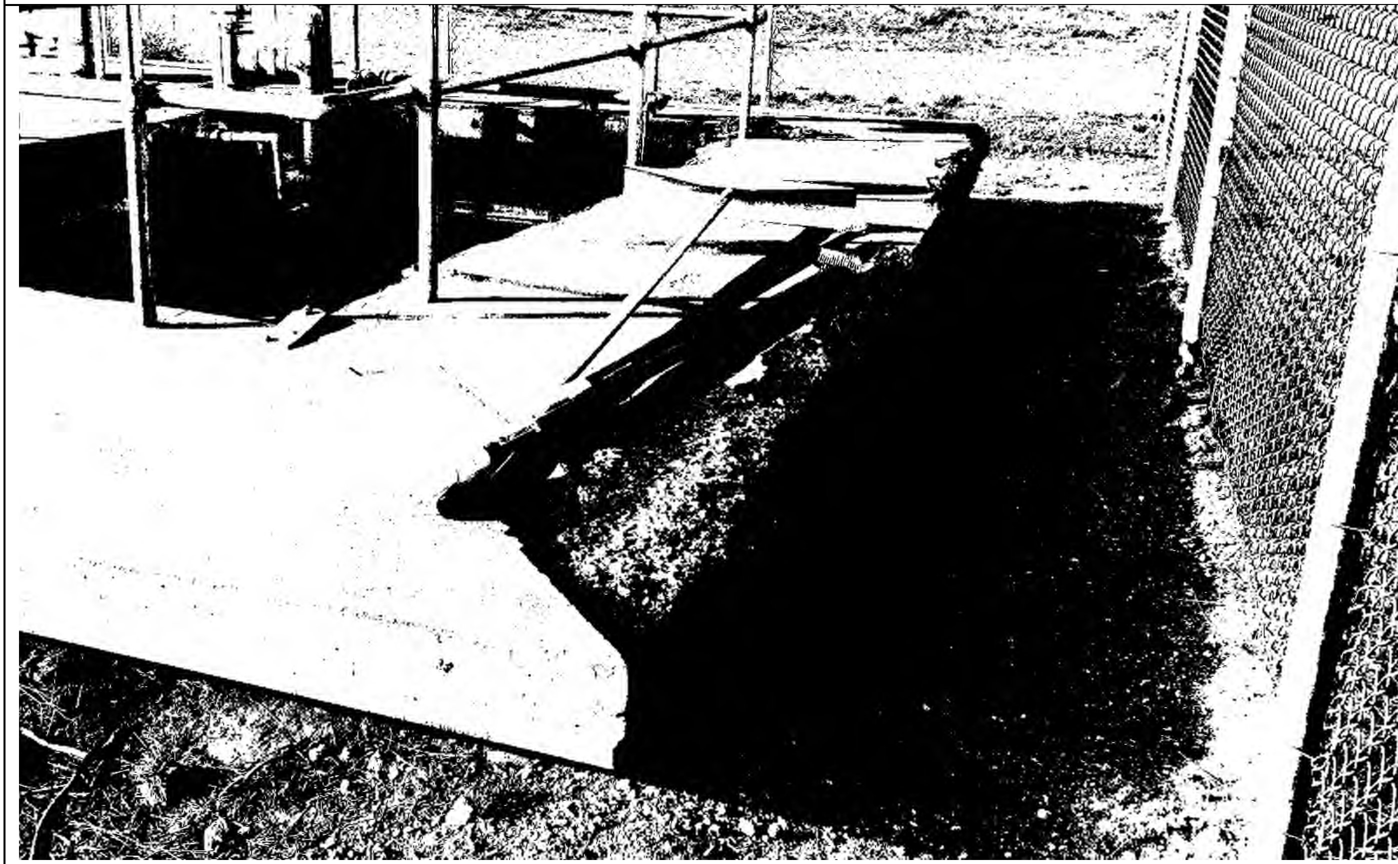


Photo 4 (11/15/18) – Existing concrete cantilever walkway along north side of plant. Photo shows significant concrete deterioration including cracks, spalling, exposed aggregate, and exposed rebar. Exposure area and depth appears to have increased from 9/13/2017 inspection (Photo 1) with additional rebar visible.

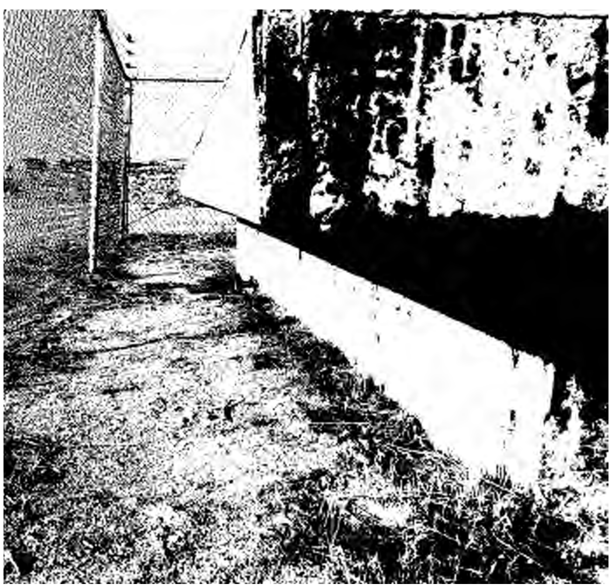


Photo 5 (11/15/18) – Existing concrete cantilever walkway at southeast corner of plant. Photo shows large vertical concrete crack and exposed aggregate.

Photo 6 (11/15/18) – Existing concrete cantilever walkway at southwest corner of plant. Photo shows significant concrete deterioration including cracks, spalling, exposed aggregate, and exposed rebar.

2019 Inspection Photos (Taken for Structural Assessment)	

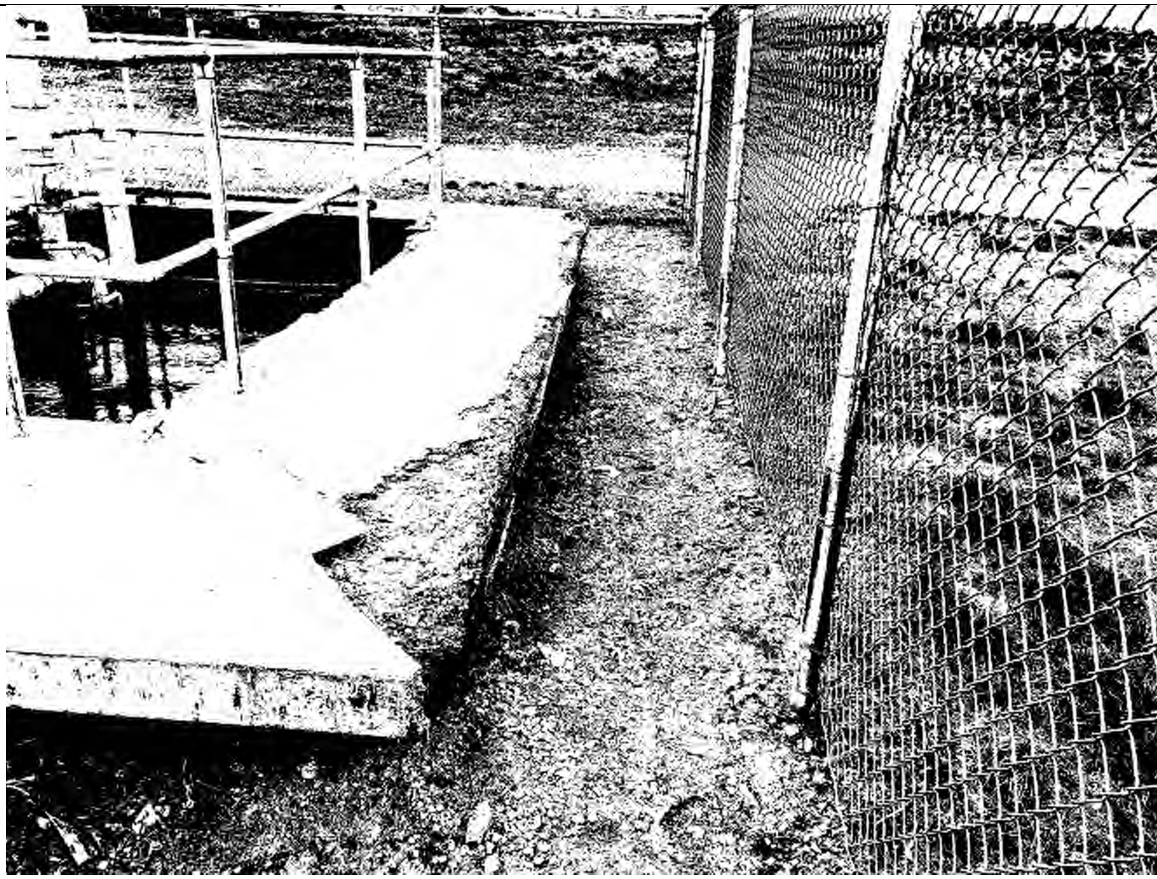



Photo 7 (4/15/2019) – Existing concrete cantilever walkway along north side of plant. Photo shows that concrete deterioration has increased since previous years with additional rebar exposure.	

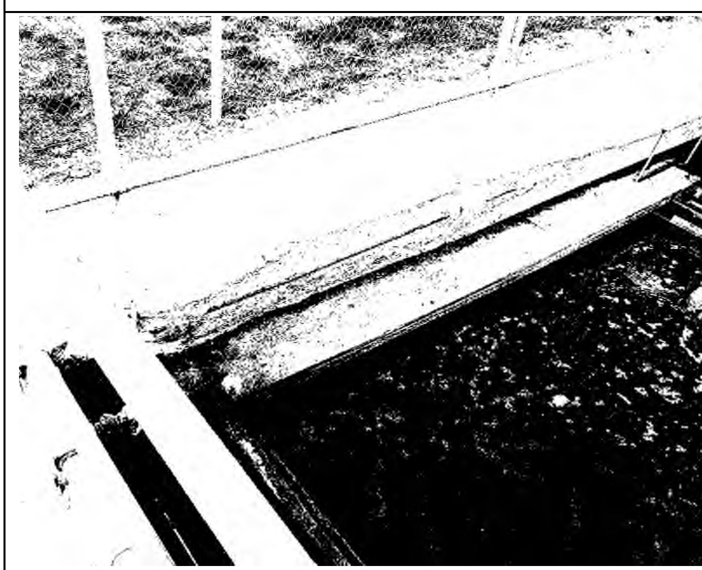
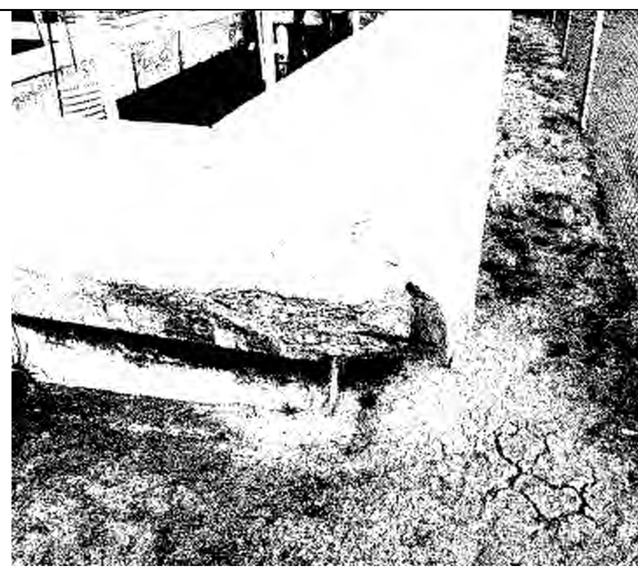

	

Photo 8 (4/15/2019) – Existing concrete at inside edge of north walkway. Photo shows significant concrete deterioration including spalling, exposed aggregate, and exposed rebar.	Photo 9 (4/15/2019) – Existing concrete cantilever walkway at southwest corner of plant. Some additional deterioration has occurred since 2018 as evidenced by aggregate collecting on the ground (see Photo 6).

2020 Inspection Photos	

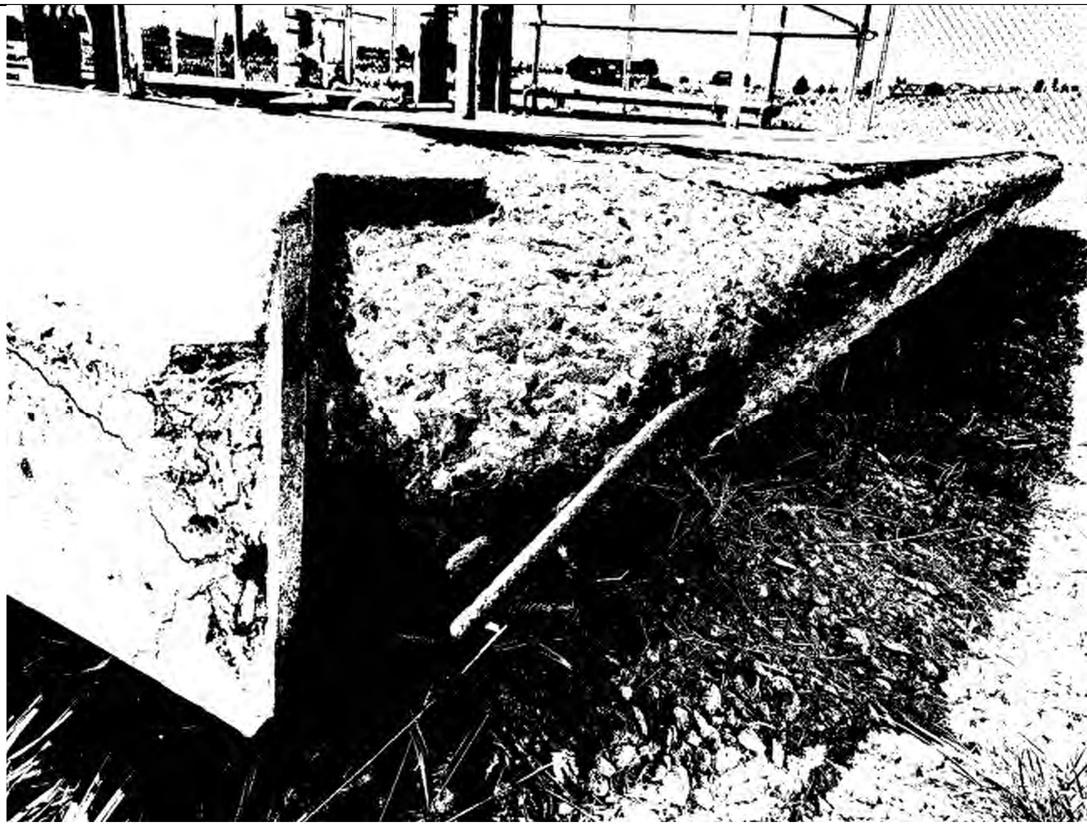



Photo 10 (9/10/2020) – Existing concrete cantilever walkway along north side of plant. Photo shows that concrete deterioration has increased since previous years with additional aggregate exposure.	
	
Photo 11 (9/10/2020) – Existing concrete at inside edge of north walkway. Deterioration has advanced since 2019 (see Photo 8).	Photo 12 (9/10/2020) – Existing concrete cantilever walkway at southwest corner of plant. Deterioration has advanced since 2019 (see Photo 9).

LUMOS & ASSOCIATES

Carson City Fallon Lake Tahoe Reno

Reno
9222 Prototype Drive
Reno, Nevada
775.827.6111

August 2, 2019
Project No. 9726.000

Mr. Marc Rohus
Regional Manager
GREAT BASIN WATER COMPANY
1005 Terminal Way
Reno, NV 89502

RE: SPRING CREEK WWTP STRUCTURAL ASSESSMENT

Dear Mr. Rohus:

Pursuant to your request, an assessment of the concrete basins at the Spring Creek Wastewater Treatment Plant (WWTP) located in Spring Creek, Nevada has been conducted. The purpose of our assessment was to determine the current physical condition of the concrete basins. This report presents our findings.

Background

A copy of the original WWTP construction drawings as prepared by Mar-Wood Inc. and dated June 2002 have been provided for our use in the assessment. According to those drawings, the WWTP basins consist of precast reinforced concrete panels joined together to form continuous walls. The wall panels are supported on a cast-in-place concrete mat foundation system.

Concrete walkways with guardrails are located on top of the perimeter walls as well as in a few locations within the interior of the basins. The walkways appear to have a cementitious overlay. It is unknown if the overlay is original construction or was added later.

A small 3-sided timber equipment enclosure is located on the east side of the basins. Photographs 1 and 2 show overall views of the basin. Photograph 3 shows the front of the equipment enclosure.

Inspection Results

On April 15, 2019, a site visit was conducted to examine the exposed portions of the basins. At the time of our inspection, the treatment plant was in operation and only the walkways and upper portions of the walls were visible. The following summarizes the results of our inspection:

1. The concrete along the sides of the north walkway is significantly deteriorated. The exposed edges have spalled and reinforcing steel is exposed. The exposed reinforcing steel is corroded. See Photographs 4, 5 and 6.

2. Other areas of the walkway are spalling and some spalls have exposed the reinforcing steel. See Photograph 7. In other locations, the walkway edges are cracked indicating future spalling will likely occur.

3. The cementitious overlay is separating from the underlying walkway slabs in numerous locations. In other locations, the overlay is cracked and has a hollow sound when impacted by a hammer, which indicates delamination of the overlay from the top of the walkway slab. See Photograph 8.

4. As seen in Photograph 9, there is evidence of leakage in the wall along the east side of the larger basin. It is our understanding that some of these leaks have been previously repaired. Photograph 10 shows a repair of a leak that occurred in the north wall.

5. Several of the joints between adjacent walkway elements are relatively wide and filled with caulking. It appears that these joints resulted from the original construction. See Photograph 11.

6. In general, the guardrail system does not deflect when subjected to lateral load. However, a few of the guardrail post-to-walkway connections are beginning to deteriorate. See Photograph 12.

Although not related to the concrete deterioration, it was observed that the equipment in the enclosure was not anchored to the slab and is therefore susceptible to movement during a seismic event.

Discussion

Portions of the exposed concrete at the WWTP is in poor physical condition and there is evidence of leakage through the walls in some locations. The walkways, especially, the north walkway, have spalling concrete and the reinforcing is exposed in several locations.

We have concluded that the concrete walkways are deteriorating due to frequent exposure to freeze-thaw cycles. Since the basins are exposed to the environment, the walkways become saturated due to rain and snowmelt. During the night, the saturated concrete freezes. When water freezes, it expands approximately 9 percent. This expansion within the concrete eventually leads to cracking and disintegration of the concrete.

The deterioration is likely exacerbated by corrosion of the reinforcing steel, which expands as it corrodes, adding more internal expansive stresses to the concrete.

In order to help prevent damage due to freeze-thaw, concrete exposed to a freezing environment typically has a higher compressive strength and incudes air-entrainment. The Mar-Wood drawings do not include concrete specifications so the concrete properties are unknown nor do the drawings indicate whether the concrete was sealed to help prevent absorption of water. Without adequate air entrainment or the application of a sealer, the concrete is susceptible to freeze-thaw damage.

Evidence of leakage was also observed. The leakage may be related to the lack of a waterstop at the joints between the walkways and the walls. The plans are lacking specific details of these joints so the lack of waterstop cannot be confirmed.

Conclusions

The concrete walkways are deteriorating and the deterioration will get progressively worse. The north walkway is substantially deteriorated and presents a safety hazard. The walkway deterioration can be repaired to mitigate the damage but the repairs will be extensive. In general, the repair procedure would entail the following:

- removal of the deteriorated concrete until sound concrete is encountered;
- replacement of corroded reinforcing steel with new reinforcing steel coated to aid in preventing future corrosion;
- application of a cementitious repair material to restore the walkway profile;
- application of a protective surface coating.

Areas of potential leakage can be repaired by injection of foam grouts or resins formulated for repair of cracks or joints in concrete.

The guardrail post to walkway connections can be repaired by installation of new grout around the post.

It is our understanding that the plant will be in operation during the repairs. This will limit the access to the areas requiring repair and the associated repair costs will be increased. We have prepared a budgetary estimate of costs for the repairs as summarized in Table 1. It should be noted that repairs of deteriorated concrete is difficult to estimate as the volume of concrete to be repaired can increase significantly depending on the quality of the original concrete.

It is also recommended that the equipment be anchored as required by code. Movement of the equipment may lead to disruption during a seismic event.

Limitations

It should be emphasized that our conclusions are based on examination of the visible portions of the basins. While we have endeavored to provide a comprehensive assessment, it is possible that there is hidden deterioration, which, if encountered, might affect our conclusions.

We are available to discuss our findings at your convenience.

Sincerely,
LUMOS & ASSOCIATES

Terrence R. Tobey

TERRENCE R. TOBEY, P.E., S.E.
Director - Structural Engineering Division

PROFESSIONAL ENGINEER STATE OF NEVADA
TERRENCE R.
TOBEY
8·7·19
STRUCTURAL
No. 0558

Exp.
6·30·20

LUMOS & ASSOCIATES

SPRING CREEK WWTP BASIN STRUCTURAL REPAIRS

TABLE 1 - BUDGETARY OPINION OF PROBABLE COSTS

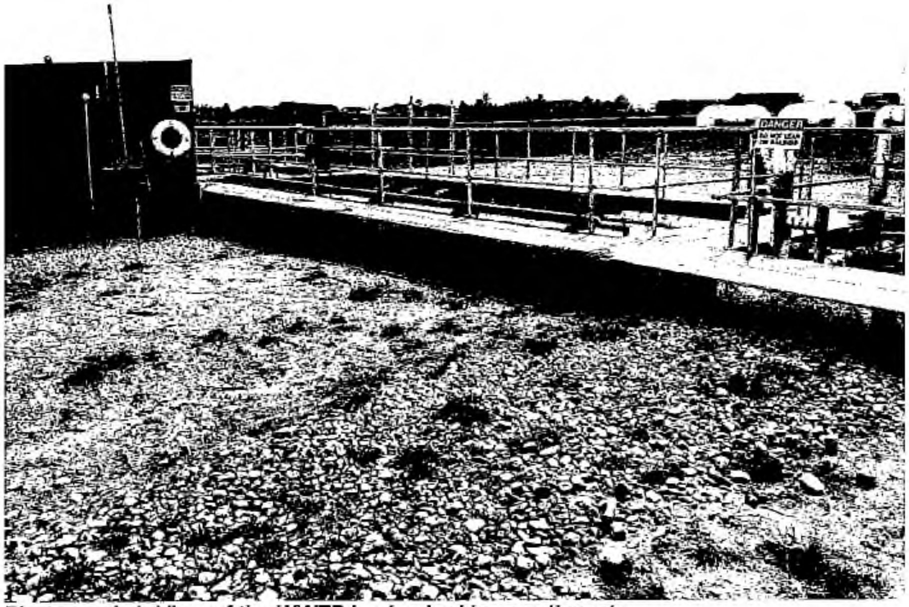
1. REPAIR OF DELAMINATIONS AND SPALLS	$18,000
2. REPLACEMENT OF CORRODED REINFORCING	$1,500
3. CRACK REPAIR BY EPOXY INJECTION	$1,500
4. DECK SURFACE COATING	$14,600
5. REPAIR OF LOOSE RAILING POSTS	$1,200
SUB-TOTAL	$36,800
20% CONTINGENCY	$7,400
TOTAL BUDGETARY COST:	**$44,200**

QUALIFICATIONS:

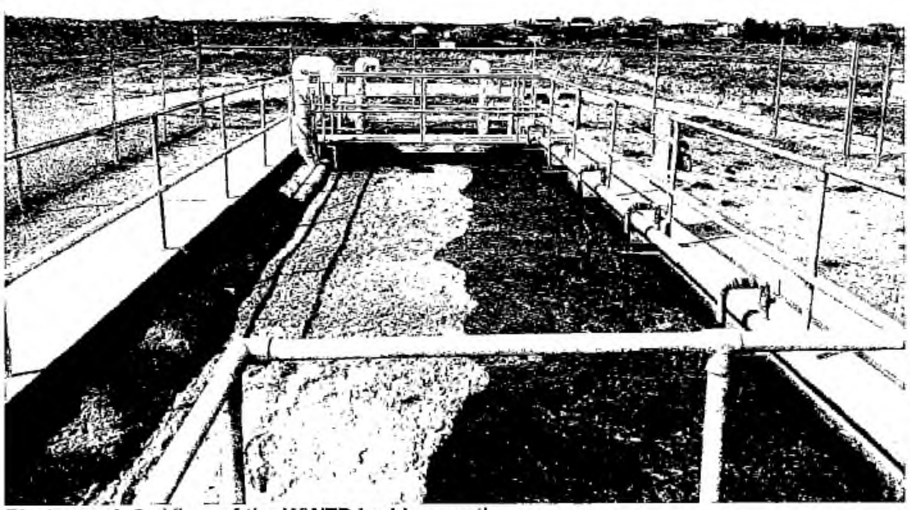
THIS BUDGETARY OPINION OF PROBABLE COSTS DOES NOT INCLUDE COSTS FOR THE FOLLOWING:

- FINAL ENGINEERING
- PERMITS
- GENERAL CONDITIONS
- GENERAL CONTRACTOR MARK-UP
- TESTING AND INSPECTION

REPORT PHOTOGRAPHS

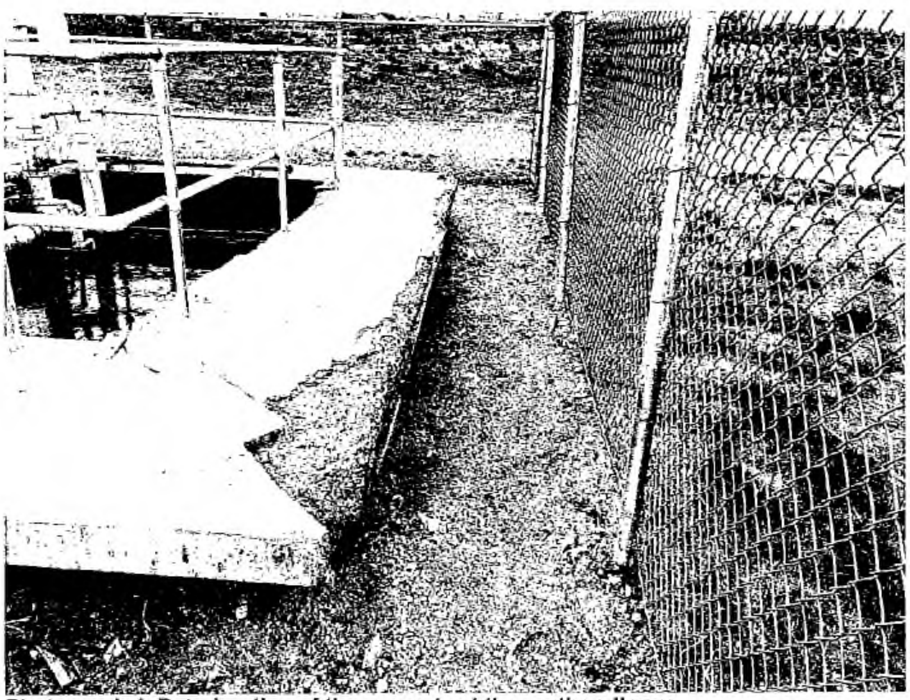


Photograph 1. View of the WWTP basins looking southwest.



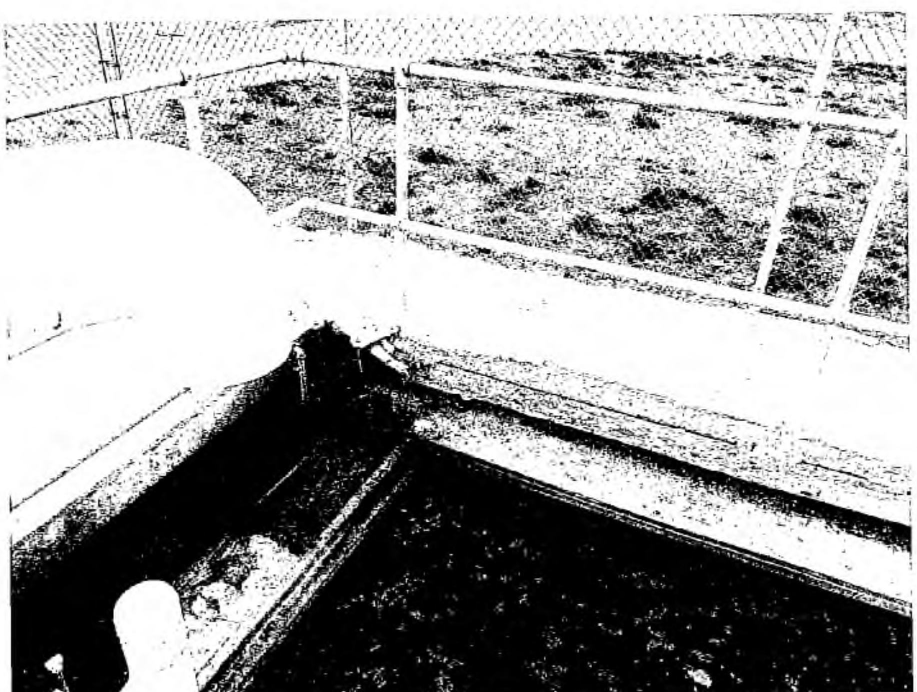
Photograph 2. View of the WWTP looking north.

Photograph 3. Front view of the equipment enclosure.



Photograph 4. Deterioration of the concrete at the north walkway.

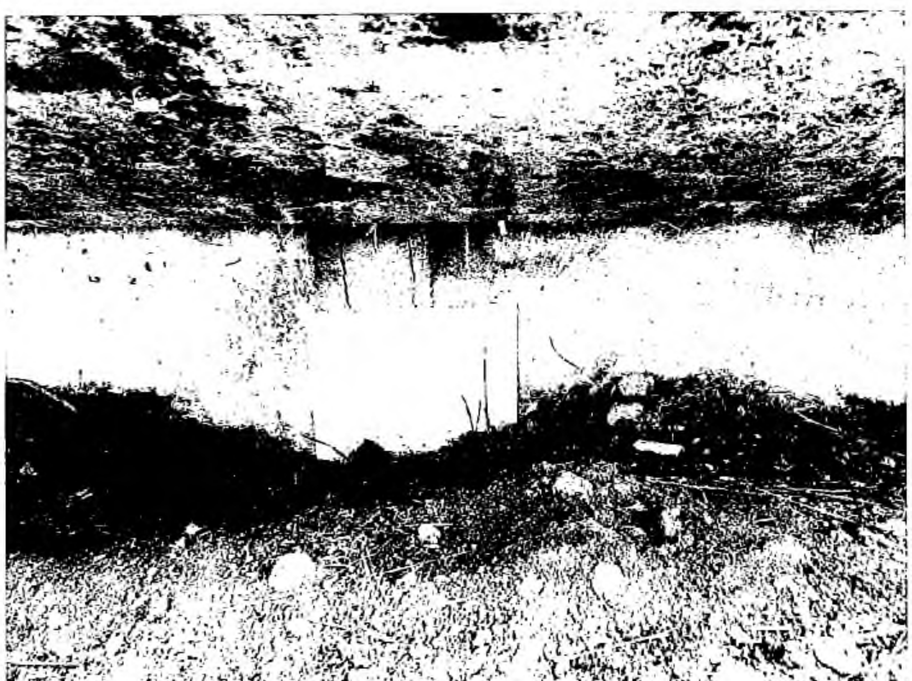

Photograph 5. Deteriorated concrete and corroded reinforcing steel at the northwest corner.


Photograph 6. Deteriorated concrete at the inside edge of the north walkwaly.

Photograph 7. Deteriorated concrete at the southwest corner.

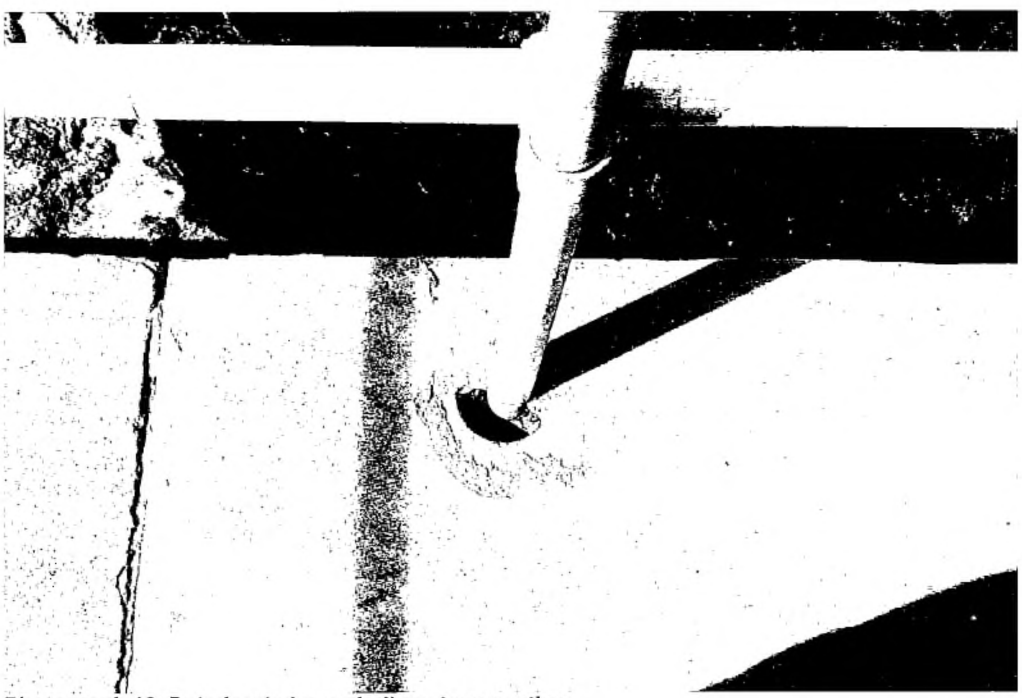
Photograph 8. Walkway overlay separating from the underlying slab.

Photograph 9. Evidence of prior leakage along the east wall.



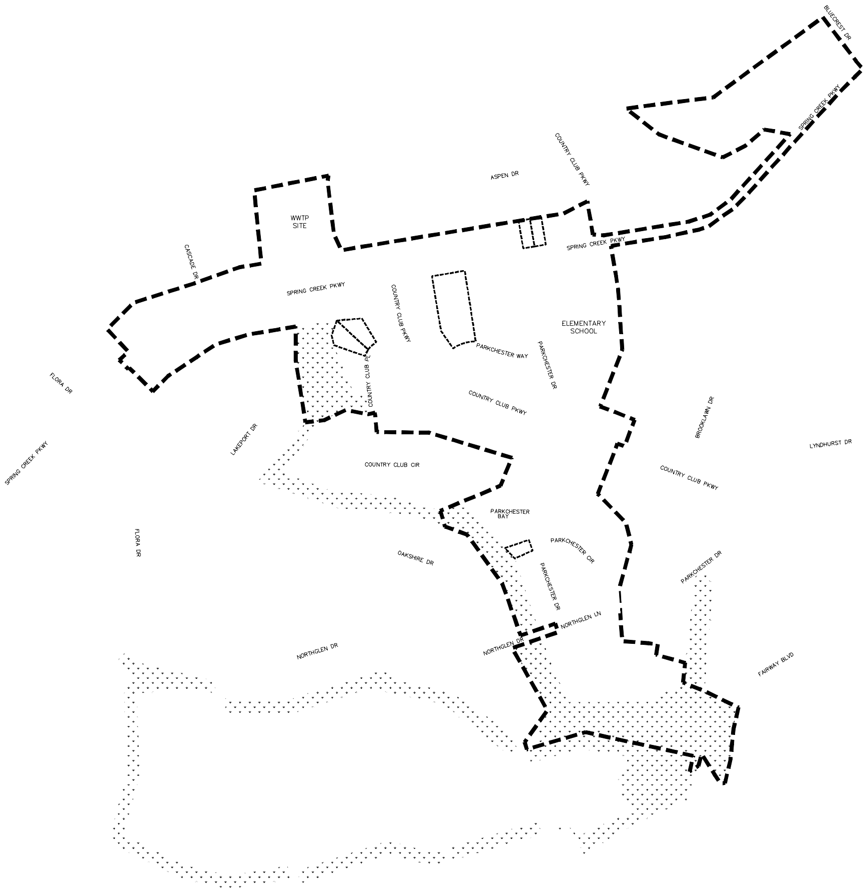
Photograph 10. Evidence of a leak repair along the north wall.

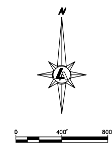
Photograph 11. Wide gaps at joints in the walkway.



Photograph 12. Deteriorated guardrail post connection.

100 Tract Service Area Map





LEGEND

100 TRACT SEWER SERVICE AREA

EXISTING LAND USE* (ACTIVE & INACTIVE CONNECTIONS)

SINGE-FAMILY RESIDENTIAL

MULTI-FAMILY RESIDENTIAL

COMMERCIAL

SCHOOL

FUTURE LAND USE* (UNDEVELOPED OR UNDER CONSTRUCTION)

SINGE-FAMILY RESIDENTIAL

MULTI-FAMILY RESIDENTIAL

COMMERCIAL

OTHER

REQUESTED SERVICE (INCLUDES LOTS PARTIALLY DEVELOPED, UNDER CONSTRUCTION, OR SOON TO START CONSTRUCTION)

*NOTE: LAND USE STATUS IS AS OF END OF 2022

LUMOS

308 N. CURRY ST., STE. 200
CARSON CITY, NV 89703
TEL: 775.883.7077

WWW.LUMOSINC.COM

GREAT BASIN WATER CO.

GBWC-SCD IRP
WWTP REPLACEMENT PROJECT
100 TRACT SEWER SERVICE AREA

NEVADA
ELKO COUNTY
SPRING CREEK

REV	DATE	DESCRIPTION	BY

CONCEPTUAL
FEBRUARY 2021

BAR IS 1 INCH ON ORIGINAL DRAWING
0 1
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

FIG 2

DRAWN BY: KT
DESIGNED BY: -
CHECKED BY: -
JOB NO.: 8595.015

Elko County Fire Protection District Fire Flow Letter

Elko County Fire Protection District

Linda Bingaman, Fire Administrator
John Pitts, Division Chief of Operations
Steven Hamilton, Division Chief of Prevention

155 South Ninth Street
Elko, NV 89801
Telephone – (775) 738-9960
Fax (775) 738-9956
Web http://www.elkocountynv.net

October 28, 2020

Art Marr
Professional Engineer
Engineering Branch, Bureau of Safe Drinking Water
Nevada Division of Environmental Protection
Department of Conservation and Natural Resources
901 S. Stewart Street, Suite 4001
Carson City, NV 89701

Ref: Spring Creek Waterline Project in Tract 200

A fire flow of 1000 gpm at a flow duration of 1 hour. Based on the maximum structure size of 3600 square feet. International Fire Code 2018 Table B105.1(1)

Steven Hamilton

Steven Hamilton
Elko County Fire Protection District
Chief of Prevention
775-739-9960

Great Basin Water Co.
Spring Creek Division

Wastewater Treatment Plant Expansion
Preliminary Engineering Report

Final
December 2018

Prepared For:

Great Basin
Water Co.

Prepared By:

LUMOS

308 N. Curry Street, Suite 200
Carson City, Nevada 89703
775 / 883-7077
www.lumosengineering.com

PROFESSIONAL ENGINEER – STATE OF NEVADA
KRISTIN N. TOKHEIM
Exp. 6/30/20
CIVIL
No. 024064

12/03/18

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APPENDICES

LIST OF TABLES

LIST OF FIGURES

[File Doc: L:\LAProj\9542.000 - Spring Creek WWTP PER\Civil\0-Reports\9542.000 Final WWTP PER_20181203.docx]
December 3, 2018

1.0 INTRODUCTION

The Great Basin Water Co. – Spring Creek Division (GBWC-SCD) owns and operates a 50,000 gallons per day (gpd) wastewater treatment plant (WWTP) in the 100 Tract of Spring Creek, Nevada. The WWTP is an extended aeration package plant with anoxic denitrification supplied by Mar-Wood in 2003. With a new elementary school planned in 2019 and several new homes being constructed and/or requesting service, additional treatment capacity will be needed. In addition, the existing Mar-Wood WWTP is aging and will likely need to be replaced within the next 5 years based on performance and service life of similar wastewater plants.

This Preliminary Engineering Report (PER) has been prepared to define the need for the project, estimate future wastewater flows, evaluate treatment expansion alternatives, and recommend alternatives for moving forward.

2.0 DESCRIPTION OF EXISTING FACILITIES

Existing wastewater collection and treatment facilities for the 100 Tract of the GBWC-SCD are described below.

2.1 Location and Service Area

The rural community of Spring Creek, Nevada, is located approximately 10 miles southeast of Elko, Nevada, on Lamoille Highway (State Route 227). The 100 Tract sewer service area of GBWC-SCD serves residential and commercial customers within an area of approximately 250 acres. Existing land uses within the 100 Tract sewer service area include multi-family residential, single-family residential, and commercial (e.g. gas station, food establishments, and small-scale retail shops). A site map, location map, and vicinity map are included in Figure 1.

2.2 Wastewater Collection System

The wastewater collection system in the 100 Tract consists of approximately 3.5 miles of gravity sewer mains and approximately 56 manholes. The collection system includes two sewer lift stations. Lift Station 1 is a submersible duplex system located near the intersection of Spring Creek Parkway and Brooklawn Drive. The WWTP Lift Station is a submersible duplex lift station located near the intersection at Spring Creek Parkway and Country Club Parkway. From the WWTP Lift Station, raw sewage is pumped to the Mar-Wood WWTP located north of Spring Creek Parkway. Based on old design files for the Mar-Wood WWTP, the operating point for each pump in the WWTP Lift Station is approximately 196 gallons per minute (gpm) which equates to a capacity of 282,000 gpd per pump. During a site visit on November 15, 2018, the flow rate with one pump in operation was noted at approximately 143 gpm.

2.3 Wastewater Treatment Plant

Wastewater treatment and disposal for the 100 Tract sewer service area includes a single-sludge type activated sludge package plant with extended aeration and anoxic denitrification (the Mar-Wood WWTP) and groundwater disposal via infiltration in leach fields. The Mar-Wood WWTP is contained in a below-grade concrete structure with shared walls between treatment zones. The treatment and disposal processes are described below.

2.3.1 *Screening and Anoxic Zone*

From the WWTP Lift Station, raw sewage is pumped via a 4-inch sewer force main to the anoxic zone of the Mar-Wood WWTP which contains a manual bar screen. The anoxic zone reduces nitrogen in the wastewater by eliminating the oxygen supply. The sewage is slowly mixed within this zone using a slow-speed mixer to keep the solids in suspension.

2.3.2 *Aeration basin*

Following the anoxic zone, the sewage flows to the aeration basin where it is aerated continuously to maintain a dissolved oxygen concentration at a minimum level of 2.0 milligrams per liter (mg/L). Aeration is provided by two blowers and diffused air assemblies. The existing blowers are located within a three-walled shed.

2.3.3 *Clarifiers*

Following the aeration basin, aerated sewage flows to a clarifier for sedimentation. The sewage separates behind a baffle and stabilized sludge settles to the bottom to be returned through the airlift pumps to the anoxic zone. A portion of the aerated sewage rises behind the baffle and must be hosed or agitated to cause it to settle. This material is partially treated, air-filled and greasy, and sometimes requires skimming. The clear liquid rising on the opposite side of the baffle is further filtered by a layer of biological sludge in the final settling compartment. The clear liquid then flows over a weir to the plant effluent pipe.

2.3.4 *Aerobic Sludge Digestion*

Excess sludge is removed from the extended aeration system and processed in an aerobic sludge digester which is integral to the package plant system. Sludge is removed from the aerobic sludge digester 3-4 times per year by a pumper truck and hauled offsite.

2.3.5 *Effluent Disposal*

From the plant effluent pipe, treated effluent flows to a 3,500 gallon dosing tank which has alternating siphon batches to two different leach fields via 4-inch gravity sewer pipelines. The original leach field was installed in 1988 with traditional perforated pipe and drain rock. The second leach field was installed in 2003 and consists of infiltrator chambers. Each leach filed has a disposal capacity of approximately 25,000 gpd.

2.4 Condition of Existing WWTP

The existing Mar-Wood plant is 15 years old and will likely need to be replaced in the 5 years based on the performance and service life of similar wastewater plants in cold weather environments. The existing concrete structures are showing deteriorating with concrete spalling and exposed aggregate/rebar and are in need of repair or replacement.

2.5 Flood Zone

The WWTP site is located in Zone X outside the 0.2% annual chance floodplain according to according to FEMA Flood Map No. 32007C5675E, FIRM Panel 5675E.

3.0 REGULATORY REQUIREMENTS

The Mar-Wood WWTP is operated under Nevada Division of Environmental Protection (NDEP) Permit No. NS2002511. The permit type is groundwater discharge with flow and quality limits as summarized in Table 1.

Table 1: Mar-Wood WWTP Permit Limits

Parameter	Permit Limit	Monitoring Frequency
Flow Rate (30-day Average)	50,000 gpd	Continuous
Effluent Biochemical Oxygen Demand (BOD_5)	30 mg/L	Monthly
Effluent Total Suspended Solids (TSS)	30 mg/L	Monthly
Effluent Total Nitrogen-N	10 mg/L	Monthly
Effluent pH	6.5 – 9.0	Monthly

The NDEP Permit No. NS2002511 states that "the Permittee shall notify the Administrator [NDEP], by letter, not later than ninety (90) days after the 30-day average daily influent flow rate first equals or exceeds 85% of the design treatment capacity for the Permittee's facility". The 85% design capacity trigger equates to a wastewater flow of 42,500 gpd. This flow trigger was exceeded in February 2017 and was reported NDEP, but was an exception due to heavy inflow and infiltration from wet weather.

4.0 EXISTING AND FUTURE LAND USES

A description of existing and future land uses within the 100 Tract sewer service area is provided in the sections to follow. Land use types and the sewer service area are shown in Figure 2.

4.1 Existing Connections

The 100 Tract sewer service area is composed of 123 existing connections which includes 110 active accounts and 13 inactive accounts. Based on existing GBWC-SCD sewer connection records and a review of Elko County parcel data, a breakdown of the existing connections by land use type and dwelling unit (DU) counts is provided below.

4.1.1 *Active Connections*

A breakdown of active connections is included in Table 2. As shown, the 110 active connection count is contained on 95 parcels and includes 31 single-family residential connections, 63 multi-family residential connections, and 16 commercial connections. For multi-family residential, the number of actual DUs represented by each connection vary. Each "connection" can actually represent anywhere from 1 DU up to 12 DUs. For the 63 active multi-family residential connections, there are a total of 166 DUs which is an average of 3.2 DUs per parcel.

Table 2: Existing Active Connections Summary

Connection Type	No. of Parcels[1]	No. of Connections	DU Count	Average DU/Parcel
Single-Family Residential	31	31	31	-
Multi-Family Residential	51.5	63	166	3.2
Commercial	12.5	16	-	-
Total	95	110	197	-

[1] Half parcels represent partially undeveloped lots.

4.1.2 *Inactive Connections*

A breakdown of the inactive connections is included in Table 3. Inactive connections may include vacant homes, vacant businesses, second/vacation homes, and unfinished lots with connections already in place. As shown, the inactive connection count of 13 is contained on 8 parcels and includes a total of 2 single-family residential connections, 7 multi-family residential connections (8 DUs), and 4 commercial connections.

Table 3: Existing Inactive Connections Summary

Connection Type	No. of Parcels	No. of Connections	DU Count
Developed Lots			
Single-Family Residential	1	1	1
Multi-Family Residential	1	2	2
Commercial	2.5	3	-
Subtotal	4.5	6	3
Unfinished Lots			
Single-Family Residential	1	1	1
Multi-Family Residential	1.5	5	6
Commercial	1	1	-
Subtotal	3.5	7	7
Total	8	13	10

4.2 Future Growth

In the 2018 GBWC-SCD Integrated Resource Plan (IRP), projected growth rates for Elko County were used for the Spring Creek area based on the *Nevada County Population Projections 2017 to 2036* dated October 1, 2017 prepared by the Nevada State Demographer's Office. The annual growth rates for the 20-year planning period in the IRP ranged from 0.28%-0.93% which would equate to one new sewer connection every 1-2 years on average in the 100 Tract sewer service area. These growth rates are helpful for evaluating long-term growth in the area, however, the GBWC-SCD has received several new service requests since preparation of the IRP that exceed the Nevada State Demographer's near-term growth rates. Ultimately the timing of the WWTP expansion should consider near-term flow projections with ultimate sizing based on buildout of the 100 Tract sewer service area. Near-term and buildout growth are described further in the sections to follow.

4.2.1 *Near-Term*

There are several new connections planned for the 100 Tract sewer service area including a new elementary school, a new market, and numerous homes as described further below.

- School: The new elementary school located on Parkchester Drive is under construction with a projected completion date of the Fall of 2019. The new elementary school will have approximately 550 students and staff and will be similar in design and size to the West Wendover Elementary School in Elko County. Infiltration chambers are included in the site design which will help reduce inflow and infiltration during wet weather events.
- Commercial: A new market is planned on a 4.1 acre parcel located between Spring Creek Parkway and Parkchester Way. The estimated completion for the market is 2020.

- Residential: There have been multiple service requests for new single-family and multi-family homes within the 100 Tract sewer service area. Some of the homes are already under construction with projected completion dates in 2018 and other homes are expected to be complete in 2019 through 2021. A total of 6 new single family DUs and 46 new multi-family DUs are planned.

A summary of near-term growth anticipated for completion in 2018-2021 is provided in Table 4.

Table 4: Near-Term Growth Summary

Connection Type	No. of Parcels	Estimated No. of Connections[1]	DU Count	Student/ Staff Count
Requested Services (2018-2021)				
Single-Family Residential	6	6	6	-
Multi-Family Residential	6	6	46	-
Commercial	1	1	-	-
School	1	1	-	550
Total	14	14	52	550

[1] The actual number of new connections is unknown because the number of multi-family DUs per connection varies.

4.2.2 *Buildout*

There are a total of 197 parcels in the 100 Tract sewer service area, some of which were not included in the original service area for the Mar-Wood WWTP. For undeveloped parcels the assumed connection type was based on Elko County land use zoning. Future counts for undeveloped parcels are as follows:

- Single-Family Residential: Total of 47 potential DUs (includes one 10.2 acre parcel zoned single-family residential which could be developed into approximately 20 single-family homes depending on development density).
- Multi-Family Residential: Total of 52 potential DUs based on 16 undeveloped parcels zoned multi-family residential and an average of 3.2 DUs per parcel based on existing active connections.
- Commercial: Total of 17 potential connections based on 17 undeveloped parcels zoned commercial and assuming one connection per parcel.

A summary of buildout counts by land use type is provided in Table 5 including all existing active connections, existing inactive connections, near-term growth (requested services), and all undeveloped parcels.

Table 5: Buildout Connections Summary

Connection Type	No. of Parcels	Estimated No. of Connections[1]	Estimated DU Count[1]	Student/ Staff Count
Single-Family Residential	86	86	86	-
Multi-Family Residential	76	96	272	-
Commercial	34	37	-	-
School	1	1	-	550
Total	197	220	358	550

[1] The actual number of connection and DU counts at buildout is unknown because the number of multi-family DUs per connection and per lot varies and is estimated for future lots based on existing lots.

5.0 WASTEWATER FLOWS AND CHARACTERIZATION

An analysis of existing wastewater flows, development of wastewater generation factors, future flow projections, and influent wastewater characterization is provided in the sections to follow.

5.1 Existing Flows

Wastewater flows from 2007-2018 for the existing Mar-Wood WWTP are summarized in Table 6. Wastewater flows from the most recent 5-year period from 2014-2018 will be used for future flow projections to reflect current trends in sewer generation.

Table 6: Historical Wastewater Flow Data, 2007-2018

Year	No. of Active Connections	Average Daily Flow, ADF		Average Flow Maximum Month, AFMM		AFMM/ ADF Factor
		(gpd)	(gpdpc)	(gpd)	(gpdpc)	
2007	-	27,958	-	36,300	-	-
2008	-	31,150	-	34,800	-	-
2009	-	29,600	-	32,300	-	-
2010	79	26,933	341	29,800	377	1.11
2011	81	29,442	363	33,600	415	1.14
2012	90	29,142	324	33,900	377	1.16
2013	96	30,867	322	35,800	373	1.16
2014	106	33,708	318	38,500	363	1.14
2015	106	30,283	286	39,400	372	1.30
2016	107	33,614	314	37,029	346	1.10
2017	110	32,146	292	45,775	416	1.42
2018[1]	110	31,911	290	34,788	316	1.09
2014-2018 Avg	-	32,300	300	39,100	363	1.20
2014-2018 Max	-	33,708	318	45,775	416	1.42

[1] Flow data for 2018 is a partial year from January thru August.

As shown in Table 6, the average daily flow (ADF) from 2014-2018 was 32,300 gpd (5-year average). The average flow during the maximum month (AFMM) for the same period averaged 39,100 gpd with a maximum month of 45,775 gpd in February 2017. The ADF on a connection basis averaged 300 gpd/connection. The maximum daily flow on record was 156,000 gpd in

February 2017 due to extreme wet weather/flooding. The next highest daily flow was 53,500 gpd in January 2016.

Based on the historical flows presented in Table 6, the AFMM/ADF peaking factor averaged 1.20 with a high of 1.42. For future flow projections it is recommended that the next highest peaking factor of 1.30 is used because the high peaking factor of 1.42 was an unusual occurrence from extreme wet weather conditions. Design of a WWTP expansion, however, should incorporate surge allowance for similar wet weather events that could occur in the future.

5.2 Wastewater Generation Factors

The gpd/connection data is useful for estimating flow projections for planning purposes as used in the recent 2018 GBWC-SCD IRP. However, for sizing the WWTP expansion, more detailed sewer flow calculations are recommended based on existing and future land uses within the sewer service area. This is especially helpful in estimating the near-term flow projections based on the actual type of development being planned and requesting service (single-family homes versus multi-family apartments and duplexes versus commercial). As discussed in Section 4.1, although there are 110 active connections in the 100 Tract sewer service area, the number of multi-family residential DUs represented by each connection vary.

Although sewer flows are not metered for each connection in the 100 Tract, wastewater generation factors by land use type can be estimated based on sewer records for other service areas, water meter records, engineering references, and industry standards. Development of wastewater generation factors for each land use type are described in the subsections to follow.

5.2.1 *Residential Wastewater Generation*

Nevada Administrative Code (NAC) Section 445A.284(2) states, "As a minimum, sewerage system designs must be based on 100 gallons per person per day and 3.5 persons per lot or dwelling unit and peak flows, unless the design engineer can demonstrate validity of other design criteria…". Using this NAC standard with 197 existing and active residential DUs (see Table 2) would result in a total ADF of 68,950 gpd which is 213% higher than the actual ADF of 32,300 gpd observed at the Mar-Wood WWTP and does not even account for commercial wastewater flows. As such, other design criteria will be used to determine more representative residential flow factors of the 100 Tract sewer service area as outlined below.

The engineering reference *Wastewater Engineering: Treatment and Resource Recovery* provides recommended wastewater generation factors for residential land uses as follows:

- Multi-family residential: 32-45 gpd/person [1]
- Single-family residential: 63-68 gpd/person [1]

The average household density in the Spring Creek area is 2.94 persons per home based on the 2010 U.S. Census Bureau for the Spring Creek Census Designated Place (CDP). Based on the 2010 Census data and the household size referenced in NAC 445A.284(2), it is reasonable to assume an average density of 3.5 persons per household for single-family residential and 2.5 persons per household for multi-family residential.

Combining household densities and the conservative end of the range for flow factors, the estimated sewer flows for residential are as follows:

- Multi-family residential: 113 gpd/DU (assuming 45 gpd/person)
- Single-family residential: 245 gpd/DU (assuming 70 gpd/person)

5.2.2 *Commercial Wastewater Generation*

There are a total of 16 active commercial connections in the 100 Tract sewer service area. Sewer flows can vary greatly for different types of commercial land uses. To determine an average wastewater generation factor for commercial land use, sewer flows for the GBWC-SCD Septic #2 service area in the 200 Tract were reviewed from 2012-2016 because the connections are predominately commercial. During that time period, there were 5 active connections in the Septic #2 service area including a gym, bar/hotel, carwash, restaurant, and one single-family home. The average wastewater flow from 2012-2016 was 420 gpd/connection (see Septic #2 flows in Appendix A). Although the service area includes a residential connection, it is assumed that lower flows generated by the home balance out with higher flows from the carwash and that the 420 gpd/connection provides a good representation of average flows for a commercial connection in the Spring Creek area.

5.2.3 *Elementary School Wastewater Generation*

Wastewater generation from schools can be difficult to determine and can vary greatly by school size, school amenities, fixture types, schedules, events, etc. Wastewater generation rates can be developed from numerous sources including guidelines from codes adopted by the State regulatory agency (NDEP), engineering references/manuals, and water meter records for similar sized schools in the area. Wastewater generation factors based on each of these sources are discussed below.

- The 2012 Uniform Plumbing Code (UPC) is adopted by reference in NAC 445A.6663. Appendix H of the UPC includes estimated wastewater flow rates for elementary schools at 20 gpd/staff and 15 gpd/student.
- The engineering reference *Wastewater Engineering: Treatment and Resource Recovery* includes typical wastewater flow rates for elementary schools with cafeterias only (no gym or showers) at a range of 8-15 gpd/student [1].
- Indoor water meter records were reviewed for several schools in the Northern Nevada area including Spring Creek Elementary School (Spring Creek, NV), West Wendover Elementary (West Wendover, NV), Riverview Elementary School (Dayton, NV), and Mark Twain Elementary School (Carson City, NV). Monthly indoor water meter records for each school are included in Appendix B. Average water use ranged from 1.2-3.6 gpd/person, however this includes months when school is not in service. Maximum water usage months for the periods reviewed ranged from 2.5-6.3 gpd/person which is more representative of months when school is in service. If wastewater flows are assumed at 80% of water usage (typically ranges from 60-80% [2]), then the estimated sewer flows would be 2.0-5.0 gpd/person.
- A meeting with NDEP was held on October 3, 2018 to discuss planning and design of the WWTP expansion with attendees from GBWC, Lumos & Associates, and the Public Utilities Commission of Nevada (PUCN). During the meeting, wastewater generation rates for elementary schools were discussed and NDEP mentioned that a factor of 10 gpd/person would be a conservative wastewater generation factor to use for the new elementary school unless information from existing schools in the area validated a lower factor.

Based on the above sources there is a wide range of factors that could be used for flow projections from the new elementary school from as low as 2.0 gpd/person to as high as 15 gpd/student and

20 gpd/staff. For an estimated 500 students and 50 staff, this would translate into an ADF ranging from as low as 1,100 gpd to as high as 8,500 gpd.

Based on water usage data from other elementary schools in the area, a wastewater generation factor of 5.0 gpd/person is recommended for use in projecting future sewer flows. This factor provides a realistic flow estimate based on actual records from other schools which helps avoid the overestimation of flows while still being conservative by using the higher end of the range of historical data. A wastewater generation factor of 5.0 gpd/person translates into an ADF of 2,750 gpd for the new elementary school.

5.2.4 *Summary of Wastewater Generation Factors*

A summary of recommended wastewater generation factors by connection type is provided in Table 7. These factors are recommended for projecting future wastewater flows for near-term and long-term growth in the 100 Tract sewer service area.

Table 7: Recommended Wastewater Generation Factors

	Wastewater Generation Factor		
Connection Type	(gpd/ DU)	(gpd/ connection)	(gpd/student or staff)
Single-Family Residential	245	-	-
Multi-Family Residential	113	-	-
Commercial	-	420	-
School	-	-	5

To check the validity of the recommended wastewater generation factors, the factors were multiplied against the corresponding active connection and DU counts from Table 3 to see if the resulting flows are similar to actual flows observed over the past five years. A summary of the validity check is provided in Table 8 and shows that the recommended factors result in an estimated ADF of 33,080 gpd which is within 2.4% of the actual 2014-2018 ADF of 32,300 gpd.

Table 8: Validity Check of Wastewater Generation Factors

Connection Type	No. of Active Connections	Active DU Count	Estimated ADF[1] (gpd)
Single-Family Residential	31	31	7,600
Multi-Family Residential	63	166	18,760
Commercial	16	-	6,720
Total	110	197	33,080
			vs
	Actual 2014-2018 ADF		32,300
		% Difference	2.4%

[1] Using recommended wastewater generation factors from Table 7.

5.3 Future Flows

Sizing of the WWTP expansion should consider ultimate buildout wastewater flows anticipated for the 100 Tract sewer service area. Near-term and buildout flow projections are summarized in the sections to follow.

5.3.1 *Near-Term Flow Projections*

Flow projections for near-term growth anticipated in the next 3-years are summarized in Table 9. The projections include the 13 existing inactive accounts that are already connected to the sewer collection system and could become active at any time. Detailed flow calculations for each year (2019, 2020, and 2021) are included in Appendix C based on anticipated completion dates for the requested services.

Table 9: Near Term (3-Year) Wastewater Flow Projections

Connection Type	No. of Parcels	Estimated No. of Connections	DU Count	Student/ Staff Count	ADF[1] (gpd)	AFMM[1] (PF=1.30) (gpd)
Existing Connections (Active)						
Single-Family Residential	31	31	31	n/a	7,600	9,880
Multi-Family Residential	51.5	63	166	n/a	18,760	24,390
Commercial	12.5	16	-	n/a	6,720	8,740
Subtotal	95	110	197		33,080	43,010
Existing Connections (Inactive)						
Single-Family Residential	2	2	2	n/a	490	640
Multi-Family Residential	2.5	7	8	n/a	910	1,180
Commercial	3.5	4	-	n/a	1,680	2,180
Subtotal	8	13	10		3,080	4,000
Requested Services (2018-2021)						
Single-Family Residential	6	6	6	-	1,470	1,910
Multi-Family Residential	6	6	46	-	5,200	6,760
Commercial	1	1	-	-	420	550
School	1	1	-	550	2,750	2,750[2]
Subtotal	14	14	52	550	9,840	11,970
Total	117	137	259	550	46,000	58,980

[1] Using recommended wastewater generation factors from Table 7 and a peaking factor of 1.30.

[2] Monthly peaking factor not applied for elementary school because infiltration chambers are planned at the site to offset impact of wet weather conditions.

5.3.2 *Buildout Flow Projections*

Flow projections for buildout of the 100 Tract sewer service area are summarized in Table 10.

Table 10: Buildout Wastewater Flow Projection

Connection Type	No. of Parcels	Estimated No. of Connections	Estimated DU Count	Student/ Staff Count	ADF[1] (gpd)	AFMM[1] (PF=1.30) (gpd)
Single-Family Residential	86	86	86	-	21,070	27,390
Multi-Family Residential	76	96	272	-	30,740	39,960
Commercial	34	37	-	-	15,540	20,200
School	1	1	-	550	2,750	2,750[2]
Total	197	220	358	550	70,100	90,300

[1] Using recommended wastewater generation factors from Table 4 and a peaking factor of 1.30.

[2] Monthly peaking factor not applied for elementary school because infiltration chambers will be installed at the site to offset impact of wet weather conditions.

5.4 Summary of Flows

A summary of existing, 3-year, and buildout flow projections are summarized in Table 11.

Table 11: Summary of Existing and Projected Flows

Timeline	ADF (gpd)	AFMM (gpd)
Existing Flows	32,300	39,100
3-Year Flow Projection	46,000	59,000
Buildout Flow Projections	70,100	90,300

5.5 Wastewater Characterization

The current Permit No. NS2002511 for the Mar-Wood WWTP does not require influent water quality sampling, however, monthly influent sampling results were available from 2003-2006 and are summarized in Table 12. The average BOD_5 and TSS during that time period were 250 mg/L and 200 mg/L, respectively, which is typical for a medium strength domestic wastewater [1].

Table 12: Influent Wastewater Characterization, 2003-2006

Parameter	2003	2004	2005	2006	2003-2006 Avg
Min BOD_5 (mg/L)	130	150	130	110	-
Max BOD_5 (mg/L)	240	750	380	640	-
Avg BOD_5 (mg/L)	183	310	202	296	250
Min TSS (mg/L)	31	26	86	58	-
Max TSS (mg/L)	194	1,020	230	1,100	-
Avg TSS (mg/L)	97	294	140	282	200

6.0 DESIGN CRITERIA

Based on the projected wastewater flows, historical influent data, permit limits, and typical design parameters for activated sludge plants, the following design criteria is recommended for a WWTP expansion/replacement.

- Buildout ADF = 75,000 gpd
- Buildout AFMM = 95,000 gpd
- Influent Wastewater Quality
  - Average Influent BOD_5 = 250 mg/L
  - Average Influent TSS = 200 mg/L
  - Minimum Temperature = 8-10º Celsius (assumed)
- Performance Requirements
  - Effluent BOD_5 = 30 mg/L
  - Effluent TSS = 30 mg/L
  - Effluent Nitrogen-N = 10 mg/L
  - Effluent pH = 6.5-9.0
- Treatment Process Design Parameters
  - Aeration Basin (Extended Aeration Activated Sludge Process [1])
    - Hydraulic Retention Time = 20-30 hours
    - Solids Retention Time = 20-40 days
    - Organic Loading = 5-15 pounds (lbs) BOD_5/1,000 cubic feet (cf)/day
    - Mixed Liquor Suspended Solids = 2,000-4,000 mg/L
    - Food to Microorganisms Ratio (F/M) = 0.04-0.10 lbs BOD_5/lbs Mixed Liquor Volatile Suspended Solids (MLVSS)
  - Clarifiers (Following Extended Aeration Process [1])
    - Surface Overflow Rate = 200-400 gpd/square foot (sf)
    - Solids Loading Rate = 4.8-24.0 lbs/sf/day
  - Aerobic Digester [1]
    - Reduction of Volatile Suspended Solids (VSS) = 38-50%
    - Diffused Air Mixing = 20-40 lbs/1,000 cf/min
- Treatment System Equipment and Structure
  - Redundancy: Process equipment (blowers and pumps) will be sized to achieve permit limits with one unit out of service (minimum of 1 duty + 1 standby)
  - Freeboard: Minimum of 2-feet within treatment structures

7.0 WWTP EXPANSION ALTERNATIVES

Alternatives for expanding and replacing the WWTP for the 100 Tract sewer service area are discussed below and include the following:

- Alternative 1 – Relocate Churchill County Package WWTP
- Alternative 2 – New Aero-Mod SEQUOX Extended Aeration Package WWTP
- Alternative 3 – New Purestream BESST Single-Sludge Package WWTP
- Alternative 4 – New Fluidyne ISAM Sequencing Batch Reactor Package WWTP
- Other Alternatives Considered

7.1 Alternative 1 – Relocate Churchill County Package WWTP

In 2006 Churchill County installed a package WWTP at the Fallon Golf Course to provide wastewater treatment for new development in the area. After only two years of operation, the Churchill County WWTP was removed from service and the sewer service area was shifted to the

Moody Lane WWTP which is a membrane bioreactor (MBR) treatment system that is still in operation today. The Churchill County WWTP has remained inactive since 2010 and the NDEP discharge permit was recently terminated (Permit No. NS2006511). During the recent October 3rd meeting with NDEP, the Churchill County package WWTP was mentioned as a potential alternative for replacement of the existing Mar-Wood WWTP in Spring Creek. Following the meeting, GBWC-SCD requested that Lumos & Associates conduct an investigation of the Churchill County package WWTP for possible relocation to Spring Creek.

A site visit was conducted on October 17, 2018 to observe the condition of the existing facilities at the Churchill County WWTP and to discuss the past operations with Churchill County. The package WWTP is an Ashbrook Simon-Hartley extended aeration activated sludge plant designed for a capacity of 160,000 gpd. The following observations and anecdotal information were gathered from the site visit:

- The treatment process includes headworks screening, flow equalization, preliminary and post-anoxic denitrification, extended aeration, secondary clarification, and aerobic sludge digestion. Aeration is supplied with three blowers and diffusers within the basins.
- The plant is contained within rectangular steel basins and a circular steel clarifier and is partially buried on concrete foundations. The existing coating on the steel tanks has deteriorated from age and is in need of replacement.
- The basins can be unbolted for transport to another site as five separate components.
- Wastewater flows in 2006-2008 were approximately 40,000-50,000 gpd and monthly permit limits were met for the duration of the two years that the plant was in operation (30 mg/L BOD_5, 30 mg/L TSS, 10 mg/L Total Nitrogen-N, 6.0-9.0 pH).
- The plant was operated with water three years ago and all pumps and blowers were still in working condition.
- All equipment at the Churchill County WWTP is available for purchase including the generator.

A representative from Ashbrook Simon-Hartley (now part of Alfa Laval) was contacted that was involved in the design and construction of the Churchill County WWTP back in 2006. The representative commented that equipment that has not been regularly operated over the past 10 years may require replacement or rebuild. If the blowers have not been operated they may have seized and would need to be reconditioned. For pumps and valves not regularly exercised the bearings can go bad and would need to be replaced. In addition, the Ashbrook Simon-Hartley representative does not recommend operating the WWTP at much less than 50% of the design capacity, in this case 80,000 gpd, because it could have a negative impact on the biological processes needed for treatment.

The original construction of the Churchill County WWTP was funded by Churchill County and a grant from the United States Department of Agriculture (USDA). Per follow up conversations with USDA after the site visit, the purchase price of the package WWTP would ultimately need to be determined by a third-party as the current fair market value accounting for depreciation and salvage value. Churchill County would then need to pay back a percentage of the purchase price to USDA, but that specific percentage would be determined between the County and USDA based on the original grant agreement and should not affect the purchase price to GBWC-SCD. Appendix D contains more information on the Churchill County WWTP including recent site visit photos, the NDEP reconnaissance inspection letter and photos, a NDEP Fact Sheet, and relevant record drawings from construction of the WWTP. The estimated purchase price, structure footprint, and components that could be relocated are provided below:

- Purchase Price: Fair market value is estimated at $350,000 for the reusable package plant components based on an initial estimated value of $950,000 from Churchill County (likely included delivery costs) and assuming varying useful life expectancies (e.g. steel tanks = 40 years, mechanical and electrical equipment = 10-20 years).
- Overall structure footprint: 216'-11" length x 12'-0" basin width (clarifier diameter is 24'-0") x 11'-0" depth
- Package WWTP components to be relocated:
    - Steel tanks (equalization basin, pre/post anoxic and aerobic chambers, digester chamber, clarifier)
    - Internal piping and diffuser assemblies
    - Blowers, pumps, mixers, and clarifier mechanism
    - Electrical power/control panels and instrumentation
- Package WWTP components not recommended or needed for reuse:
    - Mechanical spiral screen and control panel (little to no useful life remaining), methanol feed system, belt filter press assembly, disinfection equipment

Advantages and disadvantages for relocating the existing Churchill County package WWTP to the GBWC-SCD 100 Tract are summarized below:

Advantages
- Excess capacity in basins could provide flow equalization for peak wet weather conditions
- Potential cost savings on tanks, equipment, and accessories by purchasing used items from Churchill County

Disadvantages
- Larger footprint than for a new package plant (1.5 times or more space required)
- Equipment warranty not available from manufacturer
- Start-up and testing assistance from the original manufacturer may not be available or will be an added cost
- Mechanical equipment is 12 years old and will likely need to be rebuilt or replaced (e.g. blowers and airlift pumps)
- Oversized plant may affect biological treatment performance during low flows and could cause odors from long hydraulic retention times
- Steel tanks coatings have deteriorated and need to be replaced for entire structure which would be very costly
- Steel tanks will need to be fully or partially above grade which effects site hydraulics and overall aesthetics
- Potential redesign of components that may be difficult to relocate (sludge pumping station, circular clarifier, etc.)
- Uncertainties during construction in removing and relocating an existing plant
- Single treatment train creates less reliability and ease of access for operation and maintenance (O&M)

7.2 Alternative 2 – New Aero-Mod SEQUOX Extended Aeration Package WWTP

The Aero-Mod SEQUOX Biological Nutrient Removal system is an activated sludge package plant with extended/sequenced aeration. The plant design includes parallel treatment trains contained within a single concrete structure with shared internal walls and includes a selector tank, two (2) first-stage aeration tanks for nitrification, two (2) second-stage aeration tanks for denitrification, two (2) clarifiers, and two (2) aerobic digesters. A summary of each stage of the treatment process is described further below:

- <u>Selector Tank</u>: Wastewater enters the selector tank through an influent pipe, mixes with return activated sludge (RAS) from the bottom of the clarifiers, and then flows by gravity to the first-stage tanks.
- <u>First-Stage Aeration Tanks</u>: Continuous aeration is provided in the first-stage tanks with fully aerobic conditions for BOD removal and nitrification. Wastewater then flows by gravity to the second-stage tanks.
- <u>Second-Stage Aeration Tanks</u>: Aeration is sequenced on and off in the second-stage tanks to create cycles of aerated zones and anoxic zones for denitrification. Wastewater then flows by gravity to the clarifiers.
- <u>Clarifiers</u>: Sedimentation is accomplished in the clarifiers and solids from the clarifier are either returned to the selector tank as RAS or wasted to the digesters as waste activated sludge (WAS) with airlift pumps. Treated effluent discharges through an outlet pipe.
- <u>Aerobic Digesters</u>: Solids are automatically or manually wasted to the digesters. Supernatant from the digesters is returned to the first-stage aeration tanks by an overflow weir.

Aeration is supplied and controlled using blowers equipped with variable frequency drives (VFDs) with high and low set points for dissolved oxygen levels to adjust blower output. For the second-stage aeration tanks, the aeration is alternated between each tank using pneumatically-controlled isolation valves.

A proposal for a 75,000 gpd Aero-Mod SEQUOX package plant is included in Appendix E and includes design criteria, calculations, a general plant layout, and list of references and other installations. A summary of the proposal is provided below:

- Budgetary Equipment Quote: $463,000 (all package plant components and delivery)
- Overall structure footprint (concrete by others): 53’-0” length x 35’-3” width x 12’-0” depth
- Manufacturers Scope of Supply:
    - Aeration Supply: Two (2) positive displacement blowers, 30 HP each, and (2) two VFDs
    - Pneumatic Valve Air Supply: Two (2) air compressors, 2 HP each, and one (1) desiccant dryer
    - Aeration Tank Equipment: Wall-mounted aeration assemblies, manual and pneumatic isolation valves
    - Clarifier and RAS Equipment: Two (2) clarifier assemblies
    - Digester and WAS Equipment: Two (2) airlift pumps, (2) air flow sensors, and wall-mounted aeration assemblies
    - Controls: Panel with programmable logic controller (PLC), dissolved oxygen sensors, and blower timers
    - Ancillary Equipment: Walkway grates, handrails, stop plates/frames, supporting hardware, pneumatic tubing, etc.

Advantages and disadvantages of a new Aero-Mod SEQUOX activated sludge package plant with extended aeration are summarized below:

Advantages
- Compact footprint
- Simple operation, controls, and maintenance
- No moving parts below water surface
- Easy access to diffuser assemblies without turning off blowers or draining tanks
- Capable of handling variable influent flows and loading (up to 4:1 sustained peak flows)
- Energy efficient with the use of dissolved oxygen sensors, timers, and VFDs
- Equipment warranty, start-up, and training assistance provided by manufacturer
- Parallel treatment train results in more reliability and operational flexibility

Disadvantages
- Some differences in treatment process as compared to existing Mar-Wood WWTP
- AeroMOD SEQUOX system is proprietary

7.3 Alternative 3 – New Purestream BESST Single Sludge Package WWTP

The Purestream BESST system is a single-sludge type activated sludge package plant with pre-anoxic denitrification (BESST = Biologically Enhanced Single Sludge Treatment). The plant includes parallel treatment trains contained within a single concrete structure with shared internal walls and includes one (1) surge tank, two (2) anoxic tanks, four (4) aeration tanks, and (4) clarifiers, and one (1) aerated sludge storage tank. A summary of each stage of the treatment process is described further below:

- Surge Tank: Wastewater enters an aerated surge tank through an influent pipe and manual bar screen and is then pumped via duplex surge pumps to a flow control chamber and anoxic zones.
- Anoxic Zones: Wastewater enter the anoxic zones with submersible mixers and is combined with nitrified RAS from the sludge blanket clarifier. Wastewater then plug flows to the aerations tanks.
- Aeration Tanks: Continuous aeration is provided in the aeration tanks with fine bubble diffusers for BOD removal and nitrification. After aeration, wastewater enters the bottom of the separation compartment of the clarifiers.
- Clarifiers: In the clarifiers, solids and treated effluent are separated by a velocity gradient sludge blanket clarifier which acts as a fluidized bed filter which removes particles from the treated effluent. Sludge settling to the bottom of clarifiers is returned to the anoxic zone or aerated sludge holding tank with airlift pumps. Treated effluent exits the clarifiers over effluent weirs with scum baffles and skimmers.
- Aerated Sludge Holding Tank: Sludge is sent to the aerated sludge holding tank by airlift pumps from the clarifiers. Supernatant from the holding tank is returned to the influent surge tank.

A proposal for a 75,000 gpd Purestream BESST package plant is included in Appendix F including plan and section schematics. A summary of the proposal is provided below:

- Budgetary Equipment Quote: $567,000 (all package plant components and delivery)
- Overall structure footprint (concrete by others): 53’-9” length x 37’-6” width x 12’-0” depth
- Manufacturers Scope of Supply:
    - Surge Tank Equipment: One (1) positive displacement blower, 5 HP, two (2) surge pumps, 0.75 HP each

- o Anoxic Zone Equipment: Four (4) submersible mixers, 1.9 HP each
- o Aeration Tank Equipment: Four (4) positive displacement blowers, 5 HP each, air headers, diffuser drop pipes, fine bubble diffusers, and isolation valves
- o Clarifier Equipment: Four (4) clarifier assemblies
- o Aerated Sludge Tank Equipment: One (1) positive displacement blower, 5 HP
- o Spare Equipment: One (1) positive displacement blower, 5 HP, back up to surge tank or aerated sludge tank blower
- o Controls panel and timers
- o Ancillary Equipment: Bar screen, grates, handrails, supporting hardware, etc.

Advantages and disadvantages of a new Purestream BESST single sludge type activated sludge package plant are summarized below:

Advantages

- Compact footprint
- Surge equalization is built into the treatment process
- Process familiarity for operators (more comparable to treatment process at existing Mar-Wood plant)
- Simple operation, controls, and maintenance
- More operational flexibility and staging with four aeration basins and clarifiers
- Equipment warranty, start-up, and training assistance provided by manufacturer
- Parallel treatment train results in more reliability and operational flexibility

Disadvantages

- Higher capital cost than other new package plants evaluated
- Purestream BESST system is proprietary
- Moving parts below the water surface (anoxic mixers, surge pumps)

7.4 Alternative 4 – New Fluidyne ISAM Sequencing Batch Reactor Package WWTP

The Fluidyne ISAM system is a sequencing batch reactor (SBR) which is a type of activated sludge treatment with wastewater treated in batches in a reactor. The plant includes parallel treatment trains contained within a single concrete structure with shared internal walls. The ISAM system includes two (2) covered anaerobic chambers (ISAM tanks), two (2) SAM surge reactor tanks, two (2) SBR tanks, and one (1) effluent equalization basin. The ISAM system is a non-conventional type of SBR because a percentage of influent solids are removed in the initial anaerobic chambers which reduces the SBR tank sizes and eliminates the need for additional aerobic digestion. A summary of each stage of the treatment process is described further below:

- Anaerobic Chambers (ISAM Tanks): Wastewater enters the anaerobic chambers and influent solids settle. Wastewater then flows to the SAM reactor tanks via an underflow baffle.
- SAM Surge Reactor Tanks: Wastewater enters the SAM reactor tanks where flow equalization and denitrification occurs as wastewater reacts with mixed liquor from the SBR tanks. When the wastewater level in the SAM reactor tank reaches a preset level, a batch of flow is fed to a SBR tank with a submersible jet motive liquid/fill pump and a portion of the flow is returned to the anaerobic chamber.
- SBR Tanks: Four phases occur in the SBR tanks and include fill, interact, settle, and decant phases. The SBR tank is filled and mixed during the fill phase and then aeration is cycled on and off during the interact phase. During the settle phase, aeration is discontinued and

the SBR tank settles until a decant valve opens based on a timer and the upper portion of the tank is decanted.

- Effluent Equalization Tank: Flow from the SBR tanks enters the effluent equalization tank to prevent overwhelming of the effluent disposal system (dosing tank to leach fields). Treated effluent is removed from the equalization tank with effluent pumps.

A proposal for a 75,000 gpd Fluidyne ISAM package plant is included in Appendix G including plan and section schematics. A summary of the proposal is provided below:

- Budgetary Equipment Quote: $260,000 (includes package plant components and delivery, but excludes equipment costs for screening, anaerobic tank covers, sludge return piping, effluent pumps, outdoor rated enclosures for electrical panels, and walkway grates and handrails – price adder for these components is included in Table 13)
- Overall structure footprint (concrete by others): 54'-0" length x 41'-0" width x 14'-0" depth (additional length needs to be added for effluent equalization tank)
- Manufacturers Scope of Supply:
  - SAM Surge Reactor Tank Equipment: Influent diffuser assemblies, two (2) submersible motive liquid/fill pumps, 15 HP each, two (2) waste sludge assemblies with motor actuated valves.
  - SBR Tank Equipment: two (2) jet aspirating nozzles and air piping assemblies, two (2) motor actuated air control valves, one (1) scum skimmer, one (1) jet mixer, two (2) motor operated valves for decant system.
  - Controls panel, timers, level sensors, and dissolved oxygen sensors.
  - Ancillary Equipment: supporting hardware and piping (as specified in proposal).

Advantages and disadvantages of a new Fluidyne ISAM SBR type package plant are summarized below:

Advantages
- SBR systems are known for high effluent quality that can well exceed permit limits
- Surge equalization is built into the treatment process
- Elimination of blowers and blower accessories with the use of aspirating jet aerators
- Reduced volume of waste sludge as compared to more conventional systems with aerobic sludge digestion
- Equipment warranty, start-up, and training assistance provided by manufacturer
- Parallel treatment train results in more reliability and operational flexibility

Disadvantages
- Larger footprint than other new package plants evaluated
- Operators would be required to become familiar with a new treatment process with a more complex control system
- Effluent equalization and pumping required to prevent overload of the existing effluent disposal dosing tanks during the SBR decant phase
- Manufacturer's scope of supply excludes some ancillary equipment such as walkway gratings and handrails that are included with other package plant proposals and will need to be included in design
- Fluidyne ISAM SBR system is proprietary
- Moving parts below the water surface (pumps, motor operated valves)

7.5 Other Alternatives Considered

In reviewing WWTP expansion alternatives, other options were considered but were determined to be either inadequate, too costly, difficult to implement, or not the best fit for GBWC-SCD. Some of the other options considered are described below.

7.5.1 *No Improvements*

Under this alternative, no improvements would be made and the existing Mar-Wood WWTP would continue to operate. However, based on planned development in the service area and near-term flow projections, the GBWC-SCD would quickly become out of compliance with its NDEP permitted capacity limit of 50,000 gpd. This option is unacceptable because it does not address capacity issues and aging infrastructure with the existing Mar-Wood WWTP.

7.5.2 *Expand Existing Mar-Wood WWTP*

Expansion of the existing Mar-Wood WWTP was considered, however, the original package plant was sized for 50,000 gpd and does not allow for an increase in capacity within the existing concrete basins. Adding an additional Mar-Wood package plant adjacent to the existing plant is also not an option because the manufacturer went out of business several years ago. A new 25,000 gpd package plant by another manufacturer could be added adjacent to the existing Mar-Wood plant, but would cause complexities in operating two different plants, each with different equipment, controls, maintenance schedules, etc. Also, continued operation of the existing Mar-Wood plant does not address aging infrastructure. The existing Mar-Wood plant is 15 years old and will likely need to be replaced in the 5 years based on the performance and service life of similar wastewater plants in cold-weather conditions.

7.5.3 *Retrofit Existing Mar-Wood WWTP*

An Aero-Mod representative was consulted on potential retrofit of the existing Mar-Wood WWTP with new treatment equipment (i.e., reuse existing concrete basins, piping, etc.). However, due to the extensive concrete deterioration observed at the existing plant, the need for active wastewater treatment during retrofit, and the limited volume/capacity in the existing concrete basins, this option does not appear to be practical or economical. For reference, the total volume of the existing Mar-Wood basins is only 65,800 gallons, whereas a new 75,000 gpd package Aero-Mod SEQOUX WWTP would have a total volume of approximately 114,300 gallons.

7.5.4 *Above-Grade Steel Plant*

Package plant manufacturers typically offer systems that can be installed in above-grade or partially-buried steel tanks instead of cast-in-place concrete. There are some potential savings with an above-grade steel structure as compared to a below-grade concrete structure, however, some of the savings would be offset by the need for insulation of above-grade piping (e.g. heat tracing), additional stairs and handrails, possibly upsized influent pumps to deliver flows to a higher elevation, and high maintenance costs for routine steel tank recoating. In addition, the overall aesthetics is an important factor and an above-grade structure could have a negative visual impact to surrounding neighbors. Installation of steel tanks below-grade is typically not recommended by manufacturers because of increased risk of steel corrosion caused by soil.

Preliminary cost estimates were provided by manufacturers for steel tank package plant options, however, this alternative was not explored further for the reasons summarized above, with exception of the Churchill County package WWTP which is partially buried.

7.6 Evaluation of Alternatives

7.6.1 *Comparison of Construction Costs*

Detailed construction costs were provided by a local estimator in heavy-bid (HCSS) format for Alternative 1 (Relocate Churchill County Package WWTP) and Alternative 2 (New Aero-Mod SEQUOX Extended Aeration Package WWTP). The local estimator (Pre-Construction Services Group, LLC) was involved with construction of the Churchill County WWTP in 2006 and also priced out relocation costs for another utility interested in purchasing the equipment several years ago. Construction costs for Alternatives 3 and 4 (Purestream BESST and Fluidyne ISAM) were approximated based on costs for Alternative 2 considering variations in equipment pricing and footprints. A summary of the construction cost estimates are provided in Table 13 and detailed HCSS format estimates are included in Appendices H and I for Alternatives 1 and 2.

Table 13: Construction Cost Comparison

		Construction Costs			
HCSS Bid No.	Bid Item	Alt 1: Relocate Churchill WWTP	Alt 2: New Aero-Mod SEQUOX WWTP	Alt 3: New Purestream BESST WWTP	Alt 4: New Fluidyne ISAM WWTP
10	Mobilization	$ 7,900	$ 7,900	$ 7,900	$ 7,900
20	Earthwork			$ -	$ -
	Excavation/Backfill for WWTP Removal	$ 22,100	$ -	$ -	$ -
	Excavation/Backfill for WWTP Install	$ 32,100	$ 14,300	$ 15,400	$ 21,600
	Yard Piping Materials	$ 37,300	$ 37,300	$ 37,300	$ 37,300
	Yard Piping Install	$ 18,900	$ 18,900	$ 18,900	$ 18,900
30	Structural Concrete	$ 237,200	$ 356,500	$ 385,000	$ 403,000
50	Steel/Metals (Install walkway grates, handrails, supports, manual bar screen)	$ 21,600	$ 20,400	$ 20,400	$ 20,400
70	Pipe Insulation	$ 15,000	$ 3,800	$ 3,800	$ 3,800
90	Paintings and Coatings	$ 125,000	$ 7,500	$ 7,500	$ 7,500
110	Equipment			$ -	$ -
	Furnish/Purchase Treatment Equipment	$ 350,000	$ 496,800	$ 608,000	$ 404,000
	Freight to Site	$ 27,000	$ -	$ -	$ -
	Install Treatment Equipment	$ 104,000	$ 52,800	$ 58,100	$ 47,500
	Demo/Loading of Existing Equipment	$ 34,000	$ -	$ -	$ -
	Rebuild/Refurbish Existing Equipment	$ 25,000	$ -	$ -	$ -
150	Process Piping/Mechanical	$ 30,400	$ 40,300	$ 40,300	$ 32,200
160	Electrical and Controls	$ 250,000	$ 225,000	$ 225,000	$ 225,000
-	Other Construction Costs			$ -	$ -
	New/Upgraded Electrical Service	$ 50,000	$ 50,000	$ 50,000	$ 50,000
	Contractor Overhead, Equipment, Misc	$ 252,100	$ 234,500	$ 260,000	$ 225,000
	Contractor Profit (11%)	$ 220,800	$ 195,600	$ 217,000	$ 188,000
	Construction Contingency	$ 200,600	$ 64,100	$ 71,000	$ 62,000
	Total Construction Cost	$ 2,061,000	$ 1,825,700	$ 2,025,600	$ 1,754,100

Assumptions, allowances, and exclusions used in estimating construction costs are summarized below:

- Cost Estimate Assumptions:
  - Gravity flow from WWTP to existing leach fields

- Native material as surface finish around WWTP structures
- Increases in steel prices over the past year due to tariffs are reflected in costs but are difficult to predict at time of construction (affects all steel plant components such as steel piping, supports/hardware, bar screen, rebar, etc.)
- Higher contingency used for Alternative 1 to account for uncertainties involved with removing and relocating a 12-year old package plant
- Costs for electrical duct banks includes concrete encasement

- Cost Estimate Allowances:
  - $50,000 for new or upgraded NV Energy electrical service (electrical requirements to be determined during design)
  - $56,000 for yard piping improvements (e.g. connections to existing 4-inch influent force main and 8-inch effluent gravity sewer pipeline, extension of plant water piping for equipment wash down)
  - $25,000 for rebuild of existing mechanical equipment (e.g. blowers) for Churchill County WWTP
  - $225,000-$250,000 for electrical and controls (this could be reduced significantly if existing electrical equipment and conduit/wiring can be reused)
- Cost Estimate Exclusions:
  - New generator (use existing portable generator at WWTP Lift Station)
  - Groundwater pumping
  - Coating or sealer on concrete structures
  - Expansion of dosing tank and leach fields for additional disposal capacity (budgetary allowance is included in Table 15, existing capacity and expansion requirements to be determined during design)
  - New blower building (use existing shed or install outdoors)
  - Outdoor blower enclosures (approx. $3,000 price adder per blower if not installed in existing blower shed)
  - Site fencing and surface treatments (concrete walkways, aggregate base, etc.)
  - Pumping upgrades at the existing WWTP Lift Station (hydraulic profile design to allow pumping with existing pump station)

7.6.2 *Evaluation Matrix*

An evaluation matrix was used to compare alternatives by assigning a rating to each alternative for its effectiveness and superiority against important project criteria. The ratings are on a scale of 1 to 5 (1 = poor; 5 = superior) and the four criteria evaluated are as follows:

1. Capital Cost
2. Required Footprint
3. System Complexity and Ease of O&M
4. Treatment Performance

Results of the evaluation matrix are presented in Table 14. Alternative 1 (Relocate Churchill County Package WWTP) has the lowest rating because of the higher capital costs and the uncertainties associated with operating an oversized plant (ease of O&M and potential treatment performance issues during low flows). Alternative 2 (New Aero-Mod SEQUOX Extended Aeration Package WWTP) has the highest rating at 18. Alternative 3 (New Purestream BESST Single Sludge Package WWTP) and Alternative 4 (New Fluidyne ISAM SBR Package WWTP) have ratings of 17.

Table 14: Alternatives Evaluation Matrix

Alternative	Effectiveness Rating[1]				
	Capital Cost	Required Footprint	System Complexity/ Ease of O&M	Treatment Performance	Total
1 – Relocate Churchill County WWTP	2	1	3	3	9
2 – New Package Aero-Mod SEQUOX WWTP	4	4	5	5	18
3 – New Package Purestream BESST WWTP	3	4	5	5	17
4 – New Package Fluidyne ISAM WWTP	5	3	4	5	17

[1] Rating Scale: 1 = Poor, 5 = Superior.

7.6.3 *Recommended Alternative*

Based on analysis of the various WWTP alternatives, the recommended alternative is a new 75,000 gpd package Aero-Mod SEQUOX WWTP (Alternative 2). The Aero-Mod SEQUOX system can meet or exceed the current permit limitations, can handle variations in flows and loadings, has a compact footprint, and has simple operation and maintenance. Replacing the existing Mar-Wood WWTP addresses aging infrastructure and also provides ease of plant operations (i.e., operating one plant instead of two different plants). The recommended plant capacity of 75,000 gpd is sized to accommodate the buildout ADF for the service area with surge allowance for peak flows.

A new package Purestream BESST WWTP (Alternative 3) or package Fluidyne ISAM SBR WWTP (Alternative 4) would also be good options, but budgetary equipment costs were higher for Alternative 3 and Alternative 4 has a larger footprint and a less familiar treatment process. Ultimately the selected plant could come down to GBWC-SCD preference.

8.0 RECOMMENDED IMPROVEMENTS

8.1 Description of Improvements

The proposed WWTP project for the GBWC-SCD 100 Tract includes: 1) Construction of a new below-grade concrete structure for the 75,000 gpd package WWTP and all associated excavation, backfill, and site grading; 2) Installing all package plant mechanical components and piping within the concrete structure; 3) Installing blowers and compressors on concrete slabs and connecting to package plant components; 4) Site piping work to connect to existing influent/effluent pipelines and to extend wash down water supply to the new WWTP site; 5) All associated electrical and controls work; and 6) Expansion of the leach field disposal system. The preliminary location for the new package plant is at the existing WWTP site adjacent to the existing Mar-Wood plant as shown on Figure 1.

8.2 Opinion of Probable Costs

An opinion of probable project costs considering both construction and non-construction costs for a new 75,000 gpd package WWTP is included in Table 15. Construction costs assume an Aero-Mod SEQUOX package WWTP. Budgetary costs for expansion of the effluent disposal capacity are included in Table 15 assuming percolation testing, a new or expanded dosing tank, and a new 25,000 gpd leach field with infiltrator chambers. Percolation testing will help determine remaining capacity in the existing leach fields and design requirements for additional disposal area.

Table 15: Preliminary Opinion of Project Costs

Item	Cost
Construction Costs (including contingency)	
New Package WWTP (75,000 gpd)	$ 1,826,000[1]
Leach Field and Dosing Tank Expansion (25,000 gpd)	$ 125,000
Non-Construction Costs	
Design, Plans, and Specifications	$ 95,000
Construction Management	$ 36,000
Permitting	$ 8,000
Geotechnical Investigation & Percolation Testing	$ 13,500
Topographic Survey	$ 7,500
Testing and Inspection	$ 78,000
GBWC Internal Capital Time	$ 17,500
Total Project Costs	$ 2,206,500

[1] See construction costs for new package 75,000 gpd package WWTP in Table 13 (Alternative 2). Includes $50,000 allowance for a new or upgraded electrical service from NV Energy (may be required depending on the new electrical loads versus capacity of the existing electrical service).

8.3 Operating Costs

Estimated annual operating costs were provided by Aero-Mod for the package plant at buildout. A detailed breakdown of the operating costs is provided in Appendix E and is summarized below. Annual costs could vary depending on local rates for power/labor and inflation rates.

	Annual Cost
• Power Costs (at $0.10/kilowatt-hour):	$ 11,420
• Servicing of Blowers and Compressors	$ 820
• Equipment Replacement (Annual Allowance)	$ 9,720
• Labor Costs for Routine Inspections and Maintenance, Sampling, Reporting (14 hr/week)	$ 22,600
Total (Rounded)	$ 45,000

8.4 Design and Construction Considerations

Additional considerations for design and construction of the new package WWTP are summarized below. Costs related to these considerations are not included in the preliminary opinion of project costs in Table 15.

- Influent Pumping: The pump operating point of the existing WWTP lift station will need to be evaluated against the proposed improvements to ensure adequate capacity and proper hydraulics while still allowing gravity flow to the leach disposal fields.
- Influent Screening: The addition of a new mechanical screen could be considered to optimize screening capture rates and reduce operator attention and labor required for a manual bar screen.

- Backup Generator: A new permanent generator should be considered for electrical loads at the WWTP site rather than using the transportable 40 kW generator located at the WWTP Lift Station.
- Blower Building: For installation of the blowers and compressors under a roofed structure, the size of the existing blower shed will need to be evaluated against footprint and clear space required for the new equipment. Alternatively, a new pre-manufactured building could be installed adjacent to the new WWTP.
- Emergency Storage: Consider converting existing Mar-Wood WWTP into an emergency storage or equalization basin with pumping back to the head of the new WWTP.
- Sludge Management: As flows to the WWTP increase, sludge dewatering may be needed to reduce the volume of sludge to be disposed off-site and the frequency of hauling.
- Effluent Disposal: Consider expanding the existing effluent disposal capacity with rapid infiltration basins or percolation ponds instead of additional leach fields.

8.5 Permit Requirements

For the WWTP expansion, the following permits and approvals will be needed:

- NDEP Approval of Engineering Report
- NDEP Approval of Plans and Specifications
- NDEP Discharge Permit for Groundwater Discharge
- PUCN Utility Environmental Protection Act (UEPA) Permit
- Nevada Air Quality Permit and Storm Water Pollution Prevention Plan (only if required by area disturbed)

8.6 Project Schedule

The preliminary design and construction schedule is projected for a duration of 16-19 months as summarized below (assuming approval of PER by NDEP):

• GBWC ITB (Intent to Bid), Proposals for Engineering Design, Contract Negotiations	3 months
• Design (Survey, Geotech, Plans, and Specifications)	3 months
• Permit Submittals and Approvals	2-3 months
• Bid Advertisement and Award	2 months
• Construction and Plant Start-Up	6-8 months
	16-19 months

9.0 CONCLUSIONS

Based on the evaluation of alternatives in this PER, it is recommended that the GBWC-SCD proceed with the design and construction of a new 75,000 gpd package WWTP. An Aero-Mod SEQUOX extended aeration package plant appears to be the superior alternative, however, the other package plants evaluated by Purestream and Fluidyne can also meet the discharge requirements and are good options for expanding wastewater treatment capacity for the 100 Tract. It is recommend that the GBWC-SCD operators be involved in the package plant selection process with site visits to other installations in Nevada and/or California prior to design. Feedback and input from other operators of the package plants would be valuable for the selection and design of the new package WWTP.

10.0 REFERENCES

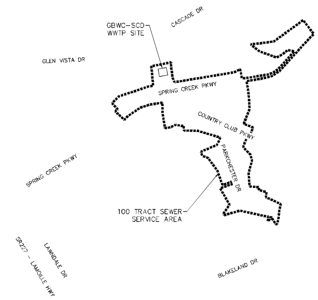
[1] Metcalf and Eddy, *Wastewater Engineering: Treatment and Resource Recovery*, 5th ed., McGraw-Hill Education, 2014.

[2] Crites and Tchobanoglous, *Small and Decentralized Wastewater Management Systems*, The McGraw-Hill Companies, Inc., 1998.

FIGURES

LOCATION MAP

NTS



VICINITY MAP

NTS

LUMOS

308 N. CURRY ST., STE. 200
CARSON CITY, NV 89703
TEL: 775.883.7077

WWW.LUMOSINC.COM

GREAT BASIN WATER CO.

GBWC-SCD WWTP EXPANSION
PRELIMINARY ENGINEERING REPORT
SITE PLAN, LOCATION, AND VICINITY MAP

SPRING CREEK | ELKO COUNTY | NEVADA

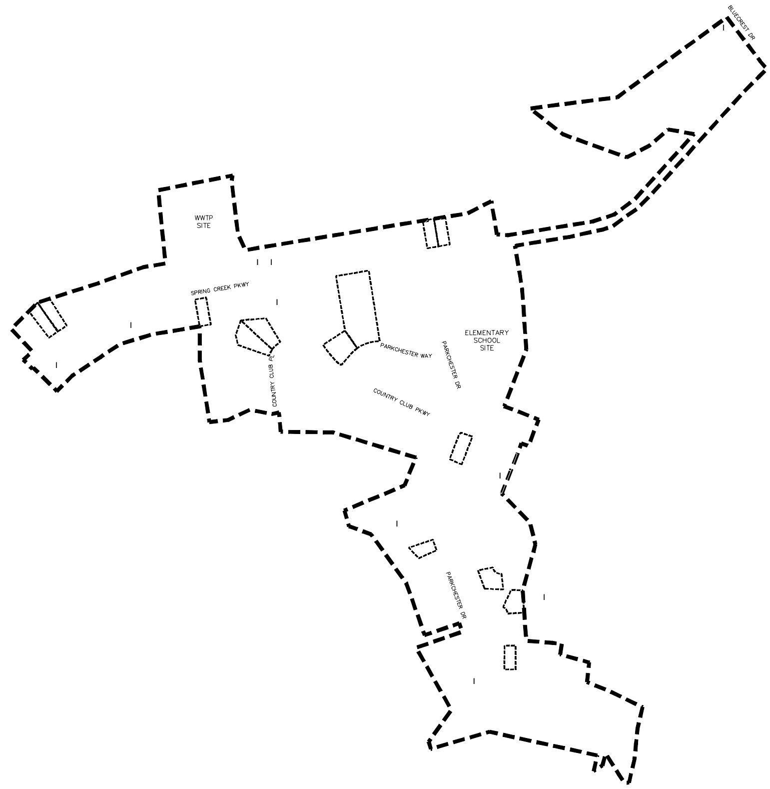
REV	DATE	DESCRIPTION	BY

DECEMBER 2018

BAR IS 1 INCH ON ORIGINAL DRAWING
0 50
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

FIG 1

DRAWN BY: KT
DESIGNED BY: -
CHECKED BY: -
JOB NO.: 9542.000



LEGEND

100 TRACT SEWER SERVICE AREA

EXISTING LAND USE

SINGE-FAMILY RESIDENTIAL

MULTI-FAMILY RESIDENTIAL

COMMERCIAL

INACTIVE CONNECTION(S) ON PARCEL

FUTURE LAND USE (UNDEVELOPED)

SINGE-FAMILY RESIDENTIAL

MULTI-FAMILY RESIDENTIAL

COMMERCIAL

REQUESTED SERVICE (2018–2021)

LUMOS

308 N. CURRY ST., STE. 200
CARSON CITY, NV 89703
TEL: 775.883.7077
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GREAT BASIN WATER CO.

GBWC-SCD WWTP EXPANSION
PRELIMINARY ENGINEERING REPORT
100 TRACT SEWER SERVICE AREA

SPRING CREEK ELKO COUNTY NEVADA

REV	DATE	DESCRIPTION	BY

DECEMBER 2018

BAR IS 1 INCH ON ORIGINAL DRAWING
0 400
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

FIG 2

DRAWN BY: KT
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CHECKED BY: -
JOB NO.: 9542.000

APPENDICES

Appendix A

200 Tract Wastewater Flows, 2012-2016

GBWC-SCD 200 Tract Wastewater Flows (Septic #2), 2012-2016

Year	Number of Active Connections	Average Daily Flow, ADF		Average Flow Maximum Month, AFMM		AFMM / ADF Factor
		(gpd)	(gpdpc)	(gpd)	(gpdpc)	
2012	5	1,913	383	3,292	658	1.72
2013	5	1,754	351	3,234	647	1.84
2014	5	2,020	404	3,861	772	1.91
2015/2016*	5	2,529	506	4,269	854	1.69
2012-2016 Average	-	2,100	420	3,700	730	1.79
2012-2016 Maximum	-	2,529	506	4,269	854	1.91

*Flows for 2015-2016 are combined to account for meter inaccuracy

Appendix B

Indoor Water Meter Records for Elementary Schools

Spring Creek Elementary School
Spring Creek, NV
Monthly Water Usage Data 2014-2016

Month	Days in Month*	Monthly Water Usage (gal/mo)	Daily Water Usage (gpd/student or staff)
Jan-14	31	52,240	1.8
Feb-14	28	52,380	2.0
Mar-14	31	63,690	2.2
Apr-14	30	62,070	2.2
May-14	31	118,710	4.0
Jun-14	30	83,130	2.9
Jul-14	31	86,950	2.9
Aug-14	31	83,310	2.8
Sep-14	30	88,430	3.1
Oct-14	31	113,410	3.8
Nov-14	30	130,750	4.6
Dec-14	31	102,260	3.5
Jan-15	31	141,170	4.8
Feb-15	28	78,420	2.9
Mar-15	31	112,090	3.8
Apr-15	30	123,500	4.3
May-15	31	152,790	5.2
Jun-15	30	139,580	4.9
Jul-15	31	104,000	3.5
Aug-15	31	85,250	2.9
Sep-15	30	101,290	3.5
Oct-15	31	118,670	4.0
Nov-15	30	137,120	4.8
Dec-15	31	93,970	3.2
Jan-16	31	118,367	4.0
Feb-16	28	80,133	3.0
Mar-16	31	120,120	4.1
Apr-16	30	147,380	5.1
May-16	31	127,630	4.3
Jun-16	30	146,950	5.1
Jul-16	31	104,290	3.5
Aug-16	31	80,380	2.7
Sep-16	30	94,780	3.3
Oct-16	31	116,550	3.9
Nov-16	30	144,420	5.0
Dec-16	31	100,920	3.4
Average	-	105,753	3.6
Minimum	-	52,240	1.8
Maximum	-	152,790	5.2

Spring Creek Counts	
No. Students	880
No. Staff	75
Total	955

Counts provided by School on 1/30/18

*Actual days in billing cycle are unknown, assumed days in month.

West Wendover Elementary School
West Wendover, NV
Monthly Water Usage Data 2016-2017

Month	Days per Billing Cycle	Monthly Water Usage (gal/mo)	Daily Water Usage (gpd/student or staff)
Dec-16	28	3,100	0.2
Jan-17	35	3,594	0.2
Feb-17	28	10,770	0.6
Mar-17	28	38,500	2.1
Apr-17	28	39,900	2.2
May-17	36	58,900	2.5
Jun-17	29	32,400	1.7
Jul-17	27	11,700	0.7
Aug-17	34	8,300	0.4
Average	-	23,018	1.2
Minimum	-	3,100	0.2
Maximum	-	58,900	2.5

West Wendover Counts	
No. Students	581
No. Staff	64
Total	645

Counts obtained from Great Schools website and West Wendover Website

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Riverview Elementary School
Dayton, NV
Monthly Water Usage Data 2016-2018

Month	Days per Billing Cycle	Monthly Water Usage (gal/mo)	Daily Water Usage (gpd/student or staff)
Sep-16	-	-	-
Oct-16	26	34,000	2.6
Nov-16	33	31,000	1.9
Dec-16	29	34,000	2.3
Jan-17	30	16,000	1.1
Feb-17	29	36,000	2.5
Mar-17	32	38,000	2.3
Apr-17	28	27,000	1.9
May-17	30	41,000	2.7
Jun-17	33	7,000	0.4
Jul-17	30	6,000	0.4
Aug-17	33	10,000	0.6
Sep-17	28	32,000	2.3
Oct-17	30	42,000	2.8
Nov-17	33	32,000	1.9
Dec-17	29	36,000	2.5
Jan-18	30	24,000	1.6
Feb-18	31	36,000	2.3
Mar-18	29	39,000	2.7
Apr-18	31	32,000	2.0
May-18	29	40,000	2.7
Jun-18	31	25,000	1.6
Jul-18	30	9,000	0.6
Aug-18	33	9,000	0.5
Sep-18	28	29,000	2.0
Average	-	27,708	1.8
Minimum	-	6,000	0.4
Maximum	-	42,000	2.8

Riverview Counts	
No. Students	450
No. Staff	56
Total	506

Counts provided by School on 10/8/18

Mark Twain Elementary School
Carson City, NV
Monthly Water Usage Data 2016-2018

Month	Days per Billing Cycle	Monthly Water Usage (gal/mo)	Daily Water Usage (gpd/student of staff)
Sep-16	33	90,000	3.9
Oct-16	30	75,000	3.6
Nov-16	33	55,000	2.4
Dec-16	30	57,000	2.7
Jan-17	29	26,000	1.3
Feb-17	32	47,000	2.1
Mar-17	29	49,000	2.4
Apr-17	30	45,000	2.1
May-17	28	55,000	2.8
Jun-17	33	64,000	2.8
Jul-17	30	35,000	1.7
Aug-17	32	41,000	1.8
Sep-17	30	132,000	6.3
Oct-17	29	69,000	3.4
Nov-17	32	49,000	2.2
Dec-17	30	43,000	2.0
Jan-18	29	23,000	1.1
Feb-18	33	49,000	2.1
Mar-18	28	38,000	1.9
Apr-18	30	42,000	2.0
May-18	32	65,000	2.9
Jun-18	29	60,000	2.9
Jul-18	30	49,000	2.3
Aug-18	33	43,000	1.9
Sep-18	30	83,000	3.9
Average	-	55,360	2.6
Minimum	-	23,000	1.1
Maximum	-	132,000	6.3

Mark Twain Counts	
No. Students	627
No. Staff	75
Total	702

Counts obtained from Great Schools website and Carson School District website

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Appendix C

Detailed Wastewater Flow Projections

GBWC-SCD WWTP - Existing and Projected Wastewater Flows

Existing Connections: Active Only					Wastewater Flow Factor				AFMM
Connection Type	No. of Parcels	No. of Connections	DU Count	Student/ Staff Count	(gpd/ DU)	(gpd/ conn)	(gpd/student or staff)	ADF (gpd)	(PF=1.30) (gpd)
Single-Family Residential	31	31	31	n/a	245	-	-	7,600	9,880
Multi-Family Residential	51.5	63	166	n/a	113	-	-	18,760	24,390
Commercial	12.5	16	-	n/a	-	420	-	6,720	8,740
Total	95	110	197				Calculated Total	33,080	43,010
							vs Actual 2014-2018 Average	32,300	39,100
							% Diff	2.4%	9%

2019 Flow Projection (Active Connections + Requested Services)					Wastewater Flow Factor				AFMM
Connection Type	No. of Parcels	Estimated No. of Conn	DU Count	Student/ Staff Count	(gpd/ DU)	(gpd/ conn)	(gpd/ student or staff)	ADF (gpd)	(PF=1.30) (gpd)
Existing Connections (Active)									
Single-Family Residential	31	31	31	n/a	245	-	-	7,600	9,880
Multi-Family Residential	51.5	63	166	n/a	113	-	-	18,760	24,390
Commercial	12.5	16	-	n/a	-	420	-	6,720	8,740
Subtotal	95	110	197					33,080	43,010
Requested Services									
Single-Family Residential	6	6	6	-	245	-	-	1,470	1,910
Multi-Family Residential	3	3	20	-	113	-	-	2,260	2,940
Commercial	0	0	-	-	-	420	-	0	0
School	1	1	-	550	-	-	5	2,750	2,750
Subtotal	10	10	26	550				6,480	7,600
Total	105	120	223	550			Total	39,560	50,610

Requested Services Completed in 2019: Elementary School, (6) SFR Units, (20) MFR Units

2020 Flow Projection (Active Connections + Requested Services)					Wastewater Flow Factor				AFMM
Connection Type	No. of Parcels	Estimated No. of Conn	DU Count	Student/ Staff Count	(gpd/ DU)	(gpd/ conn)	(gpd/ student or staff)	ADF (gpd)	(PF=1.30) (gpd)
Existing Connections (Active)									
Single-Family Residential	31	31	31	n/a	245	-	-	7,600	9,880
Multi-Family Residential	51.5	63	166	n/a	113	-	-	18,760	24,390
Commercial	12.5	16	-	n/a	-	420	-	6,720	8,740
Subtotal	95	110	197					33,080	43,010
Requested Services									
Single-Family Residential	6	6	6	-	245	-	-	1,470	1,910
Multi-Family Residential	5	5	38	-	113	-	-	4,300	5,590
Commercial	1	1	-	-	-	420	-	420	550
School	1	1	-	550	-	-	5	2,750	2,750
Subtotal	13	13	44	550				8,940	10,800
Total	108	123	241	550			Total	42,020	53,810

Requested Services Completed in 2020: Elementary School, (1) Commercial Connection (Khoury's Market), (6) SFR Units, (38) MFR Units

2021 Flow Projection (Active Connections + Requested Services)					Wastewater Flow Factor				AFMM
Connection Type	No. of Parcels	Estimated No. of Conn	DU Count	Student/ Staff Count	(gpd/ DU)	(gpd/ conn)	(gpd/ student or staff)	ADF (gpd)	(PF=1.30) (gpd)
Existing Connections (Active)									
Single-Family Residential	31	31	31	n/a	245	-	-	7,600	9,880
Multi-Family Residential	51.5	63	166	n/a	113	-	-	18,760	24,390
Commercial	12.5	16	-	n/a	-	420	-	6,720	8,740
Subtotal	95	110	197					33,080	43,010
Requested Services									
Single-Family Residential	6	6	6	-	245	-	-	1,470	1,910
Multi-Family Residential	6	6	46	-	113	-	-	5,200	6,760
Commercial	1	1	-	-	-	420	-	420	550
School	1	1	-	550	-	-	5	2,750	2,750
Subtotal	14	14	52	550				9,840	11,970
Total	109	124	249	550			Total	42,920	54,980

Requested Services Completed in 2021: Elementary School, (1) Commercial Connection (Khoury's Market), (6) SFR Units, (46) MFR Units

2021 Flow Projection (Active/Inactive Connections + Requested Services)					Wastewater Flow Factor				AFMM
Connection Type	No. of Parcels	Estimated No. of Conn	DU Count	Student/ Staff Count	(gpd/ DU)	(gpd/ conn)	(gpd/student or staff)	ADF (gpd)	(PF=1.30) (gpd)
Existing Connections (Active)									
Single-Family Residential	31	31	31	n/a	245	-	-	7,600	9,880
Multi-Family Residential	51.5	63	166	n/a	113	-	-	18,760	24,390
Commercial	12.5	16	-	n/a	-	420	-	6,720	8,740
Subtotal	95	110	197					33,080	43,010
Existing Connections (Inactive)									
Single-Family Residential	2	2	2	n/a	245	-	-	490	640
Multi-Family Residential	2.5	7	8	n/a	113	-	-	910	1,180
Commercial	3.5	4	-	n/a	-	420	-	1,680	2,180
Subtotal	8	13	10					3,080	4,000
Requested Services									
Single-Family Residential	6	6	6	-	245	-	-	1,470	1,910
Multi-Family Residential	6	6	46	-	113	-	-	5,200	6,760
Commercial	1	1	-	-	-	420	-	420	550
School	1	1	-	550	-	-	5	2,750	2,750
Subtotal	14	14	52	550				9,840	11,970
Total	117	137	259	550			Total	46,000	58,980

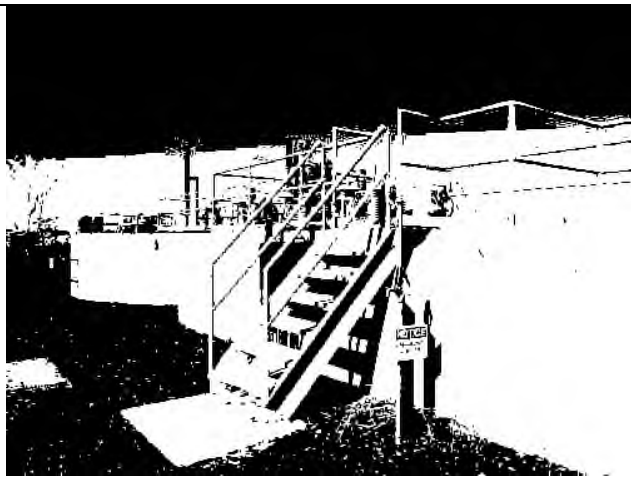
Requested Services Completed in 2021: Elementary School, (1) Commercial Connection (Khoury's Market), (6) SFR Units, (46) MFR Units

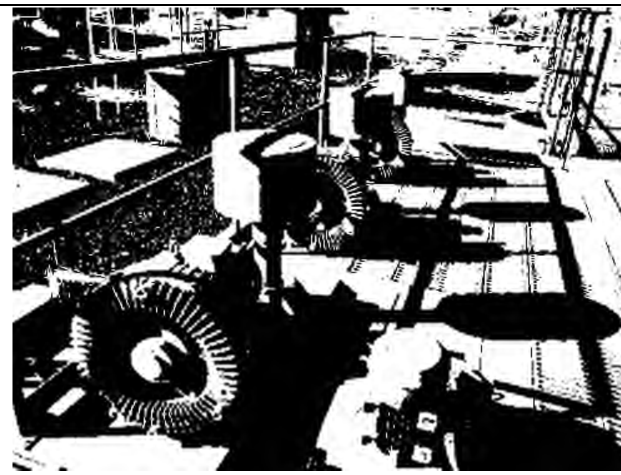
Buildout of Service Area					Wastewater Flow Factor				AFMM
Connection Type	No. of Parcels	Estimated No. of Conn	Estimated DU Count	Student/ Staff Count	(gpd/ DU)	(gpd/ conn)	(gpd/ student or staff)	ADF (gpd)	(PF=1.30) (gpd)
Single-Family Residential	86	86	86	-	245	-	-	21,070	27,390
Multi-Family Residential	76	96	272	-	113	-	-	30,740	39,960
Commercial	34	37	-	-	-	420	-	15,540	20,200
School	1	1	-	550	-	-	5	2,750	2,750
Total	197	220	358	550			Total	70,100	90,300

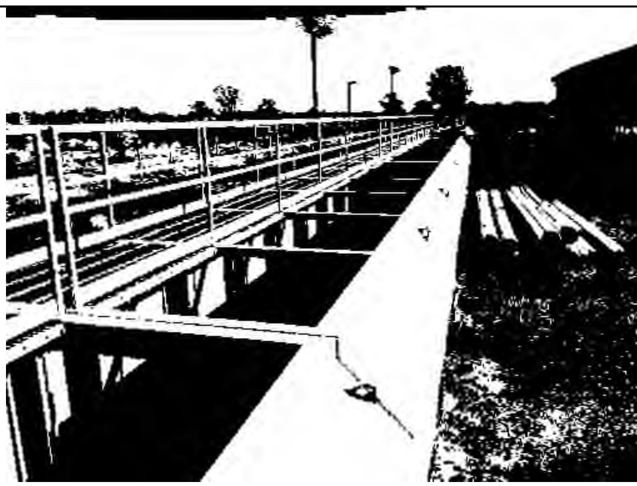
Appendix D

Alternative 1 – Churchill County Package WWTP Info

CHURCHILL COUNTY PACKAGE WWTP
SITE VISIT PHOTOS – OCTOBER 17, 2018


Post-Anoxic Chamber and Clarifier


Blowers and Post-Anoxic Mixer


Aeration Chamber and Walkway Grates


24” Diameter Clarifier


Mechanical Screen and Flow Equalization Chamber


Flow Equalization Pumps and Level Sensors

ENVIRONMENTAL
PROTECTION

June 19, 2018

Jim Barbee, County Manager
Churchill County Administrative Complex
155 N. Taylor St., Suite 153
Fallon, NV 89406

RE: **Reconnaissance Inspection (RI) for Churchill County Country Club WWTF – Discharge Permit # NS2006511**

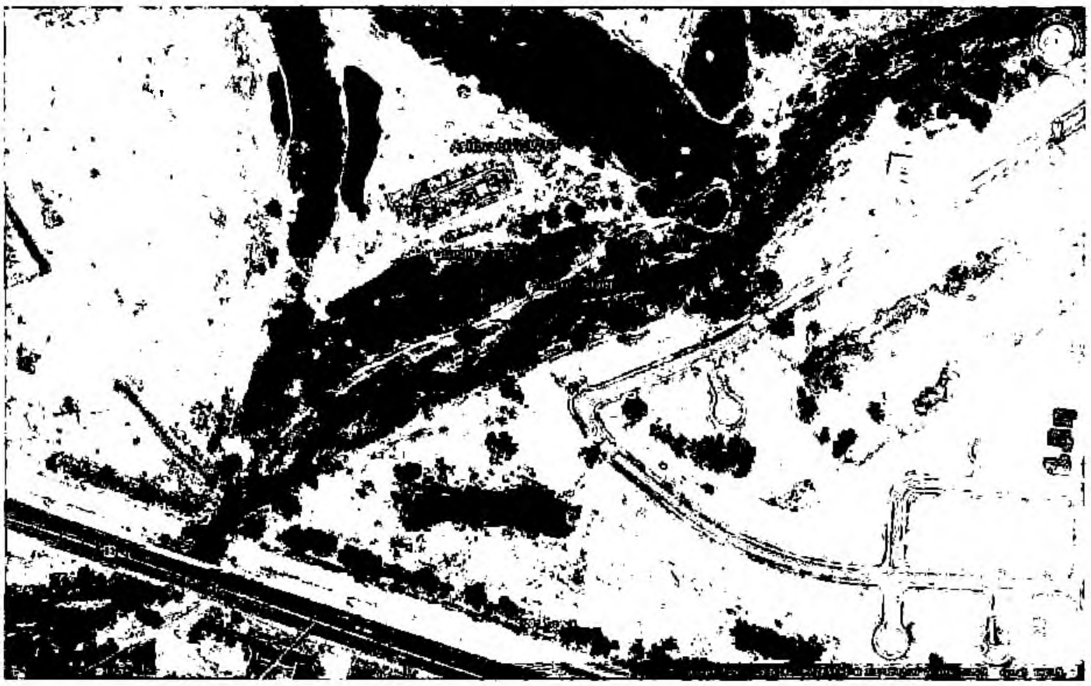
Dear Mr. Barbee:

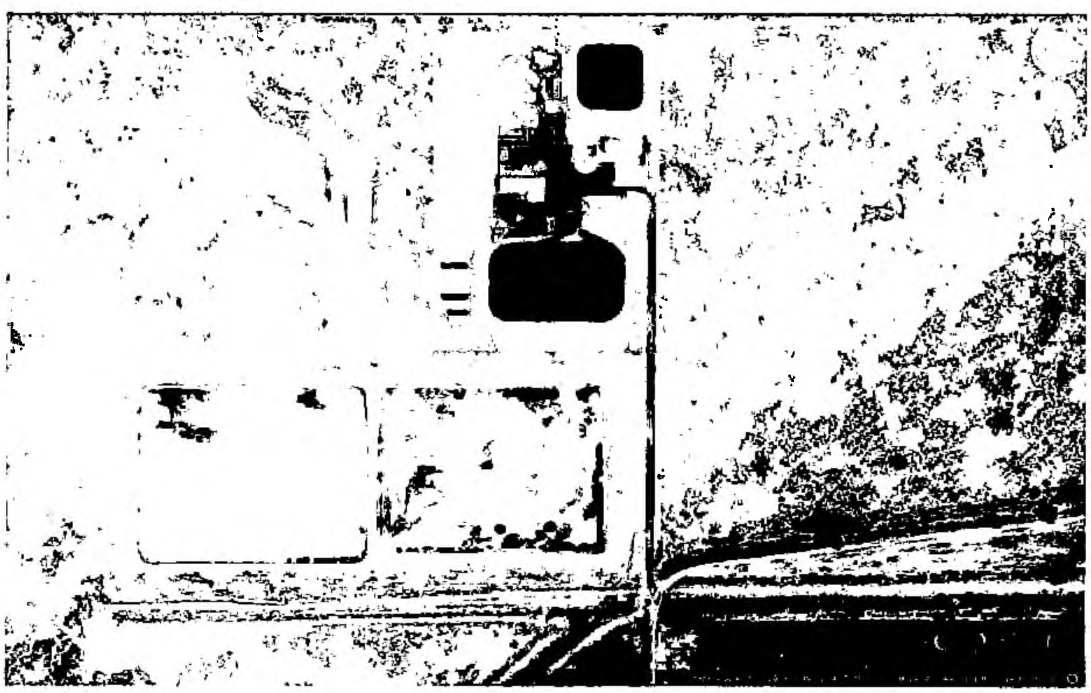
NDEP-BWPC has enclosed it closeout inspection report for this facility. At this time, no written response is required. The BWPC Permits Branch will address termination of the discharge permit.

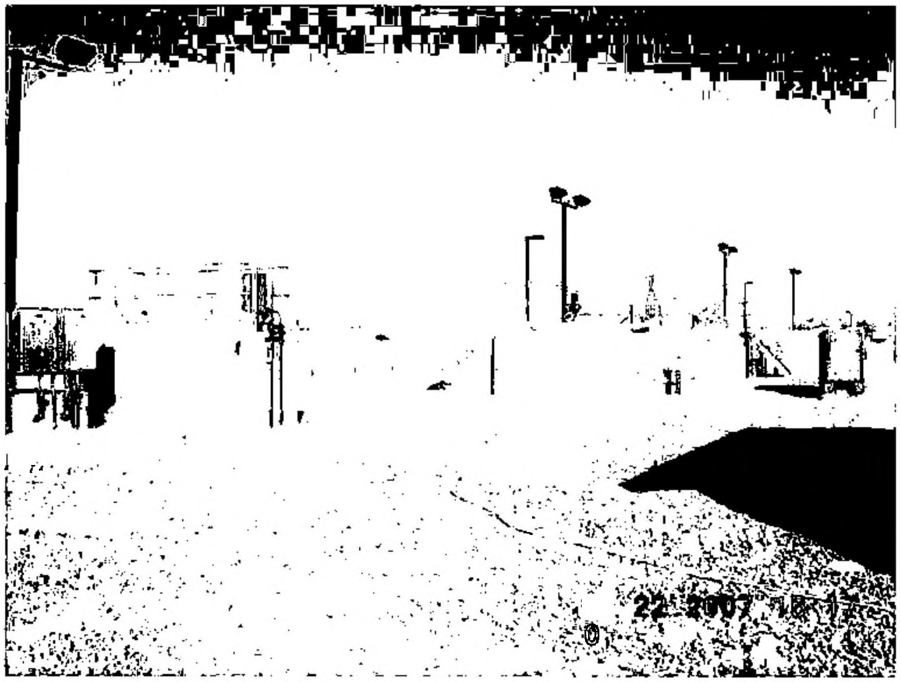
If you should have any questions, please feel free to contact me at (775) 687-9424.

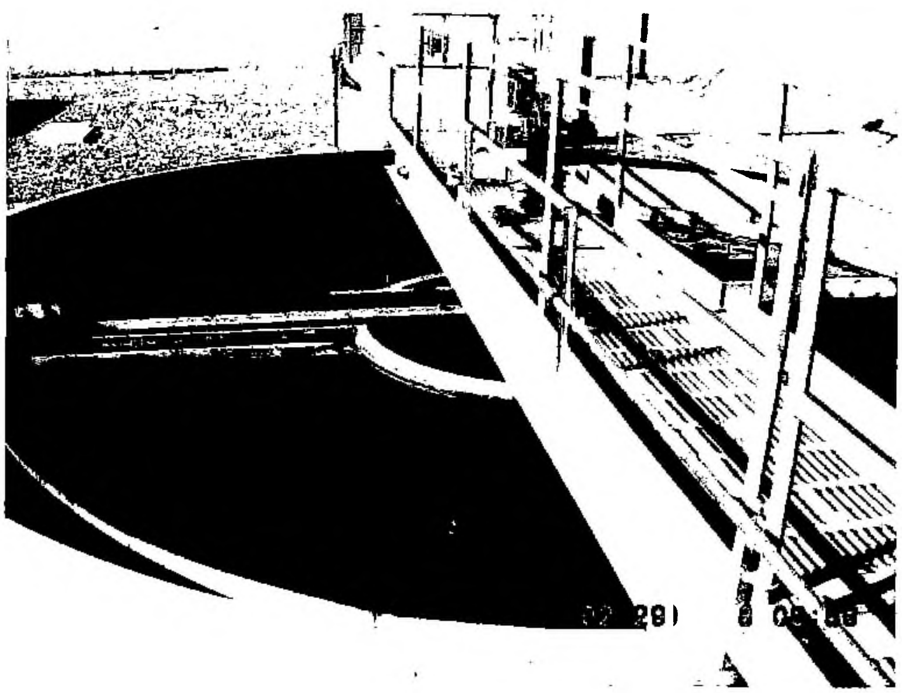
Sincerely,

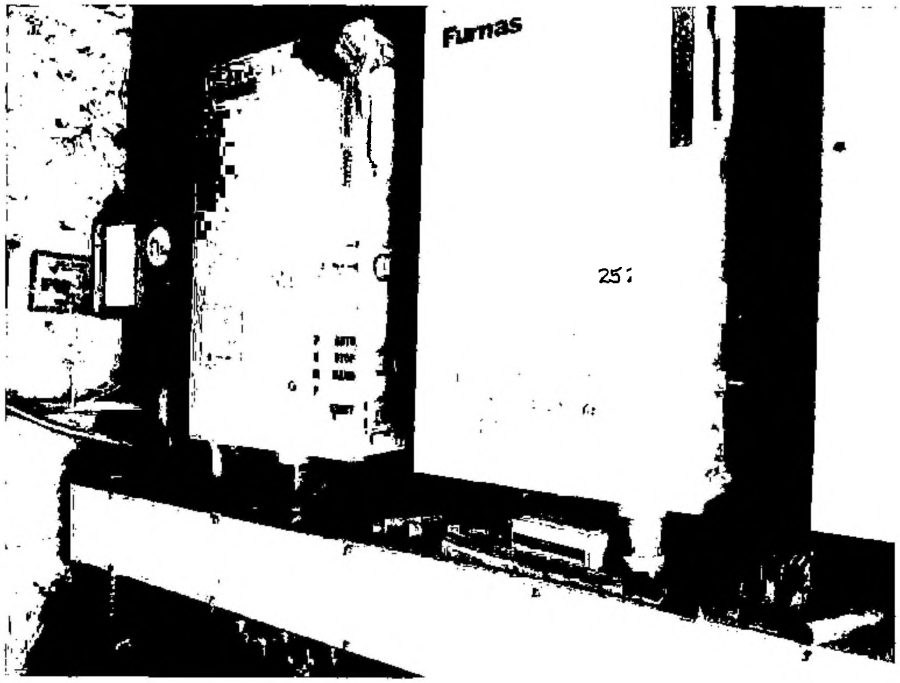
Mat . aminski







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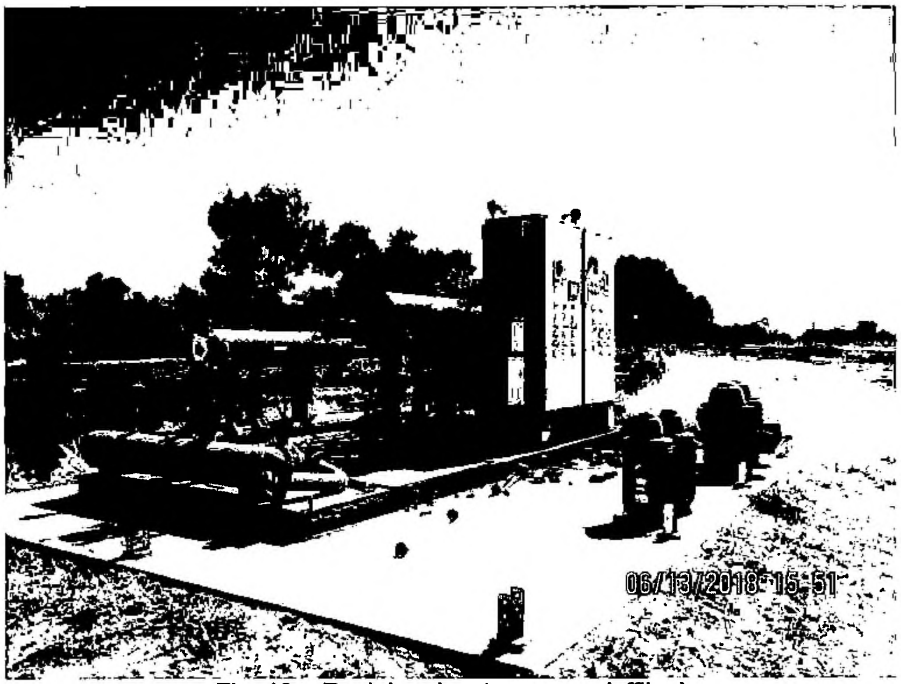


Fig. 13 – Reclaimed water pumps (offline)

Fig. 14 – River supply pump (offline)

Fig. 15 – Moody Lane WWTP (online, MBR basin)

Fig. 16 – Moody Lane (reclaimed water)

Fig. 17 – Moody Lane (storage reservoir)

Fig. 18 – Moody Lane (evaporation/percolation basins)

Office of the Churchill County Manager

May 21, 2018

Mark Kaminski
Nevada Department of Environmental Protection
Bureau of Water Pollution Control
901 S. Steward Street, Suite 4001
Carson City, NV 89701-5249

RE: CHURCHILL COUNTY WASTEWATER TREATMENT PLANT PERMIT NS2006511

Dear Mr. Kaminski,

The Churchill County Moody Lane wastewater treatment plant was constructed and began service in 2008. At that time, the Moody Lane plant took over Churchill County's entire service area, and the packaged wastewater treatment plant at 2655 Country Club Drive was withdrawn from service. The Country Club plant has not been in use since that time.

In January 2018, the Country Club rapid infiltration basins were removed and the discharge line was capped off. This removal resulted in the permanent inability to discharge from the Country Club Drive facility.

Churchill County has no plans to put the Country Club treatment plant back into service. Please consider this letter Churchill County's request to terminate Permit NS2006511, effective June 30, 2018.

Sincerely,

Jim Barbee
County Manager

Churchill County is an equal opportunity provider and employer.

STATE OF NEVADA

May 22, 2018

Jim Barbee, County Manager
Churchill County Administrative Complex
155 N. Taylor St., Suite 153
Fallon, NV 89406

RE: **Abandonment Plan for Churchill County Country Club WWTF**
– Discharge Permit # NS2006511

Dear Mr. Barbee:

NDEP-BWPC has received your letter, dated May 21, 2018. The Technical, Compliance & Enforcement Branch hereby approves abandonment (disconnection) of the wastewater treatment plant located at 2655 Country Club Drive, Fallon, NV 89406. The BWPC Permits Branch will address termination of the discharge permit.

If you should have any questions, please feel free to contact me at (775) 687-9424.

Sincerely,

Mark A Kaminski

Mark A. Kaminski, P.E.
Technical, Compliance & Enforcement Branch
Bureau of Water Pollution Control

cc:

Linda Peterson, Operations Manager, SPB Utility Services, Inc., 430 Stoker Ave., Suite 207, Reno, NV 89503
BWPC Compliance Coordinator

Emailed:

Marie Henson, Churchill County Building Dept.
Donette Barreto, P.E., Supervisor, Permits Branch

Brian Sandoval, Governor
Leo M. Drozdoff, P.E., Director
Colleen Cripps, Ph.D., Acting Administrator

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

FACT SHEET
(Pursuant to NAC 445A.236)

Permittee Name: Churchill County
Engineering & Capital Projects
155 North Taylor Street, Suite 190
Fallon, NV 89406

Permit Number: NEV2006511

Location: Churchill County Wastewater Treatment Facility
2655 Country Club Drive
Fallon, NV 89406
Latitude: 39° 28' 58" N, Longitude: 118° 48' 45" W
T19N, R28E, Section 26 MDB&M

Discharge Outfalls: 001: Discharge line to the rapid infiltration basins

General: Churchill County has applied for renewal of groundwater discharge permit NEV2006511. The Permittee owns the Churchill County Wastewater Treatment Facility (CCWTF), which was taken out of service and decommissioned in November of 2008. Influent flow to this facility has been permanently diverted to the Moody Lane Water Reclamation Facility (NEV2007500).

CCWTF is an activated sludge package treatment plant with a design 30-day average treatment capacity of 0.160 million gallons per day (MGD). The facility includes a mechanical auger screen, an equalization basin, an anoxic chamber, an aeration basin, a post anoxic basin, a clarifier, a chlorine contact tank, and a filter press with odor control. Under the previous permit, CCWTF was allowed to discharge secondary-treated, denitrified, and disinfected effluent to an irrigation holding pond located at the Fallon Golf Course (NEV2007505), and to two (2) rapid infiltration basins (RIBs) located approximately 1,200 feet northwest of the treatment facility. The Fallon Golf Course re-use permit was cancelled in August of 2009. Any future discharge from this facility will be to the two RIBs.

Churchill County would like to maintain an active permit for this facility in the event that future needs require the plant to be brought back into service. Alternatively, the package plant may be used for short term sewage detention prior to treatment at the Moody Lane Regional Water Reclamation Facility. Under this scenario, there would be no discharge to the RIBs at this facility.

Flow: The Permittee has requested a 30-day average and daily maximum flow rate of 0.100 million gallons per day (MGD).

Receiving Water Characteristics: If the treatment plant is brought back into service, discharge will be to groundwater of the State via percolation in the two RIBs.

Site Groundwater: Depth to groundwater in the area is reported to be between 14 and 16 feet below ground surface. Groundwater directional flow at the treatment plant is reported to be to the east. Groundwater monitoring is not required for the discharge of denitrified effluent.

Well Head and Drinking Water Supply Protection: The treatment plant and RIBs are not located within a Drinking Water Protection Area. The facilities are not located within a Wellhead Protection Area established for any active well sources.

Corrective Action Sites: There are no Bureau of Corrective Actions remediation sites within a one-mile radius of the facility.

Proposed Effluent Limitations: Discharge to the infiltration basins shall be limited and monitored according to the following table.

Sampling locations:
i. Treatment plant headworks
ii. Effluent wet well

Table 1: General Discharge Limitations

Parameter		Discharge Limitations		Monitoring Requirements		
		30 - Day Average	Daily Maximum	Sampling Locations	Measurement Frequency	Sample Type
Influent	Flow (MGD)	0.100	0.100	i	Continuous	Measurement
	BOD_5 (mg/L)	Monitor & Report		i	Monthly	Discrete
	TSS (mg/L)	Monitor & Report		i	Monthly	Discrete
Effluent	BOD_5 (mg/L)	30		ii	Monthly	Composite
	TSS (mg/L)	30		ii	Monthly	Composite
	Total Nitrogen (mg/L)	10		ii	Monthly	Composite
	pH (S.U.)	6.0 - 9.0		ii	Monthly	Composite

MGD: Million Gallons per Day
BOD_5: 5-day Biochemical Oxygen Demand
mg/L: Milligrams per Liter
TSS: Total Suspended Solids
S.U.: Standard Units

Rationale for Permit Requirements: Monitoring is required to ensure that the treatment plant capacity is not exceeded, to assess the level of treatment being provided, and to monitor groundwater quality.

Schedule of Compliance: The Permittee shall implement and comply with the provisions of the schedule of compliance after approval by the Administrator, including in said implementation and compliance, any additions or modifications that the Administrator may make in approving the schedule of compliance:

a. The Permittee shall achieve compliance with the effluent limitations upon issuance of the permit.

b. By MMM DD, 2012, (60 days) the Permittee shall submit two (2) copies of an updated Operations and Maintenance (O&M) Manual for review and approval by the Division. The O&M Manual shall be compiled in accordance with appropriate sections of WTS-2, Minimum Information Required for an Operation and Maintenance Manual for a Wastewater Treatment Plant.

   If no updates or revisions are required, the Permittee shall submit a letter by the above due date stating that there have been no changes to the previously approved O&M Manual.

Before implementing changes to an approved O&M Manual, the Permittee shall submit proposed changes to the Division for review and approval.

All schedule of compliance submittals and evidence of compliance documents shall be submitted to the Bureau of Water Pollution Control at the address listed below:

Division of Environmental Protection
Bureau of Water Pollution Control
901 S. Stewart Street, Suite 4001
Carson City, Nevada 89701

Proposed Determination: The Division has made the tentative determination to renew the proposed permit for a period of five (5) years.

Procedures for Public Comment: The Notice of the Division's intent to renew a groundwater discharge permit authorizing this facility to discharge secondary treated effluent to groundwater of the State of Nevada for a five-year period, subject to the conditions contained within the permit, is being sent to the Reno Gazette-Journal and Lahontan Valley News for publication.

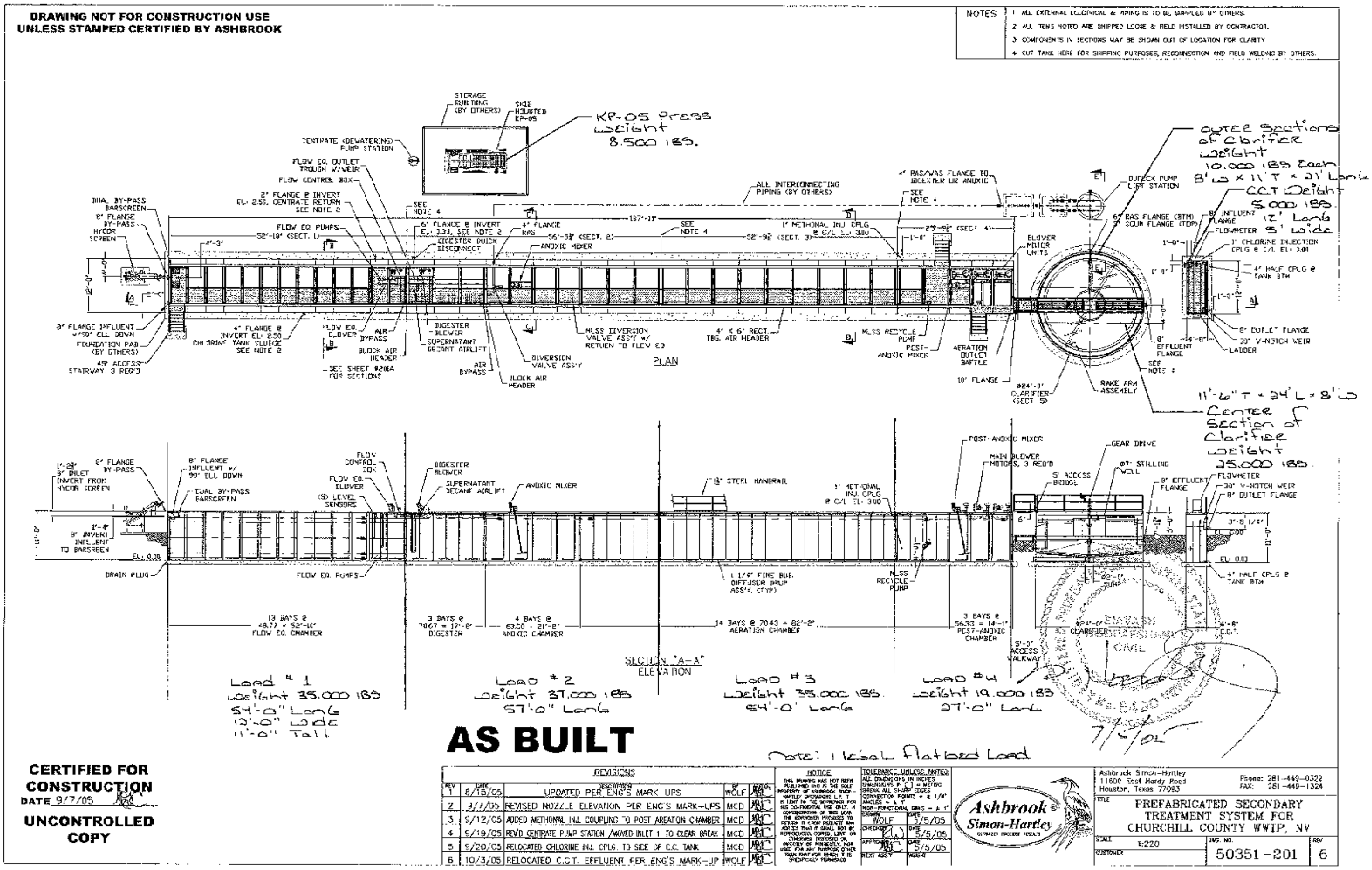
The Notice is being mailed to interested persons on our mailing list. Anyone wishing to comment on the proposed permit can do so in writing for a period of thirty (30) days following the date of public notice in the newspaper. The comment period can be extended at the discretion of the Administrator. The deadline date and time by which all comments are to be submitted (via postmarked mail or time-stamped faxes, e-mails, or hand-delivered items) to the Division is June 8, 2012, by 5:00 P.M.

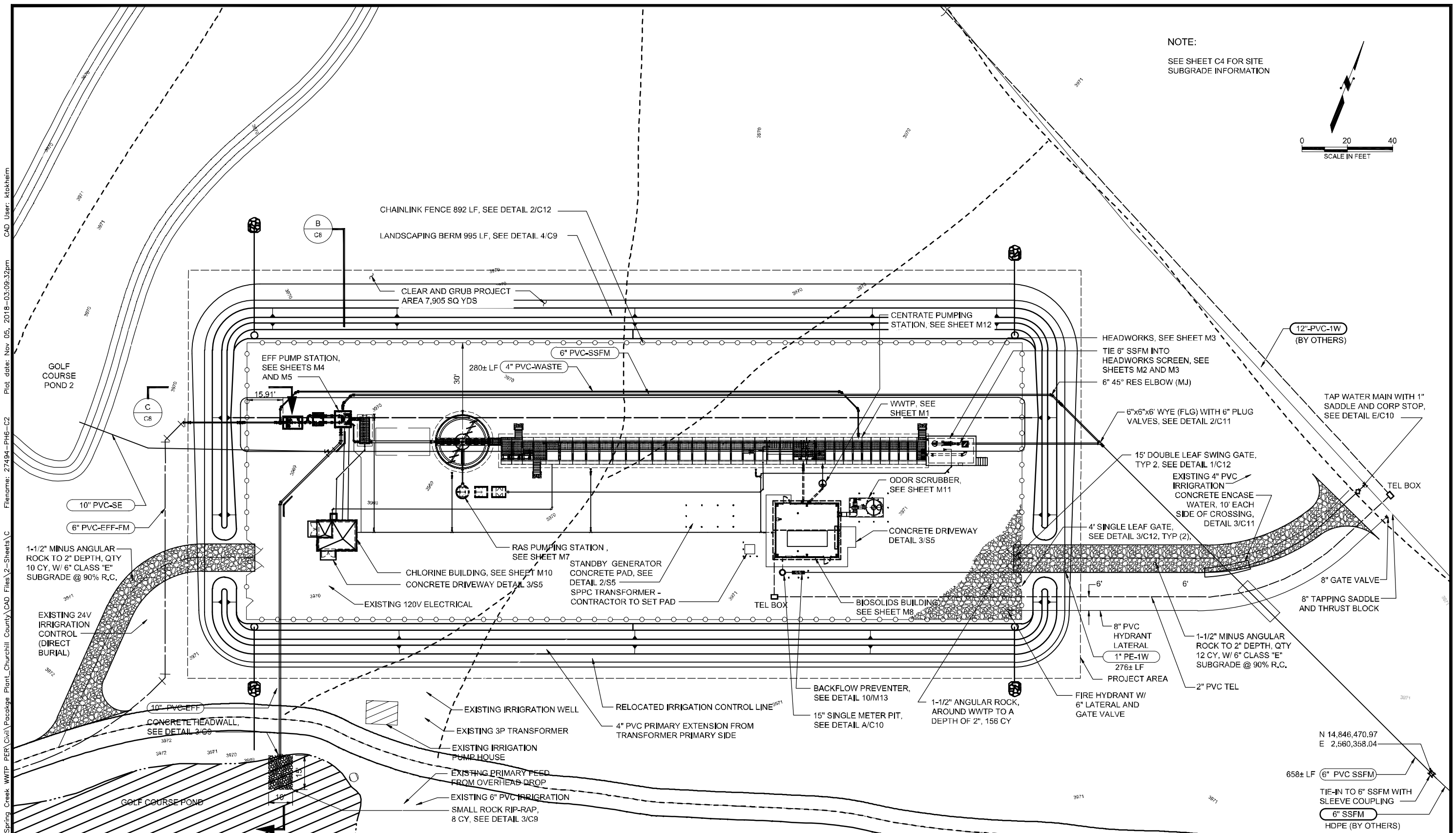
A public hearing on the proposed determination can be requested by the applicant, any affected State, any affected interstate agency, the Regional Administrator or any interested agency, person or group of persons. The request must be filed within the comment period and must indicate the interest of the person filing the request and the reasons why a hearing is warranted.

Any public hearing determined by the Administrator to be held must be conducted in the geographical area of the proposed discharge or any other area the Administrator determines to be appropriate. All public hearings must be conducted in accordance with NAC 445A.238.

The final determination of the Administrator may be appealed to the State Environmental Commission pursuant to NRS 445A.605.

Prepared by: Arthur Marr, P.E.
Date: April, 2012


DRAWING NOT FOR CONSTRUCTION USE
UNLESS STAMPED CERTIFIED BY ASHBROOK
NOTES
1. ALL EXTERNAL ELECTRICAL & PIPING IS TO BE SUPPLIED BY OTHERS.
2. ALL ITEMS NOTED ARE SHIPPED LOOSE & FIELD INSTALLED BY CONTRACTOR.
3. COMPONENTS IN SECTIONS MAY BE SHOWN OUT OF LOCATION FOR CLARITY.
4. CUT TANK HERE FOR SHIPPING PURPOSES, RECONNECTION AND FIELD WELDING BY OTHERS.
KP-05 Press Weight 8.500 lbs.
outer Sections of Clarifier Weight 10.000 lbs Each 8' W x 11' T x 21' Long
CCT Weight 5.000 lbs. 12' Long 5' Wide
11'-6" T x 24' L x 8' W Center Section of Clarifier Weight 25.000 lbs.
PLAN
SECTION "A-A" ELEVATION
Load # 1 Weight 35.000 lbs 54'-0" Long 12'-0" Wide 11'-0" Tall
Load # 2 Weight 37.000 lbs 57'-0" Long
Load # 3 Weight 35.000 lbs. 54'-0' Long
Load # 4 Weight 19.000 lbs 27'-0" Long
Note: 1 Legal Flatbed Load
AS BUILT
CERTIFIED FOR CONSTRUCTION
DATE 9/7/05
UNCONTROLLED COPY
REVISIONS
1 | 8/15/05 | UPDATED PER ENG'S MARK UPS
2 | 3/1/05 | REVISED NOZZLE ELEVATION PER ENG'S MARK-UPS
3 | 5/12/05 | ADDED METHONAL INJ. COUPLING TO POST AREATON CHAMBER
4 | 5/19/05 | REV'D CENTRATE PUMP STATION / MOVED INLET 1' TO CLEAR BREAK
5 | 5/20/05 | RELOCATED CHLORINE INJ. CPLGS. TO SIDE OF C.C. TANK
6 | 10/3/05 | RELOCATED C.C.T. EFFLUENT PER ENG'S MARK-UP
Ashbrook Simon-Hartley
Ashbrook Simon-Hartley 11600 East Hardy Road Houston, Texas 77093
Phone: 281-449-0322 FAX: 281-449-1324
PREFABRICATED SECONDARY TREATMENT SYSTEM FOR CHURCHILL COUNTY WWTP, NV
1:220
50351-201
6



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REVISIONS

NO.	DESCRIPTION	BY	CHK.	APPRVD	DATE
	RELEASED FOR BID	RJ	JB	WF	1/5/06
1	WORK CHANGE DIRECTIVE #1	RJJ	JB	WF	4/12/06
RD	RECORD DRAWINGS	RDH	JB	WKF	5/07

Call before you Dig.
1-800-227-2600
UNDERGROUND SERVICE (USA)

RECORD DRAWINGS
MAY 2007

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ENGINEER

PREPARED BY:
BROWN AND CALDWELL
3264 GONI ROAD, SUITE 153
CARSON CITY, NEVADA 89706
PHONE: (775) 883-4118

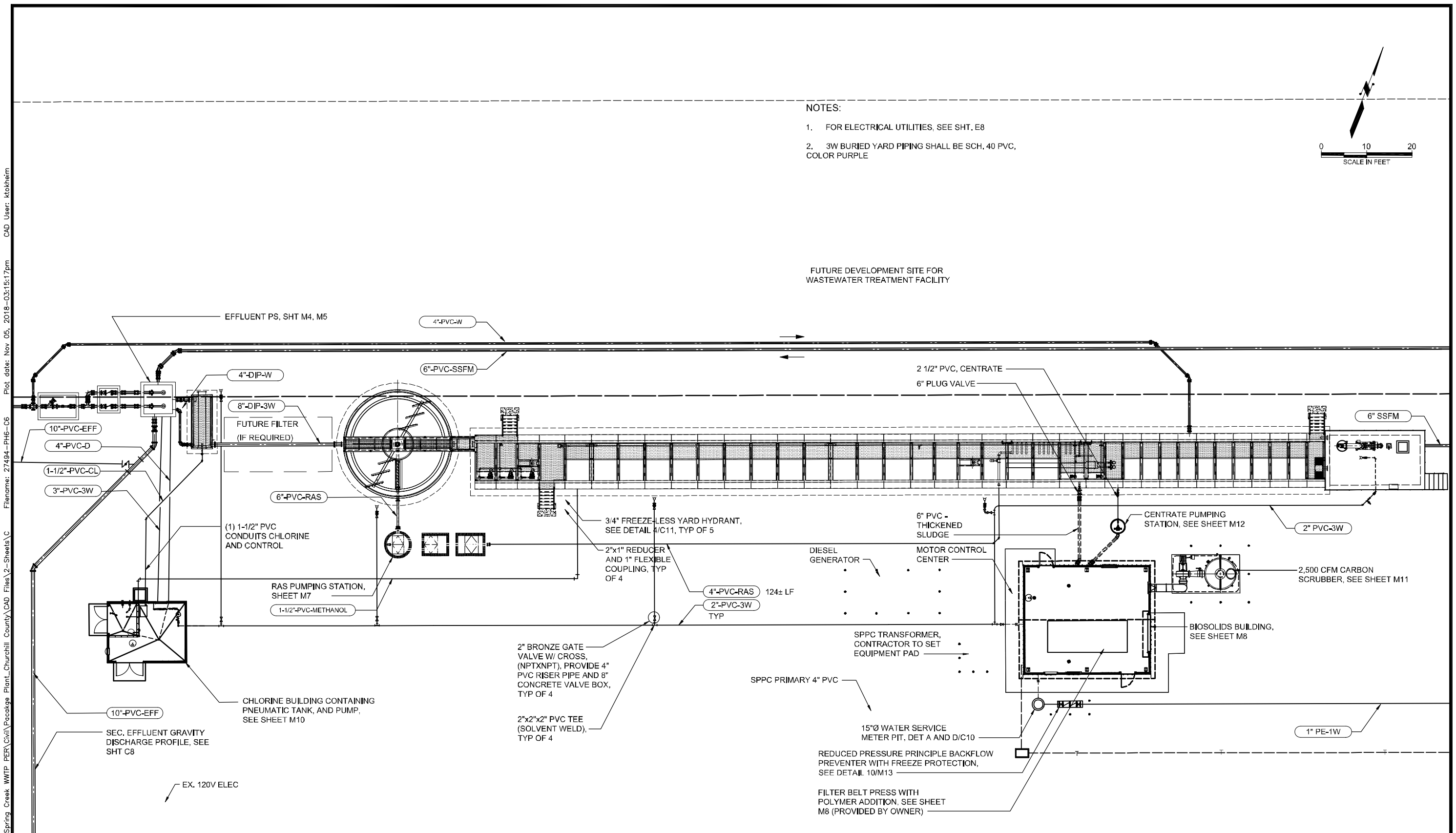
DESIGNED	J. BELLIN
DRAWN	
CHECKED	
APPROVED	
APPROVED	
APPROVED	

PREPARED FOR:
Churchill County, Nevada, Planning Department

CHURCHILL COUNTY UTILITIES
PACKAGED WASTEWATER
TREATMENT PLANT

TITLE
CIVIL
WASTEWATER TREATMENT PLANT
SITE PLAN AND YARD PIPING

SCALE 1" = 20' LINE IS 4 INCHES AT FULL SIZE (IF NOT, SCALE ACCORDINGLY)
REVISION RD
DRAWING NUMBER C2
SHEET NUMBER 9 OF 67



REVISIONS

NO.	DESCRIPTION	BY	CHK.	APPRVD	DATE
	RELEASED FOR BID	RJ	JB	WF	1/5/06
A	ADDENDUM #2	RDH	JB	WF	1/30/06
RD	RECORD DRAWINGS	RDH	JB	WKF	5/07

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CARSON CITY, NEVADA 89706
PHONE: (775) 883-4118

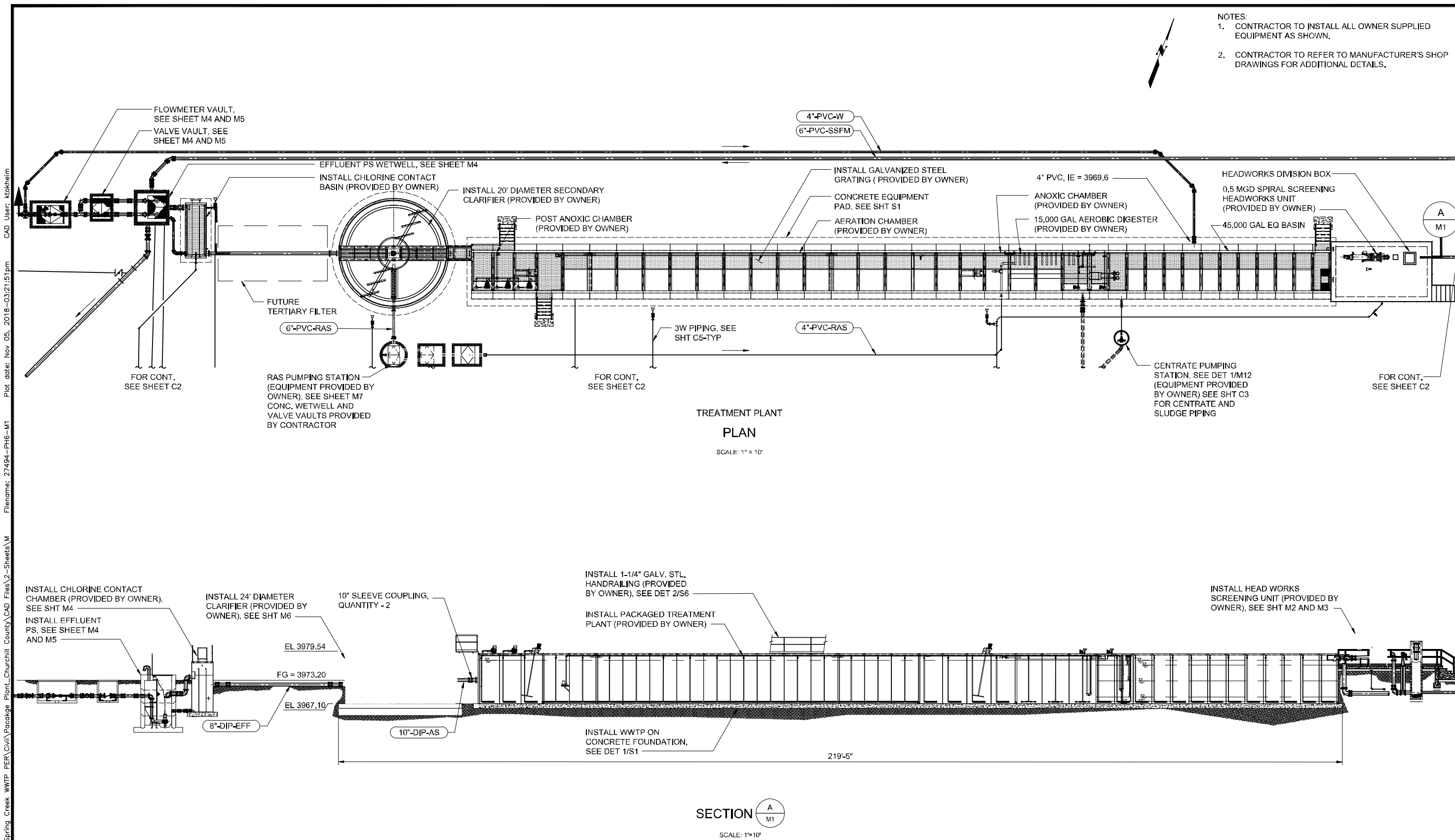
DESIGNED J. BELUN
DRAWN
CHECKED
APPROVED
APPROVED
APPROVED

PREPARED FOR:
Churchill County, Nevada, Planning Department

CHURCHILL COUNTY UTILITIES
PACKAGED WASTEWATER
TREATMENT PLANT

TITLE
CIVIL
WASTEWATER TREATMENT PLANT
UTILITY PLAN

SCALE 1" = 10' LINE IS 4 INCHES AT FULL SIZE (IF NOT, SCALE ACCORDINGLY)
REVISION RD
DRAWING NUMBER C6
SHEET NUMBER 13 OF 67



NO.	DESCRIPTION	BY	CHK.	APPRVD	DATE
	RELEASED FOR BID	RJ	JB	WF	1/3/06
	ADDENDUM #2	RDH	JB	WF	1/30/06
	RECORD DRAWINGS	RDH	JB	WKF	5/07

REVISIONS

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3264 GONI ROAD, SUITE 153
CARSON CITY, NEVADA 89706
PHONE: (775) 883-4118

DESIGNED	J. BELLIN
DRAWN	T. LAMBERT
CHECKED	
APPROVED	
APPROVED	
APPROVED	

PREPARED FOR:
Churchill County, Nevada, Planning Department

CHURCHILL COUNTY UTILITIES
PACKAGED WASTEWATER
TREATMENT PLANT

TITLE
MECHANICAL
WASTEWATER TREATMENT PLANT
PARTIAL PLAN AND SECTION

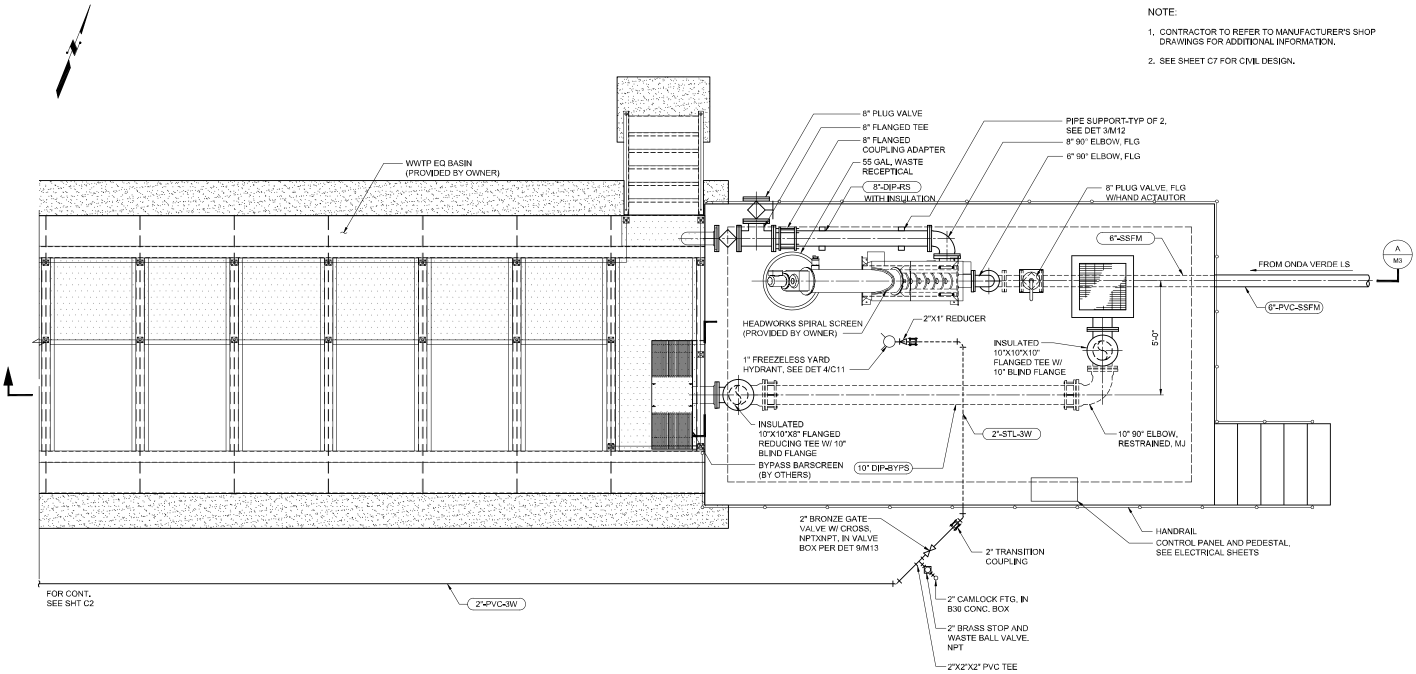
SCALE 1" = 10' | LINE IS 4 INCHES AT FULL SIZE (IF NOT, SCALE ACCORDINGLY) | REVISION

DRAWING NUMBER M1 | SHEET NUMBER 35 OF 67 | RD

Path: L:\LAProj\9542.000 Spring Creek WWTP PER\Civil\Package Plant_Churchill County\CAD Files\2-Sheets\M Filename: 27494-PH6-M1 Plot date: Nov 05, 2018-03:21:51pm CAD User: ktokheim

NOTE:

1. CONTRACTOR TO REFER TO MANUFACTURER'S SHOP DRAWINGS FOR ADDITIONAL INFORMATION.
2. SEE SHEET C7 FOR CIVIL DESIGN.



HEADWORKS

PLAN

SCALE: 1/2" = 1'-0"

NO.	DESCRIPTION	BY	CHK.	APPRVD	DATE
	RELEASED FOR BID	RJ	JB	WF	1/3/06
A	ADDENDUM #2	RDH	JB	WF	1/30/05
RD	RECORD DRAWINGS	RDH	JB	WKF	5/07

REVISIONS

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RECORD DRAWINGS MAY 2007

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ENGINEER

PREPARED BY: BROWN AND CALDWELL, 3264 GONI ROAD, SUITE 153, CARSON CITY, NEVADA 89706, PHONE: (775) 883-4118

DESIGNED	J. BELLIN
DRAWN	T. LAMBERT
CHECKED	
APPROVED	
APPROVED	
APPROVED	

PREPARED FOR: Churchill County, Nevada, Planning Department

CHURCHILL COUNTY UTILITIES PACKAGED WASTEWATER TREATMENT PLANT

TITLE: MECHANICAL WASTEWATER TREATMENT PLANT HEADWORKS PLAN

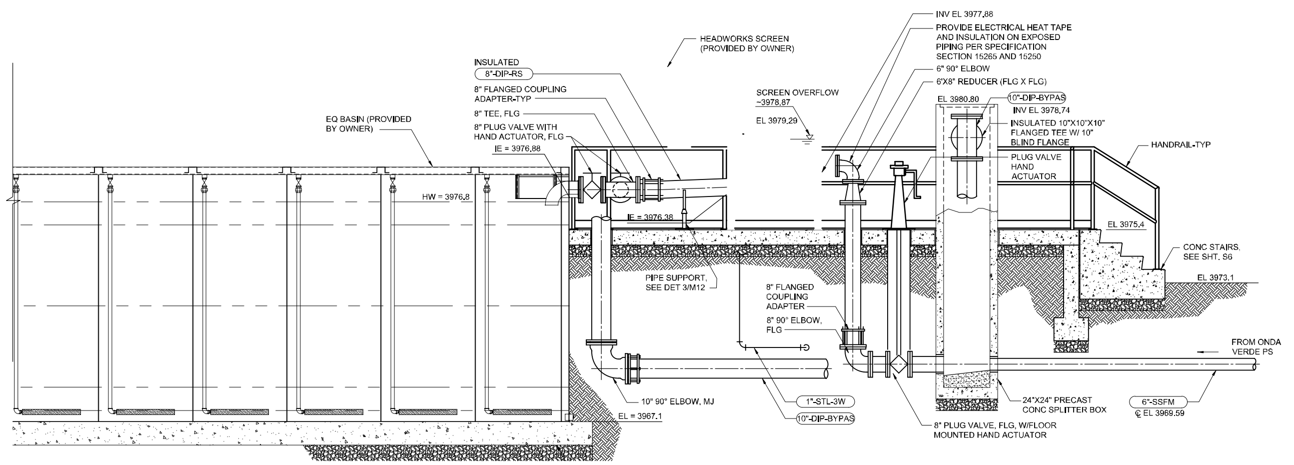
SCALE 1/2" = 1'-0" — LINE IS 4 INCHES AT FULL SIZE (IF NOT, SCALE ACCORDINGLY)

DRAWING NUMBER: M2 — SHEET NUMBER: 36 OF 67 — REVISION: RD

Path: L:\LAPro\19542.000 – Spring Creek WWTP PER\Civil\Package Plant_Churchill County\CAD Files\2-Sheets\M Filename: 27494-PH6-M2 Plot date: Nov 05, 2018-03:22:25pm CAD User: ktokheim

NOTE:

1. HEAT TAPE AND INSULATE ALL EXPOSED PIPING PER SPECIFICATIONS.
2. FASTEN HEADWORKS SCREEN TO CONCRETE PAD WITH 4 -1/2-13 UNCx5-1/2" SST EXPANSION ANCHORS, CONTRACOTR TO LEVEL EQUIPMENT AND FILL VOID WITH NON-SHRINK GROUT.



SECTION A/M2

SCALE: 1/2"=1'-0"

Path: L:\LAProj\9542.000 – Spring Creek WWTP PER\Civil\Package Plant_Churchill County\CAD Files\2-Sheets\M Filename: 27494-PH6-M3 Plot date: Nov 05, 2018-03:22:39pm CAD User: ktoelhelm

REVISIONS

NO.	DESCRIPTION	BY	CHK.	APPRVD	DATE
	RELEASED FOR BID	RJ	JB	WF	1/5/06
A	ADDENDUM #2	RDH	JB	WF	1/30/06
RD	RECORD DRAWINGS	RDH	JB	WKF	5/07

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UNDERGROUND SERVICE (USA)

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DRAWN	T. LAMBERT	
CHECKED		
APPROVED		
APPROVED		
APPROVED		

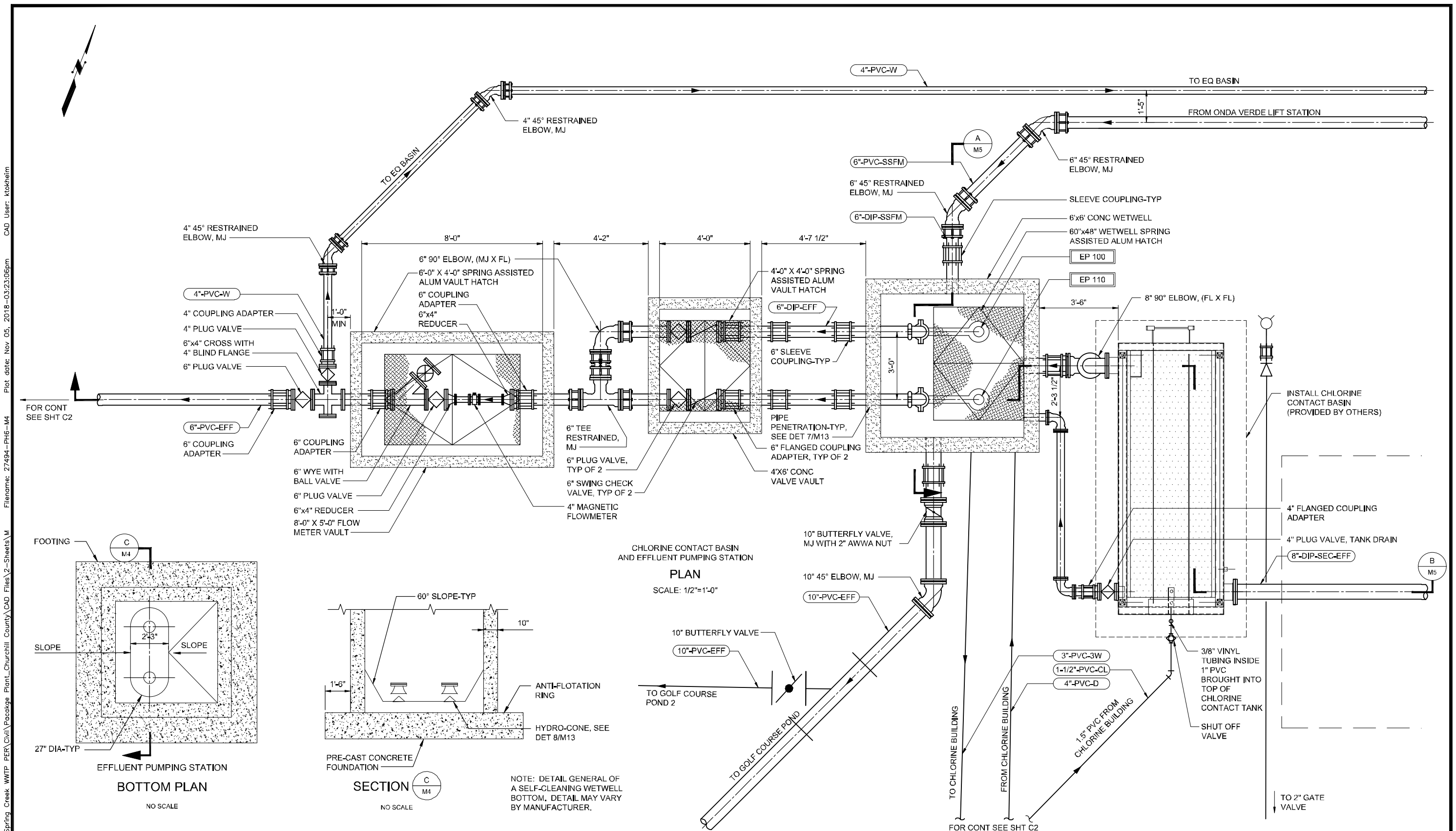
PREPARED FOR:
Churchill County, Nevada, Planning Department

CHURCHILL COUNTY UTILITIES
PACKAGED WASTEWATER
TREATMENT PLANT

TITLE
MECHANICAL
WASTEWATER TREATMENT PLANT
HEADWORKS PARTIAL SECTION

SCALE 1/2" = 1'-0" LINE IS 4 INCHES AT FULL SIZE (IF NOT, SCALE ACCORDINGLY)

DRAWING NUMBER	SHEET NUMBER	REVISION
M3	37 OF 67	RD



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A	ADDENDUM #2	RDH	JB	WF	1/30/06
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PHONE: (775) 883-4118

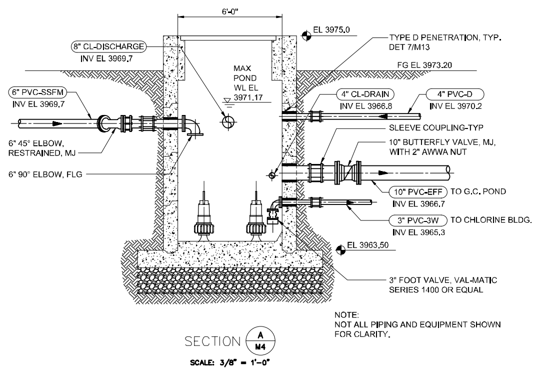
DESIGNED J. BELLIN
DRAWN T. LAMBERT
CHECKED
APPROVED
APPROVED
APPROVED

PREPARED FOR:
Churchill County, Nevada, Planning Department

CHURCHILL COUNTY UTILITIES
PACKAGED WASTEWATER
TREATMENT PLANT

TITLE
MECHANICAL
WASTEWATER TREATMENT PLANT
CHLORINE CONTACT AND EFFLUENT PUMP STATION
PLAN VIEW

SCALE 1/2" = 1'-0" LINE IS 4 INCHES AT FULL SIZE (IF NOT, SCALE ACCORDINGLY) REVISION
DRAWING NUMBER M4
SHEET NUMBER 38 OF 67
RD



SECTION A / M4

SCALE: 3/8" = 1'-0"

GENERAL NOTES:

1. DRAWING REPRESENTATIVE OF A PRE-PACKAGED LIFT STATION, AS MANUFACTURED BY ROMTEC, OR EQUAL. CONTRACTOR MAY FURNISH A LIFT STATION COMPRISED OF CONTRACTOR ASSEMBLED COMPONENTS, THAT MEETS THE CRITERIA OF SPEC SECTION 02530 AND ALL RELATED SECTIONS, AT THEIR OPTION.
2. PROVIDE 4" DIAMETER REPLACEMENT SPOOL PIECE FOR FLOW METER. MATCH FLANGE FACE-TO-FACE DIMENSION OF FLOW METER. CONTRACTOR SHALL COORDINATE LENGTH OF SPOOL WITH FLOW METER.
3. COAT ALL EXPOSED PIPE, HANGERS AND FITTINGS, PER SECTION 09900.
4. ALL NUTS, BOLTS AND WASHERS SHALL BE TYPE 316, STAINLESS STEEL. COAT THREAD WITH ANTI-SIEZE COMPOUND BEFORE ASSEMBLY.
5. COAT INTERIOR OF WET WELL PER SECTION 09900.
6. SEE CONTROL STRATEGY FOR CONTROL ELEVATIONS - SECTION 17900.
7. CONTRACTOR TO REFER TO MANUFACTURER'S SHOP DRAWINGS FOR ADDITIONAL INFORMATION.
8. PUMPS FLOATS NOT SHOWN FOR CLARITY. SEE ELECTRICAL DRAWINGS.
9. PIPING FROM THE WETWELL THROUGH THE VALVE VAULTS SHALL BE DIP.

KEY NOTES:

(1) TYPE 316 STAINLESS STEEL LIFT CHAIN. LINK SIZE PER PUMP MANUFACTURERS RECOMMENDATIONS. STAINLESS CABLE WILL NOT BE ACCEPTED. CHAIN LENGTH SHALL EXTEND FOR 3 FEET ABOVE WET WELL COVER SLAB WHEN PUMP IS IN OPERATING POSITION.

(2) INSTALL PUMP BASE ELBOW PER MANUFACTURER'S RECOMMENDATION'S.

(3) CORE DRILL WETWELL FOR PIPE PENETRATIONS, SEE DETAIL 7/M13.

(4) STAINLESS STEEL, TYPE 316, GUIDE RAIL.

(5) PROVIDE STRAIN RELIEF CABLE GRIP. SUPPORT CABLE FROM J-HOOK WITH 3/8" NYLON LINE.

(6) SEE ELECTRICAL DETAILS FOR CABLE AND CONDUIT ROUTING OUTSIDE WETWELL.

(7) INTERMEDIATE GUIDERAIL BRACKET, LOCATED PER MANUFACTURER'S RECOMMENDATIONS.

(8) PIPE SUPPORT, SEE DETAIL 3/M12.

(9) LATERAL PIPE RESTRAINTS INSTALLED PER DET 12/M14. INSTALL ON VERTICAL PIPE ON 10 FT CENTERS AND WITHIN 3 FT OF ELBOWS.

(10) PUMPS FLOATS NOT SHOWN FOR CLARITY. SEE ELECTRICAL DRAWINGS.

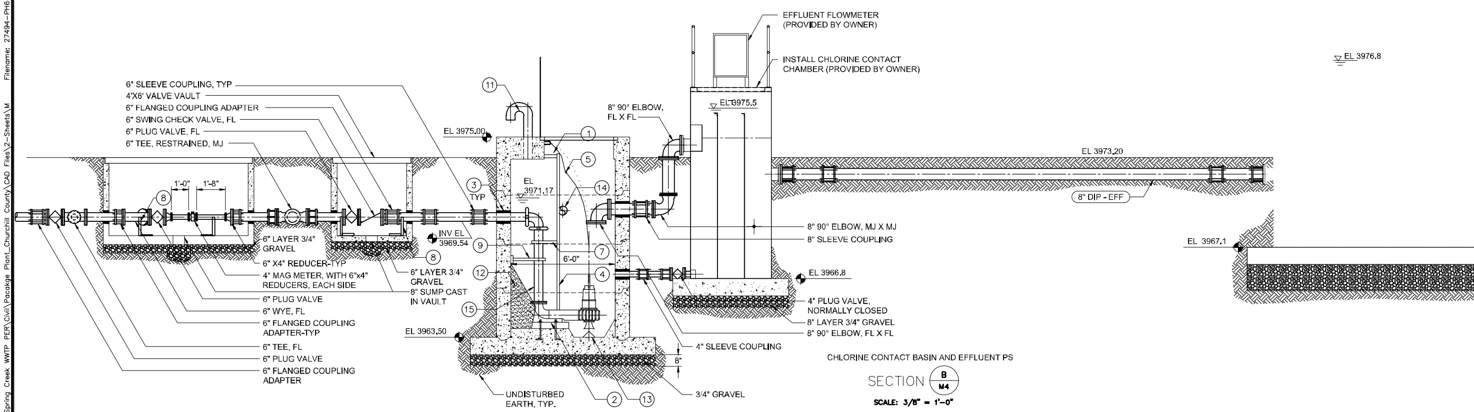
(11) 4" DIAMETER STEEL PIPE GOOSENECK VENT W/SST INSECT SCREEN.

(12) CONTRACTOR TO PROVIDE FIBERGLASS SELF-CLEANING WETWELL INSERT OR GROUT INSIDE OF WETWELL TO MATCH WETWELL BOTTOM PLAN, SEE SHEET M4.

(13) HYDRO-CONE, SEE DETAIL 8/M13.

(14) 6" SSFM

(15) 6"Ø SCH 10 STAINLESS STEEL PIPING INSIDE THE WETWELL.



CHLORINE CONTACT BASIN AND EFFLUENT PS

SECTION B / M4

SCALE: 3/8" = 1'-0"

NO.	DESCRIPTION	BY	CHK.	APPRVD	DATE
	RELEASED FOR BID	RJ	JB	WF	1/5/06
A	ADDENDUM #2	RDH	JB	WF	1/30/06
RD	RECORD DRAWINGS	RDH	JB	WKF	5/07

REVISIONS

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UNDERGROUND SERVICE (USA)

RECORD DRAWINGS
MAY 2007

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ENGINEER

PREPARED BY:
BROWN AND CALDWELL
3264 GONI ROAD, SUITE 153
CARSON CITY, NEVADA 89706
PHONE: (775) 883-4118

DESIGNED	J. BELLIN
DRAWN	T. LAMBERT
CHECKED	
APPROVED	
APPROVED	
APPROVED	

PREPARED FOR:
Churchill County, Nevada, Planning Department

CHURCHILL COUNTY UTILITIES
PACKAGED WASTEWATER
TREATMENT PLANT

TITLE
MECHANICAL
WASTEWATER TREATMENT PLANT
CHLORINE CONTACT AND EFFLUENT PUMP STATION
PARTIAL SECTION

SCALE 3/8" = 1'-0" LINE IS 4 INCHES AT FULL SIZE (IF NOT, SCALE ACCORDINGLY)

DRAWING NUMBER M5 SHEET NUMBER 39 OF 67 REVISION RD

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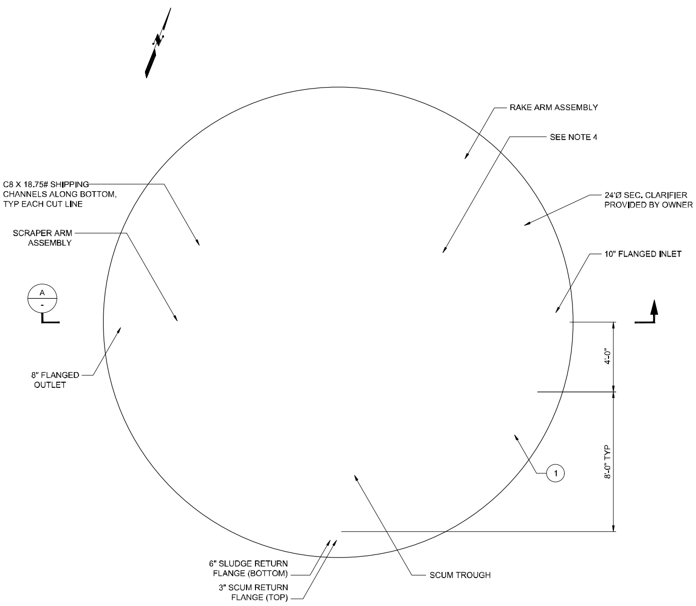


MECHANICAL CLARIFIER

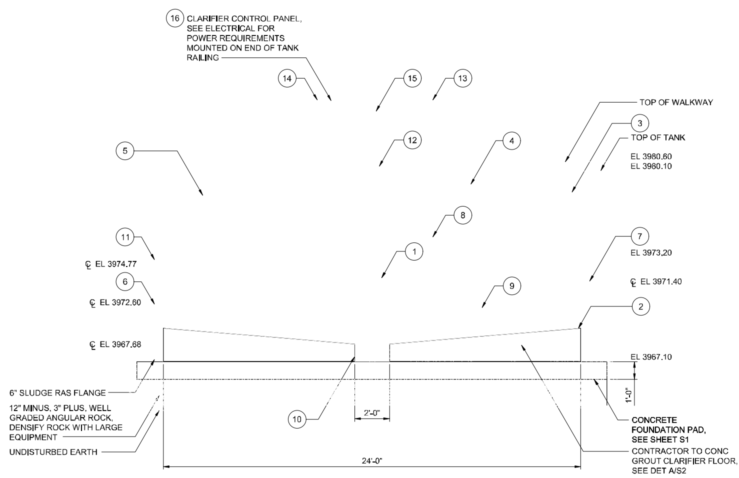
PLAN

SCALE: 3/8"=1'-0"

NOTES:
1. CLARIFIER SUPPLIED BY OWNER, INSTALLED AND ASSEMBLED BY CONTRACTOR.
2. ALL EQUIPMENT SHOWN TO BE INSTALLED BY CONTRACTOR.
3. COMPONENTS IN SECTION "A-A" MAY BE SHOWN OUT OF LOCATION FOR CLARITY.
4. TANK IS TO BE CUT HERE FOR SHIPPING PURPOSES. RECONNECTION AND FIELD WELDING BY CONTRACTOR.
5. CORRECTIONS OF MINOR MISFITS IS TO BE CONSIDERED PART OF RECONNECTION, AND PROVIDED BY FIELD CONTRACTOR.
6. FIELD TOUCH-UP TO BE COMPLETED BY FIELD CONTRACTOR AFTER RECONNECTION.

CLARIFIER EQUIPMENT LIST - PROVIDED BY OWNER

NO.	QTY.	PART NO.	DESCRIPTION
1	1	412	TORQUE TUBE
2	2	402	RAKE ARMS
3	1	403	WEIR TROUGH DETAIL
4	1	404	SKIMMER ARM
5	1	413	SCUM TROUGH
6	1	414	SCUM AIRLIFT PIPING
7	1	405	8" EFFLUENT
8	1	406	STILLING WELL
9	2	407	SUPPORT RODS
10	1	408	SUMP DETAIL
11	2	409	10" INFLUENT
12	1	415	HANG LOAD COUPLING
13	1	410	TANK & BRIDGE
14	1	411	HANDRAIL
15	1		SEW GEARMOTOR
16	1		CONTROL PANEL



SECTION A/-

NOT TO SCALE

NO.	DESCRIPTION	BY	CHK.	APPRVD	DATE
	RELEASED FOR BID	RJ	JB	WF	1/5/06
A	ADDENDUM #2	RDH	JB	WF	1/30/06
RD	RECORD DRAWINGS	RDH	JB	WKF	5/07

REVISIONS

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ENGINEER

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DESIGNED: J. BELLIN
DRAWN: T. LAMBERT
CHECKED
APPROVED
APPROVED
APPROVED

PREPARED FOR: Churchill County, Nevada, Planning Department

CHURCHILL COUNTY UTILITIES PACKAGED WASTEWATER TREATMENT PLANT

TITLE: MECHANICAL WASTEWATER TREATMENT PLANT

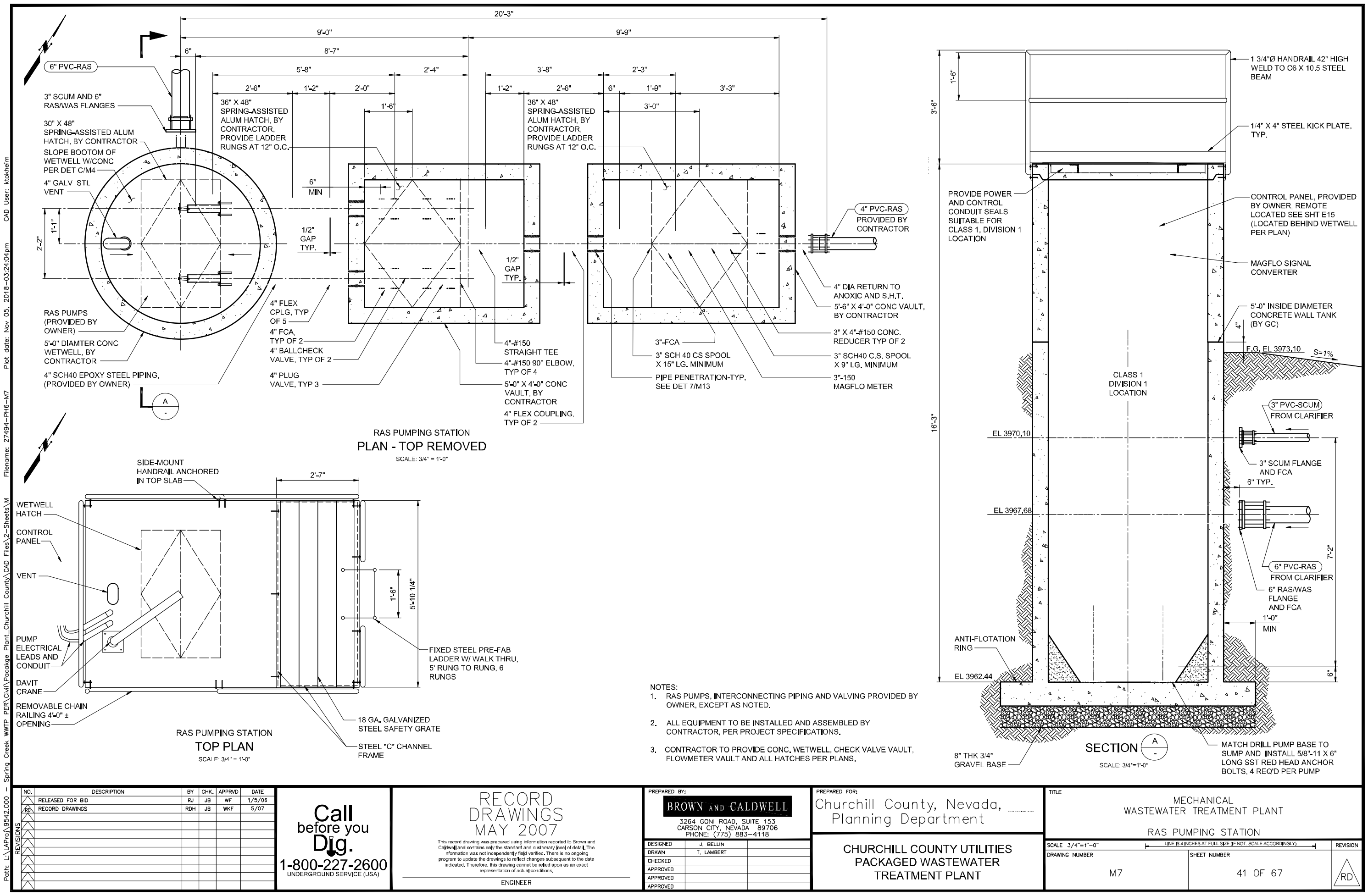
SECONDARY CLARIFIER PLAN AND SECTION

SCALE AS SHOWN — LINE IS 4 INCHES AT FULL SIZE (IF NOT, SCALE ACCORDINGLY)

DRAWING NUMBER: M6

SHEET NUMBER: 40 OF 67

REVISION: RD


RAS PUMPING STATION
PLAN - TOP REMOVED
SCALE: 3/4" = 1'-0"
RAS PUMPING STATION
TOP PLAN
SCALE: 3/4" = 1'-0"
SECTION A
SCALE: 3/4"=1'-0"
6" PVC-RAS
3" SCUM AND 6" RAS/WAS FLANGES
30" X 48" SPRING-ASSISTED ALUM HATCH, BY CONTRACTOR
SLOPE BOOTOM OF WETWELL W/CONC PER DET C/M4
4" GALV STL VENT
RAS PUMPS (PROVIDED BY OWNER)
5'-0" DIAMTER CONC WETWELL, BY CONTRACTOR
4" SCH40 EPOXY STEEL PIPING, (PROVIDED BY OWNER)
36" X 48" SPRING-ASSISTED ALUM HATCH, BY CONTRACTOR, PROVIDE LADDER RUNGS AT 12" O.C.
4" FLEX CPLG, TYP OF 5
4" FCA, TYP OF 2
4" BALLCHECK VALVE, TYP OF 2
4" PLUG VALVE, TYP 3
4"-#150 STRAIGHT TEE
4"-#150 90° ELBOW, TYP OF 4
5'-0" X 4'-0" CONC VAULT, BY CONTRACTOR
4" FLEX COUPLING, TYP OF 2
3"-FCA
3" SCH 40 CS SPOOL X 15" LG. MINIMUM
PIPE PENETRATION-TYP, SEE DET 7/M13
4" PVC-RAS PROVIDED BY CONTRACTOR
4" DIA RETURN TO ANOXIC AND S.H.T.
5'-6" X 4'-0" CONC VAULT, BY CONTRACTOR
3" X 4"-#150 CONC. REDUCER TYP OF 2
3" SCH40 C.S. SPOOL X 9" LG. MINIMUM
3"-150 MAGFLO METER
SIDE-MOUNT HANDRAIL ANCHORED IN TOP SLAB
WETWELL HATCH
CONTROL PANEL
VENT
PUMP ELECTRICAL LEADS AND CONDUIT
DAVIT CRANE
REMOVABLE CHAIN RAILING 4'-0" ± OPENING
FIXED STEEL PRE-FAB LADDER W/ WALK THRU, 5' RUNG TO RUNG, 6 RUNGS
18 GA. GALVANIZED STEEL SAFETY GRATE
STEEL "C" CHANNEL FRAME
1 3/4"Ø HANDRAIL 42" HIGH WELD TO C6 X 10.5 STEEL BEAM
1/4" X 4" STEEL KICK PLATE, TYP.
PROVIDE POWER AND CONTROL CONDUIT SEALS SUITABLE FOR CLASS 1, DIVISION 1 LOCATION
CONTROL PANEL, PROVIDED BY OWNER, REMOTE LOCATED SEE SHT E15 (LOCATED BEHIND WETWELL PER PLAN)
MAGFLO SIGNAL CONVERTER
5'-0" INSIDE DIAMETER CONCRETE WALL TANK (BY GC)
F.G. EL 3973.10
S=1%
CLASS 1 DIVISION 1 LOCATION
EL 3970.10
EL 3967.68
EL 3962.44
3" PVC-SCUM FROM CLARIFIER
3" SCUM FLANGE AND FCA
6" PVC-RAS FROM CLARIFIER
6" RAS/WAS FLANGE AND FCA
1'-0" MIN
ANTI-FLOTATION RING
8" THK 3/4" GRAVEL BASE
MATCH DRILL PUMP BASE TO SUMP AND INSTALL 5/8"-11 X 6" LONG SST RED HEAD ANCHOR BOLTS, 4 REQ'D PER PUMP
NOTES:
1. RAS PUMPS, INTERCONNECTING PIPING AND VALVING PROVIDED BY OWNER, EXCEPT AS NOTED.
2. ALL EQUIPMENT TO BE INSTALLED AND ASSEMBLED BY CONTRACTOR, PER PROJECT SPECIFICATIONS.
3. CONTRACTOR TO PROVIDE CONC. WETWELL, CHECK VALVE VAULT, FLOWMETER VAULT AND ALL HATCHES PER PLANS.
RELEASED FOR BID
RECORD DRAWINGS
Call before you Dig.
1-800-227-2600
UNDERGROUND SERVICE (USA)
RECORD DRAWINGS
MAY 2007
ENGINEER
BROWN AND CALDWELL
3264 GONI ROAD, SUITE 153
CARSON CITY, NEVADA 89706
PHONE: (775) 883-4118
Churchill County, Nevada, Planning Department
CHURCHILL COUNTY UTILITIES PACKAGED WASTEWATER TREATMENT PLANT
MECHANICAL
WASTEWATER TREATMENT PLANT
RAS PUMPING STATION
M7
41 OF 67

Appendix E

Alternative 2 – Aero-Mod SEQUOX
Extended Aeration Package WWTP Info

Wastewater Process Solutions

Wastewater Treatment Plant Proposal

for

Spring Creek, NV
Lumos & Associates, Inc.
657 Population Equivalent
18-Oct-18

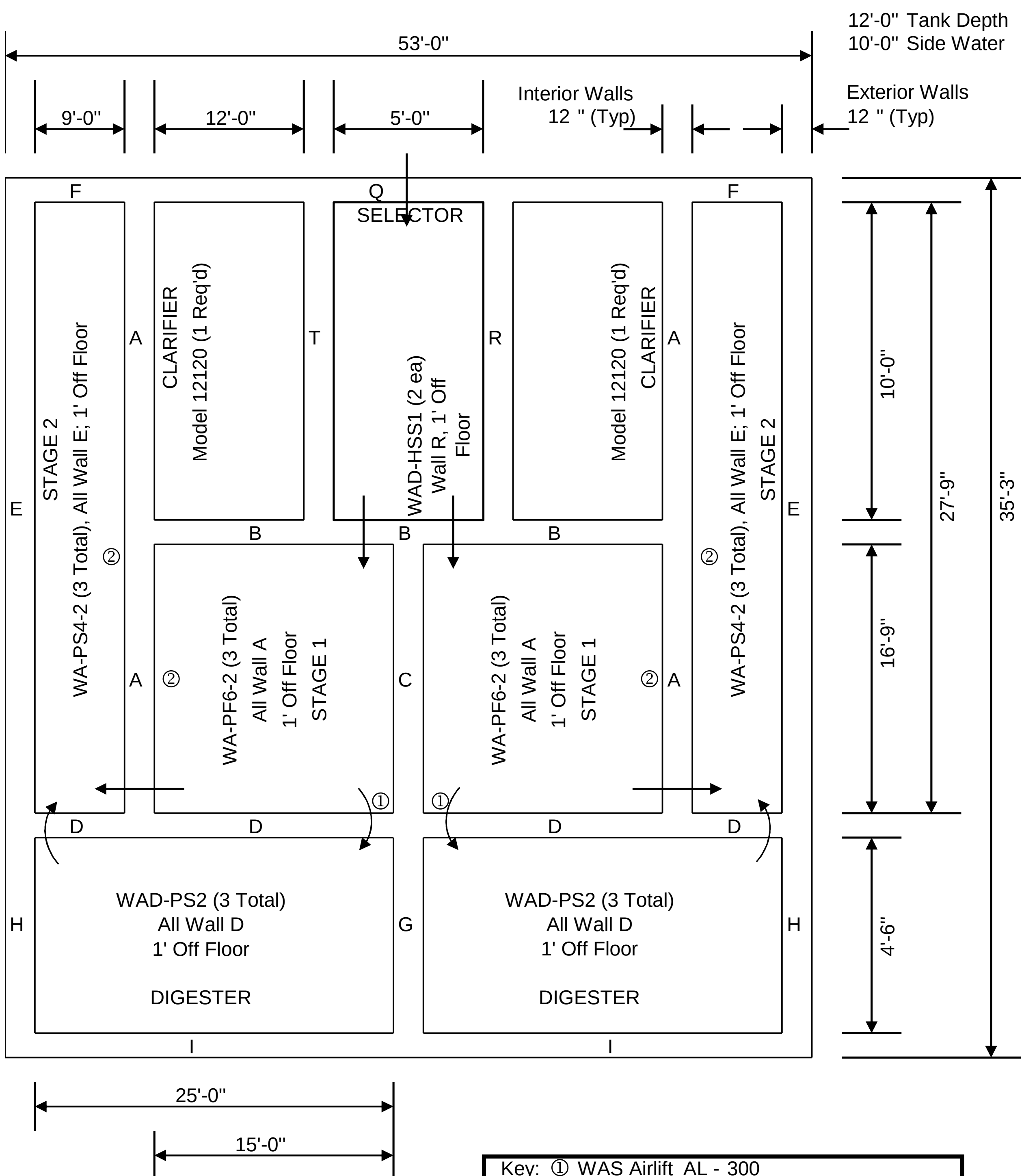
Contents

Aero-Mod, Inc.

GENERAL ARRANGEMENT DRAWING

Project: Spring Creek, NV ***Date:*** 18-Oct-18

Engineer: Lumos & Associates, Inc. Tank Dimensions (Not to Scale)



Key: ① WAS Airlift AL - 300
② DO Probe (~Centered Along Tank Wall)

Aero-Mod, Inc.

ACTIVATED SLUDGE DESIGN CALCULATIONS - ANNUAL AVERAGE

Project:	Spring Creek, NV								October 18, 2018
Engineer:	Lumos & Associates, Inc.								US Customary Units
Act. Sludge Process:		SEQUOX Plus						Prepared by:	BWN
DESIGN CONDITIONS & PARAMETERS									
		Influent		Effluent					
Flow (Q), MGD		0.075				0.2 lb BOD/capita-day = 657 Pop. Equiv.			
BOD_5, mg/L		210		10		Plant Elevation, FASL			5,659
BOD_5, lbs/day		131		6		**Aeration Basin**			
BOD_L, mg/L		280				Retention Time, hours			25
TSS, mg/L		230		15		Aeration Tank Volume, Mgal			0.079
Total P, mg/L		8.0				MCRT, days			20.0
Soluble P, mg/L		7.4		4.3		Wastewater Temperature, ^oC			8
NH_3-N, mg/L		45		1.0		Net Alkalinity Loss, mg/L as $CaCO_3$			(225)
NO_3-N, mg/L				5.0		**Aerobic Digester**			
NO_3-N, lb/d				3		Volume, Mgal			0.018
TKN, mg/L		68		3.2		Max MLSS, mg/l			12,000
TIN, mg/L				6.0		Digester Temperature, ^oC			8
PROJECTED OPERATING CONDITIONS - AERATION BASIN									
	Mixed Liquor Suspended Solids, mg/L							3,008	
	Mixed Liquor Volatile Suspended Solids, %							71%	
	F/M Ratio, lbs BOD_5/lb MLVSS							0.09	
	F/M Ratio, lbs BOD_5/lb MLSS							0.07	
	Organic Loading, lbs BOD_5/1000 cf of tank/day							12.5	
	First-Stage Specific Nitrification Rate, lb N/(lb MLVSS-day)							0.054	
	Oxygen Requirements (Carbonaceous), mg/L-hr							7.94	
	Oxygen Requirements (Nitrogenous), mg/L-hr							10.58	
	Oxygen Recovery (Denitrification), mg/L-hr							6.01	
	Solids Yield (Y), lb TSS/lb BOD_5							0.75	
	WAS - Solids Wasted, lbs/day							99	
	WAS - Solids Wasted, gal/day							3,934	
	WAS - Pumping Time, min/(day-pump) @					100	gpm	20	
PROJECTED OPERATING CONDITIONS - AEROBIC DIGESTER									
	Digester Degree C-Days							174	
	Volatile Solids Reduction in Digester							25%	
	(Net Volatile Solids Reduction Through Process, %)							51%	
	Solids To Waste from Digester, lbs/day							81	
	Volume to Waste from Digester, gallons/day							813	
	Digester Sludge Age, days							22	
	Volatile Suspended Solids							65%	

Aero-Mod, Inc.

AERATION REQUIREMENT CALCULATIONS - FIRST STAGE - AVERAGE

Project: Spring Creek, NV		October 18, 2018
Engineer: Lumos & Associates, Inc.		US Customary Units
Diffuser Type Used: Fine 1st Stage/Coarse 2nd Stage/No 3rd Stage	Prepared by:	BWN

AERATION REQUIREMENTS - FIRST STAGE

		Consumption
Carbonaceous (= 1.5 lb O2/lb BOD * 85 lb BOD/day/24), lb O2/hr	5.3	65%
Nitrogenous (= 4.6 lb O2/lb N Nitrified * 23.6 lb N Nitrified/day/24), lb O2/hr	4.5	65%
Denit. Credit (= 2.86 lb O2/lb N Denit. * 21.5 lb N Denit./day/24), lb O2/hr	-2.6	65%
Actual Oxygenation Rate (AOR), lbs O_2/hr	7.3	175

Standard Oxygenation Rate (SOR), lbs O_2/hr			24.0
$SOR = [(AOR * C_{s,20}) / (a * Q^{\wedge(T-20)} * (\tau * W * b * C_{s,20} - C_L))]$			
Where:	$C_{s,T}$	D.O. Saturation @ Sea Level and T, mg/l	9.09
	$C_{s,20}$	D.O. Saturation @ Sea Level and 20°C, mg/l	9.09
	$C_{s,act}$	D.O. Saturation in Wastewater, mg/l	7.01
	a	Alpha - O_2 Transfer Correction for Wastewater	0.55
	Q	Theta - Oxygen Transfer T Correction Coefficient	1.024
	T	Temperature of Water, °C (Design Maximum)	20
	τ	Oxygen Saturation Value ($C_{s,T,H}/C_{s,20}$)	1.000
	b	Beta - Salinity-Surface Tension Correction Factor	0.95
	P_H	Pressure at Site Elevation	11.9
	W	Omega (P_H/P_s)	0.812
	C_L	Residual D.O. Concentration, mg/l	2.00

Air Requirement at Standard Conditions		
= [SOR / (Oxygen Density * TE% * Diffuser Depth) / 60], scfm		148
Where:	Oxygen Density, lbs O_2/cf air	0.0187
	Clean Water Transfer Efficiency/Foot of Submergence, %	1.61%
	Diffuser Depth Below Water Surface, ft	9.0

Air Requirement at Plant Conditions

$$\frac{icfm}{scfm} = \frac{(T_{air}+460)}{T_{std}+460} \times \frac{14.7-RH\%_{std}xSVP_{std}}{14.7-RH\%_{act}xSVP_{Tair}} \times \frac{14.7}{P_H}$$

Where:	T_{std} = 68°F	
	$RH\%_{std}$ = 36%	
	SVP_{std} = 0.34 psi	
	T_{air} - Air Temperature, °F	80
	RH% - Relative Humidity, %	40%
	SVP_{Tair} - Saturated Vapor Pressure of Air @ T_{air}, psi	0.51
	icfm/scfm	1.27
	Process Air Required in First Stage Aeration Basins, icfm	188
	Minimum Air for Mixing First Stage Aeration Basins, icfm	64

Aero-Mod, Inc.

AERATION REQUIREMENT CALCULATIONS - SECOND STAGE - AVERAGE

Project:	Spring Creek, NV		October 18, 2018
Engineer:	Lumos & Associates, Inc.		US Customary Units
Diffuser Type Used:	Fine 1st Stage/Coarse 2nd Stage/No 3rd Stage	Prepared by:	BWN

AERATION REQUIREMENTS - SECOND STAGE

		Consumption
Carbonaceous (= 1.5 lb O2/lb BOD * 46 lb BOD/day/24), lb O2/hr	2.9	35%
Nitrogenous (= 4.6 lb O2/lb N Nitrified * 12.7 lb N Nitrified/day/24), lb O2/hr	2.4	35%
Denit. Credit (= 2.86 lb O2/lb N Denit. * 11.6 lb N Denit./day/24), lb O2/hr	-1.4	35%
Actual Oxygenation Rate (AOR), lbs O_2/hr	3.9	94

Standard Oxygenation Rate (SOR), lbs O_2/hr: 9.5

SOR = [(AOR * $C_{s,20}$) / (a * Q^$^{(T-20)}$ * (τ * W * b * $C_{s,20}$ - C_L))]

Where:			
	$C_{s,T}$	D.O. Saturation @ Sea Level and T, mg/l	9.09
	$C_{s,20}$	D.O. Saturation @ Sea Level and 20^{o}C, mg/l	9.09
	$C_{s,act}$	D.O. Saturation in Wastewater, mg/l	7.01
	a	Alpha - O_2 Transfer Correction for Wastewater	0.75
	Q	Theta - Oxygen Transfer T Correction Coefficient	1.024
	T	Temperature of Water, ^{o}C (Design Maximum)	20
	τ	Oxygen Saturation Value ($C_{s,T,H}$/$C_{s,20}$)	1.000
	b	Beta - Salinity-Surface Tension Correction Factor	0.95
	P_H	Pressure at Site Elevation	11.9
	W	Omega (P_H/P_s)	0.812
	C_L	Residual D.O. Concentration, mg/l	2.00

Air Requirement at Standard Conditions

= [SOR / (Oxygen Density * TE% * Diffuser Depth) / 60], scfm: 126

Where:		
	Oxygen Density, lbs O_2/cf air	0.0187
	Clean Water Transfer Efficiency/Foot of Submergence, %	0.75%
	Diffuser Depth Below Water Surface, ft	9.0

Air Requirement at Plant Conditions

$$\frac{icfm}{scfm} = \frac{(T_{air}+460)}{T_{std}+460} \times \frac{14.7-RH\%_{std}xSVP_{std}}{14.7-RH\%_{act}xSVP_{Tair}} \times \frac{14.7}{P_H}$$

Where:	
T_{std} = 68^{o}F	
$RH\%_{std}$ = 36%	
SVP_{std} = 0.34 psi	
T_{air} - Air Temperature, ^{o}F	80
RH% - Relative Humidity, %	40%
SVP_{Tair} - Saturated Vapor Pressure of Air @ T_{air}, psi	0.51
icfm/scfm	1.27

Process Air Required in Second Stage Aeration Basins, icfm	159
Minimum Air for Mixing Second Stage Aeration Basins, icfm	63

Aero-Mod, Inc.

AERATION REQUIREMENT CALCULATIONS - DIGESTER

Project:	Spring Creek, NV			October 18, 2018
Engineer:	Lumos & Associates, Inc.			US Customary Units
Diffuser Type Used:	**Coarse Bubble**		Prepared by:	BWN

AERATION REQUIREMENTS - DIGESTER

Net O_2 Required, lb O2/hr @	1.80	lb O_2/lb VSSdest (incl. nit./denite)	1.3	
		Actual Oxygenation Rate (AOR), lbs O_2/hr	1.3	
		Standard Oxygenation Rate (SOR), lbs O_2/hr	3.9	
		SOR = [(AOR * $C_{s,20}$) / (a * Q^$^{(T-20)}$ * (τ * W * b * $C_{s,20}$ - C_L))]		
Where:	$C_{s,T}$	D.O. Saturation @ Sea Level and T, mg/l	9.09	
	$C_{s,20}$	D.O. Saturation @ Sea Level and 20^{o}C, mg/l	9.09	
	$C_{s,act}$	D.O. Saturation in Wastewater, mg/l	7.01	
	a	Alpha - O_2 Transfer Correction for Wastewater	0.60	
	Q	Theta - Oxygen Transfer T Correction Coefficient	1.024	
	T	Temperature of Water, ^{o}C	20	
	τ	Oxygen Saturation Value ($C_{s,T,H}$/$C_{s,20}$)	1.000	
	b	Beta - Salinity-Surface Tension Correction Factor	0.95	
	P_H	Pressure at Site Elevation	11.9	
	W	Omega (P_H/P_s)	0.812	
	C_L	Residual D.O. Concentration, mg/l	2.0	
		Air Requirement at Standard Conditions		
		= [SOR / (Oxygen Density * TE% * Diffuser Depth) / 60], scfm	74	
Where:		Oxygen Density, lbs O_2/cf air	0.0187	
		Clean Water Transfer Efficiency/Foot of Submergence, %	0.50%	
		Diffuser Depth Below Water Surface, ft	9.5	
		Denitrification ***Penalty*** (= 0 if sequential aeration ***IS*** used)		
		= (TKN_{oxy}-O_2 in Effluent NO_3) * 50%, lb O_2/hr	0.0	
		Air Penalty = O_2Penalty * Air Requirement / AOR, scfm	0	
		Net Process Aeration Required in Digester, scfm	74	
		Air Requirement at Plant Conditions		

$$\frac{icfm}{scfm} = \frac{(T_{air}+460)}{T_{std}+460} \times \frac{14.7-RH\%_{std} x SVP_{std}}{14.7-RH\%_{act} x SVP_{Tair}} \times \frac{14.7}{P_H}$$

Where:	T_{std} = 68^{o}F		
	$RH\%_{std}$ = 36%		
	SVP_{std} = 0.34 psi		
	T_{air} - Air Temperature, ^{o}F		80
	RH% - Relative Humidity, %		40%
	SVP_{Tair} - Saturated Vapor Pressure of Air @ T_{air}, psi		0.51
		icfm/scfm =	1.27
		Process Air Required for Digestion, icfm	94
		Minimum Air Required for Mixing, icfm	30

Aero-Mod, Inc.

BLOWER DESIGN CALCULATIONS

Project:	Spring Creek, NV							October 18, 2018
Engineer:	Lumos & Associates, Inc.							US Customary Units
Process Configuration:			SEQUOX Plus				Prepared by:	BWN
AIR REQUIREMENTS				Process		Mixing,	Required	
				scfm	icfm	icfm	icfm	scfm
First Stage Aeration				148	188	64	188	148
Second Stage Aeration				126	159	63	159	126
Digesters	(Mix Half Digesters)			74	94	30	94	74
Anoxic Selector							13	10
Clarifier RAS Airlift Pumps & Skimmers							130	102
		Design Load Air Required		(Mix Half Digesters)			583	460
BLOWER SIZING								
Pressure (w/Allowance for Blower Inlet/Outlet)						In. H_2O	psig	
First Stage Aeration						158	5.7	
Second Stage Aeration, Selector, Clarifiers & Digesters						146	5.3	
								Minimum
Estimated Power Requirements for Operation, hp							Full Load	(Mixing)
First Stage Aeration Basins							8	4
Second Stage Aeration, Selector, Clarifiers & Digesters							16	9
				Total			24	14
						Sizing		
			Total			Data	Total	
Number of Blowers						scfm ea.	460	
Total (Including Backup)			2			P_1, psig	11.9	
Backup			1			P_2, psig	5.7	
Blower Motor Size, hp			30			RH	40%	
						T_{inlet}, ^oF	80	
						icfm ea.	583	
BLOWER SELECTION								
		Motor hp	Hz	rpm	hp	icfm	Outlet T	
Total		30						
Maximum			60.0	3,170	25.9	688	163 F	
Design Point			56.5	2,990	24.2	642	165 F	
Minimum			18.0	950	7.5	141	203 F	

Aero-Mod, Inc.

CLARIFIER DESIGN CALCULATIONS

Project:	Spring Creek, NV		October 18, 2018
Engineer:	Lumos & Associates, Inc.		US Customary Units
Clarifier Type:	Split-ClarAtor	Prepared by:	BWN

FLOW CONDITIONS

	Annual Ave	Max Mo	Max Wk	Max Day	Max Hr	Max Flow Through Clarifier
Flow, mgd	0.075	0.095	0.101	0.113	0.150	0.192
Peaking Factor		1.27	1.35	1.50	2.00	2.56
Duration, min				1,440	240	
RAS Flow, mgd	0.075	0.075	0.075	0.075	0.075	0.075

EQUIPMENT SIZING & SELECTION

Number of Clarifiers	2	Surface Area per Clarifier, sf	120
Clarifier Unit Model	12120	Total Surface Area, sf	240
Bridge Length, ft	12	Total Weir Length, ft	42
Clarifier Unit Width, ft	10	Tank Wall Height, ft	12.0
Bridges per Clarifier	1.0	Tank Water Depth, ft	10.0

CLARIFIER OPERATION	Surface Overflow, gpd/sf	Weir Loading, gpd/lin. ft	Solids Loading, lb/(sf-day)	Retention Time (Incl. RAS), hr	SOR w/o EQ, gpd/sf
Annual Average	313	1,786	15.7	2.9	
Max Month	396	2,262	22.4	2.5	
Max Wk	422	2,411	23.2	2.4	
Max Day	469	2,679	24.7	2.4	
Max Hr	625	3,571	29.6	1.9	625
***(Max Flow Through Clarifier)	800	4,571	35.2	1.6	

PEAK FLOW HANDLING - IN-BASIN SURGE STORAGE

		Vol. of Surge Storage, gal	3,871
Max "Hr" Flow Entering Plant, gph	6,250	Capacity of Surge Storage, hr	n/a
Maximum Flow Exiting Plant, gph	8,000	Add'l Surge Storage Req'd, gal	0
Excess Peak Flow, gpm	0	Nominal Rise at Max "Hr," in.	0.0

EFFLUENT PIPE SIZING

Target Max Month Velocity, ft/sec	**2.00**			
Clarifier Effluent Piping			Plant Effluent Piping	
Number of Pipes per Clarifier	**1**		Number of Main Effluent Pipes	**1**
Hazen-Williams C	**150**		Hazen-Williams C	**150**
Pipe Diameter, in.	4		Pipe Diameter, in.	4

Velocity and Headloss	V, fps	HL, in./100 ft	V, fps	HL, in./ 100 ft
Annual Ave	0.66	0.6	1.33	2.1
Max Month	0.84	0.9	1.68	3.2
Max Wk	0.90	1.0	1.80	3.6
Max Hr	1.33	2.1	2.66	7.5
***(Max Flow Through Clarifier)	1.70	3.3	3.40	11.9

Aero-Mod, Inc.

TANKAGE DESIGN CALCULATIONS

Project:	Spring Creek, NV								October 18, 2018
Engineer:	Lumos & Associates, Inc.								US Customary Units
Tank Construction:		Cast-in-Place Concrete						Prepared by:	BWN
RAS CHANNEL									
		Total Depth, ft	0.0		Width, ft	0.0			
		Total Length, ft	0.0		Total Area, sf	0			
FERMENTER TANK				Volume Required, gal	0				
		Number of Tanks	0		Tank Width, ft	0.00			
		Tank Wall Height, ft	12.0		Tank Length, ft	0.00			
		Tank Water Depth, ft	10.0		Total Volume, gal	0			
		Freeboard, ft	2.0				Retention Time (for $Q_{forward}$), min	N/A	
SELECTOR TANK				Volume Required, gal	3,646				
		Number of Tanks	1		Tank Width, ft	5.00			
		Tank Wall Height, ft	12.0		Tank Length, ft	10.00			
		Tank Water Depth, ft	10.0		Total Volume, gal	3,740			
		Freeboard, ft	2.0				Retention Time (for $Q_{forward}$), min	72	
AERATION TANK						Volume Required, gal	75,000		
		Tank Wall Height, ft	12.0			Number of Trains	2		
		Tank Water Depth, ft	10.0			Number of Stages/Train	2		
				Stage 1	Stage 2	Stage 3			
			Number of Tanks	2	2	0			
			Tank Length, ft	16.75	27.75	0.00			
			Tank Width, ft	15.00	9.00	0.00			
			Area of Each Tank, sf	251	250	0			
			Total Volume, gal	37,587	37,363	0			
						Total Volume Provided, gal	74,950		
CLARIFIER TANK									
		Number of Tanks	2			Tank Width, ft	10.0		
		Tank Wall Height, ft	12.0			Tank Length, ft	12.0		
		Tank Water Depth, ft	10.0			Total Volume, gal	17,952		
AEROBIC DIGESTER TANK					Volume Required, gal	17,065			
		Number of Tanks	2			Tank Width, ft	25.0		
		Tank Wall Height, ft	12.0			Tank Length, ft	4.5		
		Tank Water Depth, ft	10.5			Total Volume, gal	17,672		
TANKAGE DIMENSIONS									
		Wall Height, ft	12.0				Wall Thickness, in.		
		Total Length, ft	35.25				Interior	12.0	
		Total Width, ft	53.00				Exterior	12.0	
		Total Area, sf	1,868				Floor Thickness, in.	18.0	
		Wall Length, lineal ft					Total Concrete for Slab, cy	161	
		Interior	170				Total Grout for Clarifier, cy	16	
		Exterior	152				Total Concrete for Walls, cy	150	
		Total	321						

Aero-Mod, Inc.

POWER, PARTS, CONSUMABLES AND LABOR COST ESTIMATES

Project:	Spring Creek, NV		October 18, 2018
Engineer:	Lumos & Associates, Inc.		
Diffuser Type Used:	Fine 1st Stage/Coarse 2nd Stage/No 3rd Stage	Prepared by:	BWN

POWER REQUIREMENTS

Power Requirements, hp	Max Month	Minimum (Mixing)	Design Yr Ave
Process			
Stage 1 Aeration (Includes Air Sequencing)	9.4	4.3	7.4
Stage 2 Aeration (Includes Air Sequencing)	8.0	3.7	6.3
Stage 3 Aeration (Includes Air Sequencing)	0.0	0.0	0.0
Clarifier & Selector	0.9	0.6	0.7
Digester	1.7	1.0	1.3
Subtotal	20.0	9.6	15.8
Ancillary			
Compressor(s) for Pneumatic System	0.80	0.38	0.63
Compressor Auto-Drains	0.02	0.01	0.02
Compressor Regenerative Desiccant Dryer	0.04	0.02	0.03
Blower VFD Control Panels	0.95	0.45	0.75
PLC-based Process & D.O. Control	0.30	0.14	0.24
Subtotal	2.11	1.01	1.67
TOTAL (hp)	22.1	10.6	17.5
Annual Power Costs @ **$0.10** /kWh	$14,470	$6,900	$11,423

REPLACEMENT PARTS, CONSUMABLES AND MAINTENANCE LABOR REQUIREMENTS

	Qty/ Unit	Events/ yr	Unit Cost	Units	Annual Allowance	Labor Hrs/Unit	Labor Hrs/Yr
Service Blowers		**1**	**$280**	2.0	$560	**8.00**	16
Service Compressors		**1**	**$130**	2.0	$260	**4.00**	8
*Replace:							
Fine Bubble Diffusers Every	**7.00**	yrs	$24	5.00	$120	**0.50**	2.50
Compressors Every	**5.00**	yrs	$9,295	2.00	$3,718	**16.00**	6.40
Blowers & VFDs Every	**20.00**	yrs	$37,701	2.00	$3,770	**40.00**	4.00
Allowance for Other @	**20%**	of total			$2,108		10.00
Estimated Totals					$10,536		46.90

*Sinking fund costs excluding interest

OPERATIONS LABOR REQUIREMENTS

	Hrs/ Event	Events/yr Design	Total Hours/yr Design
Collect Process Samples	**1.0**	**52**	52
Analyze Process Samples	**3.0**	**52**	156
Evaluate & Record Data	**1.0**	**52**	52
Reporting	**2.0**	**12**	24
Inspect/Clean Diffusers	**4.0**	**2**	8
Inspect/Clean DO Probes	**0.5**	**52**	26
Plant Housekeeping	**2.0**	**52**	104
Rounds/Other Activities	**1.0**	**260**	260
Estimated Yearly Hours			682

TOTAL ESTIMATED O&M LABOR

Design	
729	hr/yr
14	hr/wk
$31.00	/hr
$22,596	/yr

Aero-Mod, Inc.

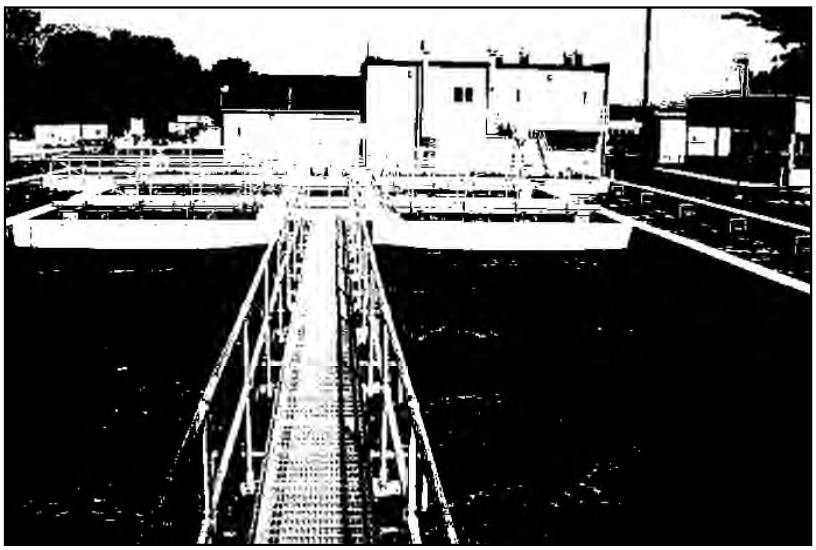
ITEMIZED EQUIPMENT AND SERVICES (& CONCRETE ESTIMATES)

Project:	Spring Creek, NV								October 18, 2018
Engineer:	Lumos & Associates, Inc.								US Customary Units
								Prepared by:	BWN
EQUIPMENT SUPPLIED									
AERATION EQUIPMENT									
2	Aeration Blower w/Sound Enclosure, P.D.,				30	HP - 230/460 V, 3 ph,		642	icfm
	Outdoor Enclosure(s)?		**N**						
2	First-Stage SEQUOX butterfly valve, pneumatically-actuated, 4"								
2	First Stage air isolation butterfly valve, gear-operated, 4"								
2	Second-Stage Air Flow Control Assembly, 6" x 4"								
6	Wall mounted aeration assembly, 1st Stage Basins, Model WA-PF6-2								
6	Wall mounted aeration assembly, 2nd Stage Basins, Model WA-PS4-2								
SELECTOR TANK EQUIPMENT									
2	Wall mounted aeration assembly, Selector Tank, Model WAD-HSS1								
1	Isolation Butterfly Valve, 4"								
CLARIFIER & RAS EQUIPMENT									
2	Aero-Mod Split-ClarAtor Clarifier System,				Model 12120,		120	sf/each	
WAS & DIGESTION EQUIPMENT									
2	WAS airlift pump, Model AL-300								
6	Wall mounted aeration assembly, Model WAD-PS2								
2	Digester Air Flow Control Assembly, 4" x 2"								
ELECTRICAL & CONTROLS EQUIPMENT									
1	SEQUOX Control Panel, Model: PLC SQC-100-PLC - 115 V								
2	Blower VFDs - 460 V, 3 ph 30 HP								
2	Air compressor system(s),			**2**	hp each, 460 V, 3 ph				
2	Air compressor auto-drain - 115 V wall outlet								
1	Regenerative desiccant dryer mounted on dry storage tank - 115 V wall outlet								
1	Dissolved Oxygen Control System								
WALKWAYS & ANCILLARY EQUIPMENT									
140	Wall mounted walkway & handrail, LF								
2	Wall mounted stop plates & frames								
2	Sonication algae control system(s)								
LS	Spare Parts								
LS	Interior tank installation materials - SS brackets, SS bolts, PVC wall inserts, pneumatic tubing, misc.								
SERVICES									
LS	Freight to Jobsite								
LS	Aero-Mod equipment dry inspection,				1	Days			
LS	Aero-Mod equipment wet inspection,				1	Days			
LS	Aero-Mod equipment final startup,				1	Days			
LS	Aero-Mod post-startup review,				1	Days			
LS	Post-Start Op School,		2	days at Factory in Manhattan, KS				2	Person(s)
BUDGET EQUIPMENT COST (Excluding all taxes, duties, fees and similar charges)									$463,000
ESTIMATED EQUIPMENT & INTERIOR PIPING INSTALLATION COST									$44,000
		ESTIMATED CONCRETE TANK COST							$197,000
			Concrete for Tank Walls, cy				150		
			Installed Concrete Cost, $/cy				**$600**		
			Concrete for Tank Slab, cy				161		
			Installed Concrete Cost, $/cy				**$600**		
			Grout for Clarifier Bottom, cy				16		
			Installed Concrete Cost, $/cy				**$600**		
									===========
TOTAL ESTIMATED COST									**$704,000**

Process Bulletin

SEQUOX® Biological Nutrient Removal

Activated Sludge Process Provides Nutrient Removal with High Quality Treatment and Energy Savings



The rectangular layout of the SEQUOX Process results in a smaller footprint and easy expansion.

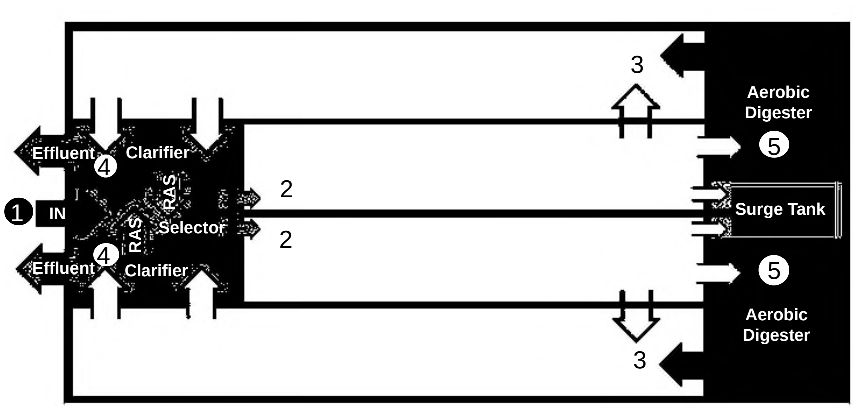
SEQUOX Process

- **Biological nutrient removal**
- **Ability to handle up to 4:1 sustained peak flows with ClarAtor clarifier technology**
- **Continuous clarification with sequencing aeration**
- **Operator friendly, low maintenance**
- **Selector tank promotes better settling characteristics**
- **Dedicated nitrification tank**
- **Sequencing without stopping blowers**
- **No moving parts below the water surface**
- **Superior effluent quality**

The SEQUOX Biological Nutrient Removal Process is a patented process and the latest innovation for biological nutrient removal from Aero-Mod. SEQUOX *(SEQUential OXidation)* offers the benefits of sequencing aeration with the reliability of continuous clarification, resulting in consistently superior effluent quality with total nitrogen levels as low as 3-5 mg/L. Phosphorus removal can be achieved by incorporating an anaerobic selector and/or chemical addition. The process is energy efficient and has a small footprint, lowering capital costs.

The SEQUOX process incorporates the patented ClarAtor® clarifier technology, another low-maintenance, operator friendly solution featuring stainless steel and fiberglass components with no moving parts below the water. Its unique flow regulation system provides in-basin surge storage. In fact, the SEQUOX process offers the ability to handle up to 4:1 sustained peak flows with no bypassing of untreated wastewater. Many collection systems encounter sustained peak flows during wet weather conditions. When infiltration and inflow is a problem, the SEQUOX-HF system offers high flow treatment capabilities.

Process Bulletin



SEQUOX Biological Nutrient Removal

1 – Flow enters into a **Selector Tank** where the raw sewage is combined with returned activated sludge (RAS) from the clarifiers.

2 – This mixture then flows into continuously aerated **First Stage Aeration Basins**, where adequate retention time is provided to achieve excellent BOD and ammonia removal (nitrification).

3 – Flow continues into the **Second Stage Aeration Tanks**, which operate in parallel. The aeration is sequenced on and off from one tank to the other. The process alternates which basin is aerated, typically sequencing the on/off cycle on a two hour basis. The end result is excellent denitrification without having to turn the blowers on and off, but by controlling which tank is receiving air.

The nitrate laden MLSS from the first stage is incorporated into oxygen depleted Biomass in the second stage. This settled biomass becomes oxygen deprived, thus using nitrates for their oxygen source (denitrification). During re-aeration, additional BOD removal and nitrification continues. The cycle is repeated several times as the liquid mass progresses through the tank to the clarifier.

4 – The mixture then enters the **ClarAtor clarifier** where the biomass is settled and hydraulically returned to the selector tank. The clarified effluent is withdrawn and discharged.

5 – At regular intervals, solids are automatically or manually wasted to the **Aerobic Digester**. Supernatant is automatically decanted back to the aeration process via a fixed overflow weir.

During denitrification, a portion of the oxygen required to oxidize the ammonia nitrogen into nitrate nitrogen is reclaimed. When the bacteria use the chemical oxygen from the nitrates, this reduces overall oxygen requirements, thus reducing total energy costs. The denitrification process also reclaims alkalinity. If alkalinity levels are low, the Sequox process can reduce or eliminate chemical costs associated with pH control.

The process is controlled within the tanks by sequencing the air with simple timer logic.

Even if nutrient removal is not the primary objective, the SEQUOX process is a cost effective solution that insures future nitrogen limits can be met with no biological process upgrades required.

ClarAtor Clarifier

Combining the SEQUOX Process with the patented ClarAtor clarifier technology offers the ability to handle up to 4:1 sustained peak flows with no loss of solids. Other ClarAtor advantages include:

- **No moving parts below the water**
- **Unique ability to regulate effluent flow rate for in-basin surge storage**
- **Uniform influent distribution and collection**
- **Stainless steel and fiber-glass fabrication**
- **Rapid and positive sludge withdrawal**
- **Minimal maintenance**

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Name	City	State	Country	Avg. Flow - MGD	Year	Process
Ford Motor Company	Cuautitlan		México	0.410	1995	Extended Aeration
Frost	Frost	TX		0.050	1995	Extended Aeration
Kirklin	Kirklin	IN		0.140	1995	Extended Aeration
Lost Valley Lake		MO		0.060	1995	Extended Aeration
San Joaquin County	Flag City	CA		0.160	1995	Extended Aeration
Ford Motor Company	Valencia		Venezuela	0.032	1996	Extended Aeration
New Richmond	New Richmond	OH		0.850	1996	Extended Aeration
Todd Road Jail	Ventura County	CA		0.085	1996	Extended Aeration
Vilonia, Arkansas	Vilonia	AR		0.250	1996	Sequox Process
Beloit, Kansas	Beloit	KS		0.612	1997	Sequox Process
Gillham	Gilham	AR		0.200	1997	Extended Aeration
Ilium Valley - Telluride, Colorado - 0.035 MGD – 1996	Telluride	CO		0.035	1997	Extended Aeration
Maryville Treatment Center	Maryville	MO		0.066	1997	Extended Aeration
Pottsville	Pottsville	AR		0.150	1997	Extended Aeration
Santiago International Airport	Santiago		Chile	2.200	1997	Sequox Process
Tepeaca	Tepeaca		México	1.200	1997	Sequox Process
Wamego, Kansas	Wamego	KS		0.750	1997	Sequox Process-HF
West Side Consolidated School District	Jonesboro	AR		0.030	1997	Extended Aeration
Biggs	Biggs	OR		0.080	1998	Extended Aeration
Buffalo	Buffalo	TX		0.100	1998	Extended Aeration
City of Acatlán	Acatlan		México	1.000	1998	Sequox Process
City of Lampasas Pre-Treatment Facility	Lampasas	TX		0.100	1998	Extended Aeration
Ellis	Ellis	KS		0.300	1998	Sequox Process-HF
Henagar	Henagar	AL		0.150	1998	Extended Aeration
Intel Corporation	Belen		Costa Rica	0.208	1998	Extended Aeration
Iquique	Iquique		Chile	0.035	1998	High Rate
Linah Touristic Development, Pan Emirates			Egypt	0.106	1998	Extended Aeration
Maize, Kansas	Maize	KS		0.500	1998	Sequox Process-HF
Metaline, Washington	Metaline	WA		0.044	1998	Extended Aeration
Sabormex	Aguascaliente		México	0.053	1998	High Rate
Sebring Airport Authority	Sebring	FL		0.090	1998	Extended Aeration
Snake Spring Township	Bedford	PA		0.285	1998	Sequox Process
Tulare County Juvenile Detentional Facility, Phase II	Tulare County	CA		0.440	1998	Extended Aeration
Ak-Chin Wastewater Facility	Maricopa	AZ		0.065	1999	Sequox Process
Blue Township Sewer District	Manhattan	KS		0.100	1999	Extended Aeration
Booneville	Booneville	KY		0.200	1999	Sequox Process
Bryant	Bryant	AR		2.000	1999	Sequox Process-HF
Carlin Fire Academy	Carlin	NV		0.020	1999	Extended Aeration
Dos Pinos	Coyol de Alajuela		Costa Rica	0.180	1999	High Rate
Gerber	San Jose		Costa Rica	0.120	1999	High Rate
Grand Sharm	Grand Sharm		Egypt	0.092	1999	Extended Aeration
Hamilton	Hamilton	AL		1.500	1999	Sequox Process-HF
Hiawassee River (Clay Cty)	Hayesville	NC		0.300	1999	Extended Aeration
Kraft Foods	México City		México	0.175	1999	High Rate
Lenguazaque	Lenguazaque		Columbia	0.060	1999	Extended Aeration
Lizton, Indiana	Lizton	IN		0.150	1999	Sequox Process
Nemak	Monterrey		México	0.053	1999	Extended Aeration
Odessa	Odessa	WA		0.200	1999	Sequox Process
Pfeiffer Big Sur State Park	Big Sur	CA		0.096	1999	Extended Aeration
Philip Morris	Belen		Costa Rica	0.050	1999	High Rate

Name	City	State	Country	Avg. Flow - MGD	Year	Process
Roberts Industrial Development	Wilmington	OH		0.200	1999	Sequox Process
Royal City	Royal City	WA		0.250	1999	Sequox Process
Sherwood Forest	Greenville	OH		0.050	1999	Extended Aeration
Southside - St. David's	St. David's		Bermuda	0.120	1999	Extended Aeration
Tenn-Tom Marina - Pickwick Dam		TN		0.050	1999	Extended Aeration
Warsaw	Warsaw	KY		0.200	1999	Sequox Process
Bear, High & Wolf Lake RSD		IN		0.125	2000	Sequox Process
Bellevue	Bellevue	IA		0.330	2000	Sequox Process-HF
Ford Climate	Queretaro		México	0.007	2000	High Rate
Kearny	Kearny	AZ		0.250	2000	Sequox Process
Kerens	Kerens	TX		0.250	2000	Sequox Process
McCordsville	McCordsville	IN		0.075	2000	Extended Aeration
Morocco	Morocco	IN		0.150	2000	Sequox Process
Newberry Township - York County		PA		1.300	2000	Sequox Process
Prairie Utilities, Inc. - Tipton County		IN		0.055	2000	Extended Aeration
Queen Wilhelmina State Park	Queen Wilhelmina	AR		0.048	2000	Extended Aeration
Tecamachalco	Puebla		México	0.750	2000	Sequox Process
Tiffin	Tiffin	IA		0.425	2000	Sequox Process-HF
Volkswagen - Puebla	Puebla		México	0.640	2000	Sequox Process
Warren Frozen Foods	Altoona	IA		0.050	2000	High Rate
Waco, Nebraska	Waco	NE		0.060	2000	Extended Aeration
West Burlington	West Burlington	IA		0.931	2001	Sequox Process-HF
Aberdeen	Aberdeen	OH		0.385	2001	Sequox Process
Ak-Chin Wastewater Facility – Phase II	Maricopa	AZ		0.175	2001	Sequox Process
Coca-Cola	Apizaco		México	0.317	2001	High Rate
Ford Car Plastics	Monterrey		México	0.050	2001	Extended Aeration
GM Expansion	Toluca		México	0.091	2001	High Rate
Gypsum	Gypsum	CO		0.960	2001	Sequox Process
Jasper	Jasper	AR		0.100	2001	Extended Aeration
Kraft Foods	Ecatepec		México	0.057	2001	High Rate
Lakewood Hills Improvement District	Ozawki	KS		0.040	2001	Extended Aeration
Monrovia	Monrovia	IN		0.085	2001	Extended Aeration
Oak Meadows	Oak Meadows	CO		0.035	2001	Extended Aeration
Pateros, Washington	Pateros	WA		0.125	2001	Extended Aeration
Santa Fe Valley		CA		0.285	2001	Sequox Process
Windsor Estates	Middletown	NY		0.040	2001	Extended Aeration
Warren Frozen Foods (Expansion)	Altoona	IA		0.150	2002	High Rate
Casa Cuervo S.A. de C.V. (Tequila)			México	0.073	2002	High Rate
Colorado Gold Chips	Colorado Springs	CO		0.028	2002	High Rate
Endicott	Endicott	WA		0.155	2002	Extended Aeration
Frito-Lay, Beloit, WI – 2001	Beloit	WI		0.800	2002	Kaldnes/High Rate
Jay	Jay	FL		0.120	2002	Sequox Process
McCordsville - Phase II	McCordsville	IN		0.150	2002	Extended Aeration
Milford	Milford	TX		0.060	2002	2-Stage Ext. Aeration
Wellman	Wellman	IA		0.450	2002	Sequox Process-HF
Pickering Place	Belton	MO		0.060	2002	Extended Aeration
Pittsford	Pittsford	VT		0.085	2002	Sequox Process
Prairie Creek		MO		0.250	2002	Sequox Process
Santa Fe Valley – Phase II		CA		0.100	2002	Sequox Process
Silsbee	Silsbee	TX		1.600	2002	Sequox Process-hf

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Name	City	State	Country	Avg. Flow - MGD	Year	Process
Spencer	Spencer	TN		0.250	2002	Sequox Process
Spring Valley Sanitation District	Glenwood Springs	CO		0.500	2002	Sequox Process
St. Marys	St. Marys	KS		0.500	2002	Sequox Process-HF
Winchester	Winchester	ID		0.035	2002	Sequox Process
Neligh, Nebraska	Neligh	NE		0.210	2002	Sequox Process
Marquette	Marquette	IA		0.156	2003	Sequox Process
Sac & Fox of the Mississippi in Iowa	Tama	IA		0.360	2003	Sequox Process
Ford Lamosa	Lamosa		México	0.150	2003	Extended Aeration
Julesburg	Julesburg	CO		0.283	2003	Sequox Process
Kamiah	Kamiah	ID		0.600	2003	Sequox Process
Van Horne	Van Horne	IA		0.387	2003	Sequox Process
Phillipsburg	Phillipsburg	KS		0.500	2003	Sequox Process
Possum Hollow	Limerick Township	PA		0.750	2003	Sequox Process
Powell's Valley Water District	Slade	KY		0.080	2003	Sequox Process
Prairie Band Potawatomi Nation - Jackson Co.		KS		0.060	2003	Sequox Process
Raccoon Lake State Recreational Area		IN		0.030	2003	Extended Aeration
Rapid River Homeowners Assn.	Riggins	ID		0.020	2003	Sequox Process
Sardimar			Costa Rica	0.140	2003	Industrial High Rate
Sherwood	Topeka	KS		2.400	2003	Sequox Process-HF
Sneads	Sneads	FL		0.734	2003	Sequox Process
Sonatrach			Algeria	0.053	2003	Extended Aeration
Topton	Topton	PA		0.300	2003	Sequox Process-HF
Two Rivers	Two Rivers	CO		0.150	2003	Sequox Process
Wymberly Woods	Galena	IN		0.200	2003	Sequox Process
Corning	Corning	IA		0.543	2004	Sequox Process
Shellsburg	Shellsburg	IA		0.480	2004	Sequox Process-HF
Belleville	Belleville	KS		0.400	2004	Sequox Process
Lafayette	Lafayette	TN		1.500	2004	Sequox Process-HF
Mid-Valley	Basalt	CO		0.500	2004	Sequox Process
Pecan Ranch	Queen Creek	AZ		1.000	2004	Sequox Process
Plainfield	Plainfield	IN		2.000	2004	Sequox Process
San Tan	Queen Creek	AZ		1.000	2004	Sequox Process
Silt	Silt	CO		0.750	2004	Sequox Process
Sundial Utilities	Milton	FL		0.250	2004	Sequox Process
Sunlight Mountain Resort	Glenwood Springs	CO		0.050	2004	Extended Aeration
Farley	Farley	IA		0.800	2005	Sequox Process
Walford	Walford	IA		0.430	2005	Sequox Process
Campton	Campton	KY		0.320	2005	Sequox Process
Hiawatha	Hiawatha	KS		1.250	2005	Sequox Process-HF
LaGrange County Sewer District		IN		0.120	2005	Sequox Process
Lizton Expansion	Lizton	IN		0.300	2005	Sequox Process
Medicine Lodge	Medicine Lodge	KS		0.350	2005	Sequox Process
Milliken	Milliken	CO		0.700	2005	Sequox Process
Pottsville, AR – Phase II	Pottsville	AR		0.300	2005	Sequox Process
Prairie Band Potawatomi Nation (Harrah's Casino)	Mayetta	KS		0.125	2005	Sequox Process
Quintero	Quintero	AZ		0.150	2005	Sequox Process
Sabetha	Sabetha	KS		0.750	2005	Sequox Process-HF
Village of Kingsley	Kingsley	MI		0.200	2005	Sequox Plus
Wellsville	Wellsville	KS		0.300	2005	Sequox Process-HF
Wellsville	Wellsville	KS		0.300	2005	Sequox Process-HF

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Name	City	State	Country	Avg. Flow - MGD	Year	Process
Eaton	Eaton	CO		0.750	2006	Sequox Process
FireLake Grand Casino, Citizen Potawatomi Nation	Shawnee	OK		0.100	2006	Sequox Process
Holton	Holton	KS		0.528	2006	Sequox Process
Lane Community College	Eugene	OR		0.060	2006	Sequox Process
NE York County Sewer Authority	Saginaw	PA		0.300	2006	Sequox Process
Pecan Ranch Expansion	Queen Creek	AZ		1.000	2006	Sequox Process
Prairie Creek Phase II				0.250	2006	Sequox Process
Vernon	Vernon	FL		0.200	2006	Sequox Process
West Glenwood Springs Sanitation District	Glenwood Springs	CO		0.600	2006	Sequox Process
Victor	Victor	IA		0.200	2007	ClarAtor Clarifier
Walcott	Walcott	IA		1.300	2007	Sequox
Anthem Development	Phoenix	AZ		1.500	2007	Sequox
Arlington	Arlington	OR		0.073	2007	Extended Aeration
Bryant (Expansion)	Bryant	AR		3.000	2007	Sequox Process-HF
Concord Twp	Concord Twp	PA		1.800	2007	Sequox
DeSoto	DeSoto	KS		1.300	2007	Sequox
Heritage Springs	Greenville	IN		0.100	2007	Extended Aeration
Intel Corporation			Costa Rica	0.092	2007	Extended Aeration
Johnson Ridge Development		MO		0.040	2007	Extended Aeration
Kickapoo Casino Expansion		OK		0.060	2007	Sequox
King Road (Limerick Township)	Montgomery County	PA		1.700	2007	Sequox Process-HF
Monrovia (Expansion)	Monrovia	IN		0.300	2007	Extended Aeration
Oakbrook Development		MO		0.030	2007	Extended Aeration
San Tan II (Expansion)	Queen Creek	AZ		1.000	2007	Sequox
Sour El-Ghozlane			Algeria	2.640	2007	Sequox
Travel Plaza #3 (INDOT)		IN		0.080	2007	Sequox
Wills Point	Wills Point	TX		1.000	2007	Sequox
Wright City WWTP	Wright City	OK		0.149	2007	Sequox
Ely	Ely	IA		0.500	2008	ClarAtor Clarifier
Lansing	Lansing	IA		0.407	2008	Sequox
Ain Tolba			Algeria	0.500	2008	Sequox
Bernalillo	Bernalillo	NM		1.200	2008	Sequox Bio-P
Camp Verde	Camp Verde	AZ		0.650	2008	Sequox
Colfax	Colfax	CA		0.500	2008	Sequox
Long Grove	Long Grove	IA		0.230	2008	Sequox
Enterprise	Enterprise	OR		0.698	2008	Sequox
Ft. Scott	Ft. Scott	OH		0.250	2008	Sequox
Hardin County WC & ID No. 1	Sour Lake	TX		0.300	2008	Sequox-HF
Higginsport	Higginsport	OH		0.060	2008	Sequox
LaGrange	LaGrange	MO		0.300	2008	Sequox
Sac & Fox of the Mississippi in Iowa (Expansion)	Tama	IA		0.420	2008	Sequox Process-HF
Maggie Valley	Maggie Valley	NC		1.000	2008	Retrofit Sequox
Pauma Valley CSD	Pauma Valley	CA		0.175	2008	Sequox
Pittsboro	Pittsboro	MS		0.015	2008	Extended Aeration
Pleasant View Estates, Phase II	Russellville	AR		0.050	2008	Extended Aeration
Plumas Eureka CSD WWTP	Graegle	CA		0.072	2008	Sequox
Town of Tornillo	Tornillo	TX		0.730	2008	Sequox
Vilonia Upgrade (Expansion)	Vilonia	AR		0.500	2008	Extended Aeration
Wishing Well		AZ		0.500	2008	ClarAtor Equip.
Village of Bennet	Bennet	NE		0.150	2008	Sequox-Plus

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Name	City	State	Country	Avg. Flow - MGD	Year	Process
Elkader	Elkader	IA		0.733	2009	Sequox-Plus
Toledo	Toledo	IA		0.600	2009	Sequox-Plus
Ashford	Ashford	AL		0.350	2009	Sequox Plus & Bio-P
Aztec WWTP	Aztec	NM		1.500	2009	Sequox
Corona	Corona	NM		0.020	2009	Extended Aeration
Cumberland Gap	Cumberland Gap	TN		0.100	2009	Sequox-Plus
Dandridge	Dandridge	TN		0.900	2009	Sequox-Plus & Bio-P
Fabens	Fabens	TX		1.200	2009	Sequox
Goddard	Goddard	KS		0.800	2009	Sequox
Kreamer Municipal Authority	Kreamer	PA		0.165	2009	Sequox Plus & Bio-P
Lake Bruce	Lake Bruce	IN		0.065	2009	Sequox
Las Cruces East Mesa WRF	Las Cruces	NM		1.000	2009	Sequox
London	London	AR		0.200	2009	Sequox
McCordsville - Phase 4 Expansion	McCordsville	IN		0.500	2009	Sequox
NE Texas Community College		TX		0.030	2009	Extended Aeration
Northeast York County Sewer Authority (Mt. Wolf), PA	Mt. Wolf	PA		1.700	2009	Sequox-Plus & Bio-P
Plummer	Plummer	ID		0.315	2009	Sequox
Tipton	Tipton	IN		0.125	2009	Sequox-Plus
Chadron	Chadron	NE		0.900	2009	Sequox-Plus
Hedrick	Hedrick	IA		0.700	2010	Sequox-Plus
Swisher	Swisher	IA		0.320	2010	Sequox-Plus
Urbana	Urbana	IA		0.480	2010	Sequox-Plus
Lake Hannibal Estates	Lake Hannibal	MO		0.060	2010	Extended Aeration
Port Byron	Port Byron	IL		0.300	2010	Sequox-Plus
Sterlington	Sterlington	LA		0.375	2010	Sequox-Plus
Georgetown	Georgetown	IN		0.350	2010	Sequox-Plus
Warsaw Expansion	Warsaw	KY		0.800	2010	Sequox
Spokane RV Park - Mullen Hill	Spokane	WA		0.035	2010	Extended Aeration
Coalfield	Coalfield	TN		0.015	2010	Extended Aeration
Walsenburg	Walsenburg	CO		0.750	2010	Sequox-Plus
Holley - Navarre Water Systems	Navarre	FL		0.250	2010	Sequox-Plus & Bio-P
Sinsinawa Dominicans	Sinsinawa	WI		0.037	2010	Sequox-Plus & Bio-P
Orange County	Vidor	TX		3.000	2010	Sequox-Plus
Ferndale	Ferndale	CA		0.990	2010	Sequox-Plus
Anamosa	Anamosa	IA		1.250	2011	Sequox-Plus
Dakota City	Dakota City	IA		0.300	2011	Extended Aeration
Alta	Alta	IA		0.566	2011	Sequox-Plus
Koontz Lake	Koontz Lake	IN		0.219	2011	Sequox-Plus
Pfeiffer Big Sur State Park (expansion)	Pfeiffer Big Sur	CA		0.100	2011	Extended Aeration
Mapleturn Utilities	Morgan County	IN		0.250	2011	Sequox-Plus
Redstone	Redstone	CO		0.050	2011	Extended Aeration
St. George	St. George	KS		0.120	2011	Sequox Plus & Bio-P
Franklin County General Authority	Chambersburg	PA		0.250	2011	Sequox-Plus
Chesterfield	Chesterfield	IN		1.000	2011	Sequox-Plus
Rock Island	Rock Island	WA		0.250	2011	Sequox Plus & Bio-P
Clarkton	Clarkton	MO		0.200	2011	Sequox Plus
Neola	Neola	IA		0.112	2012	Sequox-Plus
Village of Country Club	St. Joseph	MO		0.240	2012	Sequox
Grandview Lake	Columbus	IN		0.045	2012	Sequox-Plus
Rio Dell	Rio Dell	CA		0.500	2012	Sequox

Phone: (785) 537-4995
www.aeromod.com

AEROMOD Wastewater Process Solutions

Name	City	State	Country	Avg. Flow - MGD	Year	Process
FireLake Grand Casino, Citizen Potawatomi Nation	Shawnee	OK		0.050	2012	Sequox
Village of Cuba	Cuba	NM		0.100	2012	Sequox
Clarksville City	Clarksville City	TX		0.100	2012	Sequox
Crystal Mountain Sewer District	Crystal Mountain	WA		0.055	2012	Sequox
TRACEN Petaluma	Two Rock	CA		0.225	2012	Sequox
Louisiana	Louisiana	MO		0.750	2012	Sequox
Lind	Lind	WA		0.066	2013	Sequox Plus
Konawa	Konawa	OK		0.200	2013	Sequox BNR
Lone Grove	Lone Grove	OK		0.340	2013	Sequox Plus
General Motors	Toluca		Mexico		2013	Modifications
Hinckley	Hinckley	IL		0.500	2013	Sequox-Plus & Bio-P
Crawford	Crawford	NE		0.175	2013	Sequox-Plus
Epworth	Epworth	IA		0.580	2014	Sequox-Plus
Denver	Denver	IA		0.650	2014	Sequox-Plus
Harmony Grove	Escondido	CA		0.180	2014	Sequox
Mid-Valley	El Jebel	CO			2014	Expansion/Sequox Plus
Stillman Valley	Stillman Valley	IL		0.200	2014	Sequox-Plus
Walkerton	Walkerton	IN		0.400	2014	Sequox-Plus
Portales	Portales	NM		1.300	2014	
Tuscarora	Tuscarora	MI		0.095	2014	Sequox-Plus & Bio-P
Strasburg	Strasburg	VA		1.000	2014	
Yogi Bear's Jellystone Park Resort	Plymouth	IN		0.065	2014	Sequox-Plus
Fairbank	Fairbank	IA		0.282	2015	Sequox-Plus
Durant	Durant	IA		0.400	2015	Sequox-Plus & Bio-P
Gilbertville	Gilbertville	IA		0.200	2015	Sequox-Plus
Atkins	Atkins	IA		0.942	2015	Sequox-Plus & Bio-P
Cascade	Cascade	IA		1.250	2015	Sequox-Plus & Bio-P
Walton County Commerce Park at Mossy Head	DeFuniak Springs	FL		0.250	2015	
Window Rock	Window Rock	AZ		1.200	2015	
Bear River Rancheria		CA		0.120	2015	
Plainfield Expansion Phase II	Plainfield	IN		4.000	2015	Sequox-Plus
Brookfield	Brookfield	MO		1.000	2015	
Fayetteville	Fayetteville	IL		0.065	2015	
Coventry Estates	Guernsey County	OH		0.070	2015	
Beech Meadows	Guernsey County	OH		0.040	2015	
Stigler	Stigler	OK		0.720	2015	
Woods Valley Ranch WRF	Valley Center	CA			2015	
Lakeland Regional Sewer District	North Webster	IN		0.400	2015	Sequox-Plus
Morrison	Morrison	IL		0.941	2015	Sequox-Plus & Bio-P
Cottonwood	Cottonwood	AZ			2015	
Pecan Ranch Ph III		AZ		1.000	2015	
Spring Valley	Spring Valley	IL		0.800	2015	Sequox-Plus & Bio-P
Ellis	Ellis	KS			2015	Controls Upgrade
McCordsville Controls Upgrade	McCordsville	IN			2015	Controls Upgrade
Fenton	Fenton	LA			2015	Expansion
Ellis	Ellis	KS			2015	Controls Upgrade
Tipton	Tipton	IN			2015	
Blackwell	Blackwell	OK			2015	
Madisonville	Madisonville	TN			2015	
Savanna	Savanna	IL			2015	

Name	City	State	Country	Avg. Flow - MGD	Year	Process
Otter Creek	Wahkulla County	FL			2015	

SEQUOX BNR References

Belleville, Kansas
Contact: Craig Allen Phone: 785-527-2564
SEQUOX BNR and BIO-P design treats municipal waste and has a rated capacity of 0.400 MGD.

Kingsley, Michigan
Contact: Mark Fowler Phone: 231-218-7157
SEQUOX BNR design treats municipal waste and has a rated capacity of 0.200 MGD.

Lafayette, Tennessee
Contact: Jeff Roark Phone: 615-666-4152
SEQUOX BNR treats municipal waste and has a rated average capacity of 1.5 MGD and a peak flow of 6.0 MGD.

Ellis, Kansas
Contact: John Douglas Phone: 785-726-3667
SEQUOX BNR design treats municipal waste and has a rated capacity of 0.300 MGD.

Jay, Florida
Contact: Stephen Ross Phone: 850-256-0818
SEQUOX BNR design treats municipal waste and has a rated capacity of 0.125 MGD.

Julesburg, Colorado
Contact: Mick Reed Phone: 970-474-0927
SEQUOX BNR design treats municipal waste and has a rated capacity of 0.283 MGD.

Kerens, Texas
Contact: Ronnie Ford Phone: 903-654-4875
SEQUOX BNR design treats municipal waste and has a rated capacity of 0.250 MGD.

McCordsville, Indiana
Contact: Ron Crider Phone: 317-335-3493
Extended Aeration design treats municipal waste and has a rated capacity of 0.225 MGD.
Tankage design includes ability to grow to a 1.00 MGD SEQUOX BNR layout.

Bellevue, Iowa
Contact: Chet Claussen Phone: 319-872-4329
SEQUOX BNR design treats municipal waste and has a rated capacity of 0.330 MGD.

Possum Hollow WWTP – Limerick Township, Pennsylvania
Contact: Daniel Farris Phone: 610-948-0167
SEQUOX BNR design treats municipal waste and has a rated capacity of 0.750 MGD.

SEQUOX BNR References (cont.)

Prairie Creek WWTP - Missouri
Contact: Jeff Jochim Phone: 816-858-3989
SEQUOX BNR design treats municipal waste and has a rated capacity of 0.500 MGD.

Shellsburg, Iowa
Contact: Richard Robertson Phone: 319-436-2954
SEQUOX BNR design treats municipal waste and has a rated capacity of 0.480 MGD.

Sneads, Florida
Contact: Glenn Allen Phone: 850-593-5333
SEQUOX BNR design treats municipal waste and has a rated capacity of 0.734 MGD.

Newberry Township, York County, Pennsylvania
Contact: Joe Tate Phone: 717-938-5047
SEQUOX BNR design treats municipal waste and has a rated capacity of 1.300 MGD.

Wamego, Kansas
Contact: Bob Elder Phone: 785-456-7522
SEQUOX BNR design treats municipal waste and has a rated capacity of 0.750 MGD.

West Burlington, Iowa
Contact: Rod Mesecher Phone: 319-752-6101
SEQUOX BNR design treats municipal waste and has a rated capacity of 0.931 MGD.

Appendix F

Alternative 3 – Purestream BESST
Single Sludge Package WWTP Info

DATE: 10/16/18
TO: All bidding contractors

RE: Sewage Treatment Equipment for:
Spring Creek Concrete Option
Proposal No. BJB-101518-S2

We are pleased to present for your consideration 1 PURESTREAM ES, LLC Biologically Enhanced Single Sludge Treatment (BESST) System; Model PES-75-C sewage treatment plant equipment package capable of treating 75,000 GPD of raw sewage with a strength of 250 mg/l BOD, 210 mg/l TSS, 50 mg/l free ammonia, and 8 mg/l phosphorus, as manufactured by Purestream ES, LLC, Florence, KY. The plant shall be warranted to provide an effluent of no more than 10 mg/l BOD, 10 mg/l TSS, 10 mg/l TN, 1 mg/l free ammonia, and 3 mg/l phosphorus. The treatment plant shall consist of all necessary tanks, weirs, baffles, internal piping, and the following items:

ALL TANK STRUCTURES SHALL BE FABRICATED OF CONCRETE BY OTHERS. PURESTREAM ES, LLC TO PROVIDE ALL NECESSARY CLARIFIERS, PIPING, AND ELECTROMECHANICAL EQUIPMENT

SCREENING EQUIPMENT

__1__ Submerged bar screen in [X] surge tank

BASE UNIT & AIR SUPPLY

__2__ Anoxic compartments with a volume of 25,503 gallons. Within these compartments there shall be 4 airlift sludge pumps, 4" NPT size.
__4__ 1.9 Hp mixers in anoxic zones
__4__ Aeration zones with a total volume of 28,884 gallons. Aerated compartments will be provided with an air header, diffuser drops and high capacity fine bubble diffusers
__4__ Blower/motor units with TEFC motors, 5 Hp, 230 volts, 3 phase, 60 Hz, 99 CFM @ 6 PSIG
__4__ Locking weatherproof blower/motor enclosures [X] Fiberglass lids
__4__ Filter/silencers, 4 Check valves, 2 Air regulating rotometers, 4 Flexible connectors, 2 Pressure relief valves
__1__ Prewired control panel with starters, breakers and timers in a NEMA rated 4 painted steel enclosure
__4__ Clarifiers integral to the anoxic/aeration zones with a total volume of 19,641 gallons. Each clarifier will be complete with a baffled effluent trough with adjustable weir plates. The clarifiers will be fabricated of 1/4" plate.
__4__ 10" full port plug valves provided to isolate aeration tanks
__1__ Aerated sludge storage tank shall be provided integral to the main plant, and shall have a volume of 16,974 gallons. Diffuser drops and diffusers supplied. Air to be supplied by a dedicated blower motor unit, 5 Hp, rated for 85 CFM with appurtenances as outlined for main plant blowers. One (1) spare blower provided to act as back up to both the sludge holding tank and surge tank blower.

P.O. Box 68 Florence, KY 41022 Telephone: (859) 371-9898 Fax: (859) 371-3577
Visit us online at www.purestreaminc.com

SURGE CONTROL EQUIPMENT

1 Aerated surge tank 19,530 gallon capacity, integral to main treatment plant
2 Surge pumps 116 GPM @ 15 Ft. TDH, 0.75 Hp, 230 Volt, 3 Phase, 60 Hz, Manufacturer Goulds Model 3887 with discharge piping and [X] flow splitter box
1 Air supply system [X] separate blower/motor unit, 85 CFM, 5 Hp with appurtenances as outlined for main plant blower

GRATING, HANDRAIL, LADDERS

1 [X] Lot painted steel walkway with galvanized handrail and grating to service equipment

CORROSION PROTECTION

1 Lot steel cleaning S.S.P.C. No. 10 & 8-10 mils of Tnemec Series 46H-413 coal tar epoxy

THE FOLLOWING ITEMS ARE NOT COVERED BY THE QUOTATION AND SHALL BE PROVIDED BY OTHERS. PLEASE NOTE THAT THIS LIST IS NOT ALL INCLUSIVE AND ONLY THE ITEMS SPECIFICALLY LISTED WITHIN THIS PROPOSAL ARE INCLUDED IN THIS OFFERING.

Excavation	Crane to set tank on pad
Removing tank from truck	Hook up of prewired components
Electric to control panel	Field erection
Finish grading & seeding	Sewage lines
External piping	Fencing
Backfilling	Concrete
Water to fill tank	Anchors & turnbuckles

Dimensions of BESST system to be poured are approximately 51'W x 33'L x 12'H.
The heaviest piece shall weigh approximately 20,000 lbs.

TOTAL NET PRICE [X] F.O.B. Factory, Freight allowed to Spring Creek, NV..............***$ 566,908***
(Price does not include any Local, State or Federal taxes.)

To pour tank vessel, we estimate approximately 145 cubic yards of concrete to be required.

Delivery after receipt of order & approval drawings 12-14 weeks.

The price quoted is firm for 30 days from date indicated below. After this date, the price will be reviewed and adjusted in accordance with current costs.

PAYMENT TERMS: 10% Due with firm purchase order, 40% Due With Approval to Fabricate, 40% Due Net 30 From Date of Shipment, 10% Due Net 30 From Date of Start-up and Not to Exceed 120 Days from Date of Shipment

Time is of the essence in this contract. Once the contractor has been notified that the treatment plant is ready to ship, they MUST receive shipment within thirty (30) days of notification. If shipment does NOT occur within thirty (30) days because of delays out of Purestream ES, LLC's control (delays consisting of, but not limited to, bad site conditions, weather, approval delays, acts of God, war, terrorism, etc.), immediate payment of 95% must be paid or the Buyer will be in breach of this contract and Purestream ES, LLC may seek a remedy through any legal means at their disposal. In addition, there will be a 2% per month finance charge on the full amount of the Purchase Order, which MUST be paid before the plant will ship.

NOTE: This order is subject to terms and conditions contained herein and Purchaser agrees to be bound thereby.

TERMS AND CONDITIONS

I. **WARRANTY**

(a) For a period of one (1) year from the date of shipment of the equipment set forth herein, **Purestream ES, LLC.** warrants that said equipment will be in kind & quality as described herein & will be free from defects in workmanship, if properly installed & operated under normal use & service. Purestream ES, LLC's obligation hereunder is limited solely to furnishing without charge, f.o.b. factory, replacement parts for the equipment or any part thereof which have been found by **Purestream ES, LLC** to have been defective within one (1) year after date of shipment; provided however, that **Purchaser** notifies **Purestream ES, LLC** in writing of such defect, as soon as the alleged defect becomes apparent.

THIS WARRANTY IS EXPRESSLY MADE IN LIEU OF ANY & ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY & FITNESS.

IN ANY EVENT, THE DURATION OF ANY IMPLIED WARRANTY IS LIMITED TO ONE YEAR FROM THE DATE OF SHIPMENT OF THE PRODUCT, AS SET FORTH IN THE FIRST PARAGRAPH OF THIS SUBSECTION.

(b) **Purestream ES, LLC** shall not be liable for incidental or consequential damages or expenses relating directly or indirectly, to the sale or use of the equipment, & Purestream ES's liability hereunder is expressly limited to furnishing replacement parts, or, at Purestream ES's sole election, crediting Purchaser with an amount equal to the purchase price of such replacement part.

(c) **Purestream ES, LLC** will make no allowance for repairs, unless **Purestream ES, LLC** has given its prior written approval for such repairs.

II. CREDIT TERMS

Any order given to, or received by, **Purestream ES, LLC** is subject to credit approval by **Purestream ES, LLC.**

A service charge of up to one & one-half per cent (1 ½%) per month may be assessed against **Purchaser** on any amount due & not paid when due.

III. TAXES & TRANSPORTATION RIGHTS

Any & all sales, use, excise or other tax levied upon the equipment or upon the sale, use, receipt, manufacture, delivery or transportation of such equipment, or upon **Purestream ES, LLC** by reason of the performance of this order, shall be added to the purchase price & shall be separately stated on Purestream ES's invoice at the time of billing. Responsibility for the payment of any such tax shall be the Purchaser's.

Any increase in transportation rates, for whatever reason, shall be borne & paid by the **Purchaser.**

IV. LIABILITY

Purestream ES, LLC shall not be liable for damages, losses, expenses or delays due to or caused by labor shortage, fire, transportation difficulties, strike or other labor disputes, civil or military authority, insurrection, riot, war, accident, shortage of labor and/or material, flood, storm, acts of the **Purchaser,** priorities in allocations, or any other cause or circumstances whether like or unlike the foregoing, beyond Purestream ES's reasonable control. Acceptance of the equipment from the carrier shall constitute a waiver of any claim for losses or damages due to delay, whether or not excused by the foregoing, & a waiver of the right to revoke such acceptance for any reason. **UNDER NO CIRCUMSTANCES SHALL PURESTREAM ES BE LIABLE FOR ANY LIQUIDATED, SPECIAL OR CONSEQUENTIAL DAMAGES OR FOR ANY PENALTIES, WHETHER DIRECT OR INDIRECT.**

Purestream ES shall not be liable for damages, losses or expenses incurred by reason of tank floatation & shall not be responsible for keeping the tank or excavation free from mud or debris.

V. STORAGE

Purestream ES, LLC will withhold shipment of the equipment purchased hereunder at Purchaser's request without charge for fifteen (15) days from the scheduled shipment date; provided however, **Purchaser** will be invoiced for equipment as of the date the equipment is completed & ready for shipment. After such fifteen (15) days, a storage charge of twenty-five dollars ($25.00) per day will be assessed & added to the purchase price hereunder at the option of **Purestream ES, LLC** If the equipment is paid for in advance, it may be stored for sixty (60) days beyond the scheduled date at no charge to the **Purchaser.**

VI. CANCELLATION

Equipment cannot be returned & this order once approved cannot be cancelled without Purestream ES's prior written consent. In case of cancellation, **Purchaser** agrees to reimburse **Purestream ES, LLC** for all costs incurred, plus a margin of twenty per cent (20 %).

VII. PRICE ESCALATION

The price quoted herein is firm on all orders released by the **Purchaser** for production by **Purestream ES, LLC** within thirty (30) days from the date of this quotation. If the order cannot be entered for production by **Purestream ES, LLC** within said thirty (30) days for reasons beyond Purestream ES's control or for credit approval, then the price may be escalated, at Purestream ES's option, at a rate not greater than one & one half per cent (1 ½ %) per month from the date of the order, to cover increases in cost of material, equipment & production thereof, to **Purestream ES, LLC.**

VIII. TITLE & DELIVERY

Delivery of the equipment covered hereby to a common carrier shall be deemed delivery to **Purchaser,** & thereupon the risk of loss or damage in transit shall be Purchaser's. In the absence of specific instructions, **Purestream ES, LLC** will select the carrier.

Title to the goods covered hereby shall not pass to **Purchaser** until such goods are paid for in accordance with the terms of this order.

IX. GENERAL

(a) In the event of a conflict between the general terms & conditions stated herein & the terms & conditions stated in the Purchaser's purchase order, or elsewhere, these general terms & conditions shall govern.

Purchaser's signed acceptance of this proposal, purchase order, or any other expression of acceptance shall be deemed to be a written conformation & acceptance of these general terms & conditions. Further, acceptance of this order is expressly limited to these general terms & conditions. Any conduct of performance by **Purestream ES, LLC** regarding the existence of a contract shall not constitute an acceptance of or assent to any additional or different terms or provisions proposed by **Purchaser.**

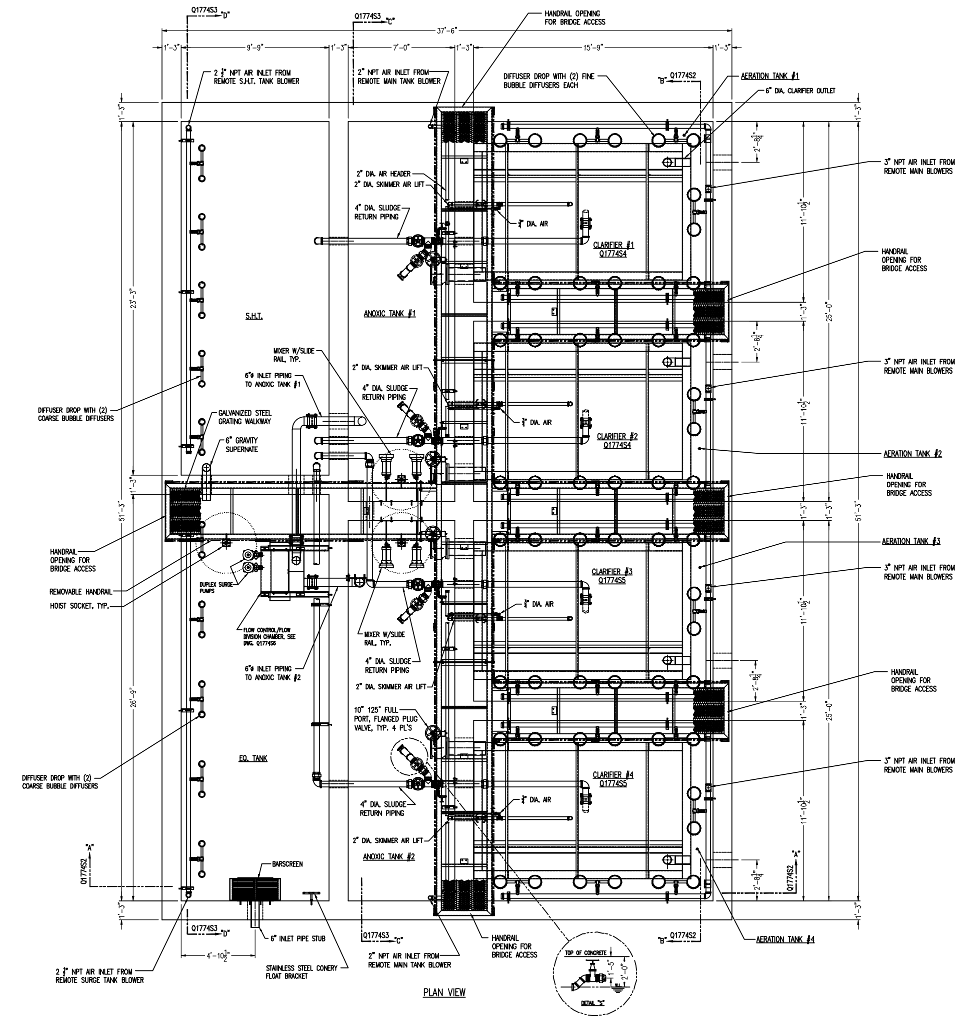
(b) The validity, construction & effect of this order & of these general terms & conditions shall be governed by the laws of the Commonwealth of Kentucky.

(c) The term "Purestream ES" or "Purestream ES, LLC" or "Purestream ES's" as used herein means "Purestream ES, LLC" & the term "Purchaser" means the person or entity for whom the work in this order will be done.

(d) No condition, representation, or agreement altering, detracting from, or adding to these terms & conditions shall be valid unless such condition, representation, or agreement is in writing & approved by **Purchaser** & by an authorized representative of **Purestream ES, LLC** at its home office in Walton, Kentucky.

THE ABOVE PROPOSAL WILL RESULT IN A FIRM ORDER WHEN ACCEPTED BY THE PURCHASER AND ONLY WHEN APPROVED BY AN AUTHORIZED OFFICER OF PURESTREAM ES, LLC.

SUBMITTED BY: PURESTREAM ES, LLC.	ACCEPTED BY: PURCHASER
Brian J. Bell Brian J. Bell	
DATE: 10/16/18	DATE:



PROTECTION AGAINST CORROSION

AFTER COMPLETE WELDING AND FABRICATION OF THE TANK, THE FOLLOWING WILL OCCUR:

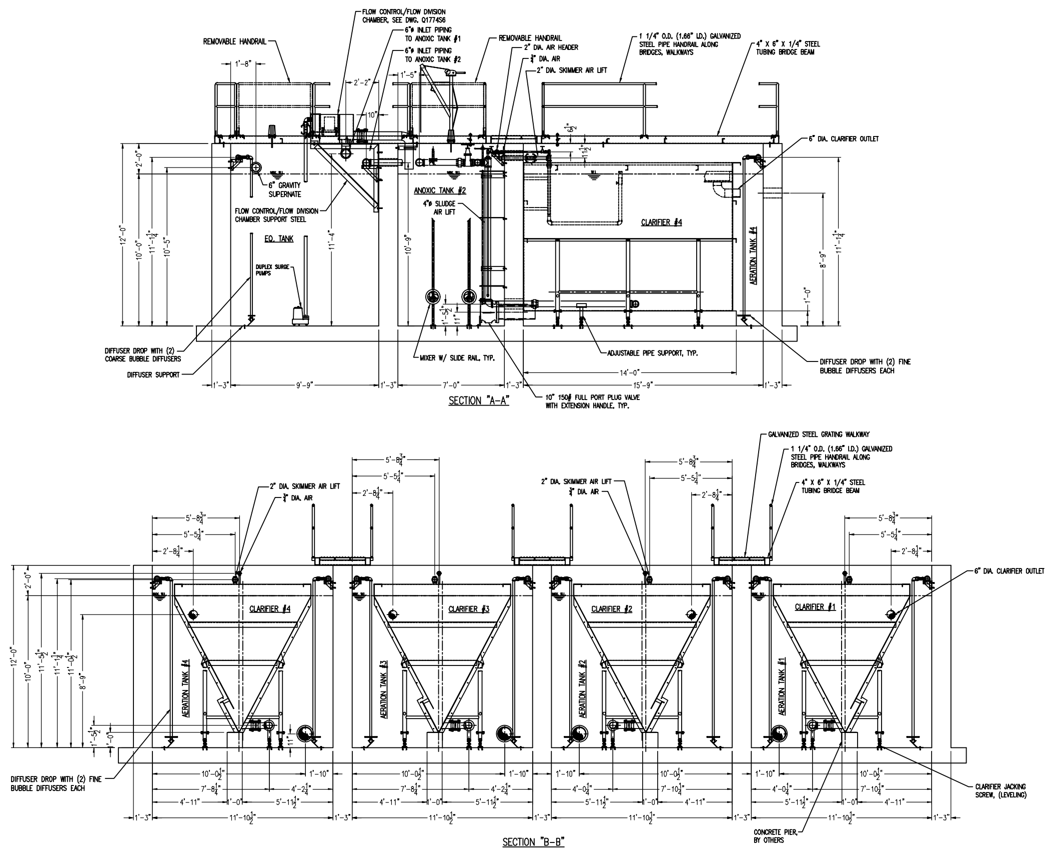
SURFACE PREPARATION:
ALL SURFACES SHALL RECEIVE A SSPC-10 NEAR WHITE METAL FINISH OBTAINING A 1.5 TO 3.0 MIL SURFACE PROFILE.

PAINT:
INTERIOR AND EXTERIOR APPLICATION THICKNESS SHALL BE 8 TO 10 MILS D.F.T. OF TNEMEC 46H-413 COAL TAR EPOXY.

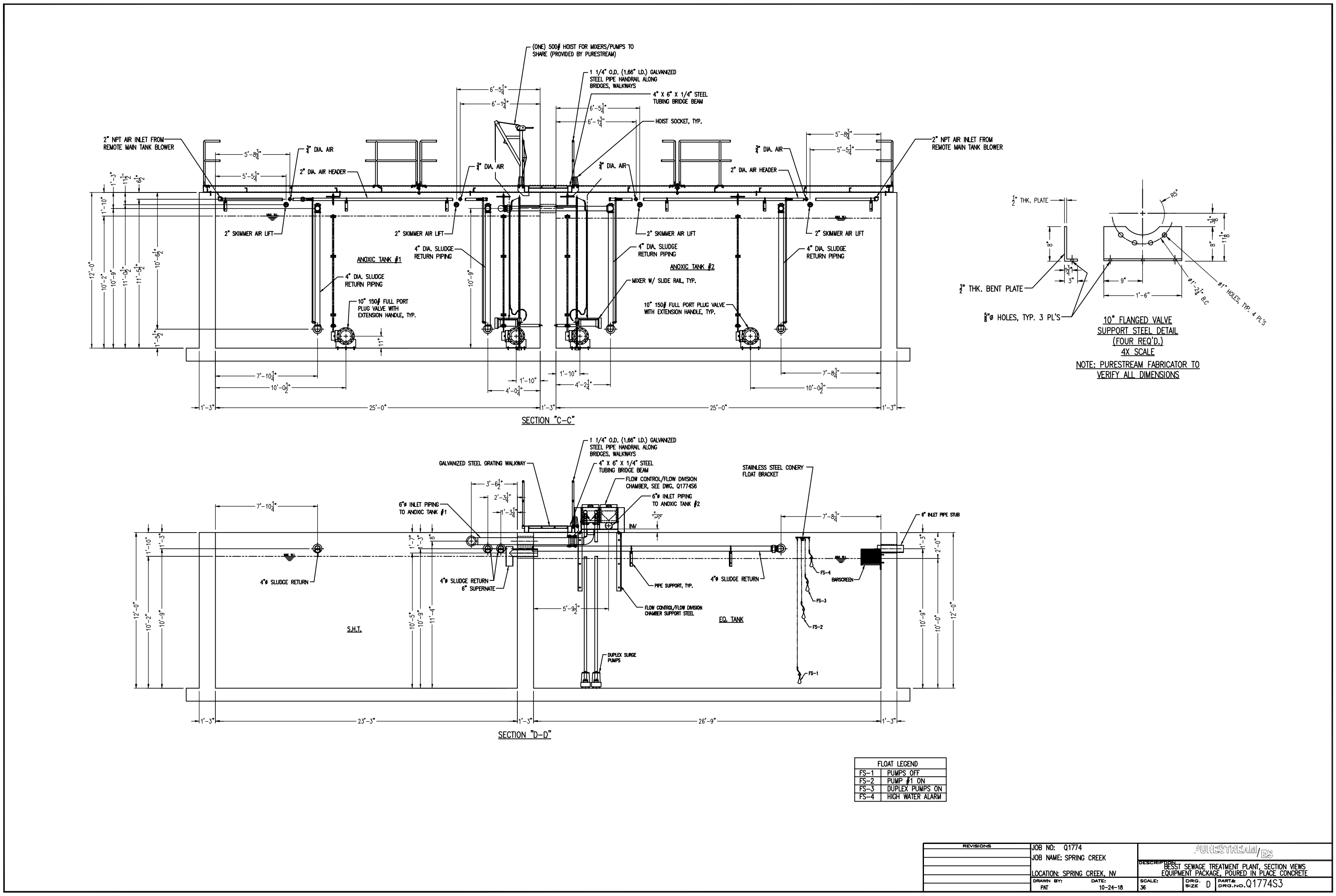
COLOR: BLACK FINISH: SATIN

NOTES:
1. EQUIPMENT SUPPLIED BY PURESTREAM/ES LLC WILL BE DESIGNED TO FIT THE TANKAGE AS SHOWN ABOVE. ANY DEVIATIONS FROM THE ABOVE DIMENSIONS MUST BE TRANSMITTED TO PURESTREAM/ES LLC BEFORE FABRICATION DRAWINGS ARE PREPARED TO AVOID DELAYS IN EQUIPMENT FABRICATION.
2. FLOAT SWITCH ELEVATION SHALL BE DETERMINED BY OTHERS.
3. ALL STEEL PIPE TO BE SCHEDULE 40 ASTM A53 CARBON STEEL OR EQ.
4. ALL PIPING ASSY'S. 2½" DIA. AND SMALLER SHALL BE GALVANIZED AND PAINTED AS PER PAINT SPECIFICATIONS.
5. ALL PIPING ASSY'S. 3" DIA. AND LARGER SHALL BE PAINTED AS PER PAINT SPECIFICATIONS.
6. ALL PIPE FITTINGS AND VALVES TO BE 150 LBS. CLASS AND MATERIAL AS SHOWN.
7. ALL PIPE THREADS TO BE AMERICAN STANDARD TAPER MALE THREAD WITH THE PROPER LENGTH REQUIRED FOR A TIGHT JOINT.
8. CONCRETE WALL THICKNESSES SHOWN FOR REFERENCE PURPOSES ONLY. ACTUAL WALL THICKNESS TO BE DETERMINED BY PROJECT ENGINEER.
9. ALL EXTERNAL PIPING TO BE FURNISHED AND INSTALLED BY OTHERS.
10. CONCRETE HOLE DIAMETER FOR PIPE PENETRATIONS AND SEALING TO BE DETERMINED BY PROJECT ENGINEER.
11. CONTRACTOR TO USE PURESTREAM VESSEL DRAWINGS TO LOCATE ALL WALL PENETRATIONS RELATED TO PURESTREAM EQUIPMENT.
12. CONTRACTOR TO USE PURESTREAM VESSEL DRAWINGS TO LOCATE CLARIFIER CONCRETE SUPPORT PIER.

REVISIONS		
	JOB NO: Q1774	PURESTREAM/ES
	JOB NAME: SPRING CREEK	DESCRIPTION: BESST SEWAGE TREATMENT PLANT, PLAN VIEW EQUIPMENT PACKAGE, POURED IN PLACE CONCRETE
	LOCATION: SPRING CREEK, NV	
	DRAWN BY: PAT DATE: 10-24-18	SCALE: 36 DRG. SIZE D PART& DRG.NO. Q1774S1



REVISIONS		
	JOB NO: Q1774	PURESTREAM/ES
	JOB NAME: SPRING CREEK	DESCRIPTION: BESST SEWAGE TREATMENT PLANT, SECTION VIEWS EQUIPMENT PACKAGE, POURED IN PLACE CONCRETE
	LOCATION: SPRING CREEK, NV	
	DRAWN BY: PAT DATE: 10-24-18	SCALE: 36 DRG. SIZE D PART& DRG.NO. Q1774S2


(ONE) 500# HOIST FOR MIXERS/PUMPS TO SHARE (PROVIDED BY PURESTREAM)
1 1/4" O.D. (1.66" I.D.) GALVANIZED STEEL PIPE HANDRAIL ALONG BRIDGES, WALKWAYS
4" X 6" X 1/4" STEEL TUBING BRIDGE BEAM
HOIST SOCKET, TYP.
2" NPT AIR INLET FROM REMOTE MAIN TANK BLOWER
2" DIA. AIR HEADER
2" SKIMMER AIR LIFT
4" DIA. SLUDGE RETURN PIPING
ANOXIC TANK #1
ANOXIC TANK #2
MIXER W/ SLIDE RAIL, TYP.
10" 150# FULL PORT PLUG VALVE WITH EXTENSION HANDLE, TYP.
SECTION "C-C"
THK. PLATE
THK. BENT PLATE
HOLES, TYP. 3 PL'S
10" FLANGED VALVE SUPPORT STEEL DETAIL (FOUR REQ'D.) 4X SCALE
NOTE: PURESTREAM FABRICATOR TO VERIFY ALL DIMENSIONS
GALVANIZED STEEL GRATING WALKWAY
FLOW CONTROL/FLOW DIVISION CHAMBER, SEE DWG. Q1774S6
6"Ø INLET PIPING TO ANOXIC TANK #1
6"Ø INLET PIPING TO ANOXIC TANK #2
STAINLESS STEEL CONERY FLOAT BRACKET
6" INLET PIPE STUB
4"Ø SLUDGE RETURN
6" SUPERNATE
BARSCREEN
PIPE SUPPORT, TYP.
FLOW CONTROL/FLOW DIVISION CHAMBER SUPPORT STEEL
DUPLEX SURGE PUMPS
S.H.T.
EQ. TANK
SECTION "D-D"
FLOAT LEGEND
FS-1 PUMPS OFF
FS-2 PUMP #1 ON
FS-3 DUPLEX PUMPS ON
FS-4 HIGH WATER ALARM
REVISIONS
JOB NO: Q1774
JOB NAME: SPRING CREEK
LOCATION: SPRING CREEK, NV
DRAWN BY: PAT
DATE: 10-24-18
PURESTREAM/ES
DESCRIPTION: BESST SEWAGE TREATMENT PLANT, SECTION VIEWS EQUIPMENT PACKAGE, POURED IN PLACE CONCRETE
SCALE: 36
DRG. SIZE D
PART& DRG.NO. Q1774S3

purestream ES LLC
Advanced Environmental Treatment Systems

BESST

BIOLOGICALLY ENGINEERED SINGLE SLUDGE TREATMENT

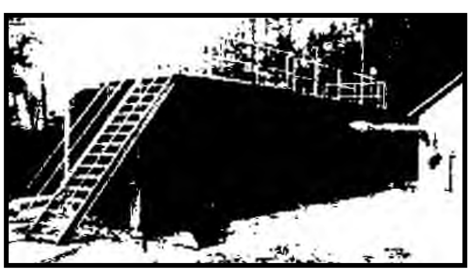
The latest technology in advanced biological wastewater treatment

cutting edge technology

The Technology

BESST™ (Biologically Engineered Single Sludge Treatment) is a Patent Pending process that is a culmination of activated sludge processes dating back to the 1920's. The BESST process is the most advanced wastewater treatment process available, and is the result of almost 60 years of research, development, practical experience and testing. Combining the principals of single sludge treatment for BOD_5, TSS and nutrient removal, and sludge blanket clarification for efficient solids separation, this process places all the components into one vessel. The end result is a compact system that can be provided in either a steel package plant for smaller systems or built in place concrete systems for larger municipalities and high strength industrial waste streams. Either configuration provides an efficient, cost effective waste-water treatment plant with extremely low maintenance and operating costs. With its efficient use of mixed liquor, the BESST process requires less sludge wasting resulting in lower hauling costs for waste sludge.

The BESST process has no capacity limits, and is used in a wide range of applications. Plants serving development and municipal sectors, industrial, and food processing waste-waters, have been designed and are in highly successful operation throughout the US, Mexico, Central America and the Caribbean.

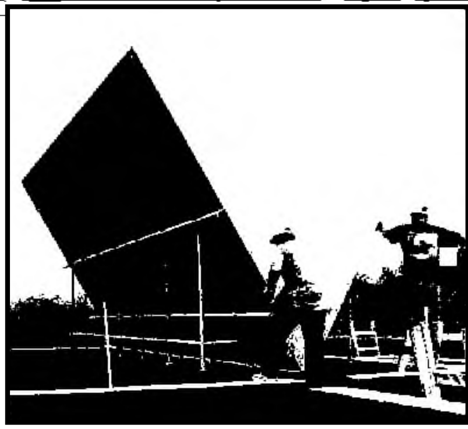


The Process

The BESST process is based on Lawrence and McCarty biological kinetics and hydraulic models dating back to the early 1900's. Utilizing the benefits of Pre-Anoxic Single Sludge activated sludge process; the BESST system uses the endogenous carbon source found in all sanitary waste to denitrify in the anoxic zone without the use of methanol or other exogenous carbon sources. The raw wastewater enters the anoxic zone first where it is mixed with nitrified Return Activated Sludge from the sludge blanket clarifier. Submersible mechanical mixers are installed in the anoxic compartment to facilitate homogeneous mixing, and increase the denitrification efficiency. From here, the mixed liquor flows in a plug flow manner to the aeration zone where fine bubble diffusers provide the oxygen required for nitrification and BOD_5 reduction.

After aeration, the mixed liquor enters the bottom of the separation compartment where solids and treated effluent are separated by a patented velocity gradient sludge blanket clarifier. The operation of the velocity gradient sludge blanket clarifier is self-regulating. As the flow enters the bottom of the clarifier, a velocity gradient is created in such a way that the bottom 2 to 3 feet of solids are kept in a completely mixed state which eliminates the need for the operator to scrape the clarifier (solids will not bulk). While the solids rise, their velocity decreases creating a sludge based, fluidized bed filter, which removes fine and colloid particles from the treated effluent. Trapping these particles increases the weight of the solids, causing them to drop to the bottom of the clarifier, where they are returned to the anoxic zone by an airlift or mechanical pump. The internal circulation loop created by this plug flow is typically set at a minimum of four (4) times the average daily flow, increasing nitirification and denitrification dramatically.

The effluent weir is equipped with a scum baffle and scum skimmer which aids in the reduction of TSS in the effluent. The efficiency of the process, and velocity gradient sludge blanket clarifier, produces effluent quality well below 10 mg/l BOD_5, <10 mg/l TSS, less than 1 mg/l ammonia, less than 10 mg/l total nitrogen (<5 mg/l TKN) and effluent phosphorous levels between 2 and 3 mg/l by "Luxury Uptake" and less than 0.5 mg/l with the use of metal salts.



The Features & Benefits

BESST technology incorporates many innovative and advanced features that increase its efficiency and reduces both capital and operational costs.

1. Mechanical Reliability

The BESST process is designed with 100% backup of all electromechanical equipment and failsafe controls. This ensures reliability of operation even when there is a mechanical failure.

2. Single Sludge Treatment

Of the three methods of single sludge treatment, the Pre-Anoxic method is the most efficient and effective method for nutrient removal and mixed liquor stabilization. By designing the BESST process with the anoxic zone as the first compartment to receive wastewater, the sludge becomes more stable and has better settling qualities than typical activated sludge processes, resulting in a lower SVI which equates to better settling sludge. This increase in sludge settleability increases the efficiency of the sludge blanket clarifier and aids in achieving between 4% and 6% solids in the sludge storage tank, reducing sludge hauling costs dramatically. In addition, the raw wastewater entering the anoxic zone provides the endogenous carbon source required for denitrification. No addition of exogenous carbon is needed to achieve Total Nitrogen levels below 10 mg/l and Total Kjeldahl Nitrogen less than 5 mg/l. The aeration chamber is designed for efficient BOD_5 and TSS removal to levels less than 10 mg/l, and with dissolved oxygen levels between 2.0 mg/l and 3.5 mg/l, the nitrification rate is extremely high, resulting in ammonia levels below 1 mg/l.

3. Mixed Liquor Suspended Solids (MLSS) Concentrations

The BESST process is designed to operate at MLSS concentrations well above the typical levels for other activated sludge processes. With a design range between 3000 mg/l and 6000 mg/l, more microbial cells are available to "feed" on a wider range of organic material in the waste stream, including some previously considered non-biodegradable.

4. Reduced Capital Costs

The efficiency of the BESST process is not only in the biology and hydraulics, but in the construction as well. By integrating all of the components into one tank, the installation costs and capital costs are reduced dramatically. In many cases by more than 40% when compared to other activated sludge processes. In addition to the upfront savings, the BESST process also reduces operating costs by as much as 50%. By maximizing the biological engineering and utilizing the mixed liquor to its fullest potential, less sludge is wasted from the system reducing hauling costs by up to 75%, and lower horsepower electrical components are required for operation resulting in lower electric costs.

5. No Odor

The stability and age of the sludge, combined with the aerobic conditions, result in a process with NO UNPLEASANT ODORS. This enables the process to be installed in locations in close proximity to populated areas without the need for costly buildings or tank coverings.

6. Hydraulic Flexibility

The velocity gradient sludge blanket clarifier's half triangle design is the most efficient design for solids separation. By taking peak flows into account at the design stage, the clarifier can hydraulically withstand a continuous peak of up to 3 times the design flow. This allows for instantaneous peaks of up to 1200% of the design flow for up to 2 hours. The sludge based fluidized bed is also self regulating in these peak conditions, as the flow increases, the sludge rises in the clarifier and expands increasing both the filtration volume and surface area.

7. Modular and Flexible Design

The small footprint and single tank design allows for easy expansion for future needs of the community or development. By placing the package plant design in parallel allows for additional tankage to be easily added as flow demands increase. The efficiency of the BESST design also lends itself well to retrofits, often times increasing the treated flow capacities by as much as 20% without the need for additional tankage.

BESST

BIOLOGICALLY ENGINEERED SINGLE SLUDGE TREATMENT

Special Applications

Although the BESST process can be applied successfully to all biologically degradable wastewaters, with minimal operator attention, it is especially suited for the following applications:

1. Environmentally sensitive areas requiring advanced treatment, such as:
   - Golf Course Communities
   - Resort Areas
   - Commercial Fishing Areas
2. Highly Variable daily hydraulic flow patterns found in:
   - Subdivisions
   - Schools
   - Small Communities
   - Shopping Centers
   - Campgrounds
3. Unusually strong and/or variable organic loads created by industrial wastes, such as:
   - Food Processing (Meat, Poultry, Vegetable....)
   - Dairies
   - Tanneries and Textile Mills

purestream ES INC.

Advanced Environmental Treatment Systems

10584 Dixie Highway
Walton, KY 41094
Telephone: (859) 371-9898
FAX: (859) 371-3577
e-mail: purestream@purestreaminc.com
Website: www.purestreaminc.com

Appendix G

Alternative 4 – Fluidyne ISAM
Sequencing Batch Reactor Package WWTP Info

FLUIDYNE
CORPORATION
5436 Nordic Drive, Suite D Cedar Falls, IA 50613
Phone: (319) 266-9967 Fax: (319) 277-6034
http://www.fluidynecorp.com

PRELIMINARY PROPOSAL

FLUIDYNE CORPORATION (HEREINAFTER CALLED THE COMPANY) AGREES TO SELL TO THE PURCHASER AND THE PURCHASER AGREES TO BUY AND ACCEPT FROM THE COMPANY, THE ITEM (S) DESCRIBED HEREIN.

PROJECT: **Spring Creek WWTP**
Elko, Nevada
Fluidyne ISAM™ System

PROPOSAL NO.: FLC 102218

DATE WRITTEN: October 22, 2018

FLUIDYNE CORPORATION
5436 Nordic Drive Suite D
Cedar Falls, IA 50613

Proposal No.: FLC 102218
Project: Spring Creek WWTP
Date: October 22, 2018

Fluidyne Corporation is pleased to quote our ISAM™ Equipment and process technology for treating wastewater at the Spring Creek wastewater treatment plant in Elko, Nevada. Fluidyne is providing a proposal based on the following design information:

Current Flow:	39,100 gpd
3-5 year Project Flow:	60,000 gpd
Buildout Flow:	95,000 gpd
Max Inst:	198 gpm
Design BOD5:	320 mg/l
Design TSS:	300 mg/l
Design TKN:	50 mg/l

	Discharge Criteria **Monthly Average**
Effluent BOD:	30 mg/l or less
Effluent TSS:	30 mg/l or less
Effluent TN:	10 mg/l or less

Fluidyne has assumed flow is continuous 24 hours/day and seven days per week. We have assumed the wastewater entering our process is non-toxic and readily biodegradable with sufficient alkalinity and pH. Wastewater temperature assumed minimum 10 degrees in the winter and approximately 20 degrees in the summer.

Fluidyne is pleased to quote the following:

Two (2) Fluidyne model # ISAM™ - Packaged Wastewater Treatment Module with SBR and integral sludge reduction system. Each ISAM™ to be divided into three (3) compartments and includes ISAM™ compartment, SAM™ compartment and SBR compartment. **Concrete tanks are to be provided by others with the following dimensions:**

ISAM (covered and vented):	14' long X 20' wide X 12.5’ TWL X 14’ Wall height
SAM:	12' long X 20' wide X 12.5’ TWL X 14’ Wall height
SBR:	24' long X 20' wide X 12.5’ TWL X 14’ Wall height

The control panel will ship loose for mounting indoors.

Each ISAM™ - units includes the following internal equipment:

ISAM COMPARTMENT:

One (1) ISAM™ Influent Diffuser Assembly fabricated out of 304 stainless steel.

Two (2) ISAM™ Overflow Assemblies fabricated out of 304 stainless steel.

SAM COMPARTMENT:

Two (2) SAM™ Influent Diffuser Assemblies with support fabricated out of 304 stainless steel.

Two (2) Vertical submersible motive liquid/fill pumps (one is an in-line spare). Each pump will provide motive liquid for a jet aspirating nozzles and be furnished complete with discharge connection, retrieval assembly, guide bars, accessories and a 15 HP submersible motor.

Two (2) 1.5" Waste Sludge Assemblies including manual isolation and 1.5" automated waste sludge control ball valve with actuator (120/1/60) mounted in a weatherproof enclosure with 300 watt strip heater. Note – Sludge return piping and fittings are not included.

SBR COMPARTMENT:

Two (2) Fluidyne model# FAS-15 jet aspirating nozzles with liquid piping, jet nozzle assembly and air intake piping.

Two (2) 3" Electric Operated Air Control Valves with electric actuator (120/1/60 electrical service)

One (1) Fluidyne model# FOW-12 Overflow Weir/Scum Skimmer.

One (1) FJM-3 Jet Mixer.

One (1) Fluidyne model# SED-3 Fixed Decanter with withdrawal piping, wall supports and a 4" flange connection to tank wall.

One (1) 1" Electric Operated Decant vent valve with electric actuator (120/1/60 electrical service) mounted in a weatherproof enclosure with 300 watt strip heater.

.

One (1) 4" Electric Operated Decant Control Valve with electric actuator (120/1/60 electrical service)

INSTRUMENTATION:

One (1) Set of Level Sensors with support brackets for the SAM™ and SBR and compartment (120/1/60 electrical service)

One (1) Dissolved Oxygen Probe with 30' of cable for each SBR with one (1) Dual Channel Dissolved Oxygen Analyzer to take DO signal from both SBRs.

CONTROLS:

One (1) Common ISAM ™ Control System shall control both trains. The control panel will be housed in NEMA 12 enclosure including motor starters, indicating lights, Allen-Bradley MicroLogix 1400 PLC with Ethernet, PanelView 700+, alarm indicators, modem, I/O, and relays to automatically control the ISAM™-process. Control of non-Fluidyne supplied equipment is not included as part of our control panel. Panel is to be installed indoors.

Six (6) Sets of Operation and Maintenance Manuals

The price for the above equipment is **$ FOB-factory with freight allowed to the jobsite. We have assumed there are no shipping restrictions to get a tank of this size to the jobsite location.**

CLARIFICATIONS:

The concrete tanks including the ISAM tank covers, any access hatches, through the wall flange penetrations, interconnecting hardware and gaskets are not included and need to be provided by others. See the full list of exclusions below.

SERVICE: Service is provided in the amount of three (3) man days provided in one (1) trip. Travel and living expenses are included in this service. Addition service can be provided at a rate of $ 1000.00/day USD plus travel and living expenses

EXCLUSIONS: Not furnished by Fluidyne are the following; concrete tanks and required tank covers; all through the wall penetrations; any pipe, supports, fittings or valves except those specifically included above; out of basin piping, valves or supports; lift station including pumps and controls; influent lift station equipment including ISAM feed pumps; screening; grit removal; disinfection; effluent equalization tank and equipment including effluent pumps; structure footing; exterior finishes other than standard coatings supplied with equipment; special interior finishes; insulation; heat tracing or freeze protection; ventilation; heating or cooling; lighting or power supply; chemicals or chemical storage; safety and security; anchor bolts; remote panels; disconnects, junction boxes; conduit and wiring external to the control panel; interconnecting hardware and gaskets; fencing; stairways, walkways or platforms; control building and accessories; chemical metering pumps and accessories; cathodic protection; explosion proof equipment; phone line and accessories; effluent sampler and accessories; electrical and mechanical installation labor; off-loading of equipment; jobsite testing; jobsite storage; structural or seismic calculations; taxes; duties; insurance and other items not specifically mentioned in the body of this proposal.

SHIPMENT: 12 to 14 weeks after receipt of approved drawings.

TAXES: Any applicable duties, sales, use, excise or similar taxes are not included in the quoted price.

TERMS OF PAYMENT: Warranties shall apply only when payments are made in full and according to the following schedule:

10% with order, 15% with approval, 75% Net 30 days from shipment

Unless other terms are specified, all payments shall be in United States Dollars and pro rate payments shall become due as deliveries are made. If date of delivery is delayed by purchaser, date of readiness for delivery shall be deemed date of delivery for payment purposes. If purchaser delays manufacture, a payment shall be made based on the purchase price and percentage of completion, balance payable in accordance with the terms stated. Title shall not pass to purchaser or end user until all payments including final payment and any retention for all goods and services have been received in full by Fluidyne.

If, at any time in Company's judgment, purchaser may be or may become unable or unwilling to meet the terms specified, Company may require satisfactory assurances of full or partial payment as a condition of commencing of continuing manufacture; or in advance of shipment, if shipment has been made, recover the product(s) from the carrier.

DURATION: This proposal shall remain in effect for 90 days after proposal due date, unless changed in the interim upon written notice.

FLUIDYNE CORPORATION - TERMS OF SALE

The conditions stated below shall constitute a part of the agreement resulting from the acceptance of an order for the whole or any part of the equipment covered by this quotation.

1. ACCEPTANCE:
All orders shall be made out to Fluidyne Corp., 5436 Nordic Drive, Suite D, Cedar Falls, Iowa 50613, and shall be subject to acceptance by Fluidyne. Orders may not be canceled without Fluidyne's written consent, and then only on terms indemnifying Fluidyne against loss. Fluidyne reserves the right to correct any typographical or clerical errors in the proposal, pricing, or specification. Acceptance of any contract by Fluidyne shall be contingent upon credit approval. Performance shall be subject to strikes, fires, accidents, or curtailments in manufacturing or due to delays unavoidable or beyond the control of Fluidyne. No direct or liquidated damages or penalties shall be accepted. Receipt of the original copy of this proposal, signed by the purchaser, shall constitute a purchase order. The drawings and bulletin illustrations submitted with this proposal shall be general type, arrangement and approximate dimensions of the equipment to be furnished. Fluidyne reserves the right to alter such details in design or arrangement of its equipment, which in its judgment would constitute an improvement in construction, application or operation. Fluidyne shall promptly forward all necessary engineering information for installation of its equipment to the purchaser upon receipt of this accepted proposal. Any changes in equipment, arrangement of equipment, or application of equipment requested by purchaser after acceptance of proposal will be made at purchaser's expense.

2. TAXES

The prices quoted are subject to any addition, which may be necessary to cover any tax charge now existing or hereafter imposed by Federal, State, or Municipal authorities upon equipment or services herein described or the production, sale, distribution or delivery thereof, or upon any feature of this transaction.

3. BINDING RESPONSIBILITIES:
Sales representatives are not authorized to bind us. Typographical errors are not binding.

4. CANCELLATION:
After acceptance, an order shall not be subject to cancellation unless cancellation charges are borne by the Purchaser for work done by the Seller up to the time of receipt of cancellation notice; nor shall such orders be subject to change unless price increases are born by the Purchaser.

5. SHIPMENT AND DELIVERY:
All deliveries quoted are estimates based on Fluidyne's best judgment at the time of this proposal, but shipment on these dates is not guaranteed. Deliveries are figured from date of receipt in Cedar Falls, Iowa of approved order and technical data. Fluidyne will not accept any claims caused by delay in shipment or delivery. It is further understood that storage charges of 1 percent per month will apply commencing 30 days from date of equipment completion if purchaser asks the delivery be delayed after production is started. Billing will be made at time of completion of equipment and paid per standard terms.

6. TERMS OF PAYMENT:
Terms of payment are as stipulated in the body of this proposal. Accounts not paid on net cash due date bear interest at the rate of 1.5 percent per month not to exceed the maximum permissible by law. Title shall not pass to purchaser or end user until all payments including final payment and any retention for all goods and services have been received in full by Fluidyne.

7. INSTALLATION AND INITIAL OPERATION:

All equipment shall be installed by and at the expense of the Purchaser unless otherwise stipulated. The Seller will furnish at its option, engineers to supervise the installation and starting up of the equipment. Field service will be provided by a factory-trained representative at a per diem rate of $850/day plus travel and expenses on any additional period not stated in this contract.

8. WARRANTY:
Fluidyne warrants the equipment proposed and described herein against defects in material and workmanship under normal service for a period of one year after date of start-up, not to exceed eighteen months from date of shipment. Parts of products manufactured by others and provided by Fluidyne are warranted only to the extent of the original manufacturer’s warranty. This warranty is valid provided that the installation operation and maintenance of the equipment is made in accordance with Fluidyne's instructions. The purchaser must promptly give written notice of any equipment defects to Fluidyne. Under warranty,

Fluidyne will provide, without cost to the purchaser, such replacement parts as may be required to repair or replace the defective equipment. All labor as may be required to make such replacements must be made by purchaser unless stated otherwise in this proposal. Qualified Fluidyne personnel or its agents must perform all startup service, or this warranty is void. Fluidyne will not warrant nor replace any material involved when repairs are made without prior written authorization from Fluidyne.

THIS IS FLUIDYNE'S SOLE WARRANTY. FLUIDYNE MAKES NO OTHER WARRANTY OF ANY KIND, IMPLIED OR EXPRESSED: ALL IMPLIED OR EXPRESSED WARRANTY MADE BY ANY PERSON, AGENT OR REPRESENTATIVE WHICH EXCEEDS FLUIDYNE'S AFOREMENTIONED OBLIGATION ARE HEREBY DISCLAIMED BY FLUIDYNE AND EXCLUDED FROM THIS WARRANTY.

9. PATENTS:
The equipment provided by Fluidyne may be covered by patents pending or issued. Fluidyne grants the right to use this equipment with further charges. Fluidyne does not grant rights to use, royalties, or protection against patent litigation arising from use of this equipment in patented processes controlled by others unless otherwise listed above.

10. CHANGE ORDERS:
Any change orders shall be mutually agreeable between buyer and seller.

11. LIABILITY:
In no event shall either party be liable to the other party for anticipated profits or for incidental, special, indirect, punitive or consequential damages under any circumstances. A party’s liability on any claim of any kind for any loss or damage arising out of, connected with, or resulting from this Agreement or from the performance or breach thereof shall, in no case, exceed the price allocable to the Equipment or the Services or any unit thereof which gives rise to the claim. Neither Buyer nor Seller shall be liable for penalties of any description.

12. PRICING
Fluidyne pricing is based on these terms of sale. No monies have been included for acceptance of different, additional or modified terms of sale.

SUBMITED BY: FLUIDYNE CORPORATION
DATE: October 22, 2018
PROJECT: Spring Creek WWTP, NV

ACCEPTED BY: ________________________________
(Sign and Title)

(Company Name)
DATED: ________________________________

From: Jim Zaiser <jimzaiser@jbiwater.com>
Sent: Monday, October 22, 2018 10:21 AM
To: Kristin Tokheim, P.E.
Subject: FW: Spring Creek Wastewater Treatment System
Attachments: Influent Quality_2003-2006.pdf; Spring Creek ISAM prop FLC 102218.pdf; Spring Creek, NV - 1 - Plan View.pdf; Spring Creek, NV - 2 - Elevation View.pdf; ISAM Brochure_ .pdf; Spring Creek WWTS ISAM calcs 102218.pdf

Based on the given design parameters, we recommend our dual train ISAM™ - SBR with integral sludge reduction technology. Details on the process are included.
Fluidyne is providing a proposal based on the following design information:

Current Flow:	39,100 gpd
3-5 year Project Flow:	60,000 gpd
Buildout Flow:	95,000 gpd
Max Inst:	198 gpm
Design BOD5:	320 mg/l
Design TSS:	300 mg/l
Design TKN:	50 mg/l

	Discharge Criteria Monthly Average
Effluent BOD:	30 mg/l or less
Effluent TSS:	30 mg/l or less
Effluent TN:	10 mg/l or less

Fluidyne has assumed flow is continuous 24 hours/day and seven days per week. We have assumed the wastewater entering our process is non-toxic and readily biodegradable with sufficient alkalinity and pH. Wastewater temperature assumed minimum 10 degrees in the winter and approximately 20 degrees in the summer.

We have the following internal tank dimensions for each train:

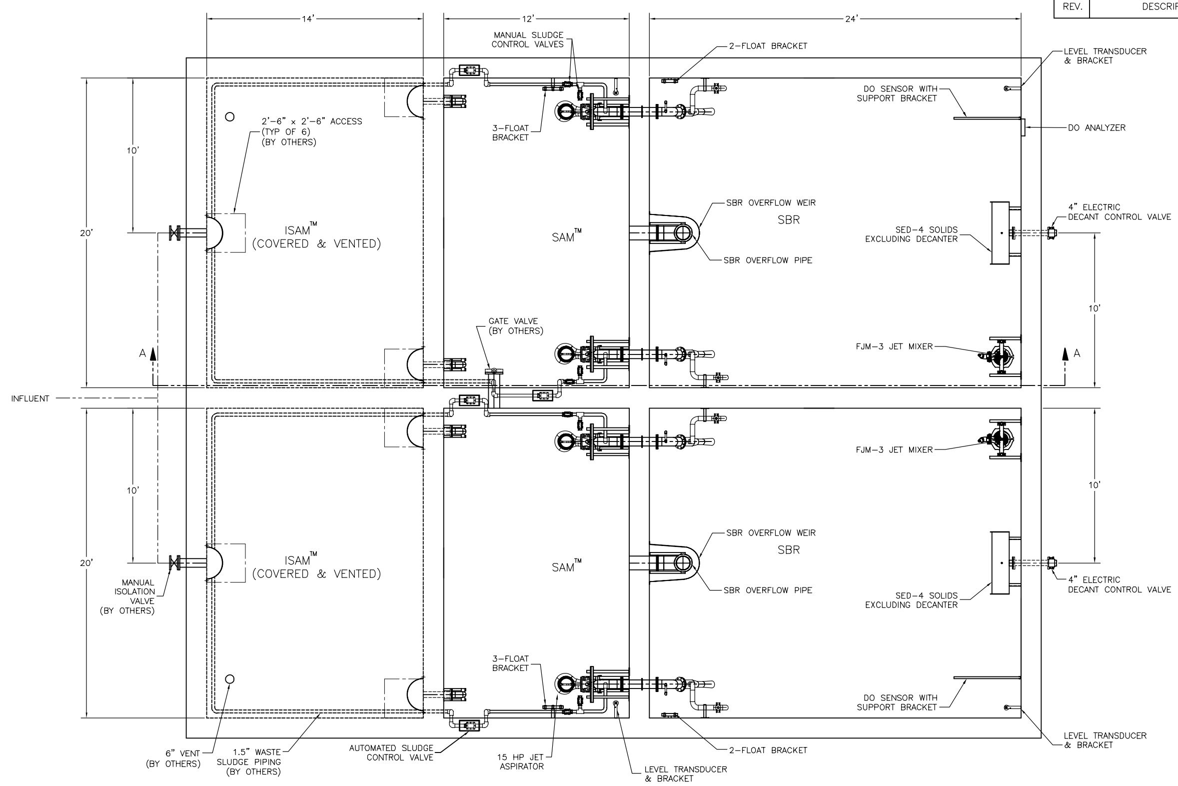
ISAM (covered and vented):	14' long X 20' wide X 12.5' TWL X 14' Wall height
SAM:	12' long X 20' wide X 12.5' TWL X 14' Wall height
SBR:	24' long X 20' wide X 12.5' TWL X 14' Wall height

There is some flexibility in the geometry, so if there are some alternate dimensions based on site restrictions that you would like us to consider, please let us know.
Please see the enclosed proposal providing a detailed equipment scope. We have also included preliminary layout drawings and process calculations.

From an equipment budget standpoint, for the two tank system we would have a budget of around $260,000.

Thanks,
Erick Mandt
FLUIDYNE CORPORATION

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED



NOTES:

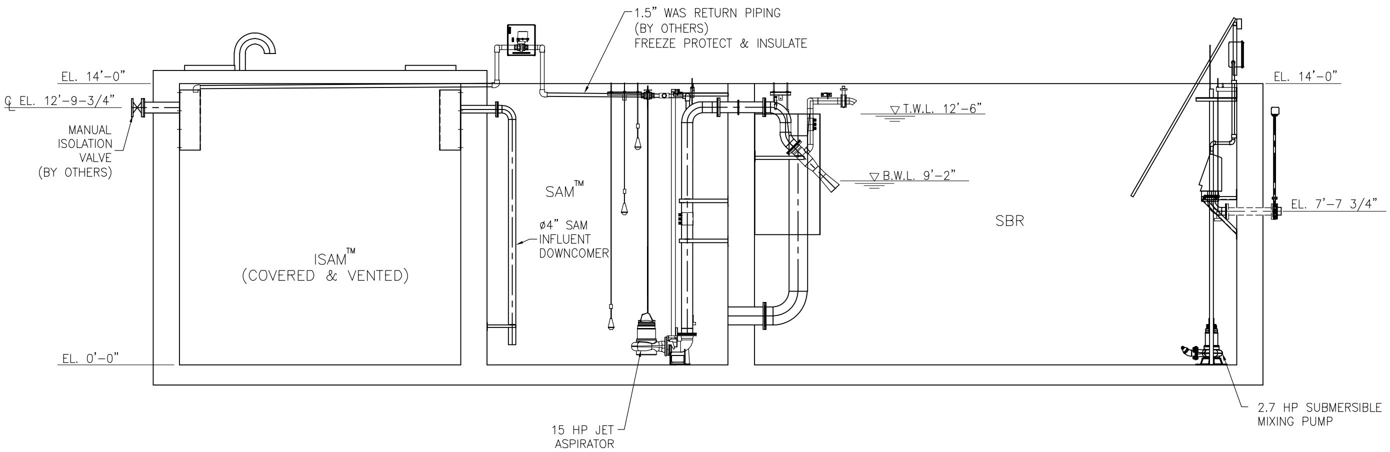
1. THOROUGHLY REVIEW INSTALLATION INSTRUCTIONS PRIOR TO BEGINNING FIELD WORK. IF YOU HAVE ANY QUESTIONS PLEASE CONSULT FACTORY.
2. ALL NOZZLES TO BE LEVELED AND AT THE SAME ELEVATION ± 1/4".
3. (FJ) MAY REQUIRE CUT-TO-FIT OR ADDITIONAL PIPE FOR FIELD ADJUSTABILITY.
4. SEE INSTALLATION INSTRUCTIONS FOR PROPER PREPARATION TO ENSURE PROPER FITTING OF ALL COMPONENTS BEFORE FIELD WELDING AND FIELD LAMINATING.
5. ALL PUMP GUIDE RAILS BY OTHERS.
6. ALL SPOOL PIECES, WALL PENETRATIONS, EBEDDED ITEMS, INTERCONNECTING HARDWARE AND GASKETS BY OTHERS
7. ALL DIMENSIONS ARE NOMINAL ±
8. ALL EXPOSED PIPING AND VALVING MUST BE PROPERLY INSULATED AND FREEZE PROTECTED.

FLUIDYNE

SPRING CREEK, NV – 1 – PLAN VIEW

DRAWN NWS	DATE 10/22/18	JOB #	CAD FILE Spring Creek, NV – 1 – Plan View
CHECKED	DATE	SCALE	SHEET 1 OF 2

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED



SECTION A-A

NOTES:

1. THOROUGHLY REVIEW INSTALLATION INSTRUCTIONS PRIOR TO BEGINNING FIELD WORK. IF YOU HAVE ANY QUESTIONS PLEASE CONSULT FACTORY.
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7. ALL DIMENSIONS ARE NOMINAL ±
8. ALL EXPOSED PIPING AND VALVING MUST BE PROPERLY INSULATED AND FREEZE PROTECTED.

FLUIDYNE

SPRING CREEK, NV – 2 – ELEVATION VIEW

DRAWN	DATE	JOB #	CAD FILE
NWS	10/22/18		Spring Creek, NV-2-Elevation View
CHECKED	DATE	SCALE	SHEET 2 OF 2

FLUIDYNE ISAM CALCULATIONS
PROJECT: Spring Creek NV

	Current	Buildout
ENGINEER: egm	Current	Buildout
DATE & TIME:	Two	Two
10/22/2018 12:12	Tank	Tank
INFLUENT CONDITIONS		
Flow (MGD)	0.060	0.095
Flow(gpm)	42	66
INFLUENT CONDITIONS		
BOD (mg/l)	320	320
(lb/d)	160	254
TSS (mg/l)	300	300
(lb/d)	150	238
TKN (mg/l)	50	50
(lb/d)	25	40
EFFLUENT REQUIREMENTS (monthly averages)		
BOD (mg/l)	30	30
TSS (mg/l)	30	30
TIN (mg/l)	10	10
OXYGEN REQUIREMENTS		
Pounds TKN required for synthesis	8.01	12.68
Pounds of NO3-N produced	17	27
Pounds O2 recovered/pound NO3-N reduced	2.6	2.6
Pound of Oxygen/ pound of BOD	1.4	1.4
Pound of Oxygen/pound of TKN	4.6	4.6
Actual Oxygen Demand (lb 02/d) Total	339	537
Alpha	0.9	0.9
Beta	0.95	0.95
Theta	1.024	1.024
Operating Dissolved oxygen (mg/l)	2	2
Clean Water oxygen sat. at op. temp (mg/l)	9.09	9.09
Clean Water oxygen sat. at std. temp (mg/l)	9.09	9.09
Clean water 02 sat, std temp,mid depth(mg/l)	10.76	10.76
Std. condition ambiant pressure (psia)	14.7	14.7
Oper. condition ambiant pressure (psia)	12	12
Wastewater temperature (c)	20	20
SOR/AOR ratio	1.88	1.88
Standard Oxygen Demand (lb 02/d) total	639	1012
Standard Oxygen Demand (lb 02/hr)	84.1	84.4
Standard Oxygen Demand (lb 02/hr/tank)	42.1	42.2
Specific oxygenation rate (mg/l-hr)	75	75
Pounds of oxygen/pound of air	0.23	0.23
Clean water efficency (%)	15	15
Pounds of air/cubic foot of air	0.075	0.075
Aeration hours per day	7.60	12.00
NITRIFICATION/DENITRIFICATION		
Required alkalinity for nitrification (mg/l)	243	243
Alkalinity recovered, denitrification (mg/l)	102	102
Net alkalinity required (mg/l)	176	176
Mixed liquor temperature, C	10	10
ML dissolved oxygen (mg/l)	1	1
Max. nitrifier growth rate, day-1	0.125	0.125
Minimum SRT required for nitrification, days	7.99	7.99
Actual or design SRT, days	28.62	18.08

PROJECT: Spring Creek NV

Kn, half velocity constant (mg/l)	0.22	0.22
Design growth rate for heterotrophs/nitrifiers	0.0349	0.0553
Projected effluent soluable NH3-N, mg/l	0.09	0.18
Specific utilization rate, lbs BOD5/lb mlvss	0.15	0.19
lbs. mlvss required for BOD & NH3 removal	1037	1324
mlvss (mg/l)	2000	2000
Tank volume req. for BOD & NH3 removal (MG)	0.062	0.079
Denitrification rate (g/g/day)	0.034	0.034
lbs mlvss required for denitrification	507	803
Tank volume required for NO3 removal (MG)	0.030	0.048
Total tank volume required (MG)	0.0926	0.1275
SBR TANK CONFIGURATION		
No. of tanks	2	2
Length overall (ft)	36	36
Length SAM tank (ft)	12.00	12.00
Length SBR tank (ft)	24.00	24.00
Width (ft)	20.00	20.00
Bottom water level (ft)	9.2	9.2
Top water level (ft)	12.5	12.5
Top of Wall (ft)	12	12
No. Decanters/tank	1	1
Total SAM™+SBR Volume @ TWL(MG)	0.1346	0.1346
Total Tankage Volume @ TWL(MG)	0.1849	0.1849
SAM™+SBR HRT (hrs)	53.86	34.01
Total HRT	73.96	46.71
CYCLE TIMES/CAPACITY CALCULATIONS		
Total decant volume (cubic feet)	3,178	3,178
Total decant volume (gallons)	23,768	23,768
Decant volume per tank (gallons)	11,884	11,884
Number of cycles per day/tank	2.52	4.00
Total time per cycle (minutes)	570	360
Fill rate (gpm)	952	952
Fill time (minutes)	12	12
Interact period (min)	452	242
Settle period (minutes)	45	45
Average decant rate (gpm/ft decanter)	65	65
Decanter length (feet)	3	3
Decanting time (minutes)	61	61
Decanting rate (gpm)	195	195
Peak decanting rate (gpm at start of decant)	215	215
Idle period time (minutes)	0	0
Aeration Hours Available	19.54	16.94
EQUIPMENT SELECTION		
Lbs O2 per nozzle per hour (SOR)	22	22
Number of nozzles required (per tank)	1.91	1.92
Number of nozzles provided (per tank)	2	2
Actual Lbs 02 per tank available per hour (SOR)	44	44

PROJECT: Spring Creek NV

POWER CONSUMPTION CALCULATIONS		
Pump efficiency	0.7	0.7
Pump horsepower, BHP	12	12
Mixing BHP/MG	178	178
Total horsepower, BHP/tank	24.0	24.0
Aeration BHP/MG	357	357
Total design equivalent horsepower, BHP	7.61	12.01
SLUDGE PRODUCTION		
Sludge Yield Factor	0.7	0.7
Net Sludge Yield (lbs/d)	112	177
Sludge Concentration (%)	0.3	0.3
Sludge Wasting Rate (gpd)	4704	7448
Waste Sludge /cycle (gal)	932	932
WAS Pumping Rate (gpm)	20	20
Waste Sludge Cycle Time (min)	46.6	46.6
Thickened Sludge Concentration (%)	3	3
Thickened Sludge (gpd)	448	709
MLSS (mg/l) @ TWL	2857	2857
MLSS (mg/l) @ BWL	3886	3886
Sludge inventory (lbs)	3208	3208
SRT (1/days)	28.62	18.08
F/M	0.05	0.08
SVI (ml/g)	150	150
Sludge blanket level (ft)	5.36	5.36
Organic loading (lbs BOD/1000 ft3)	6.48	10.26
SLUDGE STORAGE		
Surface Area Required	200	317
Number of tanks	2	2
Length required (ft)	10.00	15.83
Length (ft) provided	14.00	14.00
Width (ft)	20	20
TWL (ft)	12	12
Total volume (gal) available	50,266	50,266
Days sludge storage available undigested	112.20	70.86
Total sludge age including SBR (days)	140.82	88.94
Pounds sludge destroyed	76	90
% sludge reduction	68	51
Thickened, digested sludge (gpd)	145	348
Inerts accumulation (gal/d)	60	95
Days sludge storage available after digestion	123	60

FLUIDYNE
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THE EXPERIENCED LEADER IN SEQUENCING BATCH REACTOR TECHNOLOGY

ISAM™

SEQUENCING BATCH REACTOR PROCESS

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THE EXPERIENCED LEADER IN SEQUENCING BATCH REACTOR TECHNOLOGY

TRUST FLUIDYNE'S EXPERIENCE

The Fluidyne ISAM™ Sequencing Batch Reactor (SBR) system incorporates the latest and most innovative technology and over three decades of experience in providing the most reliable SBR systems with the highest effluent quality. Fluidyne SBR systems are in operation around the World and have won numerous awards. Fluidyne SBRs consistently provide better than 10/10/5/1 (BOD5/TSS/TN/TP) effluent quality. Fluidyne engineers have designed over 500 SBRs, and been granted over twenty patents.

A TOTALLY NEW CONCEPT IN SBR DESIGN

The Fluidyne ISAM™ Sequencing Batch Reactor system is a single train SBR system which incorporates a constant level anaerobic selector chamber, followed by a surge/anoxic/mix (SAM™) tank , and one or more SBR basins.

In operation, all influent flow enters the anaerobic selector chamber where influent solids are allowed to settle much like a primary clarifier. Elimination of primary solids in the anaerobic chamber allows for much smaller SBR basins at an equivalent SRT than conventional SBRs. The anaerobic selector also creates soluble carbon as a food source for biological nutrient removal through anaerobic conversion of settleable BOD to soluble BOD.

The influent then flows to the SAM™ surge basin (influent equalization basin). The surge basin provides flow and nutrient equalization to optimize treatment at the full range of flows and loadings. When the level in the surge basin reaches a predetermined level, the jet motive liquid/fill pump is started, and a batch is quickly fed to the reactor basin.

Several unique feature of the Fluidyne ISAM™ SBR include odor control and scum skimming. Mixed liquor is maintained in the SAM™ tank to immediately react with incoming flow from the anaerobic chamber to suppress odors and initiate and accelerate carbon and nitrogen reactions. Mixed liquor from the SBR tank overflows the proprietary flow and scum control system weir, and is returned to the SAM™ surge basin, and mixed with incoming wastewater in what is referred to as an "Interact" period. In addition, nitrates are recycled to the SAM™ tank for effective and rapid denitrification. Denitrification reactions are accelerated in the presence of the unreacted soluble carbon from the raw sewage entering the SAM™ tank. Aeration and energy requirements are reduced as nitrates are fully reduced to nitrogen gas in the SAM™ tank.

FLUIDYNE PREPACKAGED ISAM™ SBRS

The Fluidyne prepackaged ISAM™ SBR is available in standard sizes for average influent flows from 5,000 GPD to 110,000 GPD. Each unit is shipped complete; prewired and prepiped. Packaged systems can be buried or installed above grade on customer provided concrete pad.

100% ON-LINE STANDBY EQUIPMENT

Fluidyne's prepackaged ISAM™ SBRs are furnished with spare mixing/fill pump and aerator assembly installed for 100% redundancy.

The Fluidyne ISAM™ Sequencing Batch Reactor incorporates an anaerobic selector chamber with the SAM™ SBR. All influent flow enters the anaerobic chamber where influent solids settle. The anaerobic selector chamber also creates soluble carbon as a food source for denitrification through anaerobic conversion of settleable BOD to soluble BOD. During the "Interact" phase, a portion of the motive liquid is also recirculated to the anaerobic selector chamber where the mixed liquor solids are converted from an aerobic-dominant population to a facultative-dominant population. Aerobic bacteria are selectively destroyed while enabling the low-yield, facultative bacteria to breakdown and utilize the remains of the aerobes and their byproducts. The mixed liquor then flows to the SAM™ surge basin where the facultative bacteria, in turn, are out-competed by the aerobic bacteria and subsequently broken down in the alternating environments of the aerobic SBR treatment process and the anaerobic chamber. A balance between selection and destruction is developed between the anaerobic selector chamber and the SBR treatment process resulting in extremely low net biological solids produced. The ISAM™ process will reduce the volume of waste sludge, compared to a conventional SBR/aerobic digester system.

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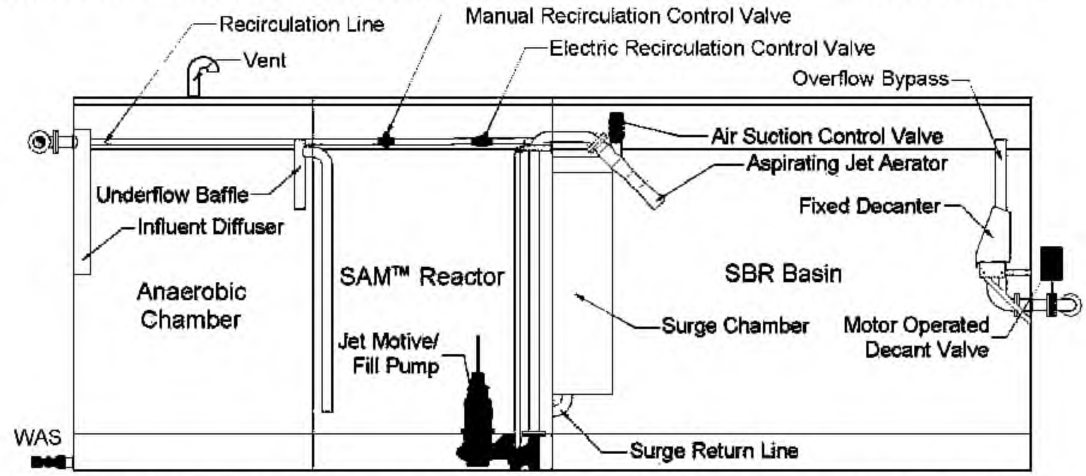
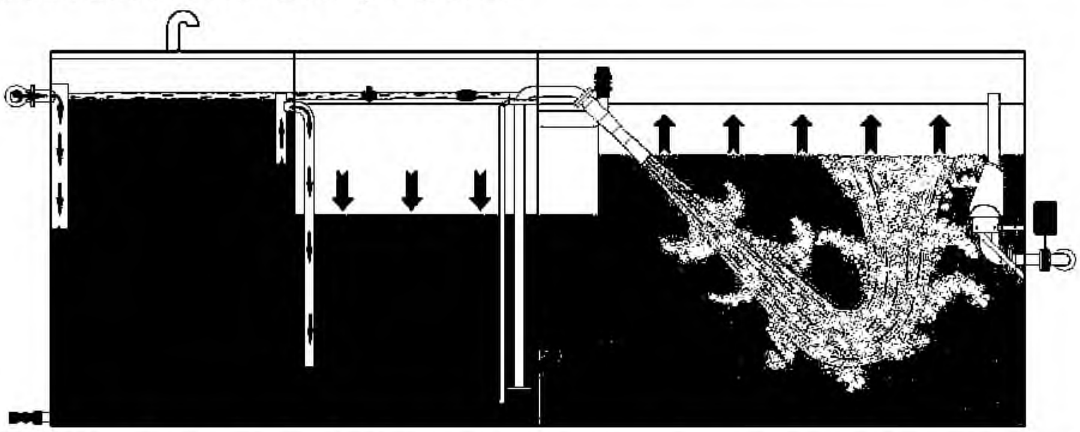
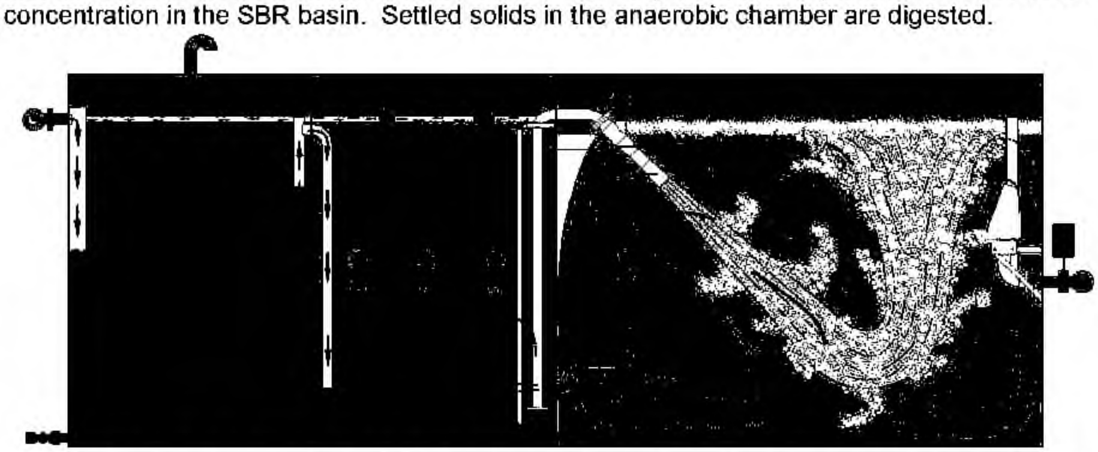
THE EXPERIENCED LEADER IN SEQUENCING BATCH REACTOR TECHNOLOGY



System Components: Influent continuously enters the anaerobic chamber where solids settle. Settleable BOD is converted to soluble BOD. BOD is reduced by 30%, and solids are reduced by 60%. The influent then flows to the SAM™ reactor. Mixed liquor is maintained in the SAM™ reactor to suppress odors, and initiate and accelerate carbon and nitrogen reduction.



Fill Phase: When the level in the SAM™ reactor reaches a predetermined "control level" the motive liquid pump is started. The SBR basin is filled and mixed. A variable percentage of the pumped flow is returned to the anaerobic chamber where biological solids settle. The recycle flow is adjustable to maintain the desired MLSS concentration in the SBR basin. Settled solids in the anaerobic chamber are digested.



Interact Phase: When the level in the SBR reaches TWL, nitrified mixed liquor overflows the surge chamber weir and is returned to the SAM™ chamber to mix and react with the raw influent. Aeration is cycled on and off to provide the required oxygen. Denitrification is reliable and complete. Scum is also removed from the SBR basin.

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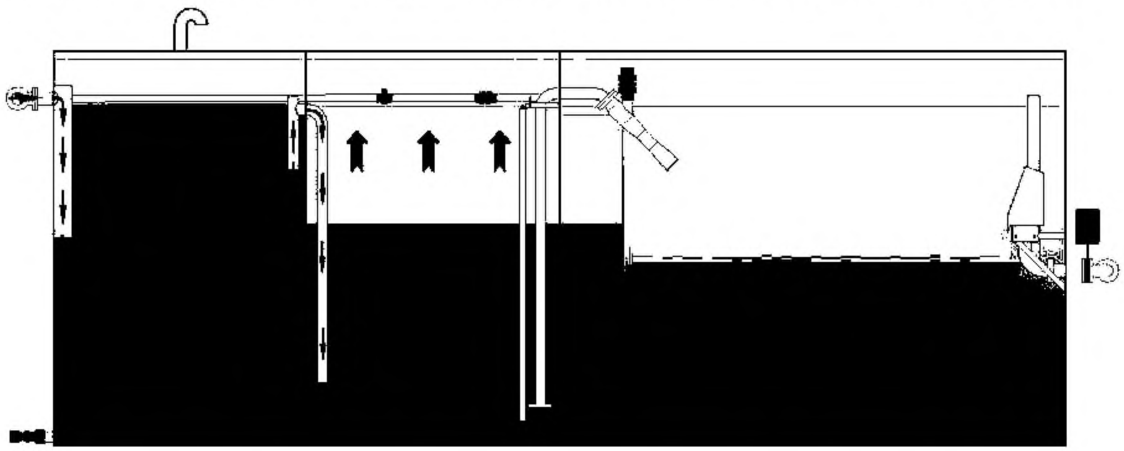
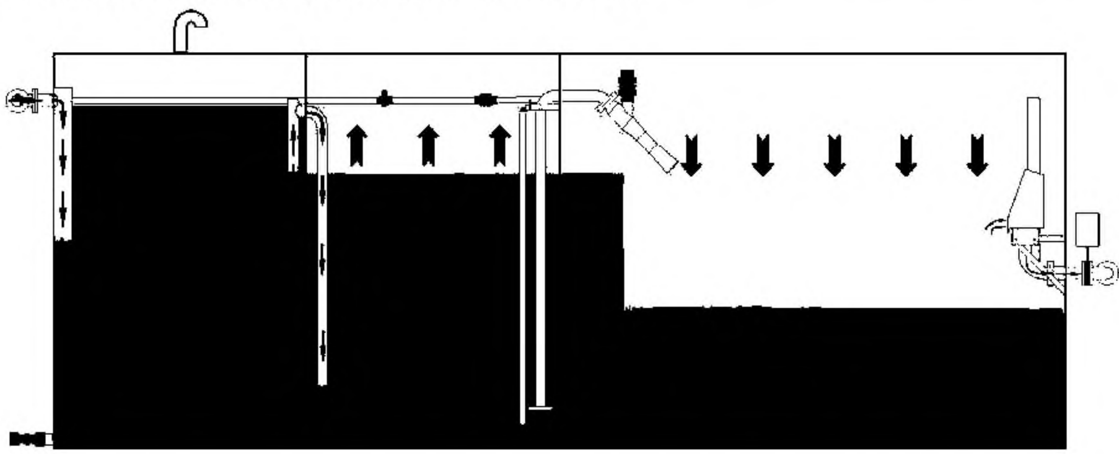
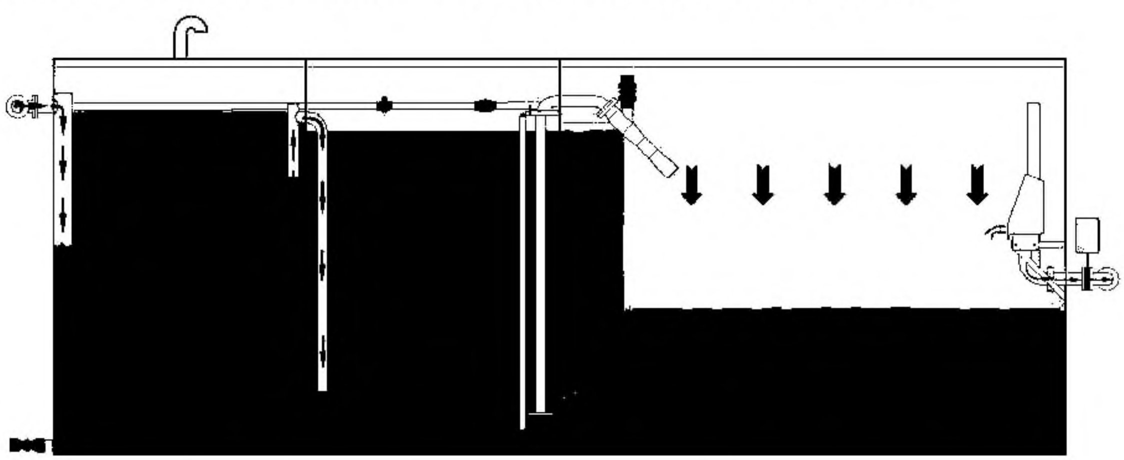


Settle Phase: When the level in the SAM™ reactor again reaches "control level," aeration is discontinued, and the SBR basin settles under perfect quiescent conditions.



Decant Phase: When the settle timer expires, the decant valve is opened, and treated effluent is withdrawn from the upper portion of the SBR basin by means of a fixed solids excluding decanter.



Filled Decant Phase: If, during peak flow events, the SAM™ reactor reaches TWL before the decant phase ends, influent flows in a reverse direction through the surge return line and overflows the surge chamber secondary weir, and is diffused into the settled sludge at very low velocity as the decant phase continues.

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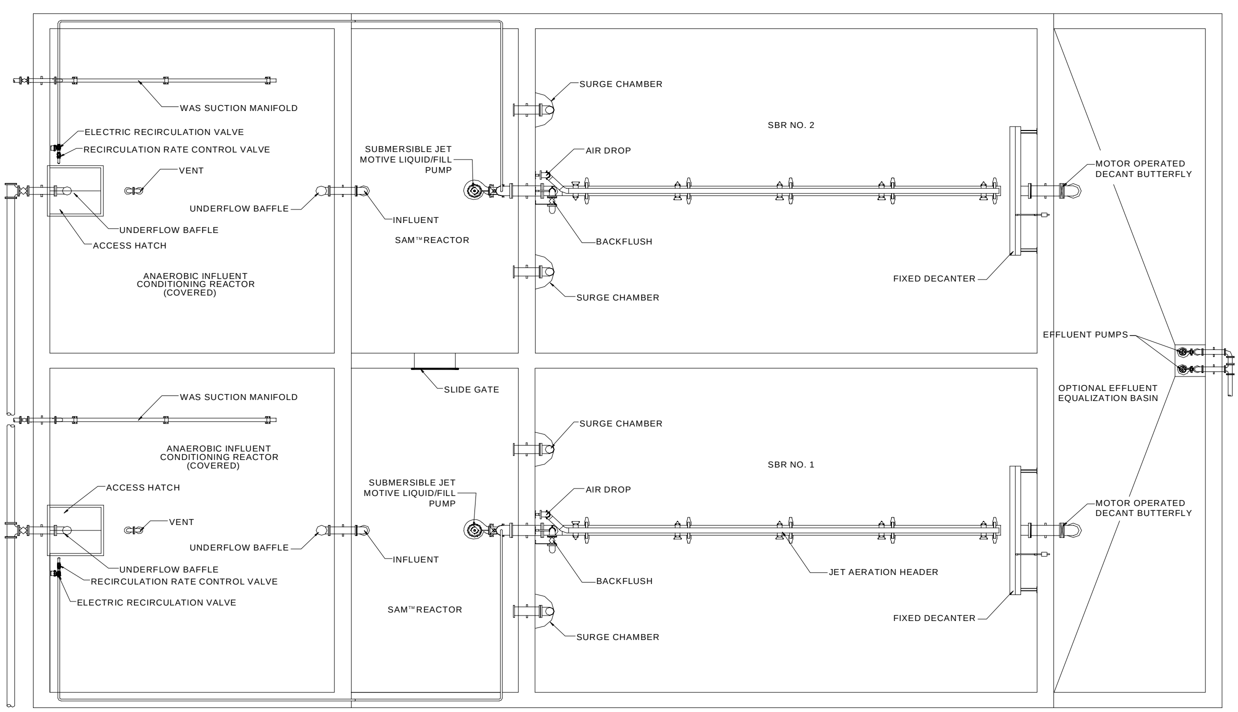
THE EXPERIENCED LEADER IN SEQUENCING BATCH REACTOR TECHNOLOGY

CUSTOM ENGINEERED ISAM™ SYSTEMS

The majority of ISAM™ systems currently operating are packaged systems for daily flows of less than 100,000 GPD. However, the process offers the same advantages for larger facilities. The first advantage is that the ISAM™ requires smaller SBR basins than a conventional SBR, at identical loadings. This is due to the fact that 65% of the influent solids are removed in the anaerobic chamber, and are therefore not considered in calculation of the SRT. An ISAM™ designed for an average daily daily flow of 1.0 MGD, and an SRT of 20 days will have an SBR basin capacity of 0.67 MG, and an HRT of 16 hours. A conventional SBR designed for a 20 day SRT would have a capacity of 1.24 MG, and an HRT of 30 hours. The 1.0 MGD ISAM™ SBR design also includes the SAM™ reactor having a capacity of 0.14 MG. Since the SAM™ reactor contains mixed liquor, the actual working SRT for the ISAM™ process is 25 days, and the total volume is only 66% of that of the conventional SBR.

The ISAM™ design also includes two anaerobic influent conditioning chambers having a total capacity of 0.50 MG. Therefore, the total volume of the entire ISAM™ SBR process is 1.31 MG, and no additional digesters are required. Aerobic digesters for a conventional 1.0 MGD SBR would have a capacity of 0.30 MG if designed for a 30 day sludge age. This means that the total volume for a 1.0 MGD conventional SBR plus aerobic digesters would be 1.54 MG. The total volume for the ISAM™ process is 1.31 MG.

The total power consumption for a 1.0 MGD conventional SBR plus aerobic digestion would be approximately 1,680 KWH/day. The total power consumption for a 1.0 MGD ISAM™ SBR is approximately 845 KWH/day; 50% less than a conventional SBR.



0.60 MGD CUSTOM ENGINEERED ISAM™SBR

FLUIDYNE CORPORATION

THE EXPERIENCED LEADER IN SEQUENCING BATCH REACTOR TECHNOLOGY

FLUIDYNE SAM™ SBR - BARONA, CA - WEEKLY REPORTS

	INFLUENT					EFFLUENT						
DATE	**BOD_5**	**TSS**	**NH_3-N**	**TKN**	**FOG**	**BOD_5**	**TSS**	**NH_3-N**	**NO_3**	**NO_2**	**TKN**	**FOG**
02/16/05	632	327	20.2	36.0	64.8	2.0	ND	ND	0.1	0.02	0.50	<1.0
02/23/05	338	226	6.7	7.8	45.5	ND	ND	ND	ND	0.02	0.60	ND
03/02/05	813	390	23.5	35.0	75.8	4.6	ND	2.0	0.1	0.01	0.80	ND
03/09/05	653	328	15.1	22.7	88.8	4.9	ND	0.2	0.3	ND	1.10	ND
03/16/05	640	237	23.7	35.9	79.4	2.7	ND	0.2	0.3	0.02	1.10	ND
03/23/05	385	445	24.1	38.2	80.7	2.2	ND	2.0	0.2	0.13	0.70	ND
03/30/05	736	358	15.2	19.3	217.0	10.0	ND	0.1	0.1	0.03	0.50	ND
04/06/05	627	338	28.3	34.5	97.0	9.0	ND	0.4	ND	ND	0.40	ND
04/13/05	784	356	23.0	27.2	31.0	12.0	ND	0.5	ND	ND	0.70	ND
04/20/05	336	223	14.0	16.6	8.4	3.5	1.9	0.4	ND	ND	3.30	<1
04/27/05	579	485	6.7	8.9	27.5	<2	ND	0.3	ND	ND	3.10	<1
05/04/05	940	334	1.0	33.1	48.9	2.9	2.5	1.0	0.1	0.08	2.60	<1
05/11/05	622	330	22.2	74.2	66.7	<2	ND	ND	ND	ND	1.80	ND
05/18/05	718	329	20.8	28.0	492.0	2.2	ND	ND	ND	ND	0.49	ND
05/25/05	575	322	13.1	13.3	450.0	4.6	ND	0.5	ND	ND	0.50	ND
06/01/05	711	688	24.0	25.8	327.0	12.3	ND	0.5	0.2	ND	0.50	ND
06/08/05	508	277	22.4	27.9	52.6	2.4	NO	0.1	0.4	ND	0.70	<1
06/15/05	343	155	14.9	22.5	90.8	<2	ND	0.5	0.4	ND	1.00	ND
06/22/05	661	477	27.6	33.5	87.2	<2	ND	0.2	0.4	ND	0.70	1.1
06/29/05	444	345	32.6	50.5	61.5	2.0	ND	0.1	0.3	0.03	0.50	ND
07/06/05	925	379	27.6	48.1	87.5	1.7	ND	0.2	0.3	0.03	0.80	ND
07/13/05	673	346	33.1	52.5	99.5	<2	ND	0.5	0.5	ND	0.90	<1.0
07/20/05	650	109	29.1	43.0	84.9	<2	ND	0.1	ND	0.04	0.70	<1.0
07/27/05	694	305	33.0	43.0	83.1	<2	ND	0.2	0.3	0.08	0.40	ND
08/03/05	580	324	26.3	28.0	65.9	3.6	ND	0.6	0.3	0.02	0.80	ND
AVG. YTD	**623**	**337**	**20.9**	**32.2**	**116.5**	**4.6**	**ND**	**0.4**	**0.2**	**0.03**	**1.01**	**ND**

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THE EXPERIENCED LEADER IN SEQUENCING BATCH REACTOR TECHNOLOGY

The Fluidyne ISAM™ SBR system provides the following benefits,

1. Ability to handle highly variable flows and loading associated with small, to medium size plants. The ISAM™ is more flexible than continuous flow plants. Regardless of flows or loading, aeration and mixing can automatically be adjusted to optimize power and prohibit filamentous growth.

2. At high flows, solids cannot wash out as with extended aeration plants as the ISAM™ SBR process utilizes quiescent settle and decant.

3. ISAM™ facilities are easily expandable by adding a new tank. The additional tank does not require major changes in controls; only a new tank and associated equipment.

4. ISAM™ provides a small footprint with no digesters, secondary clarifiers, RAS piping and pumping.

5. ISAM™ produces the highest quality effluent. Typical Fluidyne ISAM™ facilities are achieving less than 10 mg/l BOD and TSS, less than 1 mg/l NH_3-N, less than 8 mg/l total N, and less than 2 mg/l phosphorous.

6. Easy to operate and maintain as mechanical equipment is minimized with no chasing of sludge associated with extended aeration plants.

7. Use of self-aspirating jet aerators eliminate blowers and blower accessories.

8. Built in sludge reduction system using the anaerobic selector chamber significantly reduces sludge handling and hauling costs.

9. 100% stand-by aerator is included with the system to allow continuous operation with one unit out of service.

10. Built in flow equalization is provided in the ISAM™ reactor to handle peak hourly flows.

11. Automatic scum skimming prior to effluent discharge provides highest quality effluent.

12. Exceptional after sales service by Fluidyne technicians. Fluidyne employees have been granted over 40 patents in wastewater and water treatment technology and equipment.

13. Reduced operation and maintenance costs as power usage is controlled through the Fluidyne control panel.

14. Installed cost is lower as the system comes with the in-basin equipment pre-installed

15. The anaerobic selector chamber is covered and raw wastewater reacts immediately with mixed liquor in an aerated environment, there are no odor concerns.

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Cedar Falls, Iowa 50613
Phone: (319) 266-9967
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E-Mail: www.FluidyneCorp.com

Appendix H

Construction Costs: Alternative 1 – Relocate Churchill WWTP

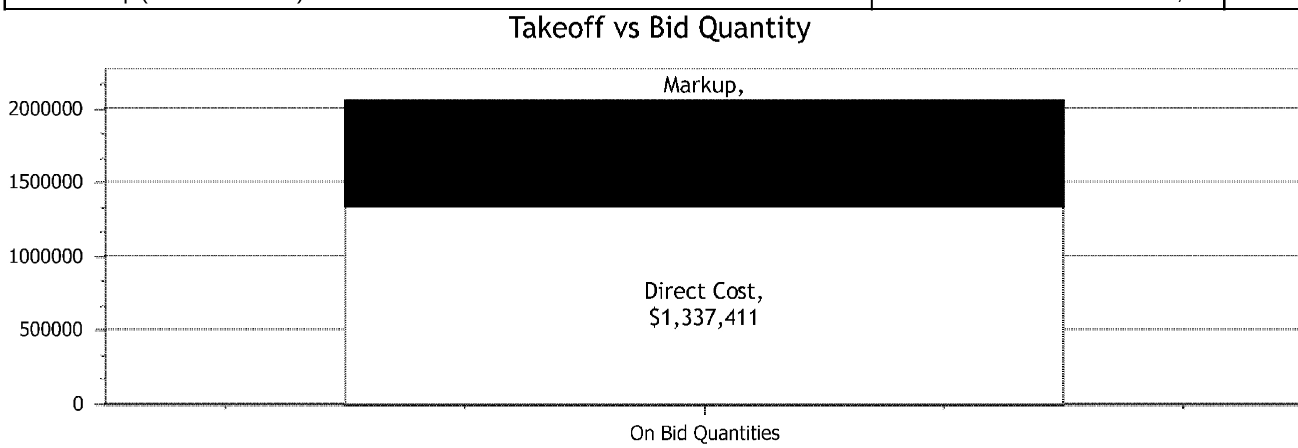
Estimate Recap Report

Project Information

Estimate:	2018GBWCSC-2 - GBWC - Spring Creek	Bid Date:	10/28/2018
Project:	-	Review Date:	-
Estimator In Charge:	JC - John Collins	Job Duration:	0 months
Owner:	-	State:	NV
Engineer:	-	Estimate Type:	Estimate
Related Estimate:	-		

Estimate Summary

	On Bid Quantities	%
Direct Cost	1,337,411	64.89%
Indirect Cost	502,678	24.39%
Addons	0	0.00%
Bond	0	0.00%
Pass Through Cost	0	0.00%
Direct Markup	160,489	7.79%
Indirect Markup	60,321	2.93%
Markup Addons	0	0.00%
+ / - Adjustments	0	
Pass Through Adjustment	0	
Unbalancing Difference	0	0.00%
Rounding Difference	0	
Desired Bid	0.00	
Final Bid Total	2,060,899.06	100.00%
Final Markup (% Based on Cost)	220,811	12.00%

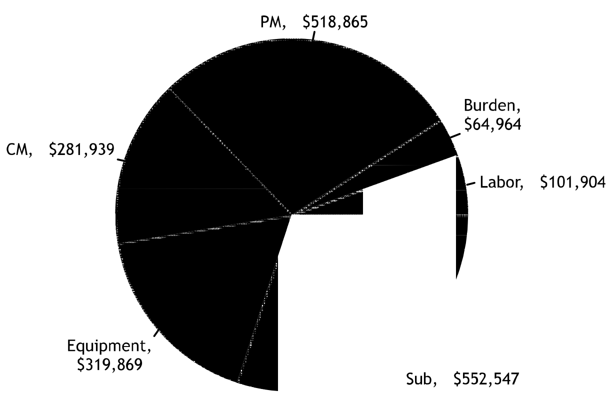


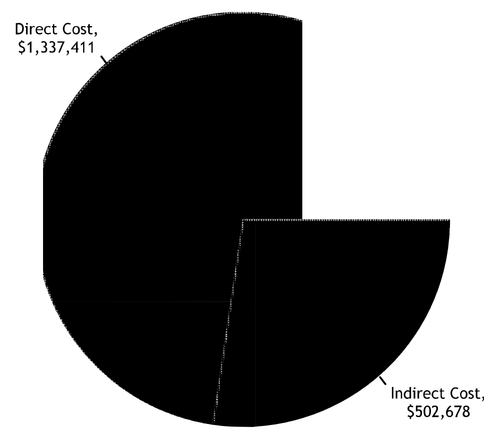
Other Totals

Total Sales Tax	$4,972	Burden % of Direct Labor	38.93%
Total Escalation	$0	Burden % of Indirect Labor	0.00%
Labor % of Job Cost	9.07%	EOE % of Equipment	82.50%
Equipment % of Job Cost	17.38%	Current Minority %	0.00%

Totals by Cost Type - Bid Quantities

	Direct	Indirect	Total	% of Total
Base Labor	101,904	0	101,904	5.54%
Burden	64,964	0	64,964	3.53%
Total Labor	166,868	0	166,868	9.07%
Inside Equipment	4,110	0	4,110	0.22%
Outside Equipment	41,318	10,560	51,878	2.82%
EOE	40,198	223,684	263,882	14.34%
Total Equipment	85,626	234,244	319,869	17.38%
Permanent Materials	518,865	0	518,865	28.20%
Construction Materials	15,155	266,784	281,939	15.32%
Subcontractors	550,897	1,650	552,547	30.03%
Misc 1	0	0	0	0.00%
Misc 2	0	0	0	0.00%
Misc 3	0	0	0	0.00%
Totals	1,337,411	502,678	1,840,088	100.00%





Fuel Summary

Fuel Type	Quantity	Units
Gasoline	0	Gal
Diesel	0	Gal
Off-Road	0	Gal

Sales Tax Summary

	Setup Tax %	Average Tax %	Total Taxes
Permanent Materials	0.00%	0.97%	4,972
Construction Materials	0.00%	0.00%	0
Inside Equipment	0.00%	0.00%	0
Outside Equipment	0.00%	0.00%	0
EOE	0.00%	0.00%	0
Subcontractors	0.00%	0.00%	0
Misc 1	0.00%	0.00%	0
Misc 2	0.00%	0.00%	0
Misc 3	0.00%	0.00%	0
Total Tax			4,972

Escalation Summary

	Average Escalation %	Total Escalation
Labor	0.00%	0
Inside Equipment	0.00%	0
Outside Equipment	0.00%	0
EOE	0.00%	0
Permanent Materials	0.00%	0
Construction Materials	0.00%	0
Subcontractors	0.00%	0
Misc 1	0.00%	0
Misc 2	0.00%	0
Misc 3	0.00%	0
Total Escalation		0

Labor Summary

	Direct	Indirect	Total
Hourly Labor (MH, MHS, MHR, MHRS)			
Manhours	3,332	0	3,332
Base Labor	101,904	0	101,904
Burden (Amount, % of Base Labor)	64,964	0	64,964
Premium	0	0	0
Total Labor	166,868	0	166,868
Daily Labor (DAY, DAYS, DY, DYS)			
None	0	0	0
Weekly Labor (WK, WKS, WEEK)			
None	0	0	0
Monthly Labor (MO, MON, MNTH, MMO, MMOS)			
None	0	0	0

Summary IS Current Last run 10/30/2018 8:35:00 AM

Balanced Markup Calculation

Spread IS Current Last run 10/30/2018 8:35:00 AM

	Cost	Markup %	Markup $
Labor	101,904	12.00%	12,229
Burden	64,964	12.00%	7,796
Permanent Materials	518,865	12.00%	62,264
Construction Materials	281,939	12.00%	33,833
Inside Equipment	4,110	12.00%	493
Outside Equipment	51,878	12.00%	6,225
EOE	263,882	12.00%	31,666
Subcontractors	552,547	12.00%	66,306
Misc 1	0	0.00%	0
Misc 2	0	0.00%	0
Misc 3	0	0.00%	0
Overrides	0	0.00%	0
Total	1,840,088	12.00%	220,811

Addons, Bond and Markup Summary Dependent on Bid Summary

	Total	%
Bond		
Bond	0	0.00%
Markup		
Resource Markup	220,811	10.71%
Total Markup	220,811	10.71%
Markup, Addons, and Bond Total	220,811	10.71%

Key Indicators Dependent on Bid Summary

	Result	Formula
Balanced Markup/Total Labor	132.33%	Balanced Markup / Total Labor
Indirect Cost/Direct Cost	37.59%	Indirect Cost / Direct Cost

Estimate Notes

```
Estimate created on: 02/03/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\ESTMAST

************Estimate created on: 07/19/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\ESTMSTRMIN

************Estimate created on: 08/17/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\2018BARRWTP

************Estimate created on: 10/26/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\2018BARRWT-2

************Estimate created on: 10/26/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\2018GBWCSC
```

Biditem 10 — Mobilization

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	0.00	0.00	0.00	7,900.00	7,900.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	7,900.00	7,900.00

Activity: 9999 MOB/DEMOB Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	0.00	0.00	0.00	7,900.00	7,900.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	7,900.00	7,900.00

Calendar: ST Straight Time Hrs/Shift: 8 WC: Code not found.

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4*9AXL	9 axel Heavy Equipment Trans	1.00	20.00	HR	175.00	100.00	175.00	3,500.00
4*TRUCKING	Flat bed material transport	1.00	40.00	HR	110.00	100.00	110.00	4,400.00

Biditem 20 — Earthwork

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	20,424.00	13,296.32	33,720.32	39,394.36	36,316.65	1,000.00	0.00	110,431.33
Total	20,424.00	13,296.32	33,720.32	39,394.36	36,316.65	1,000.00	0.00	110,431.33

Manhours	Unit/MH	MH/Unit	$/MH	Base Labor/MH	Total Labor/MH	Unit/CH
712.0000	0.0014	712.0000	155.1002	28.6854	47.3600	0.0069

Activity: 2.1 Plant Excavation in Chruchill County Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	4,576.00	2,796.92	7,372.92	7,468.58	0.00	0.00	0.00	14,841.50
Total	4,576.00	2,796.92	7,372.92	7,468.58	0.00	0.00	0.00	14,841.50

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
14,841.5000	32.0000	0.0313	463.7969	4.0000	0.2500	4.0000	3,710.3750

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
160.0000	0.0063	160.0000	46.0808	4,576.0000

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5221 Concrete Construction

Crew: SMPIPE Small Pipe Crew Prod: S 4 Eff: 100.00 Crew Hrs: 32.00 Labor Pcs: 5.00 Equipment Pcs: 2.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8267	LOADER WHEEL 2.5-2.9 CUBIC Y	1.00	32.00	HR	103.25	100.00	103.25	3,303.84
8276	EXCAVATOR 35000-39999#	1.00	32.00	HR	130.15	100.00	130.15	4,164.74
LABORER	Laborer	2.00	64.00	MH	21.00	100.00	33.76	2,160.55
OPER4	Operator Foreman	1.00	32.00	MH	37.00	100.00	58.38	1,868.29
OPERATOR	Operator	2.00	64.00	MH	32.00	100.00	52.25	3,344.08

Activity: 2.1.1 Site Grading in Churchill County Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	2,288.00	1,398.45	3,686.45	3,577.20	0.00	0.00	0.00	7,263.65
Total	2,288.00	1,398.45	3,686.45	3,577.20	0.00	0.00	0.00	7,263.65

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
7,263.6500	16.0000	0.0625	453.9781	2.0000	0.5000	2.0000	3,631.8250

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
80.0000	0.0125	80.0000	46.0806	2,288.0000

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5221 Concrete Construction

Crew: BKFL Backfill Crew Prod: S 2 Eff: 100.00 Crew Hrs: 16.00 Labor Pcs: 5.00 Equipment Pcs: 3.00

Notes: Assume excavated soils can be spread on site and that base slab under the existing plant and other foundations can remain. No import of fill or offhaul of concrete is assumed.

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8034	ROLLER 41-49" VIB SINGLE DRU	1.00	16.00	HR	60.26	100.00	60.26	964.10
8267	LOADER WHEEL 2.5-2.9 CUBIC Y	1.00	16.00	HR	103.25	100.00	103.25	1,651.92
8324	TRUCK WATER 2000-2999 GALLON	1.00	16.00	HR	60.07	100.00	60.07	961.18
LABORER	Laborer	2.00	32.00	MH	21.00	100.00	33.76	1,080.27
OPER4	Operator Foreman	1.00	16.00	MH	37.00	100.00	58.38	934.15
OPERATOR	Operator	2.00	32.00	MH	32.00	100.00	52.25	1,672.03

Activity: 2.2 Pond Grading Quantity: 39188 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.02	0.02	0.04	0.07	0.00	0.00	0.00	0.11
Total	976.00	655.63	1,631.63	2,547.39	0.00	0.00	0.00	4,179.02

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
0.1066	0.0002	4,898.5000	522.3775	1.0000	39,188.0000	0.0000	4,179.0200

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
32.0000	1,224.6250	0.0008	50.9884	0.0249

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: LGGRD Large Grading Crew Prod: S 1 Eff: 100.00 Crew Hrs: 8.00 Labor Pcs: 4.00 Equipment Pcs: 3.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8038	ROLLER 61-70" VIB SINGLE DRU	1.00	8.00	HR	81.86	100.00	81.86	654.91
8239	MOTORGRADER 150HP 14' BLADE	1.00	8.00	HR	134.44	100.00	134.44	1,075.54
8326	TRUCK WATER 4000-4999 GALLON	1.00	8.00	HR	102.12	100.00	102.12	816.94
LABORER	Laborer	1.00	8.00	MH	21.00	100.00	35.02	280.13
OPER4	Operator Foreman	1.00	8.00	MH	37.00	100.00	60.60	484.81
OPERATOR	Operator	2.00	16.00	MH	32.00	100.00	54.17	866.69

Activity: 2.3 Structure Exc Quantity: 2216 Unit: CY

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	1.55	1.04	2.59	4.09	0.00	0.00	0.00	6.68
Total	3,432.00	2,303.27	5,735.27	9,071.44	0.00	0.00	0.00	14,806.71

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
6.6817	0.0108	92.3333	616.9463	3.0000	738.6667	0.0014	4,935.5700

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
120.0000	18.4667	0.0542	47.7939	1.5487

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: EXC4 4 man Exc Crew Prod: S 3 Eff: 100.00 Crew Hrs: 24.00 Labor Pcs: 5.00 Equipment Pcs: 3.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8269	LOADER WHEEL 3.5-3.9 CUBIC Y	1.00	24.00	HR	145.71	100.00	145.71	3,497.06
8276	EXCAVATOR 35000-39999#	1.00	24.00	HR	130.15	100.00	130.15	3,123.55
8326	TRUCK WATER 4000-4999 GALLON	1.00	24.00	HR	102.12	100.00	102.12	2,450.83
LABORER	Laborer	2.00	48.00	MH	21.00	100.00	35.02	1,680.79
OPER4	Operator Foreman	1.00	24.00	MH	37.00	100.00	60.60	1,454.41

OPERATOR	Operator	2.00	48.00	MH	32.00	100.00	54.17	2,600.07

Activity: 2.4 Structure BF Quantity: 1683 Unit: CY

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	2.04	1.37	3.41	4.39	0.00	0.00	0.00	7.80
Total	3,432.00	2,303.27	5,735.27	7,394.03	0.00	0.00	0.00	13,129.30

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
7.8011	0.0143	70.1250	547.0542	3.0000	561.0000	0.0018	4,376.4333

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
120.0000	14.0250	0.0713	47.7939	2.0392

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: BKFL Backfill Crew Prod: S 3 Eff: 100.00 Crew Hrs: 24.00 Labor Pcs: 5.00 Equipment Pcs: 3.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8034	ROLLER 41-49" VIB SINGLE DRU	1.00	24.00	HR	60.26	100.00	60.26	1,446.14
8269	LOADER WHEEL 3.5-3.9 CUBIC Y	1.00	24.00	HR	145.71	100.00	145.71	3,497.06
8326	TRUCK WATER 4000-4999 GALLON	1.00	24.00	HR	102.12	100.00	102.12	2,450.83
LABORER	Laborer	2.00	48.00	MH	21.00	100.00	35.02	1,680.79
OPER4	Operator Foreman	1.00	24.00	MH	37.00	100.00	60.60	1,454.41
OPERATOR	Operator	2.00	48.00	MH	32.00	100.00	54.17	2,600.07

Activity: 2.8.2 Yard Pipe Install Quantity: 500 Unit: LF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	11.44	7.68	19.12	18.67	0.00	0.00	0.00	37.79
Total	5,720.00	3,838.78	9,558.78	9,335.72	0.00	0.00	0.00	18,894.50

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
37.7890	0.0800	12.5000	472.3625	5.0000	100.0000	0.0100	3,778.9000

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
200.0000	2.5000	0.4000	47.7939	11.4400

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: SMPIPE Small Pipe Crew Prod: S 5 Eff: 100.00 Crew Hrs: 40.00 Labor Pcs: 5.00 Equipment Pcs: 2.00

Notes: Assume Owner supplied HDPE

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8267	LOADER WHEEL 2.5-2.9 CUBIC Y	1.00	40.00	HR	103.25	100.00	103.25	4,129.80
8276	EXCAVATOR 35000-39999#	1.00	40.00	HR	130.15	100.00	130.15	5,205.92
LABORER	Laborer	2.00	80.00	MH	21.00	100.00	35.02	2,801.32
OPER4	Operator Foreman	1.00	40.00	MH	37.00	100.00	60.60	2,424.02
OPERATOR	Operator	2.00	80.00	MH	32.00	100.00	54.17	4,333.44

Activity: 2.8.9 Yard Pipe Materials Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	0.00	36,316.65	1,000.00	0.00	37,316.65
Total	0.00	0.00	0.00	0.00	36,316.65	1,000.00	0.00	37,316.65

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Notes: Due to extreme volitility in the pipe, steel, and plastics markets, this item is subject to significant changes in price. Pricing is based on the best available information 8/2018.

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
1FREIGHT	Freight Costs	1.00	1.00	EA	1,000.00	100.00	1,000.00	1,000.00
2MISCPIPE	Misc Pipe Accessories	1.00	30,769.00	LS	0.10	107.30	0.11	3,301.51
2PIPE	Plant Pipe	1.00	1.00	LS	30,769.00	107.30	33,015.14	33,015.14

Biditem 30 — Structural Concrete

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	20,344.33	11,991.97	32,336.30	3,123.78	38,577.97	10,155.00	152,997.35	237,190.40
Total	20,344.33	11,991.97	32,336.30	3,123.78	38,577.97	10,155.00	152,997.35	237,190.40

Manhours	Unit/MH	MH/Unit	$/MH	Base Labor/MH	Total Labor/MH	Unit/CH
707.5300	0.0014	707.5300	335.2372	28.7540	45.7031	0.0071

Activity: 30.1.1 Edge Form - Tank Base Quantity: 828 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	2.32	1.34	3.66	0.00	0.00	2.50	0.00	6.16
Total	1,920.00	1,110.08	3,030.08	0.00	0.00	2,070.00	0.00	5,100.08

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
3.6595	0.0193	51.7500	189.3800	2.0000	414.0000	0.0024	2,550.0400

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
64.0000	12.9375	0.0773	47.3450	2.3188

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: 4CARP 4 Man Carp Crew Prod: S 2 Eff: 100.00 Crew Hrs: 16.00 Labor Pcs: 4.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
3F1	WOODEN FORMS	1.00	828.00	SF	2.00	100.00	2.00	1,656.00
3FORMACC	Form Accessories	1.00	828.00	LF	0.50	100.00	0.50	414.00
CARP	Carpenter - Journeyman	2.00	32.00	MH	32.00	100.00	50.17	1,605.37
CARP4	Carpenter Foreman	1.00	16.00	MH	35.00	100.00	54.03	864.44
LABORER	Laborer	1.00	16.00	MH	21.00	100.00	35.02	560.27

Activity: 30.1.2 Pour Tank Base Quantity: 200 Unit: CY

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	7.83	4.69	12.52	0.36	152.10	0.00	13.65	178.63
Total	1,566.00	938.66	2,504.66	72.00	30,419.55	0.00	2,730.00	35,726.21

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
12.8833	0.0400	25.0000	322.0825	1.0000	200.0000	0.0050	35,726.2100

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
58.0000	3.4483	0.2900	43.1838	7.8300

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: POUR Pour Crew Prod: S 1 Eff: 100.00 Crew Hrs: 8.00 Labor Pcs: 7.25 Equipment Pcs: 1.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2C0004	4000 PSI Concrete	1.05	210.00	CY	135.00	107.30	144.86	30,419.55
4PUMPHR	Concrete Pump - Hour	1.00	6.00	HR	350.00	100.00	350.00	2,100.00
4PUMPYD	Concrete Pump - Yardage	1.00	210.00	CY	3.00	100.00	3.00	630.00
8UTLPU	Utility Pickup	1.00	8.00	HR	9.00	100.00	9.00	72.00
CARP	Carpenter - Journeyman	2.00	16.00	MH	32.00	100.00	50.17	802.69
CARP4	Carpenter Foreman	1.25	10.00	MH	35.00	100.00	54.03	540.28
LAB4	Labor Foreman	1.00	8.00	MH	25.00	100.00	40.16	321.30
LABORER	Laborer	3.00	24.00	MH	21.00	100.00	35.02	840.39

Activity: 30.1.3 Strip Edge Forms - Tank Base Quantity: 828 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	4.30	2.53	6.83	0.00	0.00	0.00	0.00	6.83
Total	3,562.95	2,096.03	5,658.98	0.00	0.00	0.00	0.00	5,658.98

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
6.4038	0.0233	42.8749	274.5619	2.4140	342.9992	0.0029	2,344.2336

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
124.7500	6.6373	0.1507	45.3626	4.3031

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: 4CARP 4 Man Carp Crew Prod: S 2.414 Eff: 100.00 Crew Hrs: 19.31 Labor Pcs: 6.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
CARP	Carpenter - Journeyman	3.00	57.94	MH	32.00	100.00	50.17	2,906.74
CARP4	Carpenter Foreman	1.00	19.31	MH	35.00	100.00	54.03	1,043.27
LAB4	Labor Foreman	1.00	8.88	MH	25.00	100.00	40.16	356.64
LABORER	Laborer	2.00	38.62	MH	21.00	100.00	35.02	1,352.33

Activity: 30.1.4 Tank Base Fine Grade Quantity: 3000 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.49	0.33	0.82	0.95	0.00	0.00	0.00	1.77
Total	1,464.00	983.43	2,447.43	2,850.58	0.00	0.00	0.00	5,298.01

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
0.8703	0.0040	250.0000	217.5817	1.5000	2,000.0000	0.0005	3,532.0067

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
48.0000	62.5000	0.0160	50.9881	0.4880

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: SMGRD Small Grading Crew Prod: S 1.5 Eff: 100.00 Crew Hrs: 12.00 Labor Pcs: 3.00 Equipment Pcs: 1.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8036	ROLLER 50-56" VIB SINGLE DRU	1.00	12.00	HR	74.23	100.00	74.23	890.75
8267	LOADER WHEEL 2.5-2.9 CUBIC Y	1.00	12.00	HR	103.25	100.00	103.25	1,238.94
8324	TRUCK WATER 2000-2999 GALLON	1.00	12.00	HR	60.07	100.00	60.07	720.89
LABORER	Laborer	1.00	12.00	MH	21.00	100.00	35.02	420.20
OPER4	Operator Foreman	1.00	12.00	MH	37.00	100.00	60.60	727.20
OPERATOR	Operator	2.00	24.00	MH	32.00	100.00	54.17	1,300.03

Activity: 30.2.1 Edge Form Clarifier Quantity: 150 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	6.40	3.70	10.10	0.00	0.00	2.50	0.00	12.60
Total	960.00	555.04	1,515.04	0.00	0.00	375.00	0.00	1,890.04

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
10.1003	0.0533	18.7500	189.3800	1.0000	150.0000	0.0067	1,890.0400

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
32.0000	4.6875	0.2133	47.3450	6.4000

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: 4CARP 4 Man Carp Crew Prod: S 1 Eff: 100.00 Crew Hrs: 8.00 Labor Pcs: 4.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
3F1	WOODEN FORMS	1.00	150.00	SF	2.00	100.00	2.00	300.00
3FORMACC	Form Accessories	1.00	150.00	LF	0.50	100.00	0.50	75.00
CARP	Carpenter - Journeyman	2.00	16.00	MH	32.00	100.00	50.17	802.69
CARP4	Carpenter Foreman	1.00	8.00	MH	35.00	100.00	54.03	432.22
LABORER	Laborer	1.00	8.00	MH	21.00	100.00	35.02	280.13

Activity: 30.2.2 Pour Clarifier Base Quantity: 35 Unit: CY

Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	44.74	26.82	71.56	2.06	152.10	0.00	13.65	239.37
Total	1,566.00	938.66	2,504.66	72.00	5,323.42	0.00	477.75	8,377.83

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
73.6189	0.2286	4.3750	322.0825	1.0000	35.0000	0.0286	8,377.8300

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
58.0000	0.6034	1.6571	43.1838	44.7429

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: POUR Pour Crew Prod: S 1 Eff: 100.00 Crew Hrs: 8.00 Labor Pcs: 7.25 Equipment Pcs: 1.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2C0004	4000 PSI Concrete	1.05	36.75	CY	135.00	107.30	144.85	5,323.42
4PUMPHR	Concrete Pump - Hour	1.00	1.05	HR	350.00	100.00	350.00	367.50
4PUMPYD	Concrete Pump - Yardage	1.00	36.75	CY	3.00	100.00	3.00	110.25
8UTLPU	Utility Pickup	1.00	8.00	HR	9.00	100.00	9.00	72.00
CARP	Carpenter - Journeyman	2.00	16.00	MH	32.00	100.00	50.17	802.69
CARP4	Carpenter Foreman	1.25	10.00	MH	35.00	100.00	54.03	540.28
LAB4	Labor Foreman	1.00	8.00	MH	25.00	100.00	40.16	321.30
LABORER	Laborer	3.00	24.00	MH	21.00	100.00	35.02	840.39

Activity: 30.2.3 Strip Edge Forms - Tank Base Quantity: 150 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	9.50	5.58	15.07	0.00	0.00	0.00	0.00	15.07
Total	1,424.25	836.93	2,261.18	0.00	0.00	0.00	0.00	2,261.18

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
14.6435	0.0533	18.7500	274.5650	1.0000	150.0000	0.0067	2,261.1800

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
49.6100	3.0236	0.3307	45.5791	9.4950

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: 4CARP 4 Man Carp Crew Prod: S 1 Eff: 100.00 Crew Hrs: 8.00 Labor Pcs: 6.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
CARP	Carpenter - Journeyman	3.00	24.00	MH	32.00	100.00	50.17	1,204.03
CARP4	Carpenter Foreman	1.00	8.00	MH	35.00	100.00	54.03	432.22
LAB4	Labor Foreman	1.00	1.61	MH	25.00	100.00	40.16	64.66
LABORER	Laborer	2.00	16.00	MH	21.00	100.00	35.02	560.27

Activity: 30.2.4 Imbeded Tank Ring Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	424.00	232.08	656.08	0.00	0.00	5,530.00	0.00	6,186.08
Total	424.00	232.08	656.08	0.00	0.00	5,530.00	0.00	6,186.08

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
656.0800	8.0000	0.1250	82.0100	1.0000	1.0000	1.0000	6,186.0800

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
16.0000	0.0625	16.0000	41.0050	424.0000

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5221 Concrete Construction

Crew: TEMP Template Crew Prod: S 1 Eff: 100.00 Crew Hrs: 8.00 Labor Pcs: 2.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
3F	FORMWORK	1.00	1.00	LS	500.00	100.00	500.00	500.00
3WATERSTOP	Waterstop	1.00	503.00	LF	10.00	100.00	10.00	5,030.00
CARP	Carpenter - Journeyman	1.00	8.00	MH	32.00	100.00	48.25	386.01
LABORER	Laborer	1.00	8.00	MH	21.00	100.00	33.76	270.07

Activity: 30.5.1 Grout Clarifier Bottom Quantity: 4 Unit: CY

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	327.50	178.71	506.21	18.00	0.00	0.00	353.00	877.21
Total	1,310.00	714.84	2,024.84	72.00	0.00	0.00	1,412.00	3,508.84

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
524.2100	2.0000	0.5000	262.1050	1.0000	4.0000	0.2500	3,508.8400

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
50.0000	0.0800	12.5000	40.4968	327.5000

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5221 Concrete Construction

Crew: POUR Pour Crew Prod: S 1 Eff: 100.00 Crew Hrs: 8.00 Labor Pcs: 6.25 Equipment Pcs: 1.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4PUMPHR	Concrete Pump - Hour	1.00	4.00	HR	350.00	100.00	350.00	1,400.00
4PUMPYD	Concrete Pump - Yardage	1.00	4.00	CY	3.00	100.00	3.00	12.00
8UTLPU	Utility Pickup	1.00	8.00	HR	9.00	100.00	9.00	72.00
CARP	Carpenter - Journeyman	1.00	8.00	MH	32.00	100.00	48.25	386.01
CARP4	Carpenter Foreman	1.25	10.00	MH	35.00	100.00	51.93	519.31
LAB4	Labor Foreman	1.00	8.00	MH	25.00	100.00	38.67	309.32
LABORER	Laborer	3.00	24.00	MH	21.00	100.00	33.76	810.20

Activity: 30.6.1 Headworks Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5221 Concrete Construction

Activity: 30.7.1 Edge Form Headworks Slab Quantity: 40 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	12.00	6.94	18.94	0.00	0.00	2.50	0.00	21.44
Total	480.00	277.52	757.52	0.00	0.00	100.00	0.00	857.52

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
18.9380	0.1000	10.0000	189.3800	0.5000	80.0000	0.0125	1,715.0400

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
16.0000	2.5000	0.4000	47.3450	12.0000

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: 4CARP 4 Man Carp Crew Prod: S 0.5 Eff: 100.00 Crew Hrs: 4.00 Labor Pcs: 4.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
3F1	WOODEN FORMS	1.00	40.00	SF	2.00	100.00	2.00	80.00
3FORMACC	Form Accessories	1.00	40.00	LF	0.50	100.00	0.50	20.00
CARP	Carpenter - Journeyman	2.00	8.00	MH	32.00	100.00	50.17	401.35
CARP4	Carpenter Foreman	1.00	4.00	MH	35.00	100.00	54.03	216.11
LABORER	Laborer	1.00	4.00	MH	21.00	100.00	35.02	140.06

Activity: 30.7.2 Pour Headworks Base Slab Quantity: 4 Unit: CY

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	97.88	58.67	156.54	4.50	141.75	0.00	13.65	316.44
Total	391.50	234.67	626.17	18.00	567.00	0.00	54.60	1,265.77

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
161.0425	0.5000	2.0000	322.0850	0.2500	16.0000	0.0625	5,063.0800

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
14.5000	0.2759	3.6250	43.1841	97.8750

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: POUR Pour Crew Prod: S 0.25 Eff: 100.00 Crew Hrs: 2.00 Labor Pcs: 7.25 Equipment Pcs: 1.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2C0004	4000 PSI Concrete	1.05	4.20	CY	135.00	100.00	135.00	567.00
4PUMPHR	Concrete Pump - Hour	1.00	0.12	HR	350.00	100.00	350.00	42.00
4PUMPYD	Concrete Pump - Yardage	1.00	4.20	CY	3.00	100.00	3.00	12.60
8UTLPU	Utility Pickup	1.00	2.00	HR	9.00	100.00	9.00	18.00
CARP	Carpenter - Journeyman	2.00	4.00	MH	32.00	100.00	50.17	200.67
CARP4	Carpenter Foreman	1.25	2.50	MH	35.00	100.00	54.03	135.07
LAB4	Labor Foreman	1.00	2.00	MH	25.00	100.00	40.17	80.33
LABORER	Laborer	3.00	6.00	MH	21.00	100.00	35.02	210.10

Activity: 30.7.3 Strip Headworks Slab Quantity: 40 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	17.57	10.32	27.89	0.00	0.00	0.00	0.00	27.89
Total	702.75	412.77	1,115.52	0.00	0.00	0.00	0.00	1,115.52

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
27.4563	0.1000	10.0000	274.5625	0.5000	80.0000	0.0125	2,231.0400

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
24.4300	1.6373	0.6108	45.6619	17.5688

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: 4CARP 4 Man Carp Crew Prod: S 0.5 Eff: 100.00 Crew Hrs: 4.00 Labor Pcs: 6.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
CARP	Carpenter - Journeyman	3.00	12.00	MH	32.00	100.00	50.17	602.01
CARP4	Carpenter Foreman	1.00	4.00	MH	35.00	100.00	54.03	216.11
LAB4	Labor Foreman	1.00	0.43	MH	25.00	100.00	40.16	17.27
LABORER	Laborer	2.00	8.00	MH	21.00	100.00	35.02	280.13

Activity: 30.7.4 Headworks Base Slab Fine Grade Quantity: 60 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	3.68	2.51	6.19	0.65	0.00	0.00	0.00	6.84
Total	220.88	150.40	371.28	39.20	0.00	0.00	0.00	410.48

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
5.9455	0.0667	15.0000	89.1825	0.5000	120.0000	0.0083	820.9600

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
8.2400	7.2816	0.1373	45.0583	3.6813

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: SMGRD Small Grading Crew Prod: S 0.5 Eff: 100.00 Crew Hrs: 4.00 Labor Pcs: 2.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8036	ROLLER 50-56" VIB SINGLE DRU	0.00	0.00	HR	74.23	100.00	0.00	0.00
8267	LOADER WHEEL 2.5-2.9 CUBIC Y	1.00	0.24	HR	103.25	100.00	103.25	24.78
8324	TRUCK WATER 2000-2999 GALLON	1.00	0.24	HR	60.07	100.00	60.08	14.42
LABORER	Laborer	1.00	4.00	MH	21.00	100.00	35.02	140.06
OPER4	Operator Foreman	1.00	0.24	MH	37.00	100.00	60.63	14.55
OPERATOR	Operator	1.00	4.00	MH	32.00	100.00	54.17	216.67

Activity: 30.7.5 Form Walls Quantity: 832 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	2.92	1.68	4.61	0.00	0.00	2.50	0.00	7.11
Total	2,432.00	1,400.78	3,832.78	0.00	0.00	2,080.00	0.00	5,912.78

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
4.6067	0.0192	52.0000	239.5488	2.0000	416.0000	0.0024	2,956.3900

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit

80.0000	10.4000	0.0962	47.9098	2.9231

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: 4CARP 4 Man Carp Crew Prod: S 2 Eff: 100.00 Crew Hrs: 16.00 Labor Pcs: 5.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
3F1	WOODEN FORMS	1.00	832.00	EA	2.00	100.00	2.00	1,664.00
3FORMACC	Form Accessories	1.00	832.00	SF	0.50	100.00	0.50	416.00
CARP	Carpenter - Journeyman	3.00	48.00	MH	32.00	100.00	50.17	2,408.07
CARP4	Carpenter Foreman	1.00	16.00	MH	35.00	100.00	54.03	864.44
LABORER	Laborer	1.00	16.00	MH	21.00	100.00	35.02	560.27

Activity: 30.7.6 Pour Walls Quantity: 16 Unit: CY

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	60.00	34.69	94.69	0.00	141.75	0.00	90.50	326.94
Total	960.00	555.04	1,515.04	0.00	2,268.00	0.00	1,448.00	5,231.04

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
94.6900	0.5000	2.0000	189.3800	1.0000	16.0000	0.0625	5,231.0400

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
32.0000	0.5000	2.0000	47.3450	60.0000

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: 4CARP 4 Man Carp Crew Prod: S 1 Eff: 100.00 Crew Hrs: 8.00 Labor Pcs: 4.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2C0006	5000 PSI Concrete	1.05	16.80	CY	135.00	100.00	135.00	2,268.00
4PUMPHR	Concrete Pump - Hour	1.00	4.00	HR	350.00	100.00	350.00	1,400.00
4PUMPYD	Concrete Pump - Yardage	1.00	16.00	CY	3.00	100.00	3.00	48.00
CARP	Carpenter - Journeyman	2.00	16.00	MH	32.00	100.00	50.17	802.69
CARP4	Carpenter Foreman	1.00	8.00	MH	35.00	100.00	54.03	432.22
LABORER	Laborer	1.00	8.00	MH	21.00	100.00	35.02	280.13

Activity: 30.7.7 Strip Walls Quantity: 832 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	1.15	0.67	1.82	0.00	0.00	0.00	0.00	1.82
Total	960.00	555.04	1,515.04	0.00	0.00	0.00	0.00	1,515.04

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
1.8210	0.0096	104.0000	189.3800	1.0000	832.0000	0.0012	1,515.0400

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
32.0000	26.0000	0.0385	47.3450	1.1538

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: 4CARP 4 Man Carp Crew Prod: S 1 Eff: 100.00 Crew Hrs: 8.00 Labor Pcs: 4.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
CARP	Carpenter - Journeyman	2.00	16.00	MH	32.00	100.00	50.17	802.69
CARP4	Carpenter Foreman	1.00	8.00	MH	35.00	100.00	54.03	432.22
LABORER	Laborer	1.00	8.00	MH	21.00	100.00	35.02	280.13

Activity: 3100 Rebar Sub ALLOWANCE Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4REBAR1	Rebar	1.00	117,500.00	LB	1.25	100.00	1.25	146,875.00

Biditem Masonry

40

Takeoff Qty: 1.000 LS
Bid Qty: 1.000 LS

Activity:	40.1	Masonry - None	Quantity:	1	Unit:	LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Biditem 50 — Steel/Metals

Takeoff Qty: 1.000 LS
Bid Qty: 1.000 LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	5,856.00	3,837.74	9,693.74	2,400.00	9,470.00	0.00	0.00	21,563.74
Total	5,856.00	3,837.74	9,693.74	2,400.00	9,470.00	0.00	0.00	21,563.74

Manhours	Unit/MH	MH/Unit	$/MH	Base Labor/MH	Total Labor/MH	Unit/CH
192.0000	0.0052	192.0000	112.3111	30.5000	50.4882	0.0208

Activity:	50.1	Stairs & Walkways - Existing Plant	Quantity:	1	Unit:	LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Notes: Assume Stairs & Walkways provided by Aero-Mod with Package

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2GRATING	Walkway Grating	1.00	920.00	SF	0.00	107.00	0.00	0.00
2STAIR	Stair Treads	1.00	74.00	EA	0.00	107.00	0.00	0.00
2STRUCTSTEEL	Structural Steel	1.00	0.00	LB	5.00	107.00	0.00	0.00

Activity:	50.2	Handrails - Existing Plant	Quantity:	140	Unit:	LF

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Activity:	50.3	Pipe Supports/Stands - Existing Plant	Quantity:	1	Unit:	LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Notes: To be detailed - Bid Item is an Allowance

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2STRUCTSTEEL	Structural Steel	1.00	0.00	LB	5.00	107.00	0.00	0.00

Activity:	50.4	Headworks Bar Screen	Quantity:	1	Unit:	LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5221 Concrete Construction

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2STRUCTSTEEL	Structural Steel	1.00	1,200.00	LB	7.00	100.00	7.00	8,400.00

Activity:	50.6	Install Misc Metals/Steel	Quantity:	1	Unit:	LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	5,856.00	3,837.74	9,693.74	2,400.00	0.00	0.00	0.00	12,093.74
Total	5,856.00	3,837.74	9,693.74	2,400.00	0.00	0.00	0.00	12,093.74

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
12,093.7400	48.0000	0.0208	251.9529	6.0000	0.1667	6.0000	2,015.6233

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
192.0000	0.0052	192.0000	50.4882	5,856.0000

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: MECHSM Small Mechanical Crew Prod: S 6 Eff: 100.00 Crew Hrs: 48.00 Labor Pcs: 4.00 Equipment Pcs: 2.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8*FORK8	Reach Forklift - 8000 lb	1.00	48.00	HR	41.00	100.00	41.00	1,968.00
8UTLPU	Utility Pickup	1.00	48.00	HR	9.00	100.00	9.00	432.00
LABORER	Laborer	1.00	48.00	MH	21.00	100.00	35.02	1,680.79
MECHHLP	Mech Helper	2.00	96.00	MH	28.00	100.00	47.02	4,514.11
MILLWR	Millwright	1.00	48.00	MH	45.00	100.00	72.89	3,498.84

Activity: 50.7 Unistrut & Misc Pipe Support Mat's Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2UNISTRUT	Unistrut Material Allowance	1.00	1.00	LS	1,000.00	107.00	1,070.00	1,070.00

Biditem 60 — FRP

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

Biditem 70 — Insulation

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

Activity: 70.1 Building Insullation - None Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Activity: 70.2 Pipe Insulation - Allowance Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Notes: Pipe Insulation of pipes 6" and smaller

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4PIPEINSL	Pipe Insulation	1.00	200.00	LF	75.00	100.00	75.00	15,000.00

Biditem 80 — Doors & WIndows

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

Activity: 80.1 Doors & Windows - None Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Biditem 90 — Finishes

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

Activity: 90.1 Paint & Coatings Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Notes: Painting Allowance. This is a very rough cost based on recoating the entire structure.

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4PAINT	Painting & Coating	1.00	1.00	LS	125,000.00	100.00	125,000.00	125,000.00

Biditem 110

Equipment

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	51,520.00	33,400.48	84,920.48	19,527.52	432,000.00	3,500.00	0.00	539,948.00
Total	51,520.00	33,400.48	84,920.48	19,527.52	432,000.00	3,500.00	0.00	539,948.00

Manhours	Unit/MH	MH/Unit	$/MH	Base Labor/MH	Total Labor/MH	Unit/CH
1,600.0000	0.0006	1,600.0000	337.4675	32.2000	53.0753	0.0031

Activity: 110.1 Equipment Purchase Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	0.00	402,000.00	0.00	0.00	402,000.00
Total	0.00	0.00	0.00	0.00	402,000.00	0.00	0.00	402,000.00

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Notes: Equipment Priced Separate

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2CCWWTP	CCWWTP in place	1.00	1.00	LS	350,000.00	100.00	350,000.00	350,000.00
2DELIVERY	Delivery/Freight Costs	1.00	6.00	EA	4,500.00	100.00	4,500.00	27,000.00
2REFURBISH	Refurbish Exist Motors/Equip	1.00	1.00	LS	25,000.00	100.00	25,000.00	25,000.00

Activity: 110.2 Install Equipment Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	40,080.00	25,882.92	65,962.92	15,527.52	20,000.00	2,500.00	0.00	103,990.44
Total	40,080.00	25,882.92	65,962.92	15,527.52	20,000.00	2,500.00	0.00	103,990.44

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
81,490.4400	240.0000	0.0042	339.5435	30.0000	0.0333	30.0000	3,466.3480

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
1,200.0000	0.0008	1,200.0000	54.9691	40,080.0000

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: MECHSM Small Mechanical Crew Prod: S 30 Eff: 100.00 Crew Hrs: 240.00 Labor Pcs: 5.00 Equipment Pcs: 3.00

Notes: Barscreen
Flow Eq Blower
Dig Blower
Anoxic Mixer
Post Anoxic Mixer
Main Blower
Clarifier

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2CRANE	Rental Crane	1.00	40.00	HR	500.00	100.00	500.00	20,000.00
3S4000	Sm Tools - General	1.00	1.00	LS	2,500.00	100.00	2,500.00	2,500.00
8*FORK8	Reach Forklift - 8000 lb	1.00	240.00	HR	41.00	100.00	41.00	9,840.00
8336	WELDER ARC 300 AMP GAS/DIESE	1.00	240.00	HR	14.70	100.00	14.70	3,527.52
8UTLPU	Utility Pickup	1.00	240.00	HR	9.00	100.00	9.00	2,160.00
LABORER	Laborer	1.00	240.00	MH	21.00	100.00	35.02	8,403.96
MECHHLP	Mech Helper	2.00	480.00	MH	28.00	100.00	47.02	22,570.56
MILLWR	Millwright	2.00	480.00	MH	45.00	100.00	72.89	34,988.40

Activity: 110.3 Demo/Load Existing Plant/Equipment Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	11,440.00	7,517.56	18,957.56	4,000.00	10,000.00	1,000.00	0.00	33,957.56
Total	11,440.00	7,517.56	18,957.56	4,000.00	10,000.00	1,000.00	0.00	33,957.56

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
22,957.5600	80.0000	0.0125	286.9695	10.0000	0.1000	10.0000	3,395.7560

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
400.0000	0.0025	400.0000	47.3939	11,440.0000

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: MECHSM Small Mechanical Crew Prod: S 10 Eff: 100.00 Crew Hrs: 80.00 Labor Pcs: 5.00 Equipment Pcs: 2.00

Notes: Assume that metal building, press, and chemical injection systems are not going to be relocated.

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2CRANE	Rental Crane	1.00	20.00	HR	500.00	100.00	500.00	10,000.00
3MISC	Misc Cutting Costs	1.00	1.00	LS	1,000.00	100.00	1,000.00	1,000.00
8*FORK8	Reach Forklift - 8000 lb	1.00	80.00	HR	41.00	100.00	41.00	3,280.00
8UTLPU	Utility Pickup	1.00	80.00	HR	9.00	100.00	9.00	720.00
LABORER	Laborer	2.00	160.00	MH	21.00	100.00	35.02	5,602.64
MECHHLP	Mech Helper	2.00	160.00	MH	28.00	100.00	47.02	7,523.52
MILLWR	Millwright	1.00	80.00	MH	45.00	100.00	72.89	5,831.40

Biditem 130 — Special Construction

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

Biditem 140 — Conveying Systems

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

Activity: 14.1 None Quantity: 1 Unit: EA

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Biditem 150 — Mechanical/Piping

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	3,760.00	2,437.24	6,197.24	21,180.00	2,500.00	500.00	0.00	30,377.24
Total	3,760.00	2,437.24	6,197.24	21,180.00	2,500.00	500.00	0.00	30,377.24

Manhours	Unit/MH	MH/Unit	$/MH	Base Labor/MH	Total Labor/MH	Unit/CH
120.0000	0.0083	120.0000	253.1437	31.3333	51.6437	0.0250

Activity: 15.1 HVAC Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4HVAC	HVAC - Sub	1.00	1.00	LS	0.00	100.00	0.00	0.00

Activity: 15.2 Plumbing Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Notes: Plumbing sub will include all domestic water, waste piping, and gas pipe.

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4PLUMB	Plumbing Sub	1.00	1.00	LS	0.00	100.00	0.00	0.00

Activity: 15.2.1 Plumbing & Mechanical Pipe/Material Buy Quantity: 1 Unit: LS

Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total

U. Cost	0.00	0.00	0.00	0.00	2,500.00	500.00	0.00	3,000.00
Total	0.00	0.00	0.00	0.00	2,500.00	500.00	0.00	3,000.00

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
1FREIGHT	Freight Costs	1.00	1.00	EA	500.00	100.00	500.00	500.00
2PIPECONT	Pipe Contingency	1.00	1.00	LS	2,500.00	100.00	2,500.00	2,500.00

Activity: 15.3.2 Mechanical/Piping - Process Piping Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	3,760.00	2,437.24	6,197.24	21,180.00	0.00	0.00	0.00	27,377.24
Total	3,760.00	2,437.24	6,197.24	21,180.00	0.00	0.00	0.00	27,377.24

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
7,377.2400	40.0000	0.0250	184.4310	5.0000	0.2000	5.0000	5,475.4480

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
120.0000	0.0083	120.0000	51.6437	3,760.0000

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: MECHSM Small Mechanical Crew Prod: S 5 Eff: 100.00 Crew Hrs: 40.00 Labor Pcs: 3.00 Equipment Pcs: 1.50

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8*FORK8	Reach Forklift - 8000 lb	0.50	20.00	HR	41.00	100.00	41.00	820.00
8CRANESUB	Crane Subcontractor	1.00	80.00	HR	250.00	100.00	250.00	20,000.00
8UTLPU	Utility Pickup	1.00	40.00	HR	9.00	100.00	9.00	360.00
LABORER	Laborer	1.00	40.00	MH	21.00	100.00	35.02	1,400.66
MECHHLP	Mech Helper	1.00	40.00	MH	28.00	100.00	47.02	1,880.88
MILLWR	Millwright	1.00	40.00	MH	45.00	100.00	72.89	2,915.70

Biditem 160 Electrical

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

Activity: 16.1 Electrical - Allowance Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4ELEC	Electric - Sub	1.00	1.00	LS	250,000.00	100.00	250,000.00	250,000.00

Biditem 170 I&C

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

Activity: 17.1 Instrumentation & Control Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4ELEC	Electric - Sub	1.00	1.00	LS	0.00	100.00	0.00	0.00

Biditem 990001 General Account

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total

U. Cost	0.00	0.00	0.00	234,243.61	0.00	266,784.13	1,650.00	502,677.74
Total	0.00	0.00	0.00	234,243.61	0.00	266,784.13	1,650.00	502,677.74

Activity: 99 CONTINGENCY Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	200,611.61	0.00	50,000.00	0.00	250,611.61
Total	0.00	0.00	0.00	200,611.61	0.00	50,000.00	0.00	250,611.61

Calendar: ST Straight Time Hrs/Shift: 8 WC: Code not found.

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
1ELECSERV	Electrical Service Allowance	1.00	1.00	LS	50,000.00	100.00	50,000.00	50,000.00
8224*TD	Contingency	1.00	1,337,410.71	TDC$	0.15	100.00	0.15	200,611.61

Activity: 999 PROJECT SUPPORT Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	14,432.00	0.00	0.00	1,650.00	16,082.00
Total	0.00	0.00	0.00	14,432.00	0.00	0.00	1,650.00	16,082.00

Calendar: ST Straight Time Hrs/Shift: 8 WC: Code not found.

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4*CRANESUB	Crane Subcontractor	1.00	0.00	HR	500.00	100.00	0.00	0.00
4*QAQC	QA/QC Testing	1.00	1.00	LS	0.00	100.00	0.00	0.00
4*SURVEY	Land Surveyor	1.00	10.00	HR	165.00	100.00	165.00	1,650.00
5*CRANE-CRAW	Crawler Crane	1.00	0.00	HR	400.00	100.00	0.00	0.00
5*CRANE-HYDR	Hydrolic Crane	1.00	0.00	HR	200.00	100.00	0.00	0.00
8*BOOM45	45' Boomlift	1.00	0.00	HR	31.00	100.00	0.00	0.00
8*FORK10	Reach Forklift - 10000 lb	1.00	0.00	HR	47.00	100.00	0.00	0.00
8*FORK8	Reach Forklift - 8000 lb	1.00	352.00	HR	41.00	100.00	41.00	14,432.00
8*SHOPLIFT	Shop Forklift	1.00	0.00	HR	26.00	100.00	0.00	0.00
LABORER	Laborer	1.00	0.00	MH	25.00	100.00	0.00	0.00
OPERATOR	Operator	1.00	0.00	MH	32.00	100.00	0.00	0.00
RIGGER	Crane Rigger	1.00	0.00	MH	32.00	100.00	0.00	0.00

Activity: 9 GENERAL CONDITIONS Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	19,200.00	0.00	216,784.13	0.00	235,984.13
Total	0.00	0.00	0.00	19,200.00	0.00	216,784.13	0.00	235,984.13

Calendar: ST Straight Time Hrs/Shift: 8 WC: Code not found.

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
1*ADMIN	Project Admin	1.00	0.00	MO	4,000.00	125.00	0.00	0.00
1*APM	Assistant PM	1.00	0.00	MO	8,500.00	125.00	0.00	0.00
1*PE	Project Engineer	1.00	0.00	MO	7,000.00	125.00	0.00	0.00
1*PM	Project Manager	1.00	3.00	MO	11,000.00	125.00	13,750.00	41,250.00
1*SAFETY	Safety Professional	1.00	0.00	MO	9,000.00	125.00	0.00	0.00
1*SUPT	Project Superintendent	1.00	6.00	MO	10,500.00	125.00	13,125.00	78,750.00
1*TRADESUPT	Trade Superintendent	1.00	0.00	MO	9,000.00	125.00	0.00	0.00
3*AIRPHOTO	Aerial Photography	1.00	0.00	EA	5,000.00	100.00	0.00	0.00
3*COMPUTER	Computer Cost	1.00	1.00	EA	3,000.00	100.00	3,000.00	3,000.00
3*CONEX	Conex storage box	1.00	12.00	MO	120.00	100.00	120.00	1,440.00
3*COPIER	Office Copier	1.00	0.00	MO	400.00	100.00	0.00	0.00
3*DH	SMALL TOOLS & SAFETY SUPPLIE	1.00	3,331.53	LBHR	3.00	100.00	3.00	9,994.59
3*DUMPSTER	Dumpster	1.00	6.00	EA	750.00	100.00	750.00	4,500.00
3*MAIL/FEDEX	Mail/Fedex/Postage	1.00	6.00	MO	500.00	100.00	500.00	3,000.00
3*OFFICE	Project Office - Per Single	1.00	0.00	MO	800.00	100.00	0.00	0.00
3*OFFICESUP	Office Supplies	1.00	6.00	MO	500.00	100.00	500.00	3,000.00

3*PHOTOS	Jobsite Photos	1.00	0.00	MO	250.00	100.00	0.00	0.00
3*PRINT	Printing & Copying Service	1.00	0.00	MO	400.00	100.00	0.00	0.00
3*SNOWREMOVE	Snow Removal	1.00	2.00	MO	2,000.00	100.00	2,000.00	4,000.00
3*TC	Fee	1.00	1,840,088.45	TOT$	0.02	100.00	0.02	27,601.33
3*TD	Total Direct Cost	1.00	1,337,410.71	TDC$	0.02	100.00	0.02	26,748.21
3*TEMPELESET	Temp Electrical Setup	1.00	0.00	LS	1,000.00	100.00	0.00	0.00
3*TEMPELEUSE	Temp Electric Use	1.00	0.00	MO	200.00	100.00	0.00	0.00
3*TEMPFENCE	Temp Fence	1.00	0.00	LF	2.00	100.00	0.00	0.00
3*TEMPH20SET	Temp Water Setup	1.00	0.00	LS	1,000.00	100.00	0.00	0.00
3*TEMPH20USE	Temp Water Usage	1.00	0.00	KGAL	3.00	100.00	0.00	0.00
3*TEMPHEAT	Temp Heat	1.00	500.00	GAL	5.00	100.00	5.00	2,500.00
3*TEMPTOILET	Temp Toilets	1.00	0.00	MO	125.00	100.00	0.00	0.00
3*WINTERPRO	Winter Protection	1.00	0.00	CY	3.00	100.00	0.00	0.00
8*PICKUP	Admin Pickup	1.00	15.00	MO	1,200.00	100.00	1,200.00	18,000.00
8*VAN	Passenger Van	1.00	1.00	MO	1,200.00	100.00	1,200.00	1,200.00
9*PERMITS	Permit Fees	1.00	0.00	LS	0.00	100.00	0.00	0.00
9*TRAVEL	Travel Fees	1.00	88.00	DAY	125.00	100.00	125.00	11,000.00

Report Summary

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
Total	101,904	64,964	166,868	319,869	518,865	281,939	552,547	1,840,088

Job Notes

Estimate created on: 02/03/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\ESTMAST

************Estimate created on: 07/19/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\ESTMSTRMIN

************Estimate created on: 08/17/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\2018BARRWTP

************Estimate created on: 10/26/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\2018BARRWT-2

************Estimate created on: 10/26/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\2018GBWCSC

Calendars Used In Estimate

ST Straight Time

Appendix I

Construction Costs: Alternative 2 – New Package WWTP (Aero-Mod)

Estimate Recap Report

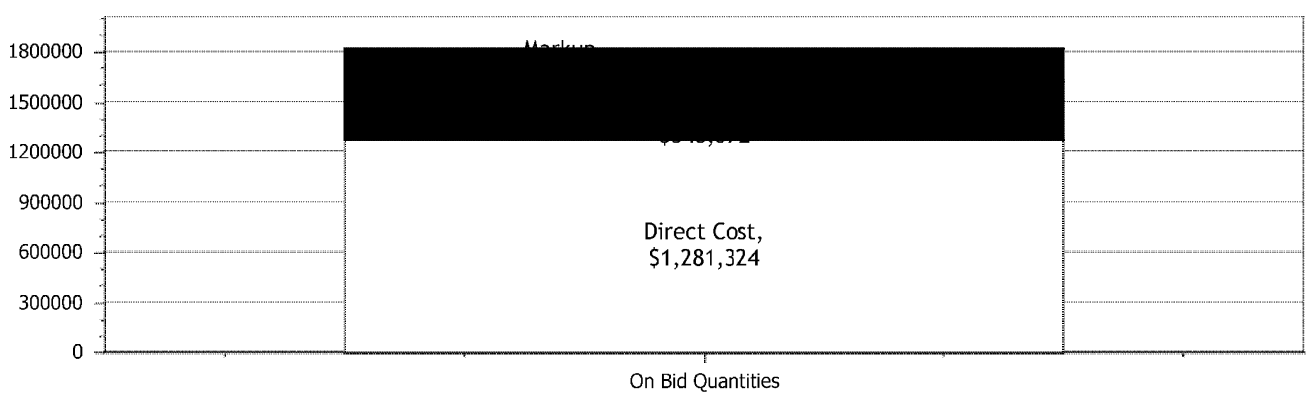
Project Information

Estimate:	2018GBWCSC - Great Basin Water - Spring Creek	Bid Date:	10/28/2018
Project:	-	Review Date:	-
Estimator In Charge:	JC - John Collins	Job Duration:	0 months
Owner:	-	State:	NV
Engineer:	-	Estimate Type:	Estimate
Related Estimate:	-		

Estimate Summary

	On Bid Quantities	%
Direct Cost	1,281,324	70.19%
Indirect Cost	348,572	19.09%
Addons	0	0.00%
Bond	0	0.00%
Pass Through Cost	0	0.00%
Direct Markup	153,759	8.42%
Indirect Markup	41,829	2.29%
Markup Addons	0	0.00%
+ / - Adjustments	0	
Pass Through Adjustment	0	
Unbalancing Difference	0	0.00%
Rounding Difference	0	
Desired Bid	0.00	
Final Bid Total	1,825,483.77	100.00%
Final Markup (% Based on Cost)	195,588	12.00%

Takeoff vs Bid Quantity

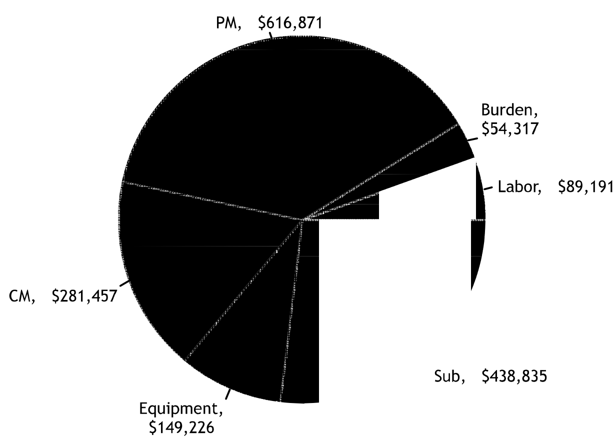


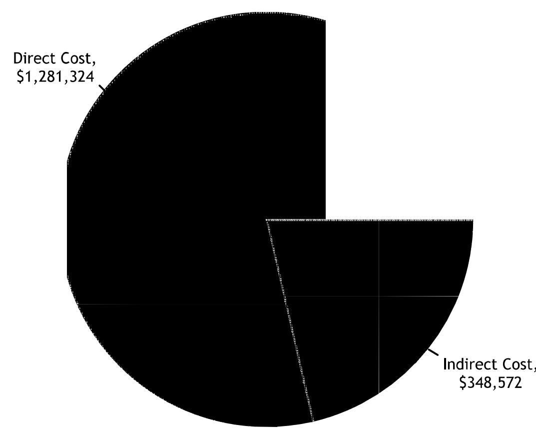
Other Totals

Total Sales Tax	$39,690	Burden % of Direct Labor	37.85%
Total Escalation	$0	Burden % of Indirect Labor	0.00%
Labor % of Job Cost	8.80%	EOE % of Equipment	78.03%
Equipment % of Job Cost	9.16%	Current Minority %	0.00%

Totals by Cost Type - Bid Quantities

	Direct	Indirect	Total	% of Total
Base Labor	89,191	0	89,191	5.47%
Burden	54,317	0	54,317	3.33%
Total Labor	143,509	0	143,509	8.80%
Inside Equipment	936	0	936	0.06%
Outside Equipment	21,287	10,560	31,847	1.95%
EOE	30,505	85,938	116,443	7.14%
Total Equipment	52,728	96,498	149,226	9.16%
Permanent Materials	616,871	0	616,871	37.85%
Construction Materials	31,033	250,424	281,457	17.27%
Subcontractors	437,185	1,650	438,835	26.92%
Misc 1	0	0	0	0.00%
Misc 2	0	0	0	0.00%
Misc 3	0	0	0	0.00%
Totals	1,281,324	348,572	1,629,896	100.00%





Fuel Summary

Fuel Type	Quantity	Units
Gasoline	0	Gal
Diesel	0	Gal
Off-Road	0	Gal

Sales Tax Summary

	Setup Tax %	Average Tax %	Total Taxes
Permanent Materials	0.00%	6.88%	39,690
Construction Materials	0.00%	0.00%	0
Inside Equipment	0.00%	0.00%	0
Outside Equipment	0.00%	0.00%	0
EOE	0.00%	0.00%	0
Subcontractors	0.00%	0.00%	0
Misc 1	0.00%	0.00%	0
Misc 2	0.00%	0.00%	0
Misc 3	0.00%	0.00%	0
Total Tax			39,690

Escalation Summary

	Average Escalation %	Total Escalation
Labor	0.00%	0
Inside Equipment	0.00%	0
Outside Equipment	0.00%	0
EOE	0.00%	0
Permanent Materials	0.00%	0
Construction Materials	0.00%	0
Subcontractors	0.00%	0
Misc 1	0.00%	0
Misc 2	0.00%	0
Misc 3	0.00%	0
Total Escalation		0

Labor Summary

	Direct	Indirect	Total
Hourly Labor (MH, MHS, MHR, MHRS)			
Manhours	2,970	0	2,970
Base Labor	89,191	0	89,191
Burden (Amount, % of Base Labor)	54,317	0	54,317
Premium	0	0	0
Total Labor	143,509	0	143,509
Daily Labor (DAY, DAYS, DY, DYS)			
None	0	0	0
Weekly Labor (WK, WKS, WEEK)			
None	0	0	0
Monthly Labor (MO, MON, MNTH, MMO, MMOS)			
None	0	0	0

Summary IS Current Last run 10/30/2018 8:14:00 AM

Balanced Markup Calculation Spread IS Current Last run 10/30/2018 8:14:00 AM

	Cost	Markup %	Markup $
Labor	89,191	12.00%	10,703
Burden	54,317	12.00%	6,518
Permanent Materials	616,871	12.00%	74,024
Construction Materials	281,457	12.00%	33,775
Inside Equipment	936	12.00%	112
Outside Equipment	31,847	12.00%	3,822
EOE	116,443	12.00%	13,973
Subcontractors	438,835	12.00%	52,660
Misc 1	0	0.00%	0
Misc 2	0	0.00%	0
Misc 3	0	0.00%	0
Overrides	0	0.00%	0
Total	1,629,896	12.00%	195,588

Addons, Bond and Markup Summary Dependent on Bid Summary

	Total	%
Bond		
Bond	0	0.00%
Markup		
Resource Markup	195,588	10.71%
Total Markup	195,588	10.71%
Markup, Addons, and Bond Total	195,588	10.71%

Key Indicators Dependent on Bid Summary

	Result	Formula
Balanced Markup/Total Labor	136.29%	Balanced Markup / Total Labor
Indirect Cost/Direct Cost	27.20%	Indirect Cost / Direct Cost

Estimate Notes

Estimate created on: 02/03/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\ESTMAST

************Estimate created on: 07/19/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\ESTMSTRMIN

************Estimate created on: 08/17/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\2018BARRWTP

************Estimate created on: 10/26/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\2018BARRWT-2

Cost Report

Biditem 10 — Mobilization

Takeoff Qty: 1.000 LS
Bid Qty: 1.000 LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	0.00	0.00	0.00	7,900.00	7,900.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	7,900.00	7,900.00

Activity: 9999 MOB/DEMOB Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	0.00	0.00	0.00	7,900.00	7,900.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	7,900.00	7,900.00

Calendar: ST Straight Time Hrs/Shift: 8 WC: Code not found.

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4*9AXL	9 axel Heavy Equipment Trans	1.00	20.00	HR	175.00	100.00	175.00	3,500.00
4*TRUCKING	Flat bed material transport	1.00	40.00	HR	110.00	100.00	110.00	4,400.00

Biditem 20 — Earthwork

Takeoff Qty: 1.000 LS
Bid Qty: 1.000 LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	9,153.22	6,142.87	15,296.09	17,851.22	36,316.65	1,000.00	0.00	70,463.96
Total	9,153.22	6,142.87	15,296.09	17,851.22	36,316.65	1,000.00	0.00	70,463.96

Manhours	Unit/MH	MH/Unit	$/MH	Base Labor/MH	Total Labor/MH	Unit/CH
320.0400	0.0031	320.0400	220.1724	28.6002	47.7943	0.0156

Activity: 2.2 Pond Grading Quantity: 39188 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	1.22	0.81	2.03	3.18	0.00	0.00	0.00	5.21

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
0.0001	0.0000	4,898,500.0000	651.2500	0.0010	39,188,000.0000	0.0000	5,210.0000

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
0.0400	979,700.0000	0.0000	50.7500	0.0000

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: LGGRD Large Grading Crew Prod: S 0.001 Eff: 100.00 Crew Hrs: 0.01 Labor Pcs: 4.00 Equipment Pcs: 3.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8038	ROLLER 61-70" VIB SINGLE DRU	1.00	0.01	HR	81.86	100.00	82.00	0.82
8239	MOTORGRADER 150HP 14' BLADE	1.00	0.01	HR	134.44	100.00	134.00	1.34
8326	TRUCK WATER 4000-4999 GALLON	1.00	0.01	HR	102.12	100.00	102.00	1.02
LABORER	Laborer	1.00	0.01	MH	21.00	100.00	35.00	0.35
OPER4	Operator Foreman	1.00	0.01	MH	37.00	100.00	60.00	0.60
OPERATOR	Operator	2.00	0.02	MH	32.00	100.00	54.00	1.08

Activity: 2.3 Structure Exc Quantity: 1357 Unit: CY

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	1.69	1.13	2.82	4.46	0.00	0.00	0.00	7.27
Total	2,288.00	1,535.51	3,823.51	6,047.64	0.00	0.00	0.00	9,871.15

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
7.2742	0.0118	84.8125	616.9469	2.0000	678.5000	0.0015	4,935.5750

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
80.0000	16.9625	0.0590	47.7939	1.6861

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: EXC4 4 man Exc Crew Prod: S 2 Eff: 100.00 Crew Hrs: 16.00 Labor Pcs: 5.00 Equipment Pcs: 3.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8269	LOADER WHEEL 3.5-3.9 CUBIC Y	1.00	16.00	HR	145.71	100.00	145.71	2,331.38
8276	EXCAVATOR 35000-39999#	1.00	16.00	HR	130.15	100.00	130.15	2,082.37
8326	TRUCK WATER 4000-4999 GALLON	1.00	16.00	HR	102.12	100.00	102.12	1,633.89
LABORER	Laborer	2.00	32.00	MH	21.00	100.00	35.02	1,120.53
OPER4	Operator Foreman	1.00	16.00	MH	37.00	100.00	60.60	969.61
OPERATOR	Operator	2.00	32.00	MH	32.00	100.00	54.17	1,733.37

Activity: 2.4 Structure BF Quantity: 605 Unit: CY

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	1.89	1.27	3.16	4.07	0.00	0.00	0.00	7.23
Total	1,144.00	767.77	1,911.77	2,464.68	0.00	0.00	0.00	4,376.45

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
7.2338	0.0132	75.6250	547.0563	1.0000	605.0000	0.0017	4,376.4500

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
40.0000	15.1250	0.0661	47.7943	1.8909

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: BKFL Backfill Crew Prod: S 1 Eff: 100.00 Crew Hrs: 8.00 Labor Pcs: 5.00 Equipment Pcs: 3.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8034	ROLLER 41-49" VIB SINGLE DRU	1.00	8.00	HR	60.26	100.00	60.26	482.05
8269	LOADER WHEEL 3.5-3.9 CUBIC Y	1.00	8.00	HR	145.71	100.00	145.71	1,165.69
8326	TRUCK WATER 4000-4999 GALLON	1.00	8.00	HR	102.12	100.00	102.12	816.94
LABORER	Laborer	2.00	16.00	MH	21.00	100.00	35.02	560.27
OPER4	Operator Foreman	1.00	8.00	MH	37.00	100.00	60.60	484.81
OPERATOR	Operator	2.00	16.00	MH	32.00	100.00	54.17	866.69

Activity: 2.8.2 Yard Pipe Install Quantity: 500 Unit: LF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	11.44	7.68	19.12	18.67	0.00	0.00	0.00	37.79
Total	5,720.00	3,838.78	9,558.78	9,335.72	0.00	0.00	0.00	18,894.50

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
37.7890	0.0800	12.5000	472.3625	5.0000	100.0000	0.0100	3,778.9000

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
200.0000	2.5000	0.4000	47.7939	11.4400

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: SMPIPE Small Pipe Crew Prod: S 5 Eff: 100.00 Crew Hrs: 40.00 Labor Pcs: 5.00 Equipment Pcs: 2.00

Notes: Assume Owner supplied HDPE

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8267	LOADER WHEEL 2.5-2.9 CUBIC Y	1.00	40.00	HR	103.25	100.00	103.25	4,129.80
8276	EXCAVATOR 35000-39999#	1.00	40.00	HR	130.15	100.00	130.15	5,205.92
LABORER	Laborer	2.00	80.00	MH	21.00	100.00	35.02	2,801.32
OPER4	Operator Foreman	1.00	40.00	MH	37.00	100.00	60.60	2,424.02
OPERATOR	Operator	2.00	80.00	MH	32.00	100.00	54.17	4,333.44

Activity:	2.8.9	Yard Pipe Materials	Quantity:	1	Unit:	LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	0.00	36,316.65	1,000.00	0.00	37,316.65
Total	0.00	0.00	0.00	0.00	36,316.65	1,000.00	0.00	37,316.65

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Notes: Due to extreme volitility in the pipe, steel, and plastics markets, this item is subject to significant changes in price. Pricing is based on the best available information 8/2018.

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
1FREIGHT	Freight Costs	1.00	1.00	EA	1,000.00	100.00	1,000.00	1,000.00
2MISCPIPE	Misc Pipe Accessories	1.00	30,769.00	LS	0.10	107.30	0.11	3,301.51
2PIPE	Plant Pipe	1.00	1.00	LS	30,769.00	107.30	33,015.14	33,015.14

Biditem 30

Structural Concrete

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	52,966.00	30,626.48	83,592.48	2,116.38	48,214.99	29,532.50	193,034.50	356,490.85
Total	52,966.00	30,626.48	83,592.48	2,116.38	48,214.99	29,532.50	193,034.50	356,490.85

Manhours	Unit/MH	MH/Unit	$/MH	Base Labor/MH	Total Labor/MH	Unit/CH
1,785.6800	0.0006	1,785.6800	199.6387	29.6615	46.8127	0.0026

Activity:	30.1.1	Edge Form - Tank Base	Quantity:	353	Unit:	SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	5.44	3.14	8.58	0.00	0.00	2.50	0.00	11.08
Total	1,920.00	1,110.08	3,030.08	0.00	0.00	882.50	0.00	3,912.58

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
8.5838	0.0453	22.0625	189.3800	2.0000	176.5000	0.0057	1,956.2900

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
64.0000	5.5156	0.1813	47.3450	5.4391

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: 4CARP 4 Man Carp Crew Prod: S 2 Eff: 100.00 Crew Hrs: 16.00 Labor Pcs: 4.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
3F1	WOODEN FORMS	1.00	353.00	SF	2.00	100.00	2.00	706.00
3FORMACC	Form Accessories	1.00	353.00	LF	0.50	100.00	0.50	176.50
CARP	Carpenter - Journeyman	2.00	32.00	MH	32.00	100.00	50.17	1,605.37
CARP4	Carpenter Foreman	1.00	16.00	MH	35.00	100.00	54.03	864.44
LABORER	Laborer	1.00	16.00	MH	21.00	100.00	35.02	560.27

Activity:	30.1.2	Pour Tank Base	Quantity:	143	Unit:	CY

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	10.95	6.56	17.52	0.50	152.10	0.00	17.69	187.80
Total	1,566.00	938.66	2,504.66	72.00	21,749.98	0.00	2,529.00	26,855.64

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
18.0186	0.0559	17.8750	322.0825	1.0000	143.0000	0.0070	26,855.6400

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
58.0000	2.4655	0.4056	43.1838	10.9510

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: POUR Pour Crew Prod: S 1 Eff: 100.00 Crew Hrs: 8.00 Labor Pcs: 7.25 Equipment Pcs: 1.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total

2C0004	4000 PSI Concrete	1.05	150.15	CY	135.00	107.30	144.86	21,749.98
4PUMPHR	Concrete Pump - Hour	1.00	6.00	HR	350.00	100.00	350.00	2,100.00
4PUMPYD	Concrete Pump - Yardage	1.00	143.00	CY	3.00	100.00	3.00	429.00
8UTLPU	Utility Pickup	1.00	8.00	HR	9.00	100.00	9.00	72.00
CARP	Carpenter - Journeyman	2.00	16.00	MH	32.00	100.00	50.17	802.69
CARP4	Carpenter Foreman	1.25	10.00	MH	35.00	100.00	54.03	540.28
LAB4	Labor Foreman	1.00	8.00	MH	25.00	100.00	40.16	321.30
LABORER	Laborer	3.00	24.00	MH	21.00	100.00	35.02	840.39

Activity: 30.1.3 Strip Edge Forms Quantity: 343 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	4.30	2.53	6.83	0.00	0.00	0.00	0.00	6.83
Total	1,476.00	868.32	2,344.32	0.00	0.00	0.00	0.00	2,344.32

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
6.4038	0.0233	42.8750	274.5650	1.0000	343.0000	0.0029	2,344.3200

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
51.6800	6.6370	0.1507	45.3622	4.3032

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: 4CARP 4 Man Carp Crew Prod: S 1 Eff: 100.00 Crew Hrs: 8.00 Labor Pcs: 6.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
CARP	Carpenter - Journeyman	3.00	24.00	MH	32.00	100.00	50.17	1,204.03
CARP4	Carpenter Foreman	1.00	8.00	MH	35.00	100.00	54.03	432.22
LAB4	Labor Foreman	1.00	3.68	MH	25.00	100.00	40.16	147.80
LABORER	Laborer	2.00	16.00	MH	21.00	100.00	35.02	560.27

Activity: 30.1.4 Tank Base Fine Grade Quantity: 2000 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.49	0.33	0.82	0.95	0.00	0.00	0.00	1.77
Total	976.00	655.63	1,631.63	1,900.38	0.00	0.00	0.00	3,532.01

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
0.8703	0.0040	250.0000	217.5813	1.0000	2,000.0000	0.0005	3,532.0100

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
32.0000	62.5000	0.0160	50.9884	0.4880

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: SMGRD Small Grading Crew Prod: S 1 Eff: 100.00 Crew Hrs: 8.00 Labor Pcs: 3.00 Equipment Pcs: 1.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8036	ROLLER 50-56" VIB SINGLE DRU	1.00	8.00	HR	74.23	100.00	74.23	593.83
8267	LOADER WHEEL 2.5-2.9 CUBIC Y	1.00	8.00	HR	103.25	100.00	103.25	825.96
8324	TRUCK WATER 2000-2999 GALLON	1.00	8.00	HR	60.07	100.00	60.07	480.59
LABORER	Laborer	1.00	8.00	MH	21.00	100.00	35.02	280.13
OPER4	Operator Foreman	1.00	8.00	MH	37.00	100.00	60.60	484.81
OPERATOR	Operator	2.00	16.00	MH	32.00	100.00	54.17	866.69

Activity: 30.1.5 Rebar Template/Waterstop for Wall Bar Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	848.00	464.16	1,312.16	0.00	0.00	5,530.00	0.00	6,842.16
Total	848.00	464.16	1,312.16	0.00	0.00	5,530.00	0.00	6,842.16

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
1,312.1600	16.0000	0.0625	82.0100	2.0000	0.5000	2.0000	3,421.0800

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
32.0000	0.0313	32.0000	41.0050	848.0000

Calendar: ST	Straight Time	Hrs/Shift: 8		WC:	5221	Concrete Construction		
Crew: TEMP	Template Crew	Prod: S 2	Eff: 100.00	Crew Hrs:	16.00	Labor Pcs: 2.00	Equipment Pcs: 0.00	

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
3F	FORMWORK	1.00	1.00	LS	500.00	100.00	500.00	500.00
3WATERSTOP	Waterstop	1.00	503.00	LF	10.00	100.00	10.00	5,030.00
CARP	Carpenter - Journeyman	1.00	16.00	MH	32.00	100.00	48.25	772.02
LABORER	Laborer	1.00	16.00	MH	21.00	100.00	33.76	540.14

Activity: 30.2.7 Form Walls Quantity: 9192 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	2.91	1.68	4.59	0.00	0.00	2.50	0.00	7.09
Total	26,752.00	15,408.46	42,160.46	0.00	0.00	22,980.00	0.00	65,140.46

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
4.5866	0.0191	52.2273	239.5481	22.0000	417.8182	0.0024	2,960.9300

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
880.0000	10.4455	0.0957	47.9096	2.9104

Calendar: ST	Straight Time	Hrs/Shift: 8		WC:	5645	Carpentry NOC Res Const		
Crew: 4CARP	4 Man Carp Crew	Prod: S 22	Eff: 100.00	Crew Hrs:	176.00	Labor Pcs: 5.00	Equipment Pcs: 0.00	

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
3F1	WOODEN FORMS	1.00	9,192.00	EA	2.00	100.00	2.00	18,384.00
3FORMACC	Form Accessories	1.00	9,192.00	SF	0.50	100.00	0.50	4,596.00
CARP	Carpenter - Journeyman	3.00	528.00	MH	32.00	100.00	50.17	26,488.71
CARP4	Carpenter Foreman	1.00	176.00	MH	35.00	100.00	54.03	9,508.84
LABORER	Laborer	1.00	176.00	MH	21.00	100.00	35.02	6,162.91

Activity: 30.2.8 Pour Walls Quantity: 170 Unit: CY

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	34.12	19.89	54.01	0.00	152.10	0.00	44.18	250.28
Total	5,800.00	3,381.70	9,181.70	0.00	25,856.62	0.00	7,510.00	42,548.32

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
44.5600	0.2353	4.2500	189.3800	5.0000	34.0000	0.0294	8,509.6640

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
200.0000	0.8500	1.1765	45.9085	34.1176

Calendar: ST	Straight Time	Hrs/Shift: 8		WC:	5645	Carpentry NOC Res Const		
Crew: 4CARP	4 Man Carp Crew	Prod: S 5	Eff: 100.00	Crew Hrs:	40.00	Labor Pcs: 4.00	Equipment Pcs: 0.00	

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2C0006	5000 PSI Concrete	1.05	178.50	CY	135.00	107.30	144.86	25,856.62
4PUMPHR	Concrete Pump - Hour	1.00	20.00	HR	350.00	100.00	350.00	7,000.00
4PUMPYD	Concrete Pump - Yardage	1.00	170.00	CY	3.00	100.00	3.00	510.00
CARP	Carpenter - Journeyman	2.00	80.00	MH	32.00	100.00	50.17	4,013.44
CARP4	Carpenter Foreman	1.00	40.00	MH	35.00	100.00	54.03	2,161.10
LAB4	Labor Foreman	1.00	40.00	MH	25.00	100.00	40.16	1,606.50
LABORER	Laborer	1.00	40.00	MH	21.00	100.00	35.02	1,400.66

Activity: 30.2.9 Strip Walls Quantity: 9192 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	1.04	0.60	1.65	0.00	0.00	0.00	0.00	1.65
Total	9,600.00	5,550.40	15,150.40	0.00	0.00	0.00	0.00	15,150.40

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
1.6482	0.0087	114.9000	189.3800	10.0000	919.2000	0.0011	1,515.0400

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
320.0000	28.7250	0.0348	47.3450	1.0444

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: 4CARP 4 Man Carp Crew Prod: S 10 Eff: 100.00 Crew Hrs: 80.00 Labor Pcs: 4.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
CARP	Carpenter - Journeyman	2.00	160.00	MH	32.00	100.00	50.17	8,026.88
CARP4	Carpenter Foreman	1.00	80.00	MH	35.00	100.00	54.03	4,322.20
LABORER	Laborer	1.00	80.00	MH	21.00	100.00	35.02	2,801.32

Activity: 30.4.1 Form Blower Pads Quantity: 56 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	12.57	7.32	19.89	0.00	0.00	2.50	0.00	22.39
Total	704.00	409.70	1,113.70	0.00	0.00	140.00	0.00	1,253.70

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
19.8875	0.1429	7.0000	139.2125	1.0000	56.0000	0.0179	1,253.7000

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
24.0000	2.3333	0.4286	46.4042	12.5714

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: 4CARP 4 Man Carp Crew Prod: S 1 Eff: 100.00 Crew Hrs: 8.00 Labor Pcs: 3.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
3F1	WOODEN FORMS	1.00	56.00	EA	2.00	100.00	2.00	112.00
3FORMACC	Form Accessories	1.00	56.00	SF	0.50	100.00	0.50	28.00
CARP	Carpenter - Journeyman	1.00	8.00	MH	32.00	100.00	50.17	401.35
CARP4	Carpenter Foreman	1.00	8.00	MH	35.00	100.00	54.03	432.22
LABORER	Laborer	1.00	8.00	MH	21.00	100.00	35.02	280.13

Activity: 30.4.2 Pour Blower Pads Quantity: 4 Unit: CY

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	88.00	51.21	139.21	0.00	152.10	0.00	0.00	291.31
Total	352.00	204.84	556.84	0.00	608.39	0.00	0.00	1,165.23

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
139.2100	1.0000	1.0000	139.2100	0.5000	8.0000	0.1250	2,330.4600

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
12.0000	0.3333	3.0000	46.4033	88.0000

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: 4CARP 4 Man Carp Crew Prod: S 0.5 Eff: 100.00 Crew Hrs: 4.00 Labor Pcs: 3.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2C0006	5000 PSI Concrete	1.05	4.20	CY	135.00	107.30	144.85	608.39
CARP	Carpenter - Journeyman	1.00	4.00	MH	32.00	100.00	50.17	200.67
CARP4	Carpenter Foreman	1.00	4.00	MH	35.00	100.00	54.03	216.11
LABORER	Laborer	1.00	4.00	MH	21.00	100.00	35.02	140.06

Activity: 30.4.3 Strip Blower Pads Quantity: 56 Unit: SF

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	6.29	3.66	9.94	0.00	0.00	0.00	0.00	9.94
Total	352.00	204.84	556.84	0.00	0.00	0.00	0.00	556.84

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
9.9436	0.0714	14.0000	139.2100	0.5000	112.0000	0.0089	1,113.6800

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
12.0000	4.6667	0.2143	46.4033	6.2857

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: 4CARP 4 Man Carp Crew Prod: S 0.5 Eff: 100.00 Crew Hrs: 4.00 Labor Pcs: 3.00 Equipment Pcs: 0.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
CARP	Carpenter - Journeyman	1.00	4.00	MH	32.00	100.00	50.17	200.67
CARP4	Carpenter Foreman	1.00	4.00	MH	35.00	100.00	54.03	216.11
LABORER	Laborer	1.00	4.00	MH	21.00	100.00	35.02	140.06

Activity: 30.5.1 Grout Clarifier Bottom Quantity: 16 Unit: CY

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	163.75	89.36	253.11	9.00	0.00	0.00	178.00	440.11
Total	2,620.00	1,429.69	4,049.69	144.00	0.00	0.00	2,848.00	7,041.69

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
262.1056	1.0000	1.0000	262.1056	2.0000	8.0000	0.1250	3,520.8450

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
100.0000	0.1600	6.2500	40.4969	163.7500

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5221 Concrete Construction

Crew: POUR Pour Crew Prod: S 2 Eff: 100.00 Crew Hrs: 16.00 Labor Pcs: 6.25 Equipment Pcs: 1.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4PUMPHR	Concrete Pump - Hour	1.00	8.00	HR	350.00	100.00	350.00	2,800.00
4PUMPYD	Concrete Pump - Yardage	1.00	16.00	CY	3.00	100.00	3.00	48.00
8UTLPU	Utility Pickup	1.00	16.00	HR	9.00	100.00	9.00	144.00
CARP	Carpenter - Journeyman	1.00	16.00	MH	32.00	100.00	48.25	772.02
CARP4	Carpenter Foreman	1.25	20.00	MH	35.00	100.00	51.93	1,038.62
LAB4	Labor Foreman	1.00	16.00	MH	25.00	100.00	38.67	618.64
LABORER	Laborer	3.00	48.00	MH	21.00	100.00	33.76	1,620.41

Activity: 3100 Rebar Sub ALLOWANCE Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4REBAR1	Rebar	1.00	156,650.00	LB	1.15	100.00	1.15	180,147.50

Biditem 40 Masonry

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

Activity: 40.1 Masonry - None Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Biditem 50 Steel/Metals

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	4,512.00	2,924.68	7,436.68	2,400.00	10,540.00	0.00	0.00	20,376.68
Total	4,512.00	2,924.68	7,436.68	2,400.00	10,540.00	0.00	0.00	20,376.68

Manhours	Unit/MH	MH/Unit	$/MH	Base Labor/MH	Total Labor/MH	Unit/CH
144.0000	0.0069	144.0000	141.5047	31.3333	51.6436	0.0208

Activity: 50.1 Stairs & Walkways - Aero-Mod Quantity: 1 Unit: LS

Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total

U. Cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Notes: Assume Stairs & Walkways provided by Aero-Mod with Package

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2GRATING	Walkway Grating	1.00	920.00	SF	0.00	107.00	0.00	0.00
2STAIR	Stair Treads	1.00	74.00	EA	0.00	107.00	0.00	0.00
2STRUCTSTEEL	Structural Steel	1.00	0.00	LB	5.00	107.00	0.00	0.00

Activity: 50.2 Handrails - Aero-Mod Quantity: 140 Unit: LF

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Activity: 50.3 Pipe Supports/Stands - Aero-Mod Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Notes: To be detailed - Bid Item is an Allowance

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2STRUCTSTEEL	Structural Steel	1.00	0.00	LB	5.00	107.00	0.00	0.00

Activity: 50.4 Barscreen Allowance Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5221 Concrete Construction

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2STRUCTSTEEL	Structural Steel	1.00	1,200.00	LB	7.00	100.00	7.00	8,400.00

Activity: 50.6 Install Misc Metals/Steel Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	4,512.00	2,924.68	7,436.68	2,400.00	0.00	0.00	0.00	9,836.68
Total	4,512.00	2,924.68	7,436.68	2,400.00	0.00	0.00	0.00	9,836.68

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
9,836.6800	48.0000	0.0208	204.9308	6.0000	0.1667	6.0000	1,639.4467

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
144.0000	0.0069	144.0000	51.6436	4,512.0000

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: MECHSM Small Mechanical Crew Prod: S 6 Eff: 100.00 Crew Hrs: 48.00 Labor Pcs: 3.00 Equipment Pcs: 2.00

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8*FORK8	Reach Forklift - 8000 lb	1.00	48.00	HR	41.00	100.00	41.00	1,968.00
8UTLPU	Utility Pickup	1.00	48.00	HR	9.00	100.00	9.00	432.00
LABORER	Laborer	1.00	48.00	MH	21.00	100.00	35.02	1,680.79
MECHHLP	Mech Helper	1.00	48.00	MH	28.00	100.00	47.02	2,257.05
MILLWR	Millwright	1.00	48.00	MH	45.00	100.00	72.89	3,498.84

Activity: 50.7 Unistrut & Misc Pipe Support Mat's Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2UNISTRUT	Unistrut Material Allowance	1.00	1.00	LS	2,000.00	107.00	2,140.00	2,140.00

Biditem 60

FRP

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

Biditem **70** Insulation

Takeoff Qty: 1.000 LS
Bid Qty: 1.000 LS

Activity:	70.1	Building Insullation - None	Quantity:	1	Unit:	LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Activity:	70.2	Pipe Insulation - Allowance	Quantity:	1	Unit:	LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Notes: Pipe Insulation of pipes 6" and smaller

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4PIPEINSL	Pipe Insulation	1.00	50.00	LF	75.00	100.00	75.00	3,750.00

Biditem **80** Doors & WIndows

Takeoff Qty: 1.000 LS
Bid Qty: 1.000 LS

Activity:	80.1	Doors & Windows - None	Quantity:	1	Unit:	LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Biditem **90** Finishes

Takeoff Qty: 1.000 LS
Bid Qty: 1.000 LS

Activity:	90.1	Paint & Coatings	Quantity:	1	Unit:	LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Notes: Painting Allowance. This is a very rough cost based on painting exposed piping only and no specialty coatings are assumed for concrete tanks

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4PAINT	Painting & Coating	1.00	1.00	LS	7,500.00	100.00	7,500.00	7,500.00

Biditem **110** Equipment

Takeoff Qty: 1.000 LS
Bid Qty: 1.000 LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	15,040.00	9,748.96	24,788.96	8,000.00	516,799.00	0.00	0.00	549,587.96
Total	15,040.00	9,748.96	24,788.96	8,000.00	516,799.00	0.00	0.00	549,587.96

Manhours	Unit/MH	MH/Unit	$/MH	Base Labor/MH	Total Labor/MH	Unit/CH
480.0000	0.0021	480.0000	1,144.9749	31.3333	51.6437	0.0063

Activity:	110.1	Equipment Purchase	Quantity:	1	Unit:	LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	0.00	496,799.00	0.00	0.00	496,799.00
Total	0.00	0.00	0.00	0.00	496,799.00	0.00	0.00	496,799.00

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2AEROMOD	Aero-Mod Plant Package	1.00	1.00	LS	463,000.00	107.30	496,799.00	496,799.00

2DELIVERY	Delivery/Freight Costs	1.00	1.00	LS	0.00	100.00	0.00	0.00

Activity: 110.2 Install Equipment Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	15,040.00	9,748.96	24,788.96	8,000.00	20,000.00	0.00	0.00	52,788.96
Total	15,040.00	9,748.96	24,788.96	8,000.00	20,000.00	0.00	0.00	52,788.96

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
32,788.9600	160.0000	0.0063	204.9310	20.0000	0.0500	20.0000	2,639.4480

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
480.0000	0.0021	480.0000	51.6437	15,040.0000

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: MECHSM Small Mechanical Crew Prod: S 20 Eff: 100.00 Crew Hrs: 160.00 Labor Pcs: 3.00 Equipment Pcs: 2.00

Notes:
```
Blowers - 2 EA
Aeration Assembly - 12 EA (1st/2nd Stage Basins)
Aeration Assembly - 2 EA (Selector Tank)
Clarifier - 2 EA
WAS Pump - 2 EA
Aeration Assembly - 6 EA (WAS/DIG)
Air Compressor Systems - 2 EA
Instruments
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Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
2CRANE	Rental Crane	1.00	40.00	HR	500.00	100.00	500.00	20,000.00
8*FORK8	Reach Forklift - 8000 lb	1.00	160.00	HR	41.00	100.00	41.00	6,560.00
8UTLPU	Utility Pickup	1.00	160.00	HR	9.00	100.00	9.00	1,440.00
LABORER	Laborer	1.00	160.00	MH	21.00	100.00	35.02	5,602.64
MECHHLP	Mech Helper	1.00	160.00	MH	28.00	100.00	47.02	7,523.52
MILLWR	Millwright	1.00	160.00	MH	45.00	100.00	72.89	11,662.80

Biditem 130 Special Construction

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

Biditem 140 Conveying Systems

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

Activity: 14.1 None Quantity: 1 Unit: EA

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Biditem 150 Mechanical/Piping

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	7,520.00	4,874.48	12,394.48	22,360.00	5,000.00	500.00	0.00	40,254.48
Total	7,520.00	4,874.48	12,394.48	22,360.00	5,000.00	500.00	0.00	40,254.48

Manhours	Unit/MH	MH/Unit	$/MH	Base Labor/MH	Total Labor/MH	Unit/CH
240.0000	0.0042	240.0000	167.7270	31.3333	51.6437	0.0125

Activity: 15.1 HVAC Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4HVAC	HVAC - Sub	1.00	1.00	LS	0.00	100.00	0.00	0.00

Activity: 15.2 Plumbing Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Notes: Plumbing sub will include all domestic water, waste piping, and gas pipe.

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4PLUMB	Plumbing Sub	1.00	1.00	LS	0.00	100.00	0.00	0.00

Activity: 15.2.1 Plumbing & Mechanical Pipe/Material Buy Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	0.00	5,000.00	500.00	0.00	5,500.00
Total	0.00	0.00	0.00	0.00	5,000.00	500.00	0.00	5,500.00

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
1FREIGHT	Freight Costs	1.00	1.00	EA	500.00	100.00	500.00	500.00
2PIPECONT	Pipe Contingency	1.00	1.00	LS	5,000.00	100.00	5,000.00	5,000.00

Activity: 15.3.2 Mechanical/Piping - Process Piping Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	7,520.00	4,874.48	12,394.48	22,360.00	0.00	0.00	0.00	34,754.48
Total	7,520.00	4,874.48	12,394.48	22,360.00	0.00	0.00	0.00	34,754.48

Crew $/Unit	Crew Hrs/Unit	Units/Crew Hr	$/Crew Hour	Shifts	Units/Shift	Shifts/Unit	$/Shift
14,754.4800	80.0000	0.0125	184.4310	10.0000	0.1000	10.0000	3,475.4480

Manhours	Unit/MH	MH/Unit	Total Labor/MH	Base Labor/Unit
240.0000	0.0042	240.0000	51.6437	7,520.0000

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Crew: MECHSM Small Mechanical Crew Prod: S 10 Eff: 100.00 Crew Hrs: 80.00 Labor Pcs: 3.00 Equipment Pcs: 1.50

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
8*FORK8	Reach Forklift - 8000 lb	0.50	40.00	HR	41.00	100.00	41.00	1,640.00
8CRANESUB	Crane Subcontractor	1.00	80.00	HR	250.00	100.00	250.00	20,000.00
8UTLPU	Utility Pickup	1.00	80.00	HR	9.00	100.00	9.00	720.00
LABORER	Laborer	1.00	80.00	MH	21.00	100.00	35.02	2,801.32
MECHHLP	Mech Helper	1.00	80.00	MH	28.00	100.00	47.02	3,761.76
MILLWR	Millwright	1.00	80.00	MH	45.00	100.00	72.89	5,831.40

Biditem 160 Electrical

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

Activity: 16.1 Electrical - Allowance Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4ELEC	Electric - Sub	1.00	1.00	LS	225,000.00	100.00	225,000.00	225,000.00

Biditem 170 I&C

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

Activity: 17.1 Instrumentation & Control Quantity: 1 Unit: LS

Calendar: ST Straight Time Hrs/Shift: 8 WC: 5645 Carpentry NOC Res Const

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4ELEC	Electric - Sub	1.00	1.00	LS	0.00	100.00	0.00	0.00

Biditem

990001

General Account

Takeoff Qty: 1.000 LS

Bid Qty: 1.000 LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	96,498.20	0.00	250,424.08	1,650.00	348,572.28
Total	0.00	0.00	0.00	96,498.20	0.00	250,424.08	1,650.00	348,572.28

Activity: 99 CONTINGENCY Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	64,066.20	0.00	50,000.00	0.00	114,066.20
Total	0.00	0.00	0.00	64,066.20	0.00	50,000.00	0.00	114,066.20

Calendar: ST Straight Time Hrs/Shift: 8 WC: Code not found.

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
1ELECSERV	Electrical Service Allowance	1.00	1.00	LS	50,000.00	100.00	50,000.00	50,000.00
8224*TD	Contingency	1.00	1,281,323.93	TDC$	0.05	100.00	0.05	64,066.20

Activity: 999 PROJECT SUPPORT Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	14,432.00	0.00	0.00	1,650.00	16,082.00
Total	0.00	0.00	0.00	14,432.00	0.00	0.00	1,650.00	16,082.00

Calendar: ST Straight Time Hrs/Shift: 8 WC: Code not found.

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
4*CRANESUB	Crane Subcontractor	1.00	0.00	HR	500.00	100.00	0.00	0.00
4*QAQC	QA/QC Testing	1.00	1.00	LS	0.00	100.00	0.00	0.00
4*SURVEY	Land Surveyor	1.00	10.00	HR	165.00	100.00	165.00	1,650.00
5*CRANE-CRAW	Crawler Crane	1.00	0.00	HR	400.00	100.00	0.00	0.00
5*CRANE-HYDR	Hydrolic Crane	1.00	0.00	HR	200.00	100.00	0.00	0.00
8*BOOM45	45' Boomlift	1.00	0.00	HR	31.00	100.00	0.00	0.00
8*FORK10	Reach Forklift - 10000 lb	1.00	0.00	HR	47.00	100.00	0.00	0.00
8*FORK8	Reach Forklift - 8000 lb	1.00	352.00	HR	41.00	100.00	41.00	14,432.00
8*SHOPLIFT	Shop Forklift	1.00	0.00	HR	26.00	100.00	0.00	0.00
LABORER	Laborer	1.00	0.00	MH	25.00	100.00	0.00	0.00
OPERATOR	Operator	1.00	0.00	MH	32.00	100.00	0.00	0.00
RIGGER	Crane Rigger	1.00	0.00	MH	32.00	100.00	0.00	0.00

Activity: 9 GENERAL CONDITIONS Quantity: 1 Unit: LS

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
U. Cost	0.00	0.00	0.00	18,000.00	0.00	200,424.08	0.00	218,424.08
Total	0.00	0.00	0.00	18,000.00	0.00	200,424.08	0.00	218,424.08

Calendar: ST Straight Time Hrs/Shift: 8 WC: Code not found.

Resource	Description	Pcs/Wste	Quantity	Unit	Unit Cost	Tax/OT %	Actual UC	Total
1*ADMIN	Project Admin	1.00	0.00	MO	4,000.00	125.00	0.00	0.00
1*APM	Assistant PM	1.00	0.00	MO	8,500.00	125.00	0.00	0.00
1*PE	Project Engineer	1.00	0.00	MO	7,000.00	125.00	0.00	0.00
1*PM	Project Manager	1.00	3.00	MO	11,000.00	125.00	13,750.00	41,250.00
1*SAFETY	Safety Professional	1.00	0.00	MO	9,000.00	125.00	0.00	0.00
1*SUPT	Project Superintendent	1.00	6.00	MO	10,500.00	125.00	13,125.00	78,750.00

1*TRADESUPT	Trade Superintendent	1.00	0.00	MO	9,000.00	125.00	0.00	0.00
3*AIRPHOTO	Aerial Photography	1.00	0.00	EA	5,000.00	100.00	0.00	0.00
3*COMPUTER	Computer Cost	1.00	1.00	EA	3,000.00	100.00	3,000.00	3,000.00
3*CONEX	Conex storage box	1.00	12.00	MO	120.00	100.00	120.00	1,440.00
3*COPIER	Office Copier	1.00	0.00	MO	400.00	100.00	0.00	0.00
3*DH	SMALL TOOLS & SAFETY SUPPLIE	1.00	2,969.72	LBHR	3.00	100.00	3.00	8,909.16
3*DUMPSTER	Dumpster	1.00	6.00	EA	750.00	100.00	750.00	4,500.00
3*MAIL/FEDEX	Mail/Fedex/Postage	1.00	6.00	MO	500.00	100.00	500.00	3,000.00
3*OFFICE	Project Office - Per Single	1.00	0.00	MO	800.00	100.00	0.00	0.00
3*OFFICESUP	Office Supplies	1.00	6.00	MO	500.00	100.00	500.00	3,000.00
3*PHOTOS	Jobsite Photos	1.00	0.00	MO	250.00	100.00	0.00	0.00
3*PRINT	Printing & Copying Service	1.00	0.00	MO	400.00	100.00	0.00	0.00
3*SNOWREMOVE	Snow Removal	1.00	2.00	MO	2,000.00	100.00	2,000.00	4,000.00
3*TC	Fee	1.00	1,629,896.21	TOT$	0.02	100.00	0.01	24,448.44
3*TD	Total Direct Cost	1.00	1,281,323.93	TDC$	0.02	100.00	0.02	25,626.48
3*TEMPELESET	Temp Electrical Setup	1.00	0.00	LS	1,000.00	100.00	0.00	0.00
3*TEMPELEUSE	Temp Electric Use	1.00	0.00	MO	200.00	100.00	0.00	0.00
3*TEMPFENCE	Temp Fence	1.00	0.00	LF	2.00	100.00	0.00	0.00
3*TEMPH20SET	Temp Water Setup	1.00	0.00	LS	1,000.00	100.00	0.00	0.00
3*TEMPH20USE	Temp Water Usage	1.00	0.00	KGAL	3.00	100.00	0.00	0.00
3*TEMPHEAT	Temp Heat	1.00	500.00	GAL	5.00	100.00	5.00	2,500.00
3*TEMPTOILET	Temp Toilets	1.00	0.00	MO	125.00	100.00	0.00	0.00
3*WINTERPRO	Winter Protection	1.00	0.00	CY	3.00	100.00	0.00	0.00
8*PICKUP	Admin Pickup	1.00	15.00	MO	1,200.00	100.00	1,200.00	18,000.00
8*VAN	Passenger Van	1.00	0.00	MO	1,200.00	100.00	0.00	0.00
9*PERMITS	Permit Fees	1.00	0.00	LS	0.00	100.00	0.00	0.00

Report Summary

	Base Labor	Burden	Total Labor	Equipment	Perm Matls	Const Matls	Sub	Total
Total	89,191	54,317	143,509	149,226	616,871	281,457	438,835	1,629,896

Job Notes

Estimate created on: 02/03/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\ESTMAST

************Estimate created on: 07/19/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\ESTMSTRMIN

************Estimate created on: 08/17/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\2018BARRWTP

************Estimate created on: 10/26/2018 by User#: 0 -
Source estimate used: C:\HEAVYBID\EST\2018BARRWT-2

Calendars Used In Estimate

ST Straight Time

WWTP Expansion PER NDEP Approval Letter

NEVADA DIVISION OF
ENVIRONMENTAL
PROTECTION

STATE OF NEVADA
Department of Conservation & Natural Resources
Brian Sandoval, Governor
Bradley Crowell, Director
Greg Lovato, Administrator

January 3, 2019

Kristin Tokheim, P.E.
Lumos & Associates
308 N. Curry St., Ste. 200
Carson City, NV 89703

RE: **Great Basin Water Co. Spring Creek WWTP #1 Expansion**
Preliminary Engineering Report – Discharge Permit # NS2002511

Dear Ms. Tokheim:

NDEP-BWPC has reviewed the Spring Creek Preliminary Engineering Report (PER) for the proposed expansion of the Spring Creek WWTP #1.

On a technical review basis, Alternative #2 specifying replacement of the existing MAR-WOOD™ WWTP with a 75,000 gpd Aero-Mod SEQUOX™ WWTP is acceptable if effluent meets a Total Nitrogen level of ≤ 10 mg/l (Daily Maximum).

Thank you for this PER submittal. To proceed forward on this proposal, 100% design plans and specifications and a complete permit modification application are required for our review and approval.

Please contact the Permits Branch at (775) 687-9418 for information regarding the permit modification process. If you should have any questions in regards to this review letter, please feel free to contact me at (775) 687-9424.

Sincerely,

Mark A. Kaminski

Mark A. Kaminski, P.E.
Technical, Compliance & Enforcement Branch
Bureau of Water Pollution Control

cc:

Marc Rohus, Regional Manager, Great Basin Water Co., Spring Creek Division, 3670 Grant Dr. #103, Reno, NV 89509
BWPC Compliance Coordinator

Emailed:

Donette Barreto, P.E.
Katrina Pascual, P.E.

Breaks and Leaks Map

FILED UNDER SEAL

[redacted]

FILED UNDER SEAL

[redacted]

Miscellaneous Data

TMFPD Cold Springs Division Water Letter RE: Tank 2

GBWC-CSD Pressure Zone 2 Memorandum

NDEP Interpretation of NAC 445A Capacity Requirements

Fire Flow Requirements for Nancy Gomes Elementary School

TMFPD Cold Springs Division Water Supply Letter RE: Tank 2

January 11, 2024

Chelsea Cluff, P.E., Senior Engineer
Lumos & Associates – Engineering Division
950 Sandhill Road, Suite 100
Reno, NV 89521
775.827.6111
ccluff@LumosInc.com

Re: Great Basin Water Company – Cold Springs Division (CSD) Water Supply

Truckee Meadows Fire Protection District (TMFPD) has been asked, as the fire authority having jurisdiction for the Cold Springs area, if TMFPD would be amenable to removing Water Storage Tank 2 from the system.

As stated previously via email, TMFPD is not amenable to removing this storage tank because CSD is a stand-alone (Isolated) water system and each of the existing storage tanks were the minimum that was required at the time of construction (the approved water supply) or were built in support of considering additional future construction at those moments, and the area continues to grow. Further, it is known that the system already has some deficiencies, in one or more Pressure Zones, in providing the minimum required fire flow.

For this request, TMFPD's focus is on the minimum requirements for fire flow of the adopted fire code, and we are not in support of removing and/or reducing the existing water supply to this community, especially in an isolated water system.

Respectfully,

Dale Way

Dale Way, Deputy Fire Chief / Fire Marshal

LUMOS

MEMORANDUM

DATE:	12/13/2023
TO:	Truckee Meadows Fire Protection District (TMFPD)
FROM:	Chelsea Cluff, P.E. (Lumos & Associates)
CC:	Mike Hardy, P.E., P.G., W.R.S. (Lumos & Associates); Mara Quiroga, P.E. (Lumos & Associates); James Eason (Great Basin Water Company); Sean Ashcraft (Great Basin Water Company)
SUBJECT:	Great Basin Water Company Cold Springs Division Pressure Zone 2

1.0 Background Information

The Great Basin Water Company (GBWC) owns and operates the Cold Springs Division (CSD) water system located in Reno, Nevada. The CSD water system is made up of four (4) pressure zones, Pressure Zones 1-4. The system is served by four (4) water storage tanks, five (5) groundwater wells, two (2) booster pump stations, and multiple pressure reducing valves (PRVs) to transfer water between the pressure zones. Currently, the system does not have emergency connections or interties with other water systems and its water supply is not diverse. During an emergency event (i.e., a fire), the only sources available for water are the wells and storage tanks within the system.

GBWC is required to file an Integrated Resource Plan (IRP) every three years for water systems it owns, maintains, and operates, including CSD. As part of GBWC's last IRP filing (2021), GBWC was directed to coordinate a meeting with the Nevada Department of Environmental Protection (NDEP) staff, Public Utility Commission of Nevada (PUCN) staff, and local fire jurisdictions to discuss storage needs. Meetings were held on October 13, 2023 and October 20, 2023 to discuss storage requirements and the need for Tank 2 in CSD as it relates to providing fire storage. As a result of these meetings, this memorandum was produced to present a comparison of the system operation with and without Tank 2 and the capacity analysis results.

Tank 2 is a 0.42 MG tank (nominal volume) that provides storage for Pressure Zone 2 of CSD and is approaching the end of its useful life. This analysis is to assist in the determination of whether Tank 2 is necessary for the operation of the system and should be replaced, or if the NAC requirements for pressure and storage can be achieved without Tank 2.

2.0 Water Demand Data

A summary of service connection counts, peaking factors, and system demands by pressure zone are included in the following sections. The data presented was calculated during the update to GBWC's IRP in 2023. The 2024 IRP is still in a draft stage and has not been sent for review by the PUCN.

CSD separates meter data into three connection types: residential, commercial, and public. During the update to the 2024 IRP, average gallons per day per connection (gpdpc) by connection type was calculated based on the provided meter data (from 2020 to 2022). The average gallons per day per connection (gpdpc) was used to calculate the existing and proposed demands shown in the following sections. For reference, the residential average demand per connection by pressure zones are provided in Table 1. The commercial and public average demand per connection were calculated as system-wide values and applied to each pressure zone. The commercial demand per connection is 1,800 gpdpc and the public average demand per connection is 3,087 gpdpc.

Table 1: Residential Average Daily Demands per Connection by Pressure Zone

Pressure Zone	Residential Average Gallons Per Day Per Connection (gpdpc)
1	387
2	309
3	269
4	269
Average	300
Notes: [1] An in-depth analysis and summary were created and will be provided in the final version of the GBWC 2024 IRP.	

2.1 Existing Demands

Existing connection counts, peaking factors, and system demands are provided by pressure zone in Table 2. Maximum day demand (MDD) and peak hour demand (PHD) are provided in addition to average day demand (ADD). As of the current draft of the 2024 IRP, the CSD has approximately 3,843 existing service connections and a system-wide ADD of 905 gpm.

Table 2: Existing Water Demands Per Pressure Zone

Pressure Zone	Existing Connection Count	Peaking Factors		Total Demands		
		MDD/ADD	PHD/ADD	ADD (gpm)	MDD (gpm)	PHD (gpm)
1	632	2.34	4.10	189	442	774
2	1,023	2.34	4.10	232	542	948
3	185	2.18	3.82	34	76	132
4	2,003	2.18	3.82	450	983	1,720
Total	3,843	-	-	905	2,043	3,574
Notes: [1] An in-depth analysis and summary were created and will be provided in the final version of the GBWC 2024 IRP.						

2.2 Projected Demands

Projected demands were estimated for the year 2044 (20-year planning period). The projection was based on population estimates from the Nevada State Demographer's Office, available land, land use types, and planned developments. After projected connection counts were estimated for each pressure zone, demands were calculated using the average daily demand per connection factors shown in previous sections. Table 3 provides a summary of projected connection counts, peaking factors and system demands by pressure zone for the year 2044. As of the current draft of the 2024 IRP, it is projected that CSD will serve approximately 4,273 connections and have a system-wide ADD of 1,018 gpm in 2044.

Table 3: Projected Water Demands Per Pressure Zone

Pressure Zone	Estimated Projected Connection Count	Peaking Factors		Total Demands		
		MDD/ADD	PHD/ADD	ADD (gpm)	MDD (gpm)	PHD (gpm)
1	724	2.34	4.10	218	511	894
2	1,206	2.34	4.10	273	639	1,118
3	185	2.18	3.82	34	76	132
4	2,158	2.18	3.82	493	1,074	1,880
Total	4,273	-	-	1,018	2,300	4,024

Notes:
[1] An in-depth analysis and summary were created and will be provided in the final version of the GBWC 2024 IRP.

2.3 Fire Demands

Residential fire flow for both existing and future scenarios will be in accordance with the 2018 International Fire Code as cited by the Truckee Meadows Fire Protection District (TMFPD). Although the referenced code specifies a maximum required fire flow of 1,000 gpm at a one-hour duration for single and dual family residents, a 1,500 gpm for a two-hour duration is utilized for the CSD system. The TMFD fire chief has stated in previous meetings with the GBWC and PUCN that the more conservative residential fire flow is preferred for the CSD system because many of the houses served by the system were built when a previous version of the International Fire Code was referenced by the fire authority.

Commercial and public facility fire flow depends on the size and material of the building as outlined in the 2018 International Fire Code. Table 4 summarizes the highest fire flow demand for each pressure zone.

Table 4: Maximum Fire Flow Required per Pressure Zone

Pressure Zone	Maximum Fire Flow Required in Zone
1	1,500 gpm for 2 hours
2	2,125 gpm for 2 hours
3	1,500 gpm for 2 hours
4	3,125 gpm for 3 hours
Average	300

Notes:
[1] An in-depth analysis and summary were created for and will be provided in the final version of the GBWC 2024 IRP.

3.0 Hydraulic Modeling

The water model analysis was conducted using the ArcGIS InfoWater Pro software by Autodesk. Demands described in the previous section of the report were applied for the existing and 20-year projected scenarios. In addition to modeling for existing and projected conditions, two scenarios were used to determine the function of Tank 2 located in Pressure Zone 2: one with Tank 2 active and one with Tank 2 inactive. The model was run for several conditions as outlined in NAC 445A. Hydraulic modeling results are provided for each pressure zone, even though the focus of this report is Pressure Zone 2 and Tank 2, to get an idea of the effect of Tank 2 on the whole system. The system was modeled with all tanks full and all Wells 1, 6, 7, 8, and the Van Dyke Well operating. The Cold Springs Drive Booster Pump Station was turned off for all existing scenarios and turned on for all projected scenarios. The water modeling scenarios and results are described in the sections below.

3.1 Maximum Day Demand (MDD)

NAC Requirement Reference: NAC 445A.6672-2(c), NAC 445A.6611-1(b)

An analysis of MDD conditions was conducted to assess the system's ability to maintain a minimum system pressure of 40 pounds per square inch (psi). Table 5 displays the resulting pressure ranges for four (4) scenarios: existing demands with Tank 2 on, projected demands with Tank 2 on, existing demands with Tank 2 off, and projected demands with Tank 2 off.

Table 5: MDD Modeling Results

Pressure Zone	Tank 2 On Pressure Range (psi) [1]				Tank 2 Off Pressure Range (psi) [1]			
	Existing		20-Year Projected		Existing		20-Year Projected	
	Min	Max	Min	Max	Min	Max	Min	Max
1	51.45	122.89	50.91	120.8	52.04	125.58	51.75	124.8
2	39.74	61.90	39.59	61.59	50.21	70.76	42.11	63.06
3	48.65	97.46	48.55	97.28	49.1	98.18	49.05	98.08
4	40.47	109.07	40.46	109.04	40.47	109.07	40.46	109.04
All	39.74	122.89	39.59	120.8	40.47	125.58	40.46	124.8

Notes:
[1] Two nodes were excluded from the pressure range provided because they are located immediately downstream of Tank 3 and 4. Although the pressures at those nodes are lower than 40 psi, the nodes do not have any service connections and do not represent the distribution system's ability to maintain the minimum pressure required by the NAC.

As shown in Table 5, the pressure ranges for existing and projected scenarios are similar with and without Tank 2. All distribution nodes are borderline or exceed the pressure requirements indicated in the NAC for all scenarios. Removing Tank 2 causes a small increase in system pressures in the MDD scenarios modeled.

3.2 Peak Hour Demand (PHD)

NAC Requirement Reference: NAC 445A.6672-2(b), NAC 445A.6611-1(c)

An analysis of PHD conditions was conducted to assess the system's ability to maintain a minimum system pressure of 30 pounds per square inch (psi) and a maximum velocity of eight (8) feet per sec (fps) in the system piping. Table 6 and Table 8 display the resulting pressure ranges and pipe velocities, respectively for four (4) scenarios: existing demands with Tank 2 on, projected demands with Tank 2 on, existing demands with Tank 2 off, and projected demands with Tank 2 off.

Table 6: PHD Modeling Results

Pressure Zone	Tank 2 On Pressure Range (psi) [1]				Tank 2 Off Pressure Range (psi) [1]			
	Existing		20-Year Projected		Existing		20-Year Projected	
	Min	Max	Min	Max	Min	Max	Min	Max
1	49.04	115.67	46.19	108.37	50.58	120.06	48.6	114.58
2	39.11	60.90	38.79	60.29	41.18	62.25	40.91	61.85
3	48.16	96.48	47.99	96.08	48.96	97.95	48.72	97.62
4	39.97	108.27	39.85	108.08	39.97	108.27	39.85	108.08
All	39.11	115.67	38.79	108.37	39.97	120.06	39.85	114.58

Notes:
[1] Two nodes were excluded from the pressure range provided because they are located immediately downstream of Tank 3 and 4. Although the pressures at those nodes are lower than 40 psi, the nodes do not have any service connections and do not represent the distribution system's ability to maintain the minimum pressure required by the NAC.

Table 7: PHD Pipe Modeling Results

Pressure Zone	Tank 2 On Velocity Range (fps)		Tank 2 Off Velocity Range (fps)	
	Existing Max[1]	20-Year Projected Max[1]	Existing Max[1]	20-Year Projected Max[1]
1	4.76	6.31	4.70	4.73
2	3.86	6.31	3.51	4.60
3	4.1	4.87	3.63	4.06
4	4.39	5.33	4.33	4.41
All	4.76	6.31	4.7	4.73

Notes:
[1] The minimum velocity for all scenarios and all Pressure Zones was 0, so only the max was listed out in this table.

The pressure ranges for the four (4) scenarios depicted in Table 6 show an insignificant difference in operations with Tank 2 on versus Tank 2 off. There is a slight increase in pipe velocities when comparing the Tank 2 on versus Tank 2 off scenarios. The reason for the increase is the Cold Springs Booster Pump Station operation. The station sees greater flows required when Tank 2 is on than when Tank 2 is removed. All minimum pressure and maximum velocity requirements for the PHD scenario is met for all four (4) scenarios.

3.3 Maximum Day Demand (MDD) with Fire Demand at Gomes Elementary School

NAC Requirement Reference: NAC 445A.6672-2(a), NAC 445A.6611-1(a)

An analysis of MDD conditions with a fire at Gomes Elementary School was conducted to assess the system's ability to maintain a residual system pressure of 20 pounds per square inch (psi) during the fire event. Gomes Elementary School's fire flow is 2,125 gpm for two (2) hours based on the 2018 International Fire Code and verbal direction from the fire authority. Gomes Elementary School has the largest fire demand in Pressure Zone 2 and represents the highest stress on Zone 2 infrastructure for fire conditions. Table 8 displays the resulting pressure ranges for four (4) scenarios: existing demands with Tank 2 on, projected demands with Tank 2 on, existing demands with Tank 2 off, and projected demands with Tank 2 off.

Table 8: MDD and Fire in Zone 2 Modeling Results

Pressure Zone	Tank 2 On Pressure Range (psi) [1]				Tank 2 Off Pressure Range (psi) [1]			
	Existing		20-Year Projected		Existing		20-Year Projected	
	Min	Max	Min	Max	Min	Max	Min	Max
1	49.02	115.09	47.52	111.22	48.71	114.23	46.97	109.77
2	37.11	57.93	36.94	57.68	36.41	36.41	35.87	57.65
3	47.41	94.53	47.33	94.35	47.23	94.11	47.06	93.71
4	40.37	108.92	40.29	108.79	40.28	108.79	40.15	108.58
All	37.11	115.09	36.94	111.22	36.41	114.23	35.87	109.77

Notes:
[1] One node was excluded from the pressure range provided because it is located immediately downstream of Tank 3 and 4. Although the pressure at the node is lower than 20 psi, the node does not have any service connections and does not represent the distribution system's ability to maintain the minimum pressure required by the NAC.

As seen in Table 8, there is a small drop in system residual pressures when Tank 2 is removed from the system; however, all distribution nodes meet the NAC requirement for minimum residual pressure (20 psi) with or without Tank 2 operating.

4.0 System Capacity and Storage Analysis

The following sections will provide a summary of NAC requirements and Pressure Zone 2 capacity and storage analysis. Capacity and storage analyses for other pressure zones will be provided as an attachment to the memorandum to support the existing capacity and storage available to Pressure Zone 2.

4.1 NAC Requirement Summary

Systems that rely exclusively on groundwater for water supply are subject to NAC 445A.6672 which requires total capacity in the system sufficient to meet the following two scenarios:

- Scenario A – Maximum Day Demand: Total system capacity (including storage) should be sufficient to meet the maximum day demand (MDD) and fire demand with all facilities in service.
- Scenario B – Average Day Demand: Total system capacity (including storage) should be sufficient to meet the average day demand (ADD) and fire demand with the most productive well out of service.

Storage requirements for existing public water systems are governed by NAC 445A.6674, 445A.66745, 445A.6675, and 445A.66755. NAC 445A.6674(a) states that an existing water system should provide a storage capacity sufficient to meet demands while maintaining pressures indicated in NAC 445A.6711 and described in the previous section. Storage capacity includes operating storage, emergency reserve, and fire demand. NAC requirements for storage are as follows:

- Operating Storage: Operating storage should be as determined by an engineer based on historical data and supply capacity to meet the requirements of MDD. For CSD, operating storage is defined as one (1) day of MDD for Scenario A and one (1) day of ADD for Scenario B.
- Emergency Reserve: Emergency reserve should be an amount as determined appropriate by the engineer. For GBWC, emergency storage is defined as one (1) day of ADD for Scenario A and Scenario B.
- Fire Demand: Storage requirements for fire demand must be calculated in accordance with the fire authority.

When evaluating the total capacity of an existing system, only the alternative pumping capacity and the storage capacity can be considered as sources of supply per NAC 445A.66725.1. A well or booster pump can be considered alternative pumping capacity when equipped with a source of backup power (e.g., emergency generator).

The total storage capacity and pump capacity for each pressure zone must be sufficient to meet MDD within each pressure zone (NAC 445A.6674.3); however, if it is determined that a higher pressure zone has excess storage capacity, it can serve a lower pressure zone if a pressure regulator is installed between zones (NAC 445A.6674.3.a). Similarly, if a lower pressure zone is determined to have excess storage, it can serve a higher pressure zone through a booster pump station as long as the booster pump has a backup power source.

4.2 Pressure Zone 2 Capacity and Storage Analysis

Operating storage (one day of ADD or MDD, depending on the scenario), emergency reserve (one day of ADD for both scenarios), and fire flow for Pressure Zone 2 match the demands described in Section 2.0. Pressure Zone 2 is currently served water by the Van Dyke Well and Tank 2. The Van Dyke Well has a pumping capacity of 1,000 gpm and is equipped with backup power. Tank 2 has a volume of 328,811 gallons. Pressure Zone 2 can also be served by Pressure Zones 1, 3, and 4 through existing pressure reducing valves (PRVs). Tank 2 triggers the Van Dyke Well to begin pumping when it reaches the low water level. If the Van Dyke Well cannot maintain Pressure Zone 2 demands, the Cold Springs Drive PRV, Puffin Street PRV, and Waxwing PRV open to convey water from Pressure Zones 1, 3, and 4 to maintain pressure. When Tank 2 reaches the high water level, the PRV's close and Van Dyke Well shuts down.

Table 9 and Table 10 are comprehensive summaries of the capacity and storage analysis for Pressure Zone 2 in existing and projected conditions, respectively. The tables depict that Pressure Zone 2 is not able to meet NAC requirements for Scenario B (ADD and fire flow demands with the largest producer out of service) for existing or projected conditions. There is a storage deficit of approximately 627,694 gallons under existing conditions and 752,877 gallons under projected conditions. This is expected since the Van Dyke Well is Pressure Zone 2's only well and is considered out of service in this scenario.

If transfers from higher pressure zones (Pressure Zones 1, 3, and 4) with excess capacity are considered, Pressure Zone 2 has enough capacity and storage available to meet the required demands for existing and projected conditions. When determining excess capacity available to Pressure Zone 2 during Scenario B, it was assumed that only the largest producer serving Pressure Zone 2 (the Van Dyke Well) was down (i.e., all facilities in other zones were functioning normally). Therefore, the largest producer's capacity was added back to each contributing zones' difference between required storage and total capacity for Scenario B to find excess capacity available to Pressure Zone 2. Pressure Zones 1, 3 and 4, have a combined storage capacity excess of 1,872,070 gallons under existing conditions and 1,656,355 gallons under projected conditions. The transferred water capacity results in Pressure Zone 2 being sufficient in Scenario B with approximately 1,244,376 gallons of excess capacity for existing conditions and 903,478 gallons of excess capacity in projected conditions.

Table 9. NAC Storage Capacity Analysis Pressure Zone 2 Existing Conditions (as of 2022)			
Required System Storage Capacity NAC 445A.6672.3			
Scenario A(1) = MDD + FF NAC 445A.6672.3.(a)		Scenario B(2) = ADD + FF - Well (Largest Producer) NAC 445A.6672.3.(b)	
Operating Storage(3) (gal) *Assumed to be MDD for Scenario A* NAC 445A.66745.1	820,099	Operating Storage(3) (gal) *Assumed to be ADD for Scenario B* NAC 445A.66745.1	350,753
Emergency Reserve(4) (gal) *Assumed to be ADD for both Scenarios* NAC 445A.6675.1	350,753	Emergency Reserve(4) (gal) *Assumed to be ADD for both Scenarios* NAC 445A.6675.1	350,753
Fire Flow (gal) *2,125 gpm for 2 hours for Zone 2* NAC 445A.6674.2	255,000	Fire Flow (gal) *1,500 gpm for 2 hours for Zone 1* NAC 445A.6674.2	255,000
Required Storage (gal) NAC 445A.6674.1.(b)	1,425,852	Required Storage (gal) NAC 445A.6674.1.(b)	956,505
System Storage Capacity			
Scenario A(1) = MDD + FF NAC 445A.6672.3.(a)		Scenario B(2) = ADD + FF - Well (Largest Producer) NAC 445A.6672.3.(b)	
Tank 2 (gal) NAC 445A.6644	328,811	Tank 2 (gal) NAC 445A.6644	328,811
Van Dyke Well (gal) NAC 445A.6554	1,440,000	Van Dyke Well (gal) NAC 445A.6554	1,440,000
Total Capacity (gal) *All Wells in Service*	1,768,811	Total Capacity (gal) *Largest Producer Out of Service*	328,811
Storage/Capacity Comparison			
Scenario A(1) = MDD + FF NAC 445A.6672.3.(a)		Scenario B(2) = ADD + FF - Well (Largest Producer) NAC 445A.6672.3.(b)	
Required Storage (gal) NAC 445A.6672.3	1,425,852	Required Storage (gal) NAC 445A.6672.3	956,505
Total Capacity (gal)	1,768,811	Total Capacity (gal)	328,811
Difference (gal)	342,959	Difference (gal)	-627,694
Meets NAC Requirements?	YES	Meets NAC Requirements?	NO
Inter-Zone Analysis, If Applicable			
Scenario A(1) = MDD + FF NAC 445A.6672.3.(a)		Scenario B(2) = ADD + FF - Well (Largest Producer) NAC 445A.6672.3.(b)	
If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone? NAC 445A.6674.3	N/A	If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone? NAC 445A.6674.3	YES
Which Pressure Zones can contribute flow ?	1, 3, 4	Which Pressure Zones can contribute flow ?	1, 3, 4
Total excess capacity under this scenario available to this Pressure Zone from other Zones(5) (gal)	-	Total excess capacity under this scenario available to this Pressure Zone from other Zones(6) (gal)	1,872,070
Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	-	Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	1,244,376
Meets NAC Requirements with contributing Zones ?	N/A	Meets NAC Requirements with contributing Zones ?	YES
Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements ?	N/A	Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements ?	YES

1. Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.
2. Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest-producing well.
3. Projected ADD was determined through analysis of 2022 meter data provided by GBWC and population projections (determined in previous sections). The ADD was increased by 5.1% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.34 (determined in previous sections).
4. Emergency reserve is defined as one day of ADD.
5. Excess capacity for Scenario A is defined as the difference between the Required Storage and Total Capacity under MDD conditions.
6. Excess capacity for Scenario B is defined as the difference between the Required Storage and Total Capacity under ADD conditions. It is assumed that the largest producing well is only offline for the Pressure Zone being analyzed, and all contributing Zones have all facilities functioning.

Table 10. NAC Storage Capacity Analysis Pressure Zone 2 Projected Conditions (as of 2044)			
Required System Storage Capacity NAC 445A.6672.3			
Scenario A[1] = MDD + FF NAC 445A.6672.3.(a)		Scenario B[2] = ADD + FF - Well (Largest Producer) NAC 445A.6672.3.(b)	
Operating Storage[3] (gal) *Assumed to be MDD for Scenario A* NAC 445A.66745.1	966,445	Operating Storage[3] (gal) *Assumed to be ADD for Scenario B* NAC 445A.66745.1	413,344
Emergency Reserve[4] (gal) *Assumed to be ADD for both Scenarios* NAC 445A.6675.1	413,344	Emergency Reserve[4] (gal) *Assumed to be ADD for both Scenarios* NAC 445A.6675.1	413,344
Fire Flow (gal) *2,125 gpm for 2 hours for Zone 2* NAC 445A.6674.2	255,000	Fire Flow (gal) *1,500 gpm for 2 hours for Zone 1* NAC 445A.6674.2	255,000
Required Storage (gal) NAC 445A.6674.1.(b)	1,634,789	Required Storage (gal) NAC 445A.6674.1.(b)	1,081,688
System Storage Capacity			
Scenario A[1] = MDD + FF NAC 445A.6672.3.(a)		Scenario B[2] = ADD + FF - Well (Largest Producer) NAC 445A.6672.3.(b)	
Tank 2 (gal) NAC 445A.6644	328,811	Tank 2 (gal) NAC 445A.6644	328,811
Van Dyke Well (gal) NAC 445A.6554	1,440,000	Van Dyke Well (gal) NAC 445A.6554	1,440,000
Total Capacity (gal) *All Wells in Service*	1,768,811	Total Capacity (gal) *Largest Producer Out of Service*	328,811
Storage/Capacity Comparison			
Scenario A[1] = MDD + FF NAC 445A.6672.3.(a)		Scenario B[2] = ADD + FF - Well (Largest Producer) NAC 445A.6672.3.(b)	
Required Storage (gal) NAC 445A.6672.3	1,634,789	Required Storage (gal) NAC 445A.6672.3	1,081,688
Total Capacity (gal)	1,768,811	Total Capacity (gal)	328,811
Difference (gal)	134,022	Difference (gal)	-752,877
Meets NAC Requirements?	YES	Meets NAC Requirements?	NO
Inter-Zone Analysis, If Applicable			
Scenario A[1] = MDD + FF NAC 445A.6672.3.(a)		Scenario B[2] = ADD + FF - Well (Largest Producer) NAC 445A.6672.3.(b)	
If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone? NAC 445A.6674.3	N/A	If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone? NAC 445A.6674.3	YES
Which Pressure Zones can contribute flow?	1, 3, 4	Which Pressure Zones can contribute flow?	1, 3, 4
Total excess capacity under this scenario available to this Pressure Zone from other Zones[5] (gal)	N/A	Total excess capacity available to this Pressure Zone from other Zones[6] (gal)	1,656,355
Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	N/A	Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	903,478
Meets NAC Requirements with contributing Zones?	N/A	Meets NAC Requirements with contributing Zones?	YES
Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	N/A	Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	YES

1. Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.
2. Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest-producing well.
3. Projected ADD was determined through analysis of 2022 meter data provided by GBWC and population projections (determined in previous sections). The ADD was increased by 5.1% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.34 (determined in previous sections).
4. Emergency reserve is defined as one day of ADD.
5. Excess capacity for Scenario A is defined as the difference between the Required Storage and Total Capacity under MDD conditions.
6. Excess capacity for Scenario B is defined as the difference between the Required Storage and Total Capacity under ADD conditions. It is assumed that the largest producing well is only offline for the Pressure Zone being analyzed, and all contributing Zones have all facilities functioning.

5.0 Summary

The CSD water system is stand-alone and does not have an emergency connection or intertie with surrounding water systems. Water supply is from five (5) groundwater wells and water storage is from the four (4) existing water tanks. As directed by the PUCN, GBWC held meetings with the PUCN, NDEP, and TMFPD to discuss water storage needs. An assessment of distribution system pressures, system capacity, and system storage was requested and completed by Lumos & Associates to determine the function of Tank 2.

Based on previous sections, it is concluded that Tank 2 is not required to maintain system pressures and pipe velocities or for system storage. The hydraulic modeling shows slight changes in pressure, but overall, the system operates similarly with or without Tank 2. In addition, when Tank 2 is removed during existing and projected conditions, the GBWC CSD distribution system can maintain all NAC minimum pressures and maximum pipe velocities for MDD, PHD, and MDD with Fire Demand at Gomes Elementary School scenarios. The NAC system capacity and storage analysis section determined that, when viewed as an isolated system, Pressure Zone 2 has a storage deficit during Scenario B (ADD and fire flow demands with the largest producer out of service) of approximately 627,694 gallons under existing conditions and 752,877 gallons under projected conditions. However, when water transfers from surrounding pressure zones are taken into consideration, Pressure Zone 2 has an additional storage availability of approximately 1,244,376 gallons of for existing conditions and 903,478 gallons of available storage capacity in projected conditions.

6.0 Attachments

1. Hydraulic Model System Map
2. Hydraulic Modeling Results
3. NAC Capacity and Storage Analysis for Pressure Zones 1, 3 and 4

ATTACHMENT 1

Hydraulic Model System Map

FILED UNDER SEAL

FILED UNDER SEAL

ATTACHMENT 2

Hydraulic Modeling Results

GBWC-CSD Existing MDD (Tank 2 On)
Distribution System Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-242	0	5,253.23	5,282.78	12.8	Zone 4
J-243	0	5,266.30	5,323.34	24.71	Zone 3
J-33	0	5,085.16	5,176.89	39.74	Zone 2
J-742	0	5,189.36	5,282.77	40.47	Zone 4
J-760	0	5,189.25	5,282.77	40.52	Zone 4
J-127	7.68	5,087.12	5,180.69	40.54	Zone 2
J-241	0	5,189.14	5,282.77	40.57	Zone 4
H-5-PH18	0	5,188.76	5,282.76	40.73	Zone 4
J-743	4.57	5,188.35	5,282.76	40.91	Zone 4
H-9-PH19	0	5,187.77	5,282.77	41.16	Zone 4
J-759	0	5,187.36	5,282.77	41.34	Zone 4
J-747	3.74	5,186.03	5,282.76	41.91	Zone 4
J-79	20.49	5,083.12	5,180.65	42.26	Zone 2
H-8-PH19	0	5,185.11	5,282.76	42.31	Zone 4
J-87	6.15	5,082.66	5,180.46	42.38	Zone 2
J-749	0	5,184.71	5,282.76	42.49	Zone 4
J-77	6.66	5,082.17	5,180.46	42.59	Zone 2
H-7-PH19	0	5,184.12	5,282.76	42.74	Zone 4
J-746	0	5,183.77	5,282.76	42.89	Zone 4
J-128	8.71	5,081.52	5,180.58	42.92	Zone 2
J-78	0	5,081.03	5,180.39	43.05	Zone 2
J-129	0	5,080.95	5,180.46	43.12	Zone 2
J-751	3.32	5,183.05	5,282.76	43.2	Zone 4
J-75	4.1	5,080.57	5,180.75	43.4	Zone 2
J-126	8.2	5,080.04	5,180.45	43.51	Zone 2
J-65	5.63	5,079.55	5,180.41	43.7	Zone 2
J-80	0	5,079.11	5,180.24	43.82	Zone 2
J-88	7.17	5,078.91	5,180.52	44.03	Zone 2
J-125	0	5,078.39	5,180.33	44.17	Zone 2
J-64	5.63	5,078.45	5,180.62	44.27	Zone 2
J-83	6.15	5,077.46	5,180.64	44.7	Zone 2
J-130	7.68	5,077.34	5,180.58	44.73	Zone 2
J-480	0	5,178.80	5,282.77	45.05	Zone 4
J-82	0	5,076.00	5,180.63	45.33	Zone 2
J-240	0	5,075.78	5,180.58	45.41	Zone 2
J-133	10.25	5,075.16	5,180.41	45.6	Zone 2
J-397	4.99	5,177.11	5,282.76	45.78	Zone 4
J-76	2.56	5,074.67	5,180.74	45.96	Zone 2
J-396	5.82	5,176.61	5,282.76	46	Zone 4
J-84	7.17	5,074.37	5,180.65	46.05	Zone 2
H-6-PH19	0	5,176.29	5,282.76	46.13	Zone 4
J-89	0	5,073.98	5,180.57	46.18	Zone 2
J-132	0	5,073.50	5,180.49	46.36	Zone 2
J-753	4.15	5,175.42	5,282.76	46.51	Zone 4
J-66	7.17	5,072.89	5,180.76	46.74	Zone 2
J-131	10.25	5,072.63	5,180.58	46.77	Zone 2

GBWC-CSD Existing MDD (Tank 2 On)
Distribution System Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
ESELEMSC	5.12	5,072.70	5,180.79	46.83	Zone 2
J-81	10.25	5,072.64	5,180.76	46.85	Zone 2
J-90	6.15	5,072.44	5,180.63	46.88	Zone 2
J-134	0	5,072.25	5,180.62	46.96	Zone 2
J-98	0	5,071.85	5,180.70	47.17	Zone 2
J-93	0	5,071.70	5,180.62	47.19	Zone 2
J-85	6.66	5,071.59	5,180.65	47.26	Zone 2
-PH19IRR	0	5,173.54	5,282.76	47.33	Zone 4
J-91	0	5,071.44	5,180.77	47.37	Zone 2
J-398	4.77	5,173.42	5,282.76	47.38	Zone 4
H-5-PH19	0	5,173.37	5,282.76	47.4	Zone 4
J-124	0	5,071.50	5,180.92	47.41	Zone 2
J-752	4.15	5,172.78	5,282.76	47.65	Zone 4
J-44	9.73	5,070.66	5,180.94	47.79	Zone 2
J-355	0	5,070.63	5,180.94	47.8	Zone 2
J-92	7.68	5,070.22	5,180.63	47.84	Zone 2
J-99	0	5,070.00	5,180.67	47.95	Zone 2
J-120	10.25	5,069.37	5,180.92	48.34	Zone 2
J-40	9.73	5,069.17	5,180.75	48.34	Zone 2
J-45	8.2	5,069.09	5,180.92	48.46	Zone 2
J-234	2.91	5,210.77	5,323.04	48.65	Zone 3
J-115	6.66	5,068.19	5,180.94	48.86	Zone 2
J-95	9.73	5,067.85	5,180.79	48.94	Zone 2
J-86	0	5,067.69	5,180.71	48.97	Zone 2
J-106	8.71	5,067.26	5,180.87	49.23	Zone 2
J-121	0	5,067.03	5,180.92	49.35	Zone 2
J-109	5.12	5,066.75	5,180.87	49.44	Zone 2
J-96	8.2	5,066.64	5,180.79	49.46	Zone 2
J-62	5.12	5,066.21	5,180.73	49.62	Zone 2
J-105	0	5,066.29	5,180.87	49.65	Zone 2
J-67	8.2	5,066.14	5,180.77	49.67	Zone 2
J-108	7.17	5,066.01	5,180.88	49.77	Zone 2
J-119	5.12	5,065.91	5,180.92	49.83	Zone 2
J-1248	0	5,065.60	5,180.90	49.96	Zone 2
J-118	5.63	5,065.58	5,180.92	49.98	Zone 2
J-104	6.66	5,065.24	5,180.86	50.1	Zone 2
J-103	5.63	5,065.09	5,180.85	50.16	Zone 2
J-70	3.59	5,065.15	5,180.95	50.17	Zone 2
WELL2	0	5,065.04	5,180.92	50.21	Zone 2
J-114	8.2	5,065.03	5,180.95	50.23	Zone 2
J-123	8.2	5,064.73	5,180.92	50.34	Zone 2
J-110	12.81	5,064.61	5,180.96	50.41	Zone 2
J-97	0	5,064.28	5,180.89	50.53	Zone 2
J-39	8.2	5,063.96	5,180.72	50.59	Zone 2
J-117	0	5,063.63	5,180.93	50.83	Zone 2
J-38	9.22	5,063.32	5,180.72	50.87	Zone 2

GBWC-CSD Existing MDD (Tank 2 On)
Distribution System Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
H-4-PH19	0	5,165.31	5,282.76	50.89	Zone 4
J-122	7.17	5,063.36	5,180.92	50.94	Zone 2
J-116	7.17	5,062.99	5,180.93	51.11	Zone 2
J-481	0	5,164.80	5,282.76	51.12	Zone 4
J-755	4.15	5,164.76	5,282.76	51.13	Zone 4
J-111	9.22	5,062.56	5,181.04	51.34	Zone 2
J-1	0	5,205.92	5,324.66	51.45	Zone 1
J-275	7.17	5,062.11	5,180.97	51.5	Zone 2
J-235	0	5,204.09	5,323.10	51.57	Zone 3
H-3-PH19	0	5,163.54	5,282.76	51.66	Zone 4
J-744	0	5,162.73	5,282.76	52.01	Zone 4
J-756	4.15	5,162.22	5,282.76	52.23	Zone 4
J-73	0	5,060.23	5,180.84	52.26	Zone 2
J-237	3.32	5,202.45	5,323.10	52.28	Zone 3
J-100	6.66	5,059.56	5,181.31	52.75	Zone 2
J-101	0	5,059.38	5,181.35	52.85	Zone 2
J-61	9.22	5,058.70	5,180.73	52.88	Zone 2
J-2	0	5,202.02	5,324.63	53.12	Zone 1
J-74	8.71	5,057.51	5,180.87	53.45	Zone 2
J-395	4.15	5,159.38	5,282.76	53.46	Zone 4
J-185	0	5,199.32	5,323.04	53.61	Zone 3
J-72	11.27	5,056.99	5,180.81	53.65	Zone 2
J-17	0	5,056.94	5,181.02	53.76	Zone 2
J-60	8.2	5,056.56	5,180.72	53.8	Zone 2
J-112	10.76	5,056.59	5,181.17	53.98	Zone 2
J-392	5.82	5,157.68	5,282.76	54.2	Zone 4
J-394	5.82	5,157.67	5,282.76	54.2	Zone 4
J-71	0	5,055.86	5,181.02	54.23	Zone 2
J-102	10.25	5,056.39	5,181.62	54.26	Zone 2
J-274	5.12	5,055.45	5,180.99	54.4	Zone 2
J-59	5.12	5,056.59	5,182.77	54.68	Zone 2
J-157	0	5,054.13	5,180.79	54.89	Zone 2
J-43	5.12	5,054.95	5,181.84	54.98	Zone 2
J-113	2.05	5,053.87	5,181.08	55.12	Zone 2
J-399	0	5,153.84	5,282.76	55.86	Zone 4
J-57	7.17	5,053.23	5,182.35	55.95	Zone 2
J-69	0	5,051.20	5,180.84	56.18	Zone 2
H-2-PH19	0	5,152.99	5,282.77	56.23	Zone 4
J-68	7.17	5,050.26	5,180.81	56.57	Zone 2
J-758	4.15	5,152.20	5,282.77	56.57	Zone 4
J-16	0	5,050.22	5,181.10	56.71	Zone 2
J-37	0	5,051.70	5,182.61	56.72	Zone 2
WELL7	0	5,200.02	5,331.52	56.98	Zone 1
J-58	0	5,050.51	5,182.29	57.1	Zone 2
-PH19IRR	0	5,150.63	5,282.77	57.26	Zone 4
H-1-PH19	0	5,150.61	5,282.77	57.27	Zone 4

GBWC-CSD Existing MDD (Tank 2 On)
Distribution System Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-757	4.15	5,149.86	5,282.77	57.59	Zone 4
J-53	9.22	5,049.40	5,182.75	57.78	Zone 2
J-1245	0	5,050.16	5,184.10	58.04	Zone 2
J-1246	0	5,049.10	5,183.18	58.1	Zone 2
J-63	10.67	5,046.87	5,181.59	58.37	Zone 2
J-192	2.98	5,189.42	5,324.59	58.57	Zone 1
J-55	6.15	5,047.20	5,183.29	58.97	Zone 2
J-393	4.99	5,146.64	5,282.76	58.98	Zone 4
J-50	6.15	5,046.44	5,182.63	59.01	Zone 2
J-391	4.15	5,146.19	5,282.76	59.18	Zone 4
J-805	0	5,045.43	5,182.64	59.45	Zone 4
H-21-PH19	0	5,045.03	5,182.64	59.62	Zone 4
J-140	10.8	5,185.26	5,322.97	59.67	Zone 3
J-255	0	5,045.07	5,182.82	59.69	Zone 2
J-51	4.61	5,044.68	5,182.68	59.79	Zone 2
WELL6	0	5,190.68	5,329.18	60.01	Zone 1
J-56	9.22	5,044.22	5,182.85	60.07	Zone 2
J-15	5.97	5,044.50	5,183.54	60.24	Zone 2
FH-925	0	5,143.68	5,282.78	60.27	Zone 4
ALLEYCHU	10.24	5,043.33	5,182.82	60.44	Zone 2
J-194	7.68	5,043.07	5,182.64	60.48	Zone 2
J-42	2.98	5,043.48	5,183.05	60.48	Zone 2
J-52	3.59	5,043.12	5,182.72	60.49	Zone 2
J-23-1188	1.25	5,142.91	5,282.79	60.61	Zone 4
J-54	0	5,044.83	5,185.01	60.74	Zone 2
J-482	0	5,142.30	5,282.76	60.86	Zone 4
J22-901	0	5,142.20	5,282.79	60.92	Zone 4
J-23-1191	0	5,142.10	5,282.79	60.96	Zone 4
J-23-1193	2.91	5,142.00	5,282.79	61	Zone 4
J-23-1190	0.83	5,142.00	5,282.79	61	Zone 4
J-23-1192	0	5,141.96	5,282.79	61.02	Zone 4
J-23-1189	1.25	5,141.96	5,282.79	61.02	Zone 4
J-142	5.4	5,182.03	5,322.87	61.03	Zone 3
J-797	9.22	5,046.51	5,187.35	61.03	Zone 2
J-23-1187	0.83	5,141.83	5,282.79	61.08	Zone 4
J-830	0	5,141.48	5,282.79	61.23	Zone 4
NDYKEWE	0	5,045.67	5,187.54	61.47	Zone 2
J-679	7.06	5,140.42	5,282.76	61.68	Zone 4
J-1184	0	5,140.06	5,282.79	61.84	Zone 4
J-23-1186	0	5,139.93	5,282.79	61.9	Zone 4
9RENOTR	2.98	5,042.15	5,185.01	61.9	Zone 2
J-23-1225	0	5,139.83	5,282.79	61.94	Zone 4
J-3	0	5,179.43	5,322.71	62.08	Zone 1
J-685	0	5,139.45	5,282.78	62.1	Zone 4
H-68-PH19	0	5,139.29	5,282.79	62.18	Zone 4
J-390	0	5,139.21	5,282.76	62.2	Zone 4

GBWC-CSD Existing MDD (Tank 2 On)
Distribution System Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-836	3.74	5,139.17	5,282.79	62.23	Zone 4
J-819	0	5,139.09	5,282.79	62.26	Zone 4
J-829	0	5,138.72	5,282.79	62.43	Zone 4
AV-1	0	5,138.66	5,282.79	62.45	Zone 4
H-67-PH19	0	5,138.40	5,282.79	62.56	Zone 4
FH-921	0	5,138.31	5,282.77	62.59	Zone 4
J-841	0	5,138.08	5,282.79	62.7	Zone 4
J-193	5.13	5,175.44	5,320.82	62.99	Zone 1
J-820	0	5,136.66	5,282.79	63.32	Zone 4
H-7-PH20	0	5,136.55	5,282.79	63.36	Zone 4
J-1199	0	5,136.51	5,282.79	63.38	Zone 4
J-815	4.77	5,135.92	5,282.79	63.64	Zone 4
PH22-FH1	0	5,135.78	5,282.79	63.7	Zone 4
J-678	0	5,135.00	5,282.77	64.03	Zone 4
J-352	5.4	5,134.35	5,282.76	64.31	Zone 4
FH-922	0	5,133.52	5,282.77	64.67	Zone 4
FH-926	0	5,133.11	5,282.78	64.85	Zone 4
H-4-PH20	0	5,132.77	5,282.79	65	Zone 4
J-187	0	5,172.80	5,322.95	65.06	Zone 3
J-810	0	5,132.51	5,282.79	65.11	Zone 4
J-1262	2.98	5,171.87	5,322.30	65.18	Zone 1
J-816	4.99	5,132.14	5,282.79	65.28	Zone 4
J-730	0	5,131.29	5,282.79	65.64	Zone 4
J-806	0	5,131.12	5,282.79	65.72	Zone 4
J-732	0	5,130.98	5,282.79	65.78	Zone 4
H-1-PH20	0	5,130.96	5,282.79	65.79	Zone 4
H-2-PH18	0	5,130.74	5,282.79	65.88	Zone 4
J-677	8.31	5,130.35	5,282.77	66.04	Zone 4
J-145	4.99	5,170.11	5,322.88	66.2	Zone 3
J-688	4.77	5,129.98	5,282.79	66.21	Zone 4
FH-923	0	5,129.94	5,282.77	66.22	Zone 4
J22-899	0	5,129.83	5,282.79	66.28	Zone 4
J-23-1195	1.25	5,129.79	5,282.79	66.29	Zone 4
J-23-1196	1.66	5,129.79	5,282.79	66.3	Zone 4
J-811	5.4	5,129.75	5,282.79	66.31	Zone 4
J-23-1194	2.08	5,129.54	5,282.79	66.4	Zone 4
J-687	0	5,129.21	5,282.79	66.55	Zone 4
J-807	4.57	5,129.05	5,282.79	66.62	Zone 4
J-23-1197	1.25	5,128.77	5,282.79	66.74	Zone 4
J-675	0	5,128.70	5,282.79	66.77	Zone 4
J-141	4.57	5,168.63	5,322.90	66.84	Zone 3
J-839	0	5,127.72	5,282.79	67.19	Zone 4
J-483	0	5,127.70	5,282.76	67.19	Zone 4
J-676	0	5,127.37	5,282.78	67.34	Zone 4
H-69-PH19	0	5,127.37	5,282.79	67.34	Zone 4
FH-930	0	5,126.99	5,282.79	67.51	Zone 4

GBWC-CSD Existing MDD (Tank 2 On)
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ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-443	4.15	5,126.84	5,282.76	67.56	Zone 4
J-576	4.99	5,126.40	5,282.77	67.76	Zone 4
J-1198	0	5,125.95	5,282.79	67.96	Zone 4
FH-927	0	5,125.90	5,282.79	67.98	Zone 4
J-842	3.74	5,125.62	5,282.79	68.1	Zone 4
H-8-PH20	0	5,125.42	5,282.79	68.19	Zone 4
H-66-PH19	0	5,125.20	5,282.79	68.28	Zone 4
J-844	2.08	5,124.82	5,282.79	68.45	Zone 4
H-5-PH20	0	5,124.50	5,282.79	68.59	Zone 4
J-736	5.82	5,124.23	5,282.79	68.71	Zone 4
J-4	8.12	5,162.98	5,321.83	68.83	Zone 1
H-2-PH20	0	5,123.59	5,282.79	68.98	Zone 4
J-817	0	5,122.16	5,282.79	69.6	Zone 4
J-846	0	5,121.84	5,282.79	69.74	Zone 4
J-690	0	5,121.80	5,282.79	69.76	Zone 4
H-9-PH20	0	5,121.59	5,282.79	69.85	Zone 4
J-674	0	5,121.42	5,282.79	69.92	Zone 4
H-6-PH20	0	5,121.04	5,282.79	70.09	Zone 4
J-143	3.74	5,160.94	5,322.87	70.16	Zone 3
J-808	0	5,120.84	5,282.79	70.17	Zone 4
H-65-PH19	0	5,120.81	5,282.79	70.18	Zone 4
J-843	0	5,120.79	5,282.79	70.19	Zone 4
J-812	0	5,120.76	5,282.79	70.21	Zone 4
J22-1078	0	5,120.76	5,282.79	70.21	Zone 4
J-389	1.66	5,120.37	5,282.76	70.36	Zone 4
FH-924	0	5,120.34	5,282.79	70.39	Zone 4
J-23-1201	1.66	5,119.21	5,282.79	70.88	Zone 4
J-348	4.15	5,119.14	5,282.76	70.9	Zone 4
J-23-1202	2.08	5,118.91	5,282.79	71.01	Zone 4
J-813	4.99	5,118.03	5,282.79	71.39	Zone 4
J-818	4.57	5,117.96	5,282.79	71.42	Zone 4
J-184	4.77	5,117.91	5,282.76	71.43	Zone 4
J-680	5.4	5,117.93	5,282.79	71.43	Zone 4
J-1200	0	5,117.54	5,282.79	71.6	Zone 4
H-3-PH20	0	5,117.46	5,282.79	71.64	Zone 4
H-3-PH18	0	5,117.38	5,282.79	71.67	Zone 4
J-823	0	5,117.34	5,282.79	71.69	Zone 4
J-809	4.57	5,117.32	5,282.79	71.7	Zone 4
J-652	6.42	5,147.64	5,313.47	71.86	Zone 1
J-729	0	5,116.93	5,282.79	71.87	Zone 4
J-346	0	5,116.15	5,282.76	72.19	Zone 4
J-735	0	5,116.01	5,282.79	72.27	Zone 4
J-851	3.32	5,115.88	5,282.79	72.32	Zone 4
H-61-PH19	0	5,115.88	5,282.79	72.32	Zone 4
J-1183	0	5,115.82	5,282.79	72.35	Zone 4
PH22-FH2	0	5,115.49	5,282.79	72.49	Zone 4

GBWC-CSD Existing MDD (Tank 2 On)
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ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-770	0	5,115.48	5,282.79	72.5	Zone 4
FH-928	0	5,115.38	5,282.79	72.54	Zone 4
J-833	0	5,115.28	5,282.79	72.58	Zone 4
H-64-PH19	0	5,115.23	5,282.79	72.6	Zone 4
J-840	4.15	5,114.89	5,282.79	72.75	Zone 4
J-845	4.15	5,114.73	5,282.79	72.82	Zone 4
H-70-PH19	0	5,114.57	5,282.79	72.89	Zone 4
J22-886	1.25	5,114.17	5,282.79	73.06	Zone 4
J-814	0	5,114.15	5,282.79	73.07	Zone 4
H-58-PH19	0	5,113.97	5,282.79	73.15	Zone 4
J-855	3.74	5,113.88	5,282.79	73.19	Zone 4
J-442	4.57	5,113.79	5,282.76	73.21	Zone 4
PH22-FH4	0	5,113.77	5,282.79	73.24	Zone 4
J22-884	1.25	5,113.64	5,282.79	73.29	Zone 4
H-60-PH19	0	5,113.58	5,282.79	73.32	Zone 4
J-832	0	5,113.49	5,282.79	73.36	Zone 4
J-689	3.74	5,113.48	5,282.79	73.36	Zone 4
J22-1079	2.78	5,113.43	5,282.79	73.38	Zone 4
J22-1159	1.25	5,113.40	5,282.79	73.4	Zone 4
J-852	3.32	5,113.35	5,282.79	73.42	Zone 4
J22-1158	1.25	5,113.34	5,282.79	73.42	Zone 4
PH22-FH3	0	5,113.29	5,282.79	73.44	Zone 4
H-59-PH19	0	5,113.22	5,282.79	73.48	Zone 4
J-856	3.74	5,113.19	5,282.79	73.49	Zone 4
J22-1080	0	5,113.14	5,282.79	73.51	Zone 4
J-650	0	5,112.98	5,282.81	73.58	Zone 4
J-139	0	5,153.08	5,322.93	73.6	Zone 3
IDDLESCH	4.77	5,112.14	5,282.81	73.95	Zone 4
J-441	4.57	5,112.05	5,282.76	73.97	Zone 4
J-783	2.91	5,112.00	5,282.79	74	Zone 4
J-570	0	5,112.01	5,282.80	74	Zone 4
J-434	3.32	5,111.84	5,282.76	74.06	Zone 4
H-20-PH17	0	5,111.82	5,282.79	74.08	Zone 4
J-854	3.74	5,111.71	5,282.79	74.13	Zone 4
H-57-PH19	0	5,111.52	5,282.79	74.21	Zone 4
J-734	0	5,110.99	5,282.79	74.44	Zone 4
J-433	1.66	5,110.90	5,282.76	74.47	Zone 4
J-195	0	5,110.77	5,282.76	74.52	Zone 4
J22-848	0	5,110.68	5,282.79	74.58	Zone 4
FH-919	4.99	5,110.63	5,282.80	74.6	Zone 4
J-681	0	5,110.40	5,282.79	74.7	Zone 4
H-72-PH19	0	5,110.13	5,282.79	74.81	Zone 4
J22-887	0	5,109.85	5,282.79	74.93	Zone 4
J22-1082	4.77	5,109.65	5,282.79	75.02	Zone 4
J22-1083	0	5,109.44	5,282.80	75.12	Zone 4
J22-1160	0	5,109.41	5,282.79	75.13	Zone 4

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ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-649	0	5,109.20	5,282.81	75.22	Zone 4
PH22-FH5	0	5,109.15	5,282.79	75.24	Zone 4
PH22-FH6	0	5,108.82	5,282.80	75.38	Zone 4
J22-1161	1.25	5,108.69	5,282.80	75.44	Zone 4
J-835	0	5,108.66	5,282.79	75.45	Zone 4
J-834	0	5,108.55	5,282.79	75.5	Zone 4
H-4-PH18	0	5,108.54	5,282.79	75.5	Zone 4
J-1179	0	5,108.50	5,282.79	75.52	Zone 4
H-62-PH19	0	5,108.36	5,282.79	75.58	Zone 4
J-571	0	5,108.10	5,282.81	75.7	Zone 4
J22-1163	1.25	5,108.04	5,282.80	75.72	Zone 4
J-731	0	5,108.03	5,282.79	75.73	Zone 4
J-286	13.08	5,107.77	5,282.76	75.82	Zone 4
PH22-FH7	0	5,107.71	5,282.80	75.87	Zone 4
J-847	0	5,107.15	5,282.79	76.11	Zone 4
J-642	0	5,107.02	5,282.81	76.17	Zone 4
J22-890	0.83	5,106.80	5,282.80	76.26	Zone 4
J-189	0	5,145.45	5,321.54	76.3	Zone 1
J22-1069	0	5,106.60	5,282.80	76.35	Zone 4
J-284	6.65	5,106.34	5,282.76	76.44	Zone 4
J-667	0	5,106.00	5,282.80	76.61	Zone 4
J-850	3.32	5,105.62	5,282.79	76.77	Zone 4
J-765	0	5,105.58	5,282.79	76.79	Zone 4
H-63-PH19	0	5,105.46	5,282.79	76.84	Zone 4
J-857	0	5,105.28	5,282.79	76.92	Zone 4
J-144	0	5,145.19	5,322.87	76.99	Zone 3
J-448	7.06	5,134.46	5,312.47	77.13	Zone 1
J-858	3.32	5,104.55	5,282.79	77.23	Zone 4
FH-929	0	5,104.35	5,282.80	77.32	Zone 4
J-190	0	5,142.64	5,321.12	77.34	Zone 1
J22-1070	0	5,104.17	5,282.80	77.4	Zone 4
J-23-1206	1.25	5,103.76	5,282.81	77.58	Zone 4
J-769	0	5,103.65	5,282.79	77.63	Zone 4
J-853	0	5,103.31	5,282.80	77.77	Zone 4
H-19-PH17	0	5,103.22	5,282.79	77.81	Zone 4
J-764	4.77	5,103.20	5,282.79	77.82	Zone 4
FH-920	0	5,103.13	5,282.81	77.85	Zone 4
J-203	4.15	5,103.04	5,282.75	77.87	Zone 4
J-23-1205	1.25	5,103.01	5,282.81	77.91	Zone 4
J-733	5.82	5,102.95	5,282.79	77.93	Zone 4
J-651	0	5,102.83	5,282.81	77.99	Zone 4
J-283	4.57	5,102.74	5,282.76	78	Zone 4
J-782	2.91	5,102.64	5,282.79	78.06	Zone 4
PH22-FH9	0	5,102.58	5,282.80	78.09	Zone 4
J22-1165	1.66	5,102.35	5,282.80	78.19	Zone 4
J-799	0	5,102.30	5,282.79	78.21	Zone 4

GBWC-CSD Existing MDD (Tank 2 On)
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ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J22-1164	1.25	5,102.26	5,282.80	78.23	Zone 4
J22-1084	0	5,102.15	5,282.80	78.28	Zone 4
J-666	5.4	5,102.13	5,282.81	78.29	Zone 4
PH22-FH8	0	5,102.01	5,282.80	78.34	Zone 4
J-23-1203	2.08	5,101.82	5,282.81	78.42	Zone 4
J22-892	0.83	5,101.66	5,282.80	78.49	Zone 4
J-1071	0	5,101.47	5,282.80	78.57	Zone 4
J-768	0	5,101.09	5,282.80	78.73	Zone 4
J23-IRR	0	5,101.05	5,282.81	78.76	Zone 4
J-683	5.4	5,100.73	5,282.80	78.89	Zone 4
J22-1085	0	5,100.66	5,282.81	78.93	Zone 4
J-432	1.66	5,100.59	5,282.75	78.93	Zone 4
J22-1166	0	5,100.41	5,282.81	79.03	Zone 4
PH22-FH1	0	5,100.33	5,282.81	79.07	Zone 4
H-18-PH1	0	5,100.15	5,282.80	79.14	Zone 4
J-204	4.15	5,099.81	5,282.75	79.27	Zone 4
H-16-PH1	0	5,099.69	5,282.80	79.34	Zone 4
J-780	4.99	5,099.49	5,282.80	79.43	Zone 4
J-763	0	5,099.48	5,282.80	79.43	Zone 4
J-196	0	5,099.35	5,282.75	79.47	Zone 4
J22-1168	1.66	5,099.28	5,282.81	79.52	Zone 4
H-17-PH1	0	5,099.26	5,282.80	79.53	Zone 4
PH22-FH1	0	5,099.17	5,282.81	79.57	Zone 4
J22-1170	1.66	5,098.86	5,282.81	79.7	Zone 4
PH22-FH1	0	5,098.86	5,282.81	79.7	Zone 4
J-781	4.15	5,098.79	5,282.80	79.73	Zone 4
J-23-1204	2.08	5,098.75	5,282.81	79.75	Zone 4
J-281	3.32	5,098.63	5,282.76	79.78	Zone 4
LDG3-CC	2.78	5,098.71	5,282.85	79.79	Zone 4
J22-1147	0	5,098.63	5,282.81	79.8	Zone 4
J22-1086	0	5,098.57	5,282.83	79.84	Zone 4
J22-1171	1.66	5,098.51	5,282.81	79.85	Zone 4
J-715	0	5,098.51	5,282.80	79.85	Zone 4
J-728	0	5,098.39	5,282.80	79.91	Zone 4
J-779	0	5,098.33	5,282.80	79.93	Zone 4
PH22-FH1	0	5,098.28	5,282.81	79.95	Zone 4
J-704	4.77	5,098.03	5,282.85	80.08	Zone 4
J22-896	0	5,097.93	5,282.80	80.11	Zone 4
J-665	0	5,097.87	5,282.82	80.14	Zone 4
J22-1169	2.08	5,097.42	5,282.80	80.33	Zone 4
H-15-PH1	0	5,097.37	5,282.80	80.35	Zone 4
PH22-FH1	0	5,097.31	5,282.80	80.37	Zone 4
PH22-FH1	0	5,097.23	5,282.81	80.41	Zone 4
J-639	0	5,097.25	5,282.84	80.42	Zone 4
J22-1172	3.74	5,097.21	5,282.81	80.42	Zone 4
J-484	4.57	5,097.17	5,282.85	80.45	Zone 4

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ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-767	4.77	5,097.07	5,282.80	80.48	Zone 4
J-705	0	5,097.12	5,282.85	80.48	Zone 4
J-778	6.23	5,096.86	5,282.80	80.57	Zone 4
J-671	4.77	5,096.69	5,282.81	80.65	Zone 4
J-613	0	5,096.67	5,282.85	80.67	Zone 4
J22-898	0	5,096.50	5,282.81	80.73	Zone 4
J-444	0	5,136.58	5,322.91	80.74	Zone 3
J-205	4.15	5,096.27	5,282.75	80.8	Zone 4
J-714	0	5,096.31	5,282.81	80.81	Zone 4
H-13-PH1	0	5,096.07	5,282.80	80.91	Zone 4
J-485	9.75	5,095.99	5,282.85	80.97	Zone 4
J-23-1207	2.08	5,095.92	5,282.84	80.99	Zone 4
J-325	7.26	5,095.74	5,282.76	81.03	Zone 4
J-306	5.13	5,133.61	5,320.64	81.04	Zone 1
H-11-PH1	0	5,095.76	5,282.81	81.05	Zone 4
J-762	0	5,095.74	5,282.80	81.06	Zone 4
J22-1072	0	5,095.73	5,282.81	81.06	Zone 4
J-669	0	5,095.57	5,282.82	81.14	Zone 4
J-1275	0	5,095.37	5,282.76	81.2	Zone 4
J-776	4.15	5,095.41	5,282.80	81.2	Zone 4
H-14-PH1	0	5,095.35	5,282.80	81.22	Zone 4
J22-874	0.83	5,095.38	5,282.85	81.23	Zone 4
J-5	5.13	5,133.16	5,320.69	81.26	Zone 1
J-670	0	5,095.24	5,282.82	81.28	Zone 4
J22-1173	0	5,095.26	5,282.85	81.28	Zone 4
J-486	0	5,095.25	5,282.84	81.28	Zone 4
PH22-FH2	0	5,095.18	5,282.85	81.32	Zone 4
J-248	5.82	5,135.17	5,322.91	81.35	Zone 3
J-774	0	5,095.00	5,282.81	81.37	Zone 4
J22-1087	7.55	5,094.99	5,282.85	81.4	Zone 4
J-431	2.08	5,094.71	5,282.75	81.48	Zone 4
J-766	0	5,094.73	5,282.81	81.49	Zone 4
J-206	4.15	5,094.63	5,282.75	81.51	Zone 4
J-428	0	5,094.44	5,282.75	81.59	Zone 4
J-771	7.89	5,094.49	5,282.81	81.6	Zone 4
J-138	0	5,134.58	5,322.91	81.6	Zone 3
J-777	0	5,094.43	5,282.80	81.62	Zone 4
J-23-1228	3.32	5,094.40	5,282.83	81.65	Zone 4
J-660	3.32	5,094.39	5,282.82	81.65	Zone 4
FH-931	0	5,094.31	5,282.85	81.7	Zone 4
H-12-PH1	0	5,094.20	5,282.81	81.72	Zone 4
J-197	0	5,094.12	5,282.75	81.73	Zone 4
J-456	0	5,093.93	5,282.86	81.86	Zone 4
J-761	0	5,093.67	5,282.81	81.96	Zone 4
H-10-PH1	0	5,093.60	5,282.81	81.99	Zone 4
J-657	4.15	5,093.38	5,282.83	82.09	Zone 4

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ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-775	4.15	5,093.32	5,282.81	82.11	Zone 4
FH-917	0	5,093.28	5,282.83	82.14	Zone 4
J-23-1212	1.66	5,093.24	5,282.90	82.18	Zone 4
J-662	4.15	5,092.99	5,282.85	82.26	Zone 4
J22-1088	2.78	5,092.98	5,282.90	82.29	Zone 4
ERTOWNC	2.98	5,124.46	5,314.46	82.33	Zone 1
J-773	0	5,092.81	5,282.81	82.33	Zone 4
J22-1174	0	5,092.88	5,282.90	82.34	Zone 4
J22-880	1.25	5,092.85	5,282.90	82.35	Zone 4
PH22-FH1	0	5,092.73	5,282.90	82.4	Zone 4
J-23-1210	0	5,092.56	5,282.82	82.44	Zone 4
J-207	4.15	5,092.46	5,282.75	82.45	Zone 4
J-455	0	5,092.48	5,282.86	82.49	Zone 4
2-IRR-11	0	5,092.39	5,282.91	82.55	Zone 4
J-658	6.23	5,092.30	5,282.83	82.56	Zone 4
J-646	10.27	5,122.90	5,313.47	82.57	Zone 1
J-429	0	5,092.08	5,282.75	82.62	Zone 4
J-23-1223	0	5,092.08	5,282.82	82.65	Zone 4
-VILLAGE	4.77	5,092.08	5,282.86	82.66	Zone 4
J-23-1208	2.91	5,092.02	5,282.82	82.67	Zone 4
J-23-1209	0	5,091.90	5,282.82	82.73	Zone 4
AV-3	0	5,091.86	5,282.82	82.74	Zone 4
J-430	0	5,091.77	5,282.75	82.75	Zone 4
J-655	4.15	5,091.87	5,282.86	82.76	Zone 4
WELL8	0	5,092.26	5,283.26	82.76	Zone 4
FH-918	0	5,091.71	5,282.83	82.81	Zone 4
J-466	6.23	5,091.59	5,282.85	82.88	Zone 4
J-656	0	5,091.48	5,282.83	82.92	Zone 4
J-198	5.4	5,091.35	5,282.75	82.93	Zone 4
J-23-1216	1.25	5,091.71	5,283.11	82.94	Zone 4
J-454	4.99	5,091.37	5,282.87	82.98	Zone 4
J-664	3.74	5,091.23	5,282.87	83.03	Zone 4
J-659	0	5,091.19	5,282.84	83.04	Zone 4
J-23-1217	0	5,091.41	5,283.11	83.07	Zone 4
J-1278	0	5,091.08	5,282.86	83.1	Zone 4
AV-2	0	5,091.29	5,283.11	83.12	Zone 4
J-23-1215	0.83	5,091.25	5,283.09	83.12	Zone 4
J-23-1219	0.83	5,091.11	5,283.11	83.19	Zone 4
FH-916	0	5,090.81	5,282.83	83.21	Zone 4
J-23-1222	0	5,090.93	5,283.21	83.31	Zone 4
FH-915	0	5,090.48	5,282.85	83.35	Zone 4
J-23-1220	0	5,090.74	5,283.14	83.37	Zone 4
J-653	6.42	5,121.04	5,313.44	83.37	Zone 1
J-23-1221	0	5,090.70	5,283.18	83.4	Zone 4
J22-1175	0	5,090.43	5,282.96	83.42	Zone 4
J22-1089	0	5,090.28	5,282.95	83.48	Zone 4

GBWC-CSD Existing MDD (Tank 2 On)
Distribution System Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-453	7.06	5,090.15	5,282.88	83.51	Zone 4
J-23-1213	2.49	5,090.32	5,283.06	83.51	Zone 4
J-23-1214	0.42	5,090.30	5,283.07	83.53	Zone 4
J22-882	1.66	5,090.19	5,282.97	83.53	Zone 4
J-654	0	5,090.03	5,282.86	83.55	Zone 4
PH22-FH1(	0	5,090.10	5,282.96	83.57	Zone 4
J-661	3.74	5,089.72	5,282.85	83.68	Zone 4
J-199	5.82	5,089.28	5,282.75	83.83	Zone 4
FH-914	0	5,089.29	5,282.86	83.88	Zone 4
FH-913	0	5,089.01	5,282.87	84	Zone 4
J-452	0	5,088.84	5,282.89	84.08	Zone 4
J-645	0	5,119.46	5,313.52	84.09	Zone 1
J-663	0	5,088.73	5,282.87	84.12	Zone 4
J-673	0	5,088.69	5,282.88	84.15	Zone 4
J-447	5.13	5,118.19	5,312.47	84.19	Zone 1
J-479	0	5,088.24	5,282.94	84.36	Zone 4
J-387	0	5,125.58	5,320.67	84.53	Zone 1
J-324	2.08	5,087.57	5,282.79	84.59	Zone 4
J-449	0	5,087.47	5,282.91	84.69	Zone 4
J-200	5.82	5,087.30	5,282.75	84.69	Zone 4
ELEMSCH(	9.54	5,087.43	5,282.95	84.72	Zone 4
J22-1090	0	5,087.33	5,282.95	84.76	Zone 4
J22-1092	0	5,087.28	5,282.95	84.79	Zone 4
17CSELEM	0	5,087.23	5,282.95	84.81	Zone 4
J-440	2.49	5,086.88	5,282.76	84.88	Zone 4
J-478	3.32	5,086.54	5,282.94	85.1	Zone 4
J-438	5.4	5,086.25	5,282.76	85.15	Zone 4
J-474	3.32	5,086.26	5,282.93	85.22	Zone 4
J-460	5.4	5,086.01	5,282.96	85.34	Zone 4
J-201	5.82	5,085.59	5,282.75	85.43	Zone 4
J-407	2.08	5,085.64	5,282.97	85.5	Zone 4
J-421	0	5,085.43	5,282.96	85.59	Zone 4
J-423	0	5,085.17	5,282.96	85.7	Zone 4
J22-902	4.77	5,085.12	5,282.96	85.72	Zone 4
J-437	0	5,084.87	5,282.76	85.75	Zone 4
J-475	3.74	5,084.82	5,282.95	85.85	Zone 4
J-202	4.99	5,084.62	5,282.75	85.85	Zone 4
J-408	4.99	5,084.71	5,282.97	85.9	Zone 4
J-644	10.91	5,115.23	5,313.56	85.94	Zone 1
J-280	3.32	5,084.28	5,282.76	86	Zone 4
J22-1091	0	5,084.24	5,282.96	86.1	Zone 4
PH22-FH1(	0	5,084.13	5,282.96	86.15	Zone 4
J-328	0	5,113.60	5,312.48	86.17	Zone 1
J-285	4.99	5,083.77	5,282.76	86.22	Zone 4
J-191	8.12	5,121.58	5,320.90	86.37	Zone 1
J-476	3.32	5,083.43	5,282.96	86.46	Zone 4

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-406	0	5,083.43	5,282.97	86.46	Zone 4
J-409	2.49	5,083.24	5,282.97	86.54	Zone 4
J-323	7.68	5,083.06	5,282.80	86.55	Zone 4
J-282	4.57	5,082.97	5,282.76	86.57	Zone 4
J-288	0	5,082.55	5,282.76	86.75	Zone 4
J-290	0	5,120.38	5,320.62	86.76	Zone 1
J-208	4.15	5,082.50	5,282.76	86.77	Zone 4
J-471	6.23	5,082.54	5,282.88	86.81	Zone 4
J-273	2.91	5,082.46	5,282.87	86.84	Zone 4
J-461	6.23	5,082.44	5,282.96	86.89	Zone 4
J-473	4.99	5,082.14	5,282.86	86.97	Zone 4
J-439	0	5,082.00	5,282.76	86.99	Zone 4
J-477	3.32	5,082.15	5,282.96	87.01	Zone 4
J-459	3.74	5,081.68	5,282.96	87.21	Zone 4
J-215	8.92	5,081.17	5,282.75	87.34	Zone 4
J-410	2.91	5,081.37	5,282.98	87.36	Zone 4
J-424	2.78	5,081.15	5,282.96	87.44	Zone 4
J-249	4.57	5,120.99	5,322.89	87.48	Zone 3
J-405	3.32	5,081.06	5,282.97	87.49	Zone 4
J-271	4.57	5,080.96	5,282.89	87.49	Zone 4
J-320	4.77	5,080.78	5,282.86	87.56	Zone 4
J-586	9.54	5,080.67	5,282.77	87.57	Zone 4
J-462	7.48	5,080.60	5,282.97	87.69	Zone 4
J-272	2.91	5,080.44	5,282.87	87.72	Zone 4
J-417	4.99	5,080.47	5,282.98	87.74	Zone 4
J-214	4.15	5,080.16	5,282.75	87.78	Zone 4
J-321	2.49	5,080.22	5,282.86	87.81	Zone 4
J-270	4.57	5,080.13	5,282.88	87.85	Zone 4
J-472	4.57	5,079.93	5,282.87	87.93	Zone 4
J-411	2.91	5,079.96	5,282.98	87.97	Zone 4
J-146	0	5,119.77	5,322.89	88.01	Zone 3
J-404	3.32	5,079.68	5,282.98	88.09	Zone 4
J-343	5.77	5,108.61	5,311.97	88.12	Zone 1
J-420	0	5,079.50	5,282.98	88.17	Zone 4
J-159	7.06	5,108.44	5,311.97	88.19	Zone 1
J-458	4.15	5,079.24	5,282.96	88.27	Zone 4
J-470	0	5,078.94	5,282.88	88.37	Zone 4
J-239	4.15	5,078.79	5,282.75	88.38	Zone 4
J-277	4.99	5,078.88	5,282.87	88.39	Zone 4
J-416	0	5,078.93	5,282.97	88.41	Zone 4
J-418	4.57	5,078.88	5,282.98	88.44	Zone 4
J-262	0	5,078.61	5,282.82	88.49	Zone 4
J-412	2.91	5,078.68	5,282.99	88.53	Zone 4
J-403	2.91	5,078.53	5,282.98	88.59	Zone 4
J-279	3.74	5,078.05	5,282.87	88.75	Zone 4
J-587	4.77	5,078.13	5,282.97	88.76	Zone 4

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ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-388	0	5,115.58	5,320.61	88.84	Zone 1
J-269	4.15	5,077.78	5,282.86	88.86	Zone 4
J-212	3.74	5,077.48	5,282.75	88.94	Zone 4
J-426	4.57	5,077.65	5,282.97	88.97	Zone 4
J-264	4.15	5,077.35	5,282.78	89.01	Zone 4
J-413	2.91	5,077.49	5,283.01	89.05	Zone 4
J-425	1.66	5,077.39	5,282.97	89.08	Zone 4
J-402	3.32	5,077.13	5,282.99	89.2	Zone 4
J-231	4.15	5,076.71	5,282.79	89.29	Zone 4
J-276	5.82	5,076.67	5,282.89	89.35	Zone 4
J-334	0	5,106.04	5,312.48	89.45	Zone 1
J-230	4.15	5,076.30	5,282.78	89.47	Zone 4
J-419	0	5,076.47	5,282.99	89.49	Zone 4
J-226	4.15	5,075.95	5,282.77	89.61	Zone 4
J-414	0	5,076.16	5,283.03	89.64	Zone 4
J-297	0	5,076.00	5,283.00	89.69	Zone 4
J-268	0	5,075.75	5,282.88	89.75	Zone 4
J-401	3.74	5,075.73	5,283.01	89.81	Zone 4
J-295	5.4	5,075.72	5,283.00	89.82	Zone 4
J-278	4.99	5,075.57	5,282.89	89.83	Zone 4
J-436	5.4	5,075.48	5,282.82	89.84	Zone 4
J-415	0	5,075.53	5,282.98	89.89	Zone 4
J-296	4.57	5,075.50	5,283.00	89.91	Zone 4
J-228	4.15	5,075.04	5,282.77	90.01	Zone 4
J-315	5.82	5,075.27	5,283.01	90.02	Zone 4
J-267	0	5,074.88	5,282.89	90.13	Zone 4
J-333	6.42	5,104.15	5,312.48	90.27	Zone 1
J-236	0	5,074.42	5,282.76	90.27	Zone 4
J-314	0	5,074.59	5,283.01	90.31	Zone 4
J-400	3.32	5,074.49	5,283.03	90.36	Zone 4
J-160	5.77	5,103.31	5,311.97	90.42	Zone 1
J-294	3.74	5,074.33	5,283.00	90.42	Zone 4
J-254	2.91	5,074.06	5,282.76	90.43	Zone 4
J-258	0	5,074.07	5,282.79	90.44	Zone 4
J-316	9.75	5,074.16	5,283.01	90.49	Zone 4
J-303	2.08	5,074.07	5,282.95	90.51	Zone 4
J-312	5.82	5,073.95	5,283.03	90.6	Zone 4
J-329	5.13	5,103.30	5,312.48	90.63	Zone 1
J-596	0	5,104.61	5,313.92	90.69	Zone 1
J-25	0	5,104.44	5,314.03	90.81	Zone 1
J-435	0	5,073.19	5,282.78	90.82	Zone 4
J-648	3.21	5,103.71	5,313.44	90.88	Zone 1
J-308	6.65	5,073.29	5,283.06	90.89	Zone 4
J-265	0	5,073.11	5,282.92	90.91	Zone 4
J-298	0	5,073.16	5,283.03	90.94	Zone 4
J-257	0	5,072.91	5,282.82	90.96	Zone 4

GBWC-CSD Existing MDD (Tank 2 On)
Distribution System Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-233	4.77	5,072.79	5,282.79	90.99	Zone 4
J-266	3.74	5,072.93	5,282.95	91	Zone 4
J-260	2.49	5,072.80	5,282.88	91.03	Zone 4
J-229	0	5,072.55	5,282.78	91.09	Zone 4
J-313	4.99	5,072.76	5,283.03	91.11	Zone 4
J-225	0	5,072.30	5,282.77	91.2	Zone 4
J-310	5.82	5,072.34	5,283.06	91.31	Zone 4
J-603	6.42	5,102.70	5,313.43	91.31	Zone 1
J-309	4.15	5,072.32	5,283.06	91.32	Zone 4
J-259	2.49	5,072.01	5,282.93	91.39	Zone 4
J-227	0	5,071.72	5,282.77	91.45	Zone 4
J-27	0	5,101.81	5,313.09	91.55	Zone 1
J-300	3.32	5,071.64	5,283.06	91.61	Zone 4
J-218	0	5,071.17	5,282.77	91.68	Zone 4
J-217	0	5,111.25	5,322.86	91.69	Zone 3
J-311	0	5,071.43	5,283.06	91.7	Zone 4
J-246	0	5,071.29	5,282.93	91.7	Zone 4
J-256	0	5,071.23	5,282.88	91.71	Zone 4
J-263	9.21	5,070.85	5,282.82	91.85	Zone 4
J-647	6.42	5,100.91	5,313.44	92.09	Zone 1
J-307	5.82	5,070.23	5,283.08	92.23	Zone 4
J-319	4.77	5,070.24	5,283.13	92.24	Zone 4
J-261	2.08	5,069.91	5,282.88	92.28	Zone 4
J-302	4.15	5,069.92	5,283.11	92.37	Zone 4
J-446	5.13	5,099.26	5,312.47	92.39	Zone 1
J-318	0	5,069.77	5,283.12	92.44	Zone 4
J-251	8.31	5,069.14	5,283.10	92.71	Zone 4
J-219	3.74	5,068.69	5,282.77	92.76	Zone 4
J-252	4.77	5,069.06	5,283.23	92.8	Zone 4
J-137	4.57	5,108.67	5,322.85	92.8	Zone 3
J-332	0	5,097.85	5,312.48	93	Zone 1
J-595	2.57	5,099.13	5,313.85	93.04	Zone 1
J-340	3.85	5,096.75	5,311.98	93.26	Zone 1
J-250	4.57	5,067.75	5,283.01	93.27	Zone 4
J-223	4.15	5,067.34	5,282.77	93.35	Zone 4
J-247	10.39	5,067.68	5,283.16	93.37	Zone 4
J-238	4.15	5,067.17	5,282.77	93.42	Zone 4
J-330	4.49	5,096.35	5,312.48	93.65	Zone 1
J-220	4.15	5,066.08	5,282.77	93.89	Zone 4
J-221	4.15	5,066.06	5,282.77	93.9	Zone 4
J-606	8.98	5,096.31	5,313.53	94.12	Zone 1
J-445	0	5,095.13	5,312.48	94.18	Zone 1
J-23	3.85	5,102.29	5,319.88	94.28	Zone 1
J-592	8.34	5,095.57	5,313.63	94.48	Zone 1
J-166	5.13	5,093.26	5,311.98	94.77	Zone 1
J-336	5.13	5,090.75	5,312.18	95.95	Zone 1

GBWC-CSD Existing MDD (Tank 2 On)
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ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-136	12.05	5,100.47	5,322.72	96.3	Zone 3
J-608	0	5,064.05	5,286.32	96.31	Zone 4
J-327	7.06	5,089.27	5,312.48	96.71	Zone 1
J-341	0	5,087.54	5,312.18	97.33	Zone 1
J-135	14.13	5,097.88	5,322.81	97.46	Zone 3
J-590	5.77	5,088.31	5,313.58	97.61	Zone 1
J-6	5.13	5,094.60	5,320.61	97.93	Zone 1
J-339	4.49	5,085.67	5,312.08	98.1	Zone 1
J-604	3.85	5,086.47	5,313.47	98.36	Zone 1
J-597	7.7	5,085.96	5,313.43	98.56	Zone 1
J-161	5.77	5,082.45	5,311.99	99.46	Zone 1
J-342	0	5,082.46	5,312.12	99.51	Zone 1
J-427	6.42	5,082.41	5,312.48	99.69	Zone 1
J-589	7.7	5,082.17	5,313.58	100.27	Zone 1
J-289	5.13	5,087.80	5,320.57	100.86	Zone 1
J-331	5.77	5,079.08	5,312.48	101.13	Zone 1
J-594	0	5,079.25	5,313.40	101.46	Zone 1
J-337	9.62	5,077.64	5,312.25	101.66	Zone 1
J-588	5.77	5,077.31	5,313.58	102.37	Zone 1
J-591	0	5,076.59	5,313.55	102.67	Zone 1
J-385	5.12	5,076.49	5,313.47	102.69	Zone 1
J-162	6.42	5,074.91	5,311.97	102.72	Zone 1
J-28	0	5,073.11	5,312.57	103.76	Zone 1
J-305	5.13	5,077.07	5,320.29	105.39	Zone 1
J-150	5.77	5,066.84	5,311.37	105.96	Zone 1
J-151	3.85	5,065.12	5,311.37	106.7	Zone 1
J-795	0	5,044.75	5,291.02	106.71	Zone 4
J-609	0	5,044.63	5,290.92	106.72	Zone 4
J-304	5.13	5,072.38	5,320.29	107.42	Zone 1
J-827	0	5,042.00	5,291.67	108.18	Zone 4
J-1242	0	5,060.56	5,311.92	108.91	Zone 1
J-828	0	5,041.01	5,292.45	108.95	Zone 4
J-158	12.83	5,060.32	5,311.94	109.03	Zone 1
J-826	0	5,040.97	5,292.70	109.07	Zone 4
J-164	8.98	5,059.45	5,311.53	109.23	Zone 1
J-152	6.42	5,058.73	5,311.37	109.47	Zone 1
J-163	8.34	5,058.71	5,311.65	109.6	Zone 1
J-165	13.47	5,057.28	5,311.77	110.27	Zone 1
J-153	5.77	5,056.40	5,311.37	110.48	Zone 1
J-1234	0	5,054.94	5,311.34	111.1	Zone 1
J-154	8.97	5,053.62	5,311.37	111.69	Zone 1
J-155	5.13	5,051.81	5,311.37	112.46	Zone 1
J-36	0	5,051.03	5,311.34	112.79	Zone 1
J-344	0	5,050.64	5,311.23	112.91	Zone 1
J-611	4.49	5,049.06	5,311.55	113.74	Zone 1
J-612	6.83	5,047.26	5,311.55	114.51	Zone 1

GBWC-CSD Existing MDD (Tank 2 On)
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ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-8	5.13	5,054.92	5,320.55	115.1	Zone 1
J-10	5.13	5,052.43	5,319.71	115.81	Zone 1
J-48	9.62	5,042.96	5,312.41	116.76	Zone 1
J-47	7.7	5,043.03	5,312.54	116.77	Zone 1
J-49	9.62	5,042.76	5,312.35	116.81	Zone 1
J-9	5.13	5,049.50	5,320.01	117.21	Zone 1
J-350	0	5,041.15	5,313.42	117.98	Zone 1
J-35	7.06	5,040.53	5,312.90	118.02	Zone 1
J-1252IRF	8.1	5,040.67	5,313.36	118.16	Zone 1
FH-801	0	5,040.29	5,313.42	118.35	Zone 1
J-706	0	5,040.13	5,313.42	118.42	Zone 1
J-14	0	5,039.76	5,313.42	118.58	Zone 1
J-13	5.12	5,039.32	5,313.42	118.77	Zone 1
J-12	0	5,037.80	5,315.60	120.37	Zone 1
J-11	0	5,034.44	5,318.05	122.89	Zone 1

GBWC-CSD Existing PHD (Tank 2 On)
Distribution System Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-242	0	5,253	5,283	12.75	Zone 4
J-243	0	5,266	5,323	24.61	Zone 3
J-33	0	5,085	5,175	39.11	Zone 2
J-127	13.45	5,087	5,179	39.71	Zone 2
J-742	0	5,189	5,282	39.97	Zone 4
J-760	0	5,189	5,282	40.04	Zone 4
J-241	0	5,189	5,282	40.08	Zone 4
H-5-PH18	0	5,189	5,282	40.22	Zone 4
J-743	8	5,188	5,282	40.4	Zone 4
H-9-PH19	0	5,188	5,282	40.67	Zone 4
J-759	0	5,187	5,282	40.85	Zone 4
J-79	35.86	5,083	5,178	41.22	Zone 2
J-87	10.76	5,083	5,178	41.38	Zone 2
J-747	6.54	5,186	5,282	41.41	Zone 4
J-77	11.65	5,082	5,178	41.59	Zone 2
H-8-PH19	0	5,185	5,282	41.8	Zone 4
J-749	0	5,185	5,282	41.98	Zone 4
J-128	15.24	5,082	5,178	41.98	Zone 2
J-78	0	5,081	5,178	42.07	Zone 2
J-129	0	5,081	5,178	42.17	Zone 2
H-7-PH19	0	5,184	5,282	42.22	Zone 4
J-75	7.17	5,081	5,178	42.36	Zone 2
J-746	0	5,184	5,282	42.37	Zone 4
J-126	14.34	5,080	5,178	42.59	Zone 2
J-751	5.82	5,183	5,282	42.68	Zone 4
J-65	9.86	5,080	5,178	42.75	Zone 2
J-80	0	5,079	5,178	42.86	Zone 2
J-88	12.55	5,079	5,178	43.02	Zone 2
J-125	0	5,078	5,178	43.22	Zone 2
J-64	9.86	5,078	5,178	43.25	Zone 2
J-83	10.76	5,077	5,178	43.68	Zone 2
J-130	13.45	5,077	5,178	43.77	Zone 2
J-82	0	5,076	5,178	44.32	Zone 2
J-240	0	5,076	5,178	44.43	Zone 2
J-480	0	5,179	5,282	44.53	Zone 4
J-133	17.93	5,075	5,178	44.63	Zone 2
J-76	4.48	5,075	5,178	44.92	Zone 2
J-84	12.55	5,074	5,178	45.03	Zone 2
J-89	0	5,074	5,178	45.18	Zone 2
J-397	8.72	5,177	5,282	45.24	Zone 4
J-132	0	5,074	5,178	45.38	Zone 2
J-396	10.18	5,177	5,282	45.46	Zone 4
H-6-PH19	0	5,176	5,282	45.61	Zone 4
J-66	12.55	5,073	5,178	45.69	Zone 2
J-131	17.93	5,073	5,178	45.79	Zone 2
SELEMSC	8.96	5,073	5,178	45.8	Zone 2

GBWC-CSD Existing PHD (Tank 2 On)
Distribution System Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-81	17.93	5,073	5,178	45.83	Zone 2
J-90	10.76	5,072	5,178	45.87	Zone 2
J-134	0	5,072	5,178	45.95	Zone 2
J-753	7.27	5,175	5,282	45.98	Zone 4
J-98	0	5,072	5,178	46.15	Zone 2
J-93	0	5,072	5,178	46.19	Zone 2
J-85	11.65	5,072	5,178	46.24	Zone 2
J-91	0	5,071	5,178	46.35	Zone 2
J-124	0	5,072	5,179	46.36	Zone 2
J-44	17.03	5,071	5,179	46.74	Zone 2
J-355	0	5,071	5,179	46.75	Zone 2
-PH19IRR	0	5,174	5,282	46.8	Zone 4
J-92	13.45	5,070	5,178	46.83	Zone 2
J-398	8.34	5,173	5,282	46.84	Zone 4
H-5-PH19	0	5,173	5,282	46.87	Zone 4
J-99	0	5,070	5,178	46.94	Zone 2
J-752	7.27	5,173	5,282	47.12	Zone 4
J-120	17.93	5,069	5,179	47.29	Zone 2
J-40	17.03	5,069	5,178	47.31	Zone 2
J-45	14.34	5,069	5,179	47.41	Zone 2
J-115	11.65	5,068	5,179	47.8	Zone 2
J-95	17.03	5,068	5,178	47.9	Zone 2
J-86	0	5,068	5,178	47.94	Zone 2
J-234	5.09	5,211	5,322	48.16	Zone 3
J-106	15.24	5,067	5,178	48.17	Zone 2
J-121	0	5,067	5,179	48.3	Zone 2
J-109	8.96	5,067	5,178	48.39	Zone 2
J-96	14.34	5,067	5,178	48.43	Zone 2
J-62	8.96	5,066	5,178	48.59	Zone 2
J-105	0	5,066	5,178	48.59	Zone 2
J-67	14.34	5,066	5,178	48.62	Zone 2
J-108	12.55	5,066	5,178	48.72	Zone 2
J-119	8.96	5,066	5,178	48.78	Zone 2
J-1248	0	5,066	5,178	48.91	Zone 2
J-118	9.86	5,066	5,178	48.92	Zone 2
J-1	0	5,206	5,319	49.04	Zone 1
J-104	11.65	5,065	5,178	49.05	Zone 2
J-70	6.28	5,065	5,179	49.11	Zone 2
J-103	9.86	5,065	5,178	49.11	Zone 2
WELL2	0	5,065	5,178	49.16	Zone 2
J-114	14.34	5,065	5,179	49.18	Zone 2
J-123	14.34	5,065	5,178	49.29	Zone 2
J-110	22.41	5,065	5,179	49.36	Zone 2
J-97	0	5,064	5,178	49.48	Zone 2
J-39	14.34	5,064	5,178	49.56	Zone 2
J-117	0	5,064	5,178	49.77	Zone 2

GBWC-CSD Existing PHD (Tank 2 On)
Distribution System Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Zone
J-38	16.14	5,063	5,178	49.84	Zone 2
J-122	12.55	5,063	5,178	49.89	Zone 2
J-116	12.55	5,063	5,179	50.05	Zone 2
J-111	16.14	5,063	5,179	50.3	Zone 2
H-4-PH19	0	5,165	5,281	50.33	Zone 4
J-2	0	5,202	5,318	50.34	Zone 1
J-275	12.55	5,062	5,179	50.45	Zone 2
J-481	0	5,165	5,281	50.55	Zone 4
J-755	7.27	5,165	5,281	50.57	Zone 4
H-3-PH19	0	5,164	5,282	51.11	Zone 4
J-235	0	5,204	5,322	51.15	Zone 3
J-73	0	5,060	5,178	51.2	Zone 2
J-744	0	5,163	5,282	51.47	Zone 4
J-756	7.27	5,162	5,282	51.69	Zone 4
J-100	11.65	5,060	5,179	51.73	Zone 2
J-101	0	5,059	5,179	51.84	Zone 2
J-61	16.14	5,059	5,178	51.84	Zone 2
J-237	5.82	5,202	5,322	51.86	Zone 3
J-74	15.24	5,058	5,178	52.39	Zone 2
J-72	19.72	5,057	5,178	52.59	Zone 2
J-17	0	5,057	5,179	52.7	Zone 2
J-60	14.34	5,057	5,178	52.76	Zone 2
J-395	7.27	5,159	5,281	52.89	Zone 4
J-112	18.83	5,057	5,179	52.97	Zone 2
J-185	0	5,199	5,322	53.12	Zone 3
J-71	0	5,056	5,179	53.17	Zone 2
J-102	17.93	5,056	5,179	53.25	Zone 2
J-274	8.96	5,055	5,179	53.35	Zone 2
J-394	10.18	5,158	5,281	53.6	Zone 4
J-392	10.18	5,158	5,281	53.62	Zone 4
J-59	8.96	5,057	5,180	53.66	Zone 2
J-157	0	5,054	5,178	53.83	Zone 2
WELL7	0	5,200	5,325	53.95	Zone 1
J-43	8.96	5,055	5,180	54.01	Zone 2
J-113	3.59	5,054	5,179	54.09	Zone 2
J-57	12.55	5,053	5,180	54.95	Zone 2
J-69	0	5,051	5,178	55.12	Zone 2
J-399	0	5,154	5,281	55.26	Zone 4
J-192	5.22	5,189	5,317	55.41	Zone 1
J-68	12.55	5,050	5,178	55.51	Zone 2
H-2-PH19	0	5,153	5,281	55.6	Zone 4
J-16	0	5,050	5,179	55.66	Zone 2
J-758	7.27	5,152	5,281	55.94	Zone 4
J-37	0	5,052	5,181	56.04	Zone 2
J-58	0	5,051	5,180	56.12	Zone 2
-PH19IRR	0	5,151	5,281	56.57	Zone 4