Universal Aggregates LLC

Birchwood Manufactured Aggregate Project
King George County, Virginia

Topical Report No. 1

April 2003

Work Performed Under
DOE Cooperative Agreement No. DE-FC26-02NT4421

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"Commercial Demonstration of the Manufactured Aggregate Processing Technology Utilizing Spray Dryer Ash"

Topical Report No. 1

Reporting Period: 11/14/2002 through 3/31/2003

DOE Award No.: DE-FC26-02NT41421

Date: April, 2003

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Glossary

ASTM	American Standard for Testing Materials
AWWA	American Water Works Association
BMAP	Birchwood Manufactured Aggregate Project
BPF	Birchwood Power Facility
BPP	Birchwood Power Partners
CBPA	Chesapeake Bay Preservation Act
CCT	Clean Coal Technologies
DEQ	Virginia Department of Environmental Quality
DOE	US Department of Energy
E&S	Erosion and Sediment Plan
FGD	Flue Gas Desulfurization
º F	Degrees Fahrenheit
GPD	Gallons Per Day
GPM	Gallons Per Minute
H_2O	Water
I/O	Input / Output
KV	Kilovolts
LB/FT^3	Pounds per Cubic Foot
LB/HR	Pounds per Hour
OIT	Operator Interface Terminal
PLC	Programmable Logic Controller
PPII	Power Plant Improvement Initiative Program
RPA	Resource Protection Area
SCFM	Standard Cubic Feet Per Minute
SDA	Spray Dryer Ash
SIC	Standard Industrial Code
UA	Universal Aggregates
VDH	Virginia Department of Health
VPDES	Virginia Pollutant Discharge Elimination System
WQV	Water Quality Volume

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Abstract

Universal Aggregates, LLC proposes to design, construct and operate a lightweight aggregate manufacturing plant at the Birchwood Power Facility in King George, Virginia. The installation and start-up expenses for the Birchwood Aggregate Facility are $19.5 million. The DOE share is $7.2 million (37%) and the Universal Aggregates share is $12.3 (63%). The project team consists of CONSOL Energy Inc., P.J. Dick, Inc., SynAggs, LLC, and Universal Aggregates, LLC. The Birchwood Facility will transform 115,000 tons per year of spray dryer by-products that are currently being disposed of in an off-site landfill into 167,000 tons of a useful product, lightweight aggregates that can be used to manufacture lightweight aggregates that can be used to manufacture lightweight and medium weight masonry blocks.

In addition to the environmental benefits, the Birchwood Facility will create eight (8) manufacturing jobs plus additional employment in the local trucking industry to deliver the aggregate to customers or reagents to the facility. A successful demonstration would lead to additional lightweight aggregate manufacturing facilities in the United States. There are currently twenty-one (21) spray dryer facilities operating in the United States that produce an adequate amount of spray dryer by-product to economically justify the installation of a lightweight aggregate manufacturing facility. Industry sources believe that as additional scrubbing is required, dry FGD technologies will be the technology of choice. Letters from potential lightweight aggregate customers indicate that there is a market for the product once the commercialization barriers are eliminated by this demonstration project.

1.0 Introduction

This Public Design Report describes the Universal Aggregates LLC (UA), Birchwood Manufactured Aggregate Project (BMAP) located at the Birchwood Power Partners (BPP) LP, Birchwood Power Facility in King George County, Virginia. The Manufactured Aggregate Facility will enable UA to demonstrate its process that converts coal combustion by-products from power plant scrubbers, into lightweight aggregate for masonry blocks or concrete. Most of this waste material currently is disposed of in landfills. The design of this facility will utilize 115,000 tons per year of spray dryer ash (SDA), a coal combustion by-product from the power facility, to produce 167,000 tons of aggregate. The total market for construction aggregate is about two billion tons annually in the United States.

UA (a joint venture between CONSOL Energy, Inc. and SynAggs, LLC) has been awarded a cost-sharing Co-operative Agreement (DE-FC26-02NT4421), from the U. S. Department of Energy (DOE), through the Power Plant Improvement Initiative Program (PPII) to construct and operate a manufacturing aggregate facility utilizing patented technology developed by CONSOL Energy, Inc. This award will provide a DOE cost share of approximately $7.2 Million of a projected $19.5 Million total project cost.

Construction of the new facility is scheduled to begin in March of 2003 with aggregate production in January of 2004 and project completion with the final report issued by May of 2005.

2.0 Program Background

The PPII was established on October 11, 2000 as a follow-on to the DOE's successful Clean Coal Technologies (CCT) programs of the 1980's and 1990's, for the purpose of demonstrating, on a commercial scale, the advanced coal-based technologies applicable to both existing and new power plants. On September 26, 2001 the UA, BMAP was selected for negotiations leading to the award of a cooperative agreement in November of 2002.

UA was formed as a joint venture on January 1, 2000 between CONSOL Energy, Inc. and SynAggs LLC, both Pittsburgh, PA based companies. CONSOL Energy is the largest bituminous coal producer east of the Mississippi River and the largest exporter of coal in the United States. SynAggs LLC ownership brings to the joint venture their expertise in heavy highway construction, building trade construction and construction management, including material handling and innovative beneficial ash utilization.

Conversion of SDA solids to manufactured aggregates has been demonstrated by Universal Aggregates in bench-scale batch, semi-continuous operations, and continuous fully integrated pilot production runs. Since 1995 Universal Aggregates has produced manufactured aggregates from the by-products of several spray dryers including the Birchwood Power Facility.

In June 2001, 2.8 tons of cured extruded products were produced with bench-scale equipment from Birchwood Power Plant station SDA by-product in semi-continuous production runs. The cured extruded products were screened and crushed for aggregate production. The crushed aggregate was used for a block production demonstration at the Ernest Meier Block Production Plant in Bladensburg, Maryland. The properties of the blocks made from the manufactured lightweight aggregate met the ASTM specification for medium-weight concrete masonry units.

2.0 Program Background (Cont.)

In August 2001, 27 tons of cured extruded products were produced in the continuous 500 lb./hr. pilot plant from the Birchwood Power Plant Station SDA by-product. The crushed aggregate produced met the ASTM C331 lightweight aggregate specification. The crushed aggregates produced with different mix designs were used for a block production demonstration at the Ernest Meier Block Production Plant in Bladensburg, Maryland. The properties of blocks indicate that manufactured aggregates made from Birchwood spray dryer ash can be used as lightweight aggregates to replace commercial lightweight aggregates for medium weight block production in the market area.

In Maryland and Virginia, most of the lightweight aggregate is used to produce medium-weight concrete masonry units for use in construction. The target market area of manufactured aggregate produced from the Birchwood Power Facility will be in Maryland and Virginia.

3.0 Location

The Universal Aggregates, LLC manufactured aggregate facility will be located on approximately five acres north of the main Birchwood Power Facility. The Birchwood Power Facility sits on approximately 345 acres adjacent to Route 665 in the northwest section of King George County. Drawing 001-C-001 shows the Universal Aggregates lease area. Drawing 001-GA-002 shows the general site location of the Birchwood Manufactured Aggregate Plant.

4.0 Technology Overview

The Universal Aggregates, LLC process will convert Flue Gas Desulfurization (FGD) scrubber by-product materials into manufactured construction aggregates. The process tailors aggregate properties to specific applications, such as, aggregates for manufacture of lightweight concrete blocks, structural lightweight concrete, or aggregates for use in asphalt road paving. The process consists of mixing, extrusion, and moderate-temperature curing. It takes advantage of the cementitious properties of the extruded products for strength development. Optimizing the water addition and time during the mixing step in addition to identifying the proper conditions for curing are important factors for the production of aggregates with high strength and other desirable properties for use in construction. A proprietary curing method has been developed to optimize aggregate strength. The Universal Aggregates process represents an advance in the state of the art, and as a result was granted two U.S. patents (others are pending).

Spray dryer ash, water, and other recycle material are fed to a pug mixer where the materials are blended together. This mixing produces a uniformly blended loose, moist, granular material that feeds directly to an extruder. The extruder has an auger that subjects the material to further mixing and then forces the material through a die (metal plate with one or more drilled or specially shaped holes). A cutter device located at the extruder outlet limits the length of the extruded pellets to manageable sizes.

Wet, "green" pellets from the extruder are soft and must be transferred to a curing vessel for hardening. A belt conveyor transfers the short, soft, wet extrusions ("green" pellets) to a large slow turning tumbler where the pellets are tumbled with embedding material. The green pellets and embedding material discharge from the tumbler to a belt conveyor that feeds the curing vessel. The purpose of the embedding material is to coat the green pellets with dry material and to fill in the void spaces between the pellets. This cushions the pellets as they move through the curing vessel and prevents agglomeration of the curing vessel charge by minimizing contact between green pellets.

4.0 Technology Overview (Cont.)

The curing vessel is a specially designed retention bin that provides for flow of solids without channeling or hang-up. To minimize system heat losses, the vessel is also heat traced and insulated. The heat tracing is not used to raise the solids temperature, but provide enough heat to insure that the curing vessel operates adiabatically. The vessel is operated at a slight vacuum. The small amount of vent gas from the curing vessel is directed through a scrubber to remove particulate matter.

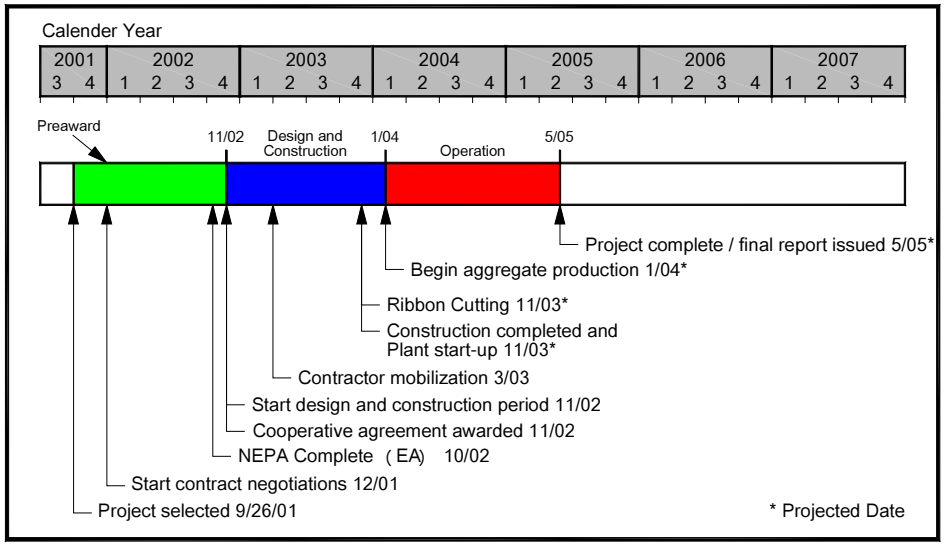
The pellets cure or harden as they slowly move down through the vessel. The hardening is a result of cementitious and/or pozzolanic reactions occurring within the green pellets. The formation of ettringite, a mineral with the formula $Ca_6A1_2(SO_4)_3(OH)_{12}\cdot 26H_2O$ or $Ca_6A1_2(SO_3)_3(OH)_{12}\cdot 26H_2O$, is thought to be responsible for much of the pellet hardening. Spray dryer ash contains the essential components for the formation of ettringite. After curing, the hardened pellets (manufactured aggregates) are screened to remove fines and are either stockpiled or sent to crushing operations.

Screened pellets are fed to the crushing section. The crusher reduces the size of the cured pellets to a size suitable for use by concrete block plants. The crushed material feeds a screen that splits the crushed aggregate into three streams: oversize material, product, and fines. The oversize material feeds back into the system through a bucket elevator to the crusher and is re-cycled to extinction. The middle screen product, which is predominately 3/8" x 100 mesh, is sent to a stock pile via a belt conveyor/stacker. The fines go to an inertial separator that uses air classification to efficiently strip - 100 mesh fines from the coarser fines. The -100 mesh fines from the inertial separator are collected in the baghouse and are recycled back to the process. In setting up the crushing system, efforts are made to minimize the production of fines and the need for fines recycle. The process Product Flow Diagram is shown on Drawing 001-R-001. See Appendix "A" for the mechanical equipment list.

5.0 Project Schedule

The following presents the major milestones of the proposed construction schedule:

Ribbon cutting ceremony mid November, 2003.
Contractor mobilization mid March, 2003.
Construction completed mid November, 2003.
Plant start-up November, 2003.
Production January, 2004.



6.0 Facility Description

6.1 General

The site layout of the Birchwood Manufactured Aggregate Plant is shown on Drawing 001-GA-002. The aggregate plant will be located north of the boiler house on approximately three (3) acres of the five (5)-acre parcel. An elevated pipe bridge, over railroad tracks, will be installed to allow pneumatic transfer of ash from the existing spray dryer ash silo to the aggregate plant. A new truck scale for weighing incoming shipments and outgoing product shipments will be located on the south side near the aggregate plant entrance. The main plant requires approximately 0.75 acres. This includes the area for:

- Personal Parking
- A 48 Ft. x 72 Ft. two (2) story building housing most of the process equipment including:
  - Daybins and Silo for Admixtures
  - Weight Feeders
  - Solid Mixers
  - Extruder
  - Crushing and Screening Operations
  - Dust Collection System
- Six (6) sided steel, Curing Vessel Structure
- Modular office for office, lab and locker room
- Radial stacker storage of finished aggregate product
- Truck Scale

6.2 Site Plan

The overall Birchwood Site survey is shown on Drawing IC1007. The General Site Location Plan for the UA Facility is shown on Drawing 001-GA-001. This drawing shows the location of the Universal Aggregate (UA) plant on the BPF property. The UA plant will occupy approximately 5-acres north of the BPF baghouse between the BPF rail loop and the RF&P Rail Line. Access to the UA Plant will be via the BPF entrance road on Route 665.

The detailed layout of the UA plant is shown on Drawing 001-GA-002. This drawing depicts the ingress and egress to the plant, the layout of the plant components and the position of the plant with respect to the BPF facility, the RF&P Rail Line and the wetland and Chesapeake Bay Preservation Areas to the north and northeast. The road crossing of the BPF rail loop lines will be improved to facilitate the UA Plant traffic.

6.3 Site Security

During both the construction and operation phases of the Universal Aggregates, LLC (UA) facility the entire site area will be enclosed by security fencing. The only access to the UA plant will be through the Birchwood Power Facility (BPF) property. BPF provides twenty-four hour surveillance of the facility. All gates providing ingress or egress to the facility will either be manned or locked to prohibit unauthorized access to the site.

6.0 Facility Description (Cont.)

6.4 Erosion and Sediment Control

The Erosion and Sediment (E&S) control measures are separated into Construction and Permanent plans. All vegetative and structural E&S control measures will be constructed and maintained to meet the standards and specifications of the Virginia Erosion and Sediment Control Handbook. A detailed E&S plan has been prepared in accordance with the King George County Site Plan Regulations and Erosion and Sediment Control Ordinance. The detailed site plan was approved by the King George County Planning commission on December 12, 2002.

6.5 Construction

The construction E&S program will be implemented in two phases. The first phase includes measures put in place before the majority of the site is cleared or disturbed. The second phase provide for enhancement and maintenance of the E&S controls through the end of construction, stabilization of the disturbed areas and completion of the final facility stormwater management components. Typical components of the construction E&S plan are presented below:

6.5.1 Phase I

6.5.1.1 Construction entrance installed at the limits of construction to a hard surface road.
6.5.1.2 Placement of perimeter controls, to include silt fence, sediment traps, diversion berms, tree protection/limits of work, stockpile areas identified with perimeter controls placed.
6.5.1.3 Clearing and grubbing of vegetation and topsoil.
6.5.1.4 Stockpiling.
6.5.1.5 Rough grading of site
6.5.1.6 Temporary seeding of stockpiles and denuded areas where work not scheduled within seven (7) days.

6.5.2 Phase II

6.5.2.1 Continued maintenance of E&S measures.
6.5.2.2 Continue with fine grading.
6.5.2.3 Placement of underground utilities (trenching and backfill work).
6.5.2.4 Surface prep and stabilizations work such as paving.
6.5.2.5 Placement of temporary E&S controls for inlets and piping, and outlet controls.
6.5.2.6 Final surface stabilization.
6.5.2.7 Clean-up/restoration work.

An integral part of the clean-up efforts will be maintenance of the controls, removal of those controls where stabilization has been achieved, warranty work, installation of permanent measures and final removal of temporary measures.

The construction process will be under the oversight of the County Inspectors in charge of E&S measures. A performance bond or other guarantee will be furnished to the County for all required improvements to insure compliance with the plan as approved. The bond will not be released until the project has been completed and site has been determined as stabilized by final inspection.

6.0 Facility Description (Cont.)

6.6 Chesapeake Bay Act Compliance and Stormwater Management

This project will be completed in accordance with the Virginia Storm Water Management Regulations and the Article 8, Chesapeake Bay Preservation Act (CBPA) Overlay District of the King George County Zoning Ordinance. In addition, the facility is subject to the Virginia Department of Environmental Quality (DEQ) General Virginia Pollutant Discharge Elimination System (VPDES) Permit regulations for Discharges of Storm Water Associated With Industrial Activity (9 VAC 25-151-10).

Best Management Practices consistent with King George County and the Commonwealth of Virginia requirements will be incorporated into the site plan. Where possible, non-structural measures such as vegetative buffers will be used. Structural measures will be focused in areas where developed improvements are to be built.

The plant will be built outside the 100-foot vegetated buffer Resource Protection Area (RPA) that has been mapped adjacent to and landward of nontidal wetlands along a small tributary of Birchwood Run northeast of the property. Work in the RPA will be limited to minor channelization or pipe work to achieve adequate outfall criteria.

Final construction plans will detail the work as proposed. Construction of the facility will only require disturbance of approximately 3-acres of grassland that had been previously disturbed during construction of the BPF. No trees will be cut for the UA plant. BMPs will be designed to address first flush flows defined as the first half inch of rainfall. For water runoff rate control the design standard will be to control the 2 and 10-year storms to pre-development runoff rates.

The entire project area drains toward the RPA and the railroad track surface drainage system, located north and northeast of the proposed project. Material stockpile areas will be located in areas where drainage can be controlled through catch basins and vegetative buffer areas to filter out suspended solids. The overflow/discharge from these areas will be processed over level spreaders to reduce the concentration of flow and associated velocities before entering the RPA areas.

Use of catch basin structures will facilitate the collection of the aggregate product, which tends to be a more uniform graded material consistent with a coarse grained sand material. The drainage area flowing from this site is relatively small.

6.7 Dust Control During Construction and Operation

There should be minimal dust generation during construction and operation of the plant. The plant will occupy approximately 3-acres of land immediately north of the site rail loop and boiler house. This area of the site had been previously disturbed during construction of the BPF. This land area is almost flat and vegetated with various grasses.

Very little earthwork will be required to construct the plant thereby minimizing dust generation. As necessary, dust control will be enhanced during construction by watering of the construction area with either a water truck or manually with a hose.

6.0 Facility Description (Cont.)

6.7 Dust Control During Construction and Operation (Cont.)

During operation dust control will be accomplished by a variety of methods. The spray dryer ash from the BPF will be conveyed pneumatically in completely enclosed systems to various size storage bin hoppers. Each bin will be equipped with a fabric filter that allows collected material to discharge back to the bin hopper. Additional fabric filters are provided at other material transfer points in the process. Emissions from the curing vessel will be controlled by a venturi wet scrubber and cyclone. Emissions from the crushing and screening operation will be controlled by a fabric filter baghouse.

The final aggregate product will be stored in stockpiles on an asphalt storage pad. The aggregate will be loaded onto trucks by a front-end loader or possibly into to a hopper/conveyor system for loading rail cars. Fugitive dust emission from the aggregate will be minimal due to the high moisture and low silt fraction content of the aggregate. A water spray bar at the end of the stockpile conveyor will also be used, as necessary, to control emissions. Additional water may be applied to the storage pad and aggregate if conditions warrant.

6.8 Electrical Distribution

Electrical distribution to the new Aggregate Plant will be via the utility company (Dominion Virginia Power) furnished and installed 35KV/480V 2000KVA transformer located outside the process building.

The primary (35KV) feeder to this 2000KVA transformer shall be furnished and installed by the utility company (Dominion Virginia Power) from a utility owned 35KV source located within the Birchwood Power Facility via an overhead (pole line) system.

The secondary service lateral (480VAC) from the transformer to a 480VAC low voltage switchgear line-up shall be installed via an embedded and exposed conduit system.

The 480VAC will further be distributed throughout the Aggregate Plant via power distribution panels, motor control centers, separately mounted starters and the like.

6.9 Level I Control System Overview

A Programmable Logic Controller (PLC) and a Multiple Feeder Controller shall perform plant process and supervisory control.

The PLC enclosure shall be located in the Electronic Room on the Operating Floor of the Aggregate Plant. The enclosure shall house the PLC processor, I/O Racks, power supplies, fuses and terminal blocks to accommodate field wiring from field instruments, valves, motor starters, and operator panels. The PLC shall perform digital and analog control through programmed algorithms. The PLC shall communicate with an Operator Interface Panel and the Multiple Feeder Controller via fieldbus and hardwired I/O. The Operator Interface Terminal (OIT) will be located in its own enclosure in a pulpit on the Operating Floor. The OIT will provide system monitoring, alarm and control capabilities through a touchscreen display.

6.0 Facility Description (Cont.)

6.9 Level I Control System Overview (Cont.)

The Multiple Feeder Controller shall be located in the Electronic Room on the Operating Floor of the Aggregate Plant. The Feeder Controller enclosure shall house the Feeder Processor, I/O Racks, power supplies, fusing, terminal blocks, power switches and terminal blocks for field wiring. The Feeder Controller shall supply Gravimetric and Volumetric control for up to eight (8) systems for continuous batch dump operation. The Controller shall communicate with a dedicated Touchscreen remotely mounted for operator interfacing for feeder levels, alarms, metering, motor operation and real time feed rates. Also, a remote printer is provided for reporting and logging.

The following are Level I controlled systems:

Existing Spray Dryer Ash (SDA) Silo F-110

SDA Day Bin F-120

Screw Conveyor L-120A

Screw Conveyor L-120B

SDA Weigh Feeder K-120A

SDA Weigh Feeder K-120B

Additive No. 1 Silo F-210

Screw Conveyor L-210

Additive No. 1 Weigh Feeder K-210

Additive No. 1 Pulverizer P-210

Recycle Daybin F-250

Screw Conveyor L-250B

Recycle Weigh Feeder K-250

Additive No. 2 Heated Storage Tank F-220

Additive No. 2 Feed System

Screw Conveyor L-310A

Screw Conveyor L-320

Pug Mill PM-310

6.0 Facility Description (Cont.)

6.9 Level I Control System Overview (Cont.)

The following are Level I controlled systems: (Cont.)

Vacuum Pug Sealer PS-310

Extruder E-310

Aggregate Cutter AC-310

Reversing Belt Conveyor L-310B

Tumbler T-320

Belt Conveyor L-410A

Curing Vessel C410

Wet Scrubber B-420

Reversing Belt Conveyor L-410F

Belt Conveyor L-510A

Primary Screen G-510A

Horizontal Impactor HI-510

Secondary Screen G-510B

Belt Conveyor L-510C

Belt Conveyor L-510D

Belt Conveyor L-130

Bucket Elevator BE-130

Classifier Baghouse B-520

Screw Conveyor L-250A

Bucket Elevator BE-250

Screw Conveyor L-250C

Hydraulic Power Pack HY-130

Utility Water

6.0 Facility Description (Cont.)

6.10 Buildings

6.10.1 The Process Building

The Process Building is a three (3) story, three (3) bay 79' by four (4) bay 72' structure which houses the Pug Mill, Pug Sealer, Extruder, Tumbler, Classifier, Ash Storage, Pulverizer, Horizontal Impactor, Additive Silos, Belt, Screw and Bucket Conveyors, Additive Feeders, Hydraulic System, Air Compressor, and Baghouse along with all their auxiliary components. The Process Building also has its own electrical equipment room and a conditioned space for a PLC processor.

6.10.2 The Curing Vessel Structure

The Curing Vessel Structure is a six (6) sided steel, building structure with roof, 96'-6" high.

This structure houses the Curing Vessel, Wet Scrubber, Distribution Hopper, Conveyor, along with all their auxiliary components.

The Curing Vessel structure also contains connecting conveyors to the Main Building.

6.11 Site Water, Wastewater and Waste Management Plan

This plan provides for the management of the site water, wastewater and waste for the UA plant in accordance with applicable state and local regulations and good industrial site management practices.

6.11.1 Waste Management

The UA plant will generate very little solid and no process waste. The process is set up so that all off-specification or potential process waste materials including baghouse and bin vent filter particulates are re-circulated back into the process. Therefore, there will be no production of process waste materials. The plant will generate some solid waste from the plant office and from normal and routine equipment operation and maintenance. UA will contract with a commercial waste hauler to supply a 1 or 3 cubic yard container for waste collection and regular pickup and offsite disposal. To the extent practical UA will attempt to recycle solid waste with local vendors.

No hazardous waste will be generated at the site.

The facility will have one-500 gallon aboveground storage tank for storage of diesel fuel for the front-end loader. The tank will be enclosed within a leak containment vessel.

6.0 Facility Description (Cont.)

6.11 Site Water, Wastewater and Waste Management Plan (Cont.)

6.11.2 Potable Water

A Class IIIB Private Well will supply potable water for the plant. The well will be designed and construction in accordance with the Virginia Department of Health (VDH) Private Well Regulations 12 VAC 5-630.

There will be nine (9) employees working at the plant. Potable water will only be used for drinking and sanitary purposes. There will be one restroom, a small laboratory, a wash sink and an emergency shower at the plant. Consumptive water use is conservatively estimated to be 20 gallons per day (gpd) per employee for a total daily usage of 180 gpd. The plant is exempt from the Virginia Water Works Regulations 12 VAC 5-590 as there will be only nine (9) employees. It is anticipated that the well will be completed in the upper part of the Patuxent Formation or Potomac Aquifer that underlies the site at a depth of approximately 300 to 350 feet. The well will be designed and installed in accordance with the American Water Works Association Standard for Water Wells AWWA A100-97. The well will be equipped with a pitless adapter and a ¾ or 1 horsepower submersible well pump. Flow from the well will be piped to a pressure tank located in the plant.

Following completion and development of the well the system will be disinfected. Samples will be collected and analyzed for coliform bacteria. In addition, samples will be collected and analyzed for the drinking water constituents listed in 12 VAC 5-590. In the event the well water is unsuitable for drinking due to aesthetic reasons bottled water will be used for drinking purposes.

There will be no adverse impacts to offsite private wells due to the distance from the proposed plant well to the nearest private well and the low water withdrawal.

6.11.3 Process Water

Process water will be obtained from the BPF and will be 100 percent consumed or recycled in the plant processes. Approximately 40 to 60 gallons per minute will be required for makeup process water. Most of this water ends up in the final aggregate product. See Drawing 001-R-003 for the Process Water flow diagram.

6.0 Facility Description (Cont.)

6.11 Site Water, Wastewater and Waste Management Plan (Cont.)

6.11.4 Sanitary Wastewater

Universal Aggregates, LLC (UA) proposes to dispose of sanitary wastewater onsite in accordance with the Virginia Department of Health (VDH) Sewage Handling and Disposal Regulations 12 VAC 5-610. The construction and operation of the Universal Aggregates (UA) plant will require amending the existing Birchwood Power Facility (BPF) King George Health Department Permit (WS-93-155) and modifying the construction of the effluent piping system to the drainfield. Amendment of the BPF permit and modification of the system is required for the following reasons:

- The UA plant will be constructed on the reserve drainfield area for the BPF. Therefore, a new reserve area was located, characterized and approved by the Health Department.

- The UA sewage system will include a 1,000-gallon septic tank and a1,000-gallon sewage pump station. Effluent from the tank will be pumped into the existing BPF wastewater disposal system.

6.11.5 As presented below the existing BPF drainfield has significant excess capacity and can easily accommodate the expected UA sanitary effluent. A new reserve area can be established at the drainfield permitted and constructed for the effluent for the construction trailers and workers that were onsite during construction of the BPF.

6.11.6 The following presents a brief overview of the existing BPF sewage disposal system and the expected sewage flows from the UA plant.

Birchwood Power Facility Sanitary Wastewater System

System Design Parameters		
System	-	Type III Enhanced Flow Distribution System
Soil Texture Class	-	Type II
Percolation Rate	-	45 minutes/inch
Design Capacity	-	3000 gallons per day based on 3 shifts of 25 employees per shift and 40 gallons per day per employee shift
Trench Bottom Area	-	6,870 square feet based on 229 sq. ft./100 gallons
Enhanced Flow Design	-	Two Gorman Rupp Sewage Lift Station Pumps rated at 166 gallons per minute with 34-ft. total dynamic head.
Percolation Lines	-	24 lines, 100 feet long
Installation Depth	-	48 inches
Trench Width	-	3 feet
Trench Spacing	-	9 feet

6.0 Facility Description (Cont.)

6.11 Site Water, Wastewater and Waste Management Plan (Cont.)

6.11.7 Septic Tank Effluent

The Gorman Rupp sewage pumps are constructed in parallel above a 6-ft. diameter, 12 ft. deep wet well with high and low water level controls and alarms. A transducer provides water level data in the wet well. Each pump is equipped with an hour meter.

The Birchwood Power Plant began commercial operation in November 1996. According to plant records the sewage pumps were tested on August 8, 1996. It is assumed that the septic and drainfield systems were actively used starting on the August 8, 1996 test date.

As mentioned above the pumps have a rated capacity of 166 gpm. A short-term test was run on March 18, 2002. The test results indicate a pump rate of 148 gpm over the first two minutes of the test. The pump rate decreased to 139 gpm over the entire 3.5 minutes of the test as the water level in the wet well dropped.

Numerous readings of the hour meters on the sewage pumps have been collected over the last two months. The total effluent volume and average daily pumping rate for different pump rates over the time period from March 5 to May 10, 2002 are shown on Table 1 below.

As mentioned above the sewage system was conservatively designed for 3000 gpd. The design capacity was based on 75 employees with 25 people working three shifts per day and an average sewage flow of 40 gallons per employee shift. The Virginia Department of Health (VDH) 12 VAC 5-610 recommends a design sewage flow of 15 to 35 gallons per employee per 8-hour shift for factories and office buildings. The regulations also recommend a safety factor of 1.4 for commercial mass drainfields.

Currently BPF employees 58 people working various shifts and shift durations. Reducing the various shifts to 8-hour shift equivalents indicates that 41 employees work the day shift Monday through Friday, 7.5 people work the combined evening and night shift and 7.5 people work the two shifts on weekends. Holidays, vacations and other time off are not accounted for. Averaging out the work hours to 8 hours over the entire week indicates there are an average of 39 8-hour shifts per day.

As shown in Table 1 the average daily sewage flow per employee per 8-hour shift varies from 16 to 18 gallons. The sewage flow data are at the low end of the VDH design flow criteria of 15 to 35 gallons per day per 8-hour employee shift.

Table 1 Sewage Flow Data and Estimates

Pumping Period	Pump Rate (gallons per minute)	Pumping Time (Hours)	Total Volume Pumped (gallons)	Average Daily Pump Rate (gallons per day)	Percent Design Capacity	Average Flow (gallons) per employee per 8-hour shift
3/5/02 – 5/10/02	166	4.6	45,816	694	23	18
	150	4.6	41,400	627	21	16
	140	4.6	38,630	585	20	15

6.0 Facility Description (Cont.)

6.11 Site Water, Wastewater and Waste Management Plan (Cont.)

6.11.8 Universal Aggregates Sewage Flows

Universal Aggregates will have five employees working the day shift and two employees working the evening and night shifts for a total of nine 8-hour shifts per day. The plant will have one uni-sex restroom and a laboratory sink. All other water use will be managed within the process water system. Assuming a sewage flow of 20 gallons per employee shift yields a daily sewage flow of 180 gallons per day. Adding this flow to the range of flow estimates for Birchwood indicates that the total combined flow would range from 23 to 27 percent of the design capacity. At these flow rates the Birchwood system can easily accommodate the addition of 180 gallons per day from the Universal plant. To ensure the system is not being overused sewage flows from the BPF and UA will be monitored on a regular basis.

The UA sewage system will include a 1,000-gallon septic tank and a sewage pump station. The effluent will be pumped to the headworks of the BPF system upstream of the sewage flow splitter. Design details of the system are currently being developed and will be included in the Health Department Permit Amendment application.

<u>New Birchwood Reserve Area</u>

As noted above a separate septic tank and drainfield system was permitted (permit # S-93-215) for the construction trailers during construction of the BPF. This system was operated from mid-1994 until late 1996. The system was designed, permitted and constructed to handle 900 gpd. This system is located in an upland area northwest of the plant. Additional site characterization work is currently being performed to document that this area meets all the VDH criteria.

6.11.9 Stormwater

As previously noted the facility is subject to the Virginia Department of Environmental Quality (DEQ) General Virginia Pollutant Discharge Elimination System (VPDES) Permit regulations for Discharges of Storm Water Associated With Industrial Activity (9 VAC 25-151-10). The Standard Industrial Code (SIC) for the UA plant is 3295 Stone, Clay, Glass, and Concrete Manufactured Products. UA will obtain a VPDES permit for the plant that will specify effluent limitations; maintenance, monitoring and reporting requirements; and preparation of a stormwater pollution prevention plan.

6.0 Facility Description (Cont.)

6.12 Drainage

6.12.1 This drainage project consists of approximately 71,154 Sq.Ft. of impervious area on a site of 3.87 acres. This impervious area includes an entrance road which crosses the existing railroad tracks in an access easement. BMP measures are required for this project to meet the Chesapeake Bay Watershed Pollutant Removal Standards. This site must meet a removal efficiency of 81.8%.

According to the Virginia Stormwater Management Handbook the use of an infiltration basin will achieve a pollutant removal rate of 65% if the volume is sized to capture and treat the first 1" of rainfall runoff from the site's impervious area. Using this to calculate the Water Quality Volume (WQV), the proposed BMP measure needs to capture 5,930 cubic feet of runoff. This measure will also include the use of a sediment removal forbay which will store the first ¼" of rainfall runoff. The runoff from the proposed structures and paved areas is to be captured in the proposed sediment removal forbay, and then will be conveyed by either a pipe subdrain or sheet flow to the proposed infiltration pond.

The proposed sediment removal forbay will be a trench 5' wide and 3' deep containing VDOT#5 stone and an underdrain system (see detail on Rickmond Engineer Drawing No. 6 of 11). The proposed forbay shall also have a layer of filter fabric at a depth of 12". This sediment removal forbay will have a volume of approximately 1,480 cubic feet, storing the first ¼" of stormwater runoff from the proposed impervious surface. The proposed infiltration pond shall have a bottom area of 8,000 Sq.Ft. at Elevation 88.00, and a side slope of 2:1. This pond will store the first inch of stormwater runoff from impervious surfaces in 0.80 feet of depth. This volume of water will infiltrate into the soils over a period of twelve (12) hours. This drawdown time was calculated using an infiltration rate of seventy-five (75) minutes per inch, which was determined by test pit and soil boring completed by Geoenvironmental Services, Inc. Soil descriptions are provided in the site plan supporting documentation report.

6.13 SDA Feed System

The existing Spray Dryer Ash (SDA) Silo F-110 receives SDA from the Power Plant and transfers it to the SDA Daybin F-120 via two blowers (JB-110A and JB-110B), one operational and one stand-by. The Silo has an existing Level Transmitter (LT1-F110), two Flow Valves (FV1-F110 & FV2-F110), two solenoid controlled Air Slides (SV1-F110 & SV2-F110) and one Rotary Feeder Valve (RF-110). Discharge control of the SDA Silo F-110 will be through the Aggregate Plant PLC. Also, an automatic Product Line Sampler is provided on the incoming Silo feed line.

The SDA Daybin (F-120) feeds SDA to Two (2) Weigh Feeders (K-120A and K120B) via Screw Conveyors L-120A and L-120B respectively. The Day Bin has a Level Transmitter (LT1-F120), Manual Gate Valves (MG-120A and MG-120B), Manually controlled Air Slides for each leg (AS-120A & AS-120B) and a Bagfilter (BF-120C).

Blower (BF-120C) draws air from the SDA Day Bin (F-120) through the Bag Filter (BF-120C) and vents to atmosphere.

6.0 Facility Description (Cont.)

6.13 SDA Feed System (Cont.)

SDA Weigh Feeder K-120A is a self-contained operating unit. Based on operator entered parameters, the unit will continually batch material from the SDA Day Bin F-120 via screw conveyor L-120A to screw conveyor L-310A. The Feeder also has a self contained Bagfilter (BF-120A).

SDA Weigh Feeder K-120B is a self-contained operating unit. Based on operator entered parameters, the unit will continually batch material from the SDA Day Bin F-120 via screw conveyor L-120B to screw conveyor L-320. The Feeder also has a self contained Bagfilter (BF-120B).

6.14 Additive No 1 System

The Additive No.1 Silo F-210 receives material from a pneumatic truck fill station and transfers it to screw conveyor L-210. The Silo has a Level Transmitter (LT1-F210), Manual Gate Valve (MG-210), manually operated Air Slide, Live Bottom Discharge (M1-BV210) and Bagfilter (BF-210A).

Blower (BF-210A) draws air from the Additive #1 Silo (F-210) through the Bag Filter (BF-210A) and vents to atmosphere.

Screw Conveyor L-210 supplies Additive #1 material to the Additive #1 Weigh Feeder K-210.

Additive Weigh Feeder K-210 is a self-contained operating unit. Based on operator entered parameters, the unit will continually batch material from the Additive #1 Silo F-210 via screw conveyor L-210 to Additive #1 Pulverizer P-210. The Feeder also has a self contained Bagfilter (BF-210B).

Additive #1 Pulverizer P-210 supplies Additive #1 material from the Additive #1 Feeder K-210 to the Additive #1 Screw Conveyor L-320. The Pulverizer has one feeder motor (M2-P210), one main drive motor (M1-P210), a Chute Level Switch (LSHH-P210) and a Bagfilter (BF-210C).

6.15 Recycle System

The Recycle Daybin F-250 receives fines from screw conveyor L-250C and transfers it to screw conveyor L-250B. The Recycle Daybin has a Level Transmitter (LT1-F250), Level Switch (LSLL1-F250), manual Gate Valve (MG-250), manual Air Slide valve, Bin Activator (M1-BV250), and Bagfilter (BF-250). Blower (M1-BF250A) draws air from the Recycle Daybin (F-250) through the Bag Filter (BF-250A) and vents to atmosphere.

Screw Conveyor L-250B supplies Fines from the Recycle Daybin F-250 to the Recycle Weigh Feeder K-250.

Recycle Weigh Feeder K-250 is a self-contained operating unit with Density Control (DE1-K250). Based on operator entered parameters the unit will continually batch material from the Recycle Daybin F-250 via screw conveyor L-250B to Recycle Screw Conveyor L310A. The Feeder also has a self contained Bag Filter (BF-250B).

6.0 Facility Description (Cont.)

6.16 Additive No. 2 System

Additive #2 Storage Tank F-220 is a heated storage tank containing Additive No. 2 and receives material from a truck fill station. The tank is a self-contained heated control unit. The tank has a Level Transmitter (LT1-F220), two additive Pumps (J-220A &J-220B), pump pressure control, temperature monitoring, and Pug Mill flow control/monitoring.

Two Additive Pumps (J-220A & J-220B), one operating and one standby, supply Additive No. 2 from the Additive #2 Storage Tank F-220 to the Pug Mill PM-310. Each Pump has it's own discharge Pressure Switches. When pumps are not supplying Additive No. 2 to the Pug Mill, they are recycling material to and from the Additive Tank to retain the temperature.

6.17 Extruder System

Screw Conveyor L-310A supplies SDA and Fines from the SDA Weigh Feeder K-120A and the Recycle Weigh Feeder K-250 to the Pug Mill (PM-310).

The Pug Mill PM-310 consists of a motor, air-operated clutch, reduction gearbox and knives. The Pug Mill receives and blends SDA and Recycled Fines from conveyor L-310 together with water and Additive No. 2. This mix is then conveyed on to the Pug Sealer PS-310.

The Pug Sealer PS-310 consists of a motor, air-operated clutch, reduction gearbox, motor sheaves and V-belts. Material in the Pug Sealer continues to mix under vacuum to a designated consistency. Material is then conveyed into the Extruder E-310

The Extruder E-310 consists of a motor, air-operated clutch, reduction gearbox, motor sheaves, V-belts, hydraulic die changer and a variable frequency drive. In the Extruder, the mix is formed into a 1" diameter green aggregate "noodle".

The Aggregate Cutter AC-310 mounts on the Hydraulic Die Changer frame on the outlet of the Extruder, and consists of a motor, variable frequency drive and limit switches. The Aggregate Cutter cuts the aggregate "noodles" formed by the Extruder into 2" long pieces.

Belt Conveyor L-310B, a forward and reversing conveyor, receives sized aggregate from the Aggregate Cutter (AC-310). When running in forward mode the conveyor transfers the aggregate to the Tumbler (T-320). When running in reverse mode the conveyor deposits the aggregate off line.

6.18 Tumbler

Screw Conveyor L-320 supplies SDA and Additive #1 from the SDA Weigh Feeder K-120B and the Additive #1 Pulverizer P-210 to the Tumbler (T320).

In addition, Belt Conveyor L-310B supplies sized "green" aggregate noodles from the Extruder E-310 to the Tumbler (T320). The Tumbler then mixes these products and conveys the aggregate and embedding onto Belt Conveyor L-410A.

6.0 Facility Description (Cont.)

6.19 Curing Process System

Belt Conveyor L-410A receives "green" aggregate and embedding material from the Tumbler T-320 and conveys these products into the Curing Vessel (C-410) through the Dust Collection Hood Distribution Hopper (DH-410A). The aggregate is held in the Curing Vessel for a calculated time period, as controlled by the vessel discharge rate, and discharged onto Reversing Belt Conveyor L-410F.

The Curing Vessel has the following components:

- One Dust Collection Hood Distribution Hopper (DH-410A). The Dust Collection Distribution Hopper level is controlled and monitored by a level transmitter (LT1-DH410).
- Four Curing Vessel air actuated gates (AG-410A, AG-410B, AG-410C &AG-410D). The gates are controlled through the PLC. The PLC monitors the Distribution Hopper's level via Level Transmitter (LT1-DH410).
- Four Curing Vessel Distribution Hoppers
  Hopper Level is controlled and monitored by individual Hopper Level Transmitters (LT1-C410, LT2-C410, LT3-C410 & LT4-C410).
- Eight Temperature Elements/Transmitters (TE1-C410, TE2-C410, TE3-C410, TE4-C410, TE5-C410, TE6-C410, TE7-C410 & TE8-C410).
- Three manually operated Curing Vessel Discharge Gates (MG-410A, MG-410B & MG-410C) discharging onto three Belt Feeders L-410B, L-410C & L-410D, which discharge onto Belt Conveyor L-410F.

Belt Conveyor L-410F receives product from the Curing Vessel (C-410) and conveys the product to Belt Conveyor L-510A.

Dust Collector Hood (DH-410B) is located at the transfer point of Belt Conveyor L-410F and Belt Conveyor L-510A. Dust Collector DC-410 services Dust Collector Hood DH-410B and transfers the resulting fines to Conveyor L-510A. The Dust Collector has a self-contained timer activated air blast system, Rotary Feeder Valve (RF-520), vent blower (JB-520) and Differential Pressure switch (DPSI-DC410). Blower (JB-410) draws air from the Dust Collection Hood DH-410B through the Dust Collector (DC-410) and vents to atmosphere.

6.20 Curing Vessel Scrubber System

Blower (JB-420) draws air from the Curing Vessel Dust Collection Hood (DH-410A) through a Wet Scrubber (B-420) and vents to atmosphere. The Wet Scrubber B-420 is a Venturi Scrubber and Cyclone Separator. The Scrubber is used to remove fine particles from the atmosphere, which is drawn from the Dust Collection Hood on top of Curing Vessel C-410.

6.0 Facility Description (Cont.)

6.21 Screening / Crushing System

Belt Conveyor L-510A receives product from Belt Conveyor L-410F and conveys the product into Primary Screen G-510A. Primary Screen G-510A has two Forward and Reversing Screening Motors (M1-G510A & M2-G510A).

After primary screening the screened product flows through Dust Collector and Transition Chute (DH-510B) into the Horizontal Impactor (HI510). The Impactor then reduces the product and gravity feeds to the Secondary Screen G-510B. Secondary Screen G-510B has one Forward Screening Motor (M1-G510B). After secondary screening, the screened product flows onto Belt Conveyor (L-510C).

Product fines from Primary Screen G-510A and Secondary Screen G-510B are gravity fed into the Gravitational Classifier GC-510 for excess fines removal. Product which passes the Gravitational Classifier GC-510, flows onto Belt Conveyor (L-510C).

The Classifier Baghouse B-520 receives product from the Gravitational Classifier (CG-510) and transfers the resulting fines to Screw Conveyor L-250A.

6.22 Bottom Ash System

Belt Conveyor L-130 receives Plant Bottom Ash Storage via a truck and conveys the product onto the Bucket Elevator BE-130. In addition, ¼ " product from the Secondary Screen G-510B is fed into Bucket Elevator BE-130 via chutework. The Bucket Elevator conveys the oversized and Bottom Ash material via a chute to Manual Flop Gate FG-130 where the material is directed back to the Impactor (HI-510) during normal operation or to conveyor L-510A on start up.

6.23 Recycle System

Screw Conveyor L-250A supplies recycle and fines from the Primary Screen (G-510A) and the Classifier Baghouse (B-520) to Bucket Elevator (BE-250).

Bucket Elevator (BE-250) conveys the material to Screw Conveyor L-250C.

Screw Conveyor L-250C supplies fines to the Recycle Daybin (F-250).

6.24 Product Delivery System

Belt Conveyor L-510C receives product from the Secondary Screen G-510B and Gravitational Classifier GC-510, and conveys the product onto Telescoping Belt Conveyor L-510D. Belt Conveyor L-510C contains Belt Weigh Scale (WE-L510C) and Totalizer for weighing and totalizing processed product.

Telescoping Belt Conveyor L-510D receives product from Belt Conveyor L-510C and conveys the product onto the stockpile. The conveyor is also capable of telescoping in and out (M4-L510D), raising and lowering (M2-510D), and moving left and right (M3-L510D).

Finished product is loaded from the stockpile into trucks with a front end loader. Trucks are weighed on the Truck Scale TS-540 to determine product weight to be delivered to customers.

7.0 Experimental

This section is not applicable to this project.

8.0 Results and Discussions

Topical Report No. 1 consists of the preliminary plant design information. The final design will be covered under Topical Report No. 2

9.0 Conclusion

This project is on schedule and within budget. The information described in this report is preliminary.

10.0 References

This section is not applicable for this report.

APPENDIX "A"

EQUIPMENT LIST

Appendix "A" Equipment List

ITEM NO.	DESCRIPTION
110 / 120	SDA FEED SYSTEM
F-110	Existing SDA Silo
AS-110	Automatic Sampler
JB-110A	SDA Pneumatic Transport Blower
JB-110B	SDA Pneumatic Transport Blower
RF-110	SDA Rotary Feeder
F-120	SDA Daybin
K-120A	SDA Daybin Feeder
K-120B	SDA Daybin Feeder
L-120A	SDA Daybin Screw Conveyor
L-120B	SDA Daybin Screw Conveyor
AS-120A	SDA Daybin Air Slides
AS-120B	SDA Daybin Air Slides
BF-120A	SDA Feeder Filter
BF-120B	SDA Feeder Filter
BF-120C	SDA Daybin Bag Filter
MG-120A	SDA Daybin Manual Gate
MG-120B	SDA Daybin Manual Gate
130	BOTTOM ASH SYSTEM
F-130	Bottom Ash Storage
L-130	Bottom Ash Belt Conveyor
BE-130	Bottom Ash Feed Bucket Elevator
FG-130	Bottom Ash Manual Flop Gate
200	ADDITIVES SYSTEM
210	Additive #1 System
F-210	Additive #1 Silo
K-210	Additive #1 Feeder
L-210	Additive #1 Silo Screw Conveyor
P-210	Additive #1 Pulverizer
AS-210	Additive #1 Silo Air Slides
BF-210A	Additive #1 Silo Bag Filter
BF-210B	Additive #1 Feeder Filter
BF-210C	Additive #1 Pulverizer Filter
BV-210	Additive #1 Silo Live Bottom Bin Activator
MG-210	Additive #1 Silo Manual Gate
220	Additive #2 System
F-220	Additive #2 Storage Tank

Appendix "A" Equipment List (Cont.)

ITEM NO.	DESCRIPTION
200	ADDITIVES SYSTEM (Cont.)
H-220	Additive #2 Storage Tank Heater
J-220A	Additive #2 Storage Tank Feed Pump
J-220B	Additive #2 Storage Tank Feed Pump
250	RECYCLE SYSTEM
F-250	Recycle Daybin
K-250	Recycle Feeder
L-250A	Fines to Recycle Drain Screw Conveyor
L-250B	Recycle Daybin Screw Conveyor
L-250C	Bucket Elevator Screw Conveyor
AS-250	Recycle Feeder Air Slide
AV-250	Recycle Daybin Air Vibrator
BE-250	Recycle Feed Bucket Elevator
BF-250A	Recycle Daybin Bag Filter
BF-250B	Recycle Feeder Filter
MG-250A	Recycle Daybin Entry Manual Gate
MG-250B	Recycle Daybin Manual Gate
300	PROCESS SYSTEM
310	Extruder System
E-310	Extruder
L-310A	SDA Main Feed and Recycle Screw Conveyor
L-310B	Extruder Radial Reversing Belt Conveyor
AC-310	Aggregate Cutter
PM-310	Pug Mill
PS-310	Pug Sealer
320	TUMBLER
L-320	SDA and Additive #1 Screw Conveyor
T-320	Tumbler
DH-320A	Dust Collection Hood and Distribution Hopper Entry
DH-320B	Dust Collection Hood and Distribution Hopper Exit

Appendix "A" Equipment List (Cont.)

ITEM NO.	DESCRIPTION
400	CURING PROCESS SYSTEM
410	Curing System
C-410	Curing Vessel
L-410A	Curing Vessel Feed Covered Belt Conveyor
L-410F	Curing Vessel Discharge Belt Conveyor
AG-410A	Curing Vessel Air Actuated Gate
AG-410B	Curing Vessel Air Actuated Gate
AG-410C	Curing Vessel Air Actuated Gate
AG-410D	Curing Vessel Air Actuated Gate
DC-410	Dust Collection
DH-410A	Curing Vessel Dust Collection Distribution Hopper
DH-410B	Curing Vessel Discharge Conveyor Dust Collection Distribution Hopper
MG-410A	Curing Vessel Manual Gate
MG-410B	Curing Vessel Manual Gate
MG-410C	Curing Vessel Manual Gate
RF-410	Dust Collection Rotary Feed
420	CURING VESSEL SCRUBBER SYSTEM
B-420	Curing Vessel Wet Scrubber
JB-420	Curing Vessel Scrubber Blower
500	PRODUCT SYSTEM
510	Screening / Crusher System
G-510A	Primary Screen
G-510B	Secondary Screen
L-510A	Crusher Area Feed Covered Belt Conveyor
L-510C	Belt Conveyor
L-510D	Belt Conveyor
AS-510	Automatic Sampler
DH-510A	Dust Collection and Transition Chute
DH-510B	Dust Collection and Transition Chute
DH-510C	Dust Collection and Transition Chute
DH-510D	Dust Collection and Transition Chute
DH-510E	Dust Collection and Transition Chute
GC-510	Gravitational Classifier
HI-510	Horizontal Impactor
FG-510A	Manual Flop Gate
FG-510B	Manual Flop Gate

Appendix "A" Equipment List (Cont.)

ITEM NO.	DESCRIPTION
520	CRUSHER AREA BAGHOUSE SYSTEM
B-520	Crusher Area Baghouse
JB-520	Baghouse Blower
RF-520	Baghouse Rotary Feed
540	PRODUCT TRUCK TRANSPORT SYSTEM
TS-540	Truck Scale
700	UTILITIES SYSTEM
710	Process Water and Steam System
A-710	Tank Future
F-710A	Process Water Filter
F-710B	Process Water Filter
J-710A	Condensate Water Pump
J-710B	Condensate Water Pump
J-710C	Process Water Pump
J-710D	Process Water Pump
J-710E	Scrubber Water Recirculating Sump
J-710F	Scrubber
CT-710	Condensate Tank
FT-710	Flash Tank
HE-710A	Heat Exchanger
HE-710B	Heat Exchanger
ST-710	Scrubber Tank
WT-710	Process Water Tank
J-720	Building Sump Pump
740	POTABLE WATER SYSTEM
J-740A	Well Head Pump
J-740B	High Pressure Wash Pump
HT-740	Hot Water Tank
PT-740	Potable Water Tank
750	COMPRESSED AIR SYSTEM
AC-750A	Air Compressor
AC-750B	Air Compressor
AD-750	Air Dryer
AR-750	Air Receiver

APPENDIX "B"

DRAWINGS

Appendix "B"
Drawings

Drawing No.	Title
001-C-001	Property Boundaries
001-GA-001	Site Survey Plan
001-GA-002	Site Plan
001-GA-003	Main Building Layout
001-GA-004A	Facility Layout
001-GA-005	Main Building Layout Plans and Sections
001-GA-006A	Main Building Layout Sections
001-GA-007	Main Building Layout Plans and Sections
001-R-001	Product Flow Sheet Schematic
001-R-003	Utility Flow Diagram
001-R-019	Product Design – Flow Rate Ranges
Sheet 5 of 11	Grading Plan (Rickmond Drawings, Sheet 5)
Sheet 6 of 11	SWM/BMP Details and Calculations (Rickmond Drawings, Sheet 6)
Sheet 7 of 11	Pump Station and Drainfield Details (Rickmond Drawings, Sheet 7)
Sheet 8 of 11	Erosion and Sedimentation Control Plan (Rickmond Drawings, Sheet 8)
Sheet 9 of 11	Erosion and Sedimentation Control Details and Narrative (Rickmond Drawings, Sheet 9)

N

27.3673°

E 11,823,000

E 11,823,250

E 11,823,500

E 11,823,750

N 6,782,750

N 6,782,500

PROPERTY LIMITS
N. 6,782,921.89
E. 11,822,947.69

90° E (201.12')

PROPERTY LIMITS
N. 6,782,921.89
E. 11,823,148.81

PD
N. 6,782,924.63
E. 11,823,151.83

90° N (73.59')

S 23°29'21.9" W (84.92')

EASEMENT #1
PROPERTY LIMITS
N. 6,782,848.30
E. 11,822,947.69

EASEMENT #1
PROPERTY LIMITS
N. 6,782,800.80
E. 11,823,039.33

S 68°53'7.2" W (20.41')

PROPERTY LIMITS
N. 6,782,834.83
E. 11,823,110.98

N 27°24'1.2" W (103.21')

PROPERTY LIMITS
N. 6,782,808.15
E. 11,823,058.36

PRIMARY SEPTIC FIELD

S 27°43'7.2" E (226.85')

EASEMENT #1

EASEMENT #1
PROPERTY LIMITS
N. 6,782,740.54
E. 11,822,948.02

N 01°25'9" E (107.76')

PROPERTY LIMITS
N. 6,782,729.32
E. 11,823,311.80

PD
N. 6,782,824.34
E. 11,823,350.23

N 28°42'51.1" E (174.65')

PROPERTY LIMITS
N. 6,782,882.49
E. 11,823,395.70

S 13°59'19.0" E (241.87')

PROPERTY LIMITS
N. 6,782,824.03
E. 11,823,630.39

EASEMENT #4
PROPERTY LIMITS
N. 6,782,840.84
E. 11,823,704.32

S 32°12'6.09" E (50.0')

EASEMENT #4
PROPERTY LIMITS
N. 6,782,814.20
E. 11,823,746.63

S 46°29'35.46" E (55.30')

EASEMENT #4
PROPERTY LIMITS
N. 6,782,783.90
E. 11,823,668.46

N 32°12'6.09" E (67.29')

EASEMENT #4

S 32°12'6.09" W (80.03')

S 46°29'35.46" E (51.60')

EASEMENT #4
PROPERTY LIMITS
N. 6,782,746.48
E. 11,823,703.99

S 46°29'35.46" E (220.77')

PROPERTY LIMITS
N. 6,782,586.37
E. 11,823,855.98

S 27°22'2.4" W (169.70')

PROPERTY LIMITS
N. 6,782,435.66
E. 11,823,777.96

N 30° E (58.17')

N 27°55'12.0" W (54.01')

EASEMENT #1
PROPERTY LIMITS
N. 6,782,688.76
E. 11,822,921.63

EASEMENT #1
PROPERTY LIMITS
N. 6,782,663.47
E. 11,822,969.36

S 27° W (154.13')

HW#102

HW#101

HW#103

HW#100

50.00'

N 27°22'2.4" W (325.87')

STEAM & CONDENSATE RETURN PIPING TO HOST

EASEMENT #2
PROPERTY LIMITS
N. 6,782,658.35
E. 11,823,347.77

N 27°22'2.4" W (30.00')

EASEMENT #2
PROPERTY LIMITS
N. 6,782,644.55
E. 11,823,374.41

EASEMENT #2

N 27°24'1.2" E (91.49')

N 27°24'1.2" W (96.95')

S 27°24'1.2" W (91.49')

EASEMENT #2
PROPERTY LIMITS
N. 6,782,571.80
E. 11,823,302.90

ASH SILO
DWG. 95-001-0810-02

N 26°20'18.7" W (30.01')

CB#301

CB#302

CB#202

CB#201

CB#203

CB#200

CB#300

EASEMENT #2
PROPERTY LIMITS
N. 6,782,558.48
E. 11,823,329.79

N 27°22'2.4" W (217.75')

EASEMENT #3
PROPERTY LIMITS
N. 6,782,544.46
E. 11,823,567.79

N 27°24'1.2" E (45.38')

N 27°22'2.4" W (30.00')

EASEMENT #3
PROPERTY LIMITS
N. 6,782,504.71
E. 11,823,546.91

EASEMENT #3
PROPERTY LIMITS
N. 6,782,530.66
E. 11,823,594.43

S 27°24'1.2" W (45.64')

EASEMENT #3

EASEMENT #3
PROPERTY LIMITS
N. 6,782,490.15
E. 11,823,572.43

N 28°24'1.2" W (30.00')

CB#206

CB#205

CB#207

CB#204

N 27°22'2.4" W (206.67')

BIRCHWOOD SURVEY COORDINATE
N. 6,782,550.13675
E. 11,823,308.85434

BOILER HSE.

WHSE & SHOP

CB#302A

FGC SYSTEM ELECTRICAL BUILDING

BAGHOUSE

CB#302B

CB#401

REV.	DESCRIPTION	DATE
C	ADDED EASEMENT #4	12/31/02
B	FOR REVIEW AND COMMENTS	03/28/02
A	FOR REVIEW AND COMMENTS	03/25/02

DRAWN BY:	STU	03/21/01	JOB No.AC-7336 PLOTTED:3/27/03 07:58:07
DESIGNED BY:			FILE SPEC:..\AC-7336\DRAWINGS\001-C-001.DWG
CHECKED BY:			ENGINEERED BY
APPROVED BY:			R.T. PATTERSON CO., INC.
APPROVED BY:			ENGINEERS & CONSULTANTS
APPROVED BY:			PITTSBURGH PA. ☆ HIGHLAND IN. ☆
			EVANSVILLE IN. ☆ CLEVELAND OH. ☆

Universal Aggregates, LLC
4000 Brownsville Road
South Park, PA 15129

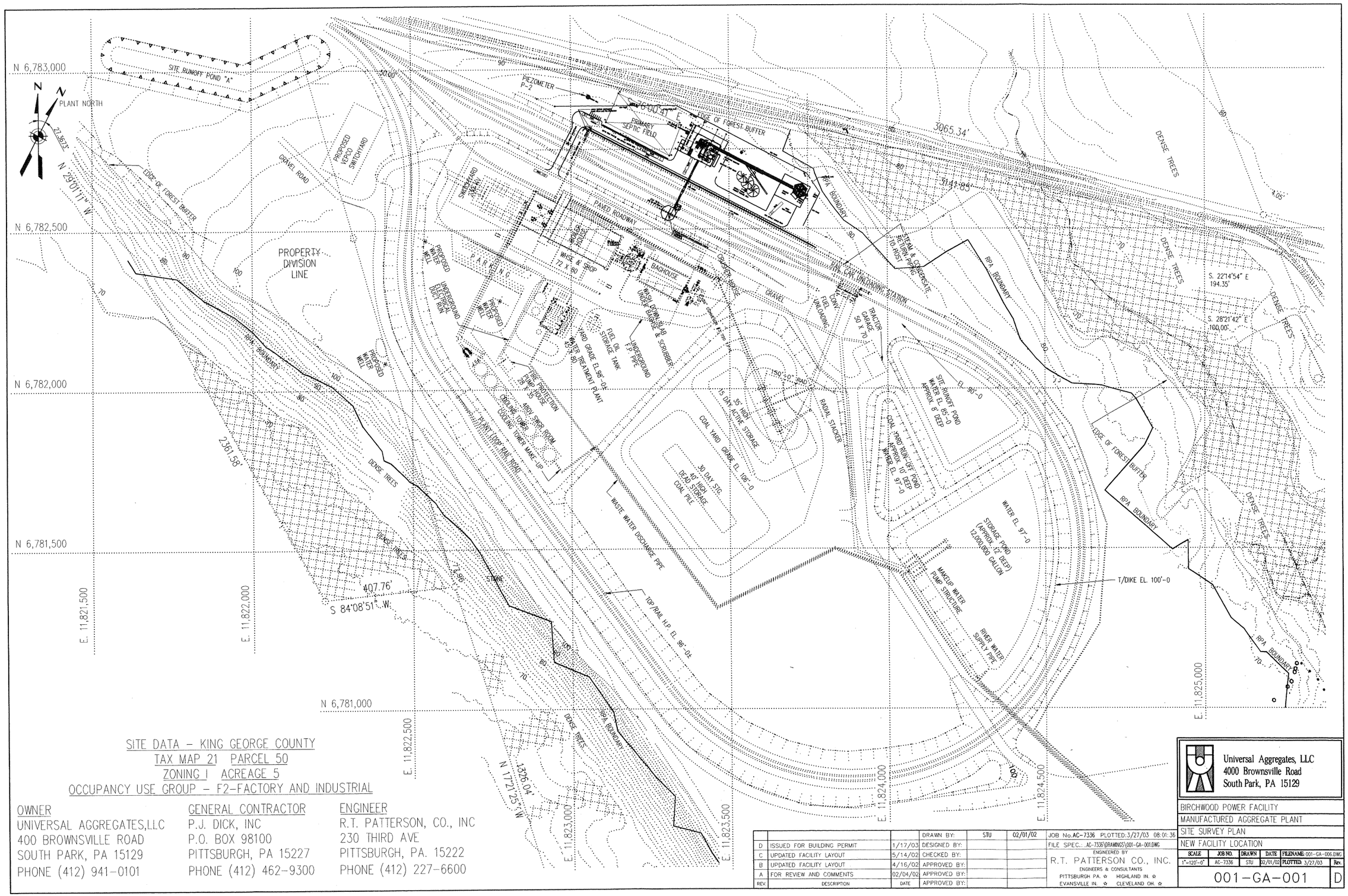
BIRCHWOOD POWER FACILITY
MANUFACTURED AGGREGATE PLANT
PROPERTY BOUNDARIES

SCALE	JOB NO.	DRAWN	DATE	FILENAME 001-C-001.DWG
1"=30'-0"	AC-7336	STU	3/21/02	PLOTTED 3/27/03

Rev.

001-C-001

B



SITE DATA – KING GEORGE COUNTY
TAX MAP 21 PARCEL 50
ZONING I ACREAGE 5
OCCUPANCY USE GROUP – F2–FACTORY AND INDUSTRIAL

OWNER	GENERAL CONTRACTOR	ENGINEER
UNIVERSAL AGGREGATES,LLC	P.J. DICK, INC	R.T. PATTERSON, CO., INC
400 BROWNSVILLE ROAD	P.O. BOX 98100	230 THIRD AVE
SOUTH PARK, PA 15129	PITTSBURGH, PA 15227	PITTSBURGH, PA. 15222
PHONE (412) 941–0101	PHONE (412) 462–9300	PHONE (412) 227–6600

REV.	DESCRIPTION	DATE	APPROVED BY:
D	ISSUED FOR BUILDING PERMIT	1/17/03	DESIGNED BY:
C	UPDATED FACILITY LAYOUT	5/14/02	CHECKED BY:
B	UPDATED FACILITY LAYOUT	4/16/02	APPROVED BY:
A	FOR REVIEW AND COMMENTS	02/04/02	APPROVED BY:
			DRAWN BY: STU 02/01/02

JOB No. AC-7336 PLOTTED: 3/27/03 08:01:36
FILE SPEC:..AC-7336\DRAWINGS\001-GA-001.DWG

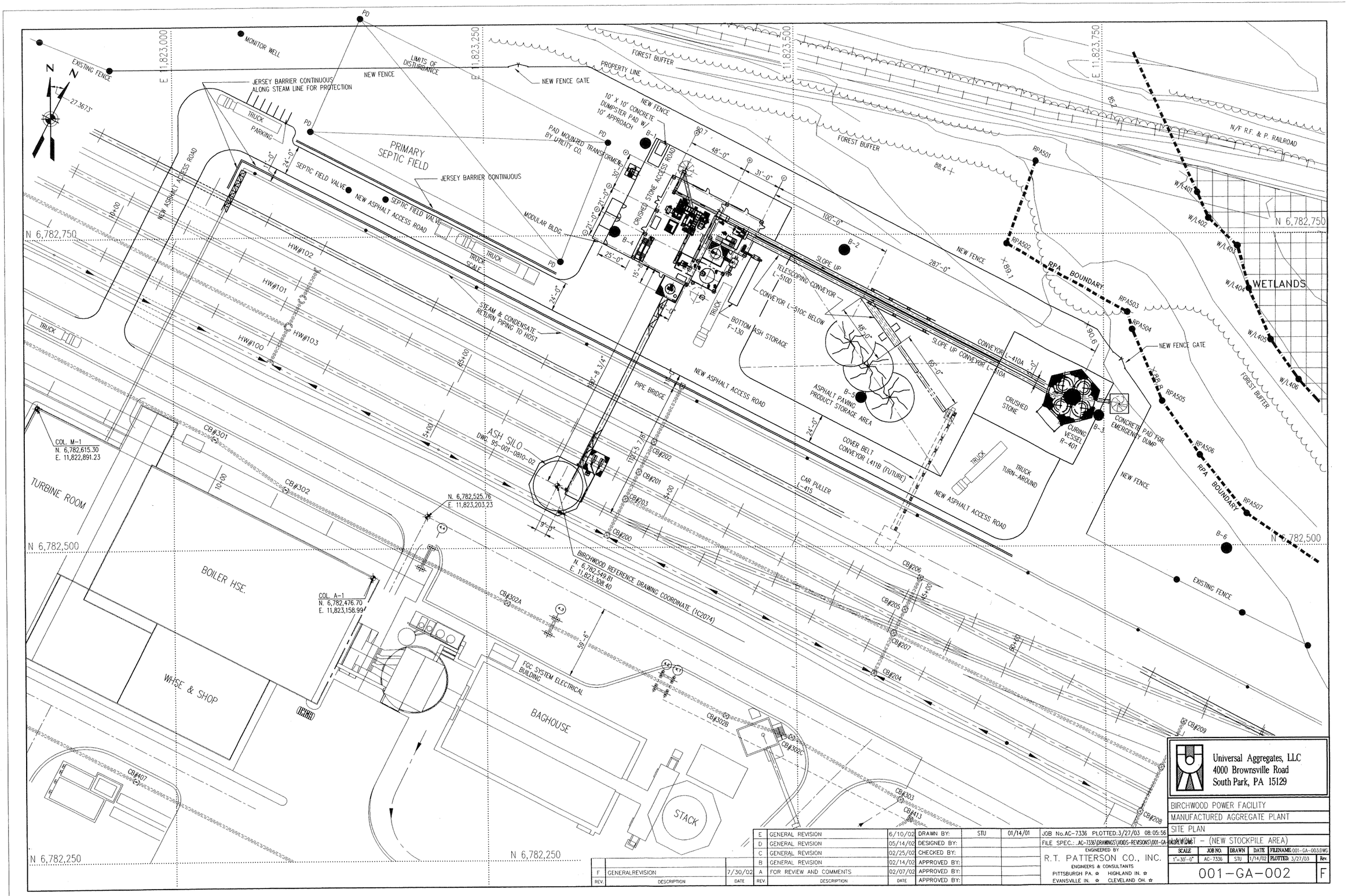
ENGINEERED BY
R.T. PATTERSON CO., INC.
ENGINEERS & CONSULTANTS
PITTSBURGH PA. ☆ HIGHLAND IN. ☆
EVANSVILLE IN. ☆ CLEVELAND OH. ☆

Universal Aggregates, LLC
4000 Brownsville Road
South Park, PA 15129

BIRCHWOOD POWER FACILITY
MANUFACTURED AGGREGATE PLANT
SITE SURVEY PLAN
NEW FACILITY LOCATION

SCALE	JOB NO.	DRAWN	DATE	FILENAME: 001-GA-006.DWG
1"=120'-0"	AC-7336	STU	02/01/02	PLOTTED: 3/27/03

001–GA–001 D



REV.	DESCRIPTION	DATE
F	GENERALREVISION	7/30/02

REV.	DESCRIPTION	DATE	DRAWN BY:		
E	GENERAL REVISION	6/10/02	DRAWN BY:	STU	01/14/01
D	GENERAL REVISION	05/14/02	DESIGNED BY:		
C	GENERAL REVISION	02/25/02	CHECKED BY:		
B	GENERAL REVISION	02/14/02	APPROVED BY:		
A	FOR REVIEW AND COMMENTS	02/07/02	APPROVED BY:		

JOB No.AC-7336 PLOTTED: 3/27/03 08:05:56
FILE SPEC.: AC-7336\DRAWINGS\VOIDS-REVISIONS\001-GA-002REVISED.DWG

ENGINEERED BY
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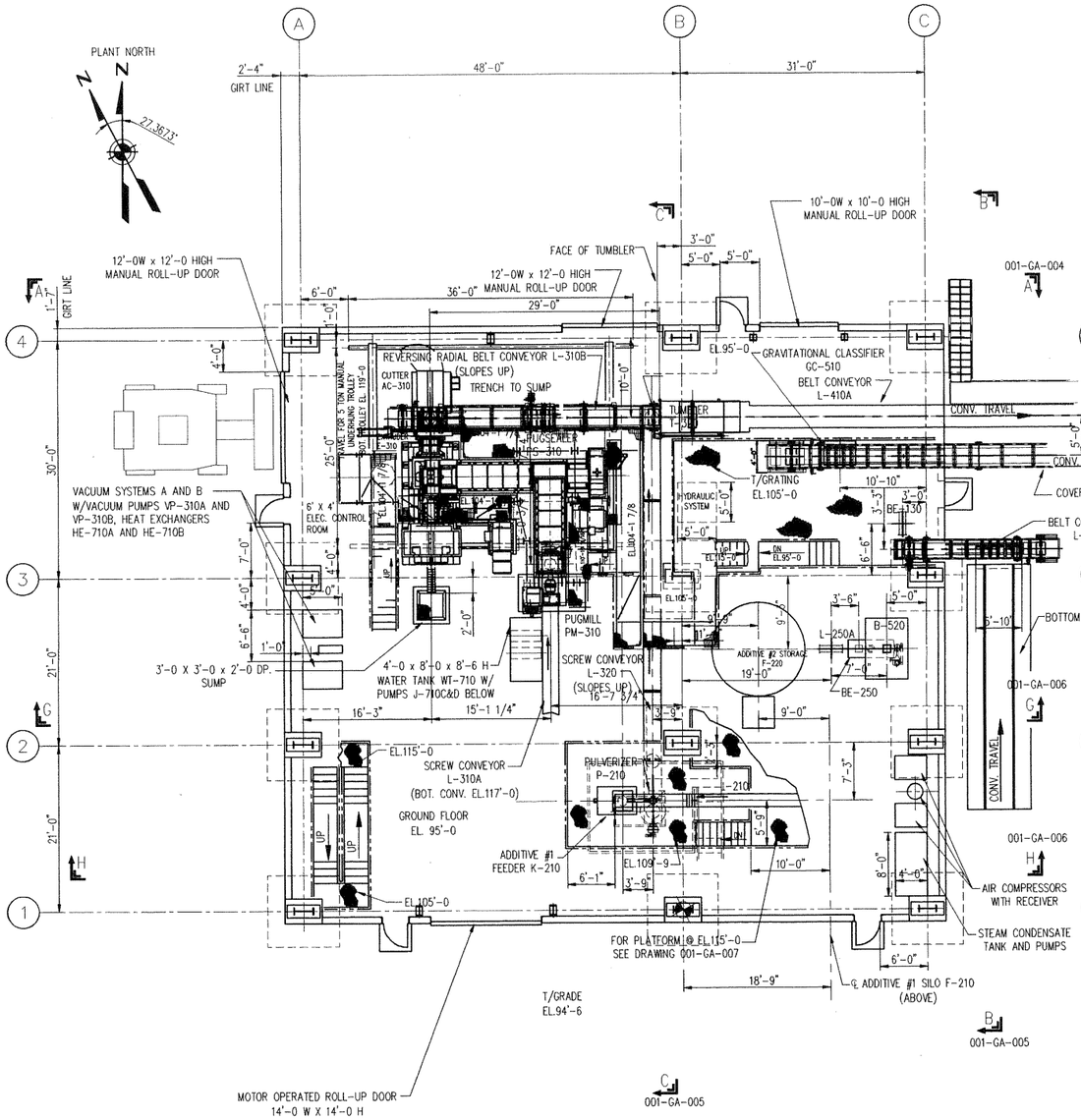
ENGINEERS & CONSULTANTS
PITTSBURGH PA. ☆ HIGHLAND IN. ☆
EVANSVILLE IN. ☆ CLEVELAND OH. ☆

Universal Aggregates, LLC
4000 Brownsville Road
South Park, PA 15129

BIRCHWOOD POWER FACILITY
MANUFACTURED AGGREGATE PLANT
SITE PLAN
OVERALL - (NEW STOCKPILE AREA)

SCALE	JOB NO.	DRAWN	DATE	FILENAME: 001-GA-003.DWG
1"=30'-0"	AC-7336	STU	1/14/02	PLOTTED: 3/27/03

001-GA-002 | Rev. F



GROUND FLOOR PLAN

GROUND FLOOR
EL. 95'-0

OPERATING FLOOR

T/OPERATING FLOOR
EL.125'-0

NOTES:
WORK THIS DRAWING WITH DRAWINGS 001-GA-004, 001-GA-005 AND 001-GA-006

REV.	DESCRIPTION	DATE
0	FOR CONSTRUCTION	
G	GENERAL REVISION	2/3/03
F	ISSUED FOR BUILDING PERMIT	1/17/03
E	GENERAL REVISION	11/20/02
D	GENERAL REVISION	6/10/02
C	GENERAL REVISION	5/14/02
B	GENERAL REVISION	2/22/02
A	REV DWG NO AND FOR INFORMATION	02/07/02

DRAWN BY: STU 1/15/02
DESIGNED BY:
CHECKED BY:
APPROVED BY:
APPROVED BY:

JOB No.AC-7336 PLOTTED:4/9/03 13:56:30
FILE SPEC:. AC-7336\DRAWINGS\001-GA-003.DWG

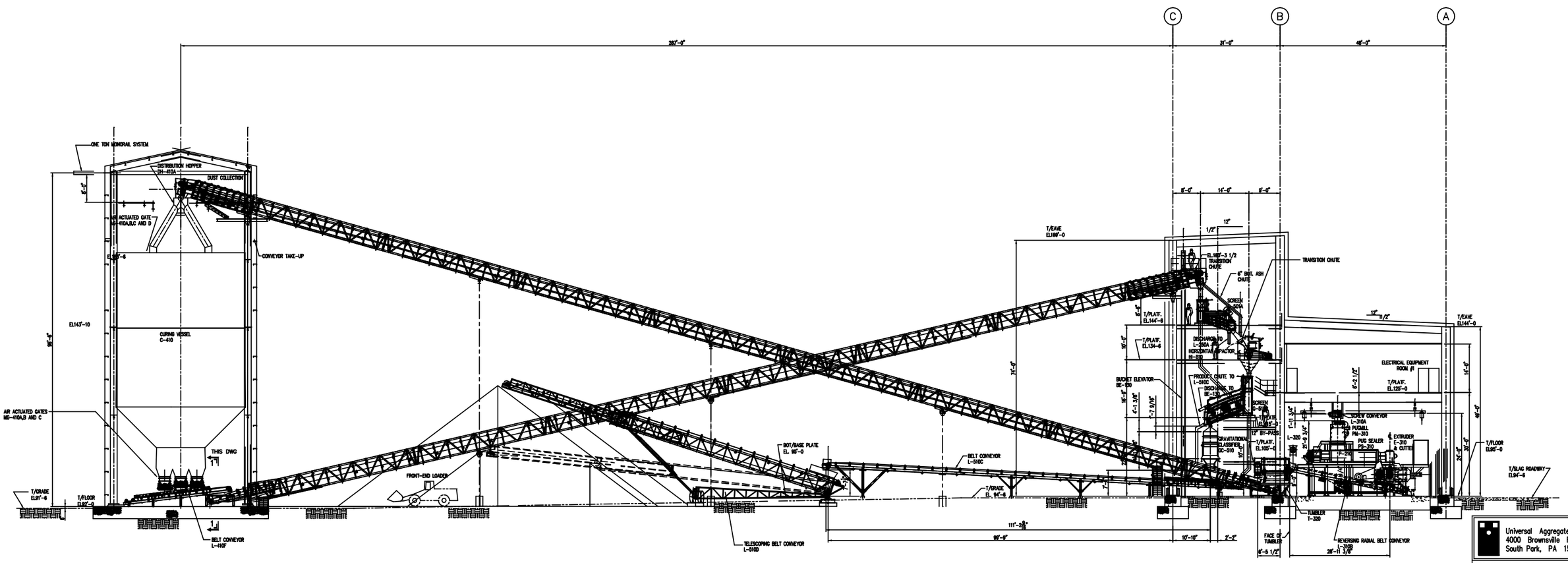
ENGINEERED BY
R.T. PATTERSON CO., INC.
ENGINEERS & CONSULTANTS
PITTSBURGH PA. ☆ HIGHLAND IN. ☆
EVANSVILLE IN. ☆ CLEVELAND OH. ☆

Universal Aggregates, LLC
4000 Brownsville Road
South Park, PA 15129

BIRCHWOOD POWER FACILITY
MANUFACTURED AGGREGATE PLANT
MAIN BLDG. LAYOUT
PLANS & SECTION

SCALE	JOB NO.	DRAWN	DATE	FILENAME 001-GA-004.DWG
1/8"=1'-0"	AC-7336	STU	1/15/02	PLOTTED 4/9/03

001-GA-003 0



SECTION A–A

BIRCHWOOD POWER FACILITY – "MANUFACTURED AGGREGATE PLANT"

(LOOKING SOUTH)

NOTE:
WORK THIS DRAWING WITH DRAWINGS 001-GA-003, 001-GA-005 AND 001-GA-006

REV.	DESCRIPTION	DATE
	E GENERAL REVISION	10/3/02
	D GENERAL REVISION	9/10/02
0	FOR CONSTRUCTION	5/19/03
G	C GENERAL REVISION	5/14/02
G	ISSUED FOR BUILDING PERMIT	1/17/02
F	B GENERAL REVISION	2/22/02
F	GENERAL REVISION	11/30/01
	A REV DWG. NO & FOR INFORMATION	02/07/02

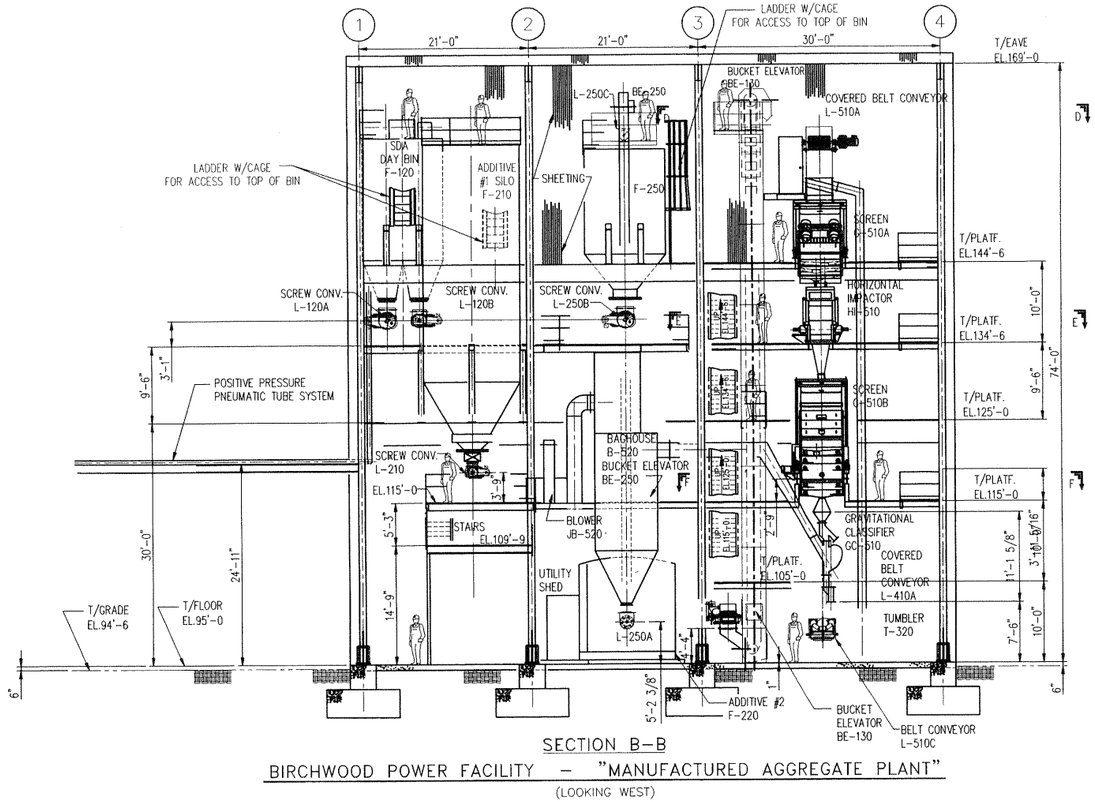
DRAWN BY: STU 1/21/02
APPROVED BY:
APPROVED BY:
APPROVED BY:
JOB No.AC-7335 PLOTTED:
FILE SPEC.:
DESIGNED BY
R.T. PATTERSON CO., INC.
ENGINEERS & CONSULTANTS
PITTSBURGH PA. ★ HIGHLAND RD. ★
EVANSVILLE IN. ★ CLEVELAND OH. ★

Universal Aggregates, LLC
4000 Brownsville Road
South Park, PA 15129

BIRCHWOOD POWER FACILITY
MANUFACTURED AGGREGATE PLANT
FACILITY LAYOUT
SECTION

SCALE	JOB NO.	DRAWN	DATE	FILENAME
1/8"=1'-0"	AC-7335	STU	1/21/02	

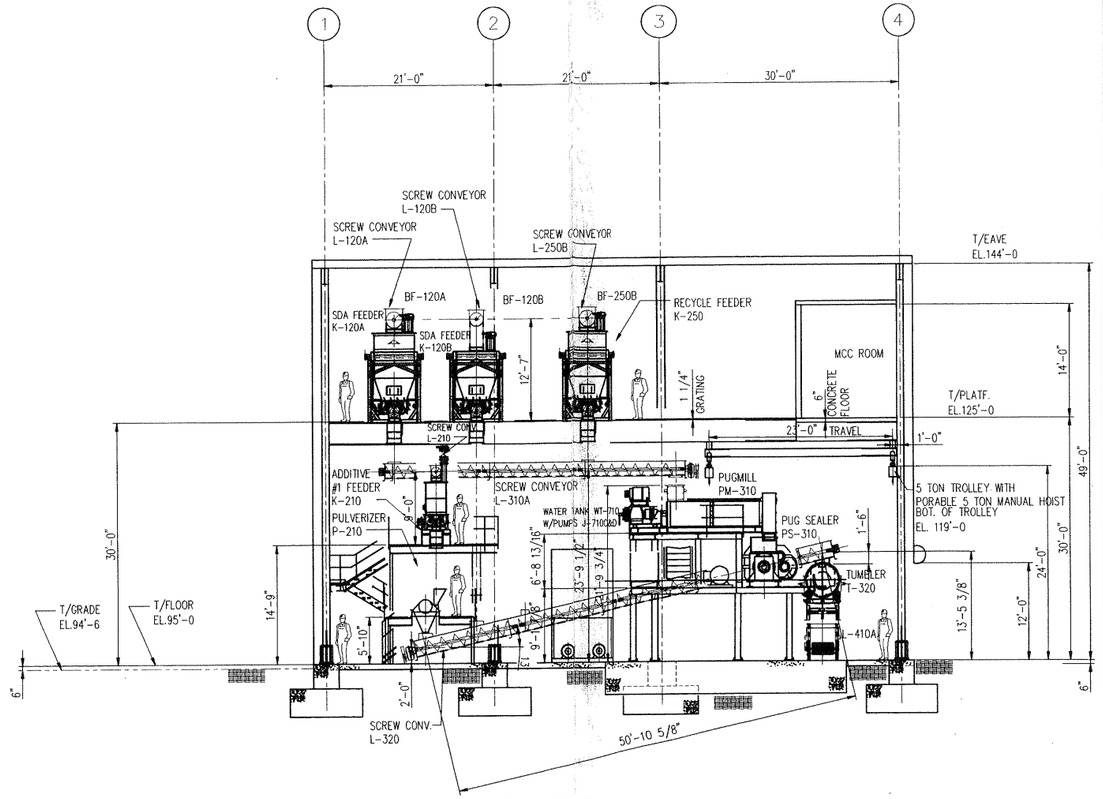
001-GA-004A 0



SECTION B-B

BIRCHWOOD POWER FACILITY – "MANUFACTURED AGGREGATE PLANT"

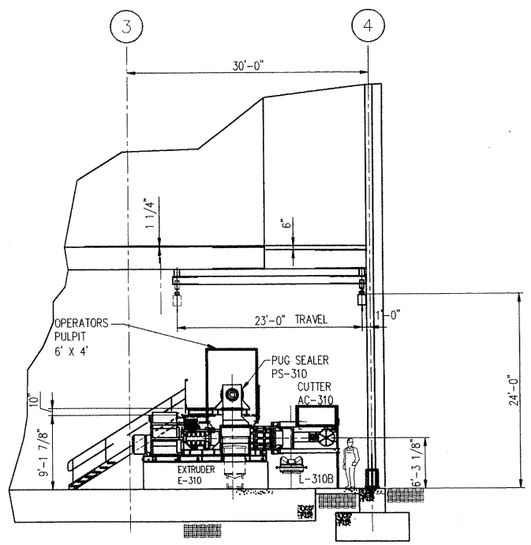
(LOOKING WEST)



SECTION C-C

BIRCHWOOD POWER FACILITY – "MANUFACTURED AGGREGATE PLANT"

(LOOKING WEST)



SECTION J-J

NOTE:
WORK THIS DRAWING WITH DRAWINGS 001-GA-003, 001-GA-004, AND 001-GA-006

REV	DESCRIPTION	DATE	REV	DESCRIPTION	DATE			
			E	GENERAL REVISION	11/20/02	DRAWN BY:	KRF	02/06/02
			D	GENERAL REVISION	6/10/02	DESIGNED BY:		
0	FOR CONSREUCTION		C	GENERAL REVISION	5/14/02	CHECKED BY:		
G	GENERAL REVISION	2/3/2003	B	GENERAL REVISION	2/22/02	APPROVED BY:		
F	ISSUED FOR BUILDING PERMIT	1/17/03	A	FOR INFORMATION	02/07/02	APPROVED BY:		

JOB No.AC-7336 PLOTTED:4/9/03 13:49:09
FILE SPEC.: AC-7336\DRAWINGS\001-GA-005.DWG

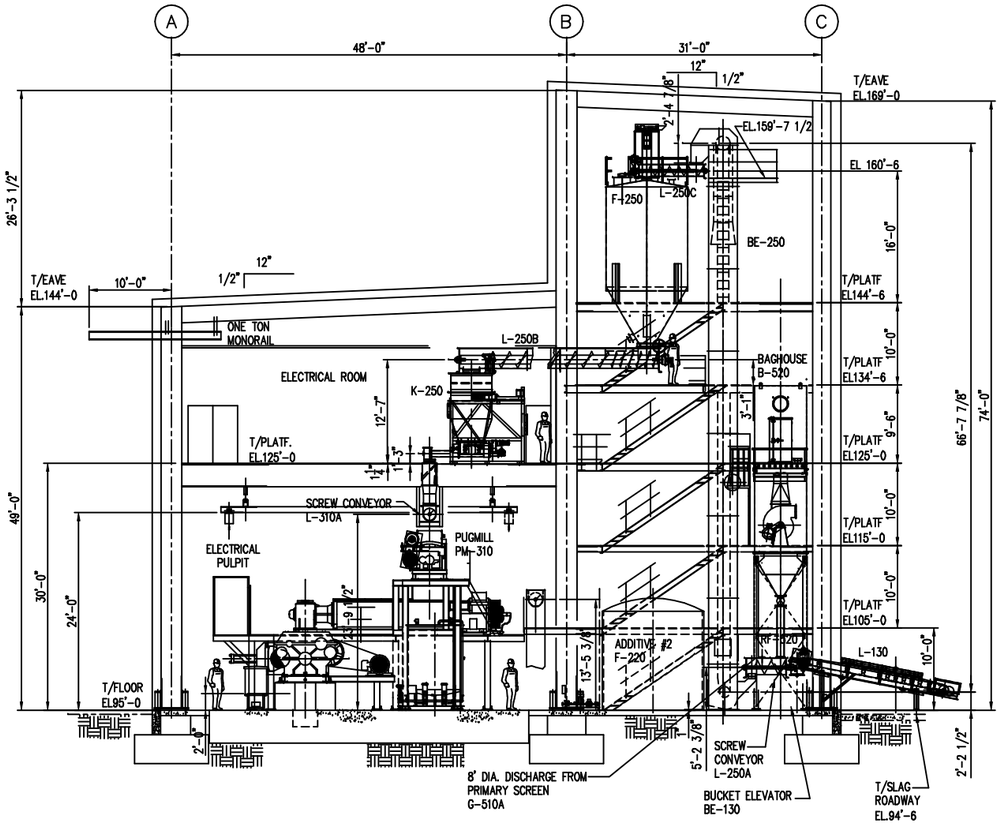
ENGINEERED BY
R.T. PATTERSON CO., INC.
ENGINEERS & CONSULTANTS
PITTSBURGH PA. ☆ HIGHLAND IN. ☆
EVANSVILLE IN. ☆ CLEVELAND OH. ☆

Universal Aggregates, LLC
4000 Brownsville Road
South Park, PA 15129

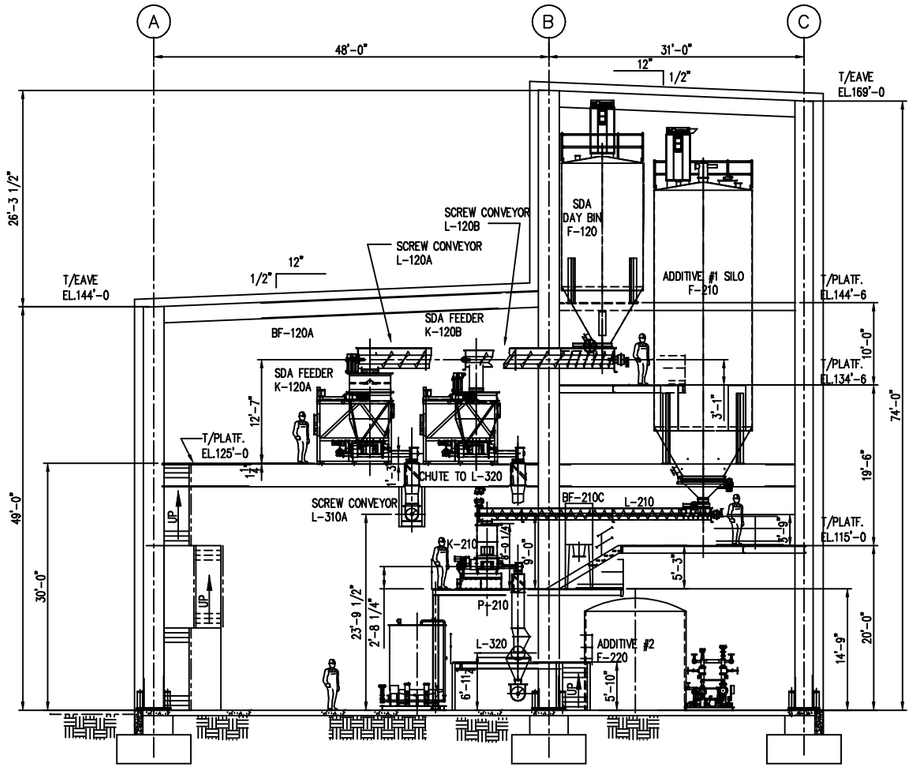
BIRCHWOOD POWER FACILITY
MANUFACTURED AGGREGATE PLANT
MAIN BLDG. LAYOUT
PLANS & SECTION

SCALE	JOB NO.	DRAWN	DATE	FILENAME 001-GA-004.DWG
1/8"=1'-0"	AC-7336	STU	1/15/02	PLOTTED 4/9/03

001-GA-005 | Rev. 0



SECTION G-G
DWG. 001-GA-003



SECTION H-H
DWG. 001-GA-003

NOTES:
WORKK THIS DRAWING WITH DRAWINGS 001-GA-003, 001-GA-004, 001-GA-005, AND 001-GA-007

REV.	DESCRIPTION	DATE	REV.	DESCRIPTION	DATE			
			E	GENERAL REVISION	2/3/03	DRAWN BY:	KRF	5/7/02
			D	ISSUED FOR BUILDING PERMIT	1/17/03	DESIGNED BY:		
			C	GENERAL REVISION	11/20/02	CHECKED BY:		
			B	GENERAL REVISION	6/10/02	APPROVED BY:		
0	FOR CONSTRUCTION	5/19/03	A	REVIEW AND COMMENTS	5/14/02	APPROVED BY:		

JOB No.AC-7336 PLOTTED:$$DATE$$ $$TIME$$
FILE SPEC.: $$$$FILENAME$$$$

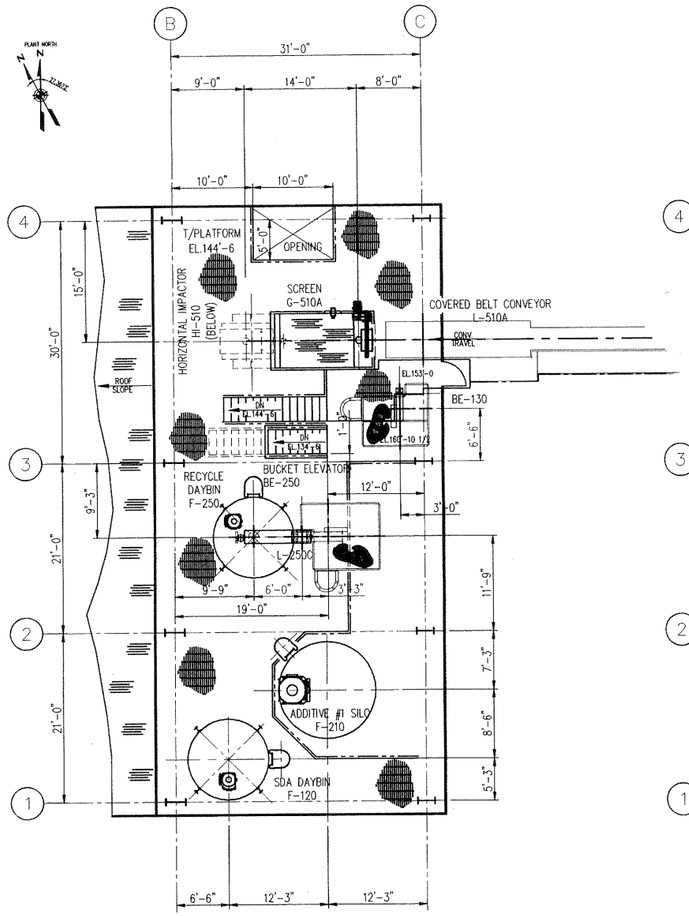
ENGINEERED BY
R.T. PATTERSON CO., INC.
ENGINEERS & CONSULTANTS
PITTSBURGH PA. ★ HIGHLAND IN. ★
EVANSVILLE IN. ★ CLEVELAND OH. ★

Universal Aggregates, LLC
4000 Brownsville Road
South Park, PA 15129

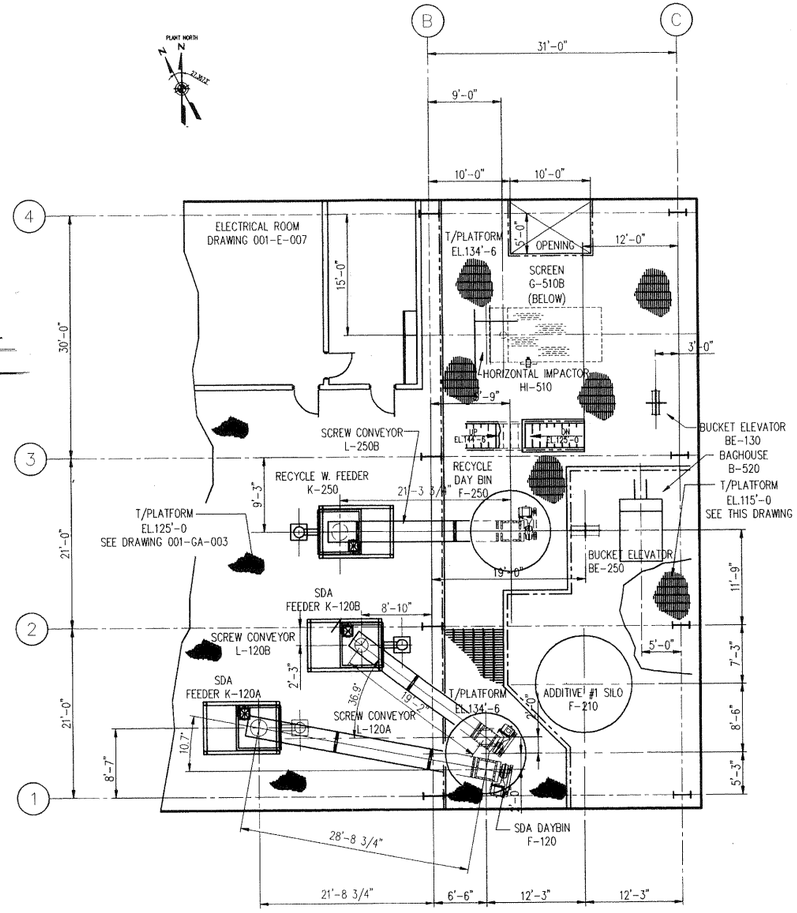
BIRCHWOOD POWER FACILITY
MANUFACTURED AGGREGATE PLANT
MAIN BLDG. LAYOUT
SECTION

SCALE	JOB NO.	DRAWN	DATE	FILENAME: 001-GA-004.DWG
1/8"=1'-0"	AC-7336	STU	1/15/02	PLOTTED: $$DATE$$

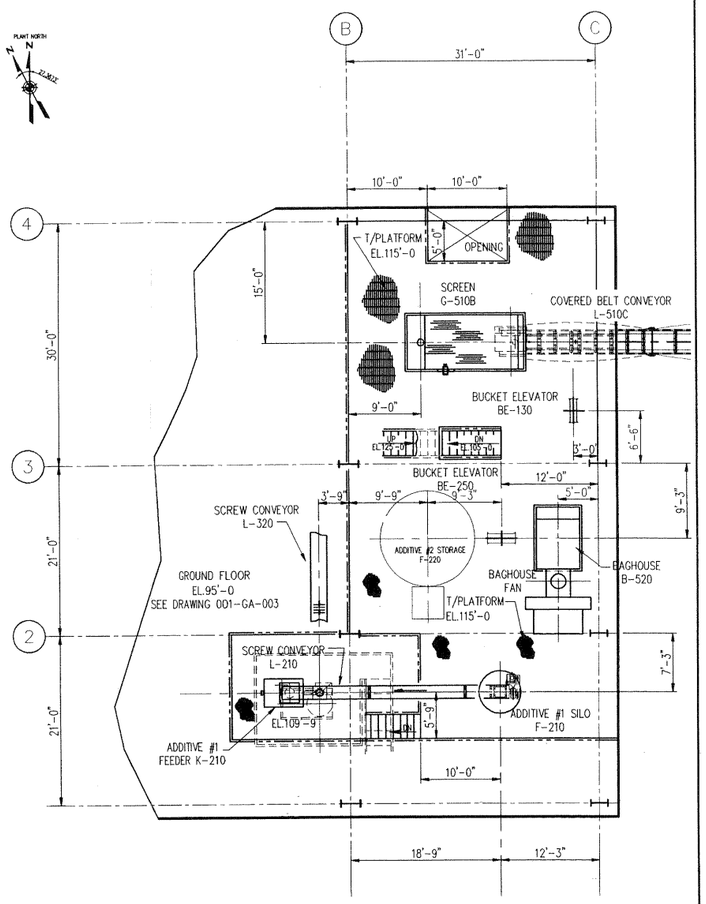
001-GA-006A | Rev. 0



SECTION D–D
T/PLATFORM
EL.144'-6



SECTION E–E
T/PLATFORM
EL.134'-6



SECTION F–F
T/PLATFORM
EL.115'-0

NOTE:
WORK THIS DRAWING WITH DRAWINGS 001-GA-003, 001-GA-004, AND 001-GA-006

REV.	DESCRIPTION	DATE
0	FOR CONSTRUCTION	

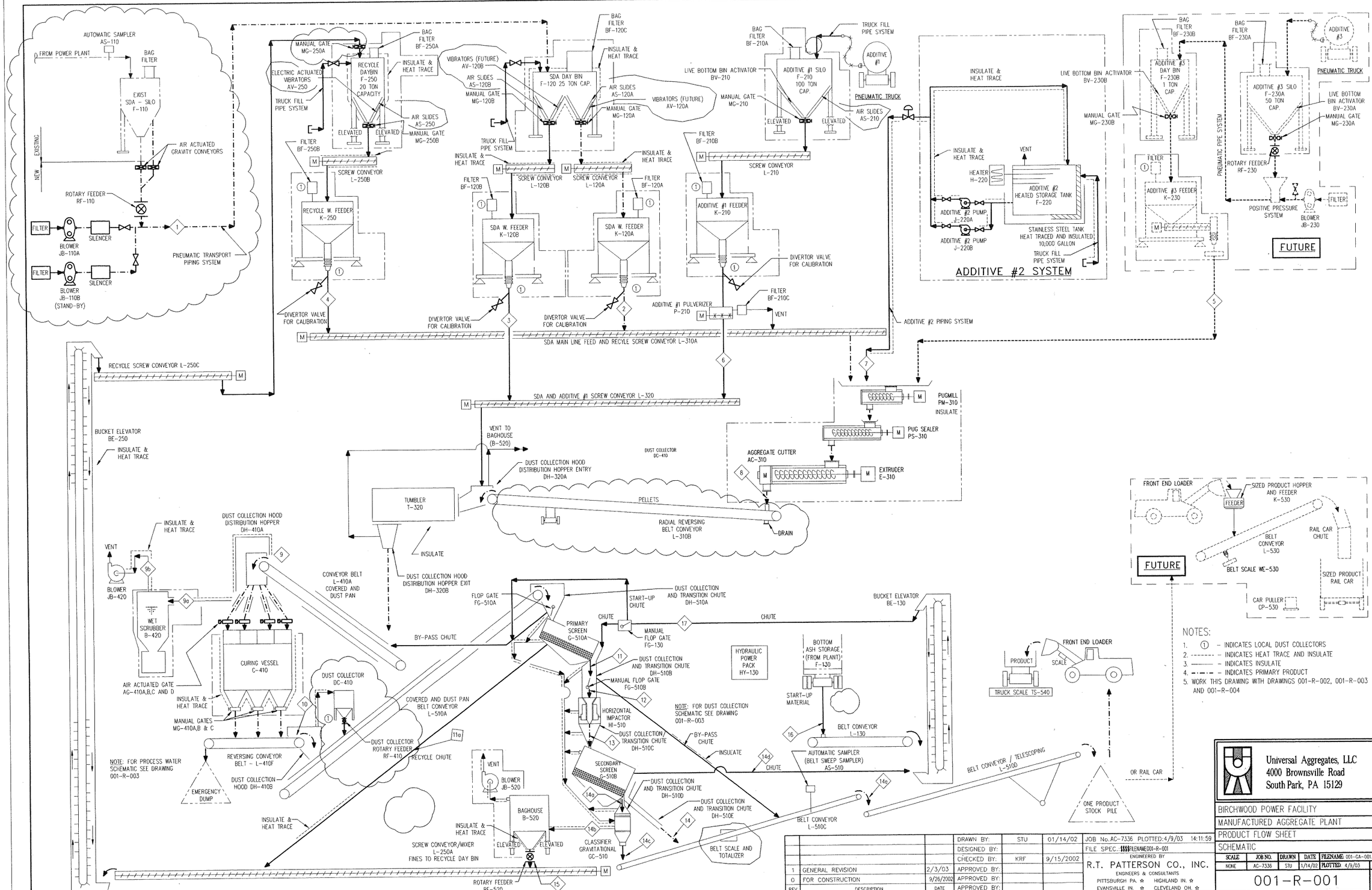
DRAWN BY:	KRF	02/06/02	JOB No.AC-7336 PLOTTED:4/9/03 14:11:07
DESIGNED BY:			FILE SPEC.: AC-7336\DRAWINGS\001-GA-007.DWG
CHECKED BY:			ENGINEERED BY
APPROVED BY:			R.T. PATTERSON CO., INC.
APPROVED BY:			ENGINEERS & CONSULTANTS
APPROVED BY:			PITTSBURGH PA. ☆ HIGHLAND IN. ☆ EVANSVILLE IN. ☆ CLEVELAND OH. ☆

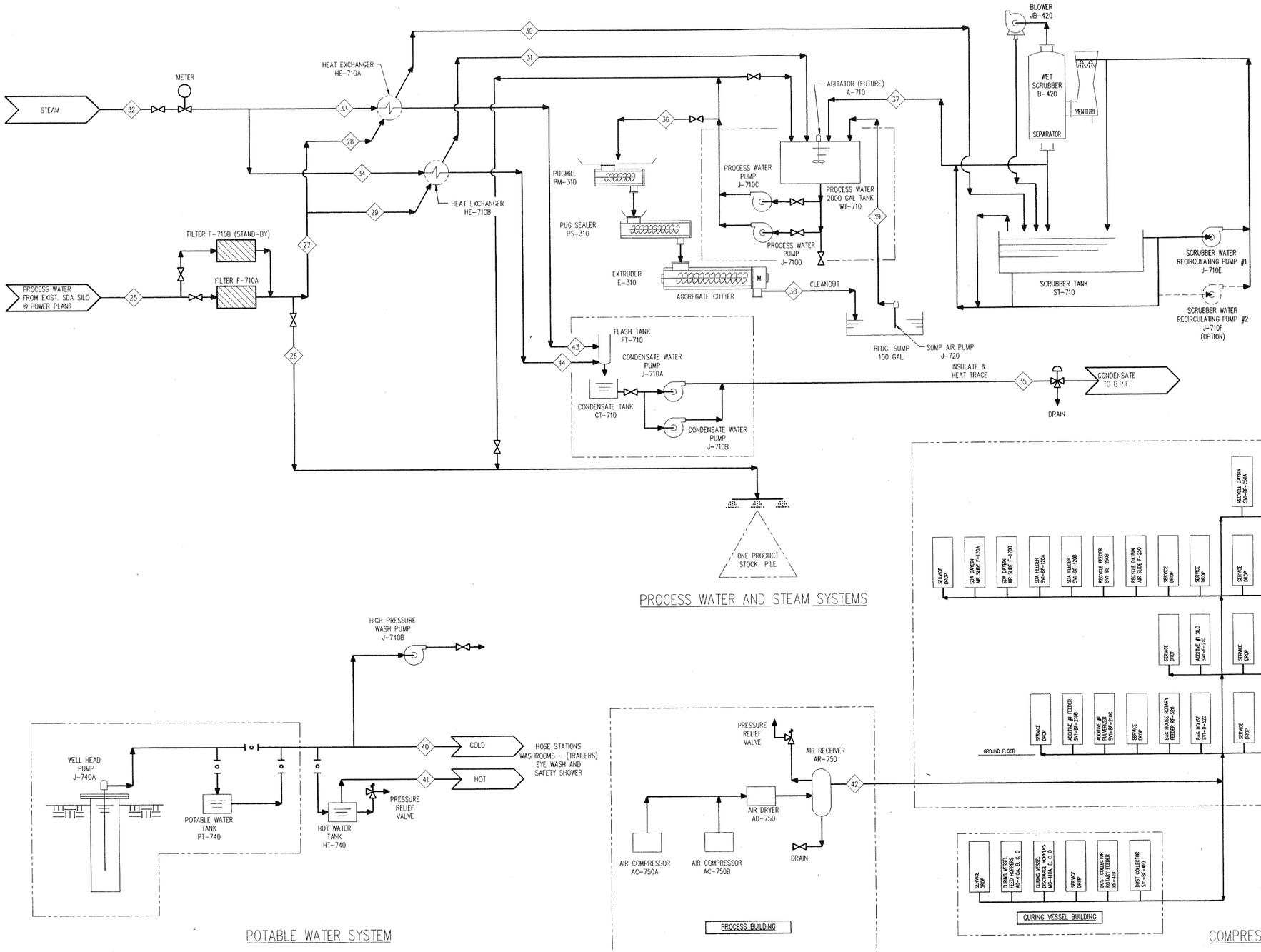
Universal Aggregates, LLC
4000 Brownsville Road
South Park, PA 15129

BIRCHWOOD POWER FACILITY
MANUFACTURED AGGREGATE PLANT
MAIN BLDG. LAYOUT
PLANS & SECTION

SCALE	JOB NO.	DRAWN	DATE	FILENAME: 001-GA-004.DWG
1/8"=1'-0"	AC-7336	STU	1/15/02	PLOTTED: 4/9/03

001-GA-007 | Rev. 0


AUTOMATIC SAMPLER AS-110
FROM POWER PLANT
BAG FILTER
EXIST. SDA - SILO F-110
NEW
EXISTING
AIR ACTUATED GRAVITY CONVEYORS
ROTARY FEEDER RF-110
FILTER
BLOWER JB-110A
SILENCER
BLOWER JB-110B (STAND-BY)
PNEUMATIC TRANSPORT PIPING SYSTEM
MANUAL GATE MG-250A
BAG FILTER BF-250A
ELECTRIC ACTUATED VIBRATORS AV-250
RECYCLE DAYBIN F-250 20 TON CAPACITY
INSULATE & HEAT TRACE
TRUCK FILL PIPE SYSTEM
ELEVATED
AIR SLIDES AS-250
MANUAL GATE MG-250B
FILTER BF-250B
SCREW CONVEYOR L-250B
RECYCLE W. FEEDER K-250
DIVERTOR VALVE FOR CALIBRATION
BAG FILTER BF-120C
VIBRATORS (FUTURE) AV-120B
AIR SLIDES AS-120B
MANUAL GATE MG-120B
SDA DAY BIN F-120 25 TON CAP.
AIR SLIDES AS-120A
MANUAL GATE MG-120A
VIBRATORS (FUTURE) AV-120A
TRUCK FILL PIPE SYSTEM
INSULATE & HEAT TRACE
SCREW CONVEYOR L-120B
SCREW CONVEYOR L-120A
FILTER BF-120B
FILTER BF-120A
SDA W. FEEDER K-120B
SDA W. FEEDER K-120A
DIVERTOR VALVE FOR CALIBRATION
DIVERTOR VALVE FOR CALIBRATION
SDA MAIN LINE FEED AND RECYCLE SCREW CONVEYOR L-310A
BAG FILTER BF-210A
TRUCK FILL PIPE SYSTEM
ADDITIVE #1
LIVE BOTTOM BIN ACTIVATOR BV-210
ADDITIVE #1 SILO F-210 100 TON CAP.
MANUAL GATE MG-210
ELEVATED
PNEUMATIC TRUCK
AIR SLIDES AS-210
FILTER BF-210B
SCREW CONVEYOR L-210
ADDITIVE #1 FEEDER K-210
DIVERTOR VALVE FOR CALIBRATION
ADDITIVE #1 PULVERIZER P-210
FILTER BF-210C
VENT
ADDITIVE #2 PIPING SYSTEM
INSULATE & HEAT TRACE
LIVE BOTTOM BIN ACTIVATOR BV-230B
MANUAL GATE MG-230B
HEATER H-220
VENT
ADDITIVE #2 HEATED STORAGE TANK F-220
ADDITIVE #2 PUMP J-220A
ADDITIVE #2 PUMP J-220B
STAINLESS STEEL TANK HEAT TRACED AND INSULATED 10,000 GALLON
TRUCK FILL PIPE SYSTEM
ADDITIVE #2 SYSTEM
BAG FILTER BF-230B
ADDITIVE #3 DAY BIN F-230B 1 TON CAP.
FILTER
ADDITIVE #3 FEEDER K-230
BAG FILTER BF-230A
ADDITIVE #3
PNEUMATIC TRUCK
ADDITIVE #3 SILO F-230A 50 TON CAP.
LIVE BOTTOM BIN ACTIVATOR BV-230A
MANUAL GATE MG-230A
ROTARY FEEDER RF-230
PNEUMATIC PIPE SYSTEM
POSITIVE PRESSURE SYSTEM
BLOWER JB-230
FILTER
FUTURE
RECYCLE SCREW CONVEYOR L-250C
BUCKET ELEVATOR BE-250
INSULATE & HEAT TRACE
VENT TO BAGHOUSE (B-520)
DUST COLLECTION HOOD DISTRIBUTION HOPPER ENTRY DH-320A
DUST COLLECTOR DC-410
TUMBLER T-320
INSULATE
DUST COLLECTION HOOD DISTRIBUTION HOPPER EXIT DH-320B
PELLETS
RADIAL REVERSING BELT CONVEYOR L-310B
DRAIN
SDA AND ADDITIVE #1 SCREW CONVEYOR L-320
PUGMILL PM-310
INSULATE
PUG SEALER PS-310
AGGREGATE CUTTER AC-310
EXTRUDER E-310
INSULATE & HEAT TRACE
VENT
BLOWER JB-420
WET SCRUBBER B-420
AIR ACTUATED GATE AG-410A,B,C AND D
DUST COLLECTION HOOD DISTRIBUTION HOPPER DH-410A
CONVEYOR BELT L-410A COVERED AND DUST PAN
CURING VESSEL C-410
INSULATE & HEAT TRACE
MANUAL GATES MG-410A,B & C
DUST COLLECTOR DC-410
DUST COLLECTOR ROTARY FEEDER RF-410
COVERED AND DUST PAN BELT CONVEYOR L-510A
RECYCLE CHUTE
REVERSING CONVEYOR BELT - L-410F
DUST COLLECTION HOOD DH-410B
EMERGENCY DUMP
NOTE: FOR PROCESS WATER SCHEMATIC SEE DRAWING 001-R-003
INSULATE & HEAT TRACE
VENT
BLOWER JB-520
BAGHOUSE B-520
ELEVATED
SCREW CONVEYOR/MIXER L-250A FINES TO RECYCLE DAY BIN
ROTARY FEEDER RF-520
FLOP GATE FG-510A
START-UP CHUTE
DUST COLLECTION AND TRANSITION CHUTE DH-510A
PRIMARY SCREEN G-510A
CHUTE
MANUAL FLOP GATE FG-130
BY-PASS CHUTE
DUST COLLECTION AND TRANSITION CHUTE DH-510B
MANUAL FLOP GATE FG-510B
HORIZONTAL IMPACTOR HI-510
DUST COLLECTION/ TRANSITION CHUTE DH-510C
SECONDARY SCREEN G-510B
DUST COLLECTION AND TRANSITION CHUTE DH-510D
DUST COLLECTION AND TRANSITION CHUTE DH-510E
CLASSIFIER GRAVITATIONAL GC-510
BELT SCALE AND TOTALIZER
HYDRAULIC POWER PACK HY-130
NOTE: FOR DUST COLLECTION SCHEMATIC SEE DRAWING 001-R-003
BOTTOM ASH STORAGE (FROM PLANT) F-130
START-UP MATERIAL
BELT CONVEYOR L-130
BY-PASS CHUTE
INSULATE
AUTOMATIC SAMPLER (BELT SWEEP SAMPLER) AS-510
BELT CONVEYOR L-510C
BUCKET ELEVATOR BE-130
BELT CONVEYOR / TELESCOPING L-510D
OR RAIL CAR
ONE PRODUCT STOCK PILE
FRONT END LOADER
PRODUCT
SCALE
TRUCK SCALE TS-540
FRONT END LOADER
SIZED PRODUCT HOPPER AND FEEDER K-530
FEEDER
RAIL CAR CHUTE
BELT CONVEYOR L-530
BELT SCALE WE-530
SIZED PRODUCT RAIL CAR
CAR PULLER CP-530
FUTURE
NOTES:
1. ① - INDICATES LOCAL DUST COLLECTORS
2. ------ - INDICATES HEAT TRACE AND INSULATE
3. ——— - INDICATES INSULATE
4. -·-·- - INDICATES PRIMARY PRODUCT
5. WORK THIS DRAWING WITH DRAWINGS 001-R-002, 001-R-003 AND 001-R-004
Universal Aggregates, LLC
4000 Brownsville Road
South Park, PA 15129
BIRCHWOOD POWER FACILITY
MANUFACTURED AGGREGATE PLANT
PRODUCT FLOW SHEET
SCHEMATIC
1 GENERAL REVISION 2/3/03
0 FOR CONSTRUCTION 9/26/2002
REV. DESCRIPTION DATE
DRAWN BY: STU 01/14/02
DESIGNED BY:
CHECKED BY: KRF 9/15/2002
APPROVED BY:
APPROVED BY:
APPROVED BY:
JOB No. AC-7336 PLOTTED: 4/9/03 14:11:59
FILE SPEC.: $$$$FILENAME001-R-001
ENGINEERED BY
R.T. PATTERSON CO., INC.
ENGINEERS & CONSULTANTS
PITTSBURGH PA. ☆ HIGHLAND IN. ☆
EVANSVILLE IN. ☆ CLEVELAND OH. ☆
SCALE: NONE
JOB NO.: AC-7336
DRAWN: STU
DATE: 1/14/02
PLOTTED: 4/9/03
FILENAME: 001-GA-001.DWG
Rev.: 1
001-R-001
SHEET 1 OF 2



NOTE:
1. WORK THIS DRAWING WITH DRAWINGS 001-R-001, 001-R-002 AND 001-R-004

REV.	DESCRIPTION	DATE
1	GENERAL REVISION	9/26/2002
0	FOR CONSTRUCTION	

DRAWN BY:	KRF	5/2/02	
DESIGNED BY:			
CHECKED BY:	KRF	9/16/02	
APPROVED BY:			
APPROVED BY:			

JOB No. AC-7336 PLOTTED: 4/9/03 14:12:36
FILE SPEC:...336\DRAWINGS\001-R-003.DWG

ENGINEERED BY
R.T. PATTERSON CO., INC.
ENGINEERS & CONSULTANTS
PITTSBURGH PA. ☆ HIGHLAND IN. ☆
EVANSVILLE IN. ☆ CLEVELAND OH. ☆

Universal Aggregates, LLC
4000 Brownsville Road
South Park, PA 15129

BIRCHWOOD POWER FACILITY
MANUFACTURED AGGREGATE PLANT
UTILITY FLOW DIAGRAMS
PROCESS & POTABLE WATER & COMP. AIR

SCALE	JOB NO.	DRAWN	DATE	FILENAME 001-R-003.DWG	
NONE	AC-7336	STU	5/2/02	PLOTTED 4/9/03	Rev.

001-R-003 | 1

VALUES REPRESENT DESIGN RATES FOR 1 OPERATING LINE PRODUCING LIGHTWEIGHT AGGREGATE

STREAM / LINE No.	1	2	3	4	◇	6	7	8	9	9a	9b	10	11	11a	12	13	14	14a
MATERIAL / FUNCTION	SDA	SDA	SDA	RECYCLE		ADDITIVE #1	ADDITIVE #2	PELLETS	PELLETS AND EMBEDDING	CURING VESSEL VENT	SCRUBBER VENT	PRODUCT AND EMBEDDING	SCREENED PRODUCT	RECYCLE	PRODUCT AND OVERSIZE	CRUSHED PRODUCT	PRODUCT 1/4x16MESH	PRODUCT MINUS 16MESH
TOTAL																		
TOTAL LB. / HR. OPERATING	37,500 TO 62,500	21,750 TO 36,250	15,675 TO 26,125	25,350 TO 42,250		2,595 TO 4,325	275 TO 455	59,500 TO 99,175	77,850 TO 129,750	760 TO 1,270		77,085 TO 128,475	57,950 TO 96,600	19,125 TO 31,880	66,065 TO 110,110	66,065 TO 110,110	44,200 TO 73,600	17,500 TO 29,200
SOLIDS																		
LB. / HR.	36,750 TO 61,250																	
LIQUID FLOW																		
LB. / HR.	750 TO 1,250						275 TO 455											
GPM	1 TO 3																	
GAS																		
SCFM.																		
LB. / HR.																		
BULK DENSITY @ CONDITIONS LB. / FT.^{3}	36	36	36	40		.65	52.5	60	70			65	58	58	58	58	58	
TEMPERATURE ° F	125°	125°	125°	80°		60°	160°	154°	148°	165°		165°	80°					

VALUES REPRESENT DESIGN RATES FOR 1 OPERATING LINE PRODUCING LIGHTWEIGHT AGGREGATE

STREAM / LINE No.	14b	14c	14d	14e	15	16	17
MATERIAL / FUNCTION	PRODUCT MINUS 100MESH	PRODUCT +100MESH	PRODUCT +1/4"	PRODUCT 1/4x100MESH	FINES TO RECYCLE	BOT. ASH	OVERSIZE TO CRUSHER
TOTAL							
TOTAL LB. / HR. OPERATING	6,220 TO 10,360	11,290 TO 18,820	4,360 TO 7,270	55,490 TO 92,475	6,215 TO 10,360	3,750 TO 6,250	8,110 TO 13,520
SOLIDS							
LB. / HR.							
LIQUID FLOW							
LB. / HR.							
GPM							
GAS							
SCFM.							
LB. / HR.							
BULK DENSITY @ CONDITIONS LB. / FT.^{3}						50	
TEMPERATURE ° F					80°		

VALUES REPRESENT DESIGN RATES PROCESS WATER & DRAINS

STREAM / LINE No.	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
MATERIAL / FUNCTION	PROCESS WATER SUPPLY	PROCESS WTR. TO STOCK PILE	VACUUM SYS. A & B	STEAM TO HEAT EXCH. HE-240A	STEAM TO HEAT EXCH. HE-240B	WATER TO SCRUBBER	WATER TO TANK WT-720	STEAM SUPPLY	TO FLASH TANK FT-240	TO FLASH TANK FT-240	CONDENSATE	TO PUGMILL PM-310	SCRUBBER DRAIN TO TANK WT-720	AGG. CUTTER DRAIN TO BLDG. SUMP	RECIRC. FROM SUMP TANK WT-720
TOTAL															
TOTAL LB. / HR. OPERATING															
SOLIDS															
LB. / HR.															
LIQUID FLOW															
LB. / HR.				555 TO 925	2,700 TO 4,500		12,130 TO 20,220	3,250 TO 5,420							
GPM	35 TO 60		23 TO 38			13 TO 17	24 TO 40				7 TO 10				
GAS															
SCFM.															
LB. / HR.															
BULK DENSITY @ CONDITIONS LB. / FT.^{3}															
TEMPERATURE ° F			180°	150°	196°		140°	567°							

VALUES REPRESENT DESIGN RATES FOR POTABLE WATER & COMPRESSED AIR

STREAM / LINE No.	40	41	42	X	X
MATERIAL / FUNCTION	COLD WELL WATER	HEATED WELL WATER	COMPRESSED AIR FROM RECEIVER		
TOTAL					
LB. / HR.					
SOLIDS					
LB. / HR.					
LIQUID FLOW					
LB. / HR.					
GPM					
GAS					
SCFM.					
LB. / HR.					
BULK DENSITY LB. / FT.^{3}					
TEMPERATURE ° F					

NOTE:
WORK THIS DRAWING WITH DRAWING 001-R-001

REV.	DESCRIPTION	DATE
0		

DRAWN BY:	RGC	3/21/03
DESIGNED BY:		
CHECKED BY:		
APPROVED BY:		
APPROVED BY:		
APPROVED BY:		

JOB No.AC-7336 PLOTTED:4/4/03 07:49:11
FILE SPEC.: J:\ES\AC-7336\DRAWINGS\001-R-019.DWG

ENGINEERED BY
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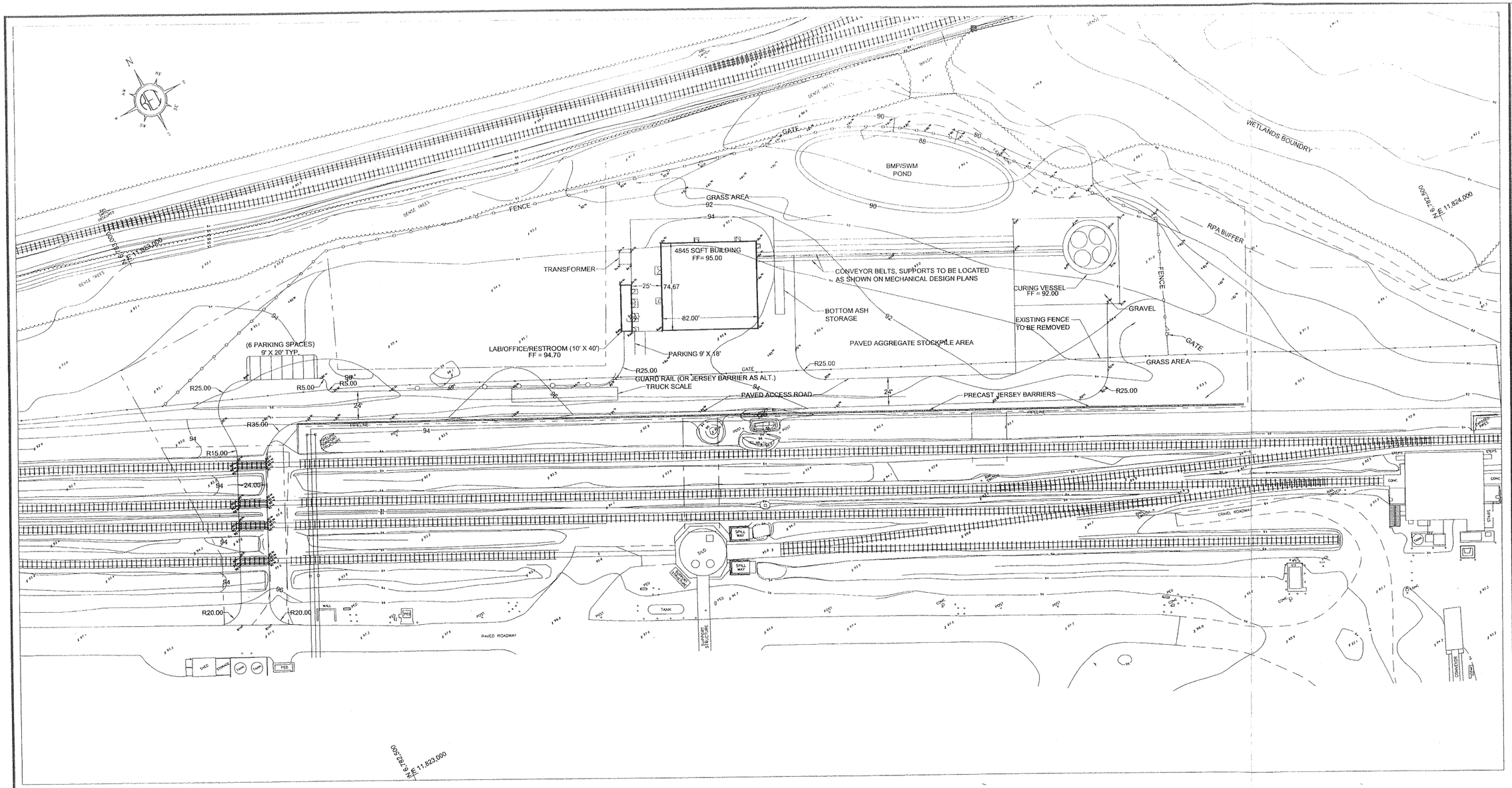
EVANSVILLE IN. ☆ CLEVELAND, OH. ☆

Universal Aggregates, LLC
4000 Brownsville Road
South Park, PA 15129

BIRCHWOOD POWER FACILITY
MANUFACTURED AGGREGATE PLANT
PRODUCT DESIGN
FLOW RATE RANGES

SCALE	JOB NO.	DRAWN	DATE	FILENAME: 001-R-019.DWG	
NONE	AC-7336	RGC	3/21/03	PLOTTED: 4/4/03	Rev.

001-R-019



CONTROLLED FILLS:
1.) CONTROLLED COMPACTION SHALL OCCUR IN ALL SUBGRADE AREAS FOR PAVEMENT, TRENCHES FOR UTILITIES, AND IN ANY OTHER AREA SO DESIGNATED ON THE DRAWINGS.
2.) CONTROLLED FILLS MUST BE COMPACTED TO A MINIMUM OF 95%, WITH THE FINAL 1' OF FILL BEING COMPACTED TO 100% OF MAXIMUM STANDARD PROCTOR DRY DENSITY AS DETERMINED BY METHODS AASHTO-T99 OR ASTM-D698. DENSITY MUST BE VERIFIED BY A QUALIFIED GEOTECHNICAL ENGINEER.

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

BEFORE DIGGING CALL "MISS UTILITY" OF VIRGINIA AT 1-800-552-7001

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www.rickmond.com

Designed By: JDD | Drawn By: LDB | Scale: 1" = 40' | Date: 8/19/02

COMMONWEALTH OF VIRGINIA
PAUL A. BERNARD
No. 012668
PROFESSIONAL ENGINEER

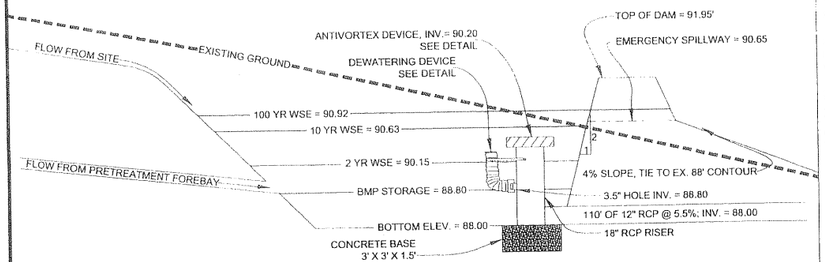
No.	By	Revision	App.	Date
01	JDD	REVISIONS PER COUNTY COMMENTS	PAB	10/14/02

UNIVERSAL AGGREGATES
BIRCHWOOD MANUFACTURED AGGREGATE PLANT
GRADING PLAN

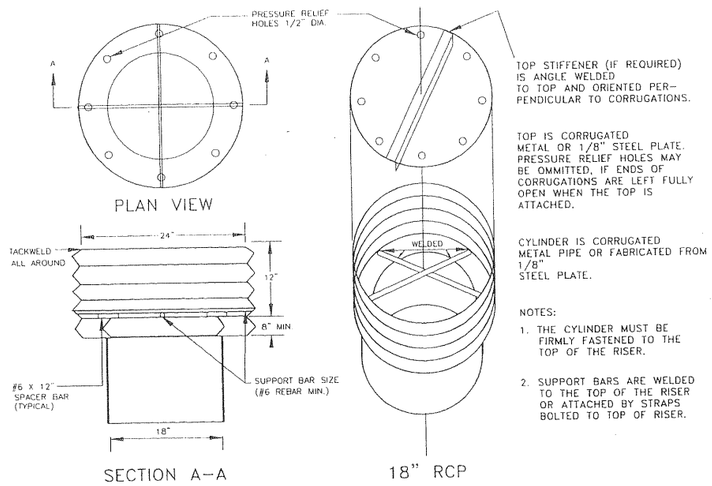
POTOMAC MAGISTERIAL DISTRICT KING GEORGE COUNTY, VA.

Job Number	Sheet No.
02507	5 OF 11

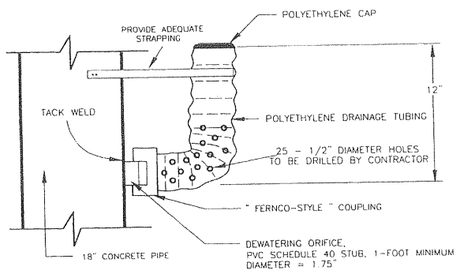
STORMWATER MANAGEMENT / BEST MANAGEMENT PRACTICE POND

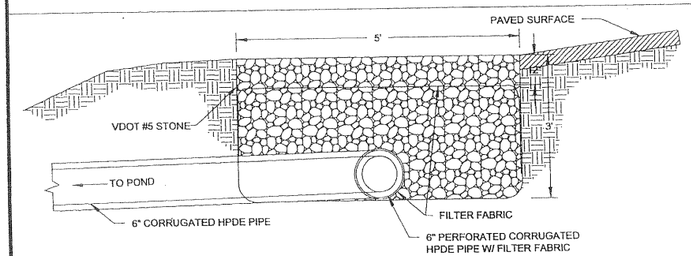


ANTI-VORTEX DEVICE DESIGN



DEWATERING DEVICE FOR OUTFALL STRUCTURE





SEDIMENT REMOVAL FOREBAY
NOT TO SCALE

BEST MANAGEMENT PRACTICE NARRATIVE

1. PROJECT DESCRIPTION
THIS PROJECT CONSISTS OF APPROXIMATELY 71,154 SQFT OF IMPERVIOUS AREA ON A SITE OF 3.87 ACRES. THIS IMPERVIOUS AREA INCLUDES AN ENTRANCE ROAD WHICH CROSSES THE EXISTING RAILROAD TRACKS IN AN ACCESS EASEMENT.

2. BMP REQUIREMENTS
BMP MEASURES ARE REQUIRED FOR THIS PROJECT TO MEET THE CHESAPEAKE BAY WATERSHED POLLUTANT REMOVAL STANDARDS. BASED ON THE "PERFORMANCE BASED WATER QUALITY CALCULATIONS" (SEE CALCULATIONS, THIS SHEET), THIS SITE MUST MEET A REMOVAL EFFICIENCY OF 61.8%.

3. PROPOSED BMP MEASURES
ACCORDING TO THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK THE USE OF AN INFILTRATION BASIN WILL ACHIEVE A POLLUTANT REMOVAL RATE OF 65% IF THE VOLUME IS SIZED TO CAPTURE AND TREAT THE FIRST 1" OF RAINFALL RUNOFF FROM THE SITE'S IMPERVIOUS AREA. USING THIS TO CALCULATE THE WATER QUALITY VOLUME (WQV), THE PROPOSED BMP MEASURE NEEDS TO CAPTURE 5,930 CUBIC FEET OF RUNOFF. THIS MEASURE WILL ALSO INCLUDE THE USE OF A SEDIMENT REMOVAL FOREBAY WHICH WILL STORE THE FIRST 1/4" OF RAINFALL RUNOFF.

THE RUNOFF FROM THE PROPOSED STRUCTURES AND PAVED AREAS IS TO BE CAPTURED IN THE PROPOSED SEDIMENT REMOVAL FOREBAY, AND THEN WILL BE CONVEYED BY EITHER A PIPE SUBDRAIN OR SHEET FLOW TO THE PROPOSED INFILTRATION POND.

THE PROPOSED SEDIMENT REMOVAL FOREBAY WILL BE A TRENCH 5' WIDE AND 3' DEEP CONTAINING VDOT #5 STONE AND AN UNDERDRAIN SYSTEM (SEE DETAIL, THIS SHEET) THE PROPOSED FOREBAY SHALL ALSO HAVE A LAYER OF FILTER FABRIC AT A DEPTH OF 12". THIS SEDIMENT REMOVAL FOREBAY WILL HAVE A VOLUME OF APPROXIMATELY 1,480 CUBIC FEET, STORING THE FIRST 1/4" OF STORMWATER RUNOFF FROM THE PROPOSED IMPERVIOUS SURFACE.

THE PROPOSED INFILTRATION POND SHALL HAVE A BOTTOM AREA OF 8,000 SQUARE FEET AT ELEVATION 88.00, AND A SIDE SLOPE OF 2:1. THIS POND WILL STORE THE FIRST INCH OF STORMWATER RUNOFF FROM THE IMPERVIOUS SURFACES IN 0.80 FEET OF DEPTH. THIS VOLUME OF WATER WILL INFILTRATE INTO THE SOILS OVER A PERIOD OF 12 HOURS. THIS DRAWDOWN TIME WAS CALCULATED USING AN INFILTRATION RATE OF 75 MINUTES PER INCH, WHICH WAS DETERMINED BY TEST PIT AND SOIL BORING COMPLETED BY GEOENVIRONMENTAL SERVICES, INC. SOIL DESCRIPTIONS ARE PROVIDED IN THE SITE PLAN SUPPORTING DOCUMENTATION REPORT.

PERFORMANCE BASED WATER QUALITY CALCULATIONS

BASED ON THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK APPENDIX 5D

APPLICABLE AREA (A) = 3.57 ACRES
POST DEVELOPMENT IMPERVIOUS COVER = 1.82 ACRES
PERCENTAGE OF POST DEVELOPMENT AREA WHICH IS IMPERVIOUS (IP) = 50.9%

AVERAGE EXISTING LAND COVER OR EXISTING IMPERVIOUS COVER (IW) = 16%
(THIS IS BASED ON THE CHESAPEAKE BAY WATERSHED DEFAULT VALUE)

(IP) 50.9% > (IW) 16%
POST DEVELOPMENT IMPERVIOUS AREA (IP) IS GREATER THAN THE EXISTING VALUE OR DEFAULT WATERSHED VALUE (IW).

DETERMINE THE PREDEVELOPMENT POLLUTANT LOAD:
LOAD PREDEVELOPMENT (LPRE) = [0.05+(0.009 X IW)] X A X 2.28 = 1.58 LBS PER YEAR

DETERMINE THE POST DEVELOPMENT POLLUTANT LOAD:
LOAD POST DEVELOPMENT ((LPOST) = [0.05+(0.009 X IP)] X A X 2.28 = 4.135 LBS PER YEAR

DETERMINE THE RELATIVE POLLUTANT REMOVAL REQUIREMENT (RR):
RR = LPOST - LPRE = 4.135 - 1.58 = 2.55 LBS PER YEAR

REMOVAL EFFICIENCE REQUIRED (EFF) = (RR / LPOST) X 100 = 61.8%

IN ACCORDANCE WITH THE WATER QUALITY BMP POLLUTANT REMOVAL EFFICIENCIES (TABLE 3.10-2 OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK), USING AN INFILTRATION POND WHICH WILL STORE A VOLUME OF 1" TIMES THE IMPERVIOUS AREA WILL ACHIEVE A REMOVAL EFFICIENCY OF 65%.

STORMWATER MANAGEMENT NARRATIVE

STORMWATER MANAGEMENT PURPOSE
THE STORMWATER MANAGEMENT POND WAS DESIGNED SO THAT POST DEVELOPMENT RUNOFF WAS LESS THAN PREDEVELOPMENT RUNOFF.

STORMWATER MANAGEMENT
PEAK SHAVING WILL BE DONE THROUGH THE USE OF STORAGE AND CONTROLLED DISCHARGE. THE PROPOSED POND CAPTURES 73.61% OF THE TOTAL LEASE AREA AND 78.50% OF THE PROPOSED IMPERVIOUS AREA. THE DISCHARGE WILL BE CONTROLLED BY A MULTISTAGE DISCHARGE DEVICE (SEE DETAIL, THIS SHEET) WHICH WILL CONSIST OF AN 18" CONCRETE RISER PIPE WITH A 1.75" HOLE AT 88.80'. THE RISER PIPE WILL BE DRAINED BY A 12" RCP WHICH WILL DISCHARGE INTO THE STREAM NORTHEAST OF THE SITE. BENEATH THE 1.75" HOLE, THE PROPOSED POND WILL STORE THE BMP WATER QUALITY VOLUME, WHILE THE ENTIRE 2 AND PART OF THE 10 YEAR STORMS WILL PASS THROUGH THE 1.75" HOLE AT A RATE LOW ENOUGH TO RESTRICT THE POST DEVELOPMENT RUNOFF TO LESS THAN THE PREDEVELOPMENT RUNOFF. THE TOP OF THE 18" RISER WILL BE BELOW THE 10 YEAR STORM WATER SURFACE ELEVATION AND WILL BE USED TO PASS THE 10 YEAR STORM AS WELL AS ANY STORM OF GREATER INTENSITY. IN ADDITION TO THE 18" RISER, THERE IS A 50' EMERGENCY SPILLWAY IN THE DAM WHICH WILL PASS THE 100 YEAR STORM IN CASE OF A FAILURE IN THE OUTLET DEVICE.

ALL RUNOFF, HYDROGRAPH, AND POND STORAGE/DISCHARGE CALCULATIONS WERE DONE IN *HYDRAFLOW HYDROGRAPHS 6.02* (SEE GRAPHS THIS SHEET, AND REPORT SUBMITTED SEPARATELY).

STORMWATER MANAGEMENT MAINTENANCE

THE MAINTENANCE OF THE BMP/SWM POND AND SEDIMENT REMOVAL FOREBAY SHALL BE DONE BY UNIVERSAL AGGREGATES TWICE ANNUALLY, AND SHALL CONSIST OF THE FOLLOWING:
1) VISUAL INSPECTION OF THE FILTER FABRIC IN THE SEDIMENT REMOVAL FOREBAY TO ENSURE IT HAS NOT BECOME CLOGGED TO AN EXTENT WHICH WOULD PREVENT ITS PROPER FUNCTION.
2) VISUAL INSPECTION OF THE POND OUTLET STRUCTURE TO ENSURE IT HAS NOT BEEN DAMAGED AND HAS NOT BECOME CLOGGED WITH SEDIMENT TO AN EXTENT WHICH WOULD PREVENT ITS PROPER FUNCTION.
3) VISUAL INSPECTION OF THE BMP/SWM POND DAM TO ENSURE NO EROSION OR DAMAGE HAS OCCURRED.

IF THE INSPECTIONS FIND THAT ANY OF THE BMP/SWM FACILITIES ARE NOT PROPERLY FUNCTIONAL, MEASURES SHALL BE TAKEN TO RESTORE THEM TO THEIR DESIGNED FUNCTIONAL LEVEL. ANY SEDIMENT REMOVED DURING THE STORMWATER MANAGEMENT MAINTENANCE WILL BE DISPOSED OF IN AN ENVIRONMENTALLY SOUND MANNER.

INPUT DATA FOR STORMWATER MANAGEMENT

PREDEVELOPMENT RUNOFF

AREA	4.588 ACRES
RCN	49
TIME OF CONCENTRATION	14.14 MINUTES
2 YEAR 24 HOUR STORM	3.5 INCHES
10 YEAR 24 HOUR STORM	6 INCHES
2 YEAR STORM PEAK RUNOFF	0.18 CFS
10 YEAR STORM PEAK RUNOFF	5.35 CFS

POST DEVELOPMENT RUNOFF TO BYPASS POND

AREA	1.996 ACRES
RCN	49
TIME OF CONCENTRATION	11.00 MINUTES
2 YEAR 24 HOUR STORM	3.5 INCHES
10 YEAR 24 HOUR STORM	6 INCHES
2 YEAR STORM PEAK RUNOFF	0.08 CFS
10 YEAR STORM PEAK RUNOFF	2.72 CFS

POST DEVELOPMENT RUNOFF CAPTURED BY POND

AREA	2.592 ACRES
RCN	81
TIME OF CONCENTRATION	3.5 MINUTES
2 YEAR 24 HOUR STORM	3.5 INCHES
10 YEAR 24 HOUR STORM	6 INCHES

ALLOWABLE 2 YEAR STORM DISCHARGE = 0.18 CFS - 0.08 CFS = 0.10 CFS
ACTUAL 2 YEAR STORM DISCHARGE FROM POND = 0.09 CFS
ALLOWABLE 10 YEAR STORM DISCHARGE = 5.35 CFS - 2.72 CFS = 2.63 CFS
ACTUAL 10 YEAR STORM DISCHARGE FROM POND = 2.48 CFS

FOR CALCULATIONS AND OUTPUT FOR RUNOFF RATES, SEE GRAPHS ON THIS SHEET AND DOCUMENT SUBMITTED SEPARATELY.
FOR POND ROUTING CALCULATIONS AND OUTPUT, SEE GRAPHS ON THIS SHEET AND DOCUMENT SUBMITTED SEPARATELY.

BEFORE DIGGING CALL "MISS UTILITY" OF VIRGINIA AT 1-800-552-7001

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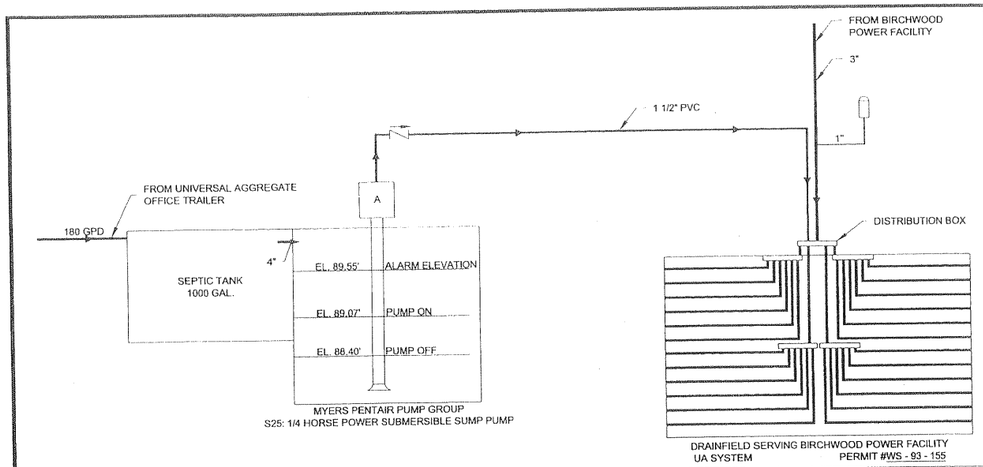
Date: 8/19/02
Scale: NTS
Drawn By: LDB
Designed By: JDD

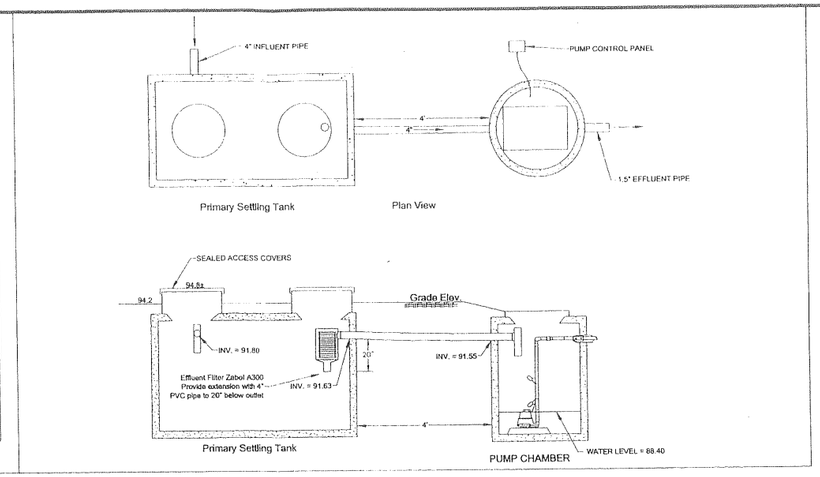
COMMONWEALTH OF VIRGINIA
PAUL A. BERNARD
No. 012668
PROFESSIONAL ENGINEER

No.	By	Revision	Date
01	JDD	REVISIONS PER COUNTY COMMENTS	PAB 10/14/02
			App.

UNIVERSAL AGGREGATES
BIRCHWOOD MANUFACTURED AGGREGATE PLANT
SWM/BMP DETAILS & COMPUTATIONS
POTOMAC MAGISTERIAL DISTRICT KING GEORGE COUNTY, VA.

Job Number 02507
Sheet No. 6 OF 11





UNIVERSAL AGGREGATES BIRCHWOOD MANUFACTURED AGGREGATE PLANT
KING GEORGE COUNTY, VIRGINIA
WASTEWATER TREATMENT THEORY OF DESIGN/OPERATION

THE UA FACILITY IS AN INDUSTRIAL SITE THAT WILL EMPLOY 9 EMPLOYEES SPREAD OVER 3 SHIFTS TO COVER 24-HOURS OF OPERATION. THE SANITARY WASTEWATER PROCESS FOR THIS FACILITY WILL BE INTEGRATED INTO THE EXISTING DRAINFIELD DISPOSAL SYSTEM CURRENTLY SERVING THE BIRCHWOOD POWER FACILITY (KING GEORGE HEALTH DEPT. PERMIT WS-93-155). A RECENT STUDY HAS SHOWN THAT THE TYPICAL WASTEWATER LOADING FROM THE CURRENT OPERATIONS, COVERING 65 EMPLOYEES OVER VARIOUS SHIFTS, IS BETWEEN 15 AND 18 GALLONS PER DAY PER EMPLOYEE SHIFT, TOTALING BETWEEN 585 AND 694 GALLONS PER DAY TO THE EXISTING DRAINFIELD WHICH HAS A 3000 GALLON PER DAY CAPACITY. THE DOSING VOLUME OF THE EXISTING FACILITIES IS APROXIMATELY 55% OF THE DRAINFIELD DISTRIBUTION SYSTEM CAPACITY.

THE PROJECTED PEAK FLOWS FOR THE PROPOSED UA FACILITY IS 180 GALLONS PER DAY THAT WILL BE GENERATED FROM ONE BATHROOM FACILITY AND ONE LAB SINK TO BE LOCATED IN A MODULAR OFFICE TRAILER.

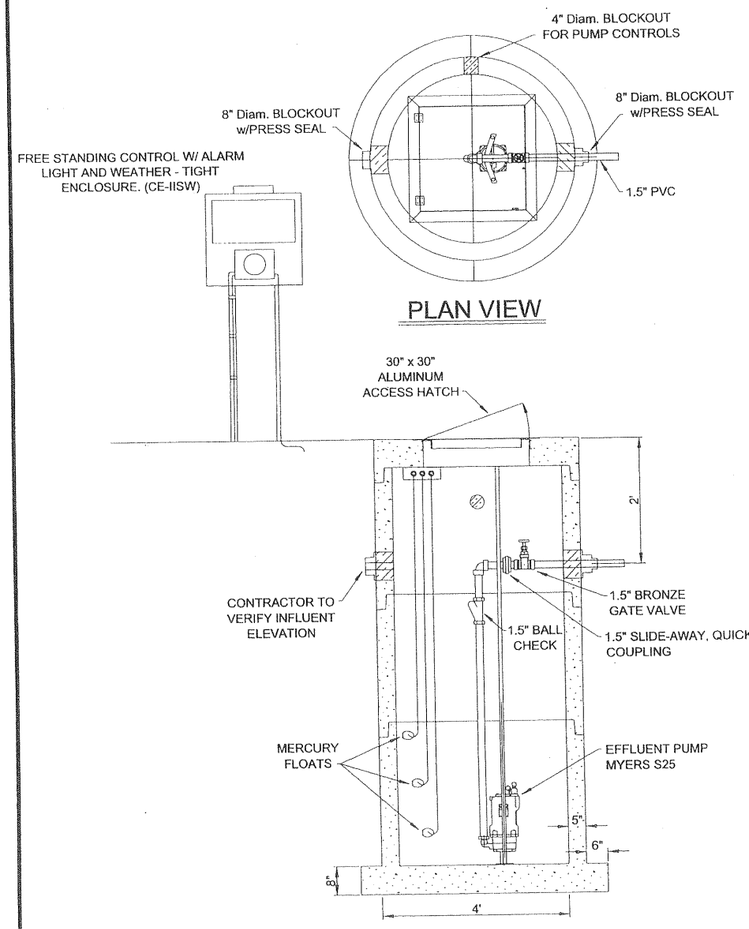
WASTEWATER WILL FLOW FROM THE OFFICE TRAILER BY GRAVITY TO A 1000-GALLON SEPTIC TANK LOCATED 10 FEET FROM THE TRAILER. THE EFFLUENT FROM THE SEPTIC TANK WILL FLOW THROUGH A SOLIDS FILTER UNIT INTO AN EFFLUENT PUMP/DOSING CHAMBER THAT WILL BE CONTROLLED BY WATER LEVEL SENSORS AT PRE-DETERMINED DOSING AMOUNTS EQUAL TO ONE THIRD THE PEAK DAILY FLOW, 60 GALLONS. THIS WILL ADD APPROXIMATELY 6 % TO THE 55% OF THE DRAINFIELD DISTRIBUTION CAPACITY BEING PUMPED BY THE BIRCHWOOD FACILITY FOR A TOTAL OF 61%.

THE EFFLUENT WILL BE PUMPED FROM THE DOSING CHAMBER THROUGH A 1.5-INCH PVC PIPE TO THE EXISTING PRIMARY DISTRIBUTION TANK. FROM THERE THE EFFLUENT WILL COMBINE WITH THE BIRCHWOOD FLOW FOR EQUAL DISTRIBUTION TO THE SECONDARY DISTRIBUTION BOXES AND FINALLY TO THE 2400 LINEAR FEET OF DISTRIBUTION PIPE.

THE WATER LEVELS IN THE PUMP/DOSING CHAMBER OF THE UA FACILITY ARE TO BE MONITORED BY LEVEL SENSORS CONNECTED TO THE PUMP CONTROL PANEL. AS THE WATER SURFACE REACHES THE PREDETERMINED DEPTH, THE PUMP IS ACTIVATED AND CONTINUES TO PUMP UNTIL THE DOSING VOLUME IS DISCHARGED, AS INDICATED BY THE PUMP-OFF LEVEL SWITCH. THE PUMP CONTROLS ARE TO BE LOCATED IN A WEATHER TIGHT NEMA 4X PANEL, MOUNTED ON A POWER POLE IN CLEAR VISIBILITY OF THE PUMP CHAMBER AND THE OFFICE TRAILER. ALL ELECTRICAL CONNECTIONS ARE TO BE HARD-WIRED BY A QUALIFIED ELECTRICIAN PROVIDED BY THE CONTRACTOR.

THE PUMP IS TO BE A MYERS S25, ¼ HORSEPOWER EFFLUENT PUMP, OR APPROVED EQUAL, MADE FOR PUMPING WASTEWATER EFFLUENT. THE PUMP REQUIRES 115-V, 9-AMP, SINGLE-PHASE POWER. IN THE EVENT ANY MALFUNCTION OCCURS WITH THE PUMP, IT IS TO BE INSTALLED WITH A PRESSURE RATED QUICK-DISCONNECT COUPLING AND A GATE VALVE ON THE FORCE MAIN SIDE OF THE COUPLING SO THAT THE PUMP CAN BE READILY REMOVED FOR REPAIR OR REPLACEMENT. A CHECK VALVE IS TO BE LOCATED BETWEEN THE PUMP AND UNION COUPLING. A SPARE PUMP IS TO BE MAINTAINED ON THE SITE AS A BACKUP.

THE FORCE MAIN PIPE FROM THE PUMP CHAMBER TO THE EXISTING DISTRIBUTION BOX IS TO BE SCHEDULE 80 PVC WITH GLUED FITTINGS. THE CONTRACTOR IS TO LOCATE THE DISTRIBUTION BOX PRIOR TO PLACING THE FORCE MAIN PIPE. CONNECTION TO THE BOX SHALL BE BY BORING A HOLE THROUGH THE BOX, INSERTING THE PIPE THROUGH THE BOX WALL AND SECURELY GROUTING THE PIPE IN PLACE. THE GROUT SHALL BE A NON-SHRINK EPOXY GROUT SUITABLE FOR BONDING WITH PVC AND CONCRETE.



NOTES:
1. PUMP CHAMBER TO BE PRECAST MANHOLE OR PUMP VAULT W/ FLAT SLAB TOP W/ ALUM. ACCESS HATCH.
2. CONTROL PANEL SUPPLIED BY CONTRACTOR FOR ON-SITE INSTALLATION AND ELECTRICAL HOOK-UP BY CONTRACTORS ELECTRICIAN.

Pump System Design Criteria, Specifications, and Calculations

	Number of bedrooms	0	
A	Number of Occupants (Industrial/Commercial Use)	9	
B	Gallons Per Occupant	20	
C	Design flow in gallons per day (A x B)	180	gpd
D	Minimum pump capacity in gallons per minute using 1.5" force main	11	gpm
E	Maximum pump capacity in gallons per minute using 1.5" force main	35	gpm
F	Relative elevation of force main at surge basin - distribution box	93.5	
G	Relative elvation of pump off float switch	88.4	
H	Static head in feet (F-G)	5	
I	Equivalent length of 1.5" pipe in feet for this system(all materials are 1.5")		
1.	Length of 1.5" force main	161	
2.	1 90 degree bends (7 per bend)	7	
3.	0 45 degree bends (4 per bend)	0	
4.	1 check valve	28	
5.	1 gate valve	2	
	Total (1+2+3+4+5)	198	
J	Friction loss per 100 of 1.5" pipe (C=120, @ 18 gpm)	5.37	feet/100'
K	Number of 100' pipe increments (I/100)	1.98	
L	Friction head for this system (J*K)	10.43	
M	Total Dynamic Head (H+L)	15.53	
N	Pump chamber volume in gallons	484	gal.
O	Gallons per inch in pump chamber	7.8	gal/inch
	inside length = inside width =		
P	Number of soil absorbtion trenches	24	
Q	Length of soil absorbtion trenches	100	
R	Total linear feet of percolation piping (P*Q)	2400	
S	Volume pumped per pump cycle in gallons (A/GD/GPD - 2 cycles)	60	gal.
T	Volume pumped per pump cycle in inches (S/O)	8.00	
U	Minimum emergency storage in gallons (C/4)	45	
V	Minimum emergency storage in inches (U/O)	5.8	
W	Maximum pump run time in minutes (S/D)	5.83	min
X	Minimum pump run time in minutes (S/E)	3.00	min

Pump Selection:
Pump must provide a min. of 18 GPM at a Total Dynamic Head of 15.6 feet
Pump: Myers
Model S25
HP: 0.25

* NOTE: TDE & GPM should be confirmed at the time of installation

PUMP CHAMBER SIZE IN GALLONS 484 gal
GALLONS PER CYCLE 180 gpd 3 cycles per day = 60 gal
DRAWDOWN IN INCHES N/A
PUMP CYCLE TIME (GALLONS PER CYCLE 18 GPM) 5.8 min on 8 hrs off

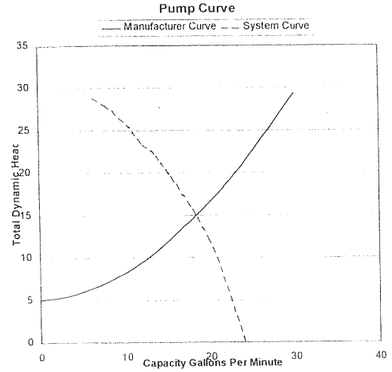
* PUMP MUST PROVIDE 11 GPM MINIMUM AT SYSTEM HEAD TO MAINTAIN MIN. VEL. OF 2-FT-SEC.
* THE PUMP STATION MUST BE PROVIDED WITH CONTROLS FOR AUTOMATICALLY STARTING AND STOPPING THE PUMP BASED ON WATER LEVEL
* THE ELECTRICAL MOTOR CONTROL CENTER AND MASTER DISCONNECT SWITCH SHALL BE PLACED IN A SECURE LOCATION ABOVE GRADE AND REMOTE FROM THE PUMP STATION
* EACH MOTOR CONTROL CENTER SHALL BE PROVIDED WITH A MANUAL OVERRIDE SWITCH
* A HIGH WATER ALARM WITH REMOTE SENSING AND ELECTRICAL CIRCUITRY SEPARATE FROM THE MOTOR CONTROL CENTER CIRCUITRY SHALL BE PROVIDED
* THE ALARM SHALL BE AUDIO/VISUAL AND PLACED IN AN AREA WHERE IT MAY BE EASILY MONITORED
* THE ELECTRICAL CONNECTIONS SHALL BE MADE HARDWIRED IN AN ELECTRICAL JUNCTION BOX
* ALL PIPING SHALL BE PRESSURE TYPE WITH PRESSURE TYPE FITTINGS
* USE GLUE OR SCREW FITTINGS ONLY. DO NOT USE COMPRESSION FITTINGS
* FORCE MAIN SHALL BE PLACED DEEP ENOUGH TO PREVENT FREEZING
* PUMP CHAMBER SHALL BE LEVEL AND WATER TIGHT

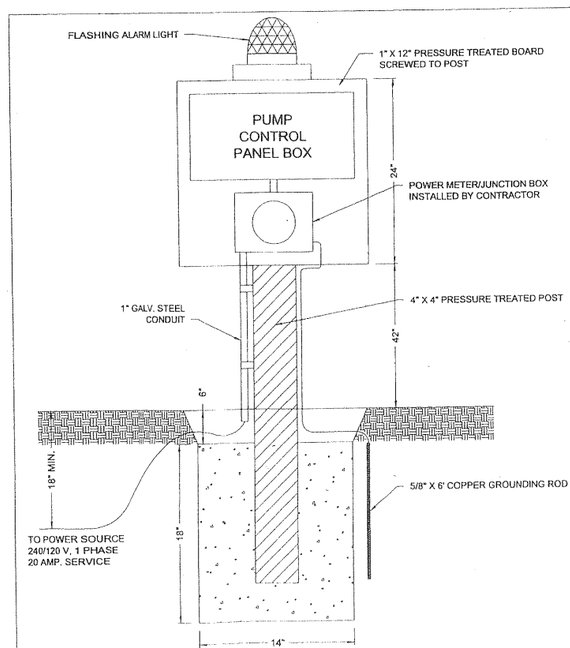
Pump Information

Enter Pump Data only if you Selected "Y" above		
Elev force main @D-Box	93.5	feet
Elev of Pump off switch	88.4	feet
Length of 1.5" force main	161	feet
Size tank	4	ft. Diam
# of 90 degree bends	1	
# of 45 degree bends	0	

Peak GPD	180	
Trench Length	100	
# Trenches	24	
# Bedrooms		
# Occupants	9	
Gallons per Occupant	20	

Note: The discharge form this system is pumped to the existing drainfield serving Birchwood. Each pump cycle from the UA system will contribute an additional 6% of the existing distribution charge volume to the 56% typically contributed from the Birchwood Facility.





PUMP CONTROL PANEL POST
(NOT TO SCALE)

BEFORE DIGGING CALL "MISS UTILITY"
OF VIRGINIA AT 1-800-552-7001

Rickmond Engineering, Inc.
Engineering Surveying Land Planning
Vint Hill • P.O. Box 861647
Warrenton, VA 20187
Voice: (540)349-7730
Fax: (540)349-7731
1943 Mantmac Trail
Williamsburg, VA 23185
Voice: (757)229-1776
Fax: (757)229-4663
www.rickmond.com

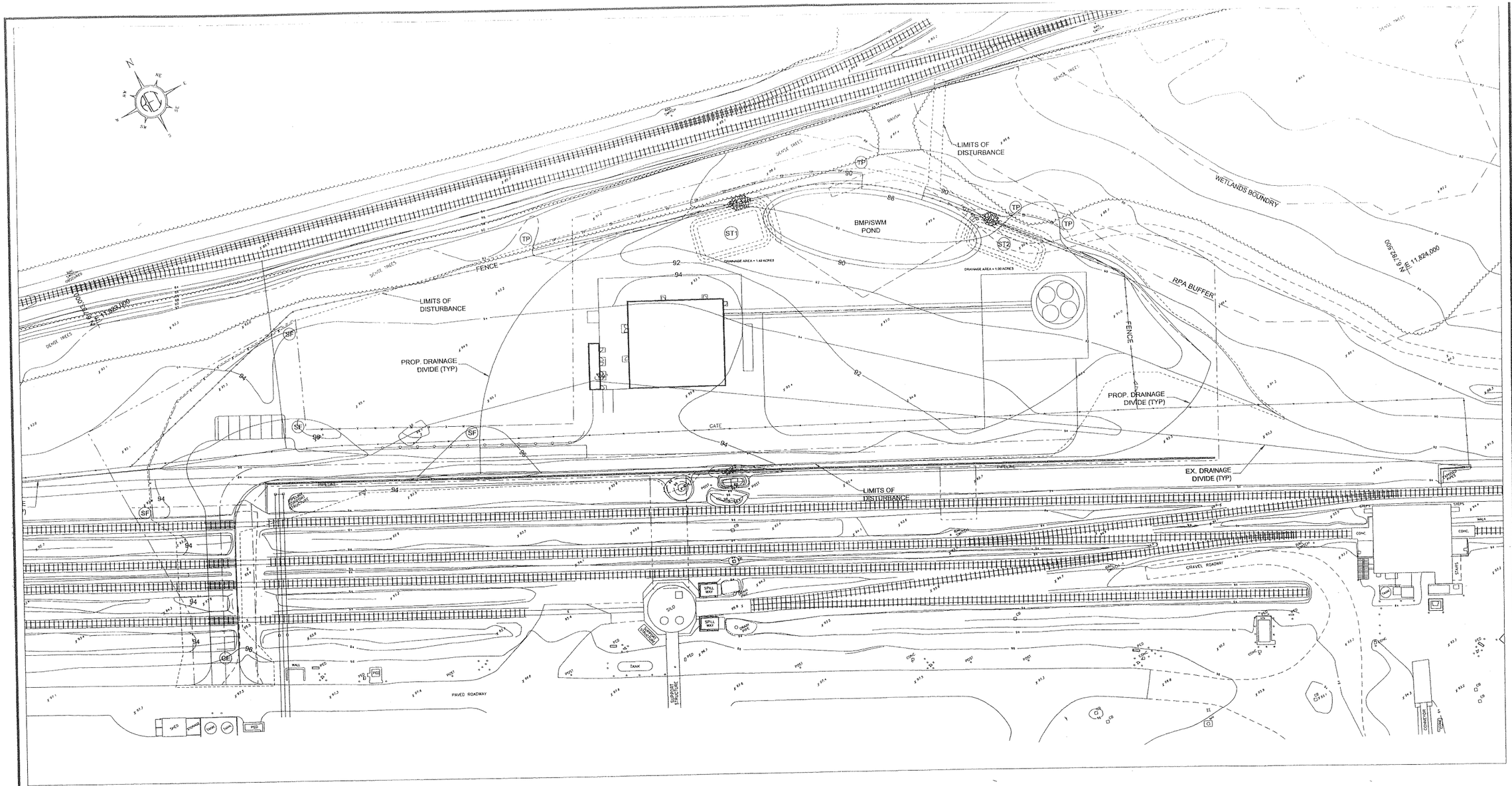
Designed By: PAB
Drawn By: LDB
Scale: NTS
Date: 8/19/02

COMMONWEALTH OF VIRGINIA
PAUL A. BERNARD
No. 012668
PROFESSIONAL ENGINEER

No.	By	Revision	Date	App.

UNIVERSAL AGGREGATES
BIRCHWOOD MANUFACTURED
AGGREGATE PLANT
PUMPSTATION AND DRAINFIELD DETAIL
KING GEORGE COUNTY, VA.
POTOMAC MAGISTERIAL DISTRICT

Job Number 02507
Sheet No. 7 OF 11



LEGEND

LIMITS OF DISTURBANCE

CONSTRUCTION ENTRANCE (CE)

SILT FENCE (SF)

DIVERSION BERM

TREE PROTECTION (TP)

SEDIMENT TRAP SCHEDULE		
SEDIMENT TRAP	# 1	# 2
DRAINAGE AREA (ac.)	1.49	1.00
BOTTOM WIDTH (ft.)	26	14
BOTTOM LENGTH (ft.)	52	56
WET STORAGE (cy)	103.65	38.34
DRY STORAGE (cy)	103.65	38.34
BOTTOM ELEVATION	87.29	87.16
CLEANOUT ELEVATION	88.22	88.23
WET STORAGE ELEVATION	89.00	89.00
DRY STORAGE ELEVATION	90.29	90.16
WIDTH OF EMBANKMENT (ft.)	3	3
ROCK OUTLET		
LENGTH OF ROCK OUTLET (ft.)	9	6
INVERT OF ROCK OUTLET	89.00	89.00
CREST OF ROCK OUTLET	90.29	90.16
TOP OF EMBANKMENT	91.29	91.16

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

BEFORE DIGGING CALL "MISS UTILITY" OF VIRGINIA AT 1-800-552-7001

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1843 Mammac Trail
Williamsburg, VA 23185
Voice: (757)229-1776
Fax: (757)229-4683
Warrenton, VA 20187
Voice: (540)349-7730
Fax: (540)349-7731
www.rickmond.com

Designed By: JDD | Drawn By: LDR | Scale: 1" = 40' | Date: 8/19/02

COMMONWEALTH OF VIRGINIA
PAUL A. BERNARD
No. 012668
PROFESSIONAL ENGINEER

No.	By	Revision	App.	Date
01	JDD	REVISIONS PER COUNTY COMMENTS	PAB	10/14/02

UNIVERSAL AGGREGATES
BIRCHWOOD MANUFACTURED AGGREGATE PLANT
EROSION AND SEDIMENTATION CONTROL PLAN

POTOMAC MAGISTERIAL DISTRICT — KING GEORGE COUNTY, VA.

Job Number: 02507

Sheet No.: 8 OF 11

EROSION AND SEDIMENT CONTROL NARRATIVE

1. PROJECT DESCRIPTION
THIS PROJECT CONSISTS OF APPROXIMATELY 4.12 ACRES OF DISTURBED AREA. THE AREA BEING DISTURBED IS FOR THE CONSTRUCTION OF THE UNIVERSAL AGGREGATES BIRCHWOOD MANUFACTURED AGGREGATE PLANT AND ITS ENTRANCE DRIVE.

2. EXISTING SITE CONDITIONS
THE TOPOGRAPHY OF THE SITE RANGES IN SLOPES FROM 2% TO 7%. THE SITE DRAINS INTO A STREAM TO THE EAST OF THE DEVELOPMENT.

3. ADJACENT AREAS
THIS SITE IS ENCLOSED ON THE SOUTH, EAST AND WEST BY BIRCHWOOD POWER AND THE NORTH BY R & F RAILROAD.

4. DATES OF CONSTRUCTION
CONSTRUCTION IS SCHEDULED TO BEGIN IN THE FALL OF 2002.

5. EROSION CONTROL PROGRAM
A. NO DISTURBED AREA IS TO REMAIN DENUDED FOR MORE THAN 7 DAYS UNLESS AUTHORIZED BY THE DIRECTOR OR HIS AGENT (SPECIFIC AREAS TO BE DETERMINED AT THE PRE-CONSTRUCTION MEETING.)
B. ELECTRIC, POWER, TELEPHONE, CABLE, SANITARY SEWER, WATER SUPPLY AND GAS SUPPLY TRENCHES ARE TO BE COMPACTED, SEEDING, AND MULCHED WITHIN 5 DAYS AFTER BACKFILLING. NO MORE THAN 300 FEET OF TRENCH IS TO BE OPEN AT ANY ONE TIME. SOIL EXCAVATED DURING THE TRENCHING OPERATIONS SHALL BE PLACED ON THE UP HILL SIDE OF TRENCH.
C. TOPSOIL WHICH HAS BEEN STOCKPILED IS TO BE SURROUNDED BY SILT FENCE, AND SHALL BE PROTECTED BY MULCH AND/OR TEMPORARY VEGETATION IMMEDIATELY AFTER GRADING.
D. ALL TEMPORARY EARTH BERMS AND DIVERSIONS ARE TO BE MACHINE COMPACTED, SEEDED AND MULCHED FOR TEMPORARY VEGETATIVE COVER WITHIN 10 DAYS OF GRADING.
E. ALL FILLS ARE TO BE LEFT WITH A LIP AT THE TOP OF THE SLOPE AT THE END OF EACH DAYS OPERATIONS.
F. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND MULCHED WITHIN 10 DAYS OF THE COMPLETION OF GRADING.
G. DISTURBED AREAS ARE TO BE SEEDED WITHIN 15 DAYS OF CONSTRUCTION COMPLETION WITH OATS, ABRUZZI RYE, OR EQUIVALENT AND MULCHED WITH STAW OR HAY MULCH AT THE RATE OF 2 TONS PER ACRE.

6. SEDIMENT CONTROL PROGRAM
A. INSTALL A TEMPORARY CONSTRUCTION ENTRANCE. MUD AND DEBRIS SHALL BE WASHED FROM ALL CONSTRUCTION VEHICLES AND EQUIPMENT PRIOR TO LEAVING THE SITE. THE SEDIMENT LADEN WATER SHALL BE FILTERED THROUGH SILT FENCING. WATER TANK TRUCKS WILL BE USED IF PUBLIC METERED WATER IS NOT AVAILABLE.
B. INSTALL SILT FENCE AND DIVERSION BERMS AT THE LIMITS OF DISTURBANCE PER THE EROSION AND SEDIMENTATION CONTROL PLAN.
C. INSTALL TREE PROTECTION USING THE METHODS OUTLINED FOR USE BY THE VIRGINIA STATE EROSION AND SEDIMENT CONTROL HANDBOOK.
D. CONSTRUCT BUILDINGS & ASSOCIATED STRUCTURES.
E. REMOVE SEDIMENT TRAPS AND CONSTRUCT BMP/SWM POND AND ITS OUTLET STRUCTURE.
F. FINAL GRADING.

7. PHASING OF LAND DISTURBING ACTIVITIES
A. STAGE I
a. HAND DIG TEST PITS OVER EXISTING UTILITIES (IF REQUIRED).
b. INSTALL CONSTRUCTION ENTRANCE.
c. INSTALL SILT FENCE AND DIVERSION BERMS AT THE LIMITS OF DISTURBANCE.
d. INSTALL TREE PROTECTION.
B. STAGE II
a. CLEAR REMAINDER OF SITE.
b. ROUGH GRADING OF THE SITE.
d. FINAL GRADING OF SITE.
e. STABILIZE CRITICAL SLOPE AREAS.

8. MAINTENANCE PROGRAM
A. ALL CONTROL MEASURES ARE TO BE INSPECTED ON A DAILY BASIS BY THE SITE SUPERINTENDENT OR HIS REPRESENTATIVE. ANY DAMAGED STRUCTURAL MEASURES ARE TO BE REPAIRED BY THE END OF THE WORKING DAY.
B. ALL SEDIMENT TRAPPING DEVICES SHALL BE CLEANED OUT AT 50 PERCENT CAPACITY AND DISPOSED OF BY SPREADING ON THE SITE.
C. CONTROLS MAY BE REMOVED AFTER THE AREAS ABOVE THEM HAVE BEEN STABILIZED AND WITH THE APPROVAL OF THE SITE INSPECTOR.
D. DEVICES SHOWN ARE TO BE CONSIDERED MINIMUM EROSION AND SEDIMENTATION CONTROLS. ADDITIONAL CONTROLS MAY BE NECESSARY DUE TO THE CONTRACTOR'S PHASING OR OTHER UNANTICIPATED CONDITIONS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ADDITIONAL DEVICES AS NECESSARY TO THOSE SHOWN IN ORDER TO CONTROL EROSION AND SEDIMENTATION. EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS IN THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.
E. THE CONTRACTOR IS TO PROVIDE ADEQUATE MEANS OF CLEANING AND REMOVING ALLAYING DUST AS NECESSARY BY APPLYING EITHER MOISTURE, CALCIUM CHLORIDE, OR BOTH MATERIALS ALONG THOSE SECTION OF THE PROJECT ADJACENT TO EXISTING DWELLINGS OR PUBLIC ACCESS.

9. TREE PROTECTION
TREES TO BE SAVED ARE TO BE PROTECTED FROM EQUIPMENT DAMAGE. PROTECTION TO BE LOCATED AT THE DRIP LINE OF TREE (LIMITS OF DISTURBANCE).

10. ADDITIONAL EROSION AND SEDIMENT NOTES
A. NO UNPROTECTED, DISTURBED AREA SHALL DRAIN TO ROADWAY PAVEMENTS SUCH THAT THE SUB BASE BASE, OR WEARING SURFACE ARE CONTAMINATED BY SILT TRAPPED AT LOW POINTS OR INLETS.
B. NO EROSION & SEDIMENT CONTROLS SHALL BE REMOVED WITHOUT THE APPROVAL OF THE COUNTY INSPECTOR.
C. ONCE CONSTRUCTION IS COMPLETE, AND REMOVAL OF THE SEDIMENT TRAPS IS AUTHORIZED, THE TEMPORARY DIVERSION BERMS SHOWN ON THE E&S PLAN SHOULD BE CONVERTED INTO THE PERMANENT CAPTURE DAM OF THE BMP/SWM POND. AT THIS POINT, THE BMP/SWM POND MAY BE CONSTRUCTED AND ITS OUTLET CONTROL STRUCTURE INSTALLED.

11. WETLANDS NOTE
WEDLANDS ARE PRESENT ON THIS SITE PLAN, AND WILL NOT BE DISTURBED.

DIVERSIONS

TYPICAL PARABOLIC DIVERSION

TYPICAL TRAPEZOIDAL DIVERSION

TYPICAL VEE-SHAPED DIVERSION

Source: Va. DSWC

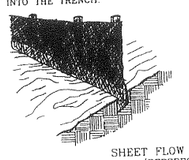
Plate 3.12-1

CONSTRUCTION OF A SILT FENCE (WITHOUT WIRE SUPPORT)

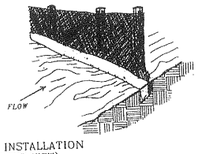
1. SET THE STAKES.

2. EXCAVATE A 4"X 4" TRENCH UPSLOPE ALONG THE LINE OF STAKES.

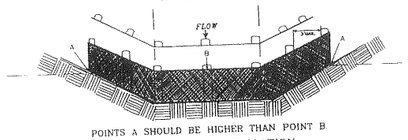
3. STAPLE FILTER MATERIAL TO STAKES AND EXTEND IT INTO THE TRENCH.



4. BACKFILL AND COMPACT THE EXCAVATED SOIL.



SHEET FLOW INSTALLATION
(PERSPECTIVE VIEW)



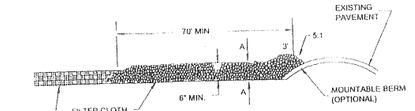
POINTS A SHOULD BE HIGHER THAN POINT B

DRAINAGEWAY INSTALLATION
(FRONT ELEVATION)

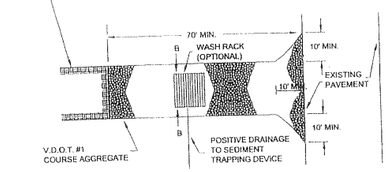
SOURCE Adapted from Installation of Straw and Fabric Filter Barriers for Sediment Control VA DSWC Sherwood and Wyant

PLATE 3.05-2

STONE CONSTRUCTION ENTRANCE



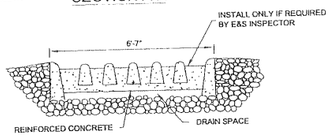
SIDE ELEVATION



MUST EXTEND FULL WIDTH OF INGRESS AND EGRESS OPERATION.

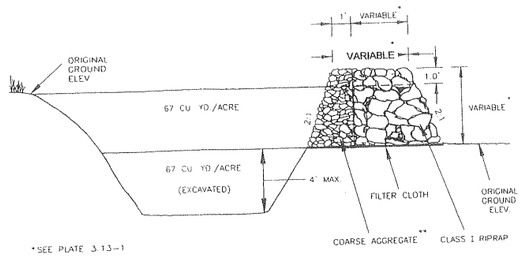
PLAN VIEW

SECTION A-A



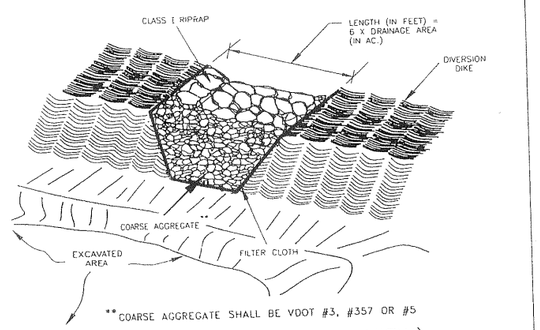
SECTION B-B

TEMPORARY SEDIMENT TRAP



*SEE PLATE 3.13-1

CROSS SECTION OF OUTLET

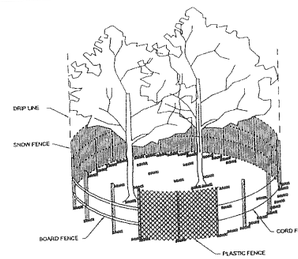


**COARSE AGGREGATE SHALL BE VDOT #3, #357 OR #5

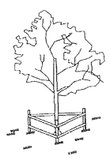
OUTLET (PERSPECTIVE VIEW)

SOURCE: VA. DSWC

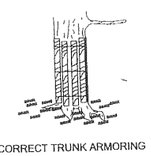
PLATE. 3.13-2



CORRECT METHOD OF TREE FENCING



TRIANGULAR BOARD FENCING



CORRECT TRUNK ARMORING

TREE PROTECTION

Rickmond Engineering, Inc.
Engineering Surveying Land Planning
1645 Merrimac Trail
Williamsburg, VA 23185
Voice: (757)229-1776
Fax: (757)229-4683
Vint Hill • P.O. Box 861647
Warrenton, VA 20187
Voice: (540)349-7730
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Date: 8/15/02
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COMMONWEALTH OF VIRGINIA
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UNIVERSAL AGGREGATES
BIRCHWOOD MANUFACTURED AGGREGATE PLANT
EROSION & SEDIMENTATION CONTROL DETAILS AND NARRATIVE
KING GEORGE COUNTY, VA
POTOMAC MAGISTERIAL DISTRICT

Job Number	Sheet No.
02507	9 OF 11

BEFORE DIGGING CALL "MISS UTILITY" OF VIRGINIA AT 1-800-552-7001