STORM WATER MANAGEMENT SYSTEM

by

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STORM WATER MANAGEMENT SYSTEM

* FLORIDA TILE HAS COMPLETED CONSTRUCTION OF AN INNOVATIVE STORM WATER MANAGEMENT SYSTEM THAT EXCEEDS THE REQUIREMENTS OF EXISTING LAWS AND REGULATIONS.

* THE FLORIDA TILE SYSTEM HAS BEEN DESIGNED TO ACHIEVE ZERO DISCHARGE (ZD) OF STORM WATER RUNOFF FROM THE CERAMIC TILE MANUFACTURING PLANT.

* THE SYSTEM CONSISTS OF A NETWORK OF STORM WATER COLLECTION AND CONVEYANCE IMPROVEMENTS AND TWO REINFORCED CONCRETE RESERVOIRS - NORTHWEST RESERVOIR AND EAST RESERVOIR - THAT WILL CAPTURE ALL THE STORM WATER RUNOFF FROM THE ENTIRE 22 ACRE FLORIDA TILE CONTIGUOUS PLANT AREA.

* FLORIDA ENGINEERING AND DESIGN, INC. OF LAKELAND DESIGNED THE SYSTEM TO ELIMINATE THE STORM WATER RUNOFF, INSTEAD OF MERELY TREATING OR CONTROLLING IT. NONE OF THE STORM WATER WILL DRAIN INTO NEARBY LAKE WIRE OR SEEP INTO THE GROUND. CONSEQUENTLY, THERE WILL BE NO DISCHARGE OF LEAD OR ZINC INTO THE LAKE OR THE ENVIRONMENT.

* IT IS BELIEVED THAT FLORIDA TILE IS THE FIRST INDUSTRIAL PLANT IN THE COUNTRY TO ACHIEVE ZERO DISCHARGE (ZD) OF STORM WATER.

* IN ADDITION TO THE DRAINAGE SYSTEM, FLORIDA TILE ALSO HAS INSTALLED AN INNOVATIVE EVAPORATIVE ROOF COOLING SYSTEM THAT IS DESIGNED TO CONSUME A LARGE PART OF THE STORM WATER COLLECTED IN THE RESERVOIRS.

* THE EVAPORATIVE ROOF COOLING SYSTEM IS COMPUTER DRIVEN BY A WEATHER STATION WHICH CONSUMES STORM WATER BY SPRAYING IT ON THE PLANT ROOF. THIS RESULTS IN CONSERVATION OF RESOURCES AND REDUCES THE TEMPERATURE INSIDE THE PLANT FROM 10 TO 12 DEGREES TO MAKE IT COOLER FOR EMPLOYEES.

* THE SYSTEM BECAME FULLY OPERATIONAL MAY 13, 1994 AT A TOTAL COST FOR LEGAL FEES, ENGINEERING AND CONSTRUCTION OF $6.7 MILLION.

* FLORIDA TILE INDUSTRIES, INC. IN LAKELAND, FLORIDA, A WHOLLY OWNED SUBSIDIARY OF PREMARK INTERNATIONAL, INC., IS A MAJOR MANUFACTURER OF CERAMIC FLOOR AND WALL TILES. WE ARE FACED

WITH THE MANDATORY COMPLIANCE AND MANAGEMENT OF SOLID WASTE, INDUSTRIAL WASTE WATER AND AIR EMISSIONS AS ALL OF INDUSTRY IS EXPERIENCING. NEVER IN OUR WILDEST IMAGINATION DID WE EVER BELIEVE THAT THERE WOULD COME A DAY WHEN WE WOULD BE REQUIRED TO MANAGE STORM WATER RUNOFF.

* IT IS REASONABLE TO EXPECT THAT WE SHOULD MANAGE OR CONTROL THE VOLUME OF RUNOFF IN ORDER TO PROTECT PRIVATE AND PUBLIC PROPERTY. WE WERE NOT PREPARED TO MANAGE THE QUALITY OF THE RAINWATER. IN 1985 ALL OF THIS CHANGED.

* TODAY MANY INDUSTRIAL PLANTS ACROSS THE UNITED STATES ARE BEING REQUIRED TO OPERATE UNDER THE SEVERE DEMANDS OF AN EPA PERMIT FOR STORM WATER DISCHARGES. FAILURE TO COMPLY WITH THE DEMANDS AS DEFINED IN THESE PERMITS CAN RESULT IN ENFORCEMENT ACTION BY THE EPA OR THE DEPARTMENT OF JUSTICE. CONTINUAL FAILURE TO COMPLY CAN RESULT IN ENORMOUS FINES OR EVEN JAIL SENTENCES.

* ALLOW ME TO SHARE WITH YOU AN ACTUAL STORM WATER CASE THAT CLEARLY DEMONSTRATES THE CONSEQUENCES OF ENFORCEMENT TAKEN BY THE EPA AND THE DEPARTMENT OF JUSTICE. THE CASE I AM GOING TO DESCRIBE IS ON GOING AND REMEDIAL WORK CONTINUES AS WE SPEAK.

* FLORIDA TILE INDUSTRIES OPERATES A CERAMIC GLAZED WALL TILE PLANT IN LAKELAND, FLORIDA. THIS FACILITY WAS ESTABLISHED IN 1954 AND HAS GROWN AT THIS LOCATION FROM 14 EMPLOYEES TO OVER 500 EMPLOYEES. APPROXIMATELY 22 ACRES OF MANUFACTURING BUILDINGS, OFFICE BUILDINGS AND PARKING LOTS DISCHARGE STORM WATER RUNOFF INTO A NATURAL LAKE (LAKE WIRE) LOCATED ACROSS THE STREET FROM THE FACTORY. DUE TO THE TROPICAL CLIMATE, THE AMOUNT OF RAINFALL AND RESULTANT DISCHARGE IS CONSIDERABLE.

* OUR PROBLEMS BEGAN WHEN FLORIDA TILE WAS ISSUED A NPDES PERMIT AT THIS LAKELAND FACILITY ON DECEMBER 31, 1985 DUE TO AN UNACCEPTABLE LEVEL OF METALS IN THE STORM WATER RUNOFF. THIS PERMIT REQUIRED THE COMPANY TO COLLECT A WEEKLY COMPOSITE SAMPLE OF THIS STORM WATER AND ANALYZE IT FOR TOTAL LEAD, TOTAL ZINC AND TOTAL COPPER. THE PERMIT LIMITATION FOR EACH WAS .03 MILLIGRAMS PER LITER (PPM). THESE TEST RESULTS WERE THEN REPORTED TO THE REGIONAL EPA OFFICE.

* AFTER TWO MONTHS OF SAMPLING AND TESTING, FLORIDA TILE RECOGNIZED THAT THE PERMIT LIMITS COULD NOT BE MET WITHOUT MORE STRINGENT STORM WATER MANAGEMENT ACTIVITIES. UNDER THE TOTAL QUALITY MANAGEMENT CONCEPT THE COMPANY BEGAN THE DEVELOPMENT AND IMPLEMENTATION OF A LENGTHY AND EXPENSIVE CORRECTIVE ACTION PROGRAM WHICH INCLUDED THE FOLLOWING:

1ST. THE CONSTRUCTION AND OPERATION OF A HYPOLON LINED STORM WATER RETENTION POND THAT WAS DESIGNED TO CAPTURE, CHEMICALLY TREAT AND FILTER BEFORE DISCHARGE THE FIRST INCH OF STORM WATER RUNOFF FROM THE MANUFACTURING AREAS OF THIS FACILITY (FIVE ACRES OF THE 22 TOTAL ACRES AT THIS SITE). RAINWATER IN EXCESS OF THE FIRST INCH WOULD BY-PASS THIS POND AND BE DISCHARGED DIRECTLY INTO THE LAKE WITHOUT TREATMENT. THIS RETENTION POND WAS PUT INTO SERVICE IN JULY OF 1987.

2ND. THE R&D DEPARTMENT BEGAN A PROGRAM TO DEVELOP ALL LEAD FREE GLAZE FORMULAS. THIS PROGRAM WAS COMPLETED BY JUNE OF 1989.

3RD. ALL EMISSION POINTS THROUGHOUT THE MANUFACTURING AREAS AT THIS LOCATION WERE SURVEYED TO ENSURE THAT PARTICULATES WERE NOT BEING DEPOSITED ON THE ROOF AREAS OF THE MANUFACTURING BUILDINGS. PARTICULAR EMPHASIS WAS GIVEN TO KILN STACKS AND DUST COLLECTOR EXHAUSTS.

4TH. CONTRACTORS WERE THEN HIRED TO JET-WASH ALL ROOF AREAS, GUTTERS AND DOWNSPOUTS TO ELIMINATE ANY POSSIBLE ACCUMULATION OF PARTICULATE RESIDUE FROM THESE EMISSION POINTS. ALL UNDER FLOOR BURIED STORM WATER LINES & DRAINS WERE HYDRO - BLASTED TO REMOVE ANY POSSIBLE ACCUMULATION OF TILE BODY OR GLAZE RESIDUE.

5TH. AN ENVIRONMENTAL ENGINEERING CONSULTING FIRM WAS HIRED TO REVIEW OUR STORMWATER MANAGEMENT SYSTEM AND MAKE RECOMMENDATIONS ON FURTHER IMPROVEMENTS.

6TH. A SECOND STORM WATER RETENTION POND WAS CONSTRUCTED TO CAPTURE RUNOFF FROM NON - MANUFACTURING AREAS. THIS COLLECTED STORM WATER WAS TO BE TESTED BUT NOT TREATED BEFORE DISCHARGING TO THE LAKE.

7TH. THE R&D GROUP IMPLEMENTED A ZINC MINIMIZATION PROGRAM AND BEGAN TO REFORMULATE GLAZE FORMULAS TO EITHER ELIMINATE OR REDUCE THE ZINC CONTENT.

8TH. IT HAD BEEN STANDARD PRACTICE IN THIS FACTORY TO RECYCLE INDUSTRIAL WASTEWATER THROUGH THE BODY PREPARATION DEPARTMENT. IN APRIL OF 1991, THE COMPANY BEGAN TO ALSO RECYCLE COLLECTED STORM WATER DRAWN DIRECTLY FROM THESE RETENTION PONDS AND PUMPED TO THE BODY PREPARATION OPERATION.

* UNDER THE EXPERT GUIDANCE OF OUR CONSULTING ENGINEERS, THESE EFFORTS CONTINUED TO FURTHER IMPROVE THE QUALITY OF STORM WATER BEING DISCHARGED TO THE LAKE.

* AFTER FIVE YEARS OF CORRECTIVE ACTION ALL OF THESE EARLY PROJECTS WERE COMPLETED BY 1991 AT A COST IN EXCESS OF $1 MILLION. THERE WAS INDEED A MAJOR IMPROVEMENT IN THE QUALITY OF RUNOFF WATER BEING DISCHARGED TO THE LAKE. ALL OF OUR "TREATED WATER" WAS WITHIN ACCEPTABLE LIMITS. HOWEVER, THE "UNTREATED WATER" (THAT RUNOFF IN EXCESS OF ONE INCH OF RAINFALL THAT COULD NOT BE CAPTURED AND TREATED) STILL WAS FREQUENTLY NOT WITHIN THE ACCEPTABLE LIMITS. THE "LEAD" WAS NO LONGER A PROBLEM, THE "ZINC" WAS NOW THE MAJOR OFFENDER.

* IN SPITE OF THE MAJOR IMPROVEMENTS MADE IN THE QUALITY OF THE STORMWATER DISCHARGE TO THE LAKE, ON MARCH 17, 1992, THE DEPARTMENT OF JUSTICE FILED A CIVIL SUIT AGAINST FLORIDA TILE ALLEGING VIOLATIONS OF THE CLEAN WATER ACT. UNDER THE TERMS OF THE ACT, THE EPA HAD DETERMINED THAT THEY COULD SEEK A MAXIMUM PENALTY IN THIS CASE OF UP TO $39 MILLION. HOWEVER, THE EPA AND DEPARTMENT OF JUSTICE WERE WILLING TO SETTLE THIS MATTER IF FLORIDA TILE WOULD AGREE TO ENTER INTO A JUDICIAL CONSENT DECREE, WHICH PROVIDES FOR A FINE OF $2.7 MILLION FOR PAST VIOLATIONS AND PENALTIES OF UP TO $15,000/DAY FOR FUTURE VIOLATIONS.

* THIS CIVIL SUIT WAS THEN ASSIGNED TO OUR ATTORNEYS WHILE WE CONTINUED TO SEARCH FOR A PERMANENT SOLUTION TO OUR STORM WATER PROBLEM.

* WE HAD REACHED THE POINT WHERE WE HAD SUCCESSFULLY ELIMINATED ALL LEAD FROM THE GLAZES, THE LEVEL OF ZINC HAD BEEN REDUCED IN THE GLAZE FORMULAS, WE WERE SUCCESSFULLY CAPTURING AND

TREATING THE FIRST INCH OF RAINWATER, HOWEVER, WE COULD NOT CONSISTENTLY MEET THE ALLOWABLE LIMITS FOR ZINC. ADDITIONALLY, THE REGULATORY STANDARDS HAD CHANGED. THE MAXIMUM ALLOWABLE CONTAMINANT CONCENTRATIONS GOT TOUGHER. WE NEEDED A NEW PLAN.

* THE CHALLENGE WAS: 1) TO ENGINEER AND CONSTRUCT A SYSTEM WHICH WOULD COLLECT ALL STORM WATER RUNOFF, 2) STORE THE AMOUNT GENERATED BY THE MOST HISTORICALLY INTENSE STORM, AND 3) PREVENT ANY UNTREATED STORM WATER FROM LEAVING THE PROPERTY AND ENTERING LAKE WIRE.

* THE INITIAL CONCEPT WAS TO CAPTURE AND STORE ALL STORM WATER AND TO RETRIEVE (AT A CONSTANT RATE), TREAT AND DISCHARGE TO LAKE WIRE. IT SOON BECAME APPARENT THAT THE COST OF TREATMENT TO ACHIEVE ACCEPTABLE QUALITY WOULD BE PROHIBITIVE.

* THE NEW PLAN WAS BASED UPON TWO PRINCIPALS:

  ONE - CAPTURE ALL POSSIBLE RUN-OFF WATER FROM THE ENTIRE 22 ACRES.

  TWO - FIND A WAY TO CONSUME ALL OF THE RUN-OFF WATER SUCH THAT THERE WILL BE NO DISCHARGES WHICH EXCEED THE REGULATORY STANDARDS.

* THE ULTIMATE GOAL MUST BE ZERO DISCHARGE. THIS IS A VERY EXPENSIVE COMMITMENT.

* THE DETAILED PLANNING AND DESIGN ENGINEERING COMMENCED IMMEDIATELY.

* THE DESIGN WAS TO BE DRIVEN BY THE FOLLOWING OBJECTIVE:

  THE FINAL STORM WATER SYSTEM MUST BE ABLE TO MANAGE ALL DESIGN STORMS. THIS MEANS THAT THE FINAL DESIGN MUST HANDLE IN EXCESS OF THE RUNOFF FROM A 100 YEAR RAIN EVENT, TO BE SPECIFIC, A REPLICATION OF HURRICANE DONNA FROM SEPTEMBER OF 1960 WHICH DEPOSITED 11.4 INCHES OF RAINFALL IN A SINGLE 24 HOUR PERIOD.

  ALSO, THE FINAL DESIGN SHOULD REQUIRE MINIMAL SUPERVISION TO OPERATE, BE GRAVITY FED USING NO PUMPS AND THUS BE ABLE TO FUNCTION DURING ANY HURRICANE EVENT.

* THE DESIGN PHASE REQUIRED RUNNING DOZENS OF COMPUTER MODELS BEFORE A WORKABLE DESIGN WAS OBTAINED.

* DUE TO THE LIMITED REMAINING REAL ESTATE AVAILABLE WITHIN THE EXISTING 22 ACRES AT THIS FACILITY AND BECAUSE OF THE PHYSICAL LIMITATIONS OF THE EXISTING STORM WATER SEWER COLLECTION SYSTEM, THE DESIGN REQUIRED NOT ONE BUT TWO INTERCONNECTED LARGE RESERVOIRS.

* THESE RESERVOIRS WERE TO BE CONSTRUCTED OF REINFORCED POURED CONCRETE AND MUST BE DESIGNED TO OVERCOME THE BUOYANCY OF THE SHALLOW WATER TABLE COMMON TO FLORIDA.

* THE FIRST RESERVOIR TO BE CONSTRUCTED WOULD HAVE A SURFACE AREA OF 1/2 ACRES, BE SIXTEEN FEET IN DEPTH AND HAVE A CAPACITY OF 2.24 MILLION GALLONS OF STORM WATER.

* THE SECOND RESERVOIR WOULD BE EVEN LARGER WITH A SURFACE AREA OF 2/3 ACRES, BE TWENTY-FIVE FEET IN DEPTH, AND WOULD HAVE A CAPACITY OF 3.9 MILLION GALLONS OF STORM WATER.

* THE COMBINED CAPACITY OF BOTH RESERVOIRS WOULD BE 6.2 MILLION GALLONS. THEY WOULD BE REQUIRED TO MANAGE ABOUT 27 MILLION GALLONS OF WATER DURING A NORMAL RAINFALL YEAR AND OVER 40 MG DURING A RECORD WET YEAR.

* THIS FINAL DESIGN WAS APPROVED BY FLORIDA TILE AND A FAST-TRACK PROGRAM WAS IMPLEMENTED. CONSTRUCTION DRAWINGS WERE PREPARED, BUILDING PERMITS WERE OBTAINED AND BID PACKAGES WERE MAILED. FINALLY, A CONTRACT WAS AWARDED FOR THE FIRST RESERVOIR AND CONSTRUCTION BEGAN IMMEDIATELY.

* THE FIRST RESERVOIR WAS COMPLETED AND BECAME OPERATIONAL ON JUNE 4TH, 1993.

* DURING THIS ENGINEERING AND DESIGN PROCESS, FLORIDA TILE ATTORNEYS HELD NUMEROUS MEETINGS WITH THE EPA AND THE DEPARTMENT OF JUSTICE IN WASHINGTON IN ORDER TO APPEAL OUR CASE AND REDUCE THE PROPOSED PENALTY. WE BELIEVED THAT THE COMPANY RECEIVED NO ECONOMIC ADVANTAGE BECAUSE OF THE LARGE AMOUNT OF MONEY SPENT ON EARLY ACTIVITIES TO BRING OUR DISCHARGE INTO COMPLIANCE. AND WE BELIEVED OUR PROPOSED SOLUTION GOES FAR BEYOND EPA'S EXPECTATIONS.

* WITH THE FIRST RESERVOIR UNDER CONSTRUCTION AND THE ATTORNEYS TRYING TO AMELIORATE THE PROPOSED PENALTY, WE THEN PROCEEDED WITH THE NEXT AND MOST DIFFICULT PHASE OF THE PROJECT. HOW DO YOU CONSUME OR DISPOSE OF 27 MILLION GALLONS OF CAPTURED STORM WATER ?

* WITH THE USE OF A SPRAY DRYER IN OUR BODY PREPARATION DEPARTMENT, WE HAD THE OPPORTUNITY TO CONSUME ABOUT 7,500 GALLONS PER DAY OF WATER OR ABOUT 10% OF THE CAPTURED STORM WATER.

* ADDITIONALLY, DUE TO THE WARM FLORIDA WEATHER AND DAILY SUNSHINE, WE COULD EXPECT NORMAL EVAPORATION FROM THE RESERVOIRS' SURFACE TO CONSUME APPROXIMATELY 4% OF ALL CAPTURED STORM WATER.

* HOWEVER, THIS LEFT A SUBSTANTIAL BALANCE OF COLLECTED STORM WATER TO DISPOSE OF. IN COLLABORATION WITH A SPECIALTY ENGINEERING FIRM IN TAMPA, FLORIDA, AN EVAPORATIVE COOLING SYSTEM WAS DESIGNED FOR INSTALLATION ON THE ROOFS OF ALL BUILDINGS AT THIS LOCATION. THESE ROOFS HAVE AN AVERAGE DAYTIME SURFACE TEMPERATURE OF APPROXIMATELY 165 DEGREES FAHRENHEIT. BY SPRAYING COLLECTED STORM WATER THROUGH SEVERAL THOUSAND SMALL ORIFICES ON A PROGRAMMED OFF-ON SCHEDULE, THIS SYSTEM WAS DESIGNED TO EVAPORATE 100 GALLONS OF WATER PER DAY FOR EACH 1000 SQUARE FOOT OF ROOF AREA. THIS TRANSLATES TO APPROXIMATELY 40,000 GALLONS PER DAY OR ABOUT 40% OF THE CAPTURED STORM WATER.

  THE EVAPORATIVE COOLING SYSTEM WAS INSTALLED IN MAY OF 1992 AT A COST OF $190,000. IT WORKED VERY WELL. AVERAGE TEMPERATURES INSIDE THE MANUFACTURING BUILDINGS WERE REDUCED BY 10 TO 12 DEGREES.

  THE SYSTEM EASILY MET ITS CAPACITY OF 40,000 GALLONS PER DAY. IN FACT, DUE TO THE HEAT OF THE KILNS FROM WITHIN THE PLANT, ON CERTAIN HOT DAYS IN MID-SUMMER, THE SYSTEM EVAPORATED IN EXCESS OF 150,000 GALLONS PER DAY.

* SINCE THE AMOUNT OF WATER WHICH CAN BE EVAPORATED BY THE ROOF TOP COOLING SYSTEM IS SUBJECT TO CLIMATE AND MAY FALL SHORT OF REQUIREMENTS, A PERMIT TO DISCHARGE TO THE CITY OF LAKELAND SANITARY SEWERAGE SYSTEM HAS BEEN OBTAINED.

THE QUALITY OF THE DISCHARGE MUST MEET A MAXIMUM LEVEL OF CONTAMINANTS CRITERIA AND DISCHARGE CAN OCCUR ONLY BETWEEN THE HOURS OF 5:00 P.M. AND 5:00 A.M. AT THE MAXIMUM RATE OF 95 GPM (68,400 GPD).

THIS PERMITTED CONNECTION TO THE CITY'S POTW HAS THE CAPACITY TO DISPOSE OF UP TO 91% OF THE AVERAGE YEAR'S STORM WATER RUNOFF.

* THE SECOND RESERVOIR AND APPURTENANCES (ASSOCIATED STORM WATER COLLECTION AND INTERCONNECTING PIPING) WERE COMPLETED AND THE ENTIRE SYSTEM BECAME OPERATIONAL MAY 13, 1994.

* WE HAVE NOW MET OUR TWO GOALS.

WE CAN CAPTURE 100% OF ALL STORM WATER RUNOFF

AND

WE CAN CONSUME 100% OF THIS STORM WATER.

WE HAVE ACHIEVED A ZERO DISCHARGE CONDITION.

WHAT DID IT COST?

PREVENTATIVE ACTION PROGRAMS PRIOR TO INSTALLING THE RESERVOIRS = APPROXIMATELY $1 MILLION .

THE TWO RESERVOIRS AND INTEGRATED SUPPORT SYSTEMS = $4.2 MILLION.

THE FINAL LEGAL SETTLEMENT NEGOTIATED WITH THE DEPARTMENT OF JUSTICE = $493,000.

ESTIMATED LEGAL FEES & CONSULTANT FEES = $1 MILLION.

TOTAL COST = APPROXIMATELY $6.7 MILLION.

WHAT HAVE WE GAINED BY THIS EXPERIENCE ?

- WE CERTAINLY HAVE COME TO REALIZE THE POTENTIAL MAGNITUDE OF THE STORM WATER ISSUE.

- WE ARE NOW OUT-FROM-UNDER THE NPDES PERMIT. THE STORM WATER REGULATIONS SHOULD NO LONGER BE AN OBSTACLE TO OPERATION OF THIS PLANT.

- WE HAVE THE ONLY STORM WATER ZERO DISCHARGE OPERATION OF THIS NATURE IN THE UNITED STATES CAPABLE OF CONSUMING 100% OF THE CAPTURED STORM WATER.

- AND - NO ONE WENT TO JAIL.

WE HAVE JUST LEARNED THAT THIS PROJECT HAS BEEN NOMINATED AS ONE OF THE TOP ENVIRONMENTAL PROJECTS IN THE STATE OF FLORIDA. ALSO, THE DESIGN ENGINEER HAS BEEN NOMINATED AS THE ENGINEER OF THE YEAR FOR THE STATE OF FLORIDA.

THANK YOU.

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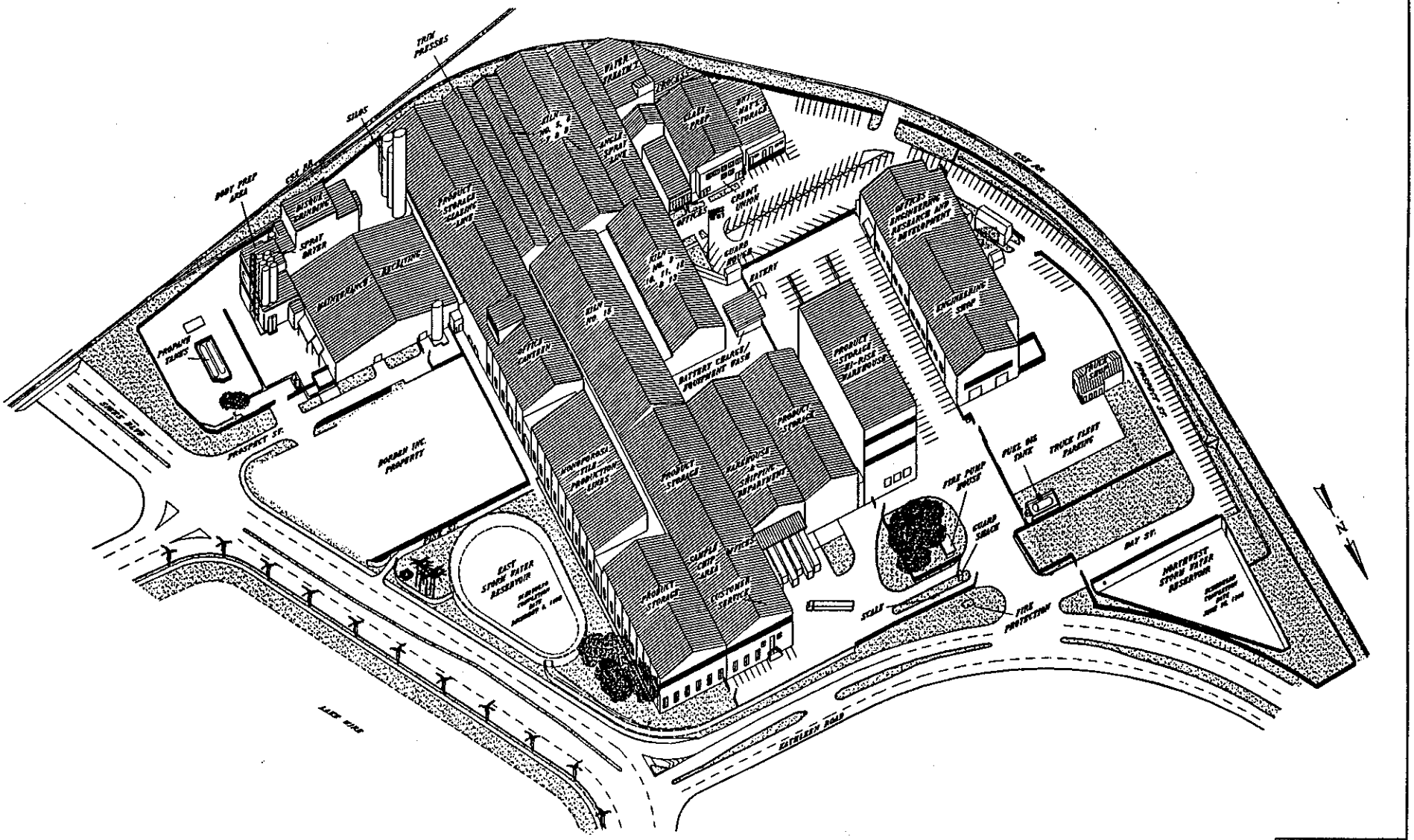

AS BUILT

FLORIDA ENGINEERING DIVISION
CONSULTING ENGINEERS
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EDGEWOOD CENTER
LAKELAND, FL 33803-3940
TEL: (813) 686-6360
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NO.	DATE	REVISION
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DESIGNED BY: JWP
DRAWN BY: JM
CHECKED BY: WFK
SCALE: N.T.S.

Florida Tile

FLORIDA TILE INDUSTRIES, INC.
P.O. BOX 447 LAKELAND, FL 33802

SITE PLAN (ISOMETRIC)

1991-1993 IMPROVEMENTS TO STORMWATER MANAGEMENT SYS LAKELAND, FLORIDA FACILITIES

MICHAEL F. KELLEY DATE:
CIVIL ENGINEER
P.E. NO. 45614

PROJECT NO. 91-0170
CAD NO. 91170101
DWG NO. 93-018
DATE 4-16-94
SHEET NO. 18A

FLORIDA ENGINEERING and DESIGN INC.

CONSULTING ENGINEERS

FOR IMMEDIATE RELEASE

Contact:
James G. Tavrides
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ENGINEERING FIRM DESIGNS INNOVATIVE STORM WATER SYSTEM

Lakeland, Florida (July 27, 1993) -- Florida Engineering & Design, Inc., has developed an innovative system to meet the storm water discharge needs of Florida Tile Industries, Inc., by eliminating the discharge all together. The first phase of the project is now complete and in operation.

The client did not meet surface water quality standards because of the the amounts of zinc and lead found within the storm water. In early 1991 they faced a major decision. Should they treat the water to consistently meet the stringent surface water standard of contaminants (30 parts per billion) or should they take a bolder approach and investigate the possibility of completely solving the problem by eliminating all storm water discharge?

Florida Engineering & Design, Inc., decided to try for a system that produced no discharge. They succeeded. James Tavrides, vice president of Florida Engineering & Design, Inc., said, "What you have here is the first zero discharge system anywhere."

The system captures the entire 22 acre facility's storm water runoff, which totals over 27 million gallons in an average year. It is designed to handle hurricane conditions of 11.4 inches of rainfall in a 24 hour period.

The annual average of 27 million gallons of storm water runoff will be almost entirely consumed on the facility. None will be discharged into nearby Lake Wire. Approximately 90% will be consumed by a rooftop Evaporative Cooling System (ECS).

The majority of the remaining 10% will go to the plant to satisfy the plant's production demand for non-potable water. A smaller percentage will be treated and discharged to the City of Lakeland's sanitary sewer system. Virtually the entire system is gravity driven so the system will operate under adverse weather conditions.

--more--

The system also functions as a cooling mechanism. The ECS is made up of a grid of copper tubing that sprays the roof in sections with a micro-fine jet of water. The roof is divided into zones that are sprayed for 20 seconds and then remain idle for eight minutes allowing the area to evaporate.

A rooftop weather station and computer controls the volume of water, the spray patterns and the spray durations to optimally cool the roof. The system yields a summertime minimum temperature reduction of 12 degrees at the employee working level when it is in operation.

Alex Stangle, engineering services manager for Florida Tile Industries, Inc., said, "Under typical Florida conditions the roof may get as hot as 180 degrees but by using the evaporative roof cooling system, roof temperatures are held down to around 90 degrees." "This keeps energy costs down and reduces the temperature inside the plant by as much as 14 degrees F."

Even though the system serves as a cooling mechanism its primary reason of installation is to consume storm water. Under normal operation the ECS will use between 40,000 and 45,000 gallons of water per day. There is an alternative mode for maximum consumption and when used the ECS has been able to handle as much as 170,000 gallons of water in a 24 hour period.

Two watertight, below ground, concrete reservoirs serve as storm water collection sites that fuel the ECS. The Northwest reservoir has a design capacity of 2.24 million gallons and the east reservoir has a design capacity of 3.9 million gallons. The two reservoirs are connected by a 24 inch balance line that allows easy water movement from one reservoir to another.

This line helps during annual reservoir clean-up. Each year the reservoirs will be drained and sediment removed. "The reservoirs not only collect storm water but they also act as large settling tanks," said Tavrides. "The suspended solids, particularly the zinc will settle to the bottom, allowing the cleaner surface water to be used for the ECS and to satisfy the plant's demand for non-potable water."

The system can create a win-win solution for many of Florida's storm water runoff problems. It not only collects the storm water creating a zero discharge system but it also reduces temperature in the plant with its roof cooling system.

--660 words--

FLORIDA ENGINEERING and DESIGN INC.

CONSULTING ENGINEERS

STORM WATER MANAGEMENT SYSTEM FACT SHEET

This innovative system

- is designed to be the first **zero discharge system.**

  - to provide a sustainable solution to a complex environmental problem.

  - to eliminate the negative impacts of storm water runoff.

  - to **prevent pollution** to downtown Lakeland's nearby Lake Wire.

  - to manage virtually all of Florida Tile Industries, Inc. storm water runoff by capture and consumption.

  - to optimize **resource conservation** by using stored stormwater for an **evaporative roof cooling system** which increases employee comfort and productivity.

  - to handle the extreme conditions of a hurricane: 11.4 inches of rainfall in a 24 hour period.

  - to capture over 99% of storm water runoff from client's 22 acres of property: over 27 million gallons in an average year.

  - to be **environmentally responsible and sustainable** with no adverse effects to the environment.

- No storm water will be discharged into Lake Wire. Approximately 90% will be consumed by the evaporative roof cooling system. The majority of the remaining 10% will go to the plant to satisfy the plant's demand for non-potable water. A smaller percentage will be treated and discharged to the City of Lakeland's sanitary sewer system.

- The system is **gravity driven.** It can continue working when most needed and challenged, as in a hurricane, with lots of water, no people and no electricity.

- Though the primary purpose of the system is to consume storm water, the system yields a summertime minimum temperature reduction of 12 degrees in plant work environments when in operation.

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Let It Rain, Let It Rain, Let It Rain

Florida Tile Industries Inc. (Lakeland, Fla.) faced a major decision in 1991. The company could not meet surface water quality standards because of the amount of zinc and lead in its stormwater. Company officials had to decide whether to treat water to meet stringent surface water standards (30 ppb) or take a bolder approach and investigate the possibility of zero discharge.

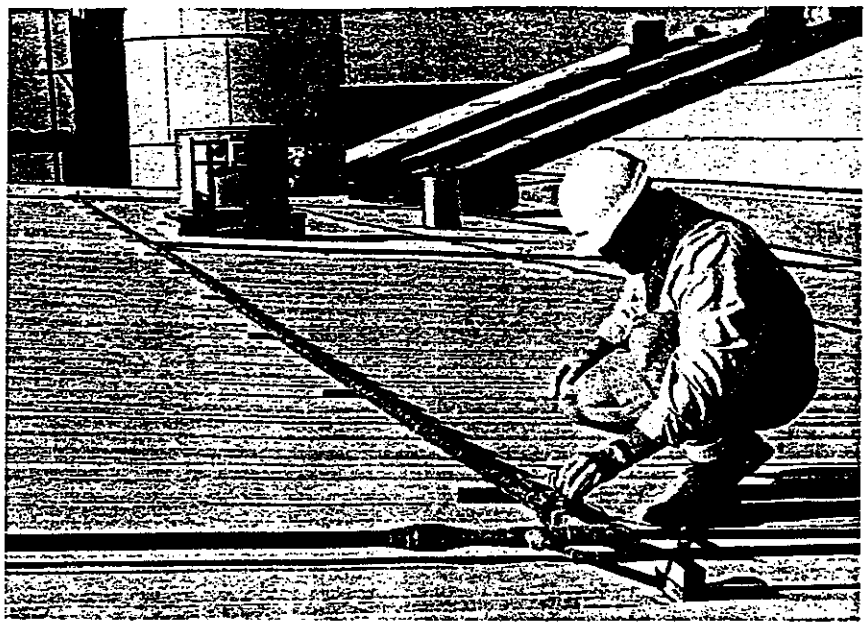
The company chose zero stormwater discharge with a system that captures the 22-acre facility's stormwater runoff, which totals more than 27 million gallons in an average year. The system is designed to handle hurricane conditions of 11.4 inches of rainfall in a 24-hour period.

About 90 percent of the stormwater runoff is collected by a rooftop evaporative cooling system (ECS), most of the remaining 10 percent goes to satisfy the plant's production demand for nonpotable water. The rest is treated and discharged to the city of Lakeland's sanitary sewer system. Virtually the entire system is gravity driven, so it will operate under adverse weather conditions.

The system also functions as a cooling mechanism. A grid of copper tubing sprays the roof, which is divided into sections, with a microfine jet of water. Each section is sprayed for 20 seconds. The system then remains idle for eight minutes, allowing water in the sprayed area to evaporate.

A rooftop weather station and computer control the volume of water, spray pattern and duration to provide optimal cooling. The system yields a minimum temperature reduction of 12 degrees Fahrenheit at the employee working level during the summer. According to Alex Stangle, the company's engineering services manager, "This keeps energy costs down and reduces the temperature inside the plant by as much as 14 degrees Fahrenheit."

Under normal operating conditions, the ECS uses between 40,000 and 45,000 gallons of water per day. An alternative mode for maximum consumption allows the unit to handle up to 170,000 gallons of water in a 24-hour period.



A Florida Tile Industries employee checks the evaporative roof-cooling system.

Two watertight, underground concrete reservoirs serve as stormwater collection sites that fuel the ECS. One reservoir holds 2.24 million gallons; the other, which was under construction at press time, has a design capacity of 3.9 million gallons. A 24-inch balance line will allow easy water movement from one reservoir to another. The line also will help during annual cleanup, when the reservoirs are drained and sediment is removed. "The reservoirs not only collect stormwater but they also act as large settling tanks," explains James Tavrides, vice president of Florida Engineering & Design Inc. (Lakeland, Fla.), which designed the system. "The suspended solids, particularly the zinc, will settle to the bottom, allowing cleaner surface water to be used for the ECS and to satisfy the plant's demand for nonpotable water."

Teamwork Expedites Site Characterization

DOE recently joined forces with the Department of Agriculture and the Commodity Credit Corp. (CCC) to demonstrate an improved process for characterizing hazardous waste sites. (CCC is an independent arm of the USDA created to stabilize, support and protect farm income and prices, and ensure a balanced supply of agricultural products.)

The Expedited Site Characterization process is designed to characterize sites "faster, more accurately, less intrusively and at less cost than traditional characterization methods," DOE announced. The characterization process was developed by CCC in conjunction with Argonne National Laboratory (Argonne, Ill.) and was demonstrated at an abandoned USDA grain elevator site in York, Neb., between July 12 and July 21 of this year.

In this approach, a multidisciplinary team reviews data, visits the site, examines site characteristics and selects multiple technology options before preparing a work plan. The entire team participates in the field program, undertaking several technical activities simultaneously, and team members jointly review results at the end of each day. The process has been approved by EPA Region VII for use at other sites.

Innovative Storm Water System

FLORIDA Engineering & Design, Inc. has developed an innovative system to meet the storm water discharge needs of Florida Tile Industries, Inc., by eliminating the discharge all together. The first phase of the project is now complete and in operation.

The client did not meet surface water quality standards because of the amounts of zinc and lead found within the storm water. In early 1991 they faced a major decision. Should they treat the water to consistently meet the stringent surface water standard of contaminants (30 parts per billion) or should they take a bolder approach and investigate the possibility of completely solving the problem by eliminating all storm water discharge?

Florida Engineering & Design, Inc., decided to try for a system that produced no discharge. They succeeded. James Tavrides, vice president of Florida Engineering & Design, Inc., said, "What you have here is the first zero discharge system anywhere."

The system captures the entire 22 acre facility's storm water runoff, which totals over 27 million gallons in an average year. It is designed to handle hurricane conditions of 11.4 inches of rainfall in a 24 hour period.

The annual average of 27 million gallons of stormwater runoff will be almost entirely consumed on the facility. None will be discharged into nearby Lake Wire. Approximately 90% will be consumed by a rooftop Evaporative Cooling System (ECS).

The majority of the remaining 10% will go to the plant to satisfy the plant's production demand for non-potable water. A smaller percentage will be treated and discharged to the City of Lakeland's sanitary sewer system. Virtually the entire system is gravity driven so the system will operate under adverse weather conditions.

The system also functions as a cooling mechanism. The ECS is made up of a grid of copper tubing that sprays the roof in sections with a micro-fine jet of water. The roof is divided into zones that are sprayed for 20 seconds and then remain idle for eight minutes allowing the area to evaporate.

A rooftop weather station and computer controls the volume of water, the spray patterns and the spray durations to optimally cool the roof. The system yields a summertime minimum temperature reduction of 12 degrees at the employee working level when it is in operation.

Even though the system serves as a cooling mechanism its primary reason of installation is to consume storm water. Under normal operation the ECS will use between 40,000 and 45,000 gallons of water per day. There is an alternative mode for maximum consumption and when used the ECS has been able to handle as much as 170,000 gallons of water in a 24 hour period.

Two watertight, below ground, concrete reservoirs serve as storm water collection sites that fuel the ECS. The Northwest reservoir has a design capacity of 2.24 million gallons and the east reservoir has a design capacity of 3.9 million gallons. The two reservoirs are connected by a 24 inch balance line that allows easy water movement from one reservoir to another.

This line helps during annual reservoir clean-up. Each year the reservoirs will be drained and sediment removed. "The reservoirs not only collect storm water but they also act as large settling tanks," said Tavrides. "The suspended solids, particularly the zinc will settle to the bottom, allowing the cleaner surface water to be used for the ECS and to satisfy the plant's demand for non-potable water." **L&W**

For more information, contact James G. Tavrides, Florida Engineering & Design, Inc., 2054 E. Edgewood Drive, Lakeland FL 33803-3640, (813)665-6363.

City's Refuse Crew Keeps Harbor Clean

(reprinted from "Baltimore Boating", September 1993)

WHEN Baltimore gets a good rain, water is not the only substance to drain into the Harbor. As any boater knows, trash, tree limbs, and other unknown objects flow into the harbor (and marinas) from the 26 storm drains positioned around the area. Even refrigerators, sofas, mattresses and other household appliances have been known to make their way to our boating playground.

Refrigerators? Yes. And tires by the truckload.

During the first half of 1993, the city's marine skimmers pulled 294 tons of debris out of the waters. With a total of five skimmer boats and 15 personnel, the marine operations division of the Department of Public Works clears almost 600 tons of trash each year long 26 miles of shoreline.

So where does this trash come from? There's a story behind that question.

Ironically, Baltimore's storm water system was designed to carry water and trash to the harbor, thus keeping the streets clean. A soda bottle that drops into the Jones Falls as far away as the Pennsylvania line will land eventually at Baltimore's waterfront, accompanied by a can from Cockeysville, a tire from Timonium, a napkin from North Avenue and about a ton of other refuse. The Gwynns Falls carries debris from as far as Reisterstown and dumps into the Middle Branch of the Patapsco River.

But there's good news! "There's very little trash from boaters," says Tony Jeffrey, superintendent of marine operations, " and we appreciate that. In fact, boaters are often our eyes and ears." Boaters may call marine operations on Channel 16 to report debris or floating hazards, such as a log, on the water.

Marine operations personnel often do more than skim debris from the water. They've assisted in oil spills, managed storm-wash off, and rescued people from the water. Each of the skimmer operators is certified in CPR, advanced first aid, and boating and swimming courses.

Other cities, such as New York and Washington, have modeled their debris collection after Baltimore's program. Baltimore was the first city to clean its harbor by the use of marine skimmer boats. Jeffrey says people from across the country are coming to Baltimore to see our success story.

So now with our harbor waters clean, Jeffrey and marine operations' goal is to educate people about how the storm water system works and how they can keep the Patapsco clean. The division recently participated in a conference at Middle Branch Park attended by hundreds of local school children. Also, Jeffrey and other representatives have given talks at area schools abut the local environment and the link between a McDonald's wrapper tossed on Orleans Street and that wrapper floating by Fells Point. "That's the way you have to start," Jeffrey says. "You have to educate." **L&W**

UMI's largest MARINESKIMMER™ is used to skim for floating debris in Baltimore's Inner Harbor. Combined with four additional trashskimmer boats, some of lesser capacity, the City utilizes auxiliary support equipment, sized to match respective models, to make up a complete system.

For more information, contact Lou Shenman, United Marine International, 2337 Lemoine Ave., Fort Lee, NJ 07024, (201)944-5600.