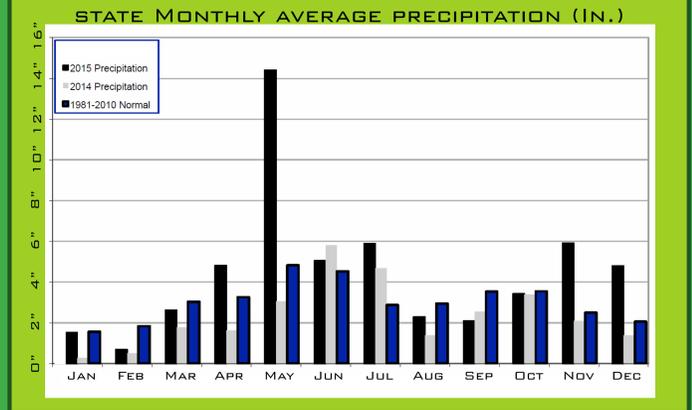
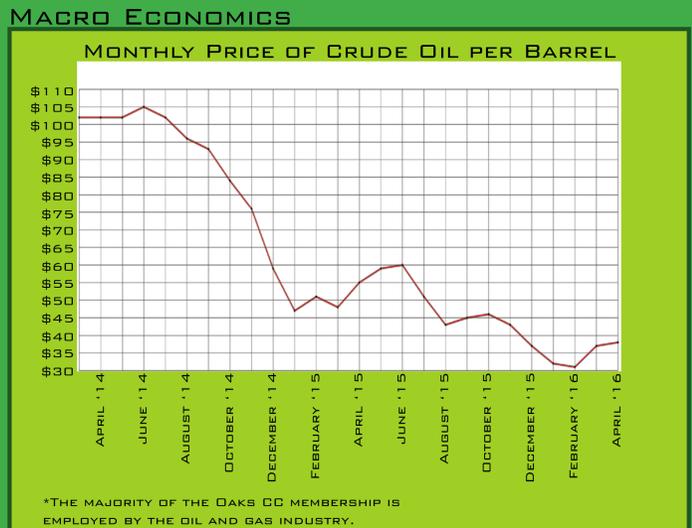
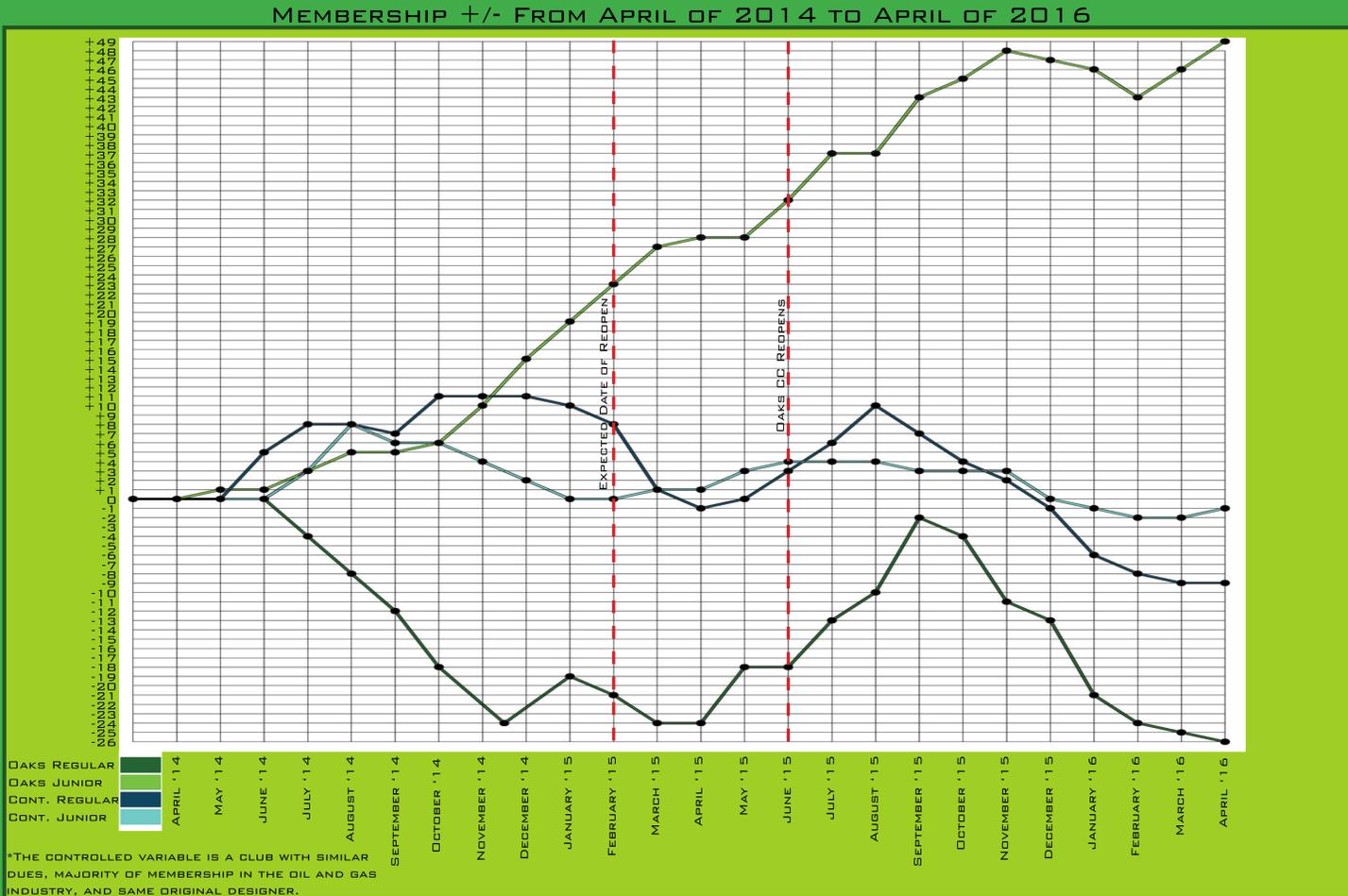


THANK YOU LEW WENTZ FOUNDATION
 THANK YOU FOR YOUR COMMITMENT AND INSPIRATION TO UNDERGRADUATE RESEARCH AT OKLAHOMA STATE UNIVERSITY. WITHOUT THE SUPPORT AND RESOURCES PROVIDED BY THE FOUNDATION, NONE OF THE RESEARCH YOU SEE TODAY WOULD BE POSSIBLE. HOPEFULLY SOME DAY I CAN BE IN THE POSITION TO HELP A STUDENT AS THE LEW WENTZ FOUNDATION HAS HELPED ME. ENJOY THE SYMPOSIUM.

ABSTRACT
 PROPOSAL: THE OAKS CC IN TULSA, OK UNDERWENT A MULTI-MILLION-DOLLAR RENOVATION/RESTORATION OF THEIR HISTORIC 1921 TILLINGHAST DESIGN GOLF COURSE. WHILE THE REDESIGN RECEIVED RAVE REVIEWS AND AWARDS FROM GOLF DIGEST AND THE AMERICAN SOCIETY OF GOLF COURSE ARCHITECTS, THE PURPOSE OF THIS STUDY IS TO EXAMINE IF THE COUNTRY CLUB BENEFITED FINANCIALLY FROM THE INVESTMENT INTO THE RENOVATION. WE EXAMINED SIMILAR CLUBS, MACRO ECONOMICS, METEOROLOGY, MAINTENANCE EFFICIENCY, AND HOW DESIGN AFFECTS MANAGEMENT.
 HYPOTHESIS: THE COST OF THE MULTI-MILLION-DOLLAR RENOVATION WILL GENERATE AN ATTRACTIVE ECONOMIC RETURN AND IN FACT WILL PAY FOR ITSELF IN A RELATIVELY SHORT TIME PERIOD BECAUSE OF RETENTION OF EXISTING MEMBERS (MONTHLY DUES) AND INCREASE IN NEW MEMBERS (DUES AND INITIATION FEES).
 DESIGN COST: COST OF DESIGN WAS MEASURED IN FOUR CATEGORIES: MASTER PLANNING, WORKING DRAWINGS, CONSTRUCTION SITE VISITS, AND TRAVEL EXPENSES.
 CONSTRUCTION COST: COST OF CONSTRUCTION WAS MEASURED AND CATEGORIZED BY COST PER GOLF COURSE FEATURE AND OTHERS EXPENSES. THE ITEMS CONSIST OF GREENS' COMPLEXES, BUNKERS, TEE BOXES, FAIRWAYS, IRRIGATION, DRAINAGE, WATER FEATURE, CART PATH, TREES/LANDSCAPING, BANK LOAN COST, AND CAPITALIZED INTEREST. SATISFACTION OF THE CONSTRUCTED GOLF COURSE FEATURES WAS SURVEYED AT THE END OF THE PROJECT BY THE MEMBERSHIP.
 ANNUAL MAINTENANCE COST: THE MAINTENANCE COST IS BROKEN DOWN BY ITEM SIMILAR TO THE CONSTRUCTION COST. COST TO MAINTAIN THE COURSE CHANGED PER ITEM AFTER THE RENOVATION. THEREFORE, WE HAVE EXAMINED COST FROM 2013 AND PROJECTED 2017 COST. WE MEASURE THE COST PER SQUARE FOOT BEFORE AND AFTER TO DETERMINE THE EFFICACY OF COURSE MAINTENANCE.
 FINDINGS: COMPARED TO THE CONTROLLED VARIABLE, THE OAKS CC MADE A WISE INVESTMENT BY RENOVATING THE GOLF COURSE. OUR DATA PREDICTS THAT THERE WILL BE A MASSIVE INCREASE IN MEMBERSHIP IN THE SPRING OF 2017. DURING THE STUDY WE NOTICED A TREND IN THE OAKS MEMBERSHIP +/-: JUNIOR MEMBERS SKYROCKET AND INCREASED BY 49. IN CONTRAST, THE REGULAR MEMBERS DECREASED BY 26. ACCORDING TO OUR RESEARCH, THIS HAPPENED FOR A NUMBER OF REASONS. THESE REASONS CONSIST OF A WILLINGNESS TO EMBRACE CHANGE FROM THE YOUNGER MEMBERS, THE PRICE OF CRUDE OIL PER BARREL RAPIDLY DECREASING, AND THE CLUB'S INABILITY TO OPEN IN PRIME SEASON (EARLY SPRING) DUE TO A BIBLICAL FLOOD IN APRIL OF 2015. THE COURSE WAS SCHEDULED TO OPEN IN FEBRUARY OF 2015.
 CLOSING: RENOVATING THE GOLF COURSE WAS A WISE INVESTMENT AND WILL CONTINUE TO PROVE IT WORTH IN THE COMING YEARS. AN ADDITIONAL HYPOTHESIS IS THAT THE OAKS CC WILL SEE A GREAT INCREASE IN THE EARLY SPRING OF 2017 BECAUSE THE PRICE OF CRUDE OIL WILL BE HIGHER AND THE COURSE WILL BE OPEN.

BACKGROUND
 DURING THE SUMMER OF 2014, I WAS FORTUNATE TO HAVE AN INTERNSHIP ON A MULTI-MILLION DOLLAR GOLF COURSE RENOVATION AT OAKS CC. I WAS ABLE TO SEE ALL FACETS OF THE PRODUCTION STAGES AS I WORKED DIRECTLY FOR THE ARCHITECT, THE MAINTENANCE CREW, AND THE CONSTRUCTION COMPANY. WITH THE RELATIONSHIPS MADE DURING THIS UNIQUE INTERNSHIP, I HAVE BEEN GRANTED ACCESS TO NUMEROUS DOCUMENTS THAT WERE VITAL TO THIS RESEARCH PROJECT.



DESIGN/RESTORATION COST \$206,561

MASTER PLANNING - \$25,000

WORKING DRAWINGS - \$95,000

CONSTRUCTION SITE VISITS - \$60,000

TRAVEL EXPENSES - \$26,561

CONSTRUCTION COST \$2,846,296 ANNUAL MAINTENANCE COST \$997,747

ITEM	COST
GREENS' COMPLEXES	\$799,992 (28%)
BUNKERS	\$463,053 (16%)
TEE BOXES	\$120,463 (4%)
FAIRWAYS	\$138,489 (5%)
IRRIGATION	\$274,112 (10%)
DRAINAGE	\$229,719 (8%)
WATER FEATURE	\$425,409 (15%)
CART PATH	\$250,873 (9%)
TREES/LANDSCAPING	\$13,800 (1%)
BANK LOAN COST	\$19,046 (1%)
CAPITALIZED INTEREST	\$111,340 (4%)

ITEM	2013 COST	2017 COST	+/-
GREENS' COMPLEXES	\$283,124 (28%)	\$344,968 (35%)	-\$61,844
BUNKERS	\$428,880 (43%)	\$372,939 (37%)	+\$55,941
TEE BOXES	\$71,851 (7%)	\$111,882 (11%)	-\$40,031
FAIRWAYS	\$94,690 (10%)	\$93,235 (9%)	-\$1,455
DRIVING RANGE	\$12,323 (1%)	\$12,323 (1%)	\$0
IRRIGATION REPAIR	\$47,024 (5%)	\$24,000 (2%)	+\$23,024
WATER FEATURE	\$3,500 (>1%)	\$4,900 (1%)	-\$1,400
TREES/LANDSCAPING	\$32,500 (3%)	\$30,500 (3%)	+\$2,000
CART PATH	\$3,500 (>1%)	\$3,000 (>1%)	+\$500
TOTAL	\$994,450	\$997,747	-\$3,297

* 2017 ARE PROJECTIONS BASED OFF OF QUANTITIES FROM 2015 & 2016
 * THE DRIVING RANGE WAS NOT PART OF THE RENOVATION

ANNUAL MAINTENANCE COST PER SQUARE FOOT

ITEM	2013 COST	2017 COST	+/-
GREENS' COMPLEXES	\$3.90	\$3.54	+\$0.36
BUNKERS	\$9.02	\$7.39	+1.63
TEE BOXES	\$1.32	\$1.32	\$0
FAIRWAYS	\$.09	\$.08	+\$0.01

TRENDS AND CONCLUSIONS

CONSIDERING THE COURSE DESIGN RECEIVED GREAT REVIEWS FROM CELEBRATED JOURNALS, THE INVESTMENT OF \$206,561 IN BERGIN GOLF DESIGNS WAS A REWARDING ONE. IT CAN SOMETIMES BE DIFFICULT TO MEASURE THE BENEFITS OF A NEW DESIGN BECAUSE IT IS SUBJECTIVE AND BEAUTY IS IN THE EYE OF THE BEHOLDER. HOWEVER, THE COURSE HAS RECEIVED SUCH GREAT REVIEWS THAT THE INVESTMENT SEEMS MORE THAN JUSTIFIED. WITH THE NEW DESIGN, THE OAKS CC WILL NOW BE ABLE TO HOLD HIGHER END TOURNAMENTS THAT THEY COULD NOT HOST BEFORE. BERGIN GOLF DESIGNS WAS EFFECTIVE AT PRESENTING THE MASTER PLAN TO THE MEMBERSHIP AND GETTING THE PROJECT APPROVED. SECONDLY, BGD PRODUCED WORKING DRAWINGS THAT WERE VITAL FOR THE CONTRACTOR TO CARRY OUT THE CONSTRUCTION. BGD WAS HANDS ON DURING THE ENTIRE PROJECT AND VISITED FREQUENTLY FOR SITE VISITS. THE ARCHITECT OPERATES AS A THIRD PARTY AND WORKS ON BEHALF OF THE CLUB. THEREFORE, IT IS IMPORTANT FOR AN ARCHITECT TO VISIT THE CONSTRUCTION SITE OFTEN. MUCH OF WHAT THE CLUB IS PAYING FOR IS GOING UNDERGROUND. ONE OF THE LAST PLACES YOU WANT TO GO TO MAKE CUTS ON THE BUDGET IS WHEN CHOOSING AN ARCHITECT.

ONE AREA WHERE OUR RESEARCH SUGGESTS THE ARCHITECT SHOULD HAVE GONE A DIFFERENT ROUTE IS ON THE WATER FEATURE. THROUGHOUT OUR SURVEYS, THE WATER FEATURE WAS OVERWHELMINGLY VOTED THE LEAST DESIRED PART OF THE PROJECT. THE WATER FEATURE COST \$425,409, 15% OF THE TOTAL PROJECT. IN GENERAL, THE WATER FEATURE ONLY ACTS AS AN AESTHETIC ELEMENT AND NOT A STRATEGIC ONE. THE CLUB COULD HAVE REMOVED THIS ITEM ENTIRELY AND SAVED 15% ON CONSTRUCTION COST.

BEFORE THE RENOVATION BEGAN, THE AVERAGE AGE AT THE OAKS CC WAS 66. THE CLUB WAS FOUNDED ALMOST 100 YEARS, AND IT WAS ESSENTIAL FOR THE CLUB TO REACH OUT TO THE YOUNGER GENERATION IF IT PLANS TO OPERATE FOR ANOTHER 100 YEARS. TO DATE, THE RENOVATION HAS BROUGHT IN 49 NEW JUNIOR MEMBERS. COMPARING THAT NUMBER TO THE CONTROLLED VARIABLE (-1) THE OAKS CC MADE A GAIN OF +50 IN JUNIOR MEMBERSHIPS.

BEFORE THE RENOVATION, IN 2013, THE MAINTENANCE STAFF SPENT \$994,450 A YEAR. AFTER THE RENOVATION, PROJECTED 2017, THE MAINTENANCE STAFF WILL SPEND \$997,747. AT FIRST ASSESSMENT IT MIGHT APPEAR THAT THE COURSE DOES NOT OPERATE AS EFFECTIVE AS IT ONCE DID. HOWEVER, LOOKING AT THE NUMBERS MORE CLOSELY, IT IS QUITE THE CONTRARY. THE NEW DESIGN INCREASED THE SQUARE FOOTAGES OF THE GREENS, BUNKERS, TEE, AND FAIRWAYS.

DUE TO BETTER DESIGNED GREENS WITH USGA SPECIFICATIONS, THE GREENS ARE EASIER TO MAINTAIN. THE OAKS STAFF SPENDS LESS TIME HAND WATERING THE GREENS (LABOR COST) BECAUSE THE NEW GREENS FUNCTION MUCH BETTER WITH MOISTURE MANAGEMENT. BEFORE THE CLUB SPENT \$3.90 A SQUARE FOOT A YEAR TO MAINTAIN GREENS. NOW THEY SPEND \$3.54.

WHEN IT CAME TO MAINTENANCE EFFICIENCY, THE BUNKERS MADE THE GREATEST IMPROVEMENT FROM THE RENOVATION. FROM DESIGN TO MECHANICS, THE BUNKERS UNDERWENT TO MOST DRAMATIC CHANGES. BERGIN GOLF DESIGNS INTRODUCED THE ORIGINAL TILLINGHAST BUNKER STYLE THAT HAS A GRASS FACE. THIS HAS SAVED THE MAINTENANCE STAFF TIME BY NOT HAVING TO PUSH SAND BACK INTO THE FACES OF THE BUNKER AFTER A RAIN. HOWEVER, THE STAFF DOES HAVE TO FLY MOW THE GRASS FACES, BUT WITH GROWTH REGULATOR AND LABOR, THE BUNKERS TAKE LESS TIME TO MAINTAIN. THE MECHANICS OF THE BUNKER CHANGED AS EVERY BUNKER WAS GIVEN NEW SUBSURFACE DRAINAGE AND EACH BUNKER WAS LINED WITH A NEW PRODUCT CALLED CAPILLARY CONCRETE. BEFORE THE RENOVATION, THE BUNKERS HAD FABRIC LINERS THAT NEEDED CONSTANT REPAIR AND COMPLETE REPLACEMENT EVERY 10-15 YEARS. CAPILLARY CONCRETE ADVERTISES AS THE LIFELONG BUNKER LINER. BEFORE THE RENOVATION THE OAKS SPENT \$9.02 A SQUARE FOOT EACH YEAR ON BUNKER MAINTENANCE AND ARE NOW PROJECTED TO SPEND \$7.39.

WHEN THE COURSE SAVES MONEY PER ITEM ON LABOR COST, IT DOES NOT CHANGE THE BOTTOM LINE. THE STAFF STILL WORKS THE SAME HOURS, BUT THEY HAVE MORE TIME TO FOCUS ON DETAILS THAT MAKE A GOOD COURSE A GREAT ONE.

NINE MONTHS AFTER REOPENING, THE MAINTENANCE CREW HAD TO SPEND \$50,000 ON SAND FOR SOME OF THE BUNKERS TO BE REILLED. AT FIRST WE FIGURED DUE TO THE WINDY OKLAHOMA CLIMATE, THE WIND HAD SWEEP AWAY SOME OF THE SAND. HOWEVER, WHEN WE STUDIED WHICH BUNKERS NEEDED MORE SAND, IT WAS OBVIOUS THAT IT WAS FROM PLAYERS HITTING OUT OF THE BUNKERS. THE OVERWHELMING MAJORITY OF BUNKERS THAT NEEDED MORE SAND WERE RIGHT GREENSIDE BUNKERS. MOST PLAYERS ARE RIGHT HANDED AND TEND TO SLIDE THE BALL. THIS IS A PERFECT EXAMPLE OF HOW DESIGN INFLUENCES MANAGEMENT. ONE OF THE KEYS TO A GOOD DESIGN IS VARIETY, SO YOU WOULD NOT WANT A COURSE TO NOT HAVE ANY RIGHT GREEN SIDE BUNKERS, HOWEVER IT IS SOMETHING TO BE CONSCIOUS OF WHEN DESIGNING.

THE OAKS REGULAR MEMBERSHIP SAW A DECLINE AT THE BEGINNING OF THE PROJECT. THIS WAS EXPECTED DUE TO AN INCREASE IN MONTHLY FEES. A RECOVERY WAS MADE IN THE SPRING OF 2015 UNTIL SEPTEMBER OF 15 BECAUSE OF THE DECLINE OF PRICE OF OIL. OKLAHOMA'S ECONOMY IS LARGELY INFLUENCED BY THE OIL AND GAS INDUSTRY, AND WHEN THE PRICE OF CRUDE OIL PLUMMETED TO RECORD LOWS, OTHER INDUSTRIES TOOK A HIT. IN THIS STUDY, GOLF TRULY PROVED HOW ELASTIC OF A PRODUCT IT REALLY IS. EXAMINE THE "MONTHLY PRICE OF CRUDE OIL PER BARREL" GRAPH AND COMPARE IT TO THE "MEMBERSHIP +/-" GRAPH YOU WILL SEE AN ALMOST IMMEDIATE CORRELATION. IN OTHER ECONOMIC STUDIES, A LAG IS REQUIRED TO MAKE A CASE FOR MACROECONOMIC INFLUENCE, BUT WITH HOW ELASTIC GOLF IS THERE WAS NO NEED FOR A LAG.

OUR RESEARCH SHOWS THAT THE CLUB WAS SUPPOSED TO REOPEN IN FEBRUARY OF 2015 BUT INSTEAD OPENED IN JUNE OF 2015. EARLY SPRING IS PRIME TIME TO CAPTURE NEW MEMBERS. THE COURSE WAS UNABLE TO OPEN DUE TO A HISTORIC FLOOD. USING THE GRAPH "STATE MONTHLY AVERAGE PRECIPITATION" IT IS OBVIOUS TO SEE AN OUTLIER IN MAY OF 2015 THAT CAUSED THIS DELAY.

NEW HYPOTHESIS - ACCORDING TO OUR DATA, THE OAKS WILL SEE A BIG JUMP IN REGULAR MEMBERSHIPS IN THE EARLY SPRING OF 2017.

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