FOUR OAKS
RECLAMATION PROJECT
Pittsburg, Kansas

Submitted by:
The Kansas Department of Health and Environment
Surface Mining Section
4033 Parkview Drive
Frontenac, Kansas 66763
(620) 231-8540

Designed by:
Ochsner, Hare & Hare
2405 Grand, Suite 1000
Kansas City, Missouri 64108

Construction by:
Preston Construction, Inc.
West Mineral, Kansas

Started: December 2001
Ended: July 2002
Cost: $322,745.72

March 2004

Background

Coal was mined in and around Pittsburg, Kansas starting about the year 1850. The first coal mining was done by the stripping process, using plows, scrapers and teams. It was in 1876 that Hodges and Armit began stripping near Pittsburg with a shovel made for railroad work. The shovel operated successfully for three years, but because it could only strip overburden of ten or twelve feet it ceased operations (Howell, 1932). In 1874, the four Scammon brothers from Illinois, dug the first mine shaft. For the next 30 years, coal was extensively underground mined in and around the Pittsburg area, with the room-and-pillar system (Geo Topics in Kansas, 2000). In 1911, a revolving stripping shovel was put into operation in the Pittsburg field. This first shovel cost $25,000 and could strip to a depth of 20 feet. Twenty years later, a shovel was developed that cost $150,000 to $175,000 and could strip to a depth of 45 feet (Howell, 1932).

Pittsburg was a thriving community at the turn of the twentieth century. Not only was coal mined, but the discovery of clay, suitable for making clay products, brought many more entrepreneurs to the area. It was around the early 1900's, the Nesch and Moore Brick Company mined near the project area for clay, and used the vein of coal, just above the clay, to furnish fuel for kilns to manufacture bricks (Howell, 1932).

As with most of the City of Pittsburg, the Four Oaks project area was mined for coal. In the late 1800's, the area encompassing the city was underground mined and later the area was strip mined for the Weir-Pittsburg coal seam. North of the project area was a lead and zinc smelter which processed ores from mines located near Baxter Springs and Galena, Kansas. The location of the smelter was chosen based on cheap fuel (coal) for firing the ovens (Howell, 1932), as it was cheaper to bring the lead and zinc ore to the coal than to haul the coal to the lead and zinc. The Missouri Geological Survey reports, "In 1882, according to the Mineral Resources of the United States, three plants (smelters) were in operation in Illinois, five in Kansas (four in Pittsburg and one in Weir City), and five in Missouri."

After the brick plant and smelters closed, the project site was used as a trash dump for the City of Pittsburg. Although Lincoln Park was already in place bordering the project site to the southeast, it was not until the late 1960's that the City of Pittsburg closed the dump and proceeded to reclaim the ground. In 1970, the front nine holes of the golf course were opened and in 1976 the back nine holes were opened, including the area which would later be identified as Problem Area KS-0118 (Larry Spahn, 2003).

Problem

The project site reclaimed as the Four Oaks Reclamation Project is part of Four Oaks Golf Course and is managed by the City of Pittsburg's Parks and Recreation Department. The golf course is located in the city limits of Pittsburg, Kansas. The 4.9 acre project site is bordered on the north and east side by city streets, and by the golf course maintenance area and building on the west. Across the street on the east side are residential homes, and across the street on the north side is a mobile home park.

On the site there was approximately 485 feet of dangerous highwall created by previous strip mining. The highwall was within 10 to 15 feet of the two bordering streets, 20th Street and Olive Street *(See diagram*). The highwall was 20 to 25 feet high and there were no barriers to stop a driver from dropping over the highwall, if one lost control of their vehicle. A storm sewer outlet drained under 20th Street from the mobile home park onto the golf course and immediately emptied into an old mine shaft left from underground coal mining of the site. The watershed utilizing the storm sewer outlet was very large and upon significant precipitation events, storm water drained to the southwest and eventually pooled in a depression near the 14th green. The pooled water would gradually enter the old mine works through a plugged mine shaft and eventually manifest itself as acid mine drainage in existing waterways on the golf course. Additionally, the 13th green was always saturated to the point of uselessness because of mine water seepage from other abandoned underground mine openings on the site.

Project Design

Appropriate agencies were contacted to seek input or obtain needed permits to proceed with the project. There were no concerns of wildlife habitat loss or disturbing any historical buildings or artifacts, nor were there concerns that re-mining the area would be of economic value.

The Four Oaks Reclamation Project was unique because of the location of the project and because it was a highly visible project to the public. The City of Pittsburg and the Surface Mining Section formed a partnership in the approach used to reclaim the Four Oaks Reclamation Project. The firm of Ochsner, Hare & Hare was selected to provide project designs based upon their experience in landscape architecture and recreational design. The unique nature of this project prompted Ochsner, Hare & Hare to collaborate with George Butler and Associates for engineering design and with Terracon, Inc. for a geotechnical study of the project area. Some of the concerns to the City of Pittsburg and the managers of the golf course were:

1. The reclamation would have to temporarily eliminate the 13th green and the 14th tee box, thus necessitating reconfiguring the course during construction.

2. Some of the existing large trees would have to be removed from the golf course. This was not necessarily all bad though. The existence of the highwalls and their dense vegetative cover retarded air flow in this corner of the course creating unfavorable conditions for both the course grasses and the golfers using the course.

3. Timing of the reclamation activities might interfere with the golfing season.

Some of the concerns of the Surface Mining Section and the designing engineers were:

1. An existing pond in the project area had a fluctuating water level and showed acid drainage characteristics.

2. The previous site was used as a landfill, which could pose environmental and health concerns.

3. Fill material would have to be imported to the site.

Partnering with the City's Park and Recreation Department and using the engineering firms expertise, produced the following design criteria.

The imported fill would be used to backslope the dangerous highwall to traversable levels for golfers and maintenance equipment. All of the regrading would then be contoured to promote positive drainage to an existing pond located on the golf course. The existing pond would be enlarged from .07 acres to .3 acres to accommodate the added drainage from the redirected watershed and to create a more sustainable water body. Some of the fill would also be used to backfill an abandoned mine shaft.

The storm water collection system had to be carefully planned. Water from about 300 acres drained through the system. A 10' X 6' junction box was designed to be connected to the existing storm water pipe. The junction box would also collect storm water with a 4' X 4' area inlet on top and be connected to 236 lf of 6' X 3' Reinforced Concrete Box (RCB). At that point an inlet riser, open on all sides, with an area of 4' X 4' would connect to an additional 122 lf of RCB that would terminate with a headwall and wingwalls into a 155 lf trapezoidal channel. The channel would direct flow to the enlarged pond.

A sub-drainage pipe collection system was designed to carry mine seepage from the east side of the project site, where the highwall was backfilled and regraded, to the enlarged pond. The mine water is treated through dilution prior to exiting the pond onto the golf course. The sub-drainage system includes 642 lf of 12" pipe and 752 lf of 4" lateral pipe. Erosion control fabric was designed into the plans to be used wherever the slightest chance of an erosion problem was suspected.

As a result of partnering, the City of Pittsburg, Parks and Recreation Department was responsible for:

1. Reinstalling the irrigation system within the project area which was destroyed during the

construction.

2. Reinstalling the asphalt golf cart path after final regrading of the site.

3. Reconstructing the 13th green and the 14th tee box.

4. Providing the labor for replacing a fence along the projects northern limits.

Project Construction and Reclamation

The construction phase of the project was awarded to Preston Construction of West Mineral, Kansas. During the preconstruction meeting, the construction company was warned of the possibility of digging into the old mine works or the trash. Because the City of Pittsburg was concerned with the timing of construction, (a portion of the golf course would be temporarily disturbed during the reclamation process), actual construction began in November of 2001 in hopes of being finished by the next spring. Since 20th Street is a busy street linking the Highway 69 bypass to the city, which makes it highly visible to the public, an orange safety fence was erected the first day of construction for safety to the public and to keep the reclamation project free of vandalism.

Clearing and grubbing was the first step in the reclamation process. Trees had to be removed to expose the highwall and start the process of regrading (Photo 1). Usually trees and brush are left in a pile for wildlife habitat, but these had to be hauled off because of the unusual circumstances of the project being so highly visible to the public. All existing plant growth medium was removed and salvaged to put back on top of the finished grade. The imported fill material was obtained from an approved offsite borrow area. The imported fill amounted to 28,725 cubic yards of material used to backfill the highwall and fill in the depression made by the storm water at the old mine shaft. Onsite cut and fill accounted for an additional 4,750 cubic yards. The junction box was connected to the existing storm drain system that runs under 20th street (Photo 2). Excluding the inlets of the junction box and the riser, the rest of the RCB drainage system was buried beneath the ground. The underground sub-drain and toe drain system were put in place before final grading. This underground drainage system was placed on the west side of what used to be part of the highwall (Photo 1). All flow is directed to the enlarged pond. A 4' X 4' riser spillway was installed as the normal spillway and a 30 linear foot bottom width with 4:1 side slopes was installed as the emergency spillway. Water from the pond flows to the southwest through an existing stream on the golf course. Two retaining walls were built around the east and north side of the extended pond for embankment support (Photo 4).

After the project site was regraded and recontoured, topsoil was replaced. All disturbed areas were planted with Savannah Bermuda grass at the rate of 1.5 lbs. PLS/1000 sq. feet. Following grass seeding, sixteen balled and burlapped trees were planted at designated locations.

Completion

The project was completed in July of 2002. The dangerous highwall was eliminated and the subterranean water collection system has eliminated acid seeps in the area. The golf course is more usable now that all the water in the immediate watershed flows through the pond and does not pool on the course. It has been two years since the project was completed and the entire project area has been stabilized.

The City of Pittsburg and the manager of the Four Oaks Golf course are very pleased with the completed reclamation of the golf course. The golf course has many events throughout the year, one of the larger events being the night time 4th of July Tournament, which attracts hundreds of golfers in the surrounding areas. Public feedback about the reclaimed area has been extremely positive. The project area is easier to maintain and is more functional, but the most significant benefit is that city streets are safer and a large hazard to health and safety of the general public has been abated. The Surface Mining Section, the engineering firms, and the contractor, in cooperation with the City of Pittsburg, and the managers of the golf course have completed a highly visible and highly beneficial reclamation project.

PHOTO CAPTIONS:

Existing highwalls were close to two residential streets. The subdrain was placed at the foot of the highwall to direct mine water seepage away from regraded project. (Photo 1)

A 10' X 6' junction box connected to the existing storm water pipe that runs under 20th Street. The top of the junction box is exposed for additional surface water collection. (Photo 2)

Laying the irrigation system in the 13th fairway. (Photo 3)

Retaining Walls installed to lessen slopes on the site. The new 13th green is above the top wall. (Photo 4)

Four Oaks Reclamation Project Completed. (Photo 5)

LITERATURE CITED

Howell, Fred N. 1932. Some Phases of the Industrial History of Pittsburg, Kansas. Kansas Historical Quarterlies. Vol. 1, No. 3. Kansas State Historical Society.

Four Oaks Golf Course Specifications. 2001. Kansas Department of Health and Environment, Surface Mining Section. Frontenac, Kansas.