

Site Drainage Study

Buckner Performing Arts Magnet Elementary School

USD # 259 Wichita, Kansas

Location

The school is located on 27th Street North, between Hillside Avenue and Oliver Street. The address is 3530 East 27th Street North. The Buckner site is located on a portion of Lot 1, Brooks-Buckner Addition. The general location of the site is shown on Appendix A.

Background

Recent renovations to the building include the construction of an addition to the building and a parking lot. The renovations added more classrooms and a library. Portions of the addition have drainage problems ranging from standing water to seepage under doors and windows. Much of the school property adjacent to the new building addition stands in water after rainfall events.

Survey

An as-built survey of the addition was prepared in January 2004. The purpose of the as-built survey was to gather building and ground elevation data in order to analyze the extent of the drainage problems, as well as provide information to aid in determining solutions to the problems.

Problem Description, Analysis, and Recommendations

Playground

Problem

A drainage system was designed to pick up runoff from various locations around the new building addition and route it away from the building. A 15" drainage pipe from the courtyard and an 18" pipe from the south side of the building and parking converge to a headwall (Figure 1—see Appendix B for photograph locations) and outlet onto the playground. Runoff from these pipes flows through a shallow ditch to the northwest (Figure 2). Runoff continues off the school site and enters a small ditch that is a tributary to one of the branches of Chisholm Creek. Neighbors to the west have complained about increased flows from the playground.

Figure 1. Headwall.



Figure 2. Water flowing across the playground.



Figure 3. Swale along west property line.



Analysis

Removal of the headwall and construction of additional underground drainage piping would reduce the amount of water running across the playground. Approximately 750 feet of drainage pipe will be necessary to convey the flow from the headwall to the northwest edge of the playground. A 12" pipe will convey the 2-year design storm or an 18" pipe will convey the 100-year design storm. If inlets are installed, portions of the playground could be graded to the inlets for better drainage. Any excess dirt should be used to construct a berm along the west edge of the site to force the drainage north rather than through neighbors' yards.

Recommendations

- Construct additional underground drainage
- Grading in the playground
- Construct a berm to block drainage to neighbors

Courtyard

Problem

A courtyard was created by the addition to the building. The courtyard is surrounded on all sides by the building and an enclosed walkway. The courtyard is susceptible to rainfall and runoff from the roof. An inlet was placed in the courtyard to drain the area (Figure 4). The relatively flat grades of both the courtyard area and concrete landings at the doors prevents water from reaching the inlet. During rainfall events this area collects standing water which allows seepage under doors and a window, then into the building.

Figure 4. Inlet in the courtyard.



Analysis

Lowering the inlet top and re-grading the area south of the inlet will help provide positive drainage in the courtyard. If problems with water seeping under the doors persists, reconstructing the concrete landings and sidewalk will help provide fall away from the building. Tying roof drains directly into drainage inlets via underground piping would help reduce the amount of surface water.

Recommendations

- Lower Inlet
- Re-grade
- Reconstruct concrete landings and sidewalk to provide fall away from the building
- Tie roof drains into underground pipe system

South Side of Building

Problem

There are two sets of exterior doors with flat concrete pads along the south side of the building (Figures 5 & 6). A drainage inlet has been constructed to carry runoff away from the building and to the playground. Water drains from the roof through scuppers and onto concrete pads (Figure 7). This area stands in water after a rain event (Figures 8 & 9). Water stands on flat landings at doors and seeps through thresholds and into the building.

Figure 5. East door on the south side.



Figure 6. West door on the south side.



Figure 7. Scupper



Figure 8. South side looking west.



Figure 9. South side looking east.



Analysis

Lowering the inlet top and grading the surrounding area will produce positive drainage. Reconstructing concrete landings and sidewalk will provide fall away from the building. Roof drains could be tied into the underground drainage system to further reduce standing water and erosion around scuppers.

Recommendations

- Lower inlet top
- Re-grade
- Reconstruct concrete landings and sidewalk

East Side of Building

Problem

Three inlets were placed on the east side of the building to pick up runoff from the building and parking lot (Figures 10-12). Grading around the inlets does not provide positive drainage. Roof runoff drains onto concrete pads and then to the ground. Ground surrounding the concrete pads does not have positive drainage (Figure 13). Seepage occurs under an exterior door to the building that has a flat concrete landing and a scupper draining next to it (Figure 14). A concrete barrier has been constructed to direct runoff from the scupper away from the door. The barrier has reduced, but not eliminated the seepage of water under the door.

Figure 10. Inlet east of the building.



Figure 11. Inlet east of the building.



Figure 12. Inlet east of the building.



Figure 13. Scupper on east side of building.



Figure 14. Door and scupper on east side of building.



Analysis

Inlets in this area could be lowered and the areas could be graded to drain to the inlets. Concrete approaches that are flat could be re-constructed to drain away from the building. Roof drains could be tied into the underground drainage system to further reduce standing water and erosion around scuppers.

Recommendations

- Lower one inlet top
- Re-grade areas around inlets
- Re-construct concrete approaches
- Re-grade north and east of library
- Tie roof drains nearest the library entrance into drainage system

Summary

Buckner Elementary School has several drainage problems created by a recent addition to the building. A large volume of water flows across the playground before exiting the site. Standing water seeps into doors and windows of the new addition. Runoff does not reach inlets. Many areas around the building are standing in water after a rainfall event. These problems can be fixed through installation of additional underground storm water pipe, lowering inlet tops, and re-grading of both vegetated areas and pedestrian walks.

Recommendations and Cost Estimate

Playground

- Design and construction for additional underground drainage \$35,000
- Grading in the playground \$5,000
- Construct a berm to block drainage to neighbors \$1,000

Courtyard

- Lower Inlet \$1,000
- Reconstruct concrete landings and sidewalk \$1,000
- Tie roof drains into piping system \$1,000

South Side of Building

- Re-grade \$2,000
- Reconstruct concrete landings and sidewalk \$1,400

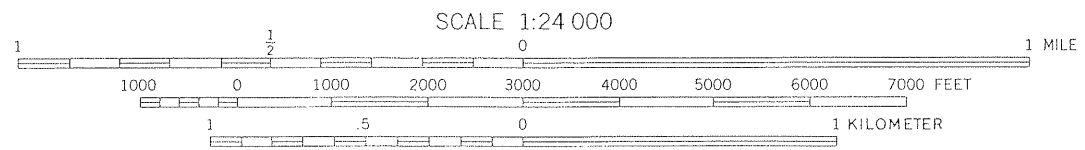
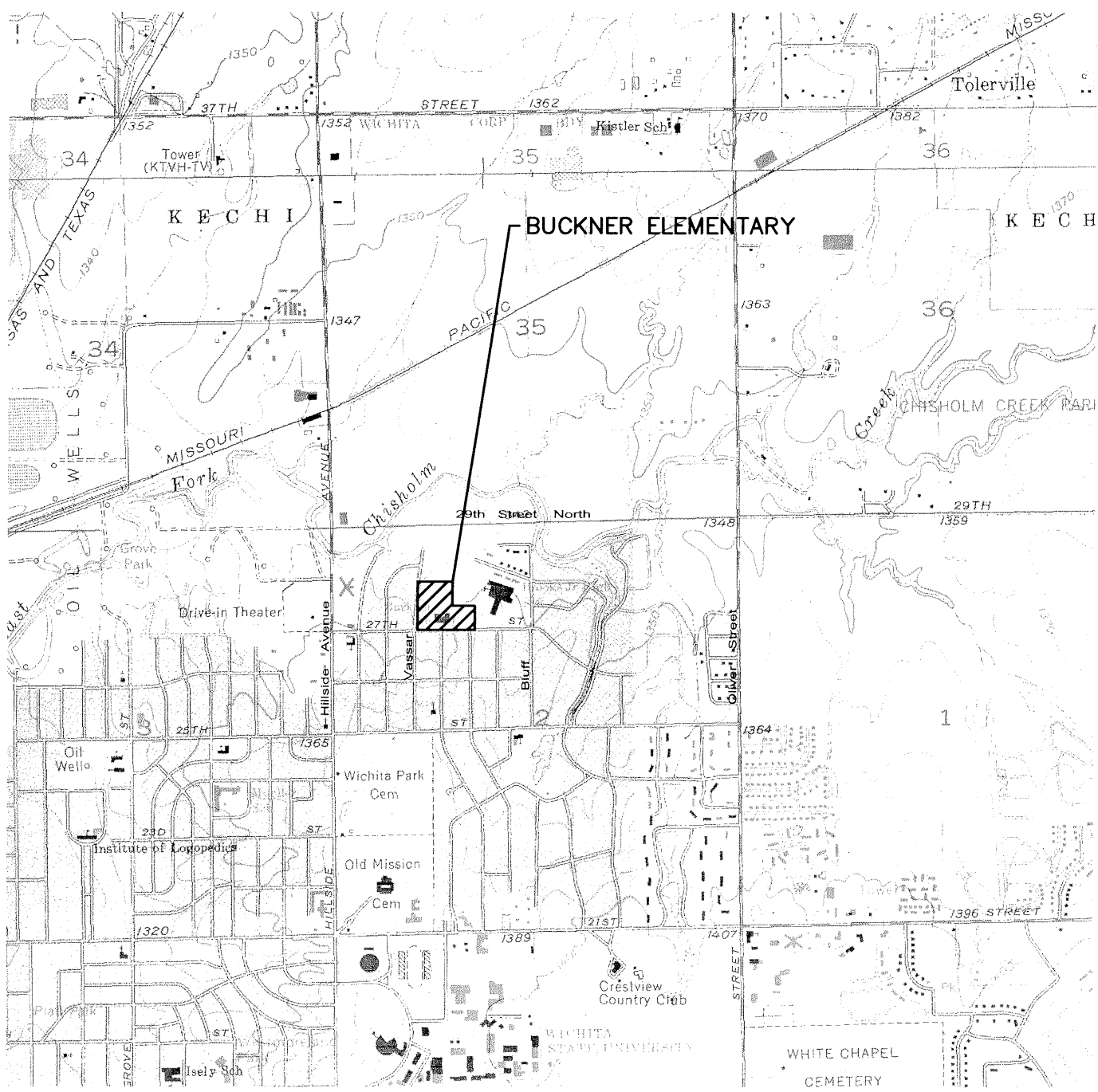
East Side of Building

- Lower inlet tops \$500
- Re-grade areas around inlets \$1,000
- Re-construct concrete approaches \$5,000
- Re-grade east & north of library \$2,000
- Tie-roof drain into drainage system \$4,000

Total=\$59,900

Appendix A

Quadrangle Map



CONTOUR INTERVAL 5 FEET
 NATIONAL GEODETIC VERTICAL DATUM OF 1929

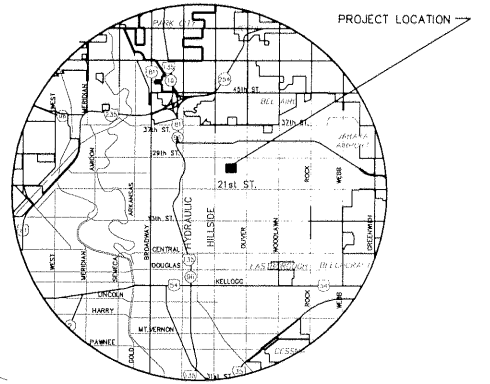
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MKEC
 ENGINEERING
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 411 N. WEBB ROAD
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BUCKNER ELEMENTARY		
PROJECT NAME		
WICHITA EAST QUADRANGLE MAP		
SHEET TITLE		
KLA	SMD	JTC
DESIGN BY.	DRAWN BY.	CHECKED BY.
FEBRUARY 2005	03443	1 / 1
DATE	JOB NO.	SHEET/OF

Appendix B

Site Plan



LOCATION MAP

BERM/SWALE
RE-GRADE SWALE & CREATE
BERM FROM EXCESS DIRT

INSTALL INLET

PROP. DRAINAGE PIPE

FILL DITCH

INSTALL INLET

LOWER INLET TOP & REGRADE
SURROUNDING AREA

NORTH BUCKNER ELEMENTARY
3530 E. 27th STREET NORTH

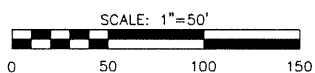
27TH ST. N.

BENCHMARKS

- BM #3 — top of curb on N. side of 27th Street North 57.5' East of power pole at Southwest corner of Buckner Elementary School property.
Elevation=157.827 (city datum)
1029.573 (USGS)
- BM #4 — top of curb on N. side of 27th Street North 137.7' East of light pole at Gentry Drive and 27th Street North.
Elevation=173.72 (city datum)
1013.68 (USGS)

LEGEND

- ➔ REGRADE FOR POSITIVE DRAINAGE
- — — — — EXISTING SWS
- — — — — RECOMMENDED SWS
- ④➔ LOCATION & DIRECTION OF PHOTOGRAPH



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BUCKNER ELEMENTARY

PROJECT NAME
APPENDIX B
SITE PLAN
SHEET TITLE

DESIGN BY: KLA	DRAWN BY: SMD/KWS	CHECKED BY: JTC
DATE: MARCH 2005	JOB NO.: 03443	SHEET/OF: 1 / 1