Engineering Specialty Report

Project Summary

Over the years, Joseph Sears School in Kenilworth, IL, has experienced various amounts of water intrusion in the crawl space and/or utility tunnel. Most recently, during the July 23, 2011 rain event approximately 6.2" fell in a 24-hour period. The results of this rain event were flooded roads in the Village of Kenilworth, sewer backups in the School, and flooding in the School utility tunnel and auditorium. As a result of this event, Kenilworth School District 38 contracted with Gewalt Hamilton Associates, Inc. (GHA) to investigate any major single sources of storm water in the crawl space/utility tunnel.

Our investigation included reviewing historical plans, District personnel interviews, televising of the roof drains and exterior storm and sanitary sewers, and visual inspection of accessible portions of the crawl space and utility tunnel. In addition, we reviewed all recordings of the televised roof drains and exterior storm and sanitary sewers.

The investigation did not find a major single source of water in the crawl space or utility tunnel. The investigation did find several sanitary and storm sewer lines in need of repair and replacement. Of significance, we found a drain tile under the auditorium floor that is mostly collapsed and full of debris. We also found that the exterior sanitary and storm sewers that run along the north side of the building parallel to the north property line are full of debris, collapsed in areas, not accessible to inspection, and back pitched in areas.

Based on our investigation we are recommending several maintenance improvements and two drainage improvements to reduce the frequency and severity of storm water in the crawl space / utility tunnel. We recommend that the storm and sanitary sewers that run parallel to the north property line be replaced (maintenance item). We are also recommending that two other sanitary sewer lines along the Abbotsford side of the building be repaired due to obstructions within the pipe (maintenance item). Recommended improvements also include the replacement of sanitary sewer backflow prevention valves along the Abbotsford side of the building (maintenance item), waterproofing the foundation (drainage item), and adding a foundation footing drain (drainage item). The foundation waterproofing and footing drain will be installed along the north, east and southeast building foundations of the School.

The anticipated project construction cost is estimated to be $325,000.

Project Assignment

GHA was retained by Kenilworth SD 38 to review historical improvement plans, interview District personnel, televise roof drains on the east and north side of the school, televise exterior sanitary and storm sewers on the north, east and southeast side of the building, and visually inspect accessible portions of the crawl space and utility tunnel. See Figure 1 for project limits. The purpose of the investigation was to determine if there is a single major source of water in the crawl space. Once complete with our investigation, we were asked to develop specific opinions regarding this situation.

Figure 1 – Project Limits (source Google Earth)

Storm Water in Crawl Space/Utility Tunnel

There have been several documented occurrences of storm water in the crawl space and/or utility tunnel. The most recent occurrence of flooding was July 23, 2011, where approximately 6.2" of rain feel within a 24-hour period. Most of the rain fell during a short period of time in the early morning hours of this day. Our office interviewed Moris Quijada, Facilities Director, regarding this specific event to determine the extent of observed water impacts. Mr. Quijada shared the following specific impacts from the July 23, 2011 event:

- At least ½ inch depth of water in low spot of auditorium. (See Figure 2)
- Utility Tunnel half full of water. (See Figure 3)
- Sewage backup in utility closet next to Cafeteria. (See Figure 4)

Figure 2 – Auditorium Flooding

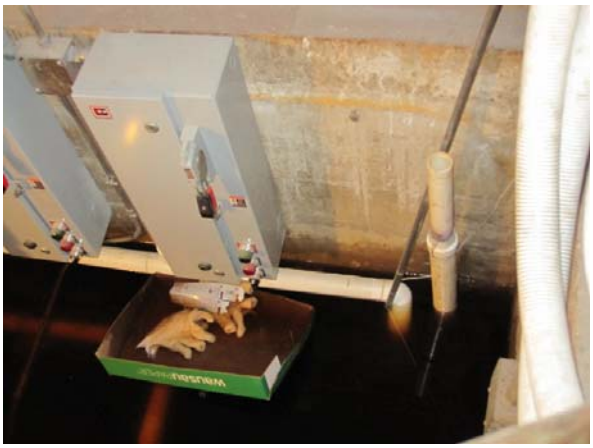


Figure 3 – Utility Tunnel

Figure 4 – Sewage Backup

Historical Plan Review

Many of the historical architectural and engineering plans for the school were severely damaged or destroyed during the Baker Building flood in August 2002. With the help of Mr. Quijada, our office was able to locate enough plans to develop a base utility plan within the project limits. See Exhibit 1 in the Appendix for a copy of this base utility plan. Some of the historical plans indicate backflow prevention valves were installed on the sanitary sewer system. Unfortunately, these valves were installed in such a way that gaining access to inspect them would require excavation on the front side of the building. We were also able to locate foundation plans for the building within the project limits. These plans indicate that no footing drain was installed on the exterior side of the foundation at the time of construction. In conventional construction today, it is standard procedure to install a perforated pipe at the bottom of a foundation surrounded by washed stone to collect ground water before it seeps into basements or crawl spaces. This perforated pipe is commonly referred to as a footing drain because it collects groundwater from the foundation's footing. The water is then pumped out of the low area via a sump pump. Many people have this setup in their homes.

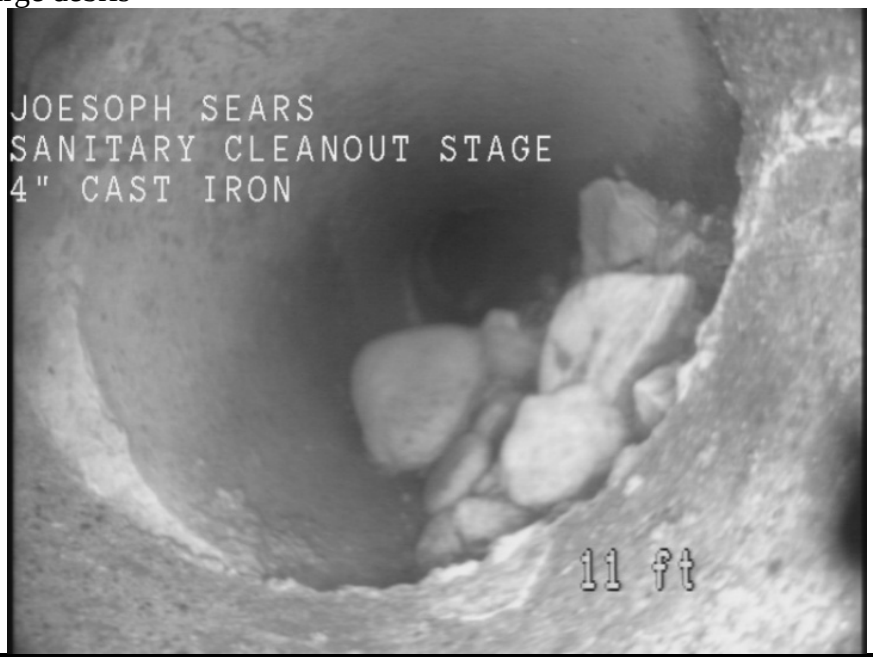
Televising of Roof Drains and Sewers

Our office contracted with H.R. Stewart Inc. to televise roof drains, exterior storm sewers and exterior sanitary sewers. Where accessible from the exterior of the building foot print, the camera was extended into the crawl space sewers as far as possible. The investigation was limited to the area identified in Figure 1 of this report.

Along with a representative from our office, H.R. Stewart Inc. was on site the week of November 21, 2011 to televise the areas mentioned above. In addition to televising DVD's, our office received a field report from H.R. Stewart Inc. indentifying defective characteristics of each pipe. Attached to this report is a copy of the DVD and field report from H.R. Stewart Inc.

Notes from Roof Drain and Sewer Televising

As a result of the televising and historical plan research, our office was able to develop a base utility plan for use when identifying the issues with the sewer and roof drain system. Reference Exhibit 1 – Base Utility Plan in the Appendix of this report. We note the following sewer deficiencies from the H.R. Stewart Inc. report and our own observations:

Sewer Observations	
Legend: CO = Cleanout MH = Manhole CB = Catch Basin	
Pipe	**Observation**
Stage Cleanout (CO #2) to Sump Pump	- Multiple joints separated - Debris throughout pipe - Survey abandoned 50' downstream of CO due to separated joint and large debris 

Sewer Observations	
Legend: CO = Cleanout MH = Manhole CB = Catch Basin	
Storm Cleanout (CO #1) to CB #2	- Debris throughout pipe. - Survey abandoned 55’ downstream of CO due to debris
CB #2 to CO #1	- Many bends observed. - Roots at many joints - Debris throughout pipe - Survey abandoned at 30’ due to debris and pipe sag.
Sanitary Cleanout (CO #4) to Abbotsford Combined Sewer	- Sag in line between 19’ and 41’ downstream of CO. - Survey abandoned due to debris and bends
MH #3 to Building	- Leaking joint (infiltration) at 50’ upstream of MH #3. - Debris in line starting at 85’ upstream of MH #3 to unknown. - Survey abandoned at 97’ upstream of MH #3 due to debris. 
MH #8 to Abbotsford Combined Sewer	- Sag begins at 36’ downstream of MH #8. Gap in joint. - Survey abandoned at 38’ downstream of MH #8 due to large joint separation. - Unknown obstruction at approximately 43’ downstream.

Sewer Repair Recommendations

Our investigation did not find a major single source of water in the crawl space / utility tunnel; however, we found several sanitary and storm sewer lines in need of repair and replacement. We recommend the following sewer repairs be completed:

- Replace sanitary sewer along north property line (CO#4 to Abbotsford Combined Sewer) and add new manhole on School side of property line at Abbotsford.

- Replace storm sewer along north property line (CO#1 to CB#2) and add new manhole at connection to existing sewer.
- Replace all sanitary sewer backflow prevention valves outside of the building footprint within manholes to allow easy access for maintenance and inspection.
- Repair or replace sanitary sewer within crawl space directly south of Skokie Ditch (MH#3 to end in building).
- Replace sanitary sewer from southeast corner of building towards Abbotsford Road (MH#8 to Abbotsford) due to large offset joint and obstruction.

Crawl Space/Utility Tunnel Improvement Recommendations

The investigation determined that there are no formal drainage systems within the crawl space/utility tunnel or footing drains within the project limits. It is our opinion that the addition of a footing drain and waterproofing the exterior side of the foundation will decrease the frequency and severity of storm water intrusion within the crawl space/utility tunnel. A conceptual cross section drawing of the waterproofing and footing drain along the north property line is shown in Figure 5. Further, we recommend that the Skokie Ditch within the footprint of the building (under the school) be sprayed with an epoxy waterproofing material to further decrease the frequency and severity of water within the crawl space/utility tunnel.

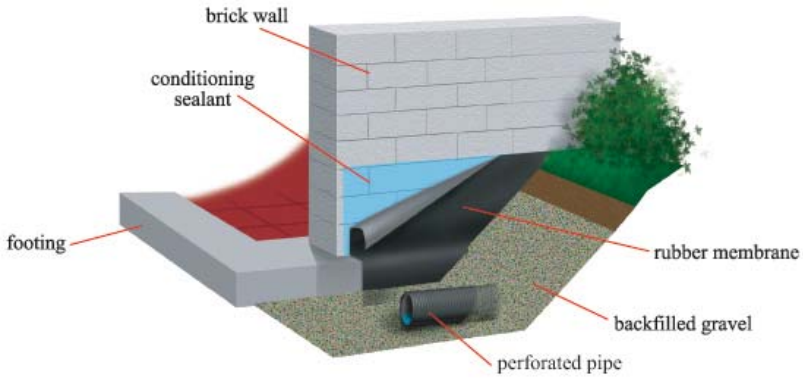


Figure 5 – Sample cross section of proposed waterproofing and footing drain improvements

Opinion of Probable Construction Costs

We anticipate the following construction costs:

1. Sewer Repair Recommendations (repair/replace sewers, install new backflow prevention valves, add manholes) - $100,000
2. Add footing drain along northside, eastside, and southeast side of building. Install sump pump on exterior of building that collects and pumps water from footing drain. Waterproof foundation adjacent to footing drain - $175,000
3. Spray epoxy coating on interior of Skokie Ditch under School - $50,000

Anticipated Project Schedule

We anticipate the following project schedule:

- February 13, 2012 – Authorization to proceed with project given to Design Team
- March 9, 2012 – Submit preliminary plans to Metropolitan Water Reclamation District, Village of Kenilworth, and Regional Office of Education
- April 1, 2012 – Begin preparation of Construction Documents
- April 26, 2012 – Construction Documents out to Bid
- May 10, 2012 – Bid Opening
- May 21, 2012 – School Board approval of Contractor
- June 18, 2012 – Begin Construction
- August 3, 2012 – End Construction

This Report was prepared by: Gewalt Hamilton Associates, Inc.

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Leo X. Morand, P.E.
Civil Engineer

LEGEND:

BITUMINOUS CONCRETE PAVEMENT	
PCC PAVEMENT	
PCC SIDEWALK	
B 6.12 CURB & GUTTER	
B 6.12 CURB & GUTTER – DEPRESSED	
B 6.12 CURB & GUTTER – REVERSED PITCH	
6' TALL, CHAIN LINK CONSTRUCTION FENCING	

GEWALT HAMILTON ASSOCIATES, INC.
CONSULTING ENGINEERS & SURVEYORS
850 Forest Edge Drive Vernon Hills, IL 60061 Tel. 847.478.9700 Fax 847.478.9701

OWP/P
O'Donnell Wicklund Pigozzi and Peterson, Inc.
Professional Design Firm
License Number 184-000339
Chicago, Illinois

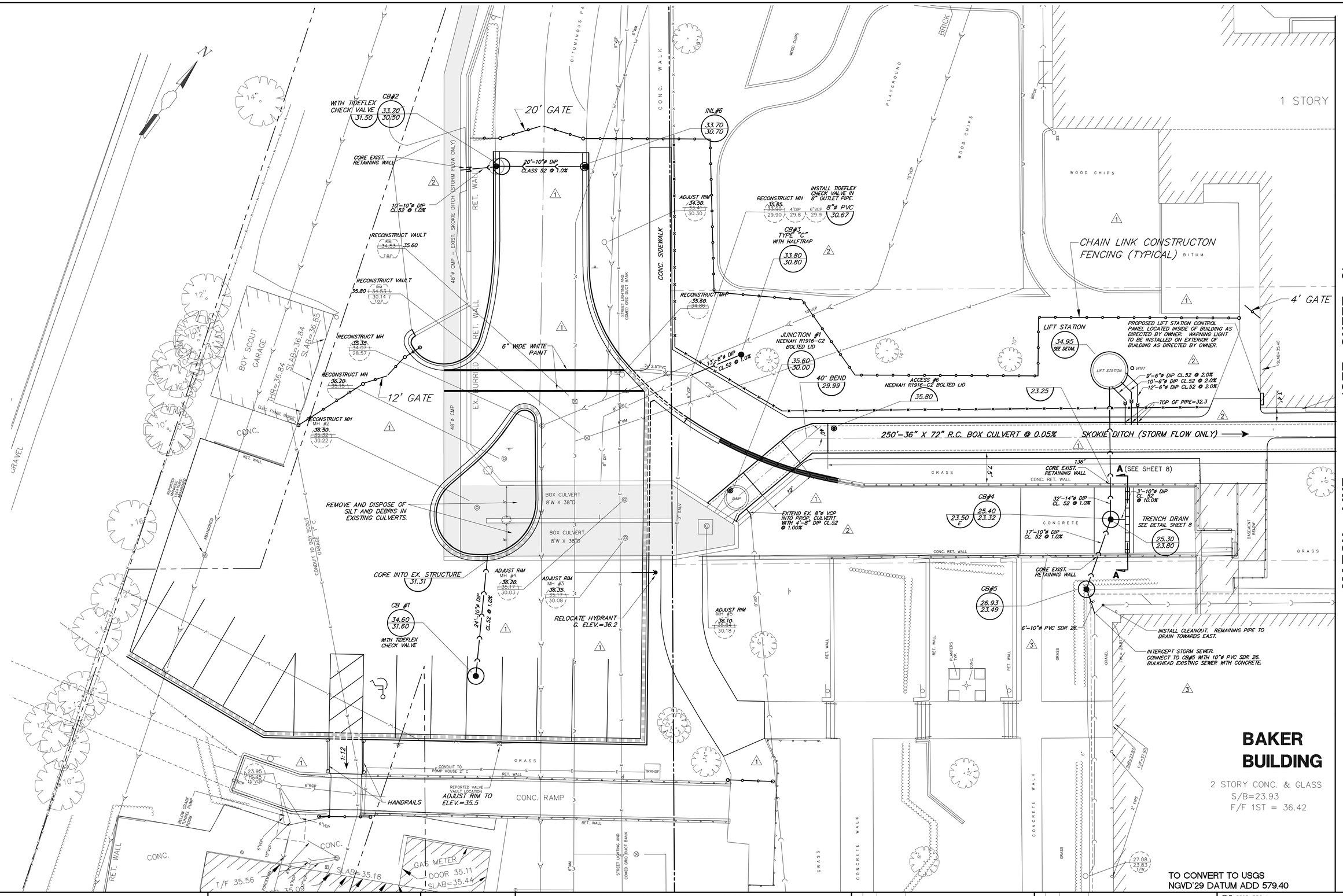
GRADING & PAVING PLAN - WEST

SEARS SCHOOL DRAINAGE IMPROVEMENTS
KENILWORTH SCHOOL DISTRICT 38
KENILWORTH, ILLINOIS

NO.	BY	DATE	REVISION
4	LXM	4-26-04	ISSUED FOR CONSTRUCTION
2	LLM	2-11-04	ISSUED FOR BID & PER MWRD
1	LLM	1-16-04	PER VILLAGE COMMENTS & INTERNAL REVIEW

NO.	BY	DATE	REVISION

FILE: 3363-PR6.dwg
DRAWN BY: LLM
DATE: 12-2-03
GHA PROJECT # 3363.000
CHECKED BY: DEM
DATE: 12-2-03
SCALE: 1"=10'
SHEET NUMBER: C3
OF 10 SHEETS



BAKER BUILDING

2 STORY CONC. & GLASS
S/B=23.93
F/F 1ST = 36.42

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UTILITY PLAN - WEST

SEARS SCHOOL DRAINAGE IMPROVEMENTS
KENILWORTH SCHOOL DISTRICT 38
KENILWORTH, ILLINOIS

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4	LXM	4-26-04	ISSUED FOR CONSTRUCTION
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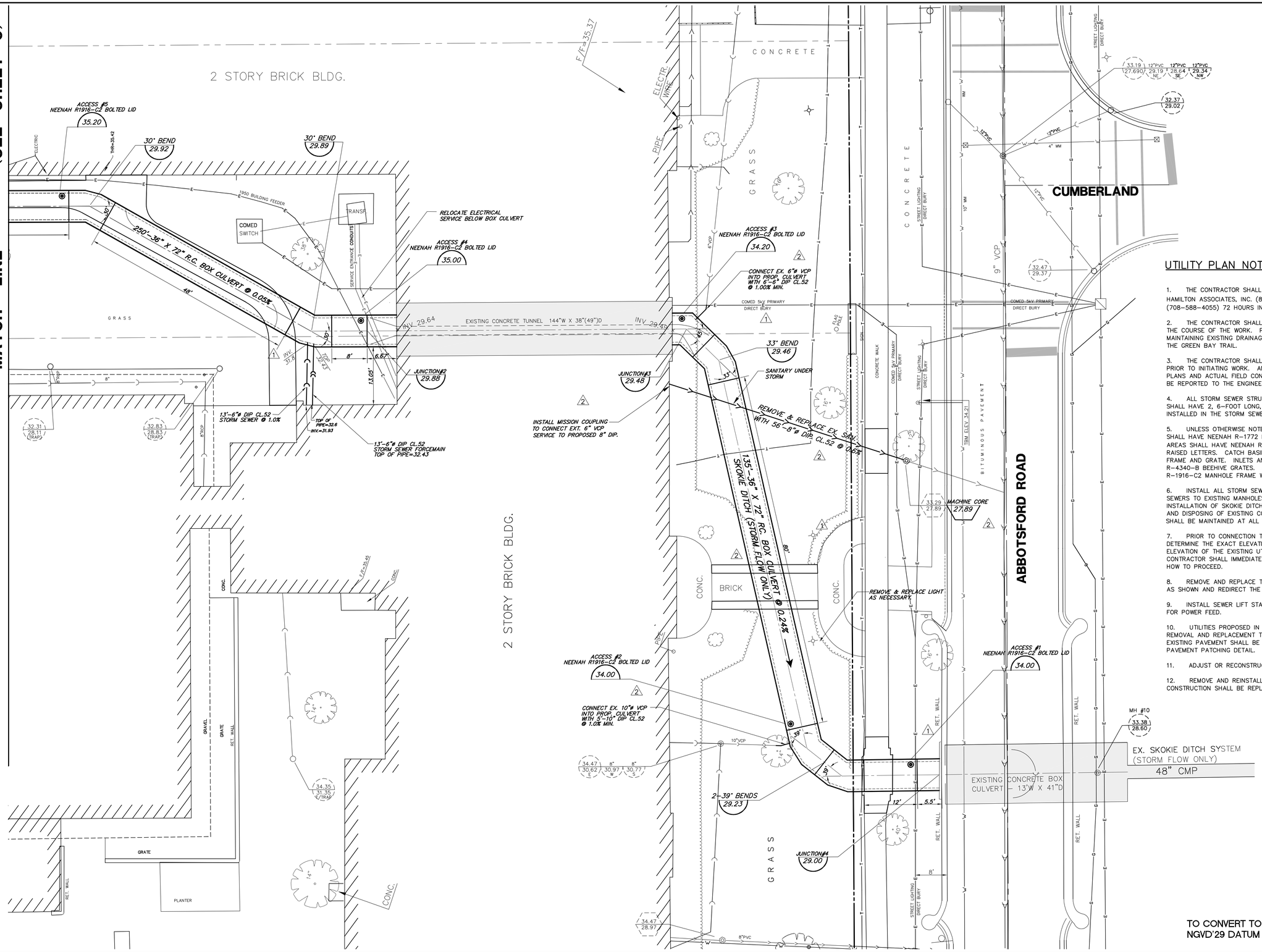
MATCH LINE (SEE SHEET 5)



UTILITY PLAN NOTES

1. THE CONTRACTOR SHALL NOTIFY THE VILLAGE OF KENILWORTH (847-251-9210), GEWALT HAMILTON ASSOCIATES, INC. (847-478-9700), AND THE MWRD OF GREATER CHICAGO (708-588-4055) 72 HOURS IN ADVANCE OF ANY WORK BEING PERFORMED ON-SITE.

2. THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER AND THE SCHOOL THROUGHOUT THE COURSE OF THE WORK. PARTICULAR ATTENTION IS REQUIRED IN COORDINATING AND MAINTAINING EXISTING DRAINAGE, AND PEDESTRIAN AND BICYCLE TRAFFIC ALONG IVY COURT AND THE GREEN BAY TRAIL.

3. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION AND ELEVATION OF EXISTING UTILITIES PRIOR TO INITIATING WORK. ANY DISCREPANCIES FOUND BETWEEN THE INFORMATION NOTED ON THE PLANS AND ACTUAL FIELD CONDITIONS, OR ANY CONFLICTS WITH PROPOSED IMPROVEMENTS SHALL BE REPORTED TO THE ENGINEER IMMEDIATELY.

4. ALL STORM SEWER STRUCTURES INTENDED TO TAKE SURFACE WATER IN PAVEMENT AREAS, SHALL HAVE 2, 6-FOOT LONG, 6-INCH DIAMETER PERFORATED PVC SDR 26 UNDER DRAINS INSTALLED IN THE STORM SEWER STRUCTURE AS DETAILED.

5. UNLESS OTHERWISE NOTED, ALL STORM SEWER STRUCTURES LOCATED IN PAVEMENT AREAS SHALL HAVE NEENAH R-1772 FRAMES WITH TYPE D GRATES. STORM MANHOLES IN OFF ROAD AREAS SHALL HAVE NEENAH R-1772 FRAMES AND LIDS WITH THE WORD "STORM" IMPRINTED IN RAISED LETTERS. CATCH BASINS IN OFF ROAD AREAS SHALL HAVE NEENAH R-2560-C1 BEEHIVE FRAME AND GRATE. INLETS AND TYPE C CATCH BASINS IN OFF ROAD AREAS SHALL HAVE NEENAH R-4340-B BEEHIVE GRATES. ACCESS WAYS TO THE BOX CULVERT SHALL UTILIZE NEENAH R-1916-C2 MANHOLE FRAME WITH BOLTED LID.

6. INSTALL ALL STORM SEWERS AND SERVICES AS SHOWN. CONNECTION OF PROPOSED STORM SEWERS TO EXISTING MANHOLES SHALL BE DONE BY CORING INTO THE EXISTING STRUCTURE. INSTALLATION OF SKOKIE DITCH BOX CULVERT SHALL BE DONE WHILE SIMULTANEOUSLY REMOVING AND DISPOSING OF EXISTING CORRUGATED METAL PIPE. POSITIVE DRAINAGE IN THE SKOKIE DITCH SHALL BE MAINTAINED AT ALL TIMES.

7. PRIOR TO CONNECTION TO THE EXISTING UTILITIES, THE CONTRACTOR SHALL EXCAVATE AND DETERMINE THE EXACT ELEVATION AND LOCATION OF THE EXISTING UTILITY. IF THE LOCATION OR ELEVATION OF THE EXISTING UTILITY IS DIFFERENT THAN THAT NOTED ON THE PLANS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND ASCERTAIN WRITTEN DIRECTION AS TO HOW TO PROCEED.

8. REMOVE AND REPLACE TRENCH DRAIN IN RECEIVING DOCK. INTERCEPT COURTYARD SEWERS AS SHOWN AND REDIRECT THE FLOW TO THE PROPOSED LIFT STATION.

9. INSTALL SEWER LIFT STATION AS SHOWN AND AS DETAILED. REFER TO ELECTRICAL DRAWINGS FOR POWER FEED.

10. UTILITIES PROPOSED IN EXISTING PAVEMENT AREAS SHALL BE INSTALLED TO LIMIT PAVEMENT REMOVAL AND REPLACEMENT TO THE EXTENT POSSIBLE. PRIOR TO INSTALLING UTILITY, THE EXISTING PAVEMENT SHALL BE SAWCUT STRAIGHT. REPAIR PAVEMENT IN ACCORDANCE WITH THE PAVEMENT PATCHING DETAIL.

11. ADJUST OR RECONSTRUCT EXISTING STRUCTURES TO NEW FINISHED GRADE AS NEEDED.

12. REMOVE AND REINSTALL STREET SIGNAGE AS REQUIRED. SIGNS DAMAGED DURING CONSTRUCTION SHALL BE REPLACED IN KIND BY THE CONTRACTOR AT HIS EXPENSE.

TO CONVERT TO USGS
NGVD'29 DATUM ADD 579.40

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UTILITY PLAN - EAST

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