

DRAINAGE REPORT

FOR

**Village at Greenwich  
Wichita, KS**

JULY 2008



## Public Works, Engineering Division Final Drainage Plan Submittal Checklist

Reviewer: _____	Date: _____
Subdivision Name: _____	Location: _____
Total Land Area Of Ownership: _____ Acres	
Type: _____ Residential _____ Commercial _____ Industrial _____ Recreation _____ Municipal _____ Other	
Applicant: _____	Contact: _____ Phone #: _____
Engineer: _____	Contact: _____ Phone #: _____

Please check the appropriate box:

I = Included; NA = Non-Applicable; R= Required prior to development  
(If "NA" is checked, an explanation must be entered)

Tab 1. Project Narrative	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Site Location Map, using USGS Map					
B. Discussion of development, existing conditions, and proposed impacts on stormwater, wetland, riparian, and flood plain					
C. Discussion of offsite conditions					
D. Summary of runoff calculations (pre/post development) No increase in peak discharge for all storm series					
E. Narrative description of the type and function of the permanent best management practices that are incorporated into the site design					
F. Copy of the plat					
G. Preliminary grading plan (The final grading plan shall be sealed, signed and dated prior to Engineering receiving the final sanitary sewer plans. One plan sheet and PDF shall be submitted to the Subdivision Engineer.)					
H. Professional Engineer seal, signature and date on cover of report					
I. CD of drainage plan in PDF format (one file) and one paper copy bound with this checklist included behind the cover					

Tab 2. Existing Conditions Runoff Calculations	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Copy of applicable orthophoto showing proposed project boundaries (preferable in color)					
B. Runoff Method (Rational, Hydrograph Method, or other approved methods by Engineering)					
C. Existing topography (no greater than 2-foot contours, 1-foot recommend)					
D. Total Site Area and Total Impervious Area (acres)					
E. Benchmarks used for site control					
F. Streams, creeks, and waterway labeled					
G. Predominant soils from USDA soil surveys, and/or on site soil borings					
H. Location and boundaries of natural features such as wetlands, lakes, and ponds with the normal water elevation noted					
I. Location of existing roads, buildings, parking lots and other impervious areas.					



J. Location of existing utilities (e.g., water, sewer, gas, electric) and easements					
K. Location of existing conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow					
L. Flow paths					
M. Location and dimensions of existing channels, bridges or culvert crossings					
N. Existing conditions hydrologic analysis for runoff rates, volumes and velocities showing methodologies used and supporting calculations (2, 5, 10, 25 & 100 year, 24-hour storm events) or Critical Duration					
O. Assumed pre-developed runoff curve numbers					
P. Existing time of concentrations used in calculations					
Q. Evaluate immediate downstream drainage capacity, not to exceed more than 0.25 miles downstream of site					
R. Existing structural elevations (e.g., invert of pipes, manholes, etc.)					
S. Cross-section data for open channels					
T. Ground water elevations, if applicable					

Tab 3. Post-Development Hydrologic Analysis	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Proposed (post-development) conditions hydrologic and hydraulic analysis for runoff rates, volumes, HGL, and velocities showing the methodologies used and supporting calculations for all applicable design storms (2, 5, 10, 25 & 100 year, 24-hour storm events)					
B. Proposed time of concentrations used in calculations					
C. Assumed post-developed runoff curve numbers					
D. Proposed contours for detention facilities (to equal area used in outlet rating curves)					
E. Preliminary sizing calculations for stormwater controls including contributing drainage area, storage, and outlet configuration					
F. Stage-storage-discharge or outlet rating curves and inflow and outflow hydrographs for storage facilities					
G. Final analysis of potential upstream/downstream impact/effects of project, where necessary					
H. Existing and proposed structural elevations (e.g., invert of pipes, manholes, etc.)					
I. Design water surface elevations and normal pool elevation for ponds.					
J. Typical detail for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc. To include height, width, elevation, and/or diameter.					
K. Proposed limits of clearing and grading					
L. Location of existing and proposed roads, buildings, parking lots and other impervious areas.					
M. Location of existing and proposed utilities (e.g., water, sewer) and easements					
N. Location of existing and proposed conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow					
O. Preliminary location and dimensions of proposed channel modifications, such as bridge or culvert crossings					



P. Preliminary selection and location of stormwater controls					
Q. Emergency overflow structure' s flow path					
R. Detention facility provides one-foot of freeboard above the HWL and emergency outfall shown (top of berm elevation shown)					
S. The 100-year 24-hour HWL delineated on the plan for detention pond					
T. Lowest opening elevations table on the plat for structures located adjacent to channels or ponds					
U. Stormwater Management Facilities located within a Reserve					
V. Maintenance responsibility of stormwater management facility shall be specified in the platters text. (e.g. HOA, Lot Owners Association, or lot)					
W. Off-site drainage easements or agreements required, where necessary					

Tab 4. Floodplain Submittal	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Provide source of flood profile					
B. Nearest base flood elevations					
C. Delineation of pre-developed regulatory floodplain/floodway limits					
D. Delineation of post-developed regulatory floodplain and floodway limits					
E. Floodplain boundary determination per elevation (project limits shown)					
F. Provide source of floodway data table and discharges					
G. Provide all hydrologic and hydraulic study information for site-specific floodplain studies, unnumbered Zone A area elevation determinations and flood plain map revisions or required permits					
H. Provide regulatory floodway and four natural profile models (10,50,100, and 500-yr) for existing and future watershed conditions					
I. Location of floodplain/floodway limits and relationship of site to upstream/downstream properties (floodplain limits to be per elevation and scaled location)					
J. Flood plains and floodways located within a Reserve, where necessary					

Tab 5. Federal, State and Local Permits (to be provided prior to construction unless otherwise specified)	Applicant			Engr	
	I/R	NA	Explanation / Location in Plan	I/R	NA
A. US Army Corps of Engineers - Regulatory program permits (404 water quality certification)					
B. Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Flood Plain Fill, Levee, Water Appropriations, Dam safety permit, etc.)					
C. Federal Emergency Management Agency (FEMA) Letter of Map Changes (LOMA, LOMR, LOMR-f, CLOMR, etc.) Shall be included and approved when project modifies the limits of the floodway.					
D. Kansas Department of Transportation					
E. Sedgwick County Right-of-way Permit					

## Tab 1. Project Narrative

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### **A. Location**

The subject property is in the city of Wichita, Sedgwick County, Kansas. The proposed development is located in the southwest ¼ of Section 3, Township 27 South, Range 2 East. The Village at Greenwich Addition consists of 20.9 acres of property on the northeast corner of Greenwich Rd. and E 21<sup>st</sup> St. N. A portion of the property was formerly platted as the Manhattan 2<sup>nd</sup> Addition. The site is shown on the USGS Map, Figure 1.1.

### **B. Discussion of Development**

The entire site will be developed as commercial property. Water, sanitary sewer and storm sewer lines are onsite; the proposed development can utilize these lines. Block 8, Lot 1 is already developed.

### **C. Discussion of Offsite**

The site is bounded by 21<sup>st</sup> St. to the south, Greenwich Rd. to the west, Kensington Gardens cemetery is to the north and south.

### **D. Summary of Runoff**

The site generally drains from the northeast to southwest/west. There is an existing detention pond that was designed by others (Baughman). According to the detention pond plans, 18 acres of the former Manhattan Addition drains to the pond. The pond outlet is an 18-inch pipe at a flowline of 1361.0. The pre and post-project runoff rates are shown below.

#### Comparison of Pre and Post-Development Flowrates

Description	Design Storm Flows (cfs)			
	2-Yr	5-Yr	10-Yr	100-Yr
<i>Pre-project</i>				
East Basin	1	1	1	2
West Basin	8	9	10	15
Manhattan Addition	22	27	31	45
<i>Post-Project</i>				
East Basin	1	1	1	2
West Basin	6	7	8	11
Manhattan Addition	20	24	28	38

### **E. Best Management Practices**

The site will be seeded or sodded after construction of grading and utilities are complete. Inlets will be kept clear of debris to ensure proper drainage of the site.

### **F. Plat**

The plat is included, Figure 1.2.

***G. Preliminary Grading Plan***

The preliminary lot grading plan is included, Figure 1.3.

***H. Professional Engineer Seal***

The cover of the report will be signed and dated.

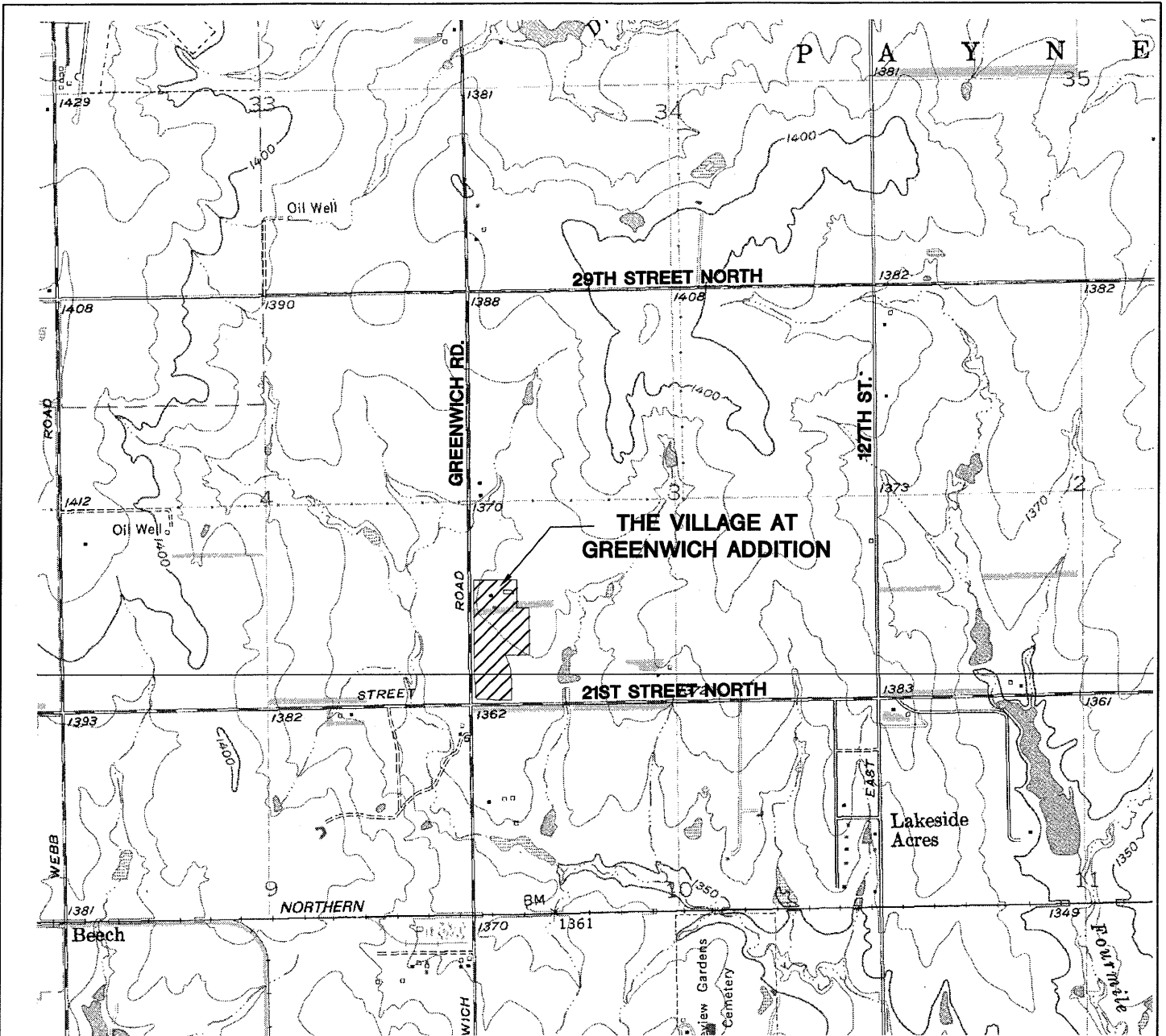
***I. CD***

A CD of the drainage report in PDF format is attached to the inside front cover of the bound report.

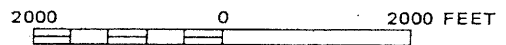
**Figure 1.1**

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USGS Quadrangle Map



APPROXIMATE SCALE



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**MKEC**  
 ENGINEERING  
 CONSULTANTS, INC.

411 N. WEBB ROAD  
 WICHITA, KS. 67206  
 316 - 684 - 9600

**THE VILLAGE AT GREENWICH ADDITION**  
 PROJECT NAME

**QUAD MAP**  
 SHEET TITLE

TMH DESIGN BY:	CMJ DRAWN BY:	GJA CHECKED BY:
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JULY 2008 DATE	08307 JOB NO.	1 / 1 SHEET/OF
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**Figure 1.2**

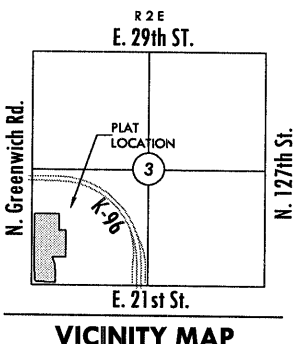
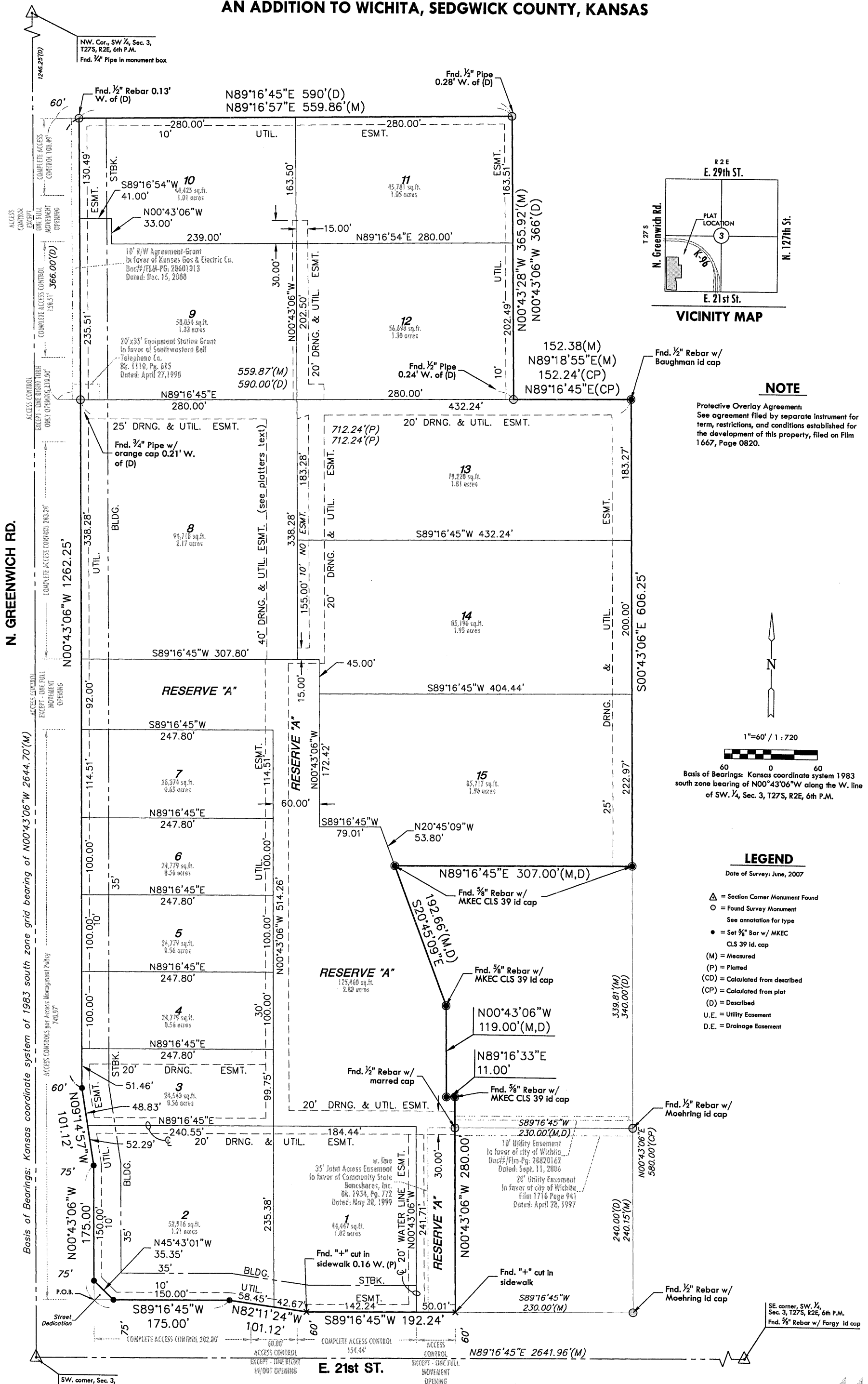
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Plat

# FINAL PLAT

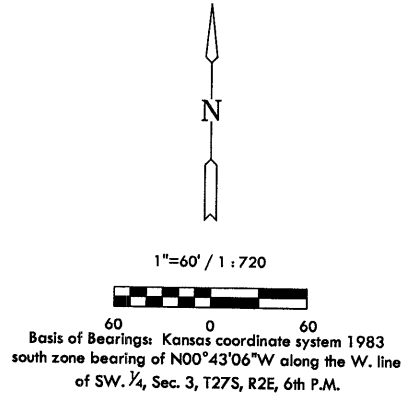
## VILLAGE AT GREENWICH ADDITION

### AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS



**NOTE**

Protective Overlay Agreement  
See agreement filed by separate instrument for term, restrictions, and conditions established for the development of this property, filed on Film 1667, Page 0820.



- LEGEND**
- Date of Survey: June, 2007
- △ = Section Corner Monument Found
  - = Found Survey Monument
  - See annotation for type
  - = Set 3/8" Bar w/ MKEC CLS 39 id. cap
  - (M) = Measured
  - (P) = Platted
  - (CD) = Calculated from described
  - (CP) = Calculated from plat
  - (D) = Described
  - U.E. = Utility Easement
  - D.E. = Drainage Easement

FINAL PLAT  
**VILLAGE AT GREENWICH ADDITION**  
AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS

CERTIFICATE OF SURVEY

I, Gregory J. Allison, a registered land surveyor in Kansas, do hereby certify that I have been in responsible charge of surveying and platting of "VILLAGE AT GREENWICH ADDITION," an addition to Wichita, Sedgwick County, Kansas, into Lots, Blocks, Reserves and Streets, the same being accurately set forth in the accompanying plat and described herein:

A replat of a tract of land lying in a portion of Lot 1, Block 1, The Manhattan Addition, to Sedgwick County, Kansas, TOGETHER WITH, an unplatted tract described as BEGINNING at a point 1246.25 feet north and 30 feet east of the Southwest corner of the Southwest Quarter of Section 3, Township 27 South, Range 2 East, of the 6th Principal Meridian, Sedgwick County, Kansas; thence east parallel with the south line of said Southwest Quarter, 590 feet; thence north parallel with the west line of said Southwest Quarter, 366 feet; thence west 590 feet; thence south 366 feet to the POINT OF BEGINNING, said tracts of land being collectively described as follows:  
BEGINNING at the southwest most corner of said Lot 1, thence for the next three courses along the westerly lines of said Lot 1 on a platted bearing of N00°43'06"W, 175.00 feet; thence N09°14'57"W, 101.12 feet; thence N00°43'06"W, 896.25 feet; to the northwest corner of said Lot 1; thence S89°16'45"W, 30.00 feet to the southwest corner of said unplatted tract; thence parallel with and 30 feet east of the west line of said Southwest Quarter, N00°43'06"W, 366.00 feet to the northwest corner of said unplatted tract; thence parallel with the south line of said Southwest Quarter, N89°16'45"E, 590.00 feet to the northeast corner of said unplatted tract; thence S00°43'06"E, 366.00 feet to the southeast corner of said unplatted tract, and being a point on the north line of said addition; thence along said north line, N89°16'45"E, 152.24 feet to the northeast corner of said Lot 1; thence along the east line of said addition S00°43'06"E, 606.25 feet to a point lying 580.00 feet north of the southeast corner of said addition; thence S89°16'45"W, 307.00 feet; thence S20°45'00"E, 192.65 feet; thence S00°43'08"E, 119.00 feet; thence N89°17'31"E, 11.00 feet; thence S00°43'02"E, 280.00 feet to a point on the south line of said addition lying 230.00 feet west of the southeast corner of said addition; thence along said south line for the next three courses, S89°16'45"W, 192.24 feet; thence N82°11'24"W, 101.12 feet; thence S89°16'45"W, 175.00 feet to the POINT OF BEGINNING.

Said tracts CONTAINING: 911,185 square feet or 20.92 acres of land, more or less.

All lots, blocks, streets, easements, setbacks, and access controls, together with an easement found on Book 677, Page 97 and being transferred to the public on Film 1455, Page 1714, together with, a right of way agreement found on Book 600, Page 45, together with a drainage and utility easement found on DOC#FLM-PG: 28820161, together with that part of an easement found on Doc#/Flm-Pg: 28820162, together with a drainage easement found on Doc#/FLM-PG:28820169, together with all other public dedications or rights-of-way(s) within the above described property are hereby vacated and replatted by virtue of K.S.A. 12-512(b).

I hereby certify that the details of this plat are correct to the best of my knowledge and belief this \_\_\_ day of \_\_\_\_\_, 2008.

Gregory J. Allison, PE, LS #1257  
MKEC Engineering Consultants, Inc.  
411 North Webb Road  
Wichita, Kansas 67206

OWNER'S CERTIFICATE

Know all men by these presents that we the undersigned property owners of the land above set forth in the Registered Land Surveyor's Certificate, have caused the same to be surveyed and platted into Lots, Blocks, Reserves, and Streets the same to be known as "VILLAGE AT GREENWICH ADDITION," an addition to Wichita, Sedgwick County, Kansas.

The streets are hereby dedicated to and for the use of the public.

Easements for the construction and maintenance of public utilities and drainage, as indicated on the accompanying plat are hereby granted to the public. The 40 foot drainage and utility easement located in the east 40 feet of Lot 8, shall allow for the placement of masonry trash enclosures, a private well and private storm sewer systems, private light poles, and service lines.

A drainage plan has been developed for this plat. All drainage easements, rights-of-way, or reserves shall remain at established grades or as modified with the approval of the applicable City or County Engineer, and unobstructed to allow for the conveyance of storm water.

All abutters rights of access to or from Greenwich Road, over and across the west line of Block 1, of "VILLAGE AT GREENWICH ADDITION", are hereby granted to the City of Wichita, provided however, Reserve A, shall have a full movement opening; Lots 9, and 10, shall share a full movement opening; Lots 2, 3, 4, 5, 6, and 7 shall have access per the Access Management Policy as indicated hereon. All abutters rights of access to or from East 21st Street, over and across the south line of Block 1 of "VILLAGE AT GREENWICH ADDITION", are hereby granted to the City of Wichita, provided however, Lots 1 and 2, shall share a right turn only opening, and Reserve A shall be allowed a full movement opening as indicated hereon. Access controls are dedicated to and for the use of the public.

Reserve "A" is platted for utilities confined by easements or as specified below, drives, drainage, berming, landscaping, irrigation, monuments, open space, development signs, fountains, and private reciprocal vehicular and pedestrian access to Block 1. The Reserve shall be owned and maintained by the developer and/or a Lot Owner's Association and are reserved for the stated uses.

According to the FEMA FIRM Map 20173C0377E, dated February 7, 2007, all of the addition is located within FEMA Zone X, areas determined to be outside the 0.2% annual chance floodplain.

GREENWICH INVESTMENT GROUP, L.L.C., a Kansas limited liability company

\_\_\_\_\_, Manager  
Steven R. Wheeler, Manager

STATE OF KANSAS, SEDGWICK COUNTY} ss:

This instrument was acknowledged before me on \_\_\_ day of \_\_\_\_\_, 2008, by Steven R. Wheeler, Manager, Greenwich Investment Group, L.L.C., a Kansas limited liability company.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year last above written.

\_\_\_\_\_, Notary Public  
Notary Public:

My Term Expires: \_\_\_\_\_

NORTH GREENWICH PROPERTIES, LLC, a Kansas limited liability company

STATE OF KANSAS, SEDGWICK COUNTY} ss:

This instrument was acknowledged before me on \_\_\_ day of \_\_\_\_\_, 2008, by North Greenwich Properties, LLC, a Kansas limited liability company.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year last above written.

\_\_\_\_\_, Notary Public  
Notary Public:

My Term Expires: \_\_\_\_\_

MORTGAGE CERTIFICATE

Community Bank of Wichita, Inc., a Kansas Corporation, holder of a mortgage on the above described property, do hereby consent to the plat of "VILLAGE AT GREENWICH ADDITION".

Community Bank of Wichita, Inc., a Kansas Corporation

\_\_\_\_\_, Vice President  
C. Jon Lehr, Vice President

STATE OF KANSAS, SEDGWICK COUNTY} ss:

This instrument was acknowledged before me on \_\_\_ day of \_\_\_\_\_, 2008, by C. Jon Lehr, Vice President, Community Bank of Wichita, Inc., a Kansas Corporation, on behalf of the corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year last above written.

\_\_\_\_\_, Notary Public  
Notary Public:

My Term Expires: \_\_\_\_\_

PLANNING COMMISSION CERTIFICATE

This plat of "VILLAGE AT GREENWICH ADDITION" has been submitted to and approved by the Wichita-Sedgwick County Metropolitan Area Planning Commission, Wichita, Kansas.

Dated this \_\_\_ day of \_\_\_\_\_, 2008

WICHITA-SEDGWICK COUNTY METROPOLITAN AREA PLANNING COMMISSION

\_\_\_\_\_, Chair  
M.S. Mitchell, Chair

Attest: \_\_\_\_\_, Secretary  
John L. Schlegel, Secretary

GOVERNING BODY CERTIFICATE

The dedications shown on this plat are hereby accepted and this plat is hereby approved by the governing body of the City of Wichita, Kansas.

Dated this \_\_\_ day of \_\_\_\_\_, 2008

At the direction of the City Council.

\_\_\_\_\_, Mayor  
Carl Brewer, Mayor

Attest: \_\_\_\_\_, City Clerk  
Karen Sublett, City Clerk

TRANSFER RECORD

STATE OF KANSAS, SEDGWICK COUNTY} ss:

Entered on transfer record this \_\_\_ day of \_\_\_\_\_, 2008.

\_\_\_\_\_, County Clerk  
Don Brace, County Clerk

REGISTER OF DEEDS CERTIFICATE

STATE OF KANSAS, SEDGWICK COUNTY} ss:

This is to certify that this instrument was filed for record in the Register of Deeds office this day of \_\_\_\_\_, 2008, at \_\_\_\_\_ o'clock \_\_M; and is duly recorded for a Fee of \$40.00

\_\_\_\_\_, Register of Deeds  
Bill Meek, Register of Deeds

Attest: \_\_\_\_\_, Deputy  
Tonya E. Buckingham, Deputy

COUNTY SURVEYOR

Reviewed in accordance with K.S.A. 58-2006 on this \_\_\_ day of \_\_\_\_\_, 2008.

\_\_\_\_\_, Deputy County Surveyor  
Tricia L. Robello, LS #1246  
Deputy County Surveyor  
Sedgwick County, Kansas

**MKEC**  
ENGINEERING  
CONSULTANTS, INC.

411 N. WEBB ROAD  
WICHITA, K.S. 67206  
316-684-9600

**Figure 1.3**

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Preliminary Grading Plan

KENSINGTON GAR

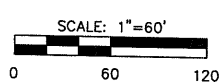
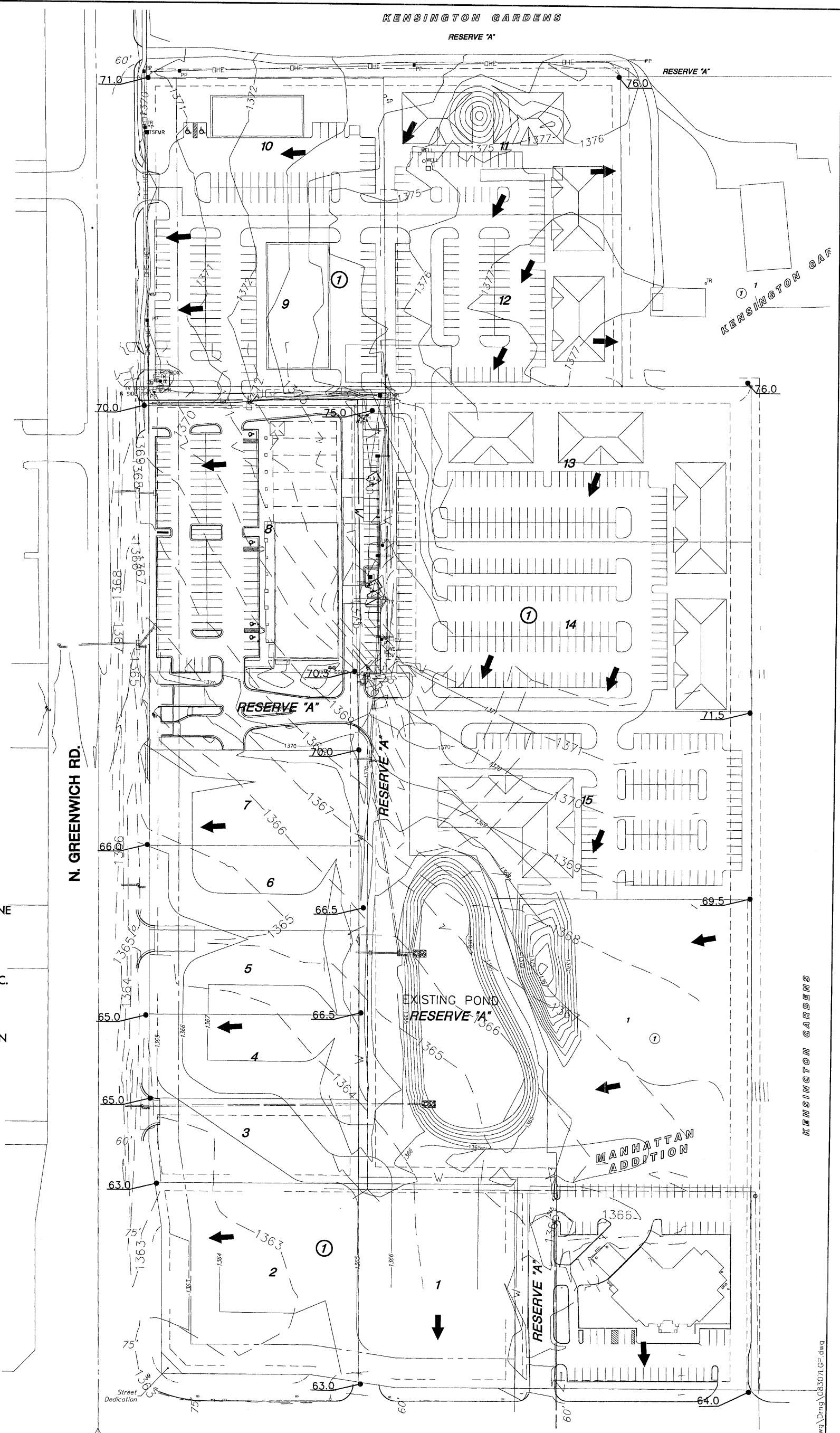
KENSINGTON GARDENS

N. GREENWICH RD.

E. 21st ST.

**LEGEND**

- 6IN - CONIFEROUS TREE
- 3IN - DECIDUOUS TREE
- SN - SIGN
- PP - POWER POLE
- ELEC BOX - ELECTRIC BOX
- LP - LIGHT POLE
- FH - FIRE HYDRANT
- WV - WATER VALVE
- WM - WATER METER
- SECTION CORNER
- BM - BENCHMARK
- EASEMENT
- BUILDING SETBACK
- FENCE
- STORM SEWER PIPE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- GAS PIPELINE
- TELEPHONE LINE
- UNDERGROUND ELEC.
- OVERHEAD ELECTRIC
- FIBER OPTIC CABLE
- DRAINAGE SUB BASIN
- DRAINAGE BASIN
- FLOW ARROW
- SPOT ELEVATION



<p><b>MKEC</b> ENGINEERING CONSULTANTS, INC.</p> <p>411 N. WEBB ROAD WICHITA, K.S. 67206 316 - 684 - 9600</p>			<p><b>VILLAGE AT GREENWICH</b> PROJECT NAME</p>		
<p><b>PRELIMINARY LOT GRADING PLAN</b> SHEET TITLE</p>			<p>TMH DESIGN BY.</p>		
<p>JULY 2008 DATE</p>			<p>TMH DRAWN BY.</p>		
<p>1 / 1 SHEET/OT</p>			<p>KLA CHECKED BY.</p>		
<p>07557 JOB NO.</p>			<p>1 / 1 SHEET/OT</p>		

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## **Tab 2. Existing Conditions Runoff Calculations**

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### ***A. Orthophotograph***

The aerial photograph is included, Figure 2.1.

### ***B. Runoff Method***

The rational method in Hydraflow Hydrographs 2007 was used to determine pre and post-project runoff rates. The rational method was used to remain consistent with the previous drainage study done for this area.

### ***C. Existing Topography***

Elevations on the site range from 1377 feet in the northeast to 1363 feet, in the southwest. The existing topography is shown on the Existing Conditions Drawing, Figure 2.2.

### ***D. Site Areas***

The site is open rural area with a farmstead located in the northern portion of the site.

### ***E. Benchmarks***

Benchmark 1: Railroad spike in South face of power pole, S. side of 21st St. between electric and telephone pedestals across from the E. entrance to Community Bank. Elev. = 1366.70 (NGVD29)

Benchmark 2: Chiseled square on top of curb at West end of median island at entrance to The Village at Greenwich being East of the Target Entrance. Elev. = 1367.98 (NGVD29)

Both benchmarks are shown on Figure 1.2. NGVD 29 datum is used in this report.

### ***F. Streams, Creeks, and Waterways***

No portion of the site is included in a regulatory floodplain. The site is in Zone X, areas outside the 0.2% annual chance event, as shown on FIRM Panel 0377E of 700, Sedgwick County, Kansas February 2, 2007 in Figure 2.3. The closest floodplain is approximately 1,000 feet east of the site.

### ***G. Soils***

According to the NRCS (SCS) Sedgwick County Soil Survey, Figure 2.4, soils on the site are Goessel silty clay 1 to 2 percent slopes, (Ga – HSG “D”) and Irwin silty clay loam 1 to 3 percent slopes, (Ia, - HSG “D”). The Hydraulic Soil Group used to select runoff coefficients is “D”.

### ***H. Natural Features***

There is an existing detention pond in the south-central portion of the site. The drainage pattern is typically northeast to southwest/west.

### ***I. Location of Existing Impervious Areas***

A majority of the site is undeveloped open land. There is an existing homestead in the northern portion of the site, approximately 20% of the homestead property is impervious. There is one

commercial lot that has been developed and there is an existing bank adjacent to the southeast corner of the site.

**J. Location of Existing Utilities**

There is an existing 8-inch sanitary sewer line that transects the lower half of the site from north to south and then heads east approximately 290 feet north of 21<sup>st</sup> Street. There is an existing 8-inch water line that enters the site approximately 490 feet east of Greenwich Road and then transects the site from south to north and then heads west to Greenwich Road approximately 1230 feet north of 21<sup>st</sup> Street. Stormsewer lines have also been constructed to drain a portion of the site to the existing detention pond. The detention pond outlets to a stormsewer line along Greenwich Road via an 18" pipe.

**K. Location of Existing Conveyance Systems**

A stormsewer line conveys runoff from north of the detention pond into the detention area; a 24-inch pipe outlets into the pond. Tie-in points have been designed for future development. The pond outlets via an 18" pipe into an 18" stormsewer line along the east side of Greenwich Road. Currently, flows from the east are conveyed to the detention area via overland flow.

**L. Flow Paths**

Flow paths are shown on the Existing Conditions Drawing, Figure 2.2.

**M. Location and Sizes of Existing Structures**

There is an existing detention pond, stormsewer lines and associated inlets. The pond storage area was determined from current survey. Plans from Baughman, Figure 2.5 called out an 18" stormsewer pipe for the outlet structure set at the normal pool elevation of 1361.0.

**N. Existing Conditions Hydrologic Analysis**

Hydraflow Hydrographs 2007 was used to calculate pre-project runoff rates. The rational method was used because this was the method used in earlier studies of the site. There are three drainage basins onsite, two basins, West and Manhattan Addition basin, drain west to Greenwich Road while the East basin drains to the east. The pre-project drainage basins are shown on the Existing Conditions drawing, Figure 2.2. The pre-development runoff rates are shown in the table below, calculations are in Figure 2.6.

**Pre-Development Flowrates**

Description	Design Storm Flows (cfs)			
	2-Yr	5-Yr	10-Yr	100-Yr
East Basin	1	1	1	2
West Basin	8	9	10	15
Manhattan Addition Basin	22	27	31	45

**O. Pre-Developed Runoff Curve Numbers**

The West and East basin are currently a homestead; therefore a rational coefficient of 0.54 was used to represent current land use. For the Manhattan Addition basin a rational coefficient of 0.47 was used to represent agricultural pasture areas.

***P. Existing Time of Concentration***

The FAA method in Hydraflow Hydrographs 2007 was used to calculate the time of concentration. The times of concentration and rational coefficients for pre-development conditions are shown in the following table. Time of concentration calculations are in Figure 2.6.

**Existing Time of Concentration and Rational Coefficient**

<b>Basin</b>	<b>T<sub>c</sub></b>	<b>Rational Coefficient</b>
	<b>minutes</b>	
East	15	0.54
West	18	0.54
Manhattan Addition	34	0.47

***Q. Downstream Drainage Capacity***

The current downstream drainage capacity will be unaffected by the proposed development.

***R. Existing Structural Elevations***

There are two developed commercial lots onsite.

***S. Open Channels***

There are no open channels on-site.

***T. Groundwater Elevations***

Groundwater elevations are not applicable for this project.

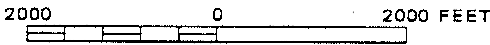
**Figure 2.1**

Orthophotograph

---



APPROXIMATE SCALE



J:\Chil\07557\08307.dwg\Drng\08037AERIAL.dwg

**MKEC**  
ENGINEERING  
CONSULTANTS, INC.

**THE VILLAGE AT GREENWICH ADDITION**  
PROJECT NAME

**AERIAL MAP**  
SHEET TITLE

411 N. WEBB ROAD  
WICHITA, KS. 67206  
316 - 684 - 9600

TMH  
DESIGN BY:

CMJ  
DRAWN BY:

GJA  
CHECKED BY:

JULY 2008  
DATE

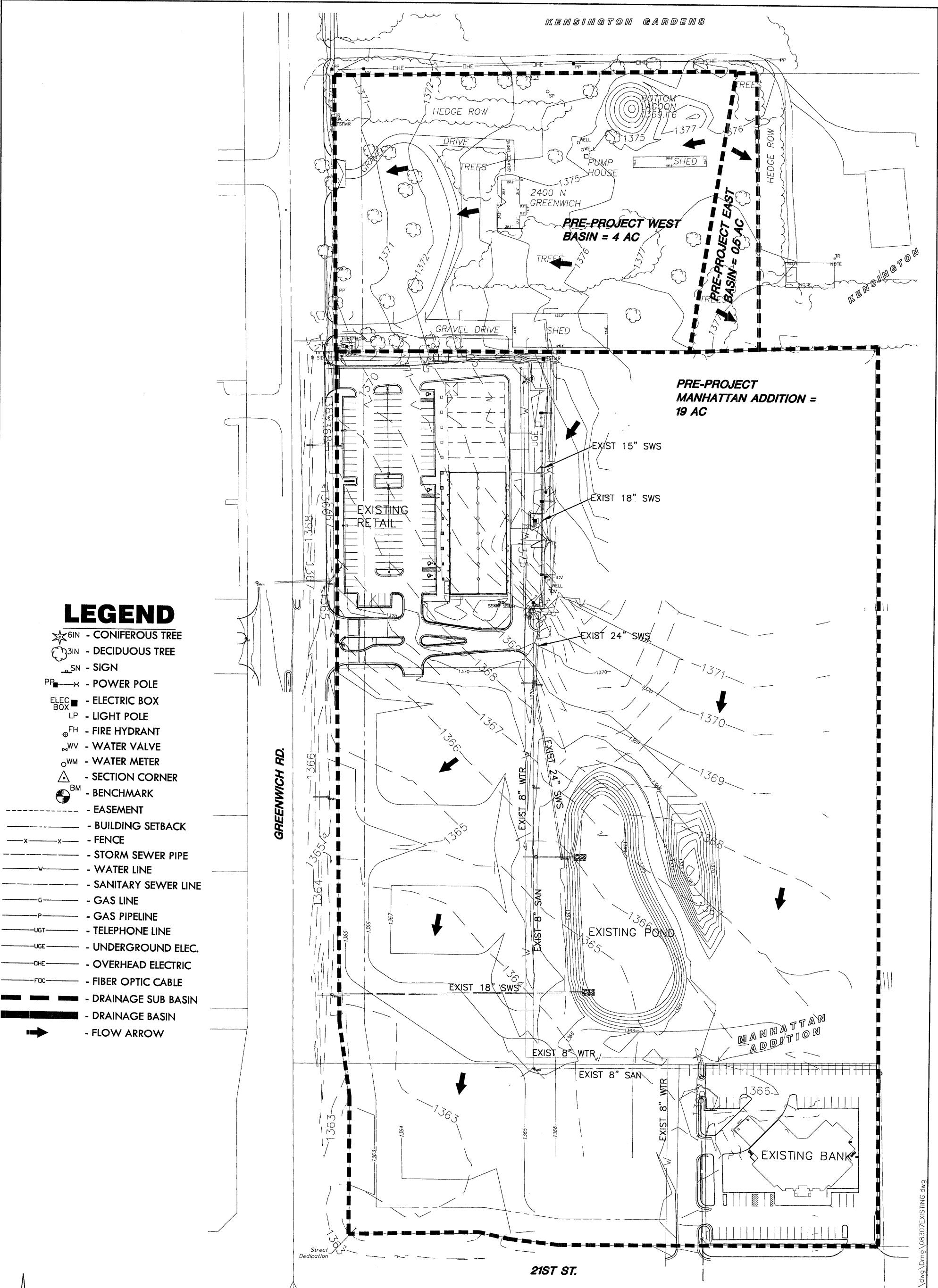
08307  
JOB NO.

1 / 1  
SHEET/OF

**Figure 2.2**

---

Existing Conditions Drawing

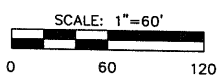


### LEGEND

- ★ 6IN - CONIFEROUS TREE
- 3IN - DECIDUOUS TREE
- SN - SIGN
- PP - POWER POLE
- ELEC BOX - ELECTRIC BOX
- LP - LIGHT POLE
- FH - FIRE HYDRANT
- WV - WATER VALVE
- WM - WATER METER
- △ - SECTION CORNER
- BM - BENCHMARK
- - - - - EASEMENT
- - - - - BUILDING SETBACK
- x - x - FENCE
- - - - - STORM SEWER PIPE
- v - - - - WATER LINE
- - - - - SANITARY SEWER LINE
- g - - - - GAS LINE
- p - - - - GAS PIPELINE
- ugt - - - - TELEPHONE LINE
- uge - - - - UNDERGROUND ELEC.
- dhe - - - - OVERHEAD ELECTRIC
- fdc - - - - FIBER OPTIC CABLE
- - - - - DRAINAGE SUB BASIN
- - - - - DRAINAGE BASIN
- ➔ - FLOW ARROW

GREENWICH RD.

21ST ST.



**MKEC**  
ENGINEERING  
CONSULTANTS, INC.

411 N. WEBB ROAD  
WICHITA, KS. 67206  
316 - 684 - 9600

**VILLAGE AT GREENWICH**  
PROJECT NAME

**EXISTING CONDITIONS**  
SHEET TITLE

TMH  
DESIGN BY.

TMH  
DRAWN BY.

KLA  
CHECKED BY.

JULY 2008  
DATE

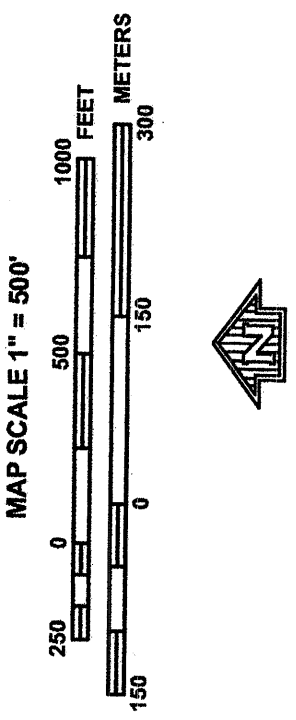
07557  
JOB NO.

1 / 1  
SHEET/OF

**Figure 2.3**

---

FIRM



**NATIONAL FLOOD INSURANCE PROGRAM**

**NFIP**

PANEL 0377E

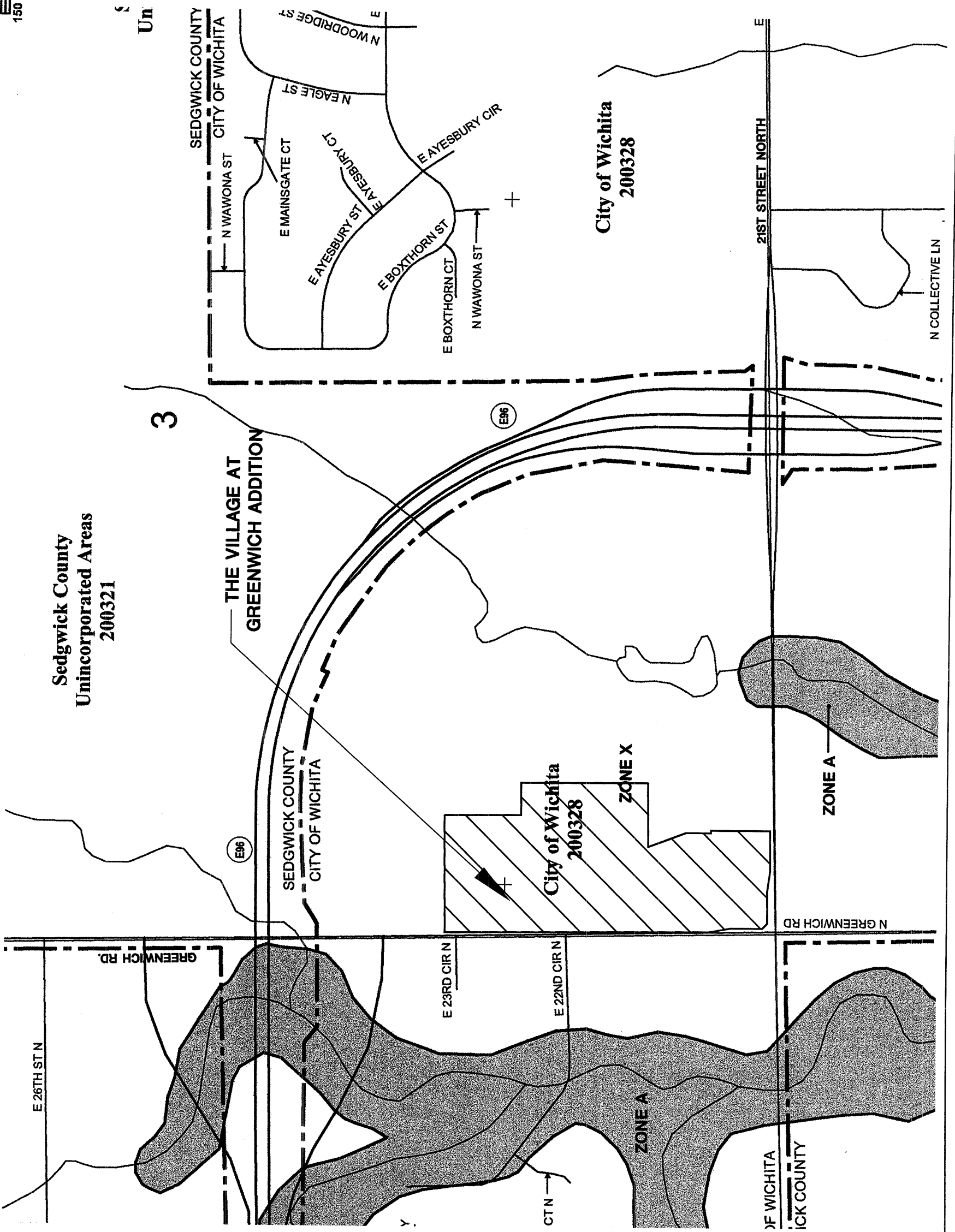
**FIRM**  
FLOOD INSURANCE RATE MAP  
SEDGWICK COUNTY,  
KANSAS  
AND INCORPORATED AREAS

PANEL 377 OF 700  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:  
COMMUNITY: SEDGWICK COUNTY WICHITA, CITY OF  
NUMBER: 200321 0377 E  
          200328 0377 E

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

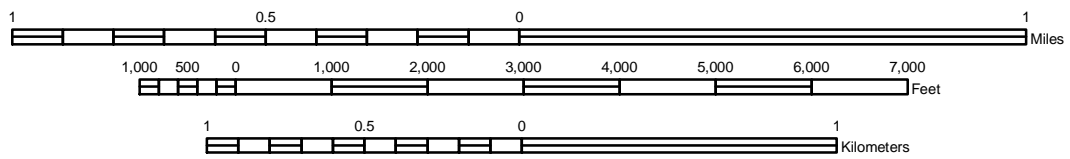
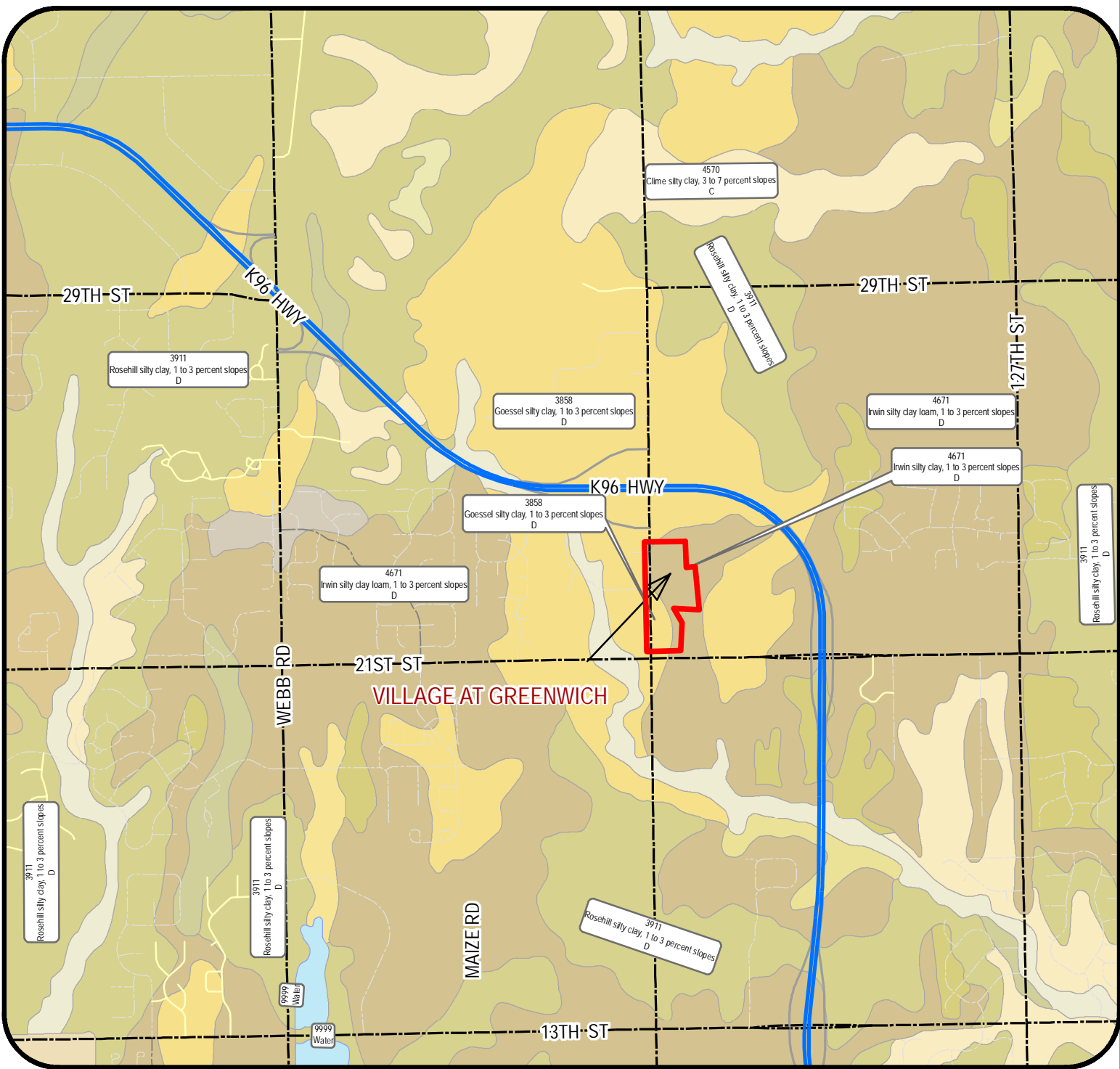
**MAP NUMBER** 20173C0377E  
**EFFECTIVE DATE** FEBRUARY 2, 2007  
Federal Emergency Management Agency



J:\GMI\07557\08307\4mg\Drng\08037\FIRM.dwg

**Figure 2.4**  
Soil Survey

---



J:\Civil\107557\08307dwg\DRNG\inrcs-soil.mxd

### VILLAGE AT GREENWICH

Project Name:

Soil Survey - Sedgwick County, KS

Sheet Title:



CMJ

Drawn By:

TMH / KLA

Design / Review:

JULY 2008

Date:

08037

Job No.:

**Figure 2.5**

---

Plans for Manhattan Addition

STORM WATER SEWER & POND TO SERVE

# The Manhattan Addition

Part of Lot 1, Block 1

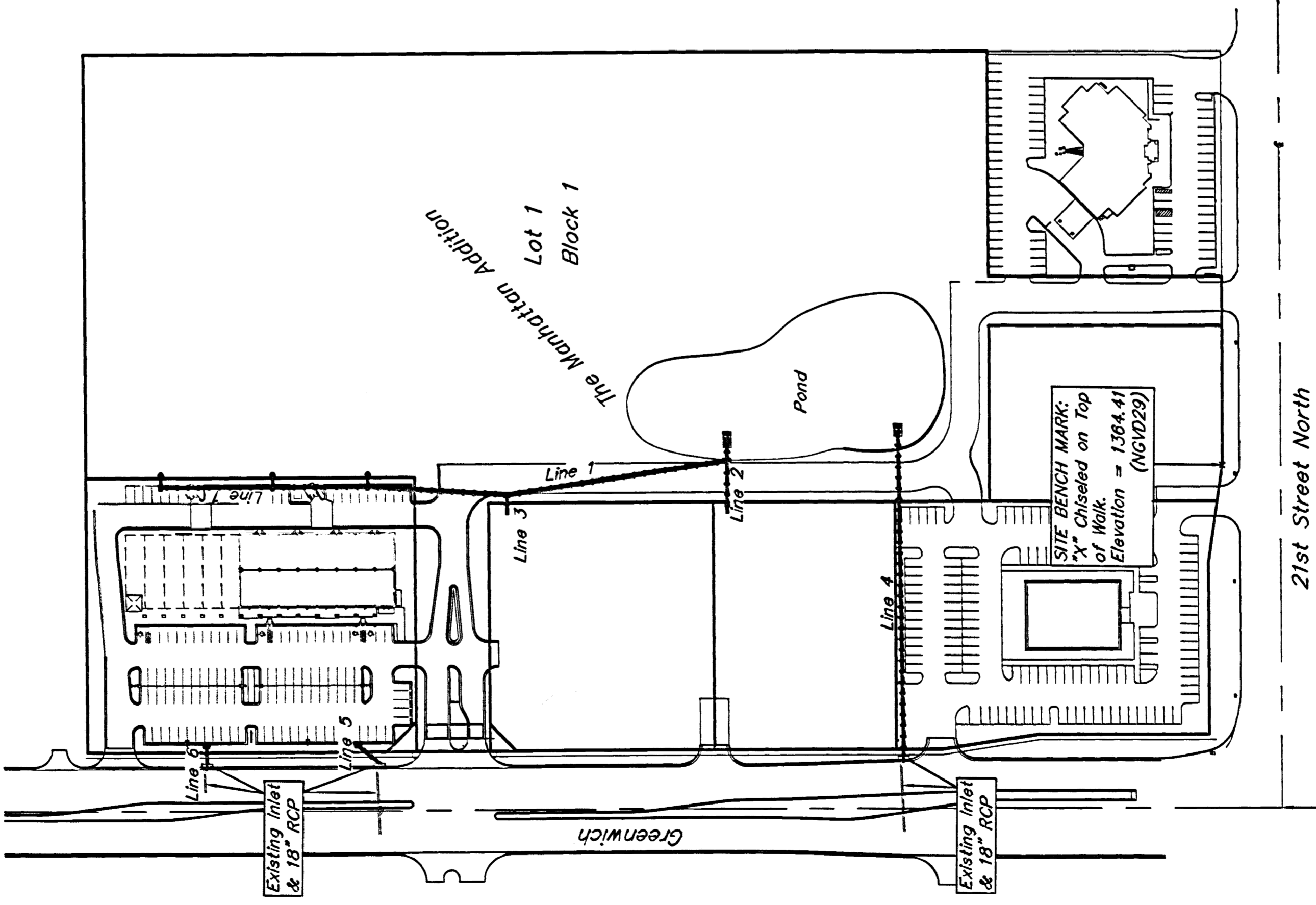
Private Project Number: 1691 PPS (607861)

CITY OF WICHITA, KANSAS

James Armour, P.E. City Engineer

September 2006

As Built- The Manhattan Addn 5 WS  
1691 PPS



**Earthwork Quantities**  
Approximate Excavation = 1,592 C.Y.  
Approximate Fill = 710 C.Y.

**Bench Mark:**

**SITING BENCH MARK**  
1/2" Chiseled on Top of Walk  
349.9' East of & of Greenwich.  
20.0' North of & of 21st Street North.  
Elevation = 1364.41 (NGVD29)

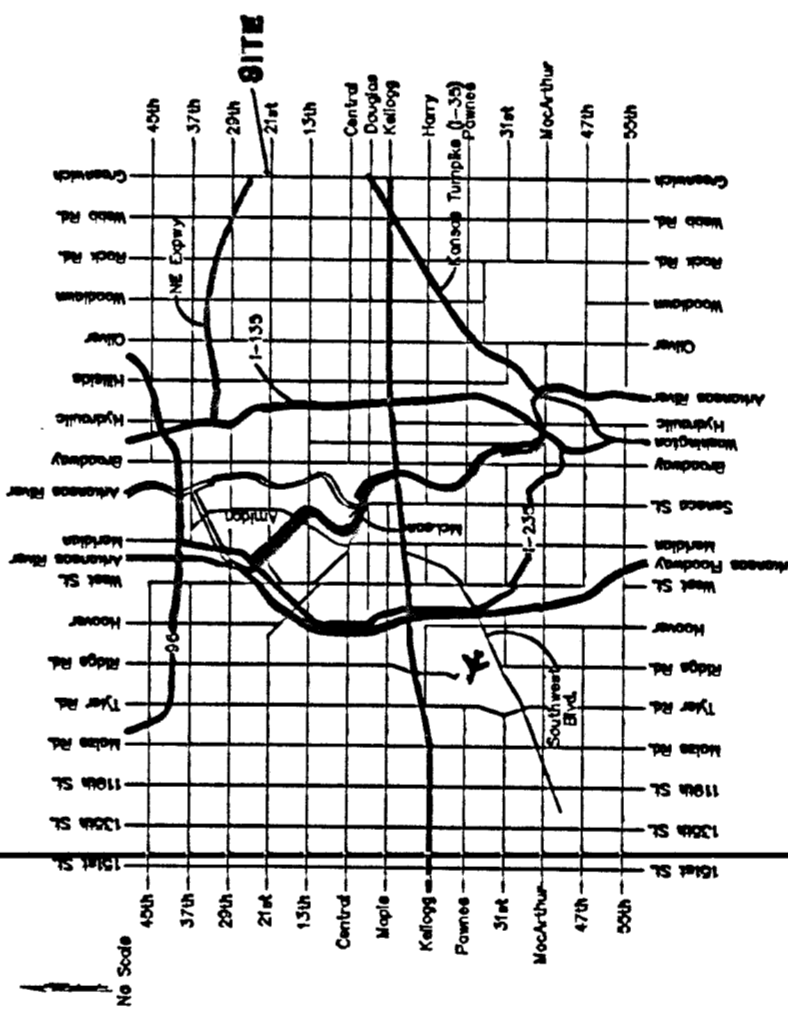
**Index**

Cover Sheet	1
Plan/Profile	2
Site/Profile	3
Site Grading Plan	4
Pond Plan	5
Pond Cross Sections	6-7
Inlet Details	8
BMP Erosion Details	Available On Request
	Available On Request

**Legal Description**

Lot 1, Block 1, The Manhattan Addition  
To Sedgewick County Kansas.

**Location Map**



APPROVED AS NOTED  
BY CITY ENGINEER OF WICHITA,  
*[Signature]* 9-20-06

**Public Works**

**NOTE TO CONTRACTORS**  
Public Property:  
Inspection and testing for the waterline is to be provided by a Licensed Consulting Engineering Firm under contract with the Owner/Developer. Said inspection to be in accordance with the City of Wichita standard construction engineering practices and certified by a Professional Engineer Licensed in the state of Kansas. No work shall be performed in dedicated easements or public right-of-way by the Contractor without such inspection nor shall any work be commenced without written authorization by the City Engineer. All Construction and Materials shall comply with the City or Wichita Specifications and Standards (on file and available in the City Engineer's Office).

SW Cor. SW 1/4, Sec. 3  
Twp. 27-S, R-2-E

**GENERAL NOTES**

- Contractor will be required to provide notice to utility companies a minimum of forty-eight (48) hours prior to any excavation, as follows:  
Kansas One-Call 687-2470  
The Contractor must notify the following in case of an emergency:  
Cox Communications Company 262-4270  
Kansas Gas Service Company 1-688-492-4950  
Western Energy (Electric) 303-2650  
Western Energy (Gas) 303-2650  
SBC (Telephones) 1-800-299-3313  
City of Wichita Water Dept. (Water) 262-6000  
City of Wichita Sewer Maint. (SS) 262-6000  
City of Wichita Storm Sewer Maint. 268-4090  
City of Wichita Traffic Maint. 268-4034
- Utility service lines, poles, valve boxes, meters et cetera are to be adjusted as necessary by others prior to construction unless the plans specifically call for their adjustment by the Contractor or unless the plans specifically identify a utility to be adjusted by its owner during construction. Existing utilities and their location, as shown on the plans shall be field verified. The contractor will be required to work around existing utilities within the right-of-way which do not conflict with proposed construction.
- Rubble from the removal of miscellaneous structures and excess excavation which is to be wasted shall be disposed of on sites to be provided by the Contractor. These sites shall be approved by the Engineer as to suitability, appearance and site location. Locations that, in the opinion of the Engineer, will leave an unsightly appearance will not be approved. All disposal sites must be approved by the Kansas Department of Health and Environment. Material either stockpiled or disposed of in a flood plain would require a Kansas State Board of Agriculture permit. Any material dumped in waters of the United States or wetlands is subject to U.S. Corps of Engineers permitting regulations. Any material buried or stockpiled beyond approved construction limits would require additional archaeological investigations unless buried in a previously approved borrow location.
- The Contractor shall give all property owners/tenants of developed property directly abutting the construction of this project a minimum of ten (10) days notice prior to start of construction.
- Contractor shall not start work on the project until the project inspector is assigned to the project and is present on the site. Contractor shall not start on the project until all necessary bonds and permits have been obtained. Bonds may include but are not limited to Statutory, Performance & Maintenance for areas in public right-of-way and easement. For projects within the City of Wichita contact Tom Mason (268-4574). Any work done without inspection will be required to be uncovered for inspection.
- Storm sewer lines, pond & appurtenances shall be installed in accordance with the most recent edition of City of Wichita, Kansas Standard Specifications for the Construction of City Projects.
- All disturbed R/W areas not intended for pavement or sidewalk construction shall be seeded with Kansas Premium Fescue Blend at a rate of 8 lb./1000 Sq. Ft. fertilized with a 16-20-6 ratio at a rate of 4 lb./1000 Sq. Ft. and mulched with Prairie Hay at a rate of 92 lb./1000 Sq. Ft. Mulch shall be "patted" with forks or punched into soil to reduce loss due to wind.
- Cuts made to paved surfaces on public property will be repaired by the City's contractor and charged against the owner/applicant. Unit repair prices are available from the City at 268-4418. A surcharge may be applicable, call 268-4418 for details. Repair costs to be paid prior to release of sewer service if sewer service is affected. Contractor shall obtain permit prior to construction.
- Contractor to remove concrete sidewalk to the nearest construction joint if within 3' of joint. Saw cut if over 3' from joint. Removal and replacement of pavement shall not be paid for directly, but shall be considered incidental to other items in the project.



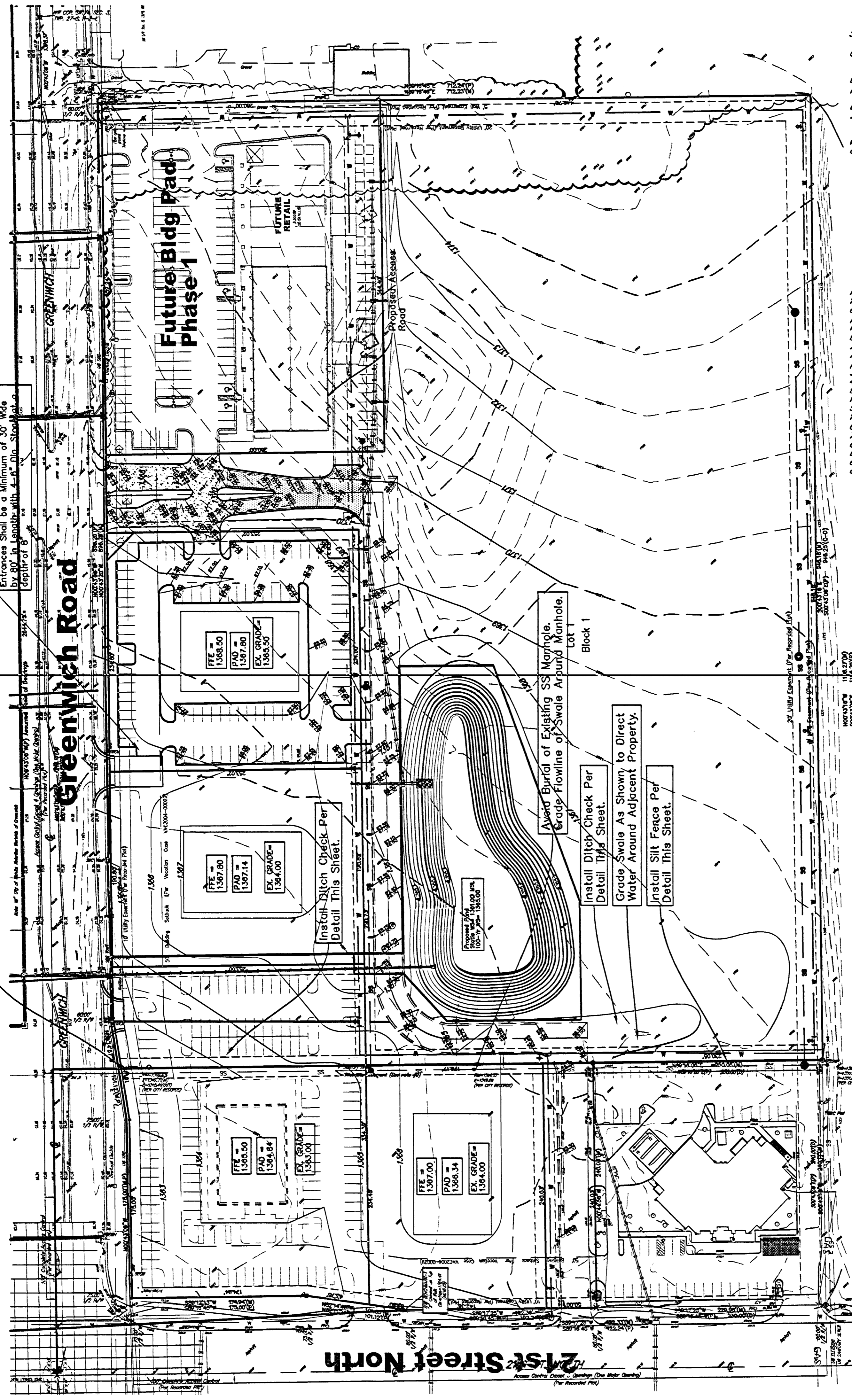
As Built- 12/18/06 1412

Baughman Company, P.A. 315 Elm St. Wichita, KS 67211 P.316.262.0149  
ENGINEERING | SURVEYING | PLANNING | LANDSCAPE ARCHITECTURE



Avoid Burial of Existing SS Manhole. Grade Flowline of Swale Around Manhole.

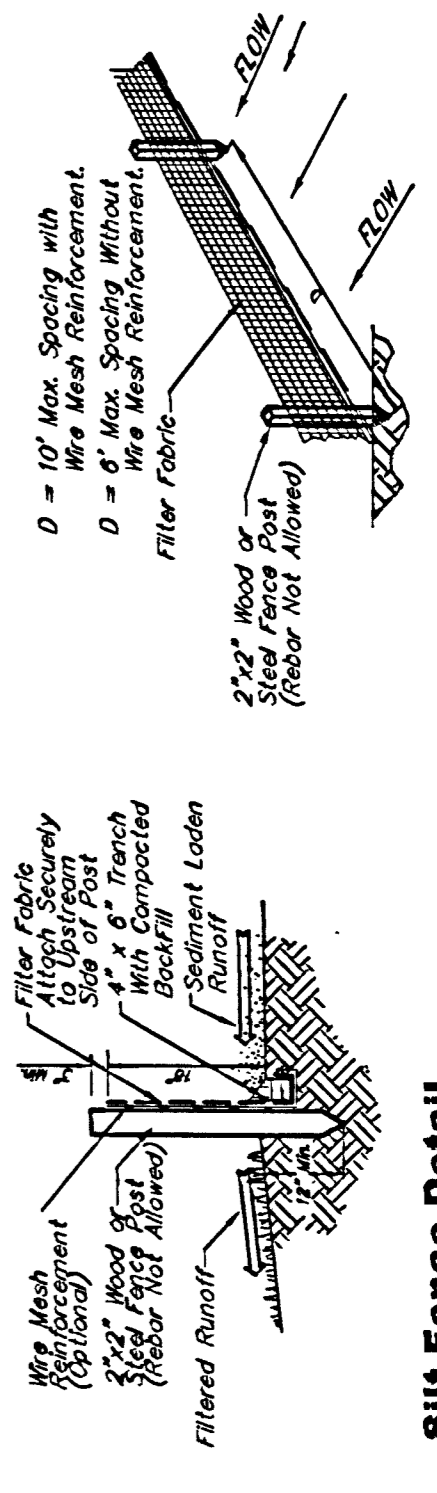
CONSTRUCTION ENTRANCE INFORMATION:  
Contractor Shall Construct and Maintain Approved Entrance as Discussed in the Storm Water Pollution Prevention Plan Guidelines. Entrances Shall be a Minimum of 30' Wide by 80' in Length with 4" Dia. Spillway a Depth of 8"



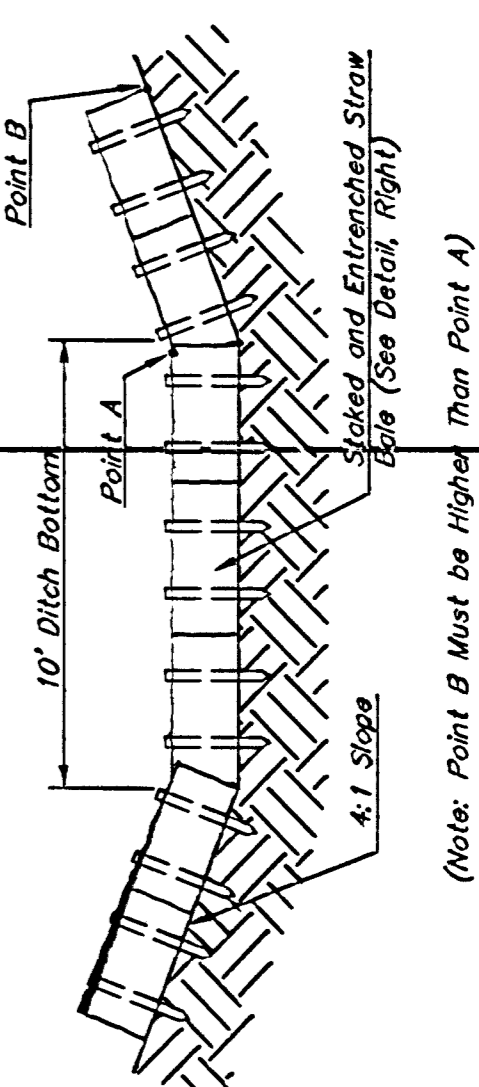
EROSION CONTROL MEASURE	UNITS	QUANTITY
SEDIMENTATION BASIN	EA.	2,165
SILT FENCE (Site perimeter)	L.F.	---
RIPRAP	S.Y.	2
DITCH CHECKS	EA.	---
CURB INLET BARRIER	EA.	---
CONSTRUCTION ENTRANCE	EA.	1

QUANTITIES ARE FOR INFORMATION ONLY. CONTRACTOR SHALL VERIFY QUANTITIES PER SPECIFIC ENGINEERING PLAN SHEET.

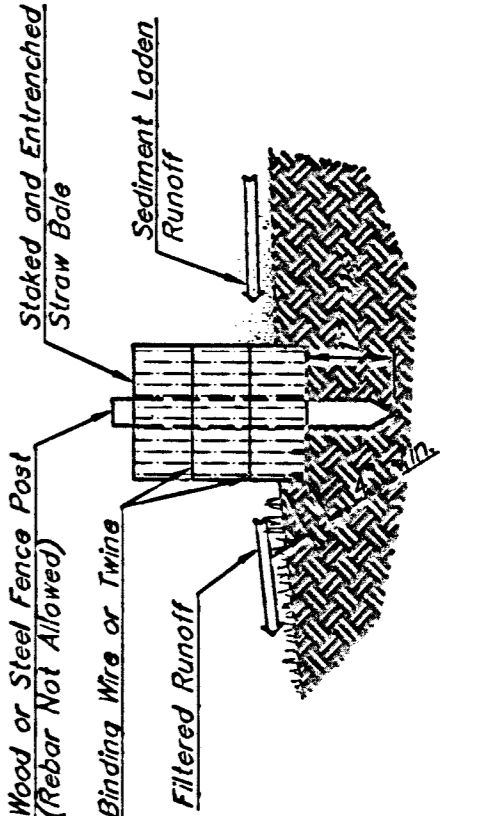
---	Existing Grade
---	Proposed Grade
---	Silt Fence
---	Ditch Checks



Silt Fence Detail  
NOT TO SCALE



STRAW BALE BARRIER DETAIL  
NOT TO SCALE



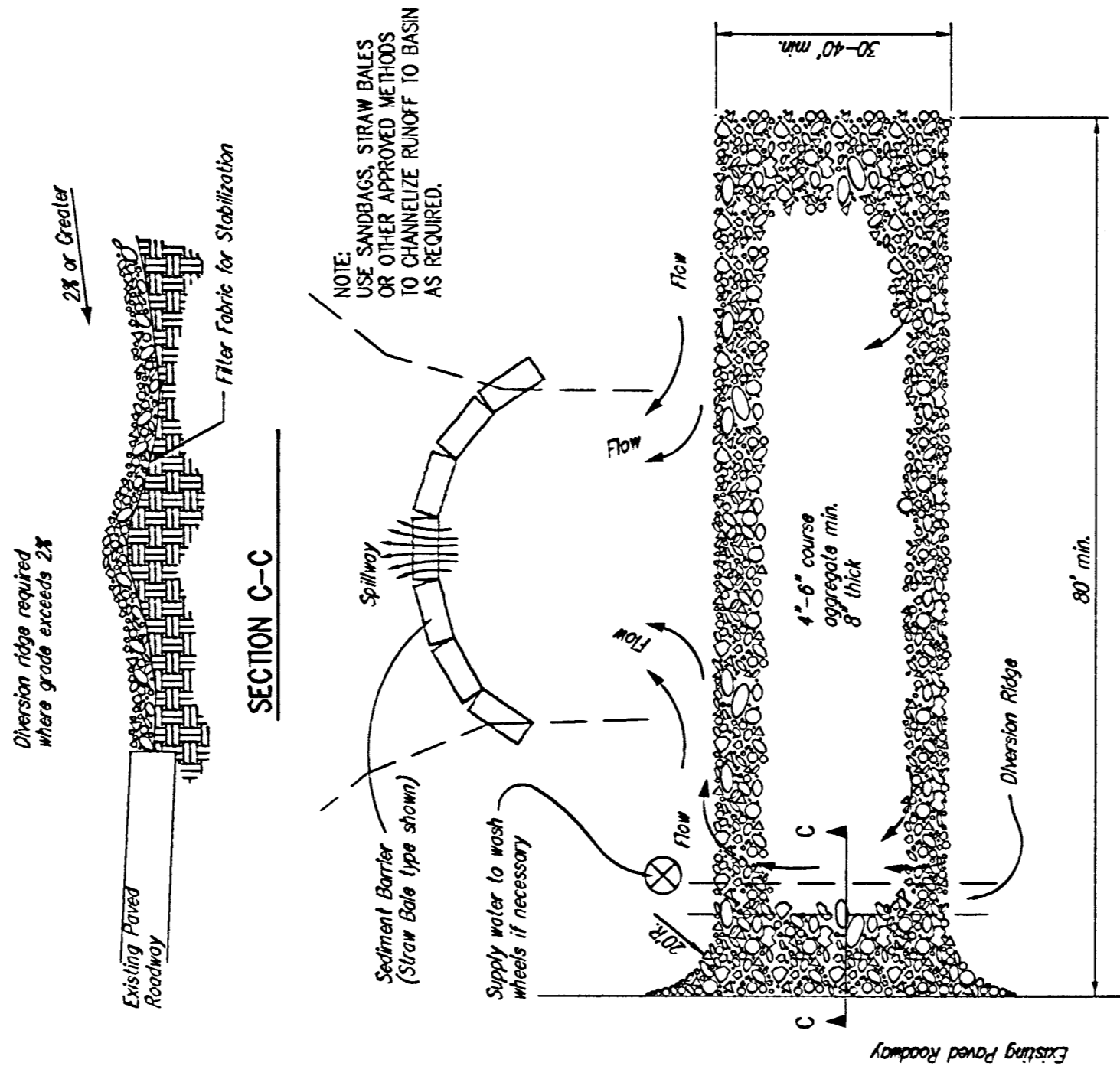
TYPICAL DITCH SECTION  
NOT TO SCALE

# MASS GRADING PLAN

Scale 1" = 60'-0"

15' Varies 10' Varies 15' (10% Slope Max.)

**NOTES:**  
All cost associated with mass grading shall be incidental to lump sum bid item "Mass Grading".  
1. Compaction of 90% standard proctor density shall be obtained in all areas.  
2. It shall be the Contractor's responsibility to protect any existing utilities during mass grading. Any damage done to these systems by Contractor or subcontractor shall be repaired at no additional cost to the project.  
3. All trees shall be protected from damage unless otherwise directed by Owner.  
4. All areas disturbed by construction (except within street R/W) shall be seeded, fertilized and mulched as follows:  
SEED --- Kansas Premium Fescue Blend; 8#/1000 Sq. Ft.  
FERTILIZER --- 12-24-12 Ratio at 350 Lbs./Ac.  
MULCH --- 2 Tons Prairie Hay / Acre



## STABILIZED CONSTRUCTION ENTRANCE

- NOTES:**
1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
  2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
  3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN, AS SHOWN ABOVE.
  4. DRIVE ENTRANCES ONTO RESIDENTIAL LOTS WILL NOT BE REQUIRED TO HAVE THE SEDIMENT TRAP OR SEDIMENT BASIN. WASHING SHALL BE REQUIRED IF STABILIZED ENTRANCE IS NOT SUFFICIENT TO KEEP WHEELS FROM BEING TRACKED ONTO ADJACENT STREET. ENTRANCE SHALL EXTEND FROM BACK OF CURB TO DWELLING.

Manhattan Address  
**Baughman**  
MASS GRADING PLAN

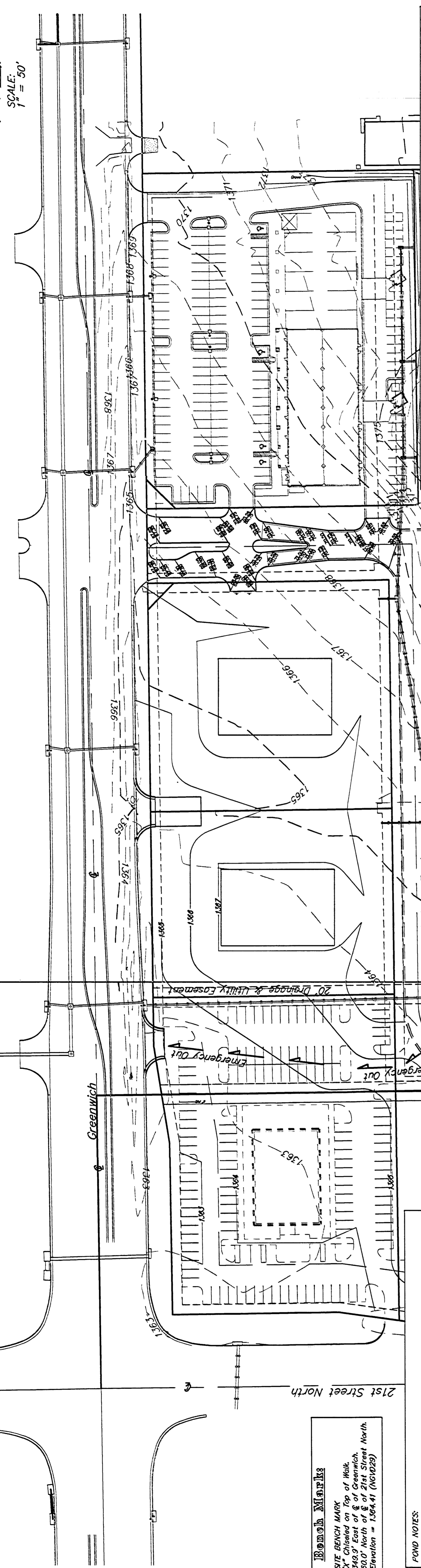
PROJECT NUMBER: 1591 JFS (07/26)  
DESIGN: MWS  
APPROVED: MWS  
DATE: 09/06

REVISIONS:  
8/7/06  
8/10/06  
BDD

SCALE: NOTED  
SHEET: 4 OF 8

Manhattan Address  
Baughman  
1155 E. 15th St. Suite 200  
Kansas City, MO 64108  
Tel: 816.432.1111  
Fax: 816.432.1112  
www.baughman.com

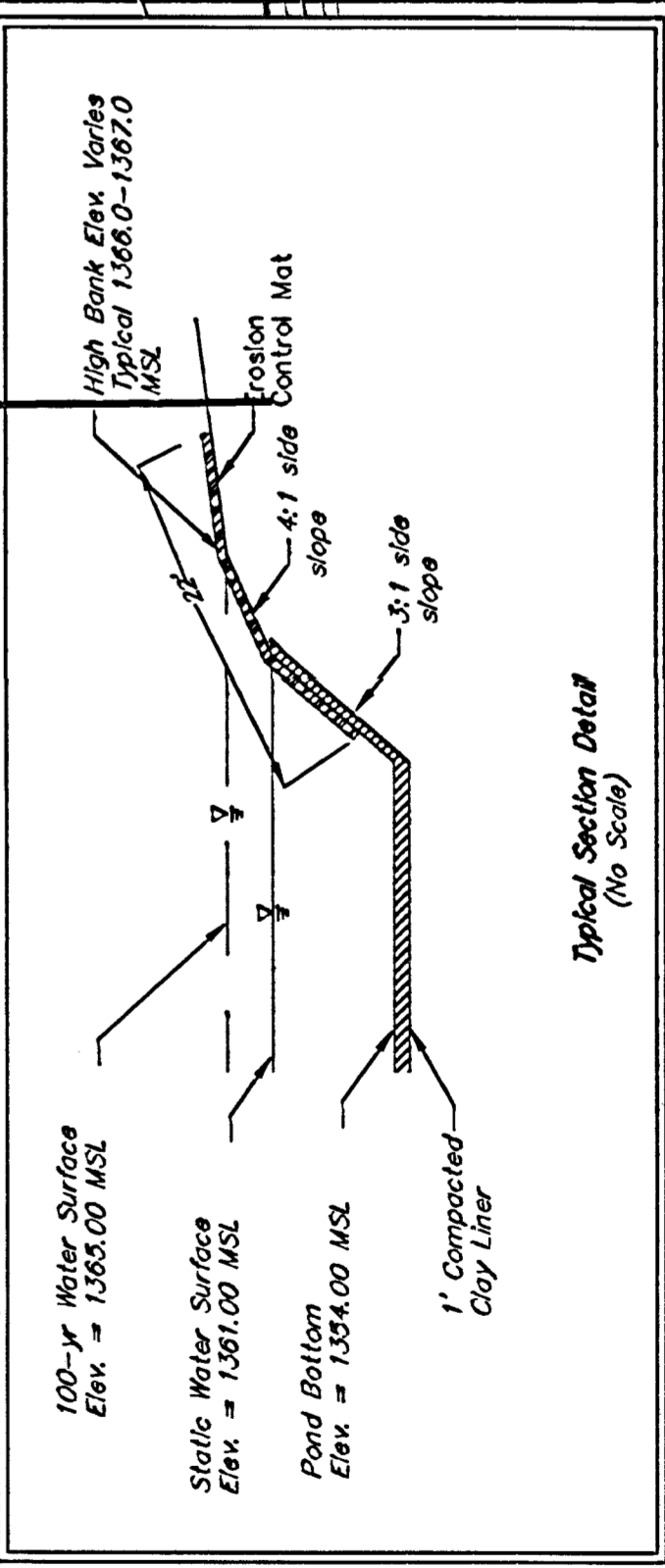
SCALE:  
1" = 50'



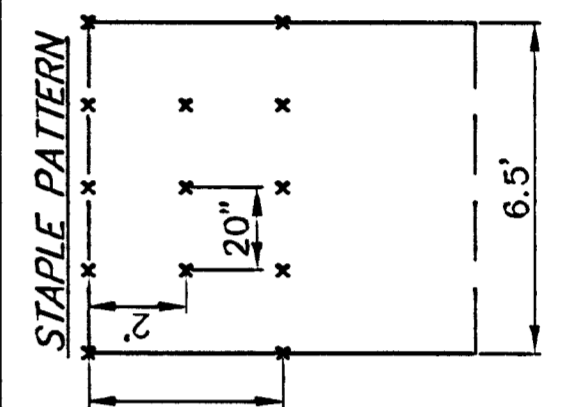
**Bench Marks**  
SITE BENCH MARK  
2" x 4" Chisled on Top of Walk  
349.3' East of Greenwich  
60.0' North of E of 21st Street North  
Elevation = 1364.41 (NGVD29)

- POND NOTES:**
- Pond bottom and slopes below static pond elevation shall be over-excavated 1' and a 1" clay liner shall be compacted to 95% std. density. The plasticity index (P.I.) shall be at least 30. The compaction and P.I. shall be verified during construction, with testing results provided to Engineer. P.I. determination and compaction testing shall be arranged by the contractor at the request of the inspector. Cost shall be incidental to "Site Clearing & Restoration". Cost of over-excavation to install Clay Liner shall be incidental to bid item, "Excavation".  
**ALTERNATE:** Bentonite applied to top 9" of soil at a rate of 6% by weight of soil per cubic foot.
  - Any excess excavation shall be stockpiled on-site at an area indicated by the Engineer out of easements and R/W. Area will be staked by Engineer.
  - All of Lot 1 above the static water surface shall be seeded and mulched as follows: (Permanent Seeding)  
**SEED** -- Kansas Premium Fescue Blend; 5#/1000 Sq. Ft.  
**FERTILIZER** -- 12-24-12 Ratio at 350 Lbs./Ac.  
**MULCH** -- 2 Tons Prairie Hay / Acre  
All other disturbed areas not in street R/W are to be seeded as follows: (Temporary Seeding)  
**SEED** -- Rye grass (P.L.S.) -- 5#/1000 Sq. Ft. and Kansas Premium Fescue Blend; 5#/1000 Sq. Ft.
  - Install Erosion Control Mat from 4' below the water surface to 22' up the bank.
  - Boughton Company will provide staking information at the time of construction.
  - Contractor to strip top 3" of soil within Lot 1 before mass grading and stockpile. Top soil stockpile to be redistributed over Lot 1 above water elevation prior to seeding.
  - Compaction of 95% shall be obtained in path of future access roadway, 90% in all other areas.

Conceptual Site Drainage	
Area = 18 acres	
Existing	Developed
"C <sub>ov</sub> " = 0.50	"C <sub>ov</sub> " = 0.84
"Q <sub>ov</sub> " = 66 cfs	"Q <sub>ov</sub> " = 111 cfs
Site to Detain Approximately 45 cfs	

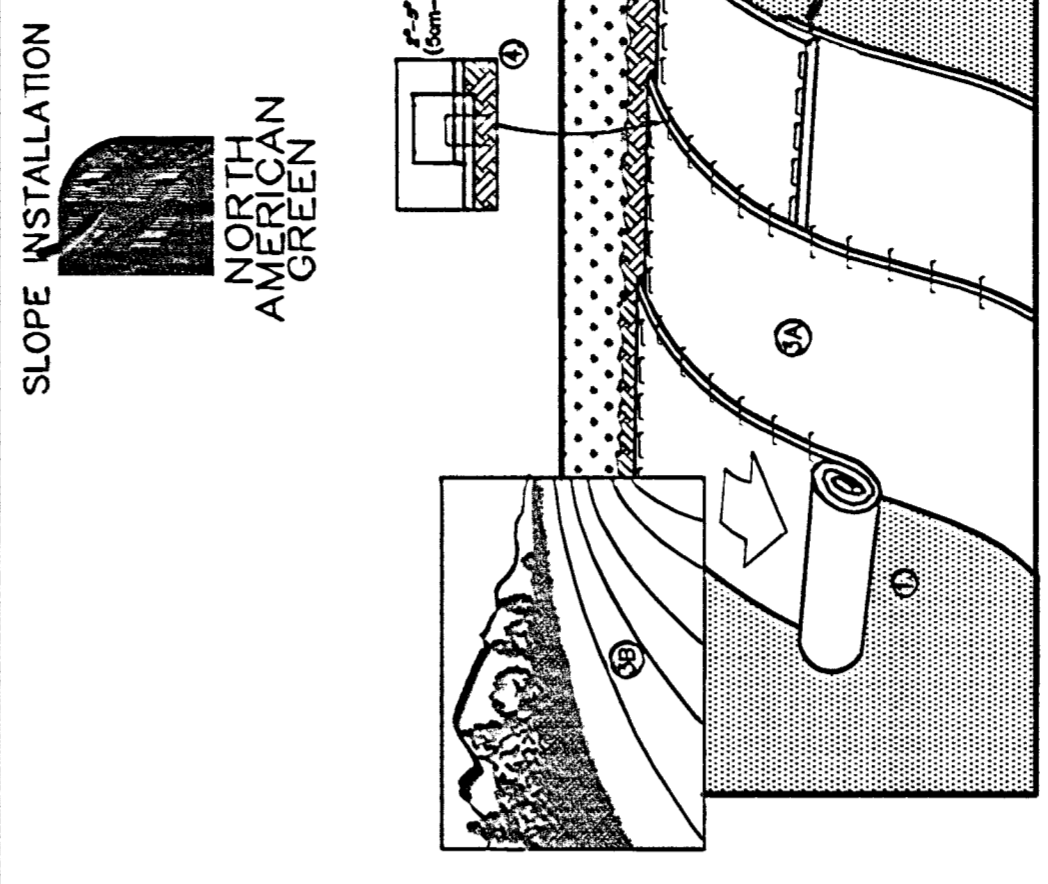


PROPOSED POND (Static WS = 1361.0)		
STAGE	INFLOW	OUTFLOW
2 yr	27 cfs	4 cfs
5 yr	38 cfs	8 cfs
100 yr	78 cfs	9 cfs
Storage = 72,900 Cu Ft.		

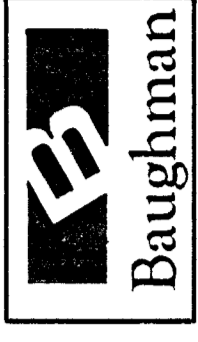


STAPLE PATTERN "D"  
3-1/2 staples per sq. yd.  
6" staples, 8"-inch staples and longer may be used for loose soils, 9" ga. staples or heavier may be necessary in hard or rocky soils.  
Contractor shall follow manufacturer's installation instructions regarding overlap dimensions. The overlap shall have a minimum dimension of three inches (3").  
Erosion control mat.

Install 3174 S.Y. North American Green Erosion Control Mat S150BN Or Approved Equal. Erosion Control Mat Shall Be Installed & Anchored Per Details This Sheet.  
Note: This Quantity Does Not Include Excess Material Necessary For Overlap & Anchoring.



- PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.  
NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
- BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN A 6" (15cm) DEEP X 6" (15cm) WIDE TRENCH. THE TRENCH SHOULD BE 12" (30cm) APART IN THE BOTTOM OF THE TRENCH. THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30cm) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30cm) PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30cm) APART ACROSS THE WIDTH OF THE BLANKET.
- ROLL THE BLANKETS (A) DOWN OR (B) HORIZONTALLY ACROSS THE SLOPE. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES AGAINST THE SOIL SURFACE. SHOW THE LOCATION OF THE FASTENERS TO THE SOIL SURFACE BY PLACING STAPLES/STAKES AGAINST THE SOIL SURFACE. SHOW THE LOCATION OF THE FASTENERS TO THE SOIL SURFACE BY PLACING STAPLES/STAKES AGAINST THE SOIL SURFACE. SHOW THE LOCATION OF THE FASTENERS TO THE SOIL SURFACE BY PLACING STAPLES/STAKES AGAINST THE SOIL SURFACE.
- THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2" (5cm) STAPLES OVERLAP DEPENDENT ON BLANKET TYPE TO ENSURE PROPER SEAL ALIGNMENT. PLACE THE EDGE OF THE OVERLAPPING BLANKET (BLANKET BEING INSTALLED ON TOP) EVEN WITH THE COLORED SEAM SWITCH ON THE PREVIOUSLY INSTALLED BLANKET.
- CONSECUTIVE BLANKETS SPICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE



**Baughton**  
ENGINEERING | SURVEYING | PLANNING | LANDSCAPE ARCHITECTURE

Baughton Company, P.A. 315 Elm St., Suite 400, Philadelphia, PA 19106  
P: 215.562.7271 F: 215.562.0191

30.02' FILL = 64.9

21.99' FILL = 56.2  
EXC = 167.2

18.00' FILL = 31.3  
EXC = 497.8

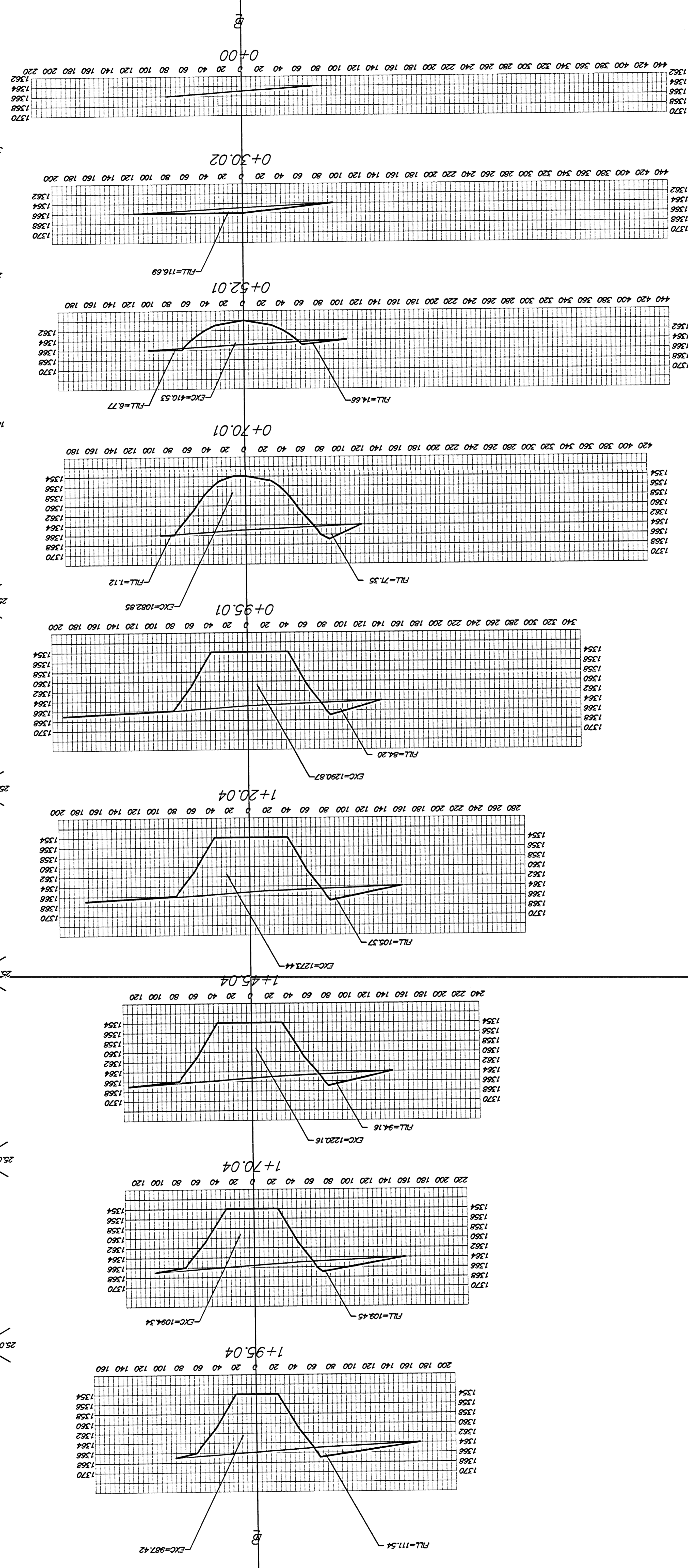
25.00' FILL = 72.5  
EXC = 1088.9

25.03' FILL = 87.9  
EXC = 1188.6

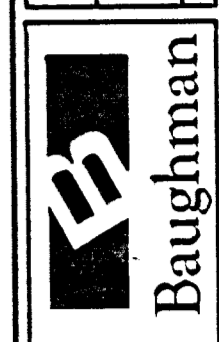
25.00' FILL = 92.4  
EXC = 1154.4

25.00' FILL = 94.3  
EXC = 1071.5

25.00' FILL = 102.3  
EXC = 963.8



SHEET TOTAL:  
EXCAVATION = 6143 C.Y.  
FILL = 602 C.Y.



Baughman

160215000  
Village at Greenwich, York, PA  
PROJECT NUMBER  
1691 PFS (07/861)  
SHEET  
6 OF 8  
ENGINEERING | SURVEYING | PLANNING | LANDSCAPE ARCHITECTURE  
Baughman Company, P.A. 315 Elm & Walnut, 18711 P.O. Box 62114  
Wilmington, DE 19806

25.00' FILL = 82.5  
EXC = 876.8

25.00' FILL = 15.8  
EXC = 866.3

25.00' FILL = 6.8  
EXC = 858.1

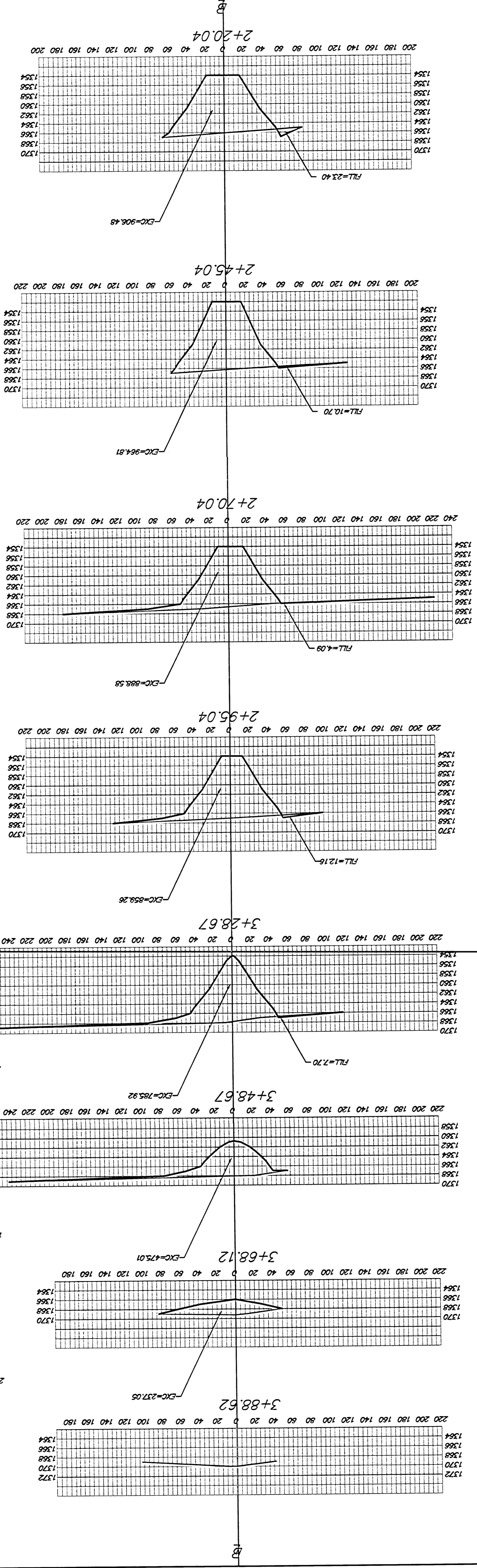
25.00' FILL = 7.5  
EXC = 809.2

33.63' FILL = 12.4  
EXC = 1024.6

20.00' FILL = 2.9  
EXC = 467.0

19.45' FILL = 0.0  
EXC = 256.5

20.50' FILL = 0.0  
EXC = 90.0



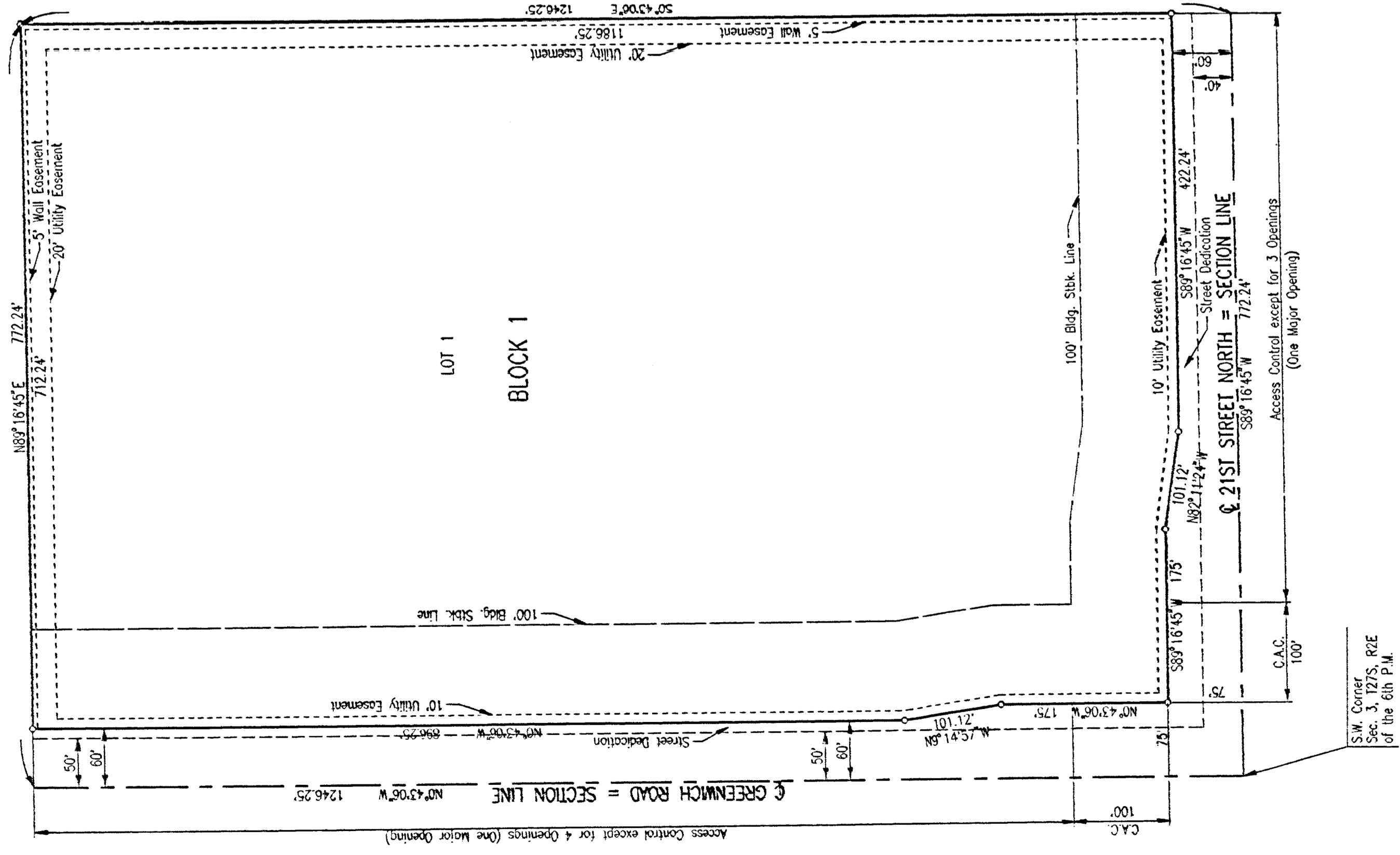
SHEET TOTAL = 5449 C.Y.  
EXCAVATION = 108 C.Y.  
FILL



Baughman

Baughman Company, P.A. 315 Elm & Walnut, 884711 P.O. Box 271711 #3168249  
ENGINEERING | SURVEYING | PLANNING | LANDSCAPE ARCHITECTURE  
PROJECT NUMBER 1691 PFS (607861)  
SHEET 7 OF 8  
Village at Greenfield, Loudon, VA 06023E900

# THE MANHATTAN ADDITION TO SEDGWICK COUNTY, KANSAS



STATE OF KANSAS ) SS  
COUNTY OF SEDGWICK )

I, MICHAEL W. BERRY, A REGISTERED LAND SURVEYOR, IN ADDRESS, STATE AND COUNTY, DO HEREBY CERTIFY THAT ON THIS 14th DAY OF JANUARY, 1997, I HAVE RECORDED AND FILED THE MANHATTAN ADDITION TO SEDGWICK COUNTY, KANSAS, INTO A LOT, A BLOCK, AND STREETS THE SAME TO BE DESCRIBED AS:

A TRACT IN THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 3, TOWNSHIP 27 SOUTH, RANGE 2 EAST OF THE SIXTH PRINCIPAL MERIDIAN, SEDGWICK COUNTY, KANSAS, DESCRIBED AS BEGINNING AT THE SOUTHWEST CORNER OF SAID SECTION; THENCE NORTH ALONG THE WEST LINE OF SAID SECTION, 1246.25 FEET; THENCE EAST ALONG THE WEST LINE OF SAID SECTION, 1246.25 FEET; THENCE SOUTH PARALLEL TO THE WEST LINE OF SAID SECTION, 1246.25 FEET; THENCE WEST ALONG THE SOUTH LINE OF SAID SECTION, 772.24 FEET TO THE POINT OF BEGINNING, EXCEPT THE WEST 50 FEET AND THE SOUTH 40 FEET THEREOF.

*Michael W. Berry*  
MICHAEL W. BERRY, R.L.S. NO. 813  
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

KNOW ALL MEN BY THESE PRESENTS THAT WE, THE UNDERSIGNED PROPERTY OWNERS OF THE LAND AS ABOVE SET FORTH IN THE SURVEYOR'S CERTIFICATE, HAVE CAUSED THE LAND TO BE SURVEYED AND PLATTED INTO A BLOCK, LOT, AND STREETS, EASEMENTS, AS INDICATED FOR THE CONSTRUCTION AND MAINTENANCE OF PUBLIC UTILITIES, ARE HEREBY GRANTED. THE STREETS ARE HEREBY DEDICATED TO AND FOR THE USE OF THE PUBLIC.

THE 5-FOOT WALL EASEMENT ALONG THE NORTH AND EAST LINES OF BLOCK 1 IS HEREBY POINTED FOR THE CONSTRUCTION AND MAINTENANCE OF A PRIVATE WALL. UTILITIES MAY CROSS THE WALL EASEMENT.

ALL ADJUTERS RIGHT OF ACCESS TO AND FROM 21ST STREET NORTH AND GREENWICH ROAD OVER AND ACROSS THE SOUTH AND WEST SIDE OF LOT 1, BLOCK 1, ARE HEREBY GRANTED TO THE APPROPRIATE GOVERNING BODY; PROVIDED HOWEVER THAT LOT 1 SHALL HAVE ACCESS TO THE 21ST STREET NORTH AT (3) THREE LOCATIONS AND GREENWICH ROAD AT (4) FOUR LOCATIONS AS SHOWN, SAID LOCATIONS TO BE DESIGNATED BY THE APPROPRIATE ENGINEER. SEE AGREEMENT FILED BY SEPARATE INSTRUMENT FOR TERMS, RESTRICTIONS, AND CONDITIONS ESTABLISHED FOR THE DEVELOPMENT OF THIS PROPERTY.

OWNERS:  
LUXURY DEVELOPMENT PARTNERS, INC.

BY *William J. Warren*  
WILLIAM J. WARREN, PRESIDENT

STATE OF KANSAS ) SS  
COUNTY OF SEDGWICK )

THIS INSTRUMENT WAS ACKNOWLEDGED BEFORE ME THIS 14th DAY OF JANUARY, 1997, BY WILLIAM J. WARREN, PRESIDENT OF LUXURY DEVELOPMENT PARTNERS, INC.

*Gary L. Wiley*  
GARY L. WILEY, NOTARY PUBLIC  
MY COMMISSION EXPIRES Jan 15, 1997

WE, INTRUST BANK, N.A., WICHITA, KANSAS, HOLDER OF A MORTGAGE ON THE ABOVE DESCRIBED PROPERTY, DO HEREBY CONSENT TO THE PLATING OF THE MANHATTAN ADDITION TO SEDGWICK COUNTY, KANSAS.

*Bruce A. Long*  
BRUCE A. LONG, VICE PRESIDENT

STATE OF KANSAS ) SS  
COUNTY OF SEDGWICK )

THIS INSTRUMENT WAS ACKNOWLEDGED BEFORE ME THIS 14th DAY OF JANUARY, 1997, BY BRUCE A. LONG, VICE PRESIDENT OF INTRUST BANK, N.A., WICHITA, KANSAS.

*Gary L. Wiley*  
GARY L. WILEY, NOTARY PUBLIC  
MY COMMISSION EXPIRES Jan 15, 1997

GARY L. WILEY  
NOTARY PUBLIC  
STATE OF KANSAS  
MY Exp. Exp. 1/15/97

THIS PLAT HAS BEEN SUBMITTED TO AND APPROVED BY THE WICHITA-SEDGWICK COUNTY METROPOLITAN AREA PLANNING COMMISSION, WICHITA, KANSAS, DATED THIS 15TH DAY OF FEBRUARY, 1996.

*Susan Osborne-Holmes*  
SUSAN OSBORNE-HOLMES, CHAIRMAN

*M. Wayne Grant*  
M. WAYNE GRANT, SECRETARY

THIS PLAT APPROVED AN ALL DEDICATIONS SHOWN HEREON ARE ACCEPTED BY THE CITY OF WICHITA, KANSAS, DATED THIS 17th DAY OF FEBRUARY, 1997.

*Bob Knight*  
BOB KNIGHT, MAYOR

*Pat Burnett*  
PAT BURNETT, CITY CLERK

THIS PLAT APPROVED AND ALL DEDICATIONS SHOWN HEREON ARE ACCEPTED BY THE BOARD OF COUNTY COMMISSIONERS OF SEDGWICK COUNTY, KANSAS. THIS DATE DAY OF FEBRUARY, 1997.

*Thomas G. Winters*  
THOMAS G. WINTERS, CHAIRMAN

*Paul H. Hancock*  
PAUL H. HANCOCK, CHAIR PRO-TEM

*Betsy Quinn*  
BETSY QUINN, COMMISSIONER

*Melody Miller*  
MELODY MILLER, COMMISSIONER

*Mark F. Schroeder*  
MARK F. SCHROEDER, COMMISSIONER

*James Alford*  
JAMES ALFORD, COUNTY CLERK

ENTERED ON TRANSFER RECORD THIS 24th DAY OF February, 1997.

*James Alford*  
JAMES ALFORD, COUNTY CLERK

THIS IS TO CERTIFY THAT THIS INSTRUMENT WAS FILED FOR RECORD IN THE REGISTER OF DEEDS OFFICE AT WICHITA, ON THIS 14th DAY OF FEBRUARY, 1997.

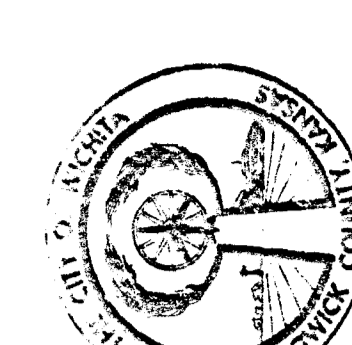
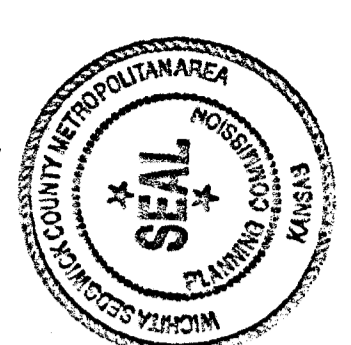
*Larry G. Solvler*  
LARRY G. SOLVLER, REGISTER OF DEEDS

*Michael D. Hurtt*  
MICHAEL D. HURTT, DEPUTY

CONSENT IS HEREBY GIVEN FOR THE FORMATION OF THE BENEFIT DISTRICTS WITHIN THE BOUNDARY OF THIS PLAT BY THE BOARD OF COUNTY COMMISSIONERS AS THEY DEEM NECESSARY TO MAKE STREET IMPROVEMENTS TO SERVE THIS AREA. THIS DATE DAY OF JANUARY, 1997.

*Bob Knight*  
BOB KNIGHT, MAYOR

*Pat Burnett*  
PAT BURNETT, CITY CLERK



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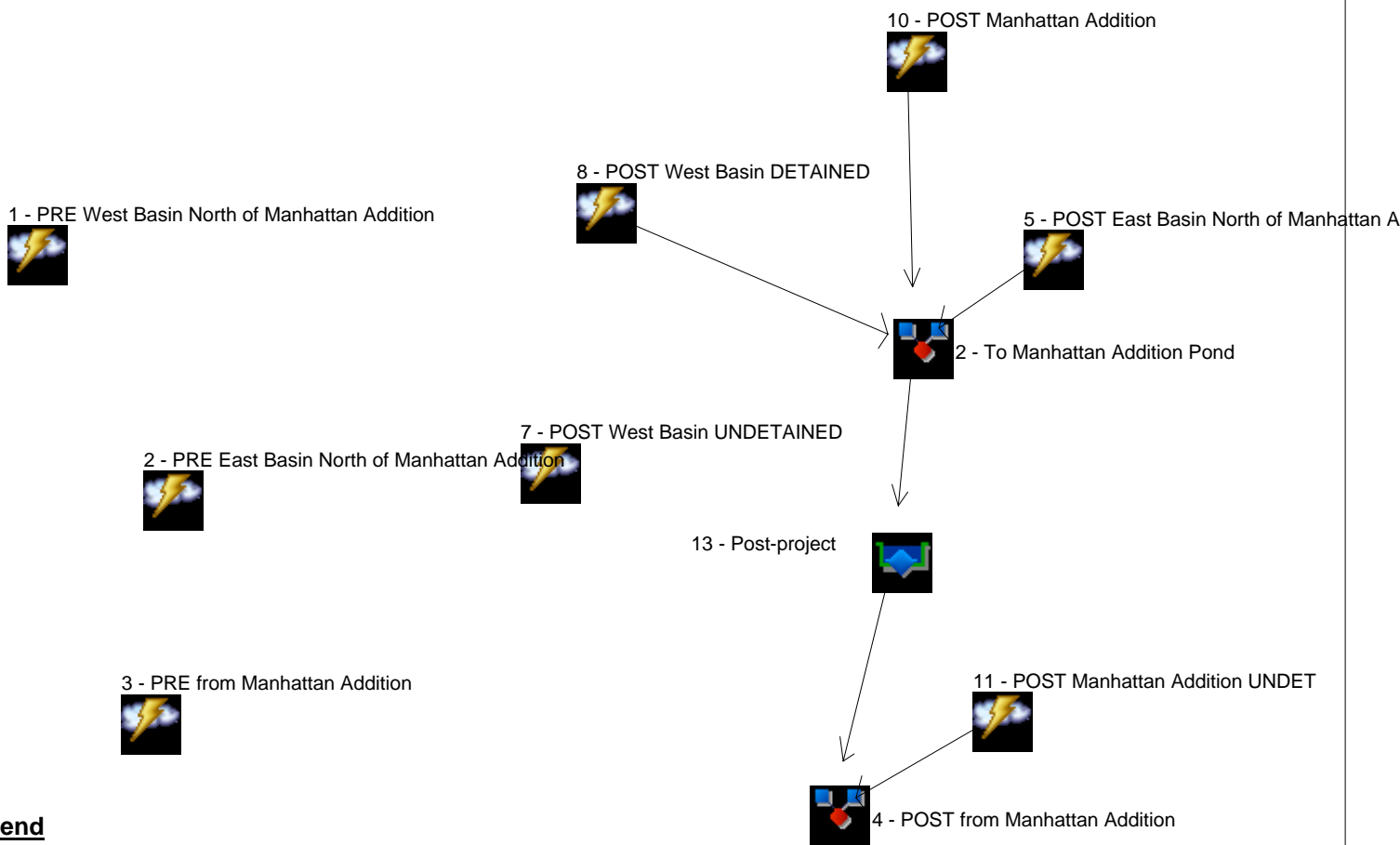


**Figure 2.6**

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Hydraflow Hyydrographs

# Watershed Model Schematic



## Legend

Hyd.	Origin	Description
1	Rational	PRE West Basin North of Manhattan Addition
2	Rational	PRE East Basin North of Manhattan Addition
3	Rational	PRE from Manhattan Addition
5	Rational	POST East Basin North of Manhattan Addition
7	Rational	POST West Basin UNDETAINED
8	Rational	POST West Basin DETAINED
10	Rational	POST Manhattan Addition
11	Rational	POST Manhattan Addition UNDET
12	Combine	To Manhattan Addition Pond
13	Reservoir	Post-project
14	Combine	POST from Manhattan Addition

# Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	Rational	-----	-----	7.626	-----	9.059	10.42	12.10	13.57	14.76	PRE West Basin North of Manhattan
2	Rational	-----	-----	1.039	-----	1.228	1.410	1.634	1.830	1.989	PRE East Basin North of Manhattan
3	Rational	-----	-----	22.09	-----	26.99	31.40	36.71	41.35	45.28	PRE from Manhattan Addition
5	Rational	-----	-----	1.004	-----	1.187	1.363	1.579	1.769	1.922	POST East Basin North of Manhattan
7	Rational	-----	-----	5.692	-----	6.728	7.722	8.950	10.02	10.89	POST West Basin UNDETAINED
8	Rational	-----	-----	8.371	-----	9.894	11.36	13.16	14.74	16.02	POST West Basin DETAINED
10	Rational	-----	-----	46.88	-----	55.41	63.59	73.71	82.54	89.71	POST Manhattan Addition
11	Rational	-----	-----	16.74	-----	19.79	22.71	26.32	29.48	32.04	POST Manhattan Addition UNDET
12	Combine	5, 8, 10,	-----	56.25	-----	66.49	76.31	88.45	99.05	107.65	To Manhattan Addition Pond
13	Reservoir	12	-----	5.435	-----	6.074	6.619	7.216	7.701	8.074	Post-project
14	Combine	11, 13	-----	20.14	-----	24.01	27.57	31.69	34.70	37.55	POST from Manhattan Addition

# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	Rational	7.626	1	18	8,236	----	-----	-----	PRE West Basin North of Manhattan
2	Rational	1.039	1	15	935	----	-----	-----	PRE East Basin North of Manhattan
3	Rational	22.09	1	34	45,060	----	-----	-----	PRE from Manhattan Addition
5	Rational	1.004	1	15	904	----	-----	-----	POST East Basin North of Manhattan
7	Rational	5.692	1	15	5,123	----	-----	-----	POST West Basin UNDETAINED
8	Rational	8.371	1	15	7,533	----	-----	-----	POST West Basin DETAINED
10	Rational	46.88	1	15	42,188	----	-----	-----	POST Manhattan Addition
11	Rational	16.74	1	15	15,067	----	-----	-----	POST Manhattan Addition UNDET
12	Combine	56.25	1	15	50,625	5, 8, 10,	-----	-----	To Manhattan Addition Pond
13	Reservoir	5.435	1	48	50,339	12	1362.60	45,560	Post-project
14	Combine	20.14	1	15	65,406	11, 13	-----	-----	POST from Manhattan Addition
08307detention.gpw					Return Period: 2 Year			Monday, Jul 14, 2008	

# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	Rational	9.059	1	18	9,784	----	-----	-----	PRE West Basin North of Manhattan
2	Rational	1.228	1	15	1,105	----	-----	-----	PRE East Basin North of Manhattan
3	Rational	26.99	1	34	55,063	----	-----	-----	PRE from Manhattan Addition
5	Rational	1.187	1	15	1,069	----	-----	-----	POST East Basin North of Manhattan
7	Rational	6.728	1	15	6,055	----	-----	-----	POST West Basin UNDETAINED
8	Rational	9.894	1	15	8,905	----	-----	-----	POST West Basin DETAINED
10	Rational	55.41	1	15	49,867	----	-----	-----	POST Manhattan Addition
11	Rational	19.79	1	15	17,810	----	-----	-----	POST Manhattan Addition UNDET
12	Combine	66.49	1	15	59,841	5, 8, 10,	-----	-----	To Manhattan Addition Pond
13	Reservoir	6.074	1	29	59,546	12	1362.88	54,110	Post-project
14	Combine	24.01	1	15	77,356	11, 13	-----	-----	POST from Manhattan Addition
08307detention.gpw					Return Period: 5 Year			Monday, Jul 14, 2008	

# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	Rational	10.42	1	18	11,258	----	-----	-----	PRE West Basin North of Manhattan
2	Rational	1.410	1	15	1,269	----	-----	-----	PRE East Basin North of Manhattan
3	Rational	31.40	1	34	64,049	----	-----	-----	PRE from Manhattan Addition
5	Rational	1.363	1	15	1,226	----	-----	-----	POST East Basin North of Manhattan
7	Rational	7.722	1	15	6,949	----	-----	-----	POST West Basin UNDETAINED
8	Rational	11.36	1	15	10,220	----	-----	-----	POST West Basin DETAINED
10	Rational	63.59	1	15	57,231	----	-----	-----	POST Manhattan Addition
11	Rational	22.71	1	15	20,440	----	-----	-----	POST Manhattan Addition UNDET
12	Combine	76.31	1	15	68,677	5, 8, 10,	-----	-----	To Manhattan Addition Pond
13	Reservoir	6.619	1	29	68,376	12	1363.14	62,331	Post-project
14	Combine	27.57	1	15	88,816	11, 13	-----	-----	POST from Manhattan Addition
08307detention.gpw					Return Period: 10 Year			Monday, Jul 14, 2008	

## 100 - Year

<b>Summary Report</b> .....	<b>1</b>
<b>Hydrograph Reports</b> .....	<b>2</b>
Hydrograph No. 1, Rational, PRE West Basin North of Manhattan Addition .....	2
FAA Tc Worksheet .....	3
Hydrograph No. 2, Rational, PRE East Basin North of Manhattan Addition .....	4
Hydrograph No. 3, Rational, PRE from Manhattan Addition .....	5
FAA Tc Worksheet .....	6
Hydrograph No. 5, Rational, POST East Basin North of Manhattan Addition .....	7
Hydrograph No. 7, Rational, POST West Basin UNDETAINED .....	8
Hydrograph No. 8, Rational, POST West Basin DETAINED .....	9
Hydrograph No. 10, Rational, POST Manhattan Addition .....	10
Hydrograph No. 11, Rational, POST Manhattan Addition UNDET .....	11
Hydrograph No. 12, Combine, To Manhattan Addition Pond .....	12
Hydrograph No. 13, Reservoir, Post-project .....	13
Pond Report - Pond from Contours .....	14
Hydrograph No. 14, Combine, POST from Manhattan Addition .....	15
<b>IDF Report</b> .....	<b>16</b>

# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	Rational	14.76	1	18	15,943	----	-----	-----	PRE West Basin North of Manhattan
2	Rational	1.989	1	15	1,790	----	-----	-----	PRE East Basin North of Manhattan
3	Rational	45.28	1	34	92,368	----	-----	-----	PRE from Manhattan Addition
5	Rational	1.922	1	15	1,730	----	-----	-----	POST East Basin North of Manhattan
7	Rational	10.89	1	15	9,804	----	-----	-----	POST West Basin UNDETAINED
8	Rational	16.02	1	15	14,417	----	-----	-----	POST West Basin DETAINED
10	Rational	89.71	1	15	80,736	----	-----	-----	POST Manhattan Addition
11	Rational	32.04	1	15	28,834	----	-----	-----	POST Manhattan Addition UNDET
12	Combine	107.65	1	15	96,883	5, 8, 10,	-----	-----	To Manhattan Addition Pond
13	Reservoir	8.074	1	29	96,561	12	1363.94	88,817	Post-project
14	Combine	37.55	1	15	125,395	11, 13	-----	-----	POST from Manhattan Addition
08307detention.gpw					Return Period: 100 Year			Monday, Jul 14, 2008	

# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

Monday, Jul 14, 2008

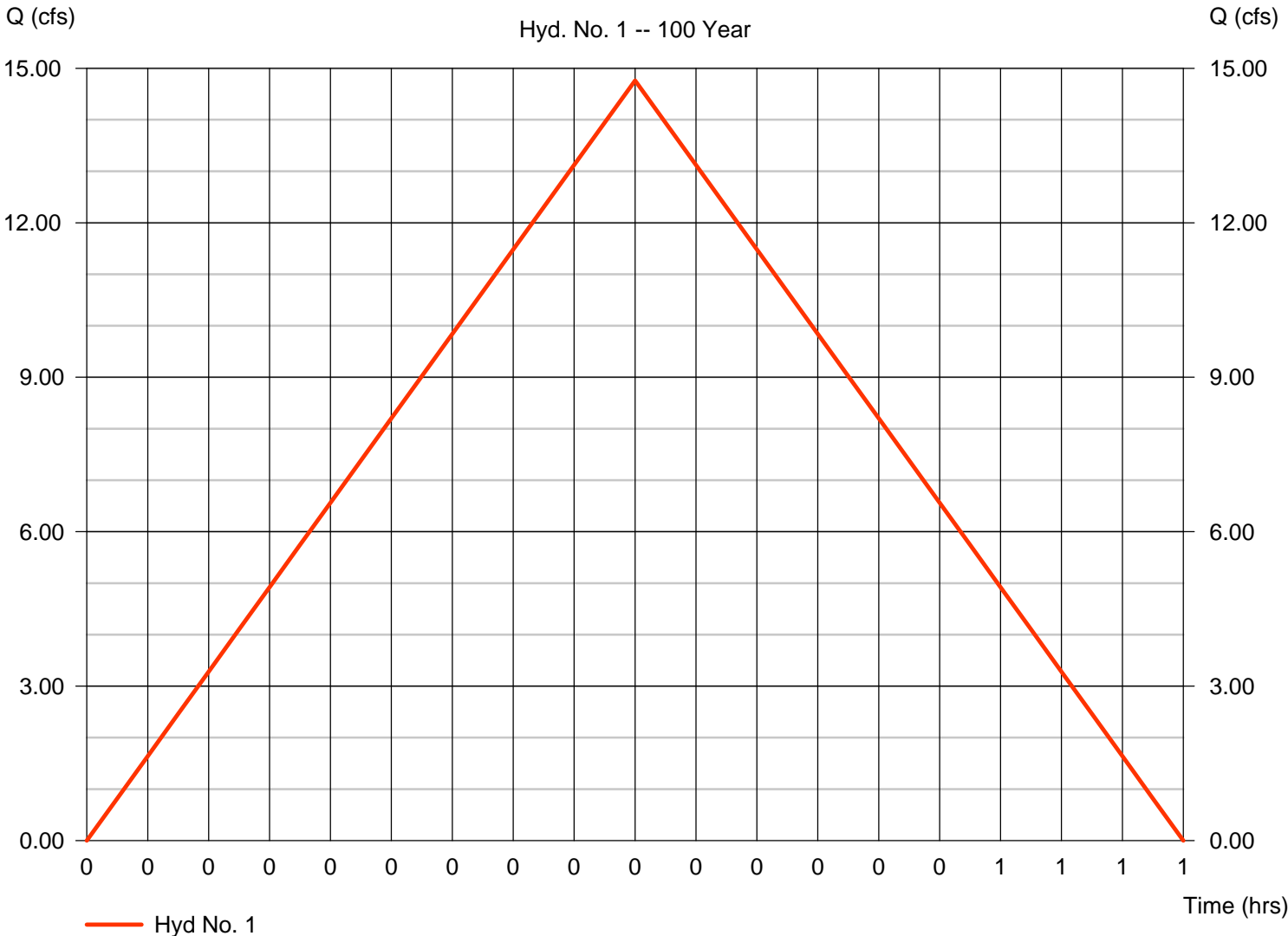
## Hyd. No. 1

PRE West Basin North of Manhattan Addition

Hydrograph type	= Rational	Peak discharge	= 14.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.30 hrs
Time interval	= 1 min	Hyd. volume	= 15,943 cuft
Drainage area	= 4.000 ac	Runoff coeff.	= 0.54
Intensity	= 6.834 in/hr	Tc by FAA	= 18.00 min
IDF Curve	= SedgwickCoKS.IDF	Asc/Rec limb fact	= 1/1

PRE West Basin North of Manhattan Addition

Hyd. No. 1 -- 100 Year



# FAA Formula Tc Worksheet

$$T_c = 1.8(1.1 - C) \times \text{Flow length}^{0.5} / \text{Watercourse slope}^{0.333}$$

Hydraflow Hydrographs by Intelisolve v9.22

## Hyd. No. 1

PRE West Basin North of Manhattan Addition

### Description

Flow length (ft) = 400.00

Watercourse slope (%) = 1.80

Runoff coefficient (C) = 0.54

**Time of Conc. (min) = 18**

# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

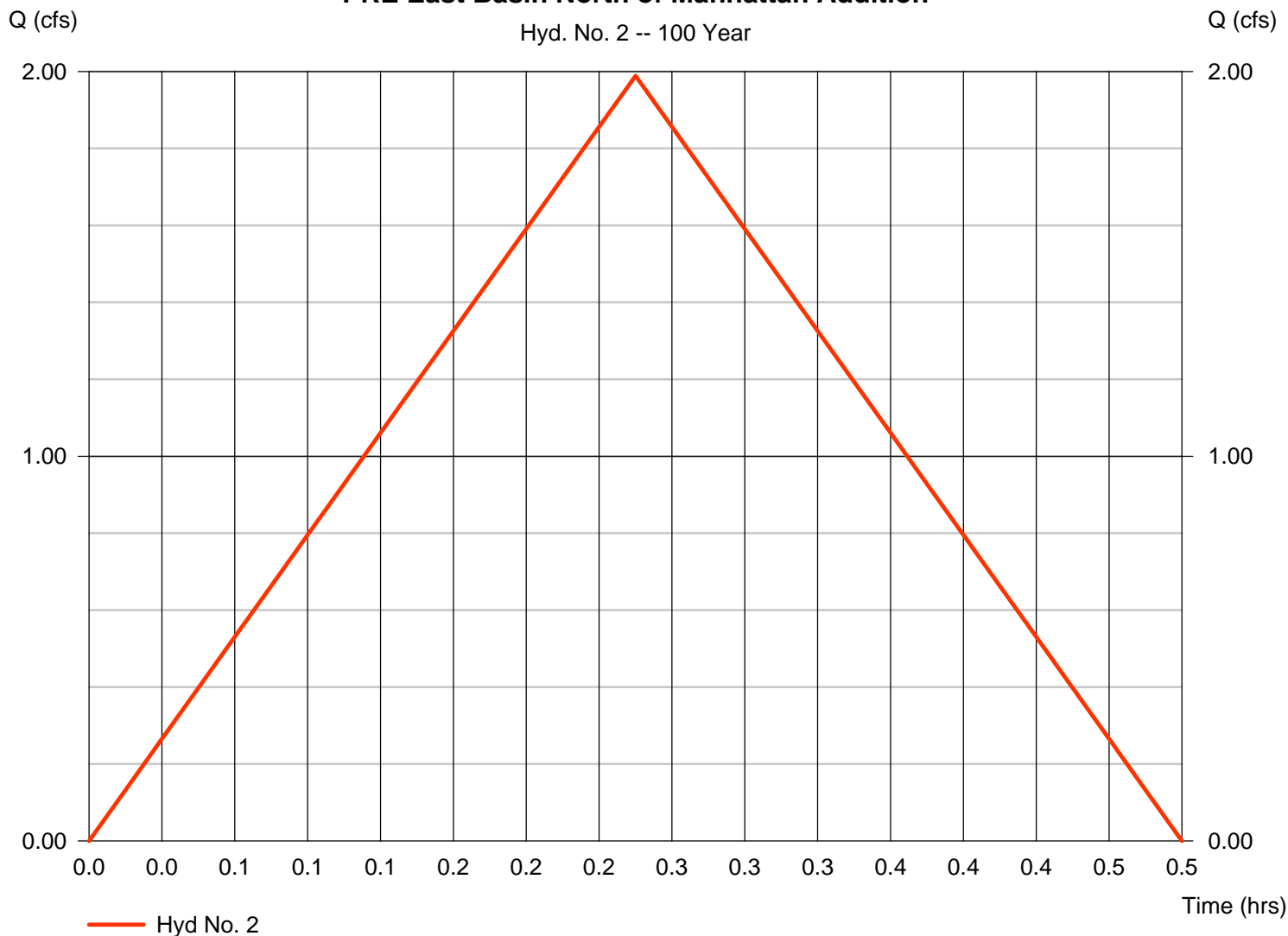
Monday, Jul 14, 2008

## Hyd. No. 2

PRE East Basin North of Manhattan Addition

Hydrograph type	= Rational	Peak discharge	= 1.989 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.25 hrs
Time interval	= 1 min	Hyd. volume	= 1,790 cuft
Drainage area	= 0.500 ac	Runoff coeff.	= 0.54
Intensity	= 7.365 in/hr	Tc by User	= 15.00 min
IDF Curve	= SedgwickCoKS.IDF	Asc/Rec limb fact	= 1/1

**PRE East Basin North of Manhattan Addition**



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

Monday, Jul 14, 2008

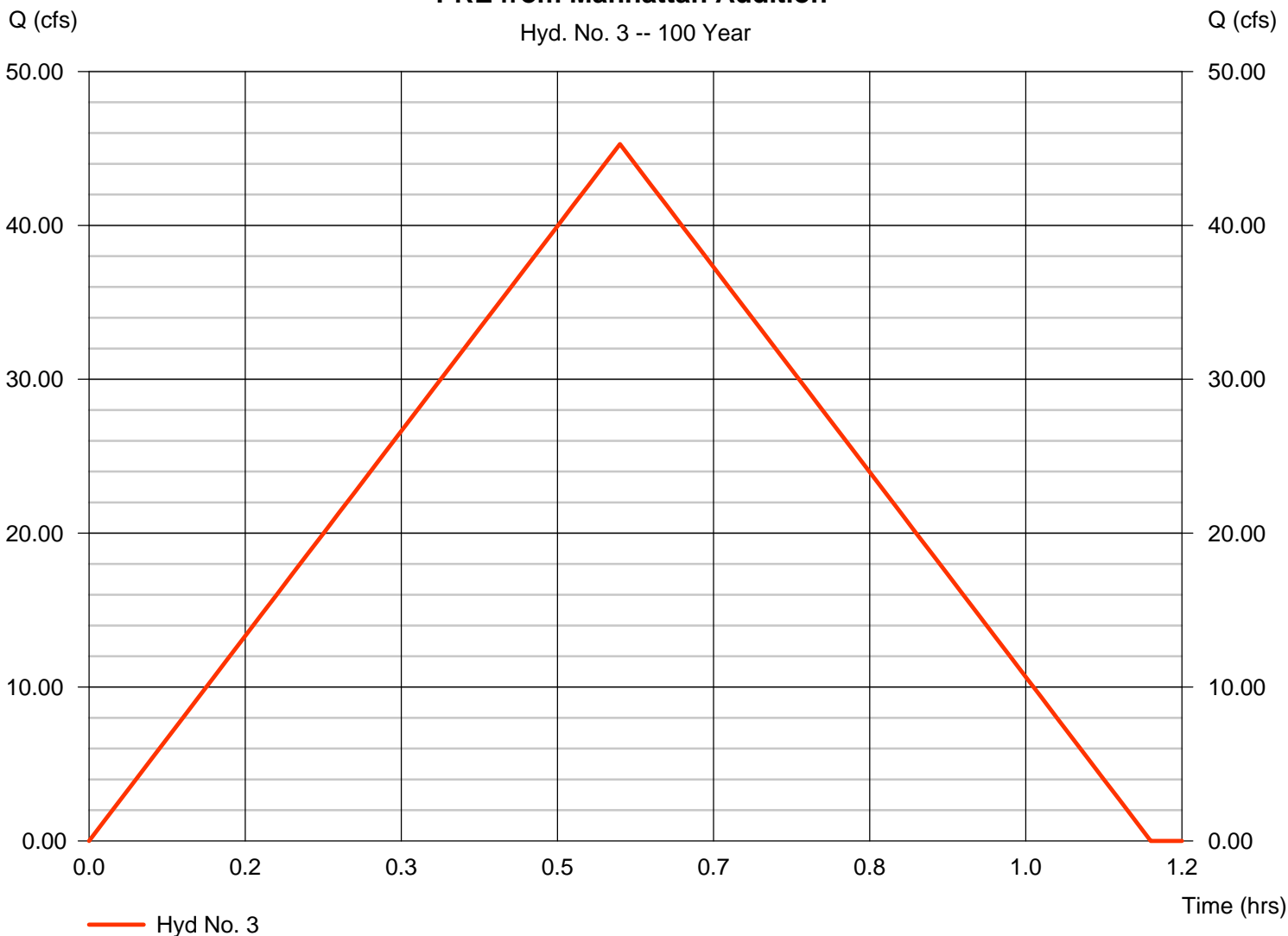
## Hyd. No. 3

PRE from Manhattan Addition

Hydrograph type	= Rational	Peak discharge	= 45.28 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.57 hrs
Time interval	= 1 min	Hyd. volume	= 92,368 cuft
Drainage area	= 19.000 ac	Runoff coeff.	= 0.47
Intensity	= 5.070 in/hr	Tc by FAA	= 34.00 min
IDF Curve	= SedgwickCoKS.IDF	Asc/Rec limb fact	= 1/1

**PRE from Manhattan Addition**

Hyd. No. 3 -- 100 Year



# FAA Formula Tc Worksheet

$$T_c = 1.8(1.1 - C) \times \text{Flow length}^{0.5} / \text{Watercourse slope}^{0.333}$$

Hydraflow Hydrographs by Intelisolve v9.22

## Hyd. No. 3

PRE from Manhattan Addition

### Description

Flow length (ft) = 1245.00

Watercourse slope (%) = 1.10

Runoff coefficient (C) = 0.47

**Time of Conc. (min) = 34**

# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

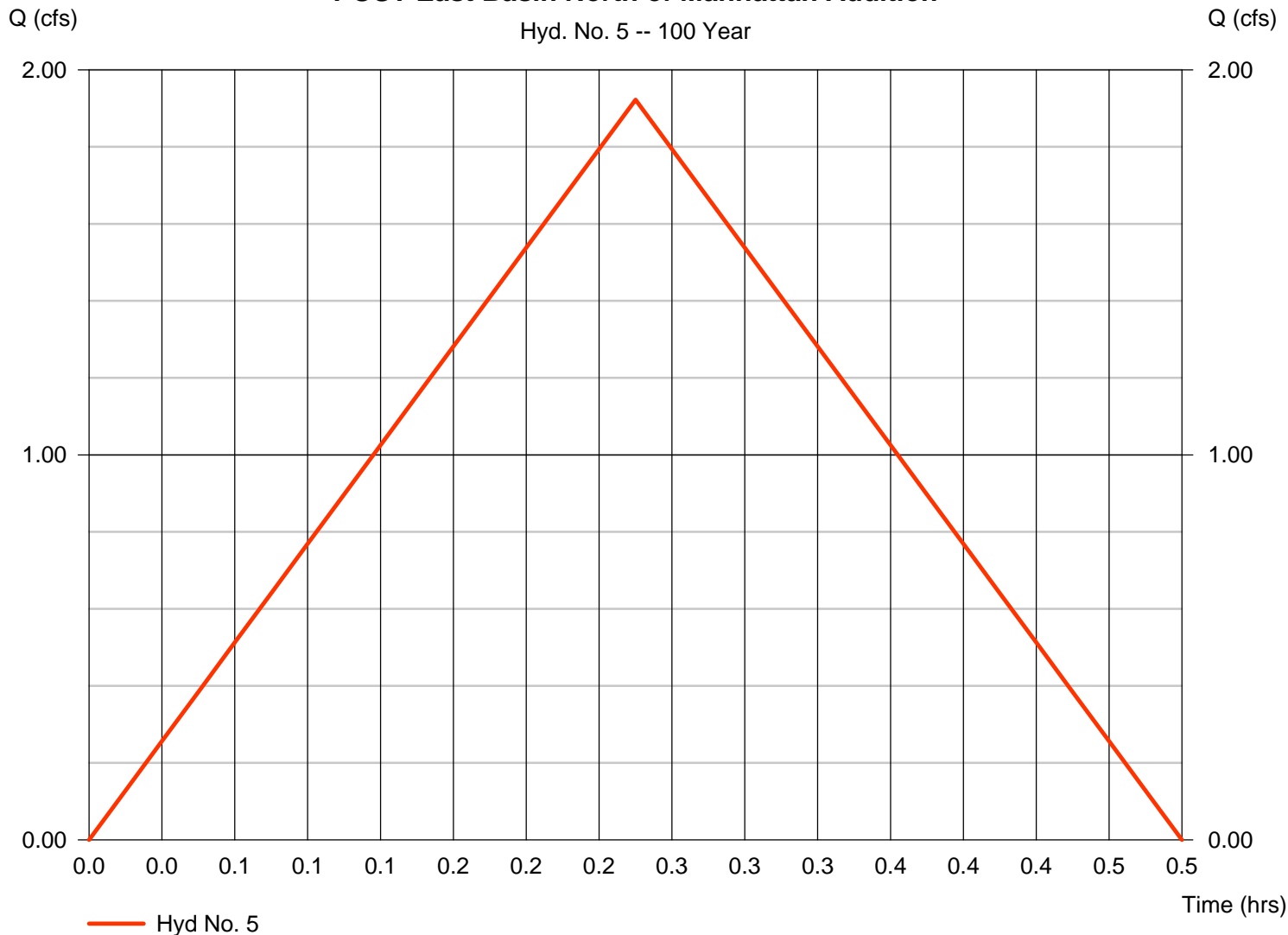
Monday, Jul 14, 2008

## Hyd. No. 5

POST East Basin North of Manhattan Addition

Hydrograph type	= Rational	Peak discharge	= 1.922 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.25 hrs
Time interval	= 1 min	Hyd. volume	= 1,730 cuft
Drainage area	= 0.870 ac	Runoff coeff.	= 0.3
Intensity	= 7.365 in/hr	Tc by User	= 15.00 min
IDF Curve	= SedgwickCoKS.IDF	Asc/Rec limb fact	= 1/1

**POST East Basin North of Manhattan Addition**



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

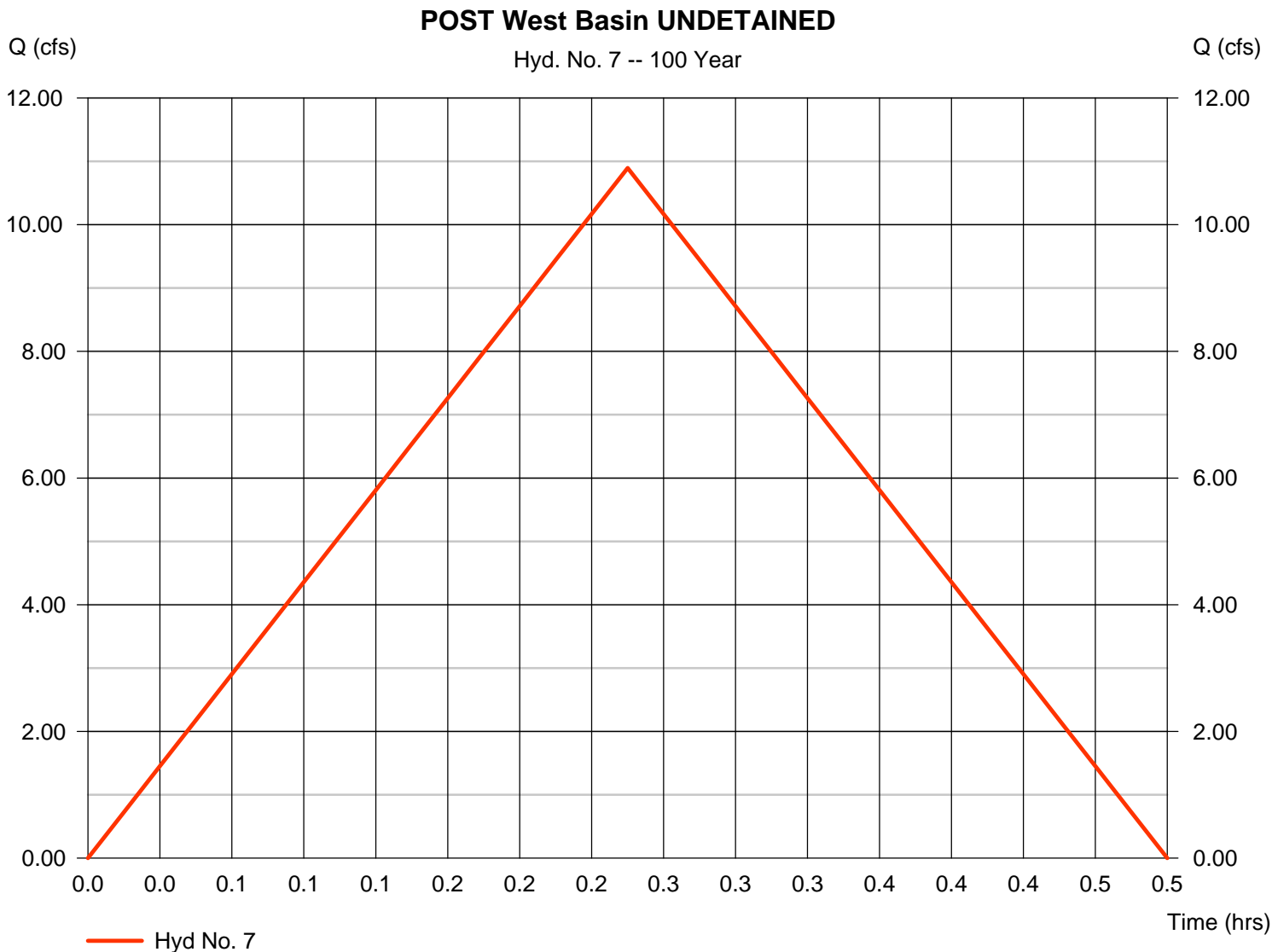
Monday, Jul 14, 2008

## Hyd. No. 7

POST West Basin UNDETAINED

Hydrograph type = Rational  
Storm frequency = 100 yrs  
Time interval = 1 min  
Drainage area = 1.700 ac  
Intensity = 7.365 in/hr  
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 10.89 cfs  
Time to peak = 0.25 hrs  
Hyd. volume = 9,804 cuft  
Runoff coeff. = 0.87  
Tc by User = 15.00 min  
Asc/Rec limb fact = 1/1



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

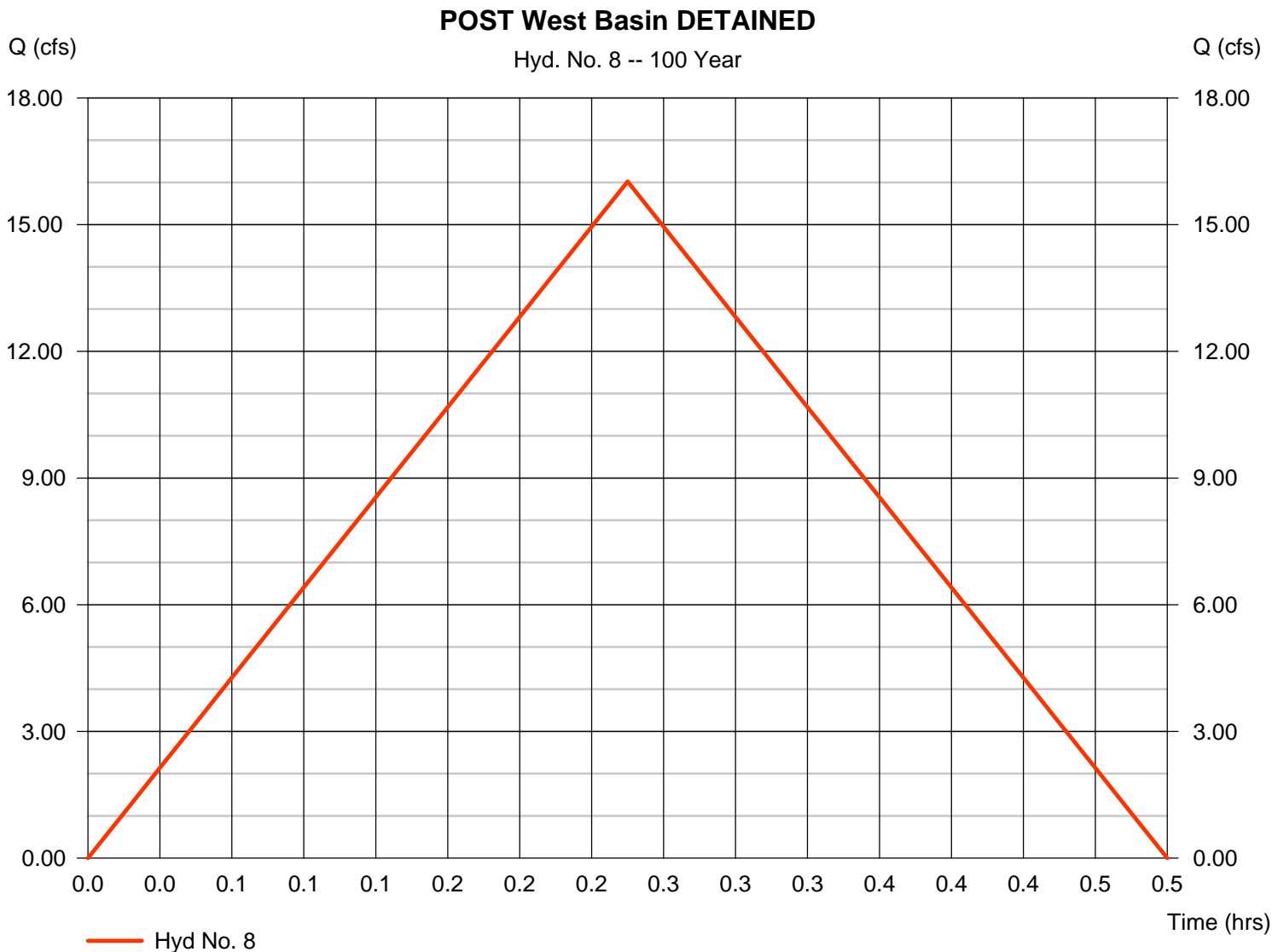
Monday, Jul 14, 2008

## Hyd. No. 8

POST West Basin DETAINED

Hydrograph type = Rational  
Storm frequency = 100 yrs  
Time interval = 1 min  
Drainage area = 2.500 ac  
Intensity = 7.365 in/hr  
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 16.02 cfs  
Time to peak = 0.25 hrs  
Hyd. volume = 14,417 cuft  
Runoff coeff. = 0.87  
Tc by User = 15.00 min  
Asc/Rec limb fact = 1/1



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

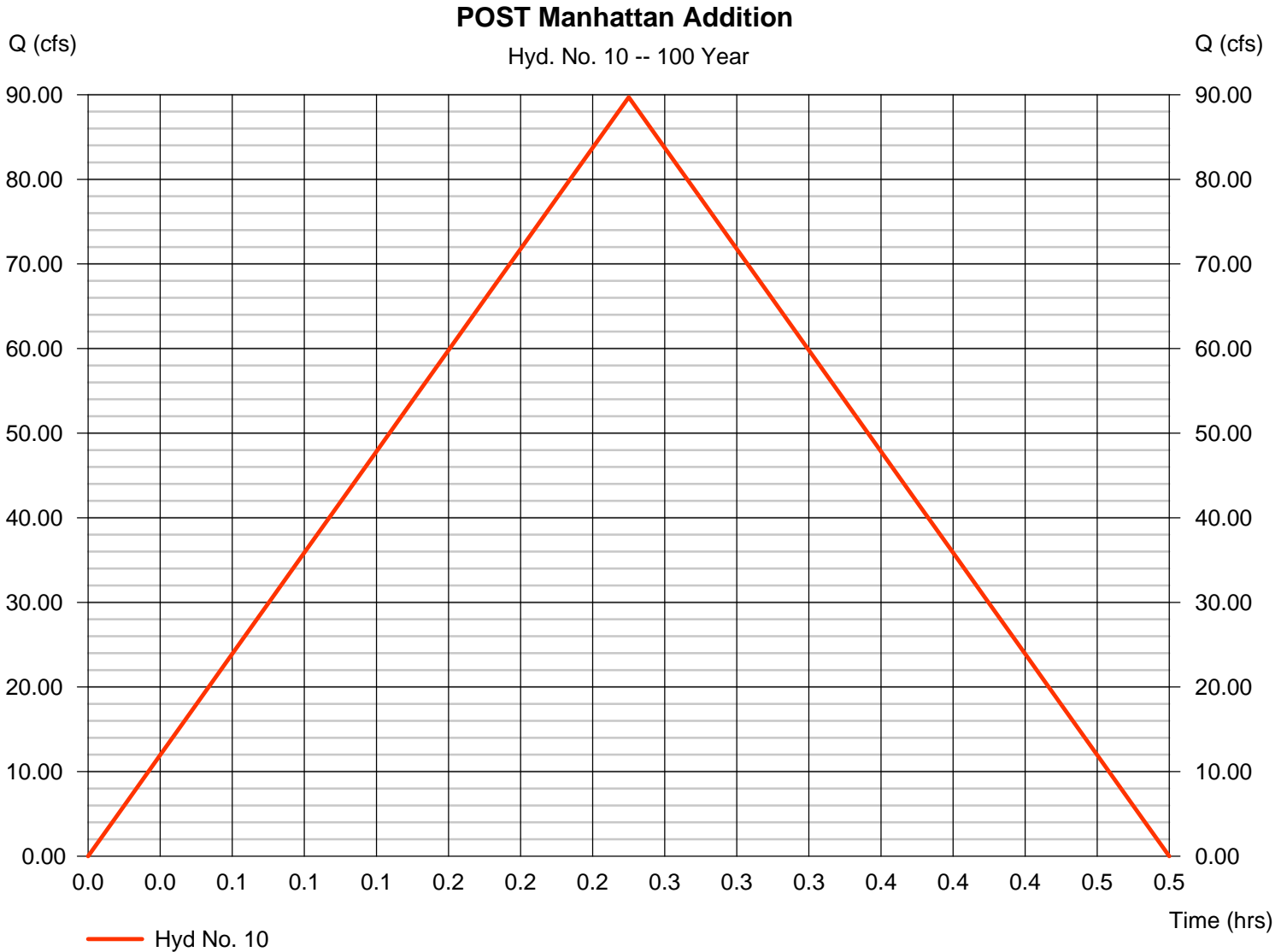
Monday, Jul 14, 2008

## Hyd. No. 10

### POST Manhattan Addition

Hydrograph type = Rational  
 Storm frequency = 100 yrs  
 Time interval = 1 min  
 Drainage area = 14.000 ac  
 Intensity = 7.365 in/hr  
 IDF Curve = SedgwickCoKS.IDF

Peak discharge = 89.71 cfs  
 Time to peak = 0.25 hrs  
 Hyd. volume = 80,736 cuft  
 Runoff coeff. = 0.87  
 Tc by User = 15.00 min  
 Asc/Rec limb fact = 1/1



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

Monday, Jul 14, 2008

## Hyd. No. 11

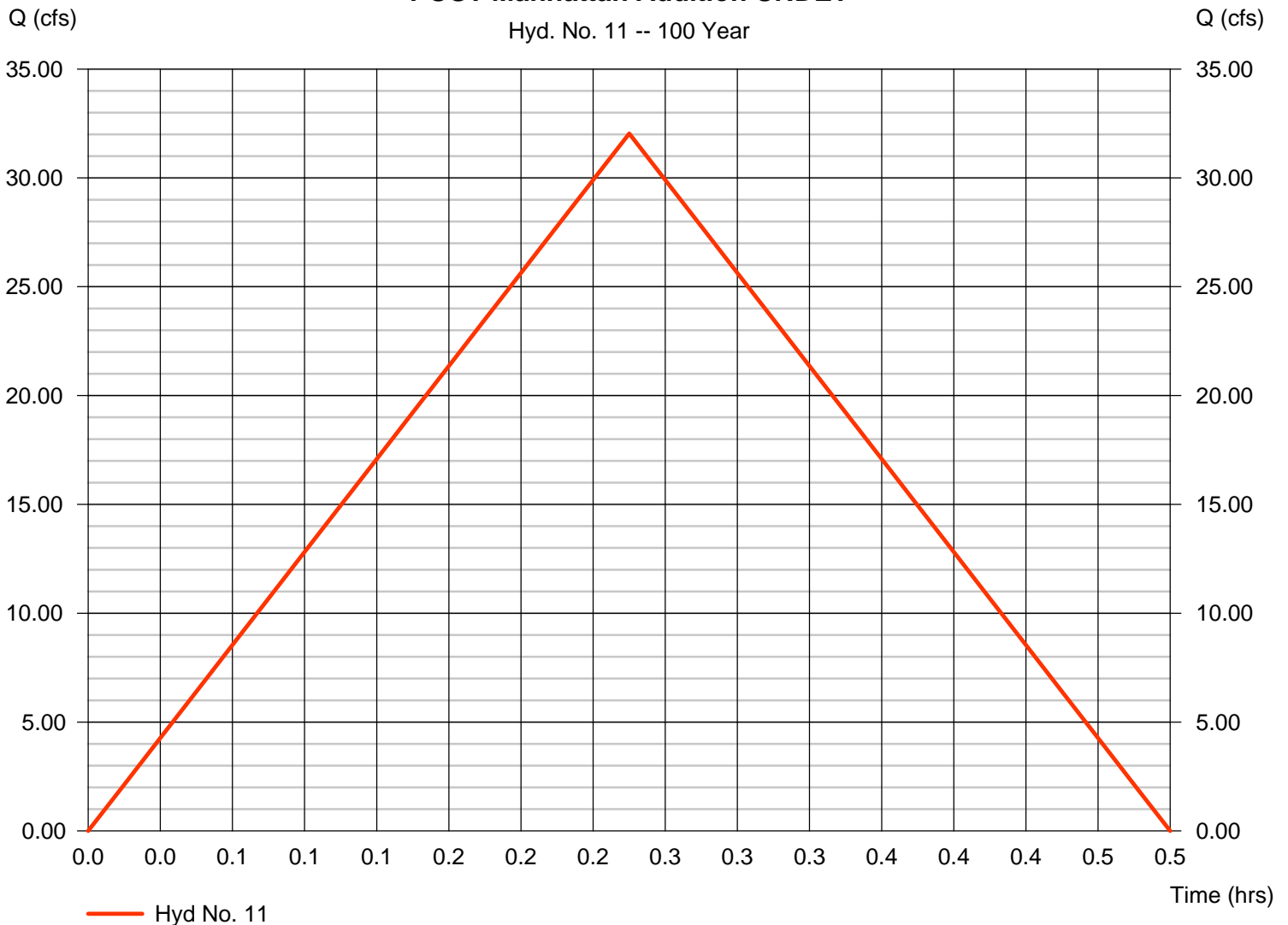
POST Manhattan Addition UNDET

Hydrograph type = Rational  
 Storm frequency = 100 yrs  
 Time interval = 1 min  
 Drainage area = 5.000 ac  
 Intensity = 7.365 in/hr  
 IDF Curve = SedgwickCoKS.IDF

Peak discharge = 32.04 cfs  
 Time to peak = 0.25 hrs  
 Hyd. volume = 28,834 cuft  
 Runoff coeff. = 0.87  
 Tc by User = 15.00 min  
 Asc/Rec limb fact = 1/1

### POST Manhattan Addition UNDET

Hyd. No. 11 -- 100 Year



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

Monday, Jul 14, 2008

## Hyd. No. 12

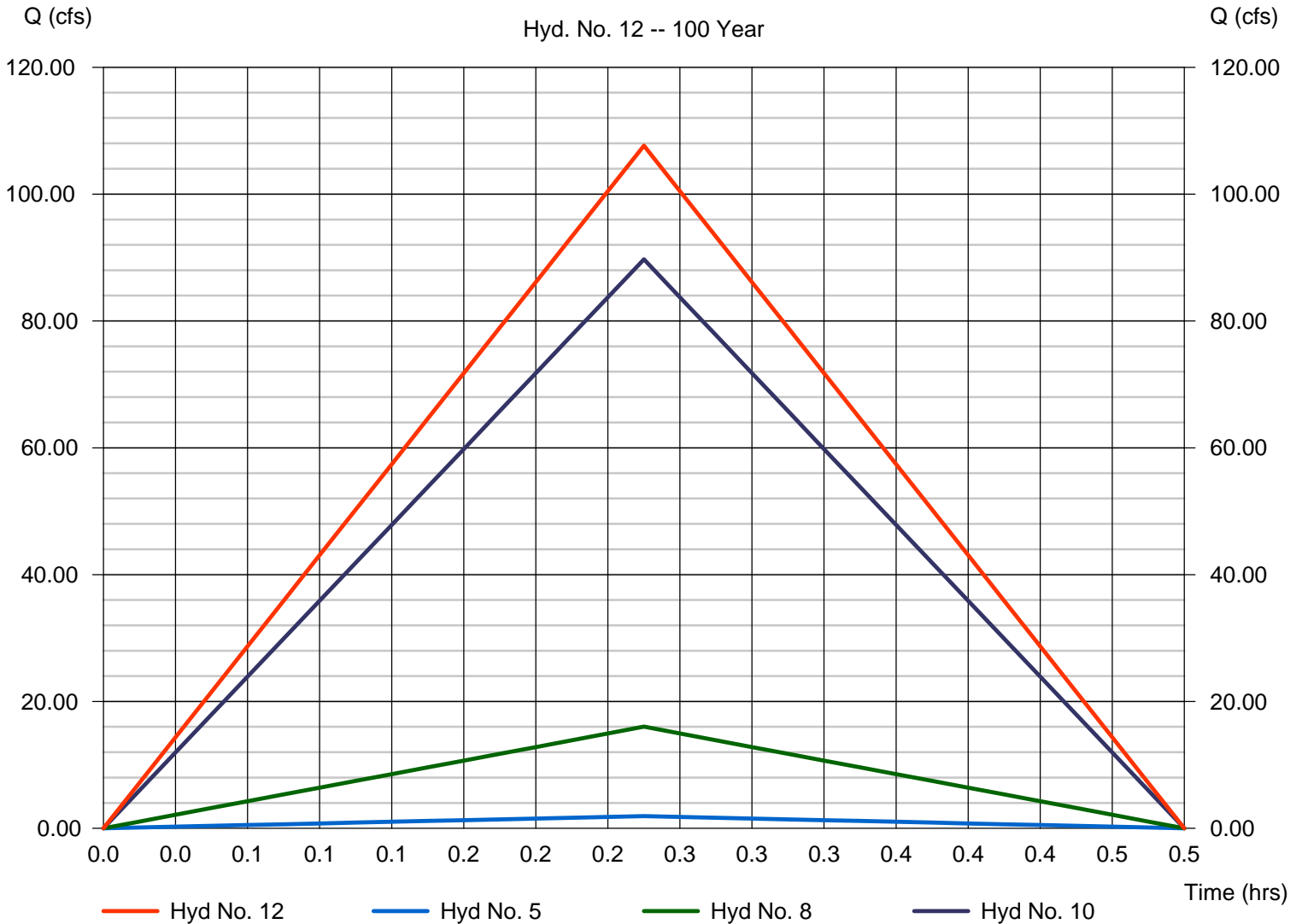
To Manhattan Addition Pond

Hydrograph type = Combine  
 Storm frequency = 100 yrs  
 Time interval = 1 min  
 Inflow hyds. = 5, 8, 10

Peak discharge = 107.65 cfs  
 Time to peak = 0.25 hrs  
 Hyd. volume = 96,883 cuft  
 Contrib. drain. area = 17.370 ac

To Manhattan Addition Pond

Hyd. No. 12 -- 100 Year



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

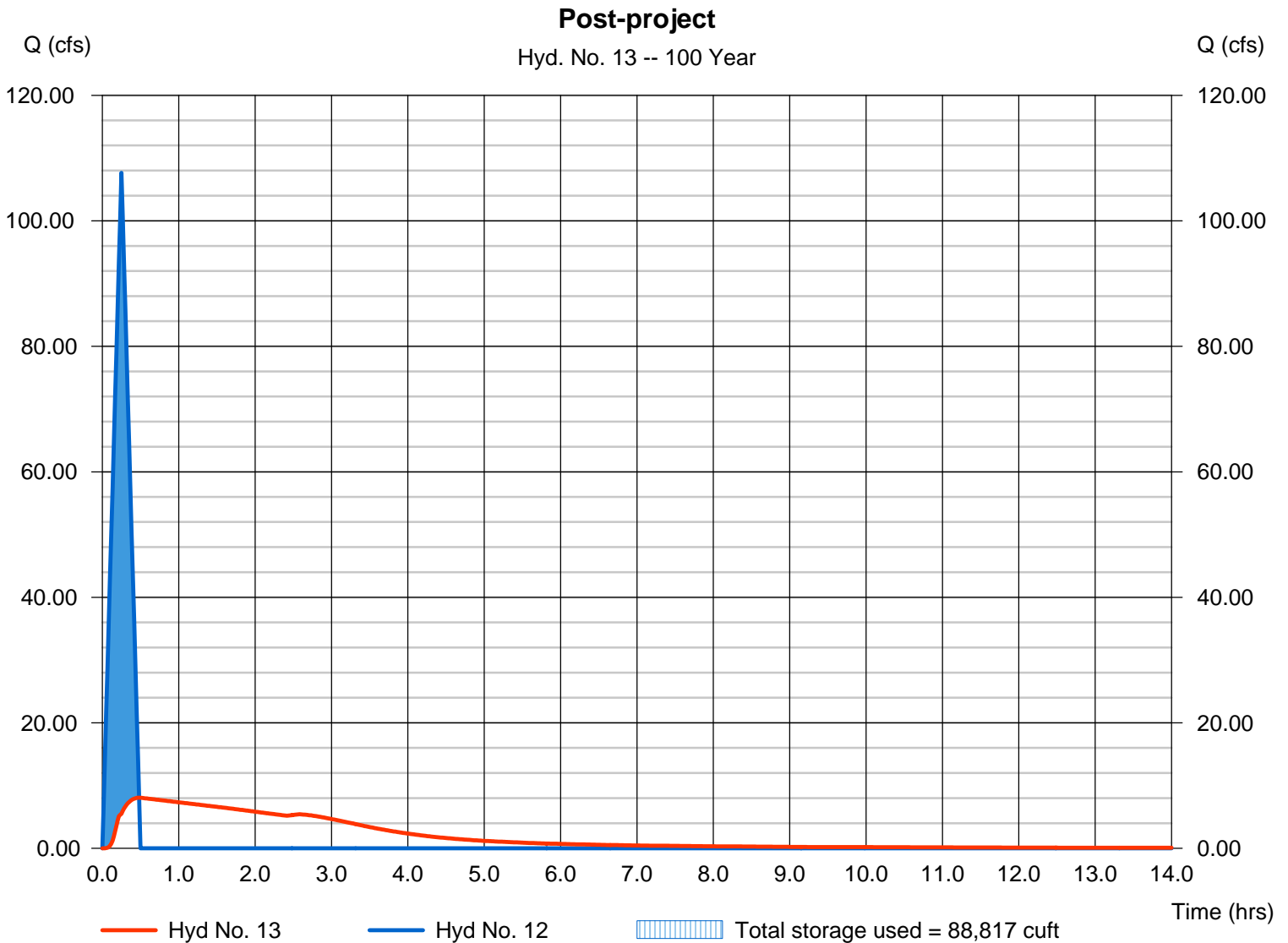
Monday, Jul 14, 2008

## Hyd. No. 13

Post-project

Hydrograph type	= Reservoir	Peak discharge	= 8.074 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.48 hrs
Time interval	= 1 min	Hyd. volume	= 96,561 cuft
Inflow hyd. No.	= 12 - To Manhattan Addition Pond	Max. Elevation	= 1363.94 ft
Reservoir name	= Pond from Contours	Max. Storage	= 88,817 cuft

Storage Indication method used.



## Pond No. 1 - Pond from Contours

### Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1361.00 ft

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1361.00	26,156	0	0
1.00	1362.00	28,834	27,481	27,481
2.00	1363.00	31,640	30,223	57,705
3.00	1364.00	34,581	33,096	90,801
4.00	1365.00	38,483	36,511	127,312

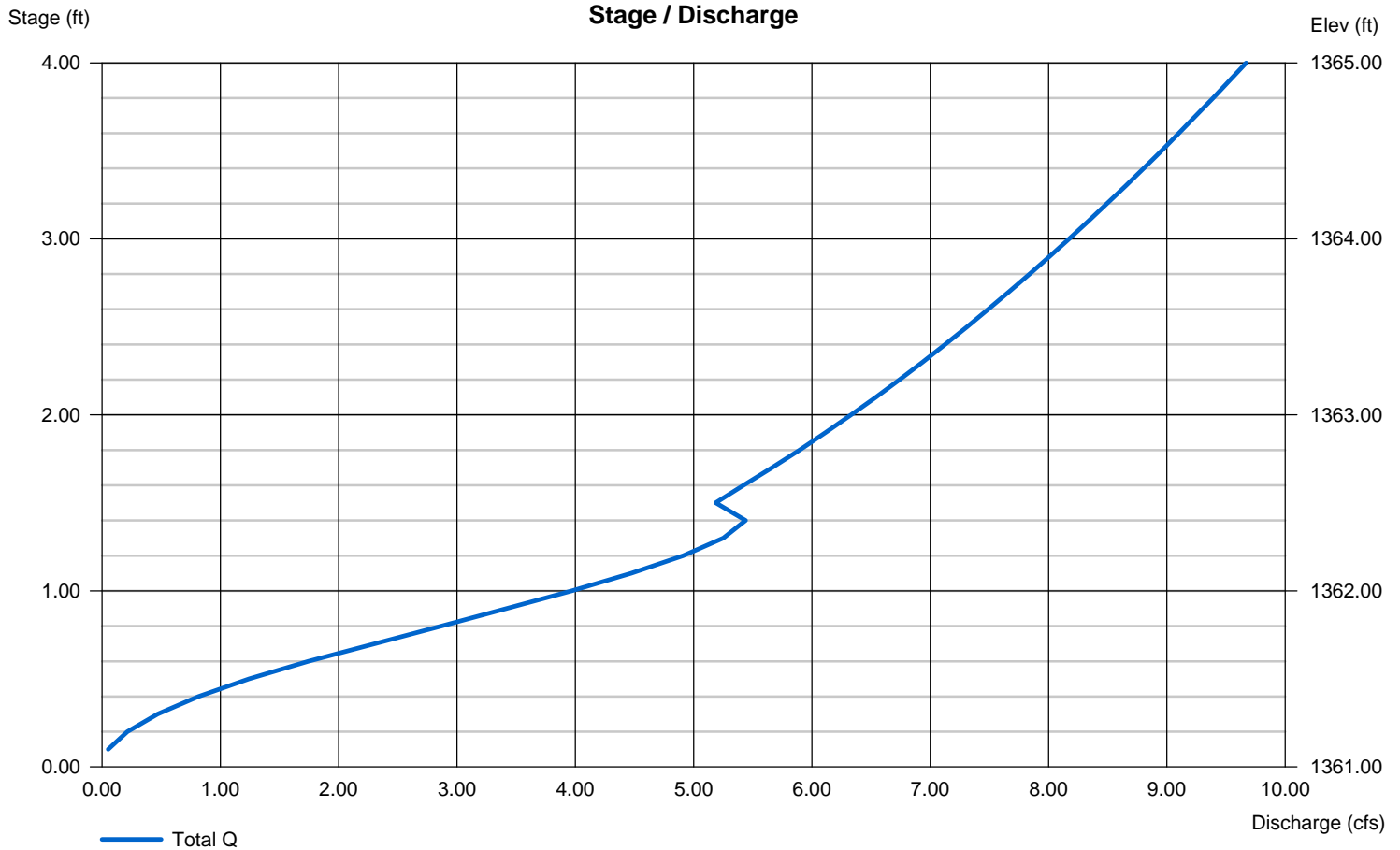
### Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1361.00	0.00	0.00	0.00
Length (ft)	= 333.50	0.00	0.00	0.00
Slope (%)	= 0.30	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

Monday, Jul 14, 2008

## Hyd. No. 14

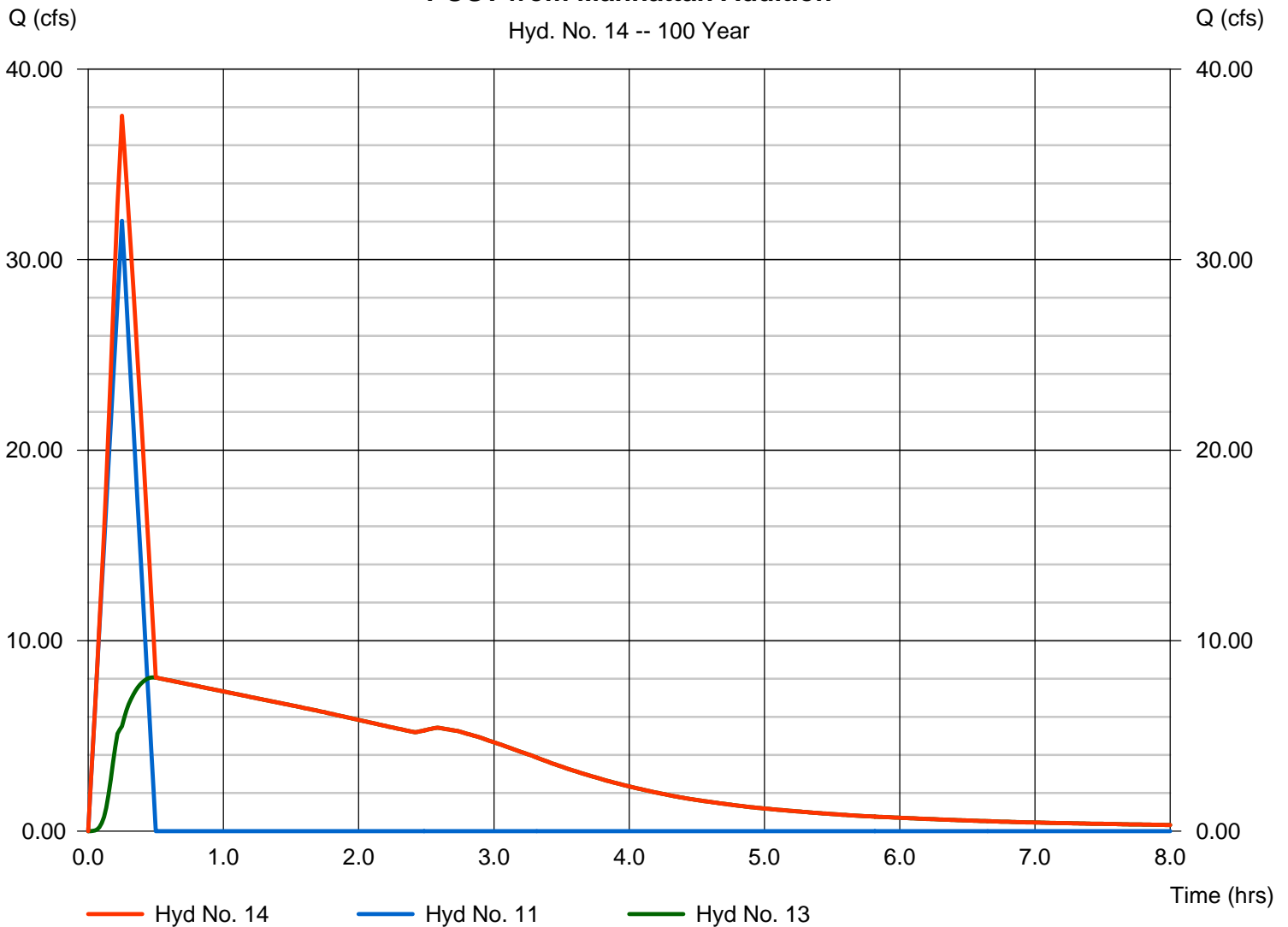
POST from Manhattan Addition

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Time interval = 1 min  
Inflow hyds. = 11, 13

Peak discharge = 37.55 cfs  
Time to peak = 0.25 hrs  
Hyd. volume = 125,395 cuft  
Contrib. drain. area = 5.000 ac

### POST from Manhattan Addition

Hyd. No. 14 -- 100 Year



# Hydraflow Rainfall Report

Hydraflow Hydrographs by Intelisolve v9.22

Monday, Jul 14, 2008

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	-----
2	76.3137	14.3000	0.8844	-----
3	0.0000	0.0000	0.0000	-----
5	52.6224	11.2000	0.7497	-----
10	55.1841	11.1000	0.7229	-----
25	60.7012	11.1000	0.7068	-----
50	66.9222	11.3000	0.7004	-----
100	62.2794	10.1000	0.6624	-----

File name: SedgwickCoKS.IDF

$$\text{Intensity} = B / (T_c + D)^E$$

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.57	4.54	3.85	3.35	2.97	2.67	2.43	2.23	2.06	1.92	1.80	1.69
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.52	5.33	4.55	3.99	3.57	3.24	2.97	2.75	2.57	2.41	2.27	2.15
10	7.40	6.09	5.22	4.60	4.13	3.76	3.46	3.21	3.00	2.82	2.67	2.53
25	8.51	7.03	6.05	5.35	4.81	4.39	4.05	3.76	3.52	3.32	3.14	2.98
50	9.47	7.86	6.78	6.00	5.41	4.94	4.56	4.24	3.98	3.75	3.55	3.37
100	10.31	8.53	7.37	6.53	5.90	5.40	5.00	4.66	4.37	4.13	3.92	3.73

T<sub>c</sub> = time in minutes. Values may exceed 60.

Precip. file name: SedgwickCoKS.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.48	0.00	4.55	5.25	6.30	7.10	7.80
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Custom	0.00	2.50	0.00	0.00	0.00	4.60	5.20	5.90

### Tab 3. Post-Development Hydrologic Analysis

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#### **A. Proposed Conditions Hydrologic and Hydraulic Analysis**

The post-project drainage boundaries are shown on the Drainage and Utility plan Figure 3.1 The rational method in Hydraflow Hydrographs 2007 was used to determine the post-development flowrates. These flows are shown below; calculations are in Figure 2.6.

##### Post-Development Flowrates

Basin	Design Storm Flows (cfs)			
	2-Yr	5-Yr	10-Yr	100-Yr
East Basin	1	1	1	2
West Basin	6	7	8	11
Manhattan Addition	20	24	28	38

#### **B. Proposed Time of Concentration**

A post-project time of concentration of 15 minutes was used for the East, West and Manhattan Addition basin. Time of concentration calculations are in Figure 2.6.

#### **C. Assumed Post-Developed Curve Numbers**

A rational coefficient of 0.87 was used to represent commercial land use under post-project conditions. The times of concentration and rational coefficients are shown below

##### Proposed Time of Concentration and Rational Coefficient

Basin	T <sub>c</sub>	Rational Coefficient
	minutes	
East	15	0.87
West	15	0.87
Manhattan Addition	15	0.87

#### **D. Proposed Contours for Detention**

There is an existing detention pond onsite that can adequately detain the runoff from the proposed development. Contours for the pond were obtained from current survey and the 18" stormsewer outlet design was obtained from plans by Baughman. The normal pool for the pond is 1361.0.

#### **E. Preliminary SWS Sizing Calculations**

There is an existing stormsewer line that conveys flow from the north portion of the Manhattan Addition to the detention pond. The proposed development will overland flow to the existing inlets and the detention pond. No additional stormsewer is proposed.

#### ***F. Stage-Storage-Discharge***

The stage-storage-discharge for the existing pond is in Figure 2.6.

#### ***G. Analysis of upstream/downstream impact***

Runoff flow for all design storms remains the same or decreases from pre to post-development; therefore, upstream/downstream impacts are unchanged from current conditions.

#### ***H. Existing and Proposed Structural Elevations***

For lots adjacent to the detention pond, minimum pad elevations will be set 3 feet above the 100-year storm event. Minimum pads will be set at 1366.9.

#### ***I. Pond Design Elevations***

The normal pool for the existing pond is 1361.0. The 100-year water surface elevation is 1363.9.

#### ***J. Structure Details***

Commercial and retail buildings are proposed for the Villages at Greenwich Addition.

#### ***K. Limits of Clearing and Grading***

The site will be cleared and graded; while maintaining the current commercial lot.

#### ***L. Location of Impervious Areas***

Roads, parking areas and buildings will be located as shown on the Drainage and Utility Plan, Figure 3.1.

#### ***M. Location of Utilities***

Proposed utilities are shown on the Drainage and Utility Plan, Figure 3.1.

#### ***N. Location of Conveyance Systems***

Proposed grading will direct runoff from the site to the existing stormsewer system and detention pond, Figure 3.1.

#### ***O. Location of Channel Modifications***

Channel modifications are not applicable to the Village at Greenwich Addition.

#### ***P. Selection and Location of Stormwater Controls***

Stormwater controls consist of grading and paving to direct stormwater to the existing inlets and detention pond.

#### ***Q. Emergency Overflow***

Plans by Baughman show an overflow escape route from the detention pond west to Greenwich Road.

***R. Freeboard***

The existing detention pond provides 1-foot of freeboard above the 100-year water surface elevation.

***S. 100-Year High Water Line***

The 100-year water surface elevation for the existing detention pond is 1363.9.

***T. Lowest Openings***

The lowest opening for structures on lots that are adjacent to the detention pond is 1366.9

***U. Stormwater Management Facilities***

The final stormsewer lines will be confined within a drainage easement.

***V. Maintenance Responsibility***

The maintenance of the reserve will be the responsibility of the owner.

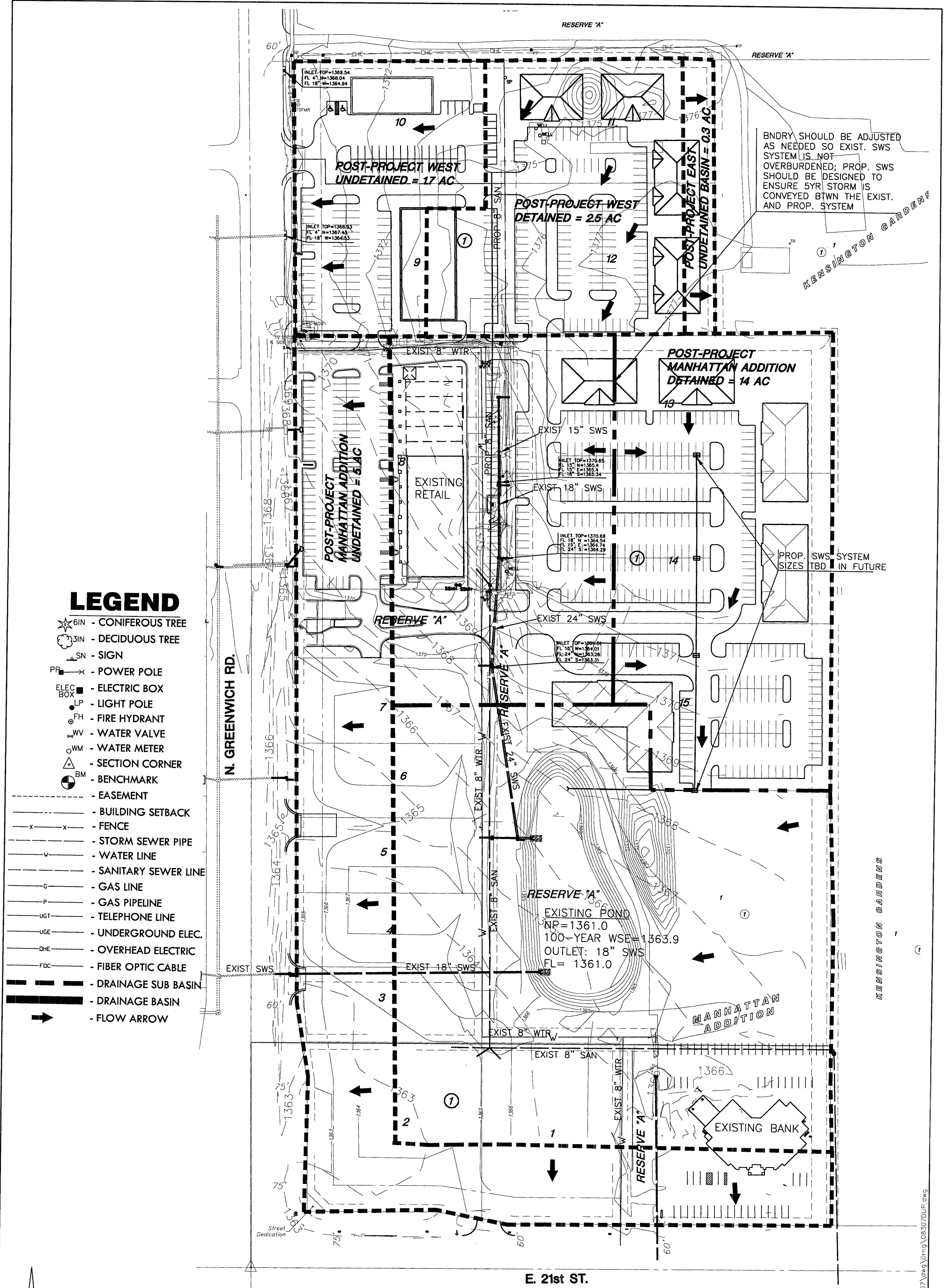
***W. Offsite-Drainage Easements***

Not applicable to Village at Greenwich.

**Figure 3.1**

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Drainage and Utility Plan



BNDRY SHOULD BE ADJUSTED AS NEEDED SO EXIST. SWS SYSTEM IS NOT OVERBURDENED; PROP. SWS SHOULD BE DESIGNED TO ENSURE 5YR STORM IS CONVEYED BTWN THE EXIST. AND PROP. SYSTEM

### LEGEND

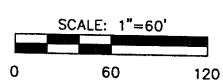
- 6IN - CONIFEROUS TREE
- 3IN - DECIDUOUS TREE
- SN - SIGN
- PP - X - POWER POLE
- ELEC BOX - ELECTRIC BOX
- LP - LIGHT POLE
- FH - FIRE HYDRANT
- WV - WATER VALVE
- WM - WATER METER
- SC - SECTION CORNER
- BM - BENCHMARK
- EASEMENT
- BUILDING SETBACK
- FENCE
- STORM SEWER PIPE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- GAS PIPELINE
- TELEPHONE LINE
- UNDERGROUND ELEC.
- OVERHEAD ELECTRIC
- FIBER OPTIC CABLE
- DRAINAGE SUB BASIN
- DRAINAGE BASIN
- FLOW ARROW

KENSINGTON GARDENS

N. GREENWICH RD.

KENSINGTON GARDENS

E. 21st St.



**MKEC**  
ENGINEERING  
CONSULTANTS, INC.

411 N. WEBB ROAD  
WICHITA, K.S. 67206  
316-684-9600

**VILLAGE AT GREENWICH**  
PROJECT NAME

**DRAINAGE AND UTILITY PLAN**  
SHEET TITLE

TMH DESIGN BY.	TMH DRAWN BY.	KLA CHECKED BY.
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JULY 2008 DATE	07557 JOB NO.	1 / 1 SHEET/OF
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J:\Civil\07557\08307.dwg (Drrg)\08307DUP.dwg

## **Tab 4. Floodplain Submittal**

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Not applicable to Village at Greenwich Development.

## Tab 5. Permits

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**A. *US Army Corps of Engineers***

Not applicable to Village at Greenwich Development.

**B. *Kansas Department of Agriculture***

Not applicable to Village at Greenwich Development.

**C. *Federal Emergency Agency (FEMA)***

Not applicable to Village at Greenwich Development.

**D. *Kansas Department of Transportation***

Not applicable to Village at Greenwich Development.

**E. *Sedgwick County Right-of-way Permit***

Not applicable to Village at Greenwich Development.