DRAINAGE PLAN

WATERWALK WEST ADDITION

TO

WICHITA, SEDGWICK COUNTY, KANSAS

PREPARED BY

Baughman
ENGINEERING | SURVEYING | PLANNING
LANDSCAPE ARCHITECTURE

20 JULY 2012

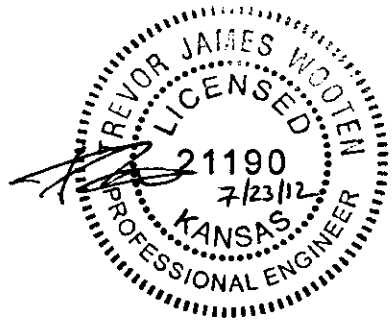
ENGINEERING | SURVEYING | PLANNING
LANDSCAPE ARCHITECTURE

DRAINAGE PLAN
WATERWALK WEST ADDITON

FINAL REPORT

Prepared by Baughman Company, P.A.
20 JULY 2012

By Trevor Wooten, P.E., LEED A.P.
N. Brent Wooten, P.E., L.S.



REPORT CONTENTS

PROJECT NARRATIVE

EXISTING CONDITIONS

The site is located just south of Maple Street and just west of McLean Boulevard in Wichita, Sedgwick County, Kansas. The proposed plat is a re-plat of existing lots previously platted as Winne's Addition and Shirk's 1st Subdivision. This area was previously completely developed, with most of the homes razed. Some of the previous infrastructure is still in place. Currently, the portion of the site that will be re-platted has existing storm sewer adjacent to the property serving some smaller areas. This area drains via sheet flow and old City right of way storm sewer into the Kellogg (US-54) Right of Way storm sewer.

PROPOSED CONDITIONS

The property will be developed into two residential apartment complexes with associated parking lots, utilities, and drainage conveyance systems. This proposed plat will not have a detention pond due to its close proximity to the Arkansas River. The storm water from the site will sheet drain off of roofs, grassed common areas, and paved parking and walking surfaces to curb and area inlets and into underground storm sewer systems. The storm sewer systems all eventually collect at a common point where the storm water will be treated for water quality before draining into the existing storm sewer system in Maple Street.

OFFSITE CONDITIONS

The proposed re-plat site is on a fairly flat piece of ground and drains to the east and south. Other than a small portion of the Kellogg (US-54) Right of Way, the surrounding properties do not drain onto this site.
The USGS Quadrangle Sheet can be seen with the site location plotted as Exhibit 1.
The Aerial for this area can be viewed as Exhibit 2.

EXISTING CONDITIONS RUNOFF CALCULATIONS

DRAINAGE METHODS & STANDARDS

The following methods and standards, although not a complete list, were used in calculating the existing conditions runoff values.

- STORM SERIES
  - 24-hour; 2-yr, 5-yr, 10-yr, 25-yr, 100-yr Storm Events Modeled
  - 2-yr Rainfall Depth = 3.5 in
  - 10-yr Rainfall Depth = 5.3 in
  - 100-yr Rainfall Depth = 7.9 in

- FLOW DATA
  - Areas per LIDAR data, USGS Quadrangle Sheet, Aerial Photos, and Site Visits
  - Rational Method used for Existing Flows (C = 0.73)
  - Time of Concentration: Lag Method (minimum 15 min)

SITE CHARACTERISTICS

The site consists of approximately 4.4 acres of currently platted and mass graded residential subdivision. The proposed area has storm water sewer adjacent and is graded to drain to the south and east, although the site was graded a long time ago and has almost certainly changed from its original drainage design.
The existing site characteristics can be seen from the aerial exhibit (Exhibit 2).

EXISTING CONDITIONS HYDROLOGIC ANALYSIS

The site was analyzed for pre-development conditions using the rational method for the entire storm event series. A Rational 'C' Coefficient of 0.73 was used for existing conditions as was used. A Time of Concentration of 15 minutes was used as is the minimum Tc in the City of Wichita.

DOWNSTREAM DRAINAGE CAPACITY

The site currently flows to the south and into the existing KDOT storm sewer system. This site was originally designed as a residential subdivision with interior streets and other infrastructure. The site will drain into the Arkansas River through the adjacent, large, existing storm sewer.

POST-DEVELOPMENT HYDROLOGIC ANALYSIS

DRAINAGE METHODS & STANDARDS

The following methods and standards, although not a complete list, were used in developing the drainage and grading plans.

- STORM SERIES
  - 24-hour; 2-yr,10-yr,100-yr Storm Events Modeled
  - Hydrograph Method utilized for Developed Flows
  - C = 0.80 for the 100 year event (Soil Type C Downtown Residential)
  - C = 0.69 for the 5 year event (Soil Type C Downtown Residential)
  - Time of Concentration; Lag Method, minimum Tc = 15min

- GRADING CONSTRAINTS
  - All perimeter lot grades matched
  - Tying into existing storm sewer with flows lines set in place
  - Minimum and maximums parking lot slops and ADA compliance

DEVELOPED CONDITIONS HYDROLOGIC ANALYSIS

The site is proposed to be re-platted and developed into two residential apartment buildings, with related parking lots and storm sewers. A Rational "C" coefficient of 0.80, although conservative, was used for the basins representing the areas to be re-developed.

DETENTION FACILITIES

There will be no detention facility on this lot due to the proximity to the Arkansas River.

DISCHARGE POINTS SUMMARY

The site will discharge to the north via the existing 42" RCP and into the Arkansas River. The storm water from this site will be treated for storm water quality prior to entering the existing 42" RCP

WATER QUALITY

Water quality volume calculation on the site is included in the Appendices. The storm water runoff generated by the site will be treated for water quality with a proprietary device. The water quality volume calculated was approximately 0.4 ac-ft of storage needed. This device will adequately satisfy the WQv requirement.

DOWNSTREAM CHANNEL PROTECTION

Downstream channel protection calculations are not required for this site because the site is less than 5 acres.

POTENTIAL UPSTREAM/DOWNSTREAM IMPACTS

No adverse upstream or downstream impacts are expected with this plat. Due to the proximity of the site to the Arkansas River, the peak runoff from this storm will be conveyed through the existing storm sewer system as soon as possible to leave as much capacity as possible in the existing storm sewer. The proprietary water quality device will treat the water for quality before the water enters the Arkansas River.

SOURCE OF FLOODPLAIN INFORMATION

The site lies within a FEMA Zone X - Shaded. The location of the property, on FEMA FIRM Panel 365 of 700 for Sedgwick County, Kansas, effective February 2, 2007, is attached as Exhibit 6.

FEDERAL, STATE, & LOCAL PERMITTING

US ARMY CORPS OF ENGINEERS
There does not appear to be any jurisdictional waters of the US on this portion of the site.

KANSAS DEPT OF AGRICULTURE – DWR PERMITTING
There does not appear to be any DWR permitting needed on the proposed site at this time.

FEMA
There is no mapped floodplain located upon the proposed site. Therefore, no FEMA permitting is expected at this time.

KANSAS DEPT OF TRANSPORTATION
There does not appear to be any KDOT permitting needed on the proposed project.

SEDGWICK COUNTY PERMITTING
There does not appear to be any Sedgwick County permitting needed at this time.

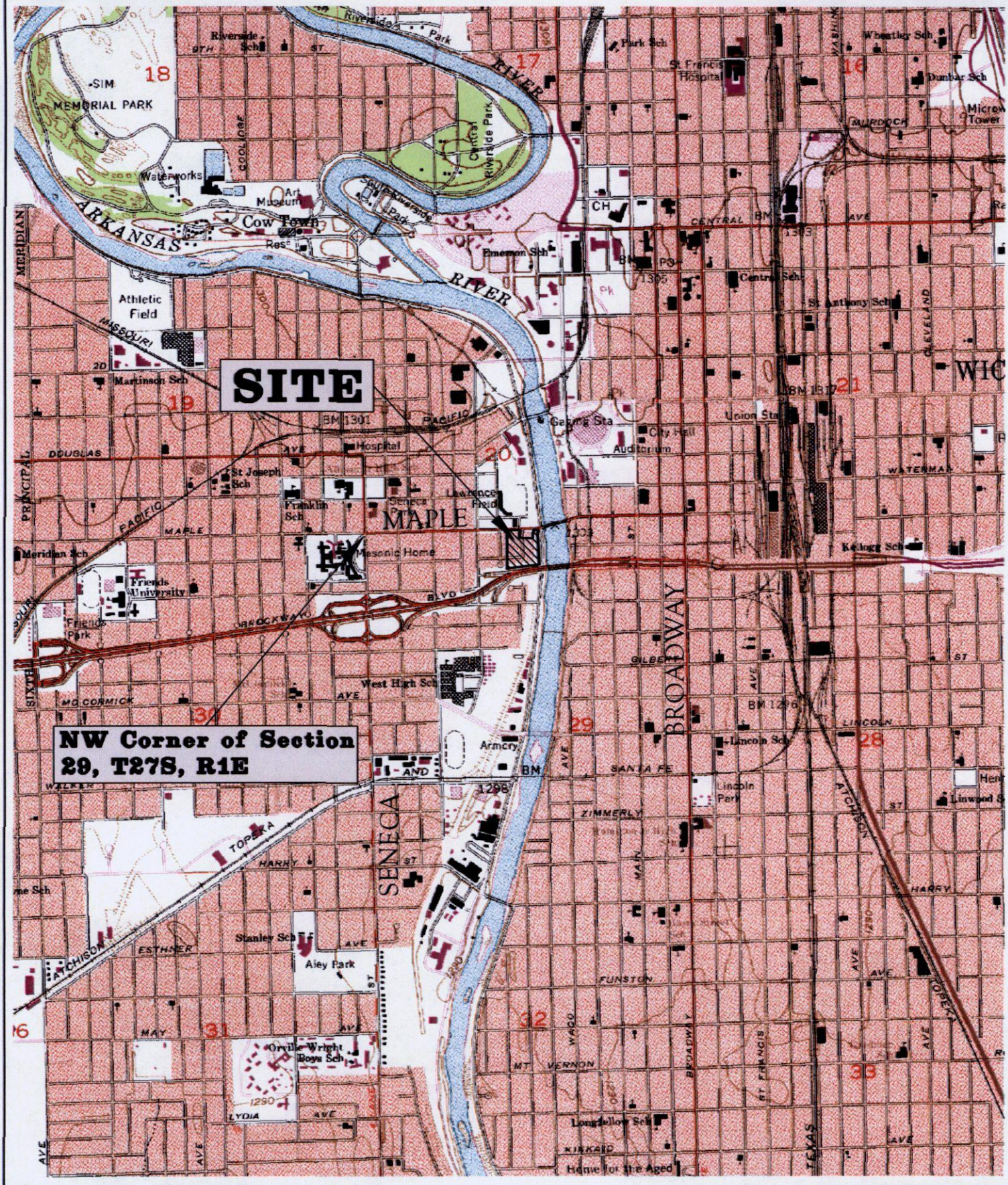
EXHIBIT 1: Site Location Map

EXHIBIT 2: Aerial Photo Exhibit with Lidar Topography

EXHIBIT 3: Plat – Half Scale

EXHIBIT 4: Grading & Drainage Plan – Half Scale

EXHIBIT 5: Floodplain Location (FIRM)



LOCATION MAP:

Waterwalk West Addition

Lot 1

WICHITA, SEDGWICK COUNTY, KANSAS

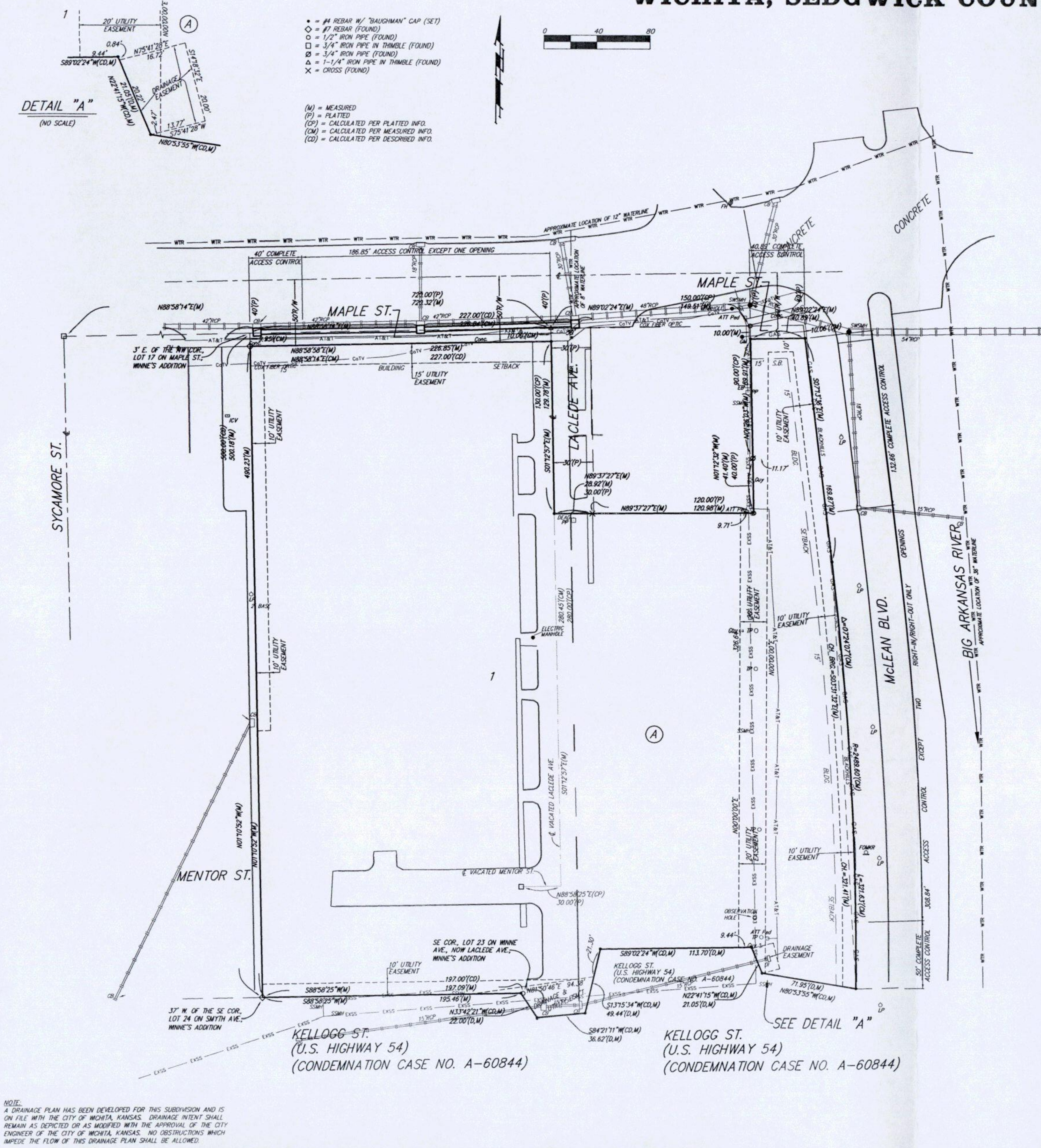
1"=2000'

Baughman
ENGINEERING | SURVEYING | PLANNING
LANDSCAPE ARCHITECTURE

Baughman Company, P.A.
315 Ellis Wichita, KS 67211


1297
1297
1298
1298
1296
1296
1297
1298
1298
1297
1296
1300
1300
1299
1299
1300
1300

WATERWALK WEST ADDITION
WICHITA, SEDGWICK COUNTY, KANSAS



NOTE:
A DRAINAGE PLAN HAS BEEN DEVELOPED FOR THIS SUBDIVISION AND IS ON FILE WITH THE CITY OF WICHITA, KANSAS. DRAINAGE INTENT SHALL REMAIN AS DEPICTED OR AS MODIFIED WITH THE APPROVAL OF THE CITY ENGINEER OF THE CITY OF WICHITA, KANSAS. NO OBSTRUCTIONS WHICH IMPEDE THE FLOW OF THIS DRAINAGE PLAN SHALL BE ALLOWED.

State of Kansas)
Sedgwick County) SS

We, Baughman Company, P.A., Surveyors in aforesaid county and state do hereby certify that we have surveyed and platted "WATERWALK WEST ADDITION", Wichita, Sedgwick County, Kansas and that the accompanying plat is a true and correct exhibit of the property surveyed, described as follows: All of Lots 4 through 11, inclusive, Shirk's 1st Sub., Wichita, Sedgwick County, Kansas, TOGETHER with all of Lots 1 through 23, odd inclusive, on Winne Ave., (now Laclede Ave.), Winne's Addition to Wichita, Sedgwick County, Kansas, TOGETHER with all of Lots 18 through 24, inclusive, on Maple St., in said Winne's Addition, TOGETHER with the east 22.00 feet of Lot 17, on said Maple St., in said Winne's Addition, TOGETHER with the east 37.00 feet of Lots 2 through 24, even inclusive, on Smyth Ave., in said Winne's Addition, TOGETHER with all of the north–south alley as dedicated in said Winne's Addition lying east of and abutting the east line of said Lots 2 through 20, even inclusive on said Smyth Ave., and lying west of and abutting the west line of said Lots 1 through 19, odd inclusive on said Winne Ave. (now Laclede Ave.), TOGETHER with that part of the east–west alley as dedicated in said Winne's Addition lying south of and abutting the south line of said Lots 18 through 24, inclusive on said Maple St., lying south of and abutting the east 22.00 feet of the south line of said Lot 17 on said Maple St., and lying east of and abutting a line described as follows: Commencing at the southwest corner of said Lot 17 on said Maple St.; thence easterly along the south line of said Lot 17 on said Maple Street, 3.00 feet for a point of beginning; thence southerly parallel with the southerly extension of the west line of said Lot 17 on said Maple Street, 15.00 feet to a point on the south line of said east–west alley, and there ending, TOGETHER with that part of the north–south alley as dedicated in said Winne's Addition lying east of and abutting the east line of said Lots 22 and 24 on said Smyth Ave., lying west of and abutting the west line of said Lots 21 and 23 on said Winne Ave., (now Laclede Ave.), and lying north of and abutting the north line of that part of said Winne's Addition condemned for Kellogg Street in District Court Case No. A–60844, TOGETHER with that part of Mentor St. as dedicated in said Winne's Addition lying east of and abutting the following described line: Commencing at the southeast corner of said Lot 20 on said Smyth Ave.; thence westerly along the south line of said Lot 20 on said Smyth Ave., 37.00 feet for a point of beginning; thence southerly, 60.00 feet to a point on the north line of said Lot 22 on said Smyth Ave., said point being 37.00 feet westerly of the northeast corner of said Lot 22 on said Smyth Ave., and there ending, TOGETHER with that part of said Winne Ave., (now Laclede Ave.), as dedicated in said Winne's Addition lying north of and abutting the north line of that part of said Winne's Addition condemned for said Kellogg Street, (D.C.C. No. A–60844) and lying south of and abutting the westerly extension of the south line of Lot 3 in said Shirk's 1st Sub., TOGETHER with that part of the west half of said Winne Ave., (now Laclede Ave.), as dedicated in said Winne's Addition lying north of and abutting the westerly extension of the south line of said Lot 3 in said Shirk's 1st Sub., TOGETHER with that part of Reserve "A" in said Winne's Addition lying east of and abutting the east line of said Shirk's 1st Sub., lying north of and abutting that part of said Winne's Addition condemned for said Kellogg Street, (D.C.C. No. A–60844), and lying west of and abutting the west line of McLean Blvd., except that part of said Reserve "A" described as follows: Commencing at the southeast corner of said Lot 11 in said Shirk's 1st Sub.; thence southerly along the southerly extension of the east line of said Lot 11 in said Shirk's 1st Sub. and along the north line of said Kellogg Street, (D.C.C. No. A–60844), 26.19 feet for a point of beginning; thence continuing southerly along said extended east line and along a segment of the north line of said Kellogg Street, (D.C.C. No. A–60844), 1.81 feet, more or less, to a deflection corner in the north line of said Kellogg Street, (D.C.C. No. A–60844); thence easterly along the north line of said Kellogg Street, (D.C.C. No. A–60844), 3.89 feet; thence northwesterly with a deflection angle to the left of 169°40'31", 3.48 feet; thence northwesterly, 1.27 feet, more or less, to the point of beginning, TOGETHER with that part of said Kellogg Street, (D.C.C. No. A–60844), described as follows: Beginning at the southeast corner of said Lot 23 on said Winne Ave., (now Laclede Ave.); thence easterly along the north line of said Kellogg Street, (D.C.C. No. A–60844), 30.00 feet to a deflection corner in said north line, said deflection corner also being on the centerline of said Winne Ave., (now Laclede Ave.); thence northerly along the north line of said Kellogg Street, (D.C.C. No. A–60844), and along the centerline of said Winne Ave., (now Laclede Ave.), to a deflection corner in said north line, said deflection corner also being the intersection of the centerline of said Winne Ave., (now Laclede Ave.), with the westerly extension of the south line of said Lot 11 in said Shirk's 1st Sub.; thence easterly along the north line of said Kellogg Street, (D.C.C. No. A–60844), and along the extended south line of said Lot 11 in said Shirk's 1st Sub., 150.00 feet to a deflection corner in said north line, said deflection corner also being the southeast corner of said Lot 11 in said Shirk's 1st Sub.; thence southerly along the north line of said Kellogg Street, (D.C.C. No. A–60844), and along the east line of said Shirk's 1st Sub., 26.19 feet; thence northwesterly with a deflection angle to the right of 158°32'09", 19.78 feet; thence westerly parallel with the south line of Lot 11 in said Shirk's 1st Sub., 113.70 feet; thence southerly with a deflection angle to the left of 75°46'50", 49.44 feet; thence westerly with a deflection angle to the right of 71°05'38", 36.62 feet; thence northwesterly with a deflection angle to the right of 61°56'27", 22.00 feet to a point on the south line of said Lot 23 on said Winne Ave., (now Laclede Ave.); thence easterly along the south line of said Lot 23 on said Winne Ave., (now Laclede Ave.), 1.63 feet, more or less, to the point of beginning, and TOGETHER with that part of said Kellogg Street, (D.C.C. No. A–60844), described as follows: Commencing at the southeast corner of said Lot 11 in said Shirk's 1st Sub.; thence southerly along the southerly extension of the east line of said Lot 11 in said Shirk's 1st Sub. and along a segment of the north line of said Kellogg Street, (D.C.C. No. A–60844), 28.00 feet to a deflection corner in the north line of said Kellogg Street, (D.C.C. No. A–60844); thence easterly along the north line of said Kellogg Street, (D.C.C. No. A–60844), 3.89 feet for a point of beginning; thence continuing easterly, southeasterly, and easterly along the north line of said Kellogg Street, (D.C.C. No. A–60844), to a point on the west line of said McLean Blvd.; thence southerly along the west line of said McLean Blvd. to the intersection with the easterly extension of the south line of said Lot 23 on said Winne Ave., (now Laclede Ave.); thence northwesterly, 68.40 feet to the point of beginning.

Existing public easements and dedications being vacated by virtue of K.S.A. 12–512b.

Baughman Company, P.A.

______________________, Surveyor
Michael G. Conrey

Know all men by these presents that we, the undersigned, have caused the land in the surveyors certificate to be platted into a Lot, a Block, and Streets, to be known as "WATERWALK WEST ADDITION", Wichita, Sedgwick County, Kansas. The utility easements are hereby granted as indicated for the construction and maintenance of all public utilities. The drainage easement is hereby granted as indicated for drainage purposes. The streets are hereby dedicated to and for the use of the public. Access controls shall be as depicted on the face of the plat and are hereby granted to the City of Wichita, Kansas. The permitted opening locations shall be as determined by the City Engineer of the City of Wichita, Kansas.

City of Wichita, Kansas, a municipal corporation

______________________, Mayor
Carl Brewer

ATTEST: ______________________, City Clerk
Karen Sublett

State of Kansas)
Sedgwick County) SS

The foregoing instrument acknowledged before me, this______day of______________, 2012, by Carl Brewer, Mayor of the City of Wichita, Kansas, a municipal corporation, on behalf of the corporation.

______________________, Notary Public

My App't. Exp.__________

This plat of "WATERWALK WEST ADDITION", Wichita, Sedgwick County, Kansas has been submitted to and approved by the Wichita–Sedgwick County Metropolitan Area Planning Commission, Wichita, Kansas.

Dated this______day of______________, 2012.
Wichita–Sedgwick County Metropolitan Area Planning Commission

______________________, Chair
Shawn Farney

______________________, Secretary
John L. Schlegel

This plat approved and all dedications shown hereon accepted by the City Council of the City of Wichita, Kansas, this______day of______________, 2012.

______________________, Mayor
Carl Brewer

______________________, City Clerk
Karen Sublett

Reviewed in accordance with K.S.A. 58–2005 on this______day of______________, 2012.

____
Tricia L. Robello, L.S. #1246
Deputy County Surveyor
Sedgwick County, Kansas

Entered on transfer record this______day of______________, 2012.

______________________, County Clerk
Kelly B. Arnold

State of Kansas)
Sedgwick County) SS

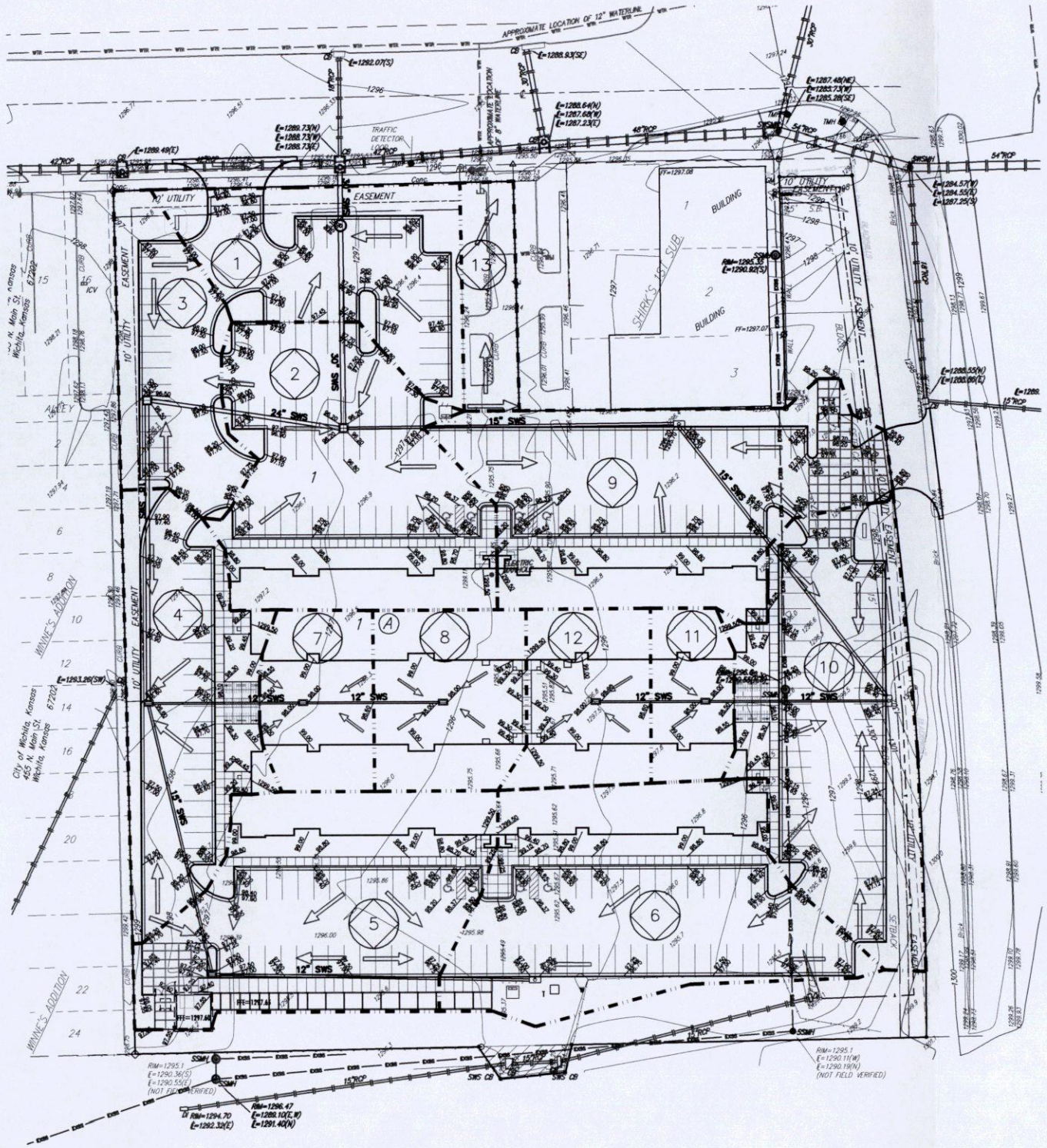
This is to certify that this plat has been filed for record in the office of the Register of Deeds, this______day of______________, 2012 at______o'clock___M; and is duly recorded.

______________________, Register of Deeds
Bill Meek

______________________, Deputy
Tonya Buckingham

Baughman Company, P.A.
315 Ellis St. Wichita, KS 67211 P 316-262-7271 F 316-262-0149
ENGINEERING | SURVEYING | PLANNING | LANDSCAPE ARCHITECTURE

E:\PROJECTS\WATERWALK WEST ADDITION_12-04-F871\PLAT\DRAWINGS\WATERWALK WEST F.DWG MOC



X

Developed		2yr	10yr	100yr
Intensity		3.8	5.22	7.36
Rational C		0.89	0.73	0.8
Basin ID	Area	Developed Flowrates		
		2-yr	10-yr	100-yr
	acres	cfs	cfs	cfs
1	0.31	0.8	1.2	1.8
2	0.48	1.2	1.8	2.8
3	0.23	0.6	0.9	1.3
4	0.36	0.9	1.4	2.1
5	0.56	1.4	2.1	3.3
6	0.21	0.6	0.8	1.3
7	0.15	0.4	0.6	0.9
8	0.20	0.5	0.8	1.2
9	0.53	1.4	2.0	3.1
10	0.49	1.3	1.8	2.9
11	0.10	0.3	0.4	0.6
12	0.17	0.4	0.6	1.0
13	0.09	0.2	0.3	0.5
TOTAL	3.86	10.0	14.7	22.7

Water Quality Calculations

Waterwalk West Addition Water Quality Data & Computations
Completed by: TJW
Date: 7/20/2012

Notes & Assumptions:

Basin	Area	Effect
1	4.4	Buildings, parking lots, green spaces
Total	4.4	

Impervious Cover %	0.38
Hydrologic Soil Group	Rv Values
Undisturbed Woods	R_{Dv} = 0.04
Turf Disturbed Soils	R_{Dv} = 0.22
Impervious Cover	R_{Iv} = 0.95

Equations
$WQ_v = R_v * A / 10$
$R_v = R_{Dv} * (U + R_{Iv} * (D + R_{Dv}))$
U = undisturbed/total area
D = dist. perv./total area
I = impervious/total area

Basin	Drainage Ba Area Acre	Pond Area Acre	Treatmen Area Acre	ndisturbe Area Acre	Disturbed Pervious Acre	mpervious Area Acre
1	4.4	0.0	4.4	0.0	0.9	3.5
Totals	4.4	0.0	4.4	27.6	0.9	3.5

Calculations			
U	D	I	Totals
0.00	0.20	0.80	1.0

Calculations		
Rv	Area Acres	WQv Acre-Ft
0.8	4.4	0.4
	4.4	0.4

BENCHMARK

Cross cut inside square cut on top of curb, East side of Ice Center drive entrance, 21.' S. & 21.3' W. of the northwest corner of Lot 1, Block A, Waterwalk West Addition.
Elev. = 1297.73 NAVD88

Chiseled square on Kellogg R/W fence footing, 1.8' S. of the SW corner of Lot 11, Shirk's 1st Sub.
Elev. = 1296.14 NAVD88

LEGAL DESCRIPTION

Lot 1, Block A, Waterwalk West Addition, Wichita, Sedgwick County, Kansas.

SITE GRADING PLAN

0 30 60
Scale 1"= 30'-0"

Baughman
ENGINEERING · ARCHITECTURE · PLANNING
LANDSCAPE ARCHITECTURE
Baughman Company, P.A.
315 Ellis Wichita, KS 67211
P 316.262.2221 F 316.262.0149

Jul 23, 2012 - 11:20am - USER trevorwolen
E:\Projects\Waterwalk West Addition_12-04-PB71\Water Resources\Waterwalk West grade-drain.dwg

NOTES TO USERS

...ap is for use in administering the National Flood Insurance Program. It does ...ecessarily *identify all areas subject* to flooding, particularly from local drainage ...s of small size. The **community map repository** should be consulted for ...le updated or additional flood hazard information.

...ain more detailed information in areas where **Base Flood Elevations** (BFEs) ... **floodways** have been determined, users are encouraged to consult the Flood ...s and Floodway Data and/or Summary of Stillwater Elevations tables contained ...the Flood Insurance Study (FIS) report that accompanies this FIRM. Users ...be aware that BFEs shown on the FIRM represent rounded whole-foot ...ons. These BFEs are intended for flood insurance rating purposes only and ...not be used as the sole source of flood elevation information. Accordingly, ...levation data presented in the FIS report should be utilized in conjunction with ...RM for purposes of construction and/or floodplain management.

...aries of the **floodways** were computed at cross sections and interpolated ...en cross sections. The floodways were based on hydraulic considerations with ...d to requirements of the National Flood Insurance Program. Floodway widths ...ther pertinent floodway data are provided in the Flood Insurance Study report ...s jurisdiction

...recommends that a Flood Insurance Policy be purchased for structures in areas ...levees are shown as providing protection from the 1% annual chance flood. ...ing is not covered by standard property/fire/dwelling insurance policies ...t covered by Homeowners Insurance, Renters Insurance, Condominium ...rs Insurance, or Commercial Property Insurance. Contact your insurance ... and local floodplain administrator for further information. Visit ...www.fema.gov/pdf/fhm/frm_gaah.pdf for information on levees and ...sk of flooding in areas shown as being protected by levees.

...in areas not in Special Flood Hazard Areas may be protected by **flood control ...tures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance ...report for information on flood control structures in this jurisdiction.

projection used in the preparation of this map was Universal Transverse ...tor (UTM) zone 14. The **horizontal datum** was NAD 83, GRS80 spheroid. ...ences in datum, spheroid, projection or UTM zones used in the production of ...s for adjacent jurisdictions may result in slight positional differences in map ...res across jurisdiction boundaries. These differences do not affect the accuracy ...s FIRM.

...elevations on this map are referenced to the North American Vertical Datum of ... These flood elevations must be compared to structure and ground elevations ...erenced to the same **vertical datum**. For information regarding conversion ...een the National Geodetic Vertical Datum of 1929 and the North American ...cal Datum of 1988, visit the National Geodetic Survey website at ...www.ngs.noaa.gov or contact the National Geodetic Survey at the following ...ess:

...al Reference System Division
...nal Geodetic Survey, NOAA
...r Spring Metro Center
... East-West Highway
...r Spring, Maryland 20910
...) 713-3191

...btain current elevation, description, and/or location information about the **bench ...s** shown on this map, please contact the Information Services Branch of the ...nal Geodetic Survey at **(301) 713-3242**, or visit their website at ...www.ngs.noaa.gov.

...**map** information shown on this FIRM was provided by Sedgwick County ... as digital data in Kansas State Plane Coordinate System South at a scale ...12,000 from photography dated June 2000.

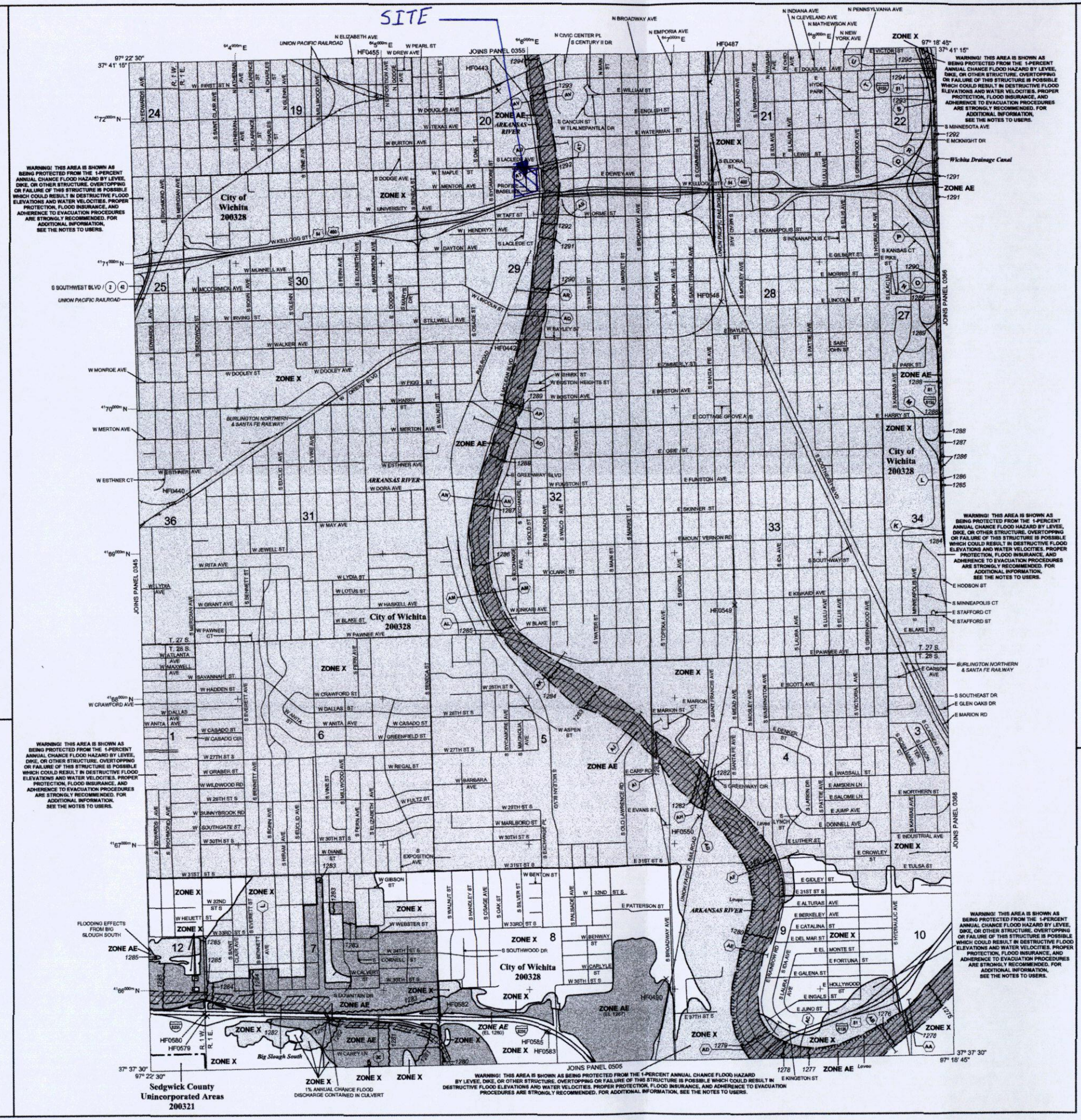
...**porate limits** shown on this map are based on the best data available at the time ...publication. Because changes due to annexations or de-annexations may have ...ed after this map was published, map users should contact appropriate ...munity officials to verify current corporate limit locations.

...map reflects more detailed up-to-date **stream channel configurations** than ... shown on the previous FIRM for this jurisdiction. The floodplains and floodways ...were transferred from the previous FIRM may have been adjusted to conform ...these new stream channel configurations. As a result, the Flood Profiles ...Floodway Data tables in the Flood Insurance Study report (which contains ...noritative hydraulic data) may reflect stream channel distances that differ from ...t is shown on this map.

...ase refer to the separately printed **Map Index** for an overview map of the ...nly showing the layout of map panels; community map repository addresses; ...a Listing of Communities table containing National Flood Insurance Program ...se for each community as well as a listing of the panels on which each community ...cated.

...tact the **FEMA Map Service Center** at 1-800-358-9616 for information ...available products associated with this FIRM. Available products may include ...viously issued Letters of Map Change, a Flood Insurance Study report, and/or ...al versions of this map. The FEMA Map Service Center may also be reached by ...at 1-800-358-9620 and their website at http://www.fema.gov/msc.

...ou have **questions about this map** or questions concerning the National Flood ...rance Program in general, please call **1- 877- FEMA MAP** (1-877-336-2627) or ...the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- **ZONE A** — No Base Flood Elevations determined.
- **ZONE AE** — Base Flood Elevations determined.
- **ZONE AH** — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- **ZONE AO** — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- **ZONE AR** — Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- **ZONE A99** — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- **ZONE V** — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- **ZONE VE** — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- **ZONE X** — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- **ZONE X** — Areas determined to be outside the 0.2% annual chance floodplain.
- **ZONE D** — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- 45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere.
- 4°mE N — 1000-meter Universal Transverse Mercator grid values, zone 14
- M1.5 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
FEBRUARY 2, 2007

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
150 0 300 600 METERS

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0365E

FIRM
FLOOD INSURANCE RATE MAP

SEDGWICK COUNTY, KANSAS
AND INCORPORATED AREAS

PANEL 365 OF 700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SEDGWICK COUNTY	200321	0365	E
WICHITA, CITY OF	200328	0365	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
20173C0365E

EFFECTIVE DATE
FEBRUARY 2, 2007

Federal Emergency Management Agency

SUPPORTING CALCULATIONS

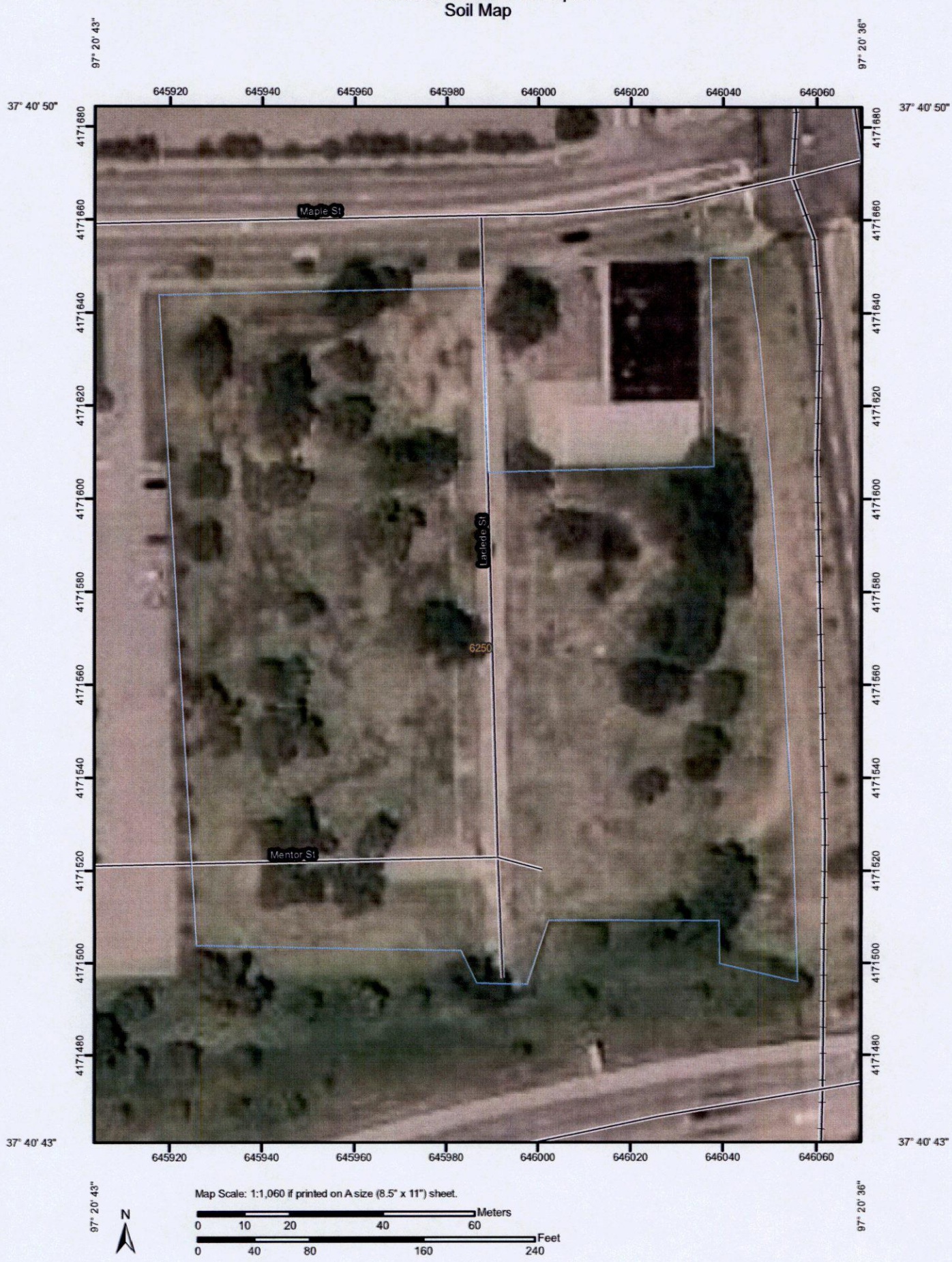
APPENDIX A: USGS Soils Survey

APPENDIX B : HydraFlow Hydrographs
Site Flow

APPENDIX C : Water Quality Volume Calculations

USGS Soils Survey

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:1,060 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 14N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sedgwick County, Kansas
Survey Area Data: Version 7, Nov 30, 2010

Date(s) aerial images were photographed: 6/20/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Sedgwick County, Kansas (KS173)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
6250	Urban land-Canadian complex, 0 to 3 percent slopes	4.1	100.0%
Totals for Area of Interest		**4.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Sedgwick County, Kansas

6250—Urban land-Canadian complex, 0 to 3 percent slopes

Map Unit Setting

Elevation: 800 to 1,300 feet
Mean annual precipitation: 24 to 31 inches
Mean annual air temperature: 45 to 66 degrees F
Frost-free period: 195 to 225 days

Map Unit Composition

Urban land: 70 percent
Canadian and similar soils: 30 percent

Description of Canadian

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.3 inches)

Interpretive groups

Land capability (nonirrigated): 1
Ecological site: Sandy Terrace (PE 17-20) (R079XY024KS)

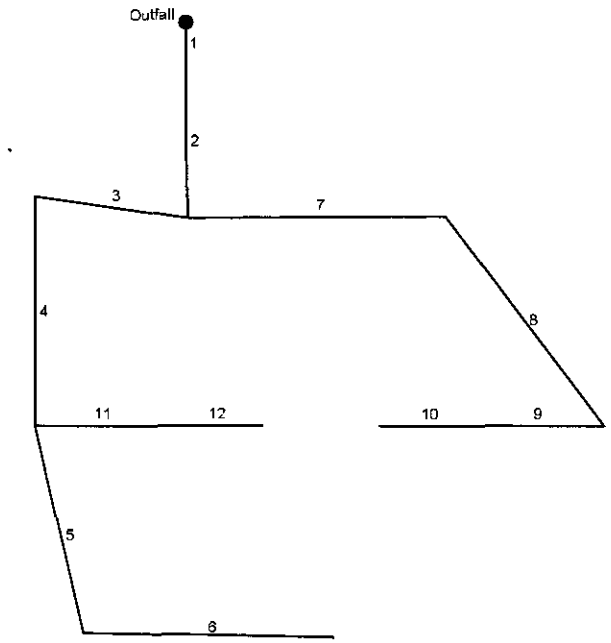
Typical profile

0 to 20 inches: Fine sandy loam
20 to 35 inches: Fine sandy loam
35 to 60 inches: Fine sandy loam

HydraFlow Hydrographs

Site Flow

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2011 Plan



Project File: Waterwalk West rev pat.stm	Number of lines: 12	Date: 6/26/2012

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	30.66	89.86	None	0.00	0.31	0.69	15.0	1289.75	0.42	1289.88	30	Cir	0.013	0.15	1295.77	Pipe - (13)
2	1	114.92	-0.45	DrGrt	0.00	0.48	0.69	15.0	1289.88	0.23	1290.15	30	Cir	0.013	2.25	1296.20	Pipe - (14)
3	2	113.05	99.00	DrGrt	0.00	0.23	0.69	15.0	1290.65	0.22	1290.90	24	Cir	0.013	1.50	1296.50	Pipe - (15)
4	3	172.27	-98.42	DrGrt	0.00	0.36	0.69	15.0	1291.15	0.32	1291.70	18	Cir	0.013	1.50	1296.60	Pipe - (16)
5	4	158.09	-13.11	DrGrt	0.00	0.56	0.69	15.0	1291.95	0.38	1292.55	15	Cir	0.013	1.46	1297.00	Pipe - (17)
6	5	183.01	-75.88	DrCrb	0.00	0.71	0.69	15.0	1292.80	0.52	1293.75	12	Cir	0.013	1.00	1297.00	Pipe - (18)
7	2	189.01	-89.87	DrGrt	0.00	0.53	0.69	15.0	1291.40	0.72	1292.77	15	Cir	0.013	1.26	1296.27	Pipe - (21)
8	7	196.28	53.68	DrCrb	0.00	0.48	0.69	15.0	1292.87	0.48	1293.82	15	Cir	0.013	1.50	1297.32	Pipe - (22)
9	8	103.17	126.77	DrGrt	0.00	0.10	0.69	15.0	1294.07	0.51	1294.60	12	Cir	0.013	0.50	1298.00	Pipe - (23)
10	9	61.85	0.00	DrGrt	0.00	0.17	0.69	15.0	1294.70	0.65	1295.10	12	Cir	0.013	1.00	1298.00	Pipe - (24)
11	4	88.00	-90.00	DrGrt	0.00	0.15	0.69	15.0	1292.34	1.32	1293.50	12	Cir	0.013	0.50	1298.00	Pipe - (19)
12	11	79.47	0.00	DrGrt	0.00	0.20	0.69	15.0	1293.60	0.50	1294.00	12	Cir	0.013	1.00	1298.00	Pipe - (20)

Project File: Waterwalk West rev pat.stm | Number of lines: 12 | Date: 6/26/2012

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	Structure - (15)	None	1295.77	n/a	n/a	n/a	30	Cir	1289.88	30	Cir	1289.88
2	Structure - (16)	DropGrate	1296.20	Cir	0.00	0.00	30	Cir	1290.15	24 15	Cir Cir	1290.65 1291.40
3	Structure - (17)	DropGrate	1296.50	Cir	0.00	0.00	24	Cir	1290.90	18	Cir	1291.15
4	Structure - (18)	DropGrate	1296.60	Cir	0.00	0.00	18	Cir	1291.70	15 12	Cir Cir	1291.95 1292.34
5	Structure - (19)	DropGrate	1297.00	Cir	0.00	0.00	15	Cir	1292.55	12	Cir	1292.80
6	Null Structure	DropCurb	1297.00	Cir	0.00	0.00	12	Cir	1293.75			
7	Structure - (21)	DropGrate	1296.27	Cir	0.00	0.00	15	Cir	1292.77	15	Cir	1292.87
8	Structure - (22)	DropCurb	1297.32	Cir	0.00	0.00	15	Cir	1293.82	12	Cir	1294.07
9	Structure - (23)	DropGrate	1298.00	Cir	0.00	0.00	12	Cir	1294.60	12	Cir	1294.70
10	Null Structure	DropGrate	1298.00	Cir	0.00	0.00	12	Cir	1295.10			
11	Structure - (20)	DropGrate	1298.00	Cir	0.00	0.00	12	Cir	1293.50	12	Cir	1293.60
12	Null Structure	DropGrate	1298.00	Cir	0.00	0.00	12	Cir	1294.00			

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (13)	11.32	30	Cir	30.66	1289.75	1289.88	0.424	1292.23	1292.25	0.01	1292.26	End	None
2	Pipe - (14)	10.70	30	Cir	114.92	1289.88	1290.15	0.235	1292.26	1292.32	0.20	1292.51	1	DropGrate
3	Pipe - (15)	6.30	24	Cir	113.05	1290.65	1290.90	0.221	1292.51	1292.58	0.12	1292.70	2	DropGrate
4	Pipe - (16)	5.77	18	Cir	172.27	1291.15	1291.70	0.319	1292.70	1293.19	0.25	1293.44	3	DropGrate
5	Pipe - (17)	3.87	15	Cir	158.09	1291.95	1292.55	0.380	1293.44*	1294.01*	0.23	1294.23	4	DropGrate
6	Pipe - (18)	2.23	12	Cir	183.01	1292.80	1293.75	0.519	1294.23*	1294.95*	0.13	1295.08	5	DropCurb
7	Pipe - (21)	3.54	15	Cir	189.01	1291.40	1292.77	0.725	1292.51	1293.52	n/a	1293.52 j	2	DropGrate
8	Pipe - (22)	2.16	15	Cir	196.28	1292.87	1293.82	0.484	1293.52	1294.41	0.33	1294.75	7	DropCurb
9	Pipe - (23)	0.81	12	Cir	103.17	1294.07	1294.60	0.514	1294.75	1294.99	0.07	1295.05	8	DropGrate
10	Pipe - (24)	0.53	12	Cir	61.85	1294.70	1295.10	0.647	1295.05	1295.41	n/a	1295.41 j	9	DropGrate
11	Pipe - (19)	1.05	12	Cir	88.00	1292.34	1293.50	1.318	1293.44	1293.93	n/a	1293.93 j	4	DropGrate
12	Pipe - (20)	0.63	12	Cir	79.47	1293.60	1294.00	0.503	1293.94	1294.34	0.11	1294.45	11	DropGrate

Project File: Waterwalk West rev pat.stm | Number of lines: 12 | Run Date: 6/26/2012

NOTES: Return period = 5 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	Structure - (15)	0.97	0.00	0.00	0.97	None	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	Structure - (16)	1.51	0.00	1.51	0.00	DrGrt	0.0	0.00	0.33	2.50	2.50	Sag	2.00	0.020	0.020	0.000	0.72	74.43	0.72	74.43	0.0	Off
3	Structure - (17)	0.72	0.00	0.72	0.00	DrGrt	0.0	0.00	0.51	4.00	4.00	Sag	2.00	0.020	0.020	0.000	0.07	10.89	0.07	10.89	0.0	Off
4	Structure - (18)	1.13	0.00	1.13	0.00	DrGrt	0.0	0.00	0.25	4.00	4.00	Sag	2.00	0.020	0.020	0.000	0.73	77.50	0.73	77.50	0.0	Off
5	Structure - (19)	1.76	0.00	1.76	0.00	DrGrt	0.0	0.00	0.38	4.00	2.00	Sag	2.00	0.020	0.020	0.000	0.73	74.59	0.73	74.59	0.0	Off
6	Null Structure	2.23	0.00	2.23	0.00	DrCrb	6.0	5.00	0.00	0.00	0.00	Sag	0.00	0.020	0.020	0.000	0.28	13.94	0.28	13.94	0.0	Off
7	Structure - (21)	1.66	0.00	1.66	0.00	DrGrt	0.0	0.00	0.57	1.00	2.00	Sag	2.00	0.020	0.020	0.000	0.30	32.00	0.30	32.00	0.0	Off
8	Structure - (22)	1.51	0.00	1.51	0.00	DrCrb	6.0	5.00	0.00	0.00	0.00	Sag	0.00	0.020	0.020	0.000	0.21	10.72	0.21	10.72	0.0	Off
9	Structure - (23)	0.31	0.00	0.31	0.00	DrGrt	0.0	0.00	0.11	1.00	2.00	Sag	2.00	0.020	0.020	0.000	0.30	32.00	0.30	32.00	0.0	Off
10	Null Structure	0.53	0.00	0.53	0.00	DrGrt	0.0	0.00	0.18	1.00	2.00	Sag	2.00	0.020	0.020	0.000	0.30	32.00	0.30	32.00	0.0	Off
11	Structure - (20)	0.47	0.00	0.47	0.00	DrGrt	0.0	0.00	0.16	1.00	2.00	Sag	2.00	0.020	0.020	0.000	0.30	32.00	0.30	32.00	0.0	Off
12	Null Structure	0.63	0.00	0.63	0.00	DrGrt	0.0	0.00	0.21	1.00	2.00	Sag	2.00	0.020	0.020	0.000	0.30	32.00	0.30	32.00	0.0	Off

Project File: Waterwalk West rev pat.stm | Number of lines: 12 | Run Date: 6/26/2012

NOTES: Inlet N-Values = 0.016; Intensity = 52.62 / (Inlet time + 11.20) ^ 0.75; Return period = 5 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

MyReport

Line No.	Area Dn (sqft)	Area Up (sqft)	Byp Ln No	Coeff C1 (C)	Coeff C2 (C)	Coeff C3 (C)	Capac Full (cfs)	Crit Depth (ft)	Cross Sl, Sw (ft/ft)	Cross Sl, Sx (ft/ft)	Curb Len (ft)	Defl Ang (Deg)	Depth Dn (ft)	Depth Up (ft)	DnStm Ln No	Drng Area (ac)	Easting X (ft)	EGL Dn (ft)	EGL Up (ft)	Energy Loss (ft)
1	4.90	4.81	n/a	0.20	0.50	0.90	26.71	1.12	....	....	....	89.86	2.48	2.37	Outfall	0.31	5150.30	1292.31	1292.33	0.021
2	4.82	4.52	Sag	0.20	0.50	0.90	19.88	1.09	0.020	0.020	....	-0.45	2.38	2.17	1	0.48	5151.49	1292.34	1292.41	0.070
3	3.05	2.82	Sag	0.20	0.50	0.90	10.64	0.89	0.020	0.020	....	99.00	1.86	1.68	2	0.23	5039.65	1292.58	1292.66	0.080
4	1.77	1.77	Sag	0.20	0.50	0.90	5.93	0.92	0.020	0.020	....	-98.42	1.50	1.49	3	0.36	5039.68	1292.86	1293.36	0.505
5	1.23	1.23	Sag	0.20	0.50	0.90	3.98	0.79	0.020	0.020	....	-13.11	1.25	1.25	4	0.56	5075.57	1293.60	1294.16	0.567
6	0.79	0.79	Sag	0.20	0.50	0.90	2.57	0.63	0.020	0.020	5.00	-75.88	1.00	1.00	5	0.71	5258.55	1294.36	1295.08	0.717
7	1.15	0.77	Sag	0.20	0.50	0.90	5.50	0.75	0.020	0.020	....	-89.87	1.11	0.75**	2	0.53	5340.49	1292.66	1293.85	0.873
8	0.65	0.57	Sag	0.20	0.50	0.90	4.49	0.59	0.020	0.020	5.00	53.68	0.65	0.59**	7	0.48	5458.01	1293.70	1294.63	0.913
9	0.56	0.28	Sag	0.20	0.50	0.90	2.55	0.38	0.020	0.020	....	126.77	0.68	0.38**	8	0.10	5354.84	1294.78	1295.12	0.315
10	0.25	0.21	Sag	0.20	0.50	0.90	2.86	0.31	0.020	0.020	....	0.00	0.35	0.31**	9	0.17	5292.99	1295.12	1295.51	0.259
11	0.79	0.33	Sag	0.20	0.50	0.90	4.09	0.43	0.020	0.020	....	-90.00	1.00	0.43**	4	0.15	5127.68	1293.47	1294.09	0.288
12	0.23	0.24	Sag	0.20	0.50	0.90	2.53	0.34	0.020	0.020	....	0.00	0.34	0.34**	11	0.20	5207.15	1294.05	1294.45	0.401

Project File: Waterwalk West rev pat.stm | Number of lines: 12 | Date: 6/26/2012

NOTES: ** Critical depth

MyReport

Flow Rate (cfs)	Sf Ave (ft/ft)	Sf Dn (ft/ft)	Grate Area (sqft)	Grate Len (ft)	Grate Width (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	Gutter Depth (ft)	Gutter Slope (ft/ft)	Gutter Spread (ft)	Gutter Width (ft)	HGL Dn (ft)	HGL Up (ft)	HGL Jnct (ft)	HGL Jmp Dn (ft)	HGL Jmp Up (ft)	Incr CxA	Incr Q (cfs)	Inlet Depth (ft)	Inlet Eff (%)
11.32	0.068	0.071	....	....	....	1295.77	1295.77	....	....	....	....	1292.23	1292.25	1292.26	....	....	0.21	0.97	....	....
10.70	0.061	0.059	0.33	2.50	2.50	1295.77	1296.20	0.72	Sag	74.43	2.00	1292.26	1292.32	1292.51	....	....	0.33	1.51	0.72	100
6.30	0.071	0.067	0.51	4.00	4.00	1296.20	1296.50	0.07	Sag	10.89	2.00	1292.51	1292.58	1292.70	....	....	0.16	0.72	0.07	100
5.77	0.293	0.302	0.25	4.00	4.00	1296.50	1296.60	0.73	Sag	77.50	2.00	1292.70	1293.19	1293.44	....	....	0.25	1.13	0.73	100
3.87	0.359	0.359	0.38	4.00	2.00	1296.60	1297.00	0.73	Sag	74.59	2.00	1293.44	1294.01	1294.23	....	....	0.39	1.76	0.73	100
2.23	0.392	0.392	....	....	....	1297.00	1297.00	0.28	Sag	13.94	....	1294.23	1294.95	1295.08	....	....	0.49	2.23	0.28	100
3.54	0.462	0.266	0.57	1.00	2.00	1296.20	1296.27	0.30	Sag	32.00	2.00	1292.51	1293.52 j	1293.52	1292.56	1292.44	0.37	1.66	0.30	100
2.16	0.465	0.389	....	....	....	1296.27	1297.32	0.21	Sag	10.72	....	1293.52	1294.41	1294.75	....	....	0.33	1.51	0.21	100
0.81	0.305	0.082	0.11	1.00	2.00	1297.32	1298.00	0.30	Sag	32.00	2.00	1294.75	1294.99	1295.05	....	....	0.07	0.31	0.30	100
0.53	0.419	0.321	0.18	1.00	2.00	1298.00	1298.00	0.30	Sag	32.00	2.00	1295.05	1295.41 j	1295.41	1295.33	1295.32	0.12	0.53	0.30	100
1.05	0.327	0.087	0.16	1.00	2.00	1296.60	1298.00	0.30	Sag	32.00	2.00	1293.44	1293.93 j	1293.93	1293.44	1293.19	0.10	0.47	0.30	100
0.63	0.504	0.524	0.21	1.00	2.00	1298.00	1298.00	0.30	Sag	32.00	2.00	1293.94	1294.34	1294.45	....	....	0.14	0.63	0.30	100

Project File: Waterwalk West rev pat.stm | Number of lines: 12 | Date: 6/26/2012

NOTES: ** Critical depth

MyReport

Inlet ID	Inlet Loc	Inlet Spread (ft)	Inlet Time (min)	i Sys (in/hr)	i Inlet (in/hr)	Invert Dn (ft)	Invert Up (ft)	Jump Loc (ft)	Jump Len (ft)	Vel Hd Jmp Dn (ft)	Vel Hd Jmp Up (ft)	J-Loss Coeff	Junct Type	Known Q (cfs)	Cost RCP	Cost CMP	Cost PVC	Line ID
Structure - (15)	Sag	....	15.0	3.83	4.55	1289.75	1289.88	....	....	0.00	0.00	0.15	None	0.00	1,620	1,458	1,377	Pipe - (13)
Structure - (16)	Sag	74.43	15.0	3.91	4.55	1289.88	1290.15	....	....	0.00	0.00	2.25	Dp-Grate	0.00	5,910	5,319	5,024	Pipe - (14)
Structure - (17)	Sag	10.89	15.0	4.13	4.55	1290.65	1290.90	....	....	0.00	0.00	1.50	Dp-Grate	0.00	5,092	4,583	4,328	Pipe - (15)
Structure - (18)	Sag	77.50	15.0	4.22	4.55	1291.15	1291.70	....	....	0.00	0.00	1.50	Dp-Grate	0.00	7,000	6,300	5,950	Pipe - (16)
Structure - (19)	Sag	74.59	15.0	4.41	4.55	1291.95	1292.55	....	....	0.00	0.00	1.46	Dp-Grate	0.00	5,650	5,085	4,803	Pipe - (17)
Null Structure	Sag	13.94	15.0	4.55	4.55	1292.80	1293.75	....	....	0.00	0.00	1.00	Dp-Curb	0.00	5,301	4,771	4,506	Pipe - (18)
Structure - (21)	Sag	32.00	15.0	4.00	4.55	1291.40	1292.77	37.80	4.41	0.23	0.35	1.26	Dp-Grate	0.00	6,350	5,715	5,398	Pipe - (21)
Structure - (22)	Sag	10.72	15.0	4.18	4.55	1292.87	1293.82	....	....	0.00	0.00	1.50	Dp-Curb	0.00	5,980	5,382	5,083	Pipe - (22)
Structure - (23)	Sag	32.00	15.0	4.36	4.55	1294.07	1294.60	....	....	0.00	0.00	0.50	Dp-Grate	0.00	2,984	2,686	2,536	Pipe - (23)
Null Structure	Sag	32.00	15.0	4.55	4.55	1294.70	1295.10	49.48	1.56	0.10	0.12	1.00	Dp-Grate	0.00	1,822	1,640	1,549	Pipe - (24)
Structure - (20)	Sag	32.00	15.0	4.34	4.55	1292.34	1293.50	35.20	3.19	0.06	0.29	0.50	Dp-Grate	0.00	2,760	2,484	2,346	Pipe - (19)
Null Structure	Sag	32.00	15.0	4.55	4.55	1293.60	1294.00	....	....	0.00	0.00	1.00	Dp-Grate	0.00	2,470	2,223	2,100	Pipe - (20)

Project File: Waterwalk West rev pat.stm | Number of lines: 12 | Date: 6/26/2012

NOTES: Intensity = 52.62 / (Inlet time + 11.20) ^ 0.75 -- Return period = 5 Yrs. ; ** Critical depth

MyReport

Line Length (ft)	Line Size (in)	Line Slope (%)	Line Type	Local Depr (in)	n-val Gutter	n-val Pipe	Minor Loss (ft)	Northing Y (ft)	Pipe Travel (min)	Q Byp (cfs)	Q Capt (cfs)	Q Carry (cfs)	Line Rise (in)	Runoff Coeff (C)	Line Span (in)	Area A1 (ac)	Area A2 (ac)	Area A3 (ac)	Tc (min)	Throat Ht (in)	Total Area (ac)
30.66	30	0.42	Cir	....	....	0.013	0.01	4991.06	0.21	....	....	....	30	0.69	30	0.00	0.00	0.00	21.7	....	4.28
114.92	30	0.23	Cir	....	....	0.013	0.20	4876.15	0.83	0.00	1.51	0.00	30	0.69	30	0.00	0.00	0.00	20.9	....	3.97
113.05	24	0.22	Cir	....	....	0.013	0.12	4892.69	0.92	0.00	0.72	0.00	24	0.69	24	0.00	0.00	0.00	18.6	....	2.21
172.27	18	0.32	Cir	....	....	0.013	0.25	4720.42	0.86	0.00	1.13	0.00	18	0.69	18	0.00	0.00	0.00	17.7	....	1.96
158.09	15	0.38	Cir	....	....	0.013	0.23	4566.45	0.83	0.00	1.76	0.00	15	0.69	15	0.00	0.00	0.00	16.1	....	1.27
183.01	12	0.52	Cir	....	....	0.013	0.13	4563.26	1.07	0.00	2.23	0.00	12	0.69	12	0.00	0.00	0.00	15.0	6.0	0.71
189.01	15	0.72	Cir	....	....	0.013	n/a	4877.67	1.02	0.00	1.66	0.00	15	0.69	15	0.00	0.00	0.00	19.9	....	1.28
196.28	15	0.48	Cir	....	....	0.013	0.33	4720.46	1.75	0.00	1.51	0.00	15	0.69	15	0.00	0.00	0.00	18.1	6.0	0.75
103.17	12	0.51	Cir	....	....	0.013	0.07	4720.44	1.61	0.00	0.31	0.00	12	0.69	12	0.00	0.00	0.00	16.5	....	0.27
61.85	12	0.65	Cir	....	....	0.013	n/a	4720.43	1.52	0.00	0.53	0.00	12	0.69	12	0.00	0.00	0.00	15.0	....	0.17
88.00	12	1.32	Cir	....	....	0.013	n/a	4720.43	1.06	0.00	0.47	0.00	12	0.69	12	0.00	0.00	0.00	16.7	....	0.35
79.47	12	0.50	Cir	....	....	0.013	0.11	4720.44	1.66	0.00	0.63	0.00	12	0.69	12	0.00	0.00	0.00	15.0	....	0.20

Project File: Waterwalk West rev pat.stm | Number of lines: 12 | Date: 6/26/2012

NOTES: ** Critical depth

MyReport

Total CxA	Total Runoff (cfs)	Vel Ave (ft/s)	Vel Dn (ft/s)	Vel Hd Dn (ft)	Vel Hd Up (ft)	Vel Up (ft/s)	Cover Dn (ft)	Cover Up (ft)	Storage (cft)
2.95	11.32	2.33	2.31	0.08	0.09	2.35	3.52	3.39	149.04
2.74	10.70	2.29	2.22	0.08	0.09	2.37	3.39	3.55	538.08
1.52	6.30	2.15	2.07	0.07	0.08	2.24	3.55	3.60	332.41
1.37	5.77	3.27	3.27	0.17	0.17	3.27	3.85	3.40	304.33
0.88	3.87	3.15	3.15	0.15	0.15	3.15	3.40	3.20	193.97
0.49	2.23	2.84	2.84	0.13	0.13	2.84	3.20	2.25	143.71
0.88	3.54	3.82	3.06	0.15	0.33	4.58	3.55	2.25	184.48
0.52	2.16	3.56	3.34	0.17	0.22	3.78	2.15	2.25	119.72
0.19	0.81	2.18	1.44	0.03	0.13	2.92	2.25	2.40	43.56
0.12	0.53	2.37	2.17	0.07	0.10	2.58	2.30	1.90	14.01
0.24	1.05	2.27	1.34	0.03	0.16	3.21	3.26	3.50	54.27
0.14	0.63	2.67	2.71	0.11	0.11	2.63	3.40	3.00	18.68

Project File: Waterwalk West rev pat.stm | Number of lines: 12 | Date: 6/26/2012

NOTES: ** Critical depth

Storm Sewer Inlet Time Tabulation

Line No.	Line ID	Tc Method	Sheet Flow					Shallow Concentrated Flow					Channel Flow							Total Travel Time (min)
			n-Value	flow Length (ft)	2-yr 24h P (in)	Land Slope (%)	Travel Time (min)	flow Length (ft)	Water Slope (%)	Surf Descr	Ave Vel (ft/s)	Travel Time (min)	X-sec Area (sqft)	Wetted Perim (ft)	Chan Slope (%)	n-Value	Vel	flow Length (ft)	Travel Time (min)	
1	Pipe - (13)	User																		15.00
2	Pipe - (14)	User																		15.00
3	Pipe - (15)	User																		15.00
4	Pipe - (16)	User																		15.00
5	Pipe - (17)	User																		15.00
6	Pipe - (18)	User																		15.00
7	Pipe - (21)	User																		15.00
8	Pipe - (22)	User																		15.00
9	Pipe - (23)	User																		15.00
10	Pipe - (24)	User																		15.00
11	Pipe - (19)	User																		15.00
12	Pipe - (20)	User																		15.00

Project File: Waterwalk West rev pat.stm | Min. Tc used for intensity calculations = 5 min | Number of lines: 12 | Date: 6/26/2012

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	30	11.32	1289.75	1292.23	2.48	4.90	2.31	0.08	1292.31	0.071	30.66	1289.88	1292.25	2.37	4.81	2.35	0.09	1292.33	0.066	0.068	0.021	0.15	0.01
2	30	10.70	1289.88	1292.26	2.38	4.82	2.22	0.08	1292.34	0.059	114.92	1290.15	1292.32	2.17	4.52	2.37	0.09	1292.41	0.062	0.061	0.070	2.25	0.20
3	24	6.30	1290.65	1292.51	1.86	3.05	2.07	0.07	1292.58	0.067	113.05	1290.90	1292.58	1.68	2.82	2.24	0.08	1292.66	0.074	0.071	0.080	1.50	0.12
4	18	5.77	1291.15	1292.70	1.50	1.77	3.27	0.17	1292.86	0.302	172.27	1291.70	1293.19	1.49	1.77	3.27	0.17	1293.36	0.284	0.293	0.505	1.50	0.25
5	15	3.87	1291.95	1293.44	1.25	1.23	3.15	0.15	1293.60	0.359	158.09	1292.55	1294.01	1.25	1.23	3.15	0.15	1294.16	0.359	0.359	0.567	1.46	0.23
6	12	2.23	1292.80	1294.23	1.00	0.79	2.84	0.13	1294.36	0.392	183.01	1293.75	1294.95	1.00	0.79	2.84	0.13	1295.08	0.392	0.392	0.717	1.00	0.13
7	15	3.54	1291.40	1292.51	1.11	1.15	3.06	0.15	1292.66	0.266	189.01	1292.77	1293.52 j	0.75**	0.77	4.58	0.33	1293.85	0.657	0.462	n/a	1.26	n/a
8	15	2.16	1292.87	1293.52	0.65	0.65	3.34	0.17	1293.70	0.389	196.28	1293.82	1294.41	0.59**	0.57	3.78	0.22	1294.63	0.542	0.465	0.913	1.50	0.33
9	12	0.81	1294.07	1294.75	0.68	0.56	1.44	0.03	1294.78	0.082	103.17	1294.60	1294.99	0.38**	0.28	2.92	0.13	1295.12	0.529	0.305	0.315	0.50	0.07
10	12	0.53	1294.70	1295.05	0.35	0.25	2.17	0.07	1295.12	0.321	61.85	1295.10	1295.41 j	0.31**	0.21	2.58	0.10	1295.51	0.517	0.419	n/a	1.00	n/a
11	12	1.05	1292.34	1293.44	1.00	0.79	1.34	0.03	1293.47	0.087	88.00	1293.50	1293.93 j	0.43**	0.33	3.21	0.16	1294.09	0.567	0.327	n/a	0.50	0.08
12	12	0.63	1293.60	1293.94	0.34*	0.23	2.71	0.11	1294.05	0.524	79.47	1294.00	1294.34	0.34**	0.24	2.63	0.11	1294.45	0.484	0.504	0.401	1.00	0.11

Project File: Waterwalk West rev pat.stm | Number of lines: 12 | Run Date: 6/26/2012

Notes: * depth assumed.; ** Critical depth.; j-Line contains hyd. jump. ; c = cir e = ellip b = box

Water Quality Volume
Spreadsheet Calculations

Waterwalk West Addition Water Quality Data & Computations
Completed by: TJW
Date: 7/20/2012

Notes & Assumptions:

Basin	Area	Effect
1	4.4	Buildings, parking lots, green spaces
Total	4.4	

Impervious Cover %	0.38
Hydrologic Soil Group	Rv Values
Undisturbed Woods	R_{VU} = 0.04
Turf/ Disturbed Soils	R_{VD} = 0.22
Impervious Cover	R_{VI} = 0.95

Equations
$WQ_V = R_V*A/10$
$R_V = R_{VU}*U+R_{VD}*D+R_{VI}*I$
U = undisturbed/total area
D = dist. perv./total area
I = impervious/total area

	Drainage Bas	Pond	Treatment	Undisturbe	Disturbed	Impervious
	Area	Area	Area	Area	Pervious	Area
Basin	Acre	Acre	Acre	Acre	Acre	Acre
1	4.4	0.0	4.4	0.0	0.9	3.5
Totals:	4.4	0.0	4.4	27.8	0.9	3.5

Calculations			
U	D	I	Totals
0.00	0.20	0.80	1.0

Calculations		
Rv	Area	WQv
	Acres	Acre-Ft.
0.8	4.4	0.4
	4.4	0.4

Drainage Plan
1:30 Scale