March 7, 2025

Dan Fernandez
City of Lee's Summit
220 SE Green Street
Lee's Summit, MO 64063

Re: Lee's Summit Medical Center – ED Expansion
Stormwater Memo

Dear Dan:

The purpose of this memo is to describe the nature of the proposed Lee's Summit Medical Center Emergency Department (ED) Expansion project and how it remains within the design parameter of the existing storm water management facilities.

The proposed ED Expansion is located at the southeast corner of the existing Lee's Summit Medical Center, and consists of a 2,900 gsf building expansion, new exterior canopy at the ED entrance, and associated drive aisle and infrastructure improvements. The addition will be constructed within an existing green/open space, adjacent to the existing ED drop off. All stormwater runoff from the ED Expansion will drain via sheet and shallow concentrated flow to a proposed area drain or existing catch basins where they are then routed to the existing detention facility in the northeast corner of the site by the existing storm sewer system. Although the hospital expansion includes the addition of 0.07 acres (3,234 sf) of impervious area, the site remains within the design parameters of the existing stormwater ponds. Refer to the attached Pre & Post Development Drainage Area Maps for additional details. Granted there are both Hydrologic Soil Group B & D soils on site, the proposed Curve number was calculated considering all soils as Calss D for a conservative approach.

The originally approved Stormwater Management Plan, prepared by George Butler Associates, Inc., dated April 13, 2006, states that the detention basins were sized to accommodate a Curve Number of 93 and a time of concentration of 6 minutes. The proposed ED Expansion falls within Watershed B, as outlined in the previously approved report. Please refer to the approved report included within the memo attachments. *Table 1*, below, summarizes the proposed and designed Watershed B characteristics.

Table 1

Watershed B Designed & Proposed Analysis			
	Area (ac)	Time of Concentration (min)	Curve Number (CN)
Designed / Existing	7.30	6	93
Proposed	7.30	6	90

On conclusion, the proposed ED Addition has no effect on the analyzed time of concentration and the added impervious area brings the Watershed B curve number to 90, which falls within the existing detention basin design parameters. Therefore, no additional detention modifications are required for the ED Expansion project. Please refer to the included Watershed B Drainage Area Exhibit.

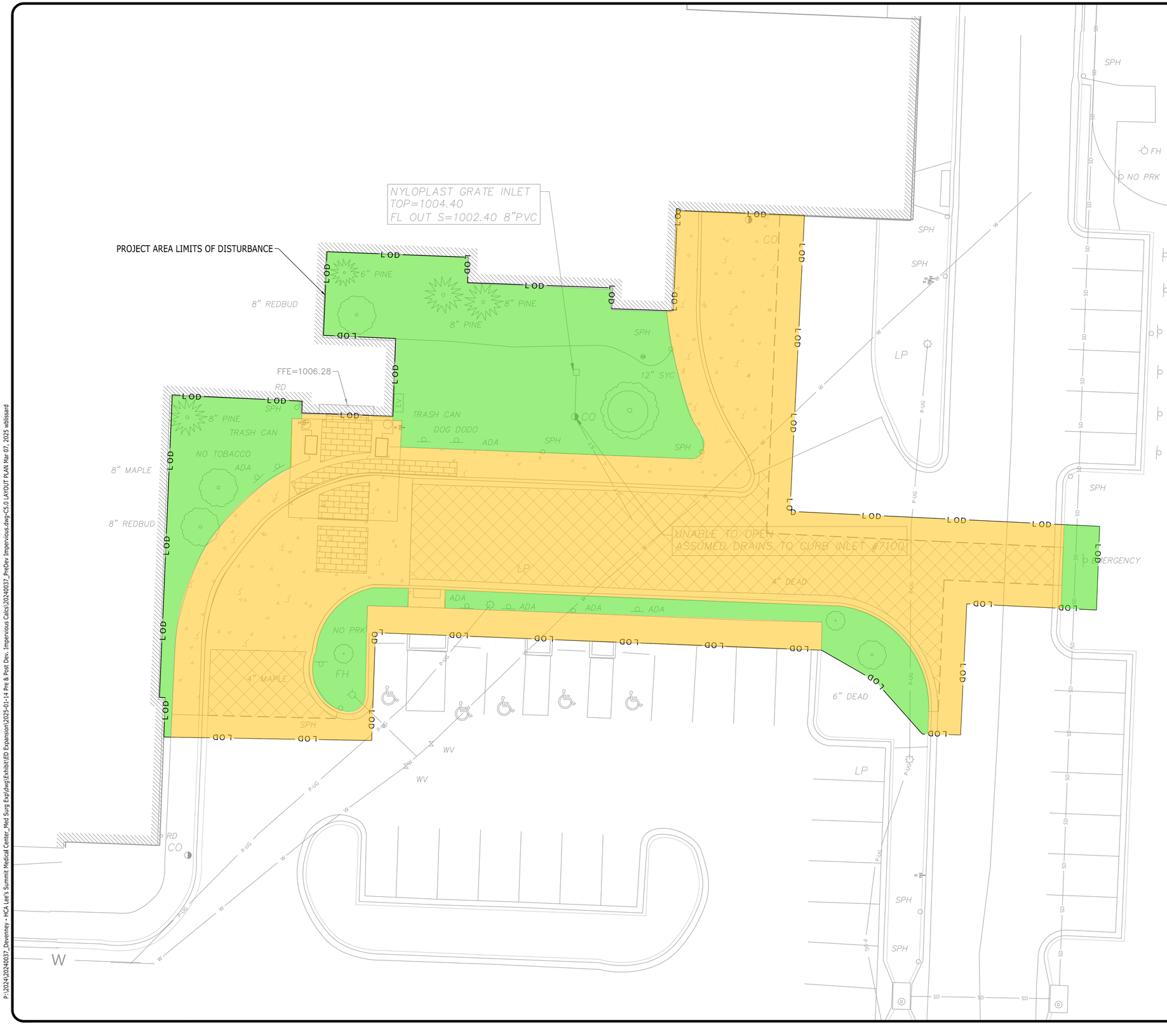
Best Regards,

Catalyst Design Group

Jack Parker, PE
Principal, Senior Project Manager

Attachments:

- Drainage Area Maps
- George Butler Associates, Inc. Approved Stormwater Management Plan, dated April 13, 2006



LEGEND	
EXISTING PERVIOUS AREA	
EXISTING IMPERVIOUS AREA	

PROJECT AREA	
PROPOSED PERVIOUS AREA	0.10 AC (4,551 SQ FT)
PROPOSED IMPERVIOUS AREA	0.20 AC (8,688 SQ FT)
TOTAL AREA	0.30 AC (13,239 SQ FT)

N

0 5 10 20 30
GRAPHIC SCALE

Catalyst Design Group
1524 WILLIAMS DR., SUITE 201, MURFREESBORO, TN 37129
(615) 522-7200 | WWW.CATALYST-DG.COM

LEE'S SUMMIT MEDICAL CENTER
ED EXPANSION
2100 SE BLUE PKWY
LEE'S SUMMIT, MO 64063
(816) 282-5000

NO.	DATE	DESCRIPTION

DRAWING TITLE
PRE-DEVELOPMENT IMPERVIOUS EXHIBIT

PROJECT NUMBER
20240037

DRAWING NUMBER
1 OF 3

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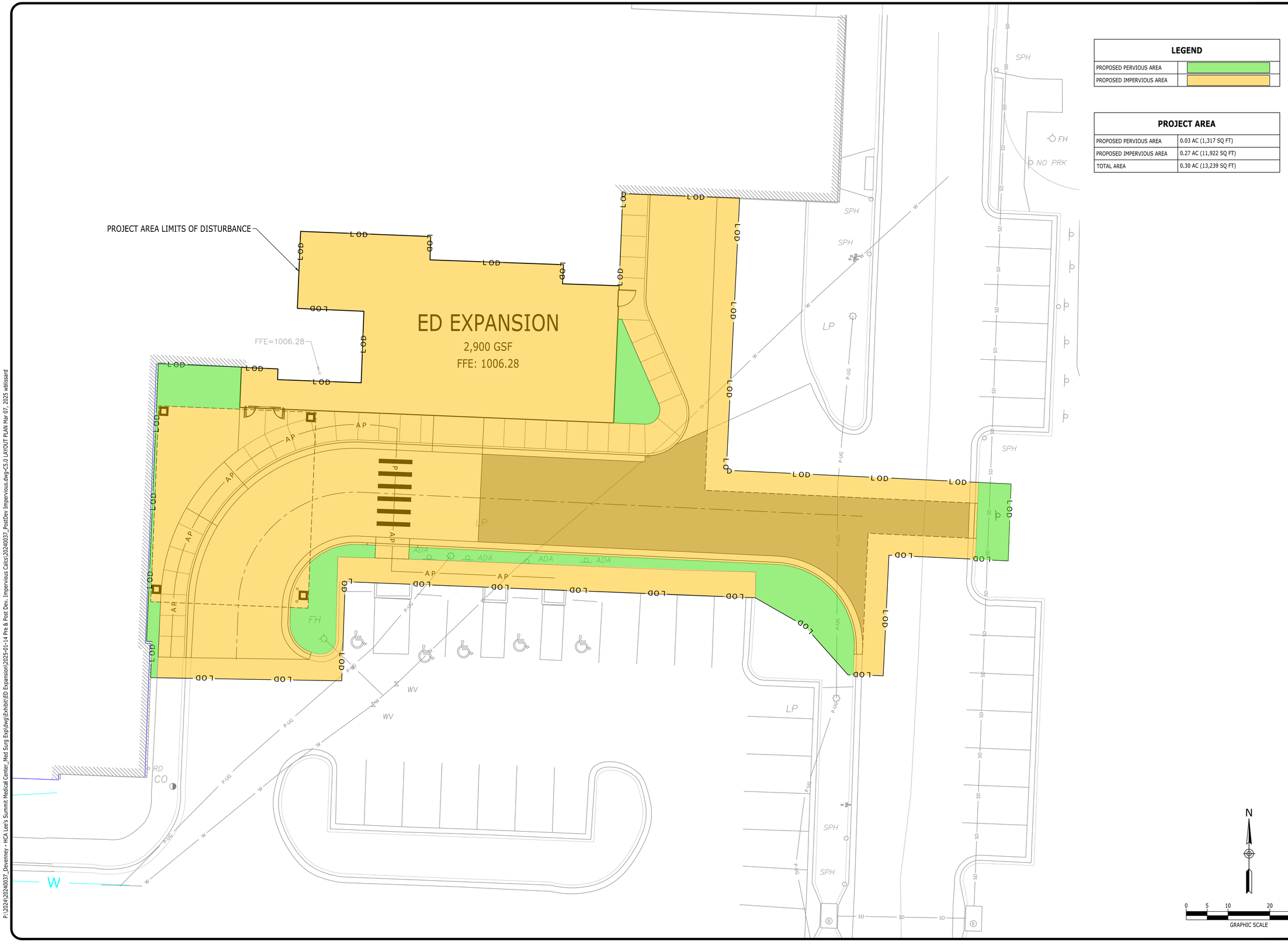

LEGEND	
PROPOSED PERVIOUS AREA	
PROPOSED IMPERVIOUS AREA	

PROJECT AREA	
PROPOSED PERVIOUS AREA	0.03 AC (1,317 SQ FT)
PROPOSED IMPERVIOUS AREA	0.27 AC (11,922 SQ FT)
TOTAL AREA	0.30 AC (13,239 SQ FT)

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NO.	DATE	DESCRIPTION

DRAWING TITLE
POST-DEVELOPMENT IMPERVIOUS EXHIBIT

PROJECT NUMBER
20240037

DRAWING NUMBER
2 OF 3

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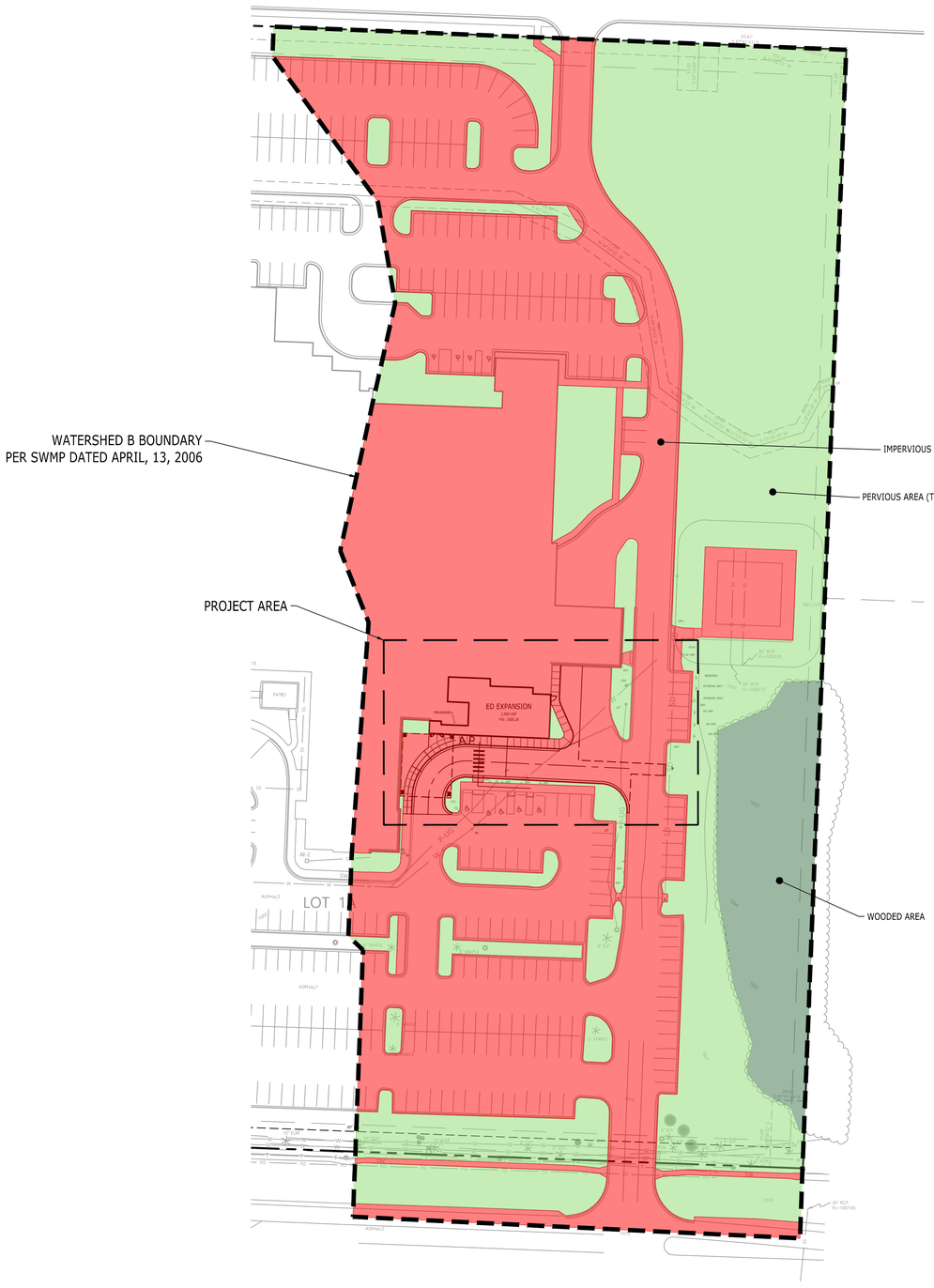

LEGEND	
PROPOSED PERVIOUS AREA	
PROPOSED WOODED PERVIOUS	
PROPOSED IMPERVIOUS AREA	

WATERSHED B AREA		
LAND USE	AREA	CURVE NUMBER
PROPOSED PERVIOUS AREA	2.74 AC (119,296 SQ FT)	80
PROPOSED WOODED PERVIOUS	0.44 AC (18,988 SQ FT)	77
PROPOSED IMPERVIOUS AREA	4.12 AC (179,704 SQ FT)	98
TOTAL	7.30 AC (317,988 SQ FT)	90

N

0 25 50 100 150

GRAPHIC SCALE

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NO.	DATE	DESCRIPTION

DRAWING TITLE

WATERSHED B DRAINAGE AREA MAP

PROJECT NUMBER
20240037

DRAWING NUMBER
3 OF 3

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FINAL STORM WATER MANAGEMENT PLAN

Lee's Summit Regional Health Center

Southeast Corner of Todd George Road and Southeast Shenandoah Drive

Lee's Summit, Jackson County, Missouri

Prepared: April 13, 2006

Prepared For:

Hospital Corporation of America (H.C.A.)
and
the City of Lee's Summit, Missouri

GBA Job Number 10367.00

TABLE OF CONTENTS

Site Location

The proposed Hospital Corporation of America (H.C.A.) Lee's Summit hospital facility is generally located east of Southeast Todd George Road, South of Southeast Shenandoah Drive, West of Church Street, and north of Southeast Blue Parkway. The overall boundary encompasses 39.00 acres in the Northwest Quarter of Section Ten (S10), Township Forty-seven North (T47N), Range Thirty-one West (R31W) in the City of Lee's Summit, Jackson County, Missouri. The site is currently zoned Planned Community Commercial District (CP-2). See Figure 1 in the List of Figures for the location of the site.

Executive Summary

Storm drainage and detention criteria will be determined as provided for in the American Public Works Association (A.P.W.A.), Division V, Section 5600, as approved and adopted on November 19, 2003 by the Kansas City Metropolitan Chapter of the A.P.W.A. and as adopted and amended on September 16, 2004 by the City of Lee's Summit. This storm water management plan report will show that the proposed, on-site detention facilities will be adequate to provide detention for the 50% (2-year), 10% (10-year), and 1% (100-year) design storms for the developed 17.2 acre proposed H.C.A. Hospital site of the total 39.00 acre boundary. The remaining 21.8 acres is currently planned to be developed in the future for medical offices usage.

Existing Conditions

The 39.00 acre site is currently undeveloped, grassy pasture with some tree cover and no existing, on-site facilities. The existing, undeveloped, weighted rational method runoff coefficient factor (C) for the 17.2 acre proposed H.C.A. Hospital site is 0.28 and the weighted Natural Resource Conservation Service (N.R.C.S.) curve number (C.N.) of 72. N.R.C.S. Hydrologic soil group B soils have moderate infiltration rates when thoroughly wetted and consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. N.R.C.S. Hydrologic soil group D soils have high runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. The existing, undeveloped site is comprised of three (3) sub-watersheds. The soils on the site are summarized in Table 1. See Figure 2 in the List of Figures for the soils survey map.

Table 1 Site Soils Survey
Soil Survey of Jackson County, Missouri, United Stated Department of Agriculture, Natural Resource Conservation Service, (September 1984)

Soil Name	Soil Map Symbol	Hydrologic Group	Soil Slope (%)	Soil Permeability (in./hr.)
Macksburg silt loam	5B	B	2 to 5	0.6 to 2.0
Sampsel silty clay loam	13B	D	2 to 5	0.2 to 0.6

The site generally drains from south to north and is within the East Fork Little Blue River watershed. See Figure 3 in the List of Figures for the existing topography. The entire site lies within the limits of flood Zone C, defined as areas of minimal flooding, as indicated by the Flood Insurance Rate Map

(F.I.R.M.) that was prepared by the Federal Emergency Management Administration (F.E.M.A.) for the City of Lee's Summit, Jackson and Cass Counties, Missouri, Community Number 290174, Panel Number 0007 C (Number 7 of 23), and with a revision date of August 3, 1989. See Figure 4 in the List of Figures for the flood insurance rate map.

The existing, site condition parameters of the on-site and off-site sub-watersheds are summarized in Table 2. See Figure 5 in the List of Figures for the existing, drainage areas for both on-site and off-site watersheds.

Table 2 Existing Condition Parameters
Haestad Methods, Inc. PondPack (ver. 9.0)

Drainage Area Name	Drainage Area (acres)	Runoff Coeff. (C/CN)	Time of Concen. (mins.)	50% Storm Peak Flow (cfs)	10% Storm Peak Flow (cfs)	2% Storm Peak Flow (cfs)	1% Storm Peak Flow (cfs)	Remarks
On-site flows draining to the existing 60-inch C.M.P. underneath Southeast Shenandoah Drive								
Watershed A	7.11	0.28 / 71	15.6	8.3	19	29	35	
Watershed C	3.10	0.28 / 71	9.0	4.7	11	16	19	
Total On-Site Peak Flows				***13***	***30***	***45***	***54***	
On-site and off-site flows draining to the existing 48-inch C.M.P. underneath Southeast Shenandoah Drive								
Watershed B	7.30	0.28 / 73	24.6	7.5	17	26	31	
Off-Site Watershed B-1	16.66	0.25 / 65	30.0	8.7	25	42	52	
Off-Site Watershed B-2	15.63	0.30 / 75	18.0	25	38	38	38	
Total Routed On-Site and Off-Site Peak Flows				***36***	***76***	***102***	***119***	

Watershed A – Encompasses 7.11 acres and is located near the southwest portion of the 17.2 acre proposed H.C.A. Hospital site. The time of concentration (Tc) for the existing condition of this watershed is 15.6 minutes to the existing 60-inch C.M.P. culvert underneath Southeast Shenandoah Drive. The N.R.C.S. C.N. for the existing condition of this watershed is 71. The existing condition 1% (100-year) storm produces 35 cfs of peak runoff that drains to an existing 60-inch C.M.P. culvert underneath Southeast Shenandoah Drive approximately 1,500 feet east of Todd George Road. The upstream flow line of the existing 60-inch C.M.P. culvert is 977.37, the downstream flow line is 976.32, and the low point in the street curb above the pipe is approximately 986.0. The capacity of the existing 60-inch C.M.P. with 8.63 feet of headwater (H.W.) is approximately 200 cfs (A.P.W.A. Figure 5603-5, Figure 7 in the List of Figures). The storm runoff exits the drainage culvert and enters a tributary of the East Fork Little Blue River. See Figure 4 in the List of Figures for the flood insurance rate map. City Staff has indicated that there are no known problems with the downstream storm water conveyance system.

Watershed B – Encompasses 7.30 acres and is located near the northeast portion of the 17.2 acre proposed H.C.A. Hospital site. The Tc for the existing condition of this watershed is 24.6 minutes to the existing 48-inch C.M.P. underneath Southeast Shenandoah Drive. The N.R.C.S. C.N. for the existing condition of this watershed is 73. The existing condition 1% (100-year) storm produces 31 cfs of peak runoff that drains to an existing 48-inch C.M.P. storm sewer system underneath Southeast Shenandoah Drive approximately 2,200 feet east of Todd George Road. The upstream

flow line of the existing 48-inch C.M.P. storm sewer system is 986.65 and the low point in the street curb above the pipe is approximately 992.4. The capacity of the existing 48-inch C.M.P. with 5.75 feet of headwater (H.W.) is approximately 100 cfs (A.P.W.A. Figure 5603-5, Figure 8 in the List of Figures). However, according to as-built street and storm sewers plans, (07-01-1993) of Ashton at Charleston Park 3rd Plat sheet 2 of 2 (Garnett Pierce, P.E.), the 2% (50-year) capacity of the existing 48-inch C.M.P. between structures 6 and 7 is approximately 71 cfs with excess flows to a 1% (100-year) storm to be carried overland in a swale. This segment of the existing 48-inch C.M.P. storm sewer is downstream of Watershed B, Off-Site Watershed B-1, and Off-Site Watershed B-2. The storm runoff exits this downstream storm sewer system and enters a tributary of the East Fork Little Blue River. See Figure 4 in the List of Figures for the flood insurance rate map. City Staff has indicated that there are no known problems with the downstream storm water conveyance system.

Off-Site Watersheds Adjacent to Watershed B – There are two (2) off-site watersheds encompassing 16.66 acres east of the proposed H.C.A. Hospital site (Off-Site Watershed B-1) and 15.63 acres south of U.S. Highway 50 (Off-Site Watershed B-2) that contribute storm runoff through Watershed B. Off-Site Watershed B-1 storm runoff sheet flows for approximately 200 feet, concentrated into shallow flow for approximately 450 feet, and collected into a channel flowing for approximately 650 feet to the existing 48-inch C.M.P. underneath Southeast Shenandoah Drive. Off-Site Watershed B-2 storm runoff sheet flows for approximately 175 feet, concentrated into shallow flow for approximately 350 feet, and collected into a channel flowing for approximately 200 feet to the existing 30-inch R.C.P. underneath Southeast Oldham Parkway and eastbound U.S. Highway 50. The upstream flow line of the existing 30-inch R.C.P. culvert is 1015.38, the downstream flow line is 1014.01, and the high point in the flow line of the existing, drainage ditch along the south side of Southeast Oldham Parkway is approximately 1017.6. The capacity of the existing 30-inch R.C.P. with 2.2 feet of headwater (H.W.) is approximately 21 cfs (A.P.W.A. figure 5603-2, Figure 9 in the List of Figures). The Off-Site Watershed B-2 storm runoff is then directed into an existing 36-inch R.C.P. underneath westbound U.S. Highway 50 and Southeast Blue Parkway, outletted north of Southeast Blue Parkway, and then flows towards the existing 48-inch C.M.P. underneath Southeast Shenandoah Drive. See Figure 5 in the List of Figures for a general overview of the drainage patterns off-site and on-site. Off-Site Watershed B-1 has an N.R.C.S. C.N. of 65 (See Worksheet 2: Runoff Curve Number and Runoff Appendix A – Existing Conditions) and a Tc of 30.0 minutes (See Worksheet 3: Time of Concentration (Tc) or Travel Time (Tt) Appendix A – Existing Conditions) for the existing condition. Off-Site Watershed B-2 has an N.R.C.S. C.N. of 75 and a Tc of 18.0 minutes for the existing condition. The off-site watersheds will produce a combined 1% storm peak runoff of 90 cfs (52 cfs from Off-Site Watershed B-1 and 38 cfs from Off-Site Watershed B-2). The South Prairie Lee Watershed Stormwater Master Plan (March 1999, Black & Veatch project number 25825.140), as prepared by Black & Veatch for the City of Lee's Summit, was reviewed for On-Site Watershed B, Off-Site Watershed B-1, and Off-Site Watershed B-2 existing conditions and proposed development.

Watershed C – Encompasses 3.10 acres and is located near the northwest portion of the 17.2 acre proposed H.C.A. Hospital site. The Tc for the existing condition of this watershed is 9.0 minutes to the existing 60-inch C.M.P. culvert underneath Southeast Shenandoah Drive. The N.R.C.S. C.N. for the existing condition of this watershed is 71. The existing condition 1% (100-year) storm produces 19 cfs of peak runoff that drains to an existing 60-inch C.M.P. culvert underneath Southeast Shenandoah Drive approximately 1,500 feet east of Todd George Road. The upstream flow line of the existing 60-inch C.M.P. culvert is 977.37, the downstream flow line is 976.32, and the low point

in the street curb above the pipe is approximately 986.0. The capacity of the existing 60-inch C.M.P. with 8.63 feet of headwater (H.W.) is approximately 200 cfs (A.P.W.A. Figure 5603-5, Figure 7 in the List of Figures). The storm runoff exits the drainage culvert and enters a tributary of the East Fork Little Blue River. See Figure 4 in the List of Figures for the flood insurance rate map. City Staff has indicated that there are no known problems with the downstream storm water conveyance system.

Methodology

Haestad Methods, Inc. PondPack version 9.0 Detention Pond Design & Urban Hydrology Model and the N.R.C.S. TR-55 Urban Hydrology for Small Watersheds computer programs and methodologies were utilized to analyze the 17.2 acre proposed H.C.A. Lee's Summit Hospital site. A Type II, 24 hour rainfall distribution was used with Antecedent Moisture Condition II for the 50% (2-year), 10% (10-year), 4% (25-year), 2% (50-year), and 1% (100-year) storms.

Proposed Development

The proposed H.C.A. Hospital Facility is proposed to have one (1), 100,600 square feet building which includes outpatient services, medical offices, and the inpatient hospital. With parking and roadways in addition to the building, the site will have 75% (12.9 acres) of the gross area of 17.2 acres covered by impervious surfaces. See Figure 6 in the List of Figures for the developed drainage areas for the on-site watersheds. The mass grading of the site will generally follow the existing drainage patterns and contours. Therefore, there will be three (3) on-site watersheds that will require detention of storm water runoff to reduce the impact of storm runoff downstream of the proposed H.C.A. Hospital site.

Site Storm Drainage

Site storm drainage will be collected from unpaved areas by area inlets and from paved areas by curb inlets. Storm sewer pipe will be sized to handle the 4% (25-year) design storm or greater. Drainage runoff flows above the 4% storm flow will travel overland through swales and/or through roadways, then into area and/or curb inlets, and then into a storm sewer system where it will travel to one (1) of three (3) on-site detention basins. Storm sewer pipes will be reinforced concrete pipe (R.C.P.) entering and corrugated metal pipe (C.M.P.) or R.C.P. exiting the detention basins. High density polyethylene (H.D.P.E.) pipe will be used for the on-site, private storm sewer system. Runoff will not pond in public streets to greater than 7-inches in depth. All on-site, building construction will be phased in after the detention basin facilities are constructed.

Detention Analysis

Three (3) existing, on-site watersheds have been analyzed, as well as the off-site watersheds flowing into On-site Watershed B. The proposed detention basins have been sized by using the existing, which are also the proposed, drainage area acreage for each of the three (3) on-site watersheds, a developed C.N. of 93, and a developed Tc of 6.0 minutes. See Figure 6 in the List of Figures for the developed drainage areas. Per A.P.W.A. Division V, Section 5600 standards (approved and adopted on November 19, 2003), the maximum release rate from any development site for the post-developed peak flow rates for the 50% (2-year), 10% (10-year), and 1% (100-year) storms shall be limited

according to the pre-developed peak flow rates for the 50% (2-year), 10% (10-year), and 1% (100-year) storms.

Watershed A Detention

The developed on-site Watershed A will produce peak runoffs of 27 cfs, 43 cfs, and 65 cfs during the 50%, 10%, and 1% storms, respectively. The maximum allowable release rates for the Watershed A for the 50%, 10%, and 1% storms are 8.3 cfs, 19 cfs, and 35 cfs, respectively. A dry, bottom detention basin (Basin A) is proposed for the developed Watershed A. Detention Basin A will be located at the low point of Watershed A near the southwest portion of the 17.2 acre proposed H.C.A. Hospital site. See Figure 10 in the List of Figures for the site plan and detention basin locations. Watershed A has a drainage area of 7.11 acres, a proposed developed N.R.C.S. C.N. of 93, and a proposed developed Tc of 6 minutes. The required volume for Detention Basin A based on the Watershed A maximum 1% allowable release rate of 35 cfs is 1.09 acre-feet as modeled by utilizing Haestad Methods, Inc. PondPack version 9.0. The side slopes and bottom of Detention Basin A will be seeded or sodded with slopes no greater than three feet horizontally to one foot vertically.

The proposed, primary outlet for the basin will be one (1) 24-inch R.C.P. through an earthen dam section. The 24-inch R.C.P. will discharge the developed 50%, 10%, and 1% peak storm runoff at a rate of 12 cfs, 19 cfs, and 27 cfs, respectively, which are less than or essentially equal to the maximum allowable release rates of 8.3 cfs, 19 cfs, and 35 cfs for the 50%, 10%, and 1% storm peak runoffs, respectively, to the existing 60-inch C.M.P. underneath Southeast Shenandoah Drive. Runoff flows from storms less frequent than the 1% storm will discharge from the detention basin via the emergency spillway located on the west side of the basin. The top of the emergency spillway will be at elevation 996.8 and the top of the basin will be at elevation 997.6 which is equal to or greater than one (1) foot above the maximum water surface elevation of 996.25 in the detention facility attained by the 1% storm.

See Figure 11 in the List of Figures for the routed surface elevations, top of emergency spillway elevations, length of emergency spillway, and top of basin elevation.

Watershed B Detention

The developed on-site Watershed B will produce peak runoffs of 28 cfs, 44 cfs, and 66 cfs during the 50%, 10%, and 1% storms, respectively. The Off-Site Watershed B-1 produces peak runoffs of 8.7 cfs, 25 cfs, and 52 cfs during the 50%, 10%, and 1% storms, respectively. The Off-Site Watershed B-2 produces peak runoffs of 25 cfs, 38 cfs, and 38 cfs during the 50%, 10%, and 1% storms, respectively. The maximum allowable release rate for Watershed B, Off-Site Watershed B-1, and Off-Site Watershed B-2, is approximately 71 cfs. The maximum allowable release rate is based on the capacity of a segment of the existing 48-inch C.M.P. storm sewer downstream from Watershed B (as-built street and storm sewers plans, July 1, 1993, Ashton at Charleston Park 3rd Plat sheet 2 of 2, Garnett Pierce, P.E.). A dry, bottom detention basin (Basin B) is proposed for the developed Watershed B. Detention Basin B will be located at the low point of Watershed B near the northeast portion of the 17.2 acre proposed H.C.A. Hospital site. See Figure 10 in the List of Figures for the site plan and detention basin locations. Watershed B has a drainage area of 7.30 acres, a proposed developed N.R.C.S. C.N. of 93, and a proposed developed Tc of 6 minutes. The required volume for Detention Basin B based on the Watershed B maximum 1% allowable release rate of 71 cfs is 2.89

acre-feet as modeled by utilizing Haestad Methods, Inc. PondPack version 9.0. The side slopes and bottom of Detention Basin B will be seeded or sodded with slopes no greater than three feet horizontally to one foot vertically.

The proposed, primary outlet for the Watershed B basin will be one (1) 11-foot by 6-foot weir box. Approximately 33 feet of 48-inch C.M.P. exits the 11-foot by 6-foot weir box and connects to the existing 48-inch C.M.P. underneath Southeast Shenandoah Drive. See Figure 12 in the List of Figures for a schematic drawing of the proposed 11-foot by 6-foot weir box. The 11-foot by 6-foot weir box has a vertical slot to restrict the 50%, 10%, and 1% storm flows to 27cfs, 48 cfs, and 73 cfs, respectively, which is essentially equal to the maximum allowable release rate of 71 cfs to the existing 48-inch C.M.P. underneath Southeast Shenandoah Drive. Runoff flows from storms less frequent than the 1% storm will discharge from the detention basin via the emergency spillway located on the north side of the basin. The top of the emergency spillway will be at elevation 997.0 and the top of the basin will be at elevation 997.5 which is equal to or greater than one (1) foot above the maximum water surface elevation of 996.14 in the detention facility attained by the 1% storm.

Watershed C Detention

The developed on-site Watershed C will produce peak runoffs of 12 cfs, 19 cfs, and 28 cfs during the 50%, 10%, and 1% storms, respectively. The maximum allowable release rates for the Watershed C for the 50%, 10%, and 1% storms are 4.7 cfs, 11 cfs, and 19 cfs, respectively. A dry, bottom detention basin (Basin C) is proposed for the developed Watershed C. Detention Basin C will be located at the low point of Watershed C near the northwest portion of the 17.2 acre proposed H.C.A. Hospital site. See Figure 10 in the List of Figures for the site plan and detention basin locations. Watershed C has a drainage area of 3.10 acres, a proposed developed N.R.C.S. C.N. of 93, and a proposed developed Tc of 6 minutes. The required volume for Detention Basin C based on the Watershed C maximum 1% allowable release rate of 19 cfs is 0.37 acre-feet as modeled by utilizing Haestad Methods, Inc. PondPack version 9.0. The side slopes and bottom of Detention Basin B will be seeded or sodded with slopes no greater than three feet horizontally to one foot vertically.

The proposed, primary outlet for the Watershed C basin will be one (1) 18-inch R.C.P. through an earthen dam section with one (1) steel, orifice plate attached to the upstream, outlet concrete headwall. The steel, orifice plate shall have a diameter of 0.90 feet (area of 0.64 square feet) and shall be one-quarter (1/4) inch in thickness. The 18-inch R.C.P. with the 0.90 foot diameter steel, orifice plate will discharge the developed 50%, 10%, and 1% storm peak runoff at a rate of 7.8 cfs, 9.6 cfs, and 11 cfs, respectively, which are less than or essentially equal to the maximum allowable release rates of 4.7 cfs, 11 cfs, and 19 cfs for the 50%, 10%, and 1% storm peak runoffs, respectively, to the existing 60-inch C.M.P. underneath Southeast Shenandoah Drive. Runoff flows from storms less frequent than the 1% storm will discharge from the detention basin via the emergency spillway located on the north side of the basin. The top of the emergency spillway will be at elevation 994.7 and the top of the basin will be at elevation 995.7 which is equal to or greater than one (1) foot above the maximum water surface elevation of 994.66 in the detention facility attained by the 1% storm.

The developed, site condition parameters of the on-site and off-site watersheds are summarized in Table 3 on the next page.

Table 3 Developed Condition Parameters
Haestad Methods, Inc. PondPack (ver. 9.0)

Drainage Area Name	Drainage Area (acres)	Runoff Coeff. (C/CN)	Time of Concen. (mins.)	50% Storm Peak Flow (cfs)	10% Storm Peak Flow (cfs)	2% Storm Peak Flow (cfs)	1% Storm Peak Flow (cfs)	Remarks
On-site flows draining to the existing 60-inch C.M.P. underneath Southeast Shenandoah Drive								
Watershed A	7.11	0.77 / 93	6.0	27	43	58	65	Detained
Watershed C	3.10	0.77 / 93	6.0	12	19	25	28	Detained
Total On-Site Peak Flows				***39***	***62***	***83***	***93***	Detained
On-site and off-site flows draining to the existing 48-inch C.M.P. underneath Southeast Shenandoah Drive								
Watershed B	7.30	0.77 / 93	6.0	28	44	59	66	Detained
Off-Site Watershed B-1	16.66	0.25 / 65	30.0	8.7	25	42	52	Detained
Off-Site Watershed B-2	15.63	0.30 / 75	18.0	25	38	38	38	Detained / Bypass
Total Routed On-Site and Off-Site Peak Flows				***53***	***91***	***115***	***128***	

Erosion Control

To control erosion during construction, silt fences will be placed around and within all construction sites including the detention basin dams and all graded areas. Rock bags will be placed around all area and curb inlets until grass is established on the site and erosion is stabilized. All disturbed area will be seeded. It is intended that this project will not increase flows downstream above established flows and velocities. As each site on this project is built, separate erosion control plans must be submitted to the city. It is anticipated that maintenance of the detention basins will be provided by the owners of the H.C.A. Lee's Summit Hospital Facility.

Summary

The proposed Hospital Corporation of America (H.C.A.) Lee's Summit Hospital Facility has an overall boundary area of 39.00 acres with this site developing approximately 17.2 acres located east of Southeast Todd George Road, South of Southeast Shenandoah Drive, West of Church Street, and north of Southeast Blue Parkway. Currently, there is one 48-inch C.M.P. storm sewer system and one 60-C.M.P. storm culvert underneath Southeast Shenandoah Drive that drains the site storm runoff to the north. The H.C.A. Hospital Facility is proposed to have one, 100,600 square feet building which includes outpatient services, medical offices, and the inpatient hospital. Three (3) detention basins will serve all development within the 17.2 acre project site. The calculations show that the proposed, detention facilities are adequate to restrict the project's 50%, 10%, and 1% developed, storm peak runoff flows to essentially equal to or less than the corresponding, undeveloped storm peak runoff flows as required by A.P.W.A. design criteria.

The peak storm runoff flows draining to the existing 60-inch C.M.P. underneath Southeast Shenandoah Drive for the existing conditions from Watersheds A and C are 13 cfs (8.3 cfs + 4.7 cfs) for the 50% storm, 30 cfs (19 cfs + 11 cfs) for the 10% storm, and 54 cfs (35 cfs + 19 cfs) for the 1% storm.

The peak storm runoff flows draining to the existing 60-inch C.M.P. underneath Southeast Shenandoah Drive after Watersheds A and C are developed and detained are 20 cfs (12 cfs + 7.8 cfs) for the 50% storm, 29 cfs (19 cfs + 9.6 cfs) for the 10% storm, and 38 cfs (27 cfs + 11 cfs) for the 1% storm. These peak flows are essentially equal to or less than the existing peak storm runoff flows from the HCA site.

The peak storm runoff flows draining to the existing 48-inch C.M.P. underneath Southeast Shenandoah Drive for the existing conditions from Watersheds B, Off-Site B-1, and Off-Site B-2 are 36 cfs for the 50% storm, 76 cfs for the 10% storm, and 119 cfs for the 1% storm. However, according to as-built street and storm sewers plans, (07-01-1993) of Ashton at Charleston Park 3rd Plat sheet 2 of 2 (Garnett Pierce, P.E.), the restricting capacity of the existing 48-inch C.M.P. between structures 6 and 7 is approximately 71 cfs. This segment of the existing 48-inch C.M.P. storm sewer is downstream of Watershed B, Off-Site B-1 Watershed, and Off-Site B-2 Watershed and it was designed to carry only a 10-year (10%) storm.

The peak storm runoff flows draining to the existing 48-inch C.M.P. underneath Southeast Shenandoah Drive after Watersheds B, Off-Site B-1, and Off-Site B-2 are developed and detained are 27 cfs for the 50% storm, 48 cfs for the 10% storm, and 73 cfs for the 1% storm. These detained peak flows are significantly less than the allowable existing peak storm runoff flows. Additional detention was provided and outflow was restricted from detention basin B to bring detention discharge as close as possible to the restricting 10% (10-year) capacity of 71 cfs in the 48-inch C.M.P. Some minor additional flow will enter the storm drainage system downstream of Shenandoah to the restricted 48-inch C.M.P. However, there was provided in the Ashton at Charleston Park 3rd Plat street and storm sewer plans cited above a note: “swale over or near the storm sewer on lots 73, 74, 77, 78, 86, 87, 108, 124, 125, and 126 to carry storm water in excess of the storm sewer capacity, to be maintained by the owners of the lots on which said swales are located”. Garnett Pierce showed on his above cited plans a 50-year (2%) storm flow of 102 cfs entering the storm sewer system at Shenandoah. This is the same point that detention basin B discharges into, moreover, the H.C.A. provided detention outflow has been reduced to 67 cfs for a 2% (50-year) storm and 73 cfs for the 1% (100-year) storm. Both of these flows are less than the system capacity Garnett Pierce provided for in the storm drainage system using pipe and swales for Ashton at Charleston Park 3rd Park.

On the next page, see Table 4 for the hydrologic summary of watersheds and Table 5 for the summary of detention release rates.

Table 4 Hydrologic Summary of Watersheds

Drainage Area Name	Drainage Area Ex. / Pr. (acres)	Existing Conditions					Developed Conditions				
		Runoff Coeff. (C/CN)	Time of Concen. (mins.)	Peak Storm Runoff (cfs)			Runoff Coeff. (C/CN)	Time of Concen. (mins.)	Peak Storm Runoff (cfs)		
				50%	10%	1%			50%	10%	1%
On-site flows draining to the existing 60-inch C.M.P. underneath Southeast Shenandoah Drive											
Watershed A	7.11 / 7.11	0.28 / 71	15.6	8.3	19	35	0.77 / 93	6.0	27	43	65
Watershed C	3.10 / 3.10	0.28 / 71	9.0	4.7	11	19	0.77 / 93	6.0	12	19	28
Total Routed On-Site Peak Flows				***12***	***29***	***53***			***20***	***29***	***38***
On-site and off-site flows draining to the existing 48-inch C.M.P. underneath Southeast Shenandoah Drive											
Watershed B	7.30 / 7.30	0.28 / 73	24.6	7.5	17	31	0.77 / 93	6.0	28	44	66
Off-Site Watershed B-1	16.66 / 16.66	0.25 / 65	30.0	8.7	25	52	0.25 / 65	30.0	8.7	25	52
Off-Site Watershed B-2	15.63 / 15.63	0.30 / 75	18.0	25	38	38	0.30 / 75	18.0	25	38	38
Total Routed On-Site and Off-Site Peak Flows				***36***	***76***	***119***			***53***	***91***	***128***

Table 5 Summary of Detention Release Rates

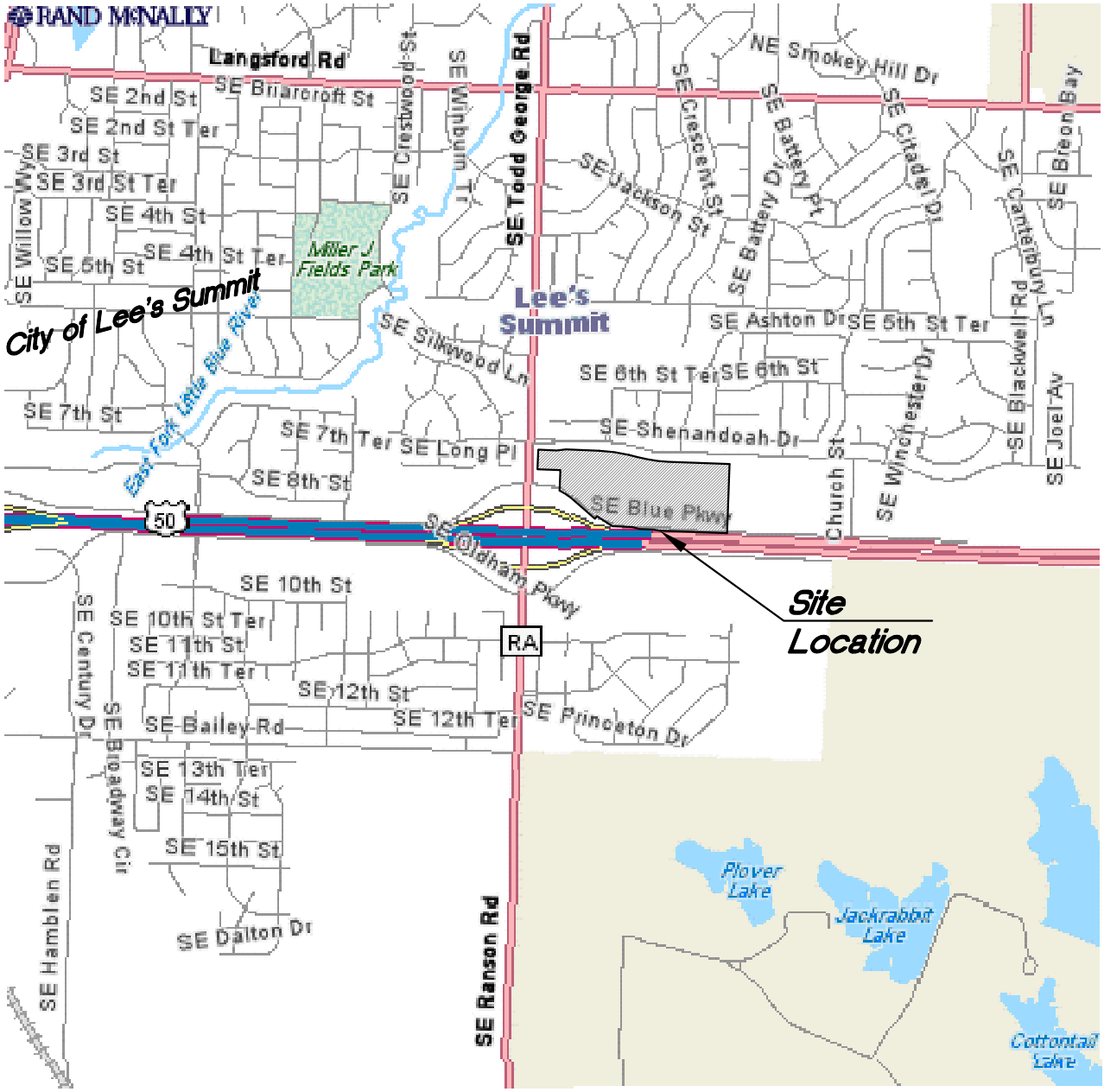
		50% Storm Peak Runoff		10% Storm Peak Runoff		1% Storm Peak Runoff			
Drainage Area Name	Detention Basin Name	Allow. Flow (cfs)	Detention Outlet (cfs)	Allow. Flow (cfs)	Detention Outlet (cfs)	Allow. Flow (cfs)	Detention Outlet (cfs)	Max. Detention Elev. (ft.)	Max. Basin Storage (ac.-ft.)
Watershed A	Basin A	8.3	12	19	19	35	27	996.25	1.09
Watershed B	Basin B	36	27	76	48	119	73	996.14	2.89
Watershed C	Basin C	5.4	7.8	11	9.6	19	11	994.66	0.37

Conclusions and Recommendations

The developed H.C.A. Lee's Summit Hospital Facility will provide peak storm flows less than, or essentially equal to, the peak flows currently discharging under the existing condition into the downstream receiving systems. The H.C.A. facility will use detention basins that will restrict the peak storm runoff flows for the developed 50% (2-year), 10% (10-year), and 1% (100-year) design storms to less than or essentially equal to the corresponding peak storm runoff flows from the undeveloped site. All calculations used for the design and preparation of this report conform with the Kansas City Metropolitan Chapter of the American Public Works Association's (A.P.W.A.) Standard Specifications and Design Criteria, including all effective and most recent supplements as adopted by the City of Lee's Summit, Jackson County, Missouri. This storm water management plan for storm water facilities on the H.C.A. Hospital site provides appropriate and effective measures to provide control of storm water runoff, detention, and release in a manner which protects the receiving systems.

List of Figures

Appendix A – Existing Conditions



2000' 0' 2000' 4000'

SCALE : 1 INCH = 2000 FEET

Project Location: NW¼ of Section 10, T47N, R31W

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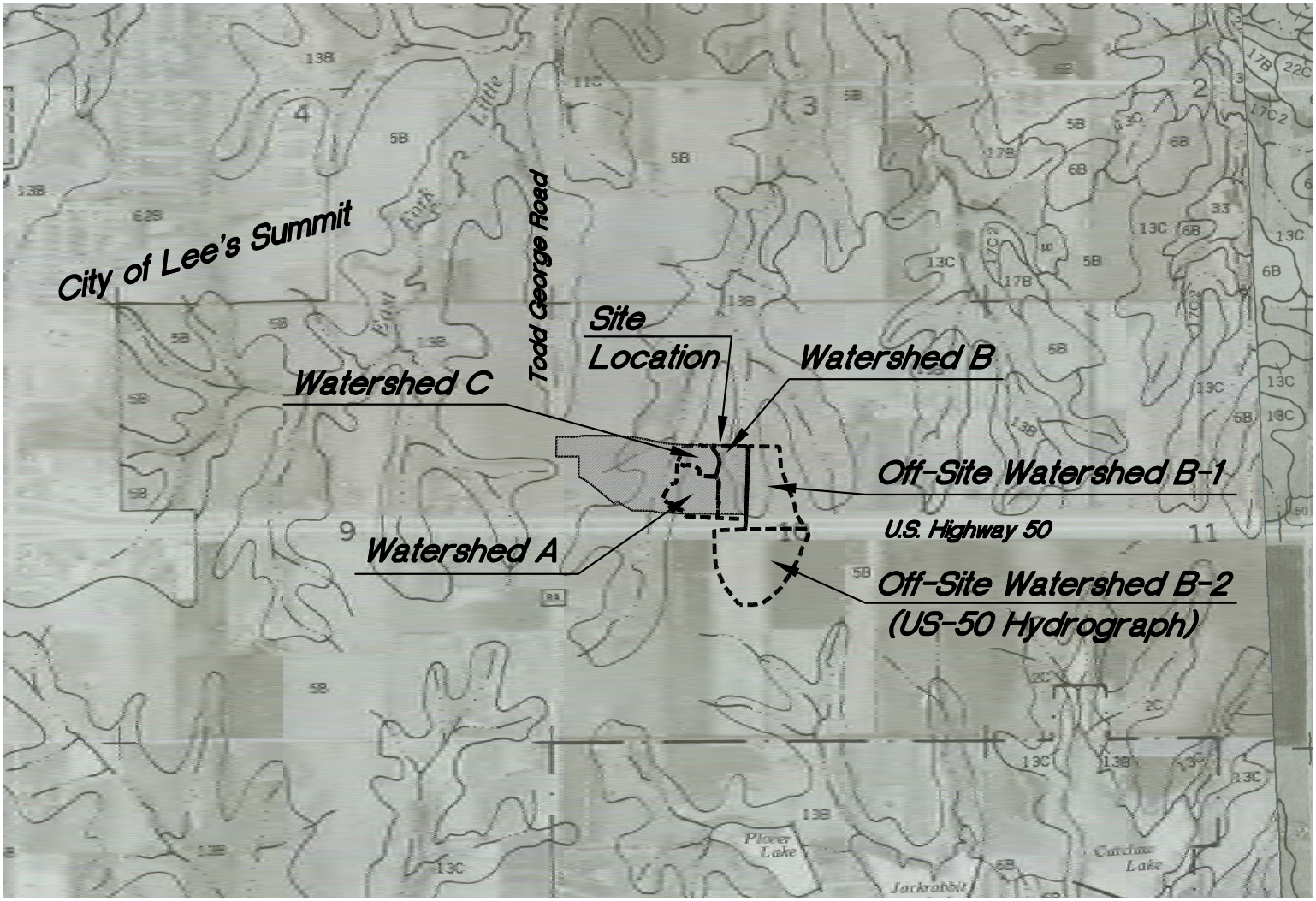
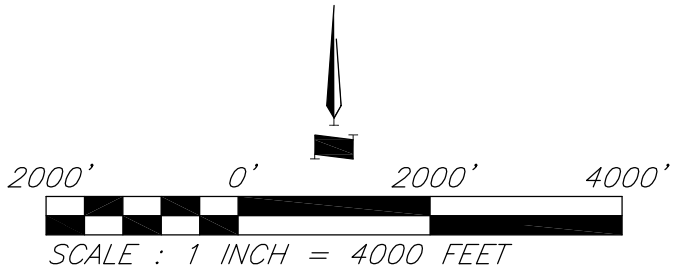
DATE 04–11–06

TITLE
LOCATION MAP
HOSPITAL CORP. OF AMERICA
LEE'S SUMMIT, MISSOURI

FIGURE
1





SOIL LEGEND:

5B - Macksburg silt loam, 2 to 5 percent slopes (Hydrologic soil group B)

13B - Sampsel silty clay loam, 2 to 5 percent slopes (Hydrologic soil group D)

Source: Soil Survey of Jackson County, Missouri United States Department of Agriculture Natural Resource Conservation Service (September 1984)

Project Location: NW¼ of Section 10, T47N, R31W

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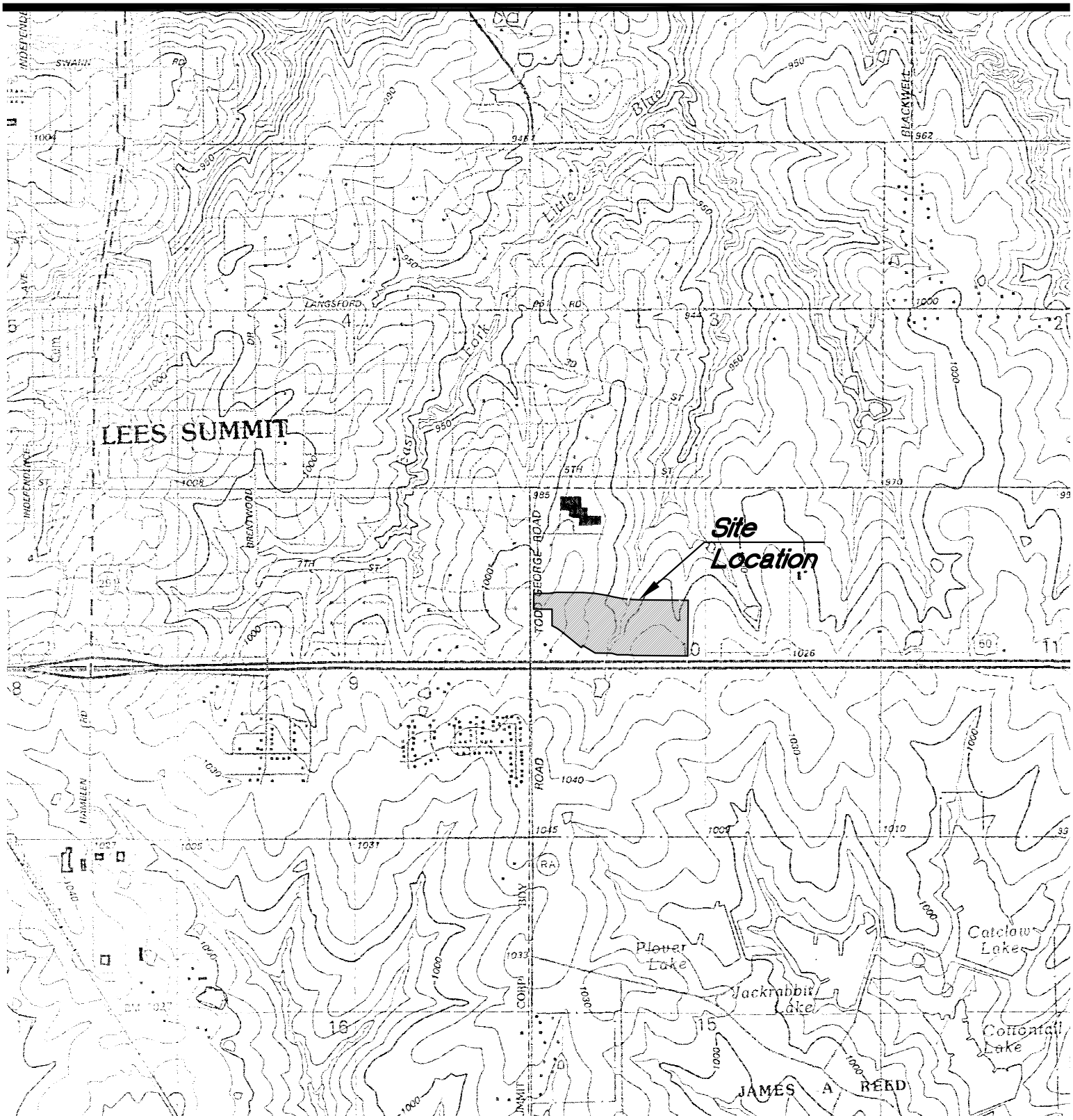
TITLE
SOILS SURVEY MAP
HOSPITAL CORP. OF AMERICA
LEE'S SUMMIT, MISSOURI

FIGURE **2**



2000' 0' 2000' 4000'

SCALE : 1 INCH = 2000 FEET

Source: USGS Quadrangle: Lake Jacomo, MO (1990)

Project Location: NW¼ of Section 10, T47N, R31W

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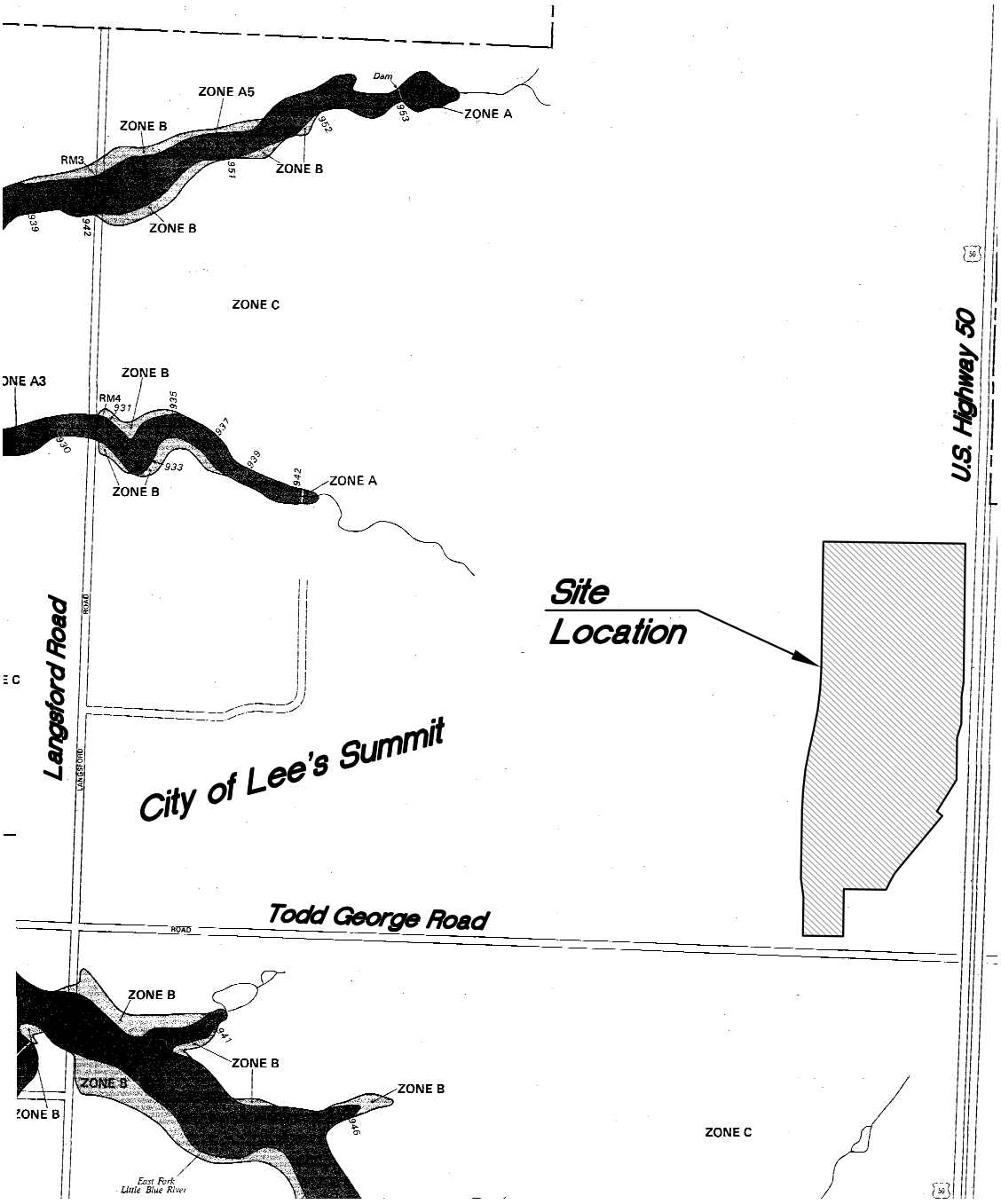
PROJECT NUMBER	TITLE	FIGURE
10367.00	*USGS TOPOGRAPHIC MAP HOSPITAL CORP. OF AMERICA LEE'S SUMMIT, MISSOURI*	**3**
DATE 04–11–06		



ZONE LEGEND:

A - Areas of 100-year flood; base flood elevations and flood hazard factors not determined.

B - Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood.

C - Areas of minimal flooding.

1000' 0' 1000' 2000'

SCALE : 1 INCH = 1000 FEET

Source: FEMA Flood Insurance Rate Map (FIRM):
City of Lee's Summit, Jackson and Cass Counties, Missouri
Community Number: 290174
Panel Number: 0007C (Number 7 of 23)
Revised Date: August 3, 1989

Project Location: NW¼ of Section 10, T47N, R31W

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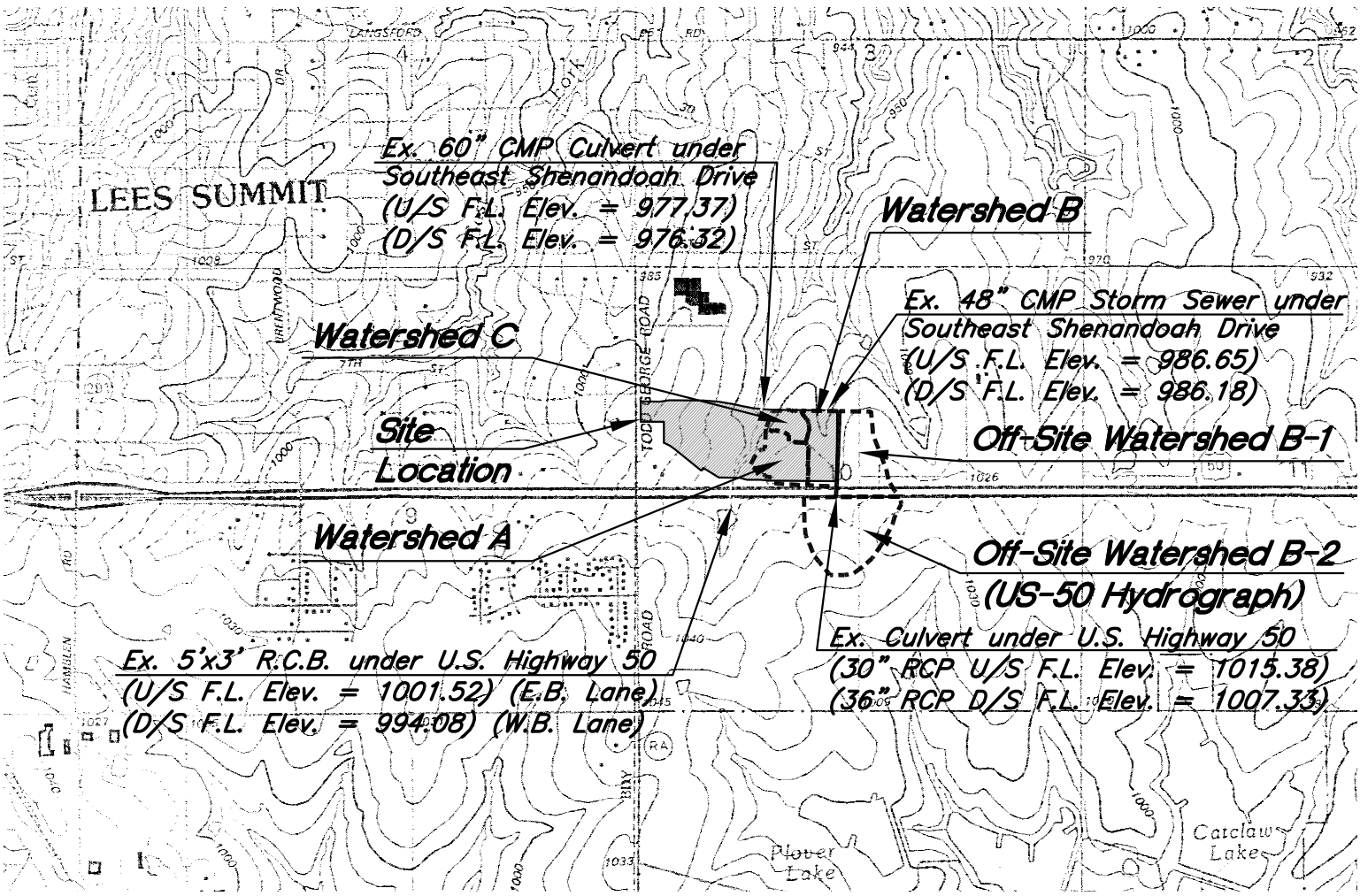
DATE 04–11–06

TITLE
F.E.M.A. F.I.R.M.
HOSPITAL CORP. OF AMERICA
LEE'S SUMMIT, MISSOURI

FIGURE **4**



Drainage Area Name	Drainage Area (ac.)	Runoff Coefficient (C/CN)	Time of Concentration (mins.)	50% Storm Peak Runoff (cfs)	10% Storm Peak Runoff (cfs)	2% Storm Peak Runoff (cfs)	1% Storm Peak Runoff (cfs)
Watershed A	7.11	0.28/71	15.6	8.3	19	29	35
Watershed B	7.30	0.28/73	24.6	7.5	17	26	31
Off-Site Watershed B-1	16.66	0.25/65	30.0	8.7	25	42	52
Off-Site Watershed B-2	15.63	0.30/75	18.0	25	38	38	38
Watershed C	3.10	0.28/71	9.0	4.7	11	16	19

Peak runoffs calculated utilizing Haestad Methods, Inc. PondPack version 9.0 computer program.

2000' 0' 2000' 4000'

SCALE : 1 INCH = 2000 FEET

Source: USGS Quadrangle: Lake Jacomo, MO (1990)

Project Location: NW¼ of Section 10, T47N, R31W

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DATE 04-11-06

TITLE
EXISTING DRAINAGE AREAS
HOSPITAL CORP. OF AMERICA
LEE'S SUMMIT, MISSOURI

FIGURE
5

Appendix B – Proposed Development

Drainage Area Name	Drainage Area (ac.)	Runoff Coefficient (C/CN)	Time of Concentration (mins.)	50% Storm Peak Runoff (cfs)	10% Storm Peak Runoff (cfs)	2% Storm Peak Runoff (cfs)	1% Storm Peak Runoff (cfs)
Watershed A	7.11	0.28/71	15.6	8.3	19	29	35
Watershed B	7.30	0.28/73	24.6	7.5	17	26	31
Off-Site Watershed B-1	16.66	0.25/65	30.0	8.7	25	42	52
Off-Site Watershed B-2	15.63	0.30/75	18.0	25	38	38	38
Watershed C	3.10	0.28/71	9.0	4.7	11	16	19

Peak runoffs calculated utilizing Haestad Methods, Inc. PondPack version 9.0 computer program.

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PROPOSED FACILITY FOR:

HCA LEE'S SUMMIT

BLACK & VEATCH DRAINAGE AREA NO. 64
AND THE SOUTH PORTION OF THE PROPOSED HCA HOSPITAL SITE
LEE'S SUMMIT, JACKSON COUNTY, MISSOURI

REVISION

PROJECT NUMBER

DATE
April 12, 2006

DESIGNED
RGZ
DRAWN
RGZ
REVIEWED
AGL

SHEET TITLE

CITY PROVIDED CONTOURS WITH PROPOSED HCA HOSPITAL LAYOUT

SHEET NUMBER
C1

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G:\10367\10367Ldet\dwg\Civil\Stormwater Management Plan Exhibits\10367C2101.dwg Layout: City Contours -- Wednesday April 12, 2006, 3:00pm -- Copyright 2006, George Butler Associates, Inc.

C:\103672\103672Cdet1.dwg\Civil\Stormwater Management Plan Exhibits\103672C2101.dwg Layout: GBA Contours -- Wednesday April 12, 2006, 3:00pm -- Copyright, 2006, George Butler Associates, Inc.

Drainage Area Name	Drainage Area (ac.)	Runoff Coefficient (C/CN)	Time of Concentration (mins.)	50% Storm Peak Runoff (cfs)	10% Storm Peak Runoff (cfs)	2% Storm Peak Runoff (cfs)	1% Storm Peak Runoff (cfs)
Watershed A	7.11	0.28/71	15.6	8.3	19	29	35
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Watershed C	3.10	0.28/71	9.0	4.7	11	16	19

Peak runoffs calculated utilizing Haestad Methods, Inc. PondPack version 9.0 computer program.

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PROPOSED FACILITY FOR:

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SHEET TITLE

GBA GENERATED CONTOURS WITH PROPOSED HCA HOSPITAL LAYOUT

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