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FORT KNOX, KENTUCKY

TERRAIN ANALYSIS

PREPARED BY

DAMES AND MOORE, WASHINGTON, DC

UNDER THE DIRECTION OF

THE TERRAIN ANALYSIS CENTER

US ARMY ENGINEER TOPOGRAPHIC LABORATORIES

FORT BELVOIR, VIRGINIA 22060

MARCH 1979

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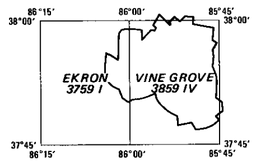
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UNDER THE DIRECTION OF

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US ARMY ENGINEER TOPOGRAPHIC LABORATORIES

FORT BELVOIR, VIRGINIA 22060

CONTRACT NUMBER DACA 87-78-C-0276

MARCH 1979

I. INTRODUCTION

BACKGROUND

The requirement for this terrain analysis of Fort Knox was validated by the Assistant Chief of Staff for Intelligence, Department of Army, included in the five-year Terrain Analysis Program, and assigned as part of the program element, "Terrain Analysis of Selected CONUS Army Installations." Responsibility for management and supervision of this program element developed in response to FORSCOM and TRADOC requirements, was assigned to the Terrain Analysis Center (TAC), U.S. Army Engineer Topographic Laboratories. TAC responsibility also includes technical supervision and direction of designated troop units assigned to the program.

Scope and content of the topical coverage included in the terrain analyses of selected CONUS installations were developed jointly between representatives of TAC and FORSCOM, and later concurred in by TRADOC.

This study was prepared by Dames & Moore, Washington, DC,(Contract No. DACA 87-78-C-0276) under the direction of TAC.

PURPOSE

The major purpose of the program is to assist military planners in future stationing decisions. To achieve this purpose, planners must obtain an appreciation of the on-post terrain that includes among other things, knowledge of the suitability for conducting field training exercises involving maneuverability of troops and military vehicles. The degree of maneuverability that can be achieved is a function of several terrain factors including slope, surface configuration, soils, vegetative cover, and surface drainage, all of which are treated in the studies.

Planners concerned with troop stationing also need certain off-post information such as statistics on housing, schools, hospitals, and public utilities in urban areas near installations, as well as pertinent data on airfields and ports in the vicinity. These items are also treated in the studies.

Because the program under which this study was prepared is intended to serve troop stationing requirements, the support provided by the program to environmental requirements is only incidental. Some of the information contained in the studies may be useful as environmental baseline data, but the studies are by no means complete environmental inventories of the kind required in support of environmental impact assessments.

SCOPE

In scope, the terrain analysis is a compendium of available data on the pertinent natural and manmade features of the reservation and an evaluation of their effects on tactical military operations. The program does not include basic research to fill gaps in these data although some short term field investigations were performed to obtain ground truth and a general overall appreciation of terrain elements. Therefore, the scope of the analysis is limited primarily to those factors which have been documented by other authorities and to the results of analysis and evaluation of those factors by senior terrain analysts for topics such as cross-country movement, cover and concealment, and water resources.

The terrain analysis preparation process has necessarily involved analytical judgment in the selection of pertinent source data, resolution of data conflicts, recognition of interrelationships not previously made explicit, and the application of remote sensing to update certain critical, time-variant data such as vegetative cover and manmade features including roads, airfields, and facilities constructed outside of the cantonment areas.

LIMITATIONS

The study naturally reflects limitations in the quality, amount, and currency of the source data on which it is based. Numerous field interviews and selective use of remote sensing were employed in an effort to assure presentation of the latest and best information. Within the relatively complex topical scope of the analysis, however, there are a number of aspects on which source data have not been generated with the focus or recency desired to meet objectives fully. As noted under Scope, the study effort was not designed to include basic research as a means of filling gaps in data.

By design, the presentation is cast at a level of data coverage consistent with stated objectives. Users interested in deeper pursuit of data are referred to the List of Sources in the back of the study.

PRESENTATION

Maximum use of graphic presentation has been made throughout the terrain analysis. Supporting text is, as far as practicable, in tabular format keyed to the related graphics which follow. The primary map scale is 1:50,000. For Urban Area (Cantonment Area), the scale of the map is 1:14,400 and for Off-Post Features the map scale is 1:1,000,000.

STUDY AREA

The Fort Knox military reservation is in north-central Kentucky, approximately 48 kilometers (30 miles) south of Louisville. The reservation extends approximately 23 kilometers (14 miles) north-south and 26 kilometers (16 miles) east-west at its widest point, and covers an area of approximately 44,534 hectares (110,000 acres). It includes parts of three counties -- Bullitt in the east, Hardin in the central and west-central portions, and Meade on the western edge. U.S. Highway 31W extends southeasterly through the western part of the reservation.

The Fort Knox military reservation lies within portions of the Mississippian Plateau and Blue Grass sections of the Interior Low Plateaus Province. The Mississippian Plateau section, which occupies the central and western parts of the reservation, is locally known as the Pennyroyal plain. Its characteristic rolling upland of generally low to moderate relief, is broken to the east along the border of the Salt River-Rolling Fork where the terrain is deeply dissected and the slopes are relatively steep. The eastern part of the reservation is in the Blue Grass section, locally called the Knobs. This is an area of rounded, steep-sided ridges of generally moderate relief. The highest elevation is 302 meters (990 feet) on a ridgetop at Dawson Knob near the eastern edge of the reservation. The lowest elevation is 116 meters (380 feet) in the flood plain of the Ohio River at Hughes Landing in the northwestern corner of the reservation. Major streams on the reservation flow generally north-northwesterly into the Ohio River, which forms part of the extreme northwestern boundary of the reservation. Drainage in the western part of the reservation is dominantly subsurface, with most streams draining into solution depressions in the underlying limestone.

The climate of the area is temperate with warm, humid summers and cool winters. The mean annual precipitation ranges from 102 to 127 centimeters (40 to 50 inches); the highest amount of precipitation occurs in the early spring and midsummer. Vegetation varies from short grass and scrub-covered plains to densely forested hills and ridgetops. Selective timber harvesting occurs in portions of the reservation, and second growth woods are scattered throughout the area.

II. DESCRIPTION AND MILITARY ASPECTS OF TERRAIN

A. SURFACE CONFIGURATION

Fort Knox lies within portions of the Mississippian Plateau and Blue Grass sections of the Interior Low Plateaus Province. The Mississippian Plateau section, locally known as the Pennyroyal plain, occupies the western and central parts of the reservation. The eastern part of the reservation is within the outer flank of the Blue Grass section, locally called the Knobs. The boundary between these two sections is marked by a series of north-northwesterly trending escarpments which extend across the eastern portion of the reservation, roughly paralleling the Salt River-Rolling Fork alluvial plain.

The western, west-central, and extreme eastern parts of Fort Knox are characterized by low plains, consisting of flat to gently rolling upland and alluvial surfaces drained by northwesterly flowing tributaries of the Ohio River. The upland surface, which characterizes most of the western part of the reservation, is gently rolling to undulating and contains numerous sinkhole depressions developed in the underlying limestone. The alluvial plains, occupied by the Salt River, Rolling Fork, and Ohio River, are generally flat.

Flanking the Salt River-Rolling Fork alluvial low plains in most of the central and eastern parts of the reservation are gently to strongly rolling and locally deeply dissected high plains interrupted by a series of limestone-capped escarpments. The rounded, steep-sided ridges have generally moderate relief.

LANDFORM TYPE	LANDFORM DESCRIPTION AND DISTRIBUTION	ELEVATIONS
1. LOW PLAINS	The gently rolling upland surface in the western portion of the reservation is characterized by numerous circular to elliptical sinkhole depressions and similar solution channel openings underlain by limestone. Sinkhole depressions average 60 m (195 ft) in diameter; their depth is generally less than 10 m (33 ft). This karst topography typically exhibits few surface streams, which flow into sinkholes and join the underground drainage system. Slopes are largely between 3 and 8 percent; in sinkhole depressions, slopes are predominantly between 15 and 30 percent. Local relief in the western part of the reservation is generally less than 10 m (33 ft). The cantonment area, in the west-central portion of the reservation, is situated on a gently rolling, partially dissected upland surface that extends north to the bluffs of the Ohio River valley. Numerous sinkhole depressions, similar to those in the western portion of the reservation, occur throughout this upland surface. Slopes are predominantly 3 to 8 percent. Along the moderately dissected alluvial terraces in the extreme northwest corner of the reservation, slopes can be as high as 15 percent. Local relief is largely between 10 and 20 m (33 and 66 ft), except southeast of Snow Mountain, where local relief is as high as 40 m (131 ft). Nearly flat alluvial plains predominate in the eastern portion of the reservation along Rolling Fork, the Salt River, and their northwesterly flowing tributaries, Mill and Cedar Creeks. The most extensive, nearly flat alluvial surface, locally called Hays Flats, is in the southeast (grid reference 050920) and is drained by Rolling Fork. Another large, flat alluvial surface, locally called Glenn Meadows (grid reference 047985), is drained by the Salt River. Slopes are largely less than 3 percent, with slopes of 3 to 8 percent occurring locally along the banks of the major streams. Local relief is generally less than 1 m (3.3 ft); incised stream channels, locally, are as much as 10 m (33 ft) deep. Two isolated areas in the southeastern portion of the reservation, largely within the Mill Creek and Cedar Creek watersheds, occupy gently rolling, moderately dissected upland surfaces bounded by steep-walled, narrow valleys. Slopes range from 3 to 8 percent; local relief is predominantly 10 to 20 m (33 to 66 ft).	Elevations in the upland surface range largely between 210 and 250 m (689 and 820 ft) above sea level. Elevations on the alluvial plains range largely between 120 and 140 m (394 and 459 ft); lowest elevations occur along the Ohio River, Salt River, and Rolling Fork. The lowest elevation on the reservation, approximately 116 m (380 ft), occurs along the banks of the Ohio River near Hughes Landing (grid reference 853021). The highest elevation, approximately 251 m (823 ft), is in the upland surface in the southeastern corner of the reservation (grid reference 058866).
2. HIGH PLAINS	Strongly rolling, moderately dissected terrain characterizes the bluffs adjacent to the Ohio River alluvial plain and the lower portion of Otter Creek in the western part of the reservation. Upland plains of moderate relief also occupy a relatively narrow, northeasterly trending zone around Snow Mountain. Slopes are largely between 15 and 30 percent. Steep bluffs along stream valleys have slopes as high as 60 percent and occasionally exceeding 100 percent. Local relief ranges from 60 to 80 m (197 to 262 ft). The central portion of the reservation, extending from the eastern periphery of the cantonment area east to the Salt River and Rolling Fork, is a moderately to strongly rolling upland. Near the cantonment area the upland is moderately rolling and less dissected than the strongly rolling, deeply dissected terrain immediately west of the Salt River and Rolling Fork, with its scattered limestone-capped escarpments. Slopes are largely between 8 and 15 percent, occasionally exceeding 45 percent in narrow, steep-sided valleys and 100 percent along rocky escarpments. Local relief is predominantly between 60 and 100 m (197 and 328 ft). Gently to strongly rolling, locally deeply dissected upland plains predominate in the east-central and extreme eastern portions of the reservation. Between Hays Flats and Glenn Meadows, and in the area north of the Salt River, there are numerous rugged, deeply dissected, steep-sided ridges. Slopes are largely between 30 and 45 percent; however, slopes often exceed 45 percent in narrow, deeply dissected valleys and along steep-sided, rounded ridges. Slopes locally exceed 100 percent along a series of limestone-capped escarpments, such as those near Jeff Lee Ridge, Dawson Knob, Dug Hill, and Chappel Ridge; these escarpments extend from the southeast to the north-central portion of the reservation. Local relief is largely between 70 and 100 m (230 and 328 ft). Maximum local relief is approximately 150 m (492 ft) near Dawson Knob.	Elevations range largely between 150 and 250 m (492 and 820 ft) above sea level. The lowest elevation, approximately 140 m (459 ft), occurs in the valley of Otter Creek (grid reference 853965). The highest elevation is approximately 302 m (990 ft) on Dawson Knob (grid reference 066976).

B. SURFACE DRAINAGE

Fort Knox is in the Ohio River drainage basin. Approximately 70 percent of the reservation is in the Salt River basin, a major Ohio River tributary. Although most of the Salt River basin is east of Fort Knox, the confluence of the Salt River and Rolling Fork, its principal tributary, is on the reservation. Most of the drainage basins of Mill Creek and Cedar Creek, north-flowing tributaries to Salt River and Rolling Fork, respectively, are also within the reservation. The Salt River joins the Ohio River at West Point, just north of the reservation.

The western portion of Fort Knox is in the Otter Creek basin, also an Ohio River tributary. Karst topography in the western portion of the reservation impacts surface drainage since there are numerous sinkholes and areas where drainage is primarily internal. These characteristics make it difficult to determine the limits of the Mill and Otter Creek basins; actual drainage areas may be 20 to 30 percent larger than known surface drainage areas. Surface runoff not flowing directly to streams is concentrated in sinkholes and eventually reaches the Ohio River, or its tributaries, through underground channels and springs. Intermittent ponds may form in sinkholes during wet periods or if the drainage is temporarily clogged.

The Ohio River forms a portion of the northwest reservation boundary and is a major, controlled, inland waterway. Cannelton Locks and Dam, 123 kilometers (95 miles) downstream of Salt River, and McAlpine Locks and Dam, 39 kilometers (24 miles) upstream at Louisville, are the two closest parts of the Ohio River system of locks, dams, and reservoirs. In addition to navigation, the system provides flood control sufficient to substantially reduce flood crests. At West Point, the unregulated flood of January 1937 reached a crest elevation of 138 meters (454 feet) and was estimated to have a return period of about 150 years; with regulation, current 100- and 500-year flood elevations would be 135 and 137 meters (443 and 449 feet), respectively. Ohio River floods near Fort Knox generally are the result of widespread storms over Pennsylvania, Ohio, and West Virginia. Although flooding presents little problem to the cantonment area, the Salt River, Rolling Fork, and the lower reaches of Mill, Cedar, and Otter Creeks may be in flood stage a week or more due to Ohio River backwater. Trafficability at these stream crossings could be severely limited during flooding.

The Salt River and its tributaries are subject to large-scale fluctuations in flow due to lack of base flow. During drought, flow in the streams may fall to or near zero. However, flow and depth increase rapidly following rainfall. Otter Creek also rises quickly following rainfall, but has more underground drainage which maintains better base flow.

There are no stream gages on Fort Knox, however, gages are maintained by the U.S. Geological Survey at the following locations: McAlpine Locks and Dam on the Ohio River at Louisville; at the State Route 61 bridge over the Salt River at Shepherdsville; and at the U.S. Highway 62 - State Route 61 bridge over Rolling Fork near Boston. Mean annual discharges presented below for these streams and locations are average discharges for the period of record, while those for ungaged streams were calculated using U.S. Geological Survey methods. Also presented are estimated discharges of 10-, 25-, 50-, and 100-year floods. Ohio River flood discharges were obtained from the U.S. Army Engineer District, Louisville, KY; U.S. Geological Survey analyses and drainage area calculations were used to calculate flood discharges for the other streams.

There are 30 lakes on the reservation, 28 of which are maintained for recreation and wildlife management. McCraken Spring Reservoir also serves as a water supply source for Fort Knox. Many of the lakes are old farm ponds which were formed behind low earth dams or by shallow excavation.

There are no swamps or marshes on the reservation, but sinkholes and the broad flood plains could be expected to contain water in spring or following heavy rains.

DRAINAGE CHARACTERISTICS

DRAINAGE CATEGORY	GENERAL	REGIME	WIDTH	DEPTH	VELOCITY AND DISCHARGE	BANKS	BOTTOM
WATERCOURSES							
Ohio River	A major perennial stream flowing in a well-defined channel with broad flood plain. The pool at Fort Knox is maintained by the Cannelton Dam.	High water, December through April. Low flows regulated by system of dams and reservoirs. Thin layers of ice may form in January or February, occasionally in December or March.	Normal pool is 350 to 600 m (1200 to 2000 ft); up to 2000 m (6500 ft) in high water.	Normal pool at West Point is 8 m (25 ft); high water is 25 m (80 ft). Minimum of 2.7 m (9 ft) in navigation channel.	Regulated by upstream and downstream dams. At Louisville, 36.9 km (22.9 mi) upstream of Salt River, maximum discharge for period of record was 31,400 m^3/sec (1,110,000 ft^3/sec) on 26-27 January 1937. Minimum was 59.5 m^3/sec (2100 ft^3/sec) on 12 August 1930. Average discharge is 3217 m^3/sec (113,600 ft^3/sec).	Silt and clay, generally 9 to 12 m (30 to 40 ft) high and steep, reaching 45° in many areas. Low rolling flood plains rise slowly to valley walls.	Silt, sand, and gravel, with gentle gradient.
Salt River	A perennial stream in a well-defined channel with broad flood plain. In places, stream is bounded on one side by steep valley walls. Drains into Ohio River at West Point.	High water, December through April; low water, August through October. Subject to wide variations in flow due to rapid runoff and lack of base flow. Thin ice may form in January or February.	Generally over 25 m (80 ft). In high water, up to 3000 m (10,000 ft) above, and up to 1600 m (5200 ft) below Rolling Fork.	Normal range is 3 to 4.5 m (10 to 15 ft); high water up to 16 m (53 ft).	At Shepherdsville, 4 km (2.4 mi) northeast of the reservation, maximum discharge for period of record was 2210 m^3/sec (78, 200 ft^3/sec) on 10 March 1964 with velocities up to 2.2 m/sec (7.2 ft/sec). Backwater flooding from Ohio River 11 March 1964 reduced velocity to 1.3 m/sec (4.2 ft/sec) and discharge to about 1120 m^3/sec (40,000 ft^3/sec) with no significant change in stage. Maximum gage height resulted from Ohio River backwater in January 1937. Ohio River floods may cause water to flow upstream in lower reaches. There is no flow at times. Average discharge is 43.3 m^3/sec (1529 ft^3/sec).	Silty clay, 6 to 9 m (20 to 30 ft) high and steep, generally over 30°. Broad, flat flood plains above channel extend to valley walls.	Silt and silty clay; average slope is 0.95 m/km (5 ft/mi).
Mill Creek	A small perennial stream meandering through a narrow, steep-walled valley; angular drainage pattern reflects control by surface bedrock. Sinkhole areas to the west probably contribute to streamflow, but limits of basin not easily determined. Drains most of cantonment area; joins Salt River below Rolling Fork.	High water, December through April; low water, August through October. Subject to wide variations in flow due to rapid runoff and lack of base flow. Ice usually forms in January or February for one to two weeks.	Generally 3 to 9 m (10 to 30 ft). In high water, 24 to 30 m (75 to 100 ft) with some areas up to 90 m (300 ft).	Generally less than 0.6 m (2 ft). In high water, Ohio River backwater affects lower reaches. May be dry with scattered pools in low water.	Velocity is fairly high and increases quickly with flow. Lower reaches subject to backwater flooding from Salt and/or Ohio Rivers. Low flows at or near zero.	Rock, sand, and silty clay, generally 1.5 to 3 m (5 to 10 ft) high with steep slopes subject to erosion on outside of meanders.	Varies from bedrock and boulders to gravel, sand, and silty clay. Gradient averages 3 m/km (16 ft/mi) above, and 0.91 m/km (4.8 ft/mi) below Porter River Range Road.

B. SURFACE DRAINAGE (Continued)

DRAINAGE CHARACTERISTICS (Continued)

DRAINAGE CATEGORY	GENERAL	REGIME	WIDTH	DEPTH	VELOCITY AND DISCHARGE	BANKS	BOTTOM
Rolling Fork	A perennial stream in a well-defined channel with broad flood plain. In places, stream is bounded on one side by steep valley walls. Drains nearly 50 percent of Salt River basin; joins Salt River at Pitts Point.	Same as Mill Creek.	Generally 15 to 25 m (50 to 80 ft). In high water, up to 2000 m (6500 ft).	Normally about 2.5 m (8 ft); high water up to 15 m (50 ft).	Near Boston, 8 km (4.8 mi) southeast of the reservation, maximum discharge for the period of record was 1430 m^3/sec (50,500 ft^3/sec) on 30 April 1970. Maximum gage height was a result of Ohio River backwater in January 1937. Minimum was 0.01 m^3/sec (0.4 ft^3/sec) on 20 October 1939 and many days of September and October 1953. Average discharge is 49.2 m^3/sec (1737 ft^3/sec). Normal flow velocities are low.	Silty clay, 7.5 to 9 m (25 to 30 ft) high and steep, generally over 30°. Broad flood plains extend to valley walls.	Sand and silty clay; slope is 1.1 m/km (6 ft/mi).
Cedar Creek	A small perennial stream meandering through a relatively broad valley. Tributary to Rolling Fork.	Same as Mill Creek.	Generally 4.5 to 7.5 m (15 to 25 ft).	Generally less than 1 m (3 ft). In high water, Ohio River backwater affects lower reaches. May be dry with scattered pools in low water.	Velocity is moderate, but rises quickly with flow. Lower reaches subject to backwater flooding from Rolling Fork. Low flows at or near zero.	Silty clay in lower reaches; gravel, sand, and silty clay in upper reaches; steep, but generally less than 2 m (6 ft) high. In places, undercut on outside of meanders.	Gravel and silty clay in lower reaches; gravel, sand, and silty clay in upper reaches. Gradient gentle downstream and moderate upstream.
Otter Creek	A small perennial stream meandering through a narrow valley with many bluffs along the lower reaches. In places, stream has distinct angular pattern reflecting control by surface bedrock. Sinkholes and subsurface drainage maintain flow, but limits of basin not known. Tributary to Ohio River.	High water, December through April; low water, August through October. Subject to wide variations in flow due to rapid runoff with base flow maintained by subsurface drainage. Ice may form on deeper pools in January or February.	Generally 6 to 15 m (20 to 50 ft). In high water up to 30 m (100 ft), but wider where valley widens.	Generally less than 1 m (3 ft). In low water, shallow pools less than 0.6 m (2 ft) deep form between riffles. Some deeper pools in lower reaches.	Velocity is normally fairly high and rises with flow such that headwater floods are of short duration.	Silt in lower reaches; gravel, sand, and silt in upper reaches; 0.6 to 2 m (2 to 6 ft) high in wider parts of valley. Cliffs and low bluffs rise from water in places along the lower reaches.	Bedrock, boulders, and gravel. Gentle to moderate gradient.
Other Streams	Mostly intermittent streams in deeply dissected valleys.	Streamflow occurs during snowmelt or intense or extended rainfall.	Generally narrow, less than 6 m (20 ft).	Probably would not exceed 2 m (6 ft) during most intense storms.	Velocities would be fairly high when flowing.	Variations of gravel, sand, and silt.	Variable, with moderate to steep slopes. Gentle to moderate gradients.

STANDING BODIES OF WATER

Reservoirs
(See table below.)

RESERVOIRS

MAP NUMBER	NAME	GRID REFERENCE	APPROXIMATE WATER SURFACE AREA AT CAPACITY hectares	(acres)	CONSTRUCTION AND USE*
W1	Carpenter	855034	1.6	(4)	Earth dam, vegetated spillway.
W2	West Point Wells	899043	0.8	(2)	Farm pond.
W3	Crystal	885014	1.6	(4)	Earth dam, concrete spillway.
W4	Ordnance	893010	0.8	(2)	Earth dam, vegetated spillway.
W5	Muldraugh	904007	0.8	(2)	Sinkhole pond.
W6	Dickerson	891973	0.8	(2)	Farm pond.
W7	Basham's Pond	839955	0.4	(1)	Farm pond.
W8	Carlson	854956	6.5	(16)	Earth dam, concrete riser and rock emergency spillway.
W9	Mudpuppy	881964	0.4	(1)	Farm pond.
W10	McCraken Spring	854941	0.4	(1)	Concrete dam and spillway; used for water supply and as a trout nursery.
W11	Tobacco Leaf	894926	2.4	(6)	Earth dam, vegetated spillway.
W12	Sawmill	943935	0.4	(1)	Farm pond.
W13	Pitts Point	018980	0.8	(2)	Farm pond.
W14	No name	061997	0.4	(1)	Farm pond.
W15	Pearl Pond	063008	0.8	(2)	Farm pond.
W16	Wilcox	070017	8.1	(20)	Earth dam, 91 cm (36 in) concrete pipe for high level discharge.
W17	Wilcox Three	068026	1.2	(3)	Earth dam, vegetated spillway.
W18	Duck	078031	14.2	(35)	Earth dam, concrete spillway.
W19	Marcum	084032	0.8	(2)	Farm pond.
W20	Cundiff	088021	0.8,	(2)	Farm pond.
W21	Zazios	078020	1.2	(3)	Farm pond.
W22	Hudic	074012	1.2	(3)	Farm pond.
W23	Woods	073005	0.8	(2)	Farm pond.
W24	Glenwells Pond	068000	0.8	(2)	Farm pond.
W25	Lebanon Junction	097887	3.6	(9)	Earth dam, vegetated spillway.
W26	Upper Douglas	992857	10.1	(25)	Earth dam, 76 cm (30 in) concrete riser to control normal flow, rock emergency spillway.
W27	Lower Douglas	980866	24.3	(60)	Earth dam, 91 cm (36 in) concrete riser to control normal flow, rock emergency spillway.
W28	Sanders Spring	942906	12.2	(30)	Earth dam, 76 cm (30 in) concrete riser to control normal flow, rock emergency spillway.
W29		938897	1.2	(3)	Earth dam - no additional data.
W30		938895	1.6	(4)	Earth dam - no additional data.

* All lakes are used for recreation and wildlife management unless otherwise noted.

DISCHARGES

NAME OF STREAM AND LOCATION	DRAINAGE AREA km²	(mi²)	MEAN ANNUAL DISCHARGE* m³/sec	(ft³/sec)	DISCHARGE AT 10-YR FLOOD m³/sec	(ft³/sec)	DISCHARGE AT 25-YR FLOOD m³/sec	(ft³/sec)	DISCHARGE AT 50-YR FLOOD m³/sec	(ft³/sec)	DISCHARGE AT 100-YR FLOOD m³/sec	(ft³/sec)
Ohio River at Louisville	236,130	(91,170)	3217	(113,600)	18,100	(640,000)	20,900	(740,000)	22,600	(800,000)	24,500	(865,000)
Salt River at Shepherdsville	3100	(1197)	43.3	(1529)	1310	(46,400)	1580	(55,700)	1770	(62,600)	1970	(69,600)
Mill Creek near mouth	119	(46)	1.56	(55)	221	(7820)	282	(9950)	328	(11,600)	376	(13,300)
Rolling Fork near Boston	3364	(1299)	49.19	(1737)	1230	(43,600)	1460	(51,700)	1620	(57,400)	1780	(62,900)
Cedar Creek near mouth	46.3	(18)	0.59	(21)	128	(4510)	151	(5320)	176	(6230)	203	(7170)
Otter Creek near mouth	163	(63)	2.21	(78)	274	(9670)	348	(12,300)	405	(14,300)	464	(16,400)

*Average discharges from gaging stations for the Ohio River, Salt River, and Rolling Fork; estimated for Mill, Cedar, and Otter Creeks.

FORDS

MAP NUMBER	GRID REFERENCE	BOTTOM	APPROXIMATE DEPTH meters (feet)	APPROXIMATE WIDTH meters (feet)	REMARKS
F1	880923	Gravel	0.15 (0.5)	3.7 (12)	All four-wheel drive and tracked vehicles. One ford on either side of wooden bridge.
F2	893916	Silty clay	0.15 (0.5)	2.4 (8)	All four-wheel drive and tracked vehicles.
F3	954932	Silty clay	0.45 (1.5)	6.1 (20)	Tracked vehicles. Downstream of bridge.
F4	948909	Limestone	0.3 (1)	4.6 (15)	All four-wheel drive and tracked vehicles.
F5	974871	Concrete	0.3 (1)	4.6 (15)	All four-wheel drive and tracked vehicles. Downstream of culvert.
F6	998873	Silty clay	0.15 (0.5)	1.8 (6)	All four-wheel drive and tracked vehicles. Downstream of culvert.
F7	024893	Concrete	0.3 (1)	3.7 (12)	All four-wheel drive and tracked vehicles.
F8	028874	Concrete	0.15 (0.5)	3 (10)	All vehicles.
F9	009009				No data

FORT KNOX, KENTUCKY
TERRAIN ANALYSIS

SURFACE CONFIGURATION

1. **LOW PLAINS** — Flat to gently rolling plains; local relief generally less than 40 m; slopes predominantly between 0 and 8%.

2. **HIGH PLAINS** — Gently to strongly rolling and locally deeply dissected uplands; local relief is largely between 60 and 100 m; slopes predominantly between 8 to 15% on upland surfaces and 30 to 45% along stream valleys. Slopes on scattered limestone escarpments may exceed 100%.

Escarpment (slope > 100%)

Through cut (>2 m)

NOTE: Barbs and hachures point downslope.

SURFACE DRAINAGE

Watercourse Width

- > 25 m
- 15-25 m
- 10-15 m
- 3-10 m
- < 3 m

Concrete Dam

Earth Dam

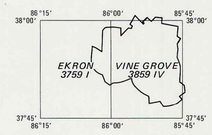
F9 — Ford

W30 — Lake, Reservoir

2m / 80° — Bank height (meters) / Bank slope (degrees)

NOTES: Number refers to entry in table.
Numerous ponds shown on map occupy sinkhole depressions and are intermittent.

1:50,000 SHEET INDEX
Series V753



Scale 1:50,000

1000 500 0 1000 2000 3000 4000 5000 Meters

1 ½ 0 1 2 3 Statute Miles

CONTOUR INTERVAL 10 METERS
SUPPLEMENTARY CONTOURS 5 METERS

Prepared by Dames & Moore, Washington, DC, under the direction of the Terrain Analysis Center, U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia. March 1979.

C. WATER RESOURCES

1. SURFACE WATER

The surface water resources of Fort Knox have been analyzed from streamflow records for the Ohio River, Salt River, Rolling Fork, and Otter Creek. Mill Creek and Cedar Creek were evaluated on the basis of regional streamflow data. Surface water categories were determined from the analysis of 7-day, 10-year low flow records for each of the major streams.

Fresh water is perennially plentiful from the Ohio River and Otter Creek, and to a lesser extent, from the Salt River and Rolling Fork. The Ohio River and Otter Creek can supply very large to enormous quantities of water, even during periods of low flow. The Salt River and Rolling Fork generally can supply large quantities of water throughout the year; however, these streams experience large fluctuations in streamflow. Fresh water is seasonally plentiful from Mill Creek and Cedar Creek. Tributaries to the major streams are generally poor sources of fresh water, except during brief periods after heavy rainfall when moderate to large yields are possible.

In the Fort Knox region, high water periods generally extend from December through April, low water from August through October. With the exception of the Ohio River and Otter Creek, streams on the reservation are subject to wide variations in flow, with greatly increased flows after rainfall. The tables below present the 10-year low flows and minimum discharges of some of the major streams on Fort Knox.

McCraken Spring Reservoir on upper Otter Creek is the only lake expected to have significant flow during low water. Other reservoirs on Fort Knox have little appreciable flow during periods of low water and would be poor water supply sources, having yields and water quality similar to their source streams. Information on Fort Knox reservoirs is presented in Section B, Surface Drainage.

Information on the quality of surface water on Fort Knox is limited to the representative samples shown below. Water quality data for Mill Creek were obtained from the Fort Knox sewage treatment plant; data for the other streams were obtained from representative U.S. Geological Survey water quality investigations in the area. In general, surface water on Fort Knox is of the calcium bicarbonate type, and is moderately hard to hard. Most of the water samples show fairly high concentrations of dissolved solids, with turbidity and hardness levels generally increasing during periods of high flow.

MAP UNIT	SOURCES	QUANTITY	QUALITY	DEVELOPMENT OF SOURCES
1	Ohio River occupies a wide channel in a broad flood plain in the extreme northeast corner of the reservation, approximately 11 km (7 mi) from the cantonment area.	**ENORMOUS*** quantities are available year round averaging 1.93×10^8 lpm (7.34×10^{10} gpd). Minimum of 3.57×10^6 lpm (1.36×10^9 gpd) occurred 12 August 1930. Floods and high water increase flow many times, approaching 1.5×10^9 lpm (5.6×10^{11} gpd).	Natural stream water would be of good quality, but is degraded by extensive dumping of industrial and municipal wastes. Water is moderately hard to hard and has fairly high bacterial counts. Sediment, turbidity, and bacteria loads increase with flow in spring and following major storms. Treatment could eliminate many of the contamination problems.	Access is limited by the steep banks and a broad flood plain which could be inundated to depths exceeding 6 m (20 ft) during floods and could be subject to high velocities. Dense vegetation also hampers access to the river.
2	Otter Creek occupies a narrow flood plain in the extreme western portion of the reservation. The cantonment area is 10 km (6 mi) east of Otter Creek.	**VERY LARGE** quantities are available even during low flow. Yield is normally high, particularly below McCraken Spring, and would be more than doubled during periods of high water and floods.	Water is hard and fairly clear but discolors during floods. Bicarbonate, hardness, and pH levels are higher than those recorded on the other streams on Fort Knox; however, extensive water quality data are lacking.	Access is limited in places by either dense vegetation or steep valley walls. Floods are of short duration, rise quickly, and have high velocities.
3	Salt River and Rolling Fork occupy incised channels with generally broad flood plains. Most of the reservation is within 15 km (9 mi) of one of these streams.	**LARGE** quantities are generally available throughout the year, however, there are large fluctuations in streamflow. Minimum flows are near zero, while high flows exceed 8×10^7 lpm (3×10^{10} gpd).	Hardness levels are lower than Ohio River and Otter Creek; bicarbonate levels are about the same as Otter Creek, but much greater than the Ohio River. Sediment loads vary with rainfall, and may be fairly high. Hardness and dissolved solids increase as sustained flow decreases.	Vegetation limits access. Flood plains could be inundated to depths exceeding 3 m (10 ft) during periods of high water and could be subject to high velocities. Water levels have risen as much as several feet immediately after heavy rains.
4	Mill Creek flows in a narrow, steep valley; Cedar Creek flows in a broader flood plain bounded by steep valley walls.	**MEAGER** quantities are available during low water. **SMALL** to **MODERATE** yields normally could be expected, with **LARGE** yields during wet periods. Flow increases rapidly after rain.	Water is hard but additional data are sparse. Cedar Creek basin is rural and undeveloped; Mill Creek drains the cantonment area, including sewage treatment plant and vehicle washrack effluent. Turbidity and sedimentation are additional problems on Mill Creek due to presence of numerous unimproved fords.	Vegetation limits accessibility in many areas of both streams. Access to Mill Creek is also restricted by steep valley walls, particularly below the outfall of Sanders Spring Lake. Wide variations in streamflow restrict planning and development of these streams as potential sources of surface water.
5	Minor tributaries, shown as intermittent on map. Data are sparse and only representative streams are shown. Stream valleys range from broad, gently sloping to narrow, deeply incised, bounded by steep valley walls.	**MEAGER** quantities are available most of the year, with streamflow occurring during, and shortly after, rainfall. Smaller streams are generally dry, while larger streams and those in bottom lands may have shallow pools and a trickle of flow. Rapid runoff can produce **LARGE** yields during brief periods following heavy rainfall.	Data are not available, but regional estimates indicate the water to be fairly hard, with some bicarbonate and high sediment content.	Accessibility in many areas is limited by dense vegetation and/or steep slopes which, in many ravines, exceed 100 percent.

*DEFINITION OF TERMS IN BOLD PRINT:

QUANTITY	LITERS PER MINUTE (lpm)	GALLONS PER DAY (gpd)
ENORMOUS	> 40,000	> 15,000,000
VERY LARGE	4000-40,000	1,500,000-15,000,000
LARGE	400-4000	150,000-1,500,000
MODERATE	40-400	15,000-150,000
SMALL	4-40	1500-15,000
MEAGER	< 4	< 1500

MINIMUM DISCHARGES-DECEMBER TO APRIL 1938 TO 1977

MONTH	SALT RIVER AT SHEPHERDSVILLE			ROLLING FORK NEAR BOSTON		
	m^3/sec	(ft^3/sec)	YEAR	m^3/sec	(ft^3/sec)	YEAR
December	0.02	(0.7)	1944	0.02	(0.8)	1944
January	0.11	(4)	1944	0.42	(15)	1964
February	1.4	(50)	1977	4.0	(140)	1977
March	3.8	(134)	1941	3.6	(126)	1968
April	3.9	(136)	1966	4.2	(150)	1963

10-YEAR LOW FLOWS (7-DAY Q_{10})

STREAM AND LOCATION	DRAINAGE AREA		DISCHARGE	
	km^2	(mi^2)	m^3/sec	(ft^3/sec)
Otter Creek at Grahamton	130	(50)	0.11	(4)
Salt River at Shepherdsville	3100	(1197)	0.02	(0.6)
Rolling Fork near Boston	3364	(1299)	0.05	(1.7)
Mill Creek near mouth	119	(46)	0	(0)
Cedar Creek near mouth	47	(18)	0	(0)

ANALYSES OF SURFACE WATERS, FORT KNOX AREA

	OHIO RIVER AT CANNELTON DAM	ROLLING FORK NEAR LEBANON JUNCTION	SALT RIVER AT SHEPHERDSVILLE	OTTER CREEK		MILL CREEK	
SOURCE DATA							
Map Number	*	*	*	1		2	
Grid Reference				857952		967968	
Drainage Area km^2 (mi^2)	251,000 (97,000)	3561 (1375)	3100 (1197)	130 (50)		101 (39)	
Sampling Date	4 Nov 76	12 May 77	6 Oct 76	31 Mar 77	20 Oct 69	25 Jun 75	9 Sep 71	16 Aug 72	5 to 21 Mar 75	2 to 10 Sep 75
Discharge m^3/sec (ft^3/sec)	4840 (171,000)	3680 (130,000)	5.75 (203)	17.1 (604)		68.5 (2420)	0.45 (16)	0.45 (16)		
Temperature °C (°F)	10.0 (50.0)	20.0 (68.0)	17.0 (62.6)	14.0 (57.2)	11.5 (52.7)	25.0 (77.0)	16.5 (61.7)	20.5 (68.5)	8.1 (46.6)	22.0 (71.6)
pH units	6.9	7.5	6.1	7.9	7.2		8.0	8.1	7.6	7.2
Specific Conductance µmhos/cm at 25°C	315	405	302	410	454		471	436	366	
Fecal Coliforms colonies/100 ml	5100	700	850	350					20	95
Fecal Streptococci colonies/100 ml	530	29	760	140						
CONSTITUENTS IN MILLIGRAMS PER LITER (mg/l)†										
Dissolved Solids	178	254	178	227	252		292	270	271	486
Calcium	31	45	46	56					54	48
Magnesium	7.7	11	9.0	14					6.9	15
Sodium	15	18	4.4	4.9						65
Potassium	3.0	3.0	4.2	2.1						7.2
Bicarbonate	56	78	147	190	198		216	186		
Sulfate	65	79	26	34	36		50	47		
Chloride	18	23	5.6	5.9	19		12	12		
Fluoride	0.3	0.2	0.4	0.1			0.3			
Silica	5.4	5.2	5.9	4.3						
Nitrogen	3.5	2.4	1.2	0.96					1.5	16
Organic Carbon	4.6	6.3	4.3						3	7.0
Phosphorus	0.16	0.17	0.22	0.12			0.26	0.03	0.14	3.0
Arsenic	0.002	0.001	0.003	0.002		0.002				
Cadmium	0.002	0.014	0.004	0		0				0.008
Chromium	0.020	<0.010	0.020	<0.010		<0.010				
Cobalt	0	0	0.001	0		0				
Copper	0.026	0.024	0.005	0.017		0.005				

C. WATER RESOURCES (Continued)

ANALYSES OF SURFACE WATERS, FORT KNOX AREA (Continued)

	OHIO RIVER AT CANNELTON DAM		ROLLING FORK NEAR LEBANON JUNCTION		SALT RIVER AT SHEPHERDSVILLE		OTTER CREEK		MILL CREEK	
Sampling Date	4 Nov 76	12 May 77	6 Oct 76	31 Mar 77	20 Oct 69	25 Jun 75	9 Sep 71	16 Aug 72	5 to 21 Mar 75	2 to 10 Sep 75
CONSTITUENTS IN MILLIGRAMS PER LITER (mg/l)†										
Iron	3.70	3.50	2.80	1.90	0.16				3.4	1.0
Lead	0.028	0.017	0.070	0.008		0.007				
Manganese	0.30	0.19	0.14	0.12	0				0.07	0.19
Mercury	0	0	0	0.0001		0.0002				0.0003
Selenium	0	0	0	0						
Zinc	0.030	0.040	0.030	0.010		0.010			0.070	0.035
Hardness (as $CaCO_3$)	173	254	179	242	216		283	248		

*Sampling station not on map; outside reservation but pertinent.

†For purposes of this study mg/l may be taken to be roughly equivalent to parts per million (ppm).

2. GROUND WATER

Large quantities of fresh ground water for Fort Knox are available from a shallow well field in the Ohio River alluvial plain at the extreme northwestern boundary of the reservation, and from McCraken Spring, which emanates from the St. Louis Limestone aquifer. These sources compose the major water supply for Fort Knox. Meager to small quantities of fresh ground water are locally available from older, deeper limestone aquifers and from scattered alluvial deposits in the valleys of the Salt River, Rolling Fork, Cedar Creek, and Mill Creek. These aquifers, however, are generally unreliable and subject to large seasonal fluctuations.

Maximum yields in the vicinity of Fort Knox generally can be obtained from thick, coarse-grained alluvial deposits along the Ohio River, especially when the saturated thickness of the aquifer is fully penetrated; large yields may also be obtained from subsurface solution channels in carbonate rocks. Springs issuing from the St. Louis Limestone provide significant quantities of fresh water when properly developed.

Ground water in the Fort Knox area is of good quality and suitable for human consumption, although generally hard to very hard due to high concentrations of dissolved calcium and magnesium. Only minor pretreatment is required in most cases; objectionable concentrations of iron, salt, and hydrogen sulfide may be encountered locally.

MAP UNIT	QUANTITY AND SOURCE	DEPTH	QUALITY	DEVELOPMENT OF SOURCES
1	**LARGE*** quantities of fresh water are available from alluvial deposits in the Ohio River flood plain. Most wells that penetrate the full thickness of the alluvium yield from 845 to 2112 lpm (288,000 to 720,000 gpd); large diameter wells may yield more than 4224 lpm (1,440,000 gpd). Yields as high as 21,120 lpm (7,200,000 gpd) have been reported from compound horizontal wells located approximately 16 km (10 mi) northwest of the cantonment area. The average yield for the month of June, 1978, for 10 wells owned and operated by Fort Knox was 13,913 lpm (4,743,000 gpd). Maximum yield for the same period was 18,905 lpm (6,445,000 gpd) and minimum yield was 11,909 lpm (4,060,000 gpd); the wells averaged 17.8 hours of pumping per day. The water-bearing deposits in this unit consist of Quaternary sand and gravel. Total thickness of alluvial deposits in this area ranges from approximately 24.4 m (80 ft) to 46.3 m (152 ft). In the vicinity of the Fort Knox well field (grid reference 895055), in the extreme northwest corner of the reservation, the alluvial deposits are approximately 33.5 m (110 ft) thick. The upper 5 to 15 m (16 to 49 ft) consist predominantly of clay and silt with relatively low permeabilities; this layer is underlain by sand and gravel strata, with occasional lenses of finer materials. Pebbles, cobbles, and boulder-size slabs of local bedrock are common throughout these unconsolidated sediments. Bedrock is encountered at depths ranging from approximately 23 m (75 ft) near the well field to approximately 38.6 m (126 ft) at the confluence of the Ohio River and Otter Creek (grid reference 852021). Permeability values recorded for 22 wells in the Ohio River flood plain, approximately 15 km (9 mi) northeast of West Point, ranged from 4.7 lpm/m^2 (150 gpd/ft^2) to 44.2 lpm/m^2 (1400 gpd/ft^2), averaging 18.5 lpm/m^2 (587 gpd/ft^2). Values recorded for four wells approximately 16 km (10 mi) northwest of the cantonment area ranged from 30.3 lpm/m^2 (960 gpd/ft^2) to 94.7 lpm/m^2 (3000 gpd/ft^2), averaging 75.4 lpm/m^2 (2390 gpd/ft^2). Transmissivity values for the above four wells ranged from 43.8 lpm/m (49,000 gpd/ft) to 105.4 lpm/m (185,000 gpd/ft), averaging 107.8 lpm/m (120,500 gpd/ft). Aquifer recharge is mainly from infiltration of Ohio River waters.	Depths of wells required to obtain maximum yields vary from approximately 24 to 52 m (80 to 172 ft), depending upon the thickness of the aquifer. Depths to the top of the water-bearing deposits vary from approximately 6 to 15 m (20 to 50 ft), depending principally on topographic controls. Depths to the top of the water table are generally greater than 12 m (40 ft); the water table is generally highest during the winter and spring months and lowest during the late summer and fall months. Depths of wells in the Fort Knox field, in the extreme northwest corner of the reservation, range from 30.5 to 38 m (100 to 125 ft).	Water is generally suitable for human consumption. Chemical analyses show the water to be generally hard to very hard. Raw pH of ground water from the Fort Knox well field averaged 7.4 for June, 1978. Concentrations of dissolved solids in samples from 10 wells in the Fort Knox well field ranged from 454 to 910 mg/l†. Fluoride concentrations in water samples from the Fort Knox well field are low, averaging 0.3 mg/l. Calcium concentrations are high, ranging from 180 to 244 mg/l, averaging 207 mg/l for the month of June, 1978. Magnesium concentrations are normal; chloride and sulfate concentrations in samples from nearby wells are low. Chemical analyses of ground water from the Fort Knox well field and other wells in the Ohio River alluvial plain are presented in the table below. Present water treatment at the Fort Knox Muldraugh Treatment Plant includes the addition of fluoride and chlorine.	Wells will obtain maximum yields where the water-bearing sand and gravel layers are thick and the saturated thickness of the aquifer is fully penetrated. Well depths should be at least 30.5 m (100 ft), or at bedrock. Favorable sites for the development of ground water supplies include the area between Abrahams Run and the reservation boundary, and the area between the Ohio River and the Louisville and Nashville Railroad track in the extreme northwestern corner of the reservation. Access to both sites is easy through existing roads; slopes are less than 3 percent and the ground is generally firm, particularly during the summer and fall. The ridge west of the Louisville and Nashville Railroad track should be avoided; well-sorted loose sands which cap the ridge may cause problems in positioning a drill rig and may result in severe cave-ins during drilling, particularly if the borehole is not adequately cased. Heavy drilling fluids are recommended to prevent cave-ins of coarse-grained unconsolidated materials; bentonite and similar substances should be avoided. Wells should be sand- or gravel-packed; the production zone should be thoroughly screened and sealed to prevent surface water from entering the casing. Surging and air injection are recommended to remove fine material and increase well production.
2	**MEAGER** to **MODERATE** quantities of fresh water are locally available from wells in the St. Louis Limestone; **LARGE** to **VERY LARGE** quantities are available from springs. Most wells yield more than 1.5 lpm (500 gpd), which is considered adequate for domestic supply; however, yields from wells which penetrate large solution cavities may range from 21 to greater than 211 lpm (7200 to greater than 72,000 gpd). Yields from springs are generally much higher than those from wells; the average yield of McCraken Spring, the second major water supply source for Fort Knox, was 5127 lpm (1,748,000 gpd) during June, 1978. Maximum and minimum yields for the same period were 7371 lpm (2,513,000 gpd) and 2655 lpm (905,000 gpd), respectively. Yields from other springs on the reservation are summarized in the table below. The water-bearing rocks in this unit consist of interbedded limestone and dolomite, with occasional shale beds; the key formation is the St. Louis Limestone. In the vicinity of Fort Knox, the thickness of this formation is greater than 70 m (230 ft). Soils overlying this unit are clayey; their thickness ranges from 9 to 12 m (30 to 40 ft). Underlying limestone beds are predominantly less than 0.3 m (1 ft) thick; thicknesses of the dolomite beds range from 3 cm (1.2 in) to 1.5 m (5 ft). Carbonaceous shale beds, less than 9 cm (3.6 in) thick, are present near the base of the formation. Springs, predominantly of the depression type, occur mainly near streams; flows range from less than 42 lpm (14,400 gpd) to more than 6336 lpm (2,160,000 gpd). In addition to McCraken Spring (grid reference 854937), other springs on the reservation include Sanders Spring (grid reference 935899), Falling Springs (grid reference 964873), and Tioga Spring (grid reference 902017). Minimum flows for representative springs emanating from this unit occur in early fall; maximum flows occur in late winter-early spring. Recharge of the aquifer results mainly from precipitation and subsequent infiltration into subterranean solution channels through sinkholes; rapid recharge from precipitation may result in considerable water level fluctuations.	Maximum yields can be obtained in wells penetrating the full thickness of this unit, at depths of 70 m (230 ft). Wells must first penetrate the 9 to 12 m (30 to 40 ft) of clayey soil mantling the bedrock. Depths of existing wells in the vicinity of Fort Knox range from 18 to 52 m (60 to 170 ft). Water levels in wells vary from 9 to 40 m (30 to 130 ft). There are no operating water wells in this unit on the reservation; all holes are dry.	Water from the St. Louis Limestone aquifer is generally suitable for human consumption. Chemical analyses of samples from several wells and springs indicate that the water is generally hard due to high concentrations of calcium carbonate. Hardness in water samples from McCraken Spring averaged 209 mg/l for the month of June, 1978; pH values averaged 7.9. Fluoride values were low, averaging only 0.01 mg/l for the same period. Calcium concentrations were high, ranging from 114 to 194 mg/l and averaging 170 mg/l; magnesium concentrations ranged from 26 to 42 mg/l and averaged 34 mg/l. Median values of iron concentrations from wells and springs in the area were 0.26 and 0.19 mg/l, respectively; recommended maximum concentration in domestic water supplies is 0.3 mg/l. The results of chemical analyses of water samples taken from wells and springs in the St. Louis Limestone are summarized in the table below. Present water treatment at the Fort Knox central filtration plant includes the addition of fluoride and chlorine.	Drilled wells will obtain maximum yields when situated distant from streams; water levels in wells should not be much higher than those of perennial streams. The best yields would be from wells which penetrate joints, faults, and solution channel openings. Prominent intersecting joint and fracture sets on the surface could be used to identify potential local areas of ground water accumulation. Very high yields may be obtained if a well is drilled near a stream and encounters subsurface solution channels which carry large water quantities feeding the stream. However, most wells near streams will have very low production rates. Generally, wells drilled near sinkholes will yield high quantities. The portion of the unit west of Mill Creek would be favorable for the development of ground water supplies. Access to most sites is easy through existing roads, and slopes are generally less than 8 percent. Positioning of the drill rig should not pose a problem except on rather steep sinkhole slopes. A truck-mounted rig equipped with hydraulic jacks may alleviate this problem. Springs can be valuable sources of fresh ground water when properly developed. Flow from the spring should not be obstructed; damming or ponding of the water can cause sediment accumulation and clogging at the spring. Spring yields can be increased by pumping. Cavernous limestone aquifers usually have little or no natural filtering properties; consequently, the water may be polluted. Water obtained from such aquifers should be treated to eliminate possible bacterial pollution. Wells should be cased to bedrock to prevent overlying soils from caving into the borehole; casing will also prevent seepage of surface water and possible pollution of the ground water supply. When large solution voids are anticipated in the subsurface, caution should be exercised during drilling to prevent the loss of equipment. The well should be thoroughly developed by surging or air injection to remove the pulverized rock produced during drilling; development could increase well yields by 100 percent.

C. WATER RESOURCES (Continued)

2. GROUND WATER (Continued)

MAP UNIT	QUANTITY AND SOURCE	DEPTH	QUALITY	DEVELOPMENT OF SOURCES
3	**MEAGER** to **SMALL** quantities of fresh water are locally available from wells and **MODERATE** quantities are seasonally available from springs. Most wells on broad uplands yield 0.3 to 1.5 lpm (100 to 500 gpd); wells on narrow ridges will produce very little water. Wells in lowland areas near streams may produce more than 21 lpm (7200 gpd) if they penetrate solution openings. Seasonal flows from springs may be as high as 127 lpm (43,200 gpd). Most wells and springs are dry during extended periods in late summer and fall. This diverse lithologic unit comprises the Mooretown Sandstone, the Salem and Harrodsburg Limestones, and several members of the Borden Formation, which is predominantly interbedded shale, siltstone, and limestone. The total thickness of the unit varies from 91.5 to 183 m (300 to 600 ft). Recharge of aquifers in this unit is from precipitation and infiltration of surface water. Percolation of water to the underlying aquifers is very slow, particularly in areas where the residual soil is chiefly clay. In such areas, recharge is mainly through joint openings in exposed bedrock.	Due to the diverse lithologic and topographic nature of this unit, well depths vary widely. Most existing wells in similar rocks, in the area surrounding Fort Knox, penetrate relatively shallow perched or semiperched aquifers of limited areal extent. These aquifers normally lie between layers of shale and limestone. Dug wells generally encounter water which accumulates at the bedrock-soil contact, or from perched zones in the uppermost bedrock strata.	Ground water is generally suitable for human consumption; chemical analyses indicate the quality of water is similar to that obtained from Unit 2. Water from shale and siltstone varies from soft to hard; water from limestone is very hard. At shallow depths below stream levels, water may contain sulfate or iron; at greater depths, the water may contain salt or hydrogen sulfide in objectionable amounts. Hydrogen sulfide and iron oxides are the products of decomposition of pyrite, which is locally abundant in the limestones of the region. Nitrate has been observed in significant amounts in water samples from dug wells.	The highest water yields are generally obtained from wells near streams. Higher production rates can also be achieved through deeper drilling, although wells that penetrate below the zone of active circulation could encounter sulfurous or saline water. Wells near prominent intersecting joint sets may increase yields, particularly if they penetrate solution channels. Small water supplies may be obtained in local areas where impure limestone beds are underlain by shale, resulting in a perched reservoir condition. Favorable sites for the development of ground water supplies within this unit are limited due to the strongly rolling to steep terrain; locating a drill rig on slopes greater than 15 percent may cause severe logistics problems. Dense vegetation and limited accessibility will further hinder ground water development in the unit. Well development techniques are similar to those recommended for Unit 2 above.
4	**MEAGER** quantities of fresh water are locally available from wells in thin alluvial deposits along major stream valleys. Most wells yield less than 1.5 lpm (500 gpd) at depths less than 30 m (100 ft); when gravel is encountered near streambeds, well yields may be slightly higher. The alluvial deposits in this unit consist mostly of clay and silt, with occasional lenses of sand and gravel. These deposits are well drained and generally retain little or no water.	Maximum yields will be obtained at depths less than 30 m (100 ft); at greater depths, the water may contain salt or hydrogen sulfide.	Ground water, although hard to very hard, is generally suitable for human consumption. Objectionable amounts of salt or hydrogen sulfide may be present in water deeper than 30 m (100 ft).	Wells in the alluvial plains of major stream valleys will obtain maximum yields when located near the streams. Gravel layers between impervious clay and silt layers will often produce the best yields. Flat to gently sloping alluvial plains, such as Hays Flats and Glenn Meadows, will produce little or no water due to great thicknesses of impervious materials. Wells must be screened, sand- or gravel-packed, and sealed to prevent surface pollution. Well development techniques will increase yields.

*DEFINITION OF TERMS IN BOLD PRINT:

QUANTITY	LITERS PER MINUTE (lpm)	GALLONS PER DAY (gpd)
VERY LARGE	4000-40,000	1,500,000-15,000,000
LARGE	400-4000	150,000-1,500,000
MODERATE	40-400	15,000-150,000
SMALL	4-40	1500-15,000
MEAGER	< 4	< 1500

†For purposes of this study mg/l may be taken to be roughly equivalent to parts per million (ppm).

SUMMARY OF DATA FROM SELECTED SPRINGS

MAP NUMBER	NAME	AQUIFER	MEASURED YIELD lpm	(gpd)
1	McCraken Spring	St. Louis Limestone	5127	(1,748,000)
2	Sanders Spring	St. Louis Limestone	1145	(330,240)
3	Falling Springs	St. Louis Limestone	211	(72,000)*
4	Tioga Spring	St. Louis Limestone	No data	
5	Poplar Spring	Harrodsburg Limestone	No data	

*Estimated yield

REGIONAL GROUND WATER QUALITY ANALYSES IN THE MISSISSIPPIAN PLATEAU SECTION*

CONSTITUENT	ALLUVIUM DRILLED WELLS†	ALLUVIUM DUG WELLS†	PREDOMINANTLY LIMESTONE, SOME SHALE DRILLED WELLS‡	PREDOMINANTLY LIMESTONE, SOME SHALE DUG WELLS‡	PREDOMINANTLY LIMESTONE, SOME SHALE SPRINGS‡
Bicarbonate (HCO_3), epm§	4.95	1.54	3.88	2.19	2.68
Carbonate (CO_3), epm	0	0	0	0	0
Chloride (Cl), epm	0.76	0.28	0.33	0 53	0.08
Fluoride (F), epm	0.01	0.02	0.01	0.01	0.01
Hardness (total $CaCO_3$), ppm	280	84	274	165	147
Iron (Fe), ppm	1.07	1.26	0.43	0.33	0.10
Nitrate (NO_3), epm	0.33	0.23	0.06	0.22	0.05
pH	7.3	6.3	7.3	6.8	7.3
Sulfate (SO_4), epm	1.53	0.51	0.76	0.23	0.19
Number of analyses	8	2	119	16	54

*Modified after: U.S. Geological Survey Water-Supply Paper 1603.
†Median values.
‡Average of median values for three subdivisions of rocks of Mississippian age.
§Equivalents per million; parts per million.

GROUND WATER QUALITY ANALYSES, OHIO RIVER ALLUVIUM AND ST. LOUIS LIMESTONE

CONSTITUENTS*	ALLUVIUM FORT KNOX WELL FIELD†	ST. LOUIS LIMESTONE McCRAKEN SPRING†	ST. LOUIS LIMESTONE GRID REFERENCE 852849‡
Alkalinity (total as $CaCO_3$)	231	184	210
Bicarbonate (HCO_3)			250
Calcium (Ca)	207	170	48
Carbonate (CO_3)			0
Chloride (Cl)			1.4
Fluoride (F)	0.3	0.01	0.9
Hardness (total as $CaCO_3$)	275	209	210
Magnesium (Mg)	74	34	22
pH	7.4	7.9	7.1
Sulfate (SO_4)			2.7
Number of analyses	30	30	1

*Values in milligrams per liter, except for pH.
†Average values for June, 1978; analyses provided by the Facilities Engineering Division, Fort Knox, Kentucky.
‡Analysis provided by the U.S. Geological Survey Central Laboratory, Atlanta, Georgia, June, 1977.

FORT KNOX, KENTUCKY
TERRAIN ANALYSIS

WATER RESOURCES

SURFACE WATER

FRESH WATER PERENNIALLY PLENTIFUL

1. **ENORMOUS*** quantities available from Ohio River.
2. **VERY LARGE** quantities available from Otter Creek; quantities increase during high water periods.
3. **LARGE** quantities available from Salt River and Rolling Fork throughout the year; flow varies widely, increasing many times during high water periods.

FRESH WATER SEASONALLY PLENTIFUL

4. **MEAGER** quantities available from Mill and Cedar Creeks during low water; **SMALL to MODERATE** quantities during most of year; increasing during high water periods.

FRESH WATER SCARCE

5. **MEAGER** quantities available from minor tributaries during most of year following rainfall; quantities increase during brief periods of high water.

▼ 2 Spot measurement for water quality constituents.

(W30) Reservoirs, see Section B, **SURFACE DRAINAGE**, for data.

NOTE: Numerous ponds on map occupy sinkhole depressions and are intermittent.

GROUND WATER

FRESH WATER GENERALLY PLENTIFUL

1. **LARGE*** quantities of fresh water available from individual wells in alluvial deposits of the Ohio River flood plain.

FRESH WATER LOCALLY PLENTIFUL

2. **MEAGER to MODERATE** quantities of fresh water available from wells; **LARGE to VERY LARGE** quantities available from springs in limestone.

FRESH WATER SCARCE OR LACKING

3. **MEAGER to SMALL** quantities of fresh water available from wells and **MODERATE** quantities available from springs in limestone, shale, siltstone, and sandstone.
4. **MEAGER** quantities of fresh water available from wells in thin alluvial deposits.

Fort Knox well field; approximate depths of wells 30.5 to 38 m

5 Spring

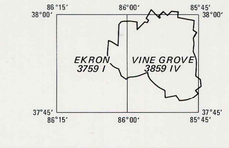
*Definition of terms in bold print:

Quantity	Liters Per Minute (lpm)	Gallons Per Day (gpd)
ENORMOUS	> 40,000	> 15,000,000
VERY LARGE	4000-40,000	1,500,000-15,000,000
LARGE	400-4000	150,000-1,500,000
MODERATE	40-400	15,000-150,000
SMALL	4-40	1500-15,000
MEAGER	< 4	< 1500

NOTES: Number refers to entry in table.

For permissible concentrations of impurities in military water supplies, see U.S. Department of the Army Technical Manual TM5-700, Field Water Supply, July 1967, paragraph 19, or other applicable manuals or regulations.

1:50,000 SHEET INDEX
Series V753



Scale 1:50,000

1000 500 0 1000 2000 3000 4000 5000 Meters

1 ½ 0 1 2 3 Statute Miles

CONTOUR INTERVAL 10 METERS
SUPPLEMENTARY CONTOURS 5 METERS

Prepared by Dames & Moore, Washington, DC, under the direction of the Terrain Analysis Center, U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia. March 1979.

D. ENGINEERING SOILS

A generalized pattern of soils on Fort Knox is outlined in the table and accompanying map, which define the prevalent physical, hydrologic, and engineering characteristics of the soils, particularly as these relate to general planning. This information provides a means for comparison of the key physical characteristics of various soil units on the reservation and gives a preliminary indication of their suitability and/or limitations with regard to development. It is intended to guide, not supplant, detailed site investigations in specific areas.

The map is based on information contained in soil surveys prepared by the U.S. Department of Agriculture, Soil Conservation Service.

Soils have been grouped into seven map units. Each unit consists of soils that share certain characteristics, such as grain size distribution and depth or total thickness to bedrock. In most cases, soils are also combined on the basis of key landform associations (stream terrace, flood plain, upland) and/or on subsoil permeability characteristics (extremely rapid or slow percolation rates). Soil profiles summarized in the table are highly generalized and represent "average" typical profiles that can be expected for each major unit; actual conditions may vary to some extent, especially the thickness of the individual layers. Each of the seven units is evaluated in terms of its limitations (slight, moderate, severe) for six common engineering applications, including the identification of major constraints such as shallow rock, excessive permeability, sinkhole terrain, etc., which would limit its use for development.

The soils on Fort Knox consist of relatively young materials that have developed on unconsolidated stream deposits, and residual soils formed on limestone, shale, siltstone, and sandstone. Alluvial deposits, Unit 2, consisting of silt and clay, are widely distributed in the eastern portion of the reservation on broad, flat to gently sloping stream terraces paralleling the Salt River and Rolling Fork. The claypan, which is common in this unit, has a moderate to high shrink-swell potential which somewhat limits its use for sanitary facilities and the placement of heavy structures.

Units 1 and 3 occur as scattered deposits in the uplands throughout the reservation. These soils are developed on limestone and occupy gently sloping upland surfaces. Although these units are severely eroded in places, they have the best overall soil characteristics for engineering development in terms of foundations, road locations, and shallow excavations.

Units 4 and 5 are widely distributed in the central and western portions of the reservation where they occupy undulating to rolling uplands. Unit 4, in particular, is characterized by a fairly dense distribution of sinkholes, which are generally less than 10 meters (33 feet) deep. This condition is indicative of a highly variable bedrock surface which must be thoroughly investigated prior to single and multiple structures emplacement and road location. Unit 5 is moderately to severely limited for most engineering uses due to its steep slope, high shrink-swell potential, and shallow rock.

Silts with minor amounts of gravel underlain by sand and gravel, Unit 6, occupy nearly level flood plains, low terraces, and most stream valleys on the reservation. The major factors which severely limit the use of this soil unit are seasonal flooding and poor drainage during the wet season, December through April.

Unit 7, residual soils developed on limestone, shale, and siltstone, occurs on steep upland slopes along the Ohio River valley and in valleys throughout the eastern half of the reservation. These soils are fine- and coarse-grained, shallow, easily erodible, and have steep slopes which severely limit their suitability for all planned engineering development.

MAP UNIT	LANDFORM AND SLOPE	TYPICAL SOIL PROFILE* LAYERS, THICKNESS OF LAYERS, DEPTH TO ROCK, UNIFIED ENGINEERING CLASSIFICATION (PROFILES NOT TO SCALE)	HIGH WATER TABLE DEPTH	PERMEABILITY	SHRINK-SWELL POTENTIAL	RATING AND MAJOR LIMITING SOIL CHARACTERISTICS FOR: SEWAGE LAGOONS	SANITARY LANDFILL	FOUNDATIONS FOR SMALL BUILDINGS	ROAD LOCATION	SHALLOW EXCAVATIONS	TRAFFICABILITY	MAJOR SOIL SERIES† AND REMARKS
1	Gently to strongly sloping stream terraces. Slopes generally between 2 and 20 percent.	cm SP — Fine sand 122 SM, GM — Sand and gravel 600+ ROCK — Depth to limestone or shale 6 to 15 m (20 to 50 ft)	None	Rapid	Low	Severe p	Moderate p	Slight	Slight	Slight	Dry-Slight Wet-Moderate w	Major soil series- Lakin Series. Contains some severely eroded areas.
2	Level to gently sloping stream terraces and gently sloping uplands. Slopes generally between 0 and 12 percent. Low-lying areas subject to occasional flooding.	cm ML — Silt 60 CL, CH — Silty clay of medium plasticity; claypan common at a depth of about 60 cm (23.6 in) 150+ ROCK — Depth to limestone or shale 1.5 to 18 m (5 to 60 ft)	None	Moderate above claypan; slow in claypan	Low above claypan; moderate to high in claypan	Severe c,x	Moderate c, q, x	Moderate c, x	Slight	Moderate c	Dry-Slight Wet-Moderate to Severe c, f, w	Major soil series- Markland and McGary Series. Severely eroded in places. Occasional flooding occurs December through April. McGary soils poorly drained during wet seasons.
3	Gently sloping to undulating uplands. Slopes generally between 2 and 20 percent.	cm ML — Silt with some clay 100 CL — Silty clay of low to medium plasticity; occasional chert fragments 150+ ROCK — Depth to limestone 1.5 to 9 m (5 to 25 ft)	None	Moderate	Low	Moderate c	Moderate c	Slight	Slight	Moderate c	Slight	Major soil series- Crider Series. Moderately to severely eroded in places. Developed in loess deposited over residuum of weathered limestone.
4	Undulating to rolling uplands; sinkhole terrain. Slopes variable; most range between 3 and 20 percent. Occasional bedrock outcrops.	cm ML — Silt with occasional chert fragments 100 CL — Silty clay of medium to high plasticity; some chert fragments 300+ ROCK — Depth to limestone 3 to 7.6 m (10 to 25 ft)	None	Moderate	Moderate to high below 0.3 m (1 ft)	Moderate h,x	Severe h, s	Moderate h, r	Moderate h, s	Moderate h, r	Moderate c, h, x	Major soil series- Baxter Series. Moderately to severely eroded in places.
5	Undulating to rolling uplands, including some ridgetops. Slopes generally between 10 and 30 percent. Occasional bedrock outcrops.	cm ML — Silt 100 CL — Silty clay of medium to high plasticity; some chert fragments 150+ ROCK — Depth to limestone (occasionally sandstone) 1 to 7.6 m (3 to 25 ft)	None	Moderate	High below 0.3 m (1 ft)	Moderate x	Severe r, s	Moderate r	Moderate r, s	Moderate r, s	Moderate c, r, s	Major soil series- Caneyville and Hagerstown Series. Severely eroded in places.
6	Nearly level flood plains, low terraces, and narrow valley bottoms. Slopes generally range from 0 to 6 percent. Low-lying areas subject to seasonal flooding.	cm ML — Silt with some gravel 100 SM, GM — Interbedded sand and gravel 600 ROCK — Depth to limestone or shale 6 to 15 m (20 to 50 ft)	3 m (10 ft)	Moderate to moderately rapid	Low	Severe f	Severe f	Severe f	Moderate f	Severe f	Dry-Moderate Wet-Severe f	Major soil series- Nolin, Chagrin, and Melvin Series. Occasional flooding occurs December through April. Melvin soils poorly drained during wet seasons.
7	Steep to precipitous upland slopes with some near-vertical escarpments. Slopes generally range from 25 to 50 percent. Numerous rock outcrops.	cm CL — Silty clay of low to medium plasticity 20 GC — Stony clay 60 ROCK — Depth to limestone, shale, or siltstone < 0.6 m (<2 ft)	None	Moderate	Low	Severe r, s	Severe r, s	Severe r, s	Severe r, s	Severe r, s	Severe r, s	Major soil series- Garmon Series. Contains severely eroded areas.

*These are typical average layers based on the major soil series; thicknesses and composition may vary considerably from those shown.

†Soils that have profiles almost alike make up a soil series. Each series is given a common name after the town or geographic feature near its initial observation. Many other minor soils are included in the map unit.

DEFINITIONS OF RATING TERMS:

Slight - relatively free of limitations or limitations are easily overcome.

Moderate - limitations can be overcome with good planning and/or careful design.

Severe - limitations are serious and are difficult to overcome.

SOIL CHARACTERISTICS AFFECTING RATINGS:

c - clayey subsoils - poor workability
f - flooding
h - sinkhole terrain
p - rapid percolation
q - slow percolation
r - shallow rock
s - steep slope
w- slick when wet
x - high shrink-swell potential

FORT KNOX, KENTUCKY
TERRAIN ANALYSIS

ENGINEERING SOILS

COARSE-GRAINED SOILS

1. Fine sand over sand and gravel, **VERY DEEP.***

FINE-GRAINED SOILS

2. Silt over silty clay of medium plasticity, **MODERATELY DEEP** to **VERY DEEP.**
3. Silt with some clay over silty clay of low to medium plasticity, **MODERATELY DEEP** to **VERY DEEP.**
4. Silt with occasional gravel over silty clay of medium to high plasticity, **DEEP** to **VERY DEEP.**
5. Silt over silty clay of medium to high plasticity, **MODERATELY DEEP** to **VERY DEEP.**

COARSE-GRAINED AND FINE-GRAINED SOILS

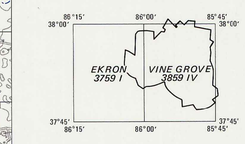
6. Silt over sand and gravel, **VERY DEEP.**
7. Silty clay over stony clay, **SHALLOW.**

NOTE: Number refers to entry in table.

*Definition of terms in bold print:

Depth Terms	Meters	Feet
VERY DEEP	>6	>20
DEEP	2-6	7-20
MODERATELY DEEP	0.6-2	2-7
SHALLOW	<0.6	<2

1:50,000 SHEET INDEX
Series V753



Scale 1:50,000

1000 500 0 1000 2000 3000 4000 5000 Meters

1 ½ 0 1 2 3 Statute Miles

CONTOUR INTERVAL 10 METERS
SUPPLEMENTARY CONTOURS 5 METERS

Prepared by Dames & Moore, Washington, DC, under the direction of the Terrain Analysis Center, U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia. March 1979.

E. ENGINEERING GEOLOGY

The table below and the accompanying Engineering Geology map indicate the extent and distribution, geologic characteristics, and geotechnical properties of seven engineering geology units on Fort Knox. These units are evaluated as to their topographic and geotechnical suitability for construction sites and route alinements, foundation stability for supporting light and heavy structures, cut-slope stability for road and bridge construction, and potential as sources of construction materials. Key geographic and geotechnical characteristics, such as the occurrence of sinkholes, subsurface solution channels and joints, relative resistance to erosion, suitability for excavation and compaction, frost susceptibility, and swelling potential are also evaluated to determine additional impacts or constraints to engineering development. The units are divided into two major suitability categories, those having some and those having few engineering uses.

The youngest sediments on Fort Knox are unconsolidated alluvial deposits consisting of clay, silt, and gravel. These sediments occur in the Ohio River valley and in the flood plains of major streams. These deposits, Unit 7 on the Engineering Geology map, exhibit generally poor foundation stability, particularly for heavy structures, and are subject to occasional severe flooding.

Underlying the alluvial deposits are fine-grained lacustrine (lake-deposited) sediments of Pleistocene age. These sediments occupy the broad, flat to gently sloping alluvial plains of the Salt River, Rolling Fork, and some of their major tributaries. These sediments, Unit 5, exhibit low bearing strength, moderate to high susceptibility to frost action, and high shrink-swell potential; however, shallow shale bedrock could locally provide good foundation support for some heavy structures.

Unit 4, which underlies Unit 5, consists of small, isolated exposures of upland gravels of Late Tertiary to Early Quaternary age. These gravels are generally suitable for a variety of construction uses; however, rugged terrain limits access to most of these deposits.

The Mooretown Sandstone of Late Mississippian age occupies a narrow northeasterly trending ridge, locally called March Ridge, immediately west of the cantonment area. This formation, Unit 6, consists of well-sorted, poorly cemented, quartzose sand that is subject to mass movement and, therefore, is unsuited for most engineering uses. Well-sorted sands from this unit have been used for various construction purposes.

Unit 1, the St. Louis Limestone of Mississippian age, underlies Unit 6, and consists of interbedded fine-grained limestone and dolomite, with minor amounts of shale. In the west-central and western portions of the reservation, the gently rolling upland surface which marks this unit contains numerous sinkholes and solution channels that could locally limit its engineering suitability. The extensive gently rolling terrain, however, is generally suitable for multi-structures emplacement, and foundation stability for heavy structures is good where anchored in sound bedrock. Although this unit is considered most suitable for engineering development, thorough geotechnical and sinkhole investigations are recommended prior to large-scale construction.

Unit 2, comprising the Salem and Harrodsburg Formations of Middle Mississippian age, consists of hard limestone and dolomite, with minor amounts of shale. This unit underlies Unit 1, and forms moderately to strongly rolling uplands and escarpments in the eastern half of the reservation. Although the resistant limestone provides excellent support for heavy structures, the generally steep slopes and heavily wooded terrain associated with the unit locally could have an impact upon its engineering suitability.

The Borden Formation and the New Albany Shale, of Mississippian and Devonian age respectively, are the oldest strata exposed on the reservation. They occupy steeply sloping ridges below the limestone-capped escarpments in the extreme eastern portion of the reservation. Frequently outcropping in narrow bands, which are often deeply dissected and inaccessible, Unit 3 is limited in its engineering suitability and generally has few engineering uses.

MAP UNIT	TOPOGRAPHY	ROCK DESCRIPTION	PHYSICAL CONSTANTS	ENGINEERING EVALUATION	EXCAVATION FACTORS	PITS AND QUARRIES
1. Interbedded fine-grained limestone and dolomite, little shale.	The major portion of this unit is in the Pennyroyal plain; scattered exposures occur on ridges north of Cedar Point Branch, on Dawson Knob, and on Chappel Ridge. The unit occupies predominantly gently rolling, partially dissected upland surfaces. Numerous, generally shallow sinkhole depressions and occasional surficial solution channels characterize the west-central and western portions of the reservation between Otter and Mill Creeks. Residual soil cover generally ranges in thickness from 3 to 12 m (10 to 40 ft). Rock outcrop occurs principally in stream valleys. Local relief is largely between 10 and 20 m (33 and 66 ft), except southeast of Snow Mountain, where local relief can be as high as 40 m (131 ft). The highest elevation within the unit, approximately 256 m (840 ft), is in the area of Dawson Knob (grid reference 048963); the lowest elevation, approximately 152 m (500 ft), is near Grahamton (grid reference 854955). Drainage throughout the unit is predominantly subsurface; short, ephemeral streams usually terminate abruptly in sinkholes.	Mississippian St. Louis Limestone consists predominantly of interbedded fine-grained limestone and dolomite, with occasional thin shale beds. The limestone is generally gray and is locally siliceous, argillaceous, or dolomitic. It is laminated to thick-bedded with beds commonly 3 to 91 cm (1.2 to 36 in) thick. The dolomite is medium gray to olive gray, very fine to finely crystalline, containing pockets of crystalline calcite. Beds range in thickness from 3 to 150 cm (1.2 to 60 in); weathering is largely by spalling. The shale is olive to medium gray, calcareous, and thin-bedded; it occurs usually at the base of the unit. Chert occurs as irregular or spherical masses in a persistent zone near the base and in upper limestone beds of the unit. Fairly thick gypsum and anhydrite beds occur near the surface; solution of these beds could result in deep weathering and the formation of sinkholes. Basal contact is sharp to gradational by interbedding with the underlying unit. On the sinkhole plain, the unit weathers to silty and cherty, reddish-orange residual soil generally 3 to 12 m (10 to 40 ft) thick; total unit thickness ranges from 70 to 85 m (230 to 280 ft).	Permeability: good Swelling potential: noncritical Frost susceptibility: very slight for bedrock; moderate for clayey overburden Absorption, percent (2 samples): 0.6 and 0.7 Los Angeles abrasion test, percent loss after 500 revolutions (2 samples): 21.3 and 20.4 Toughness (2 samples): 11 and 8 Compressive strength, MPa (lb/in^2) (2 samples): 275 (39,850) and 272 (39,400)	Large expanses of gently rolling terrain in the western portion of the reservation are suitable for multi-structures emplacement. The low relief area west of Mill Creek is suitable for straight alinements of roads, railroads, and airfields. Access to potential construction sites is easy through the existing transportation network. Cut-and-fill, generally less than 3 m (10 ft), will be required locally, particularly north and west of the cantonment area, where sinkhole depressions and surficial solution channels are prevalent. Cuts in limestone bedrock require blasting. Stability of cut slopes is excellent in bedrock, good in well-drained soils, and poor in poorly drained, sinkhole areas. Scarcity of major streams will minimize the need for bridging. Exposed bedrock weathers rapidly, locally to depths of 12 m (40 ft); in such instances, deep foundations will be required. Dolomite weathers by spalling which could result in minor rockslides, particularly on steep slopes. Foundation stability in solid bedrock is very good for heavy structures. However, detailed geotechnical investigations will be required to identify subsurface solution cavities; grouting may be required locally to fill voids. Well-drained soils provide good foundation for light structures; shallow foundations and spread footings generally would be sufficient for placement of such structures. Crushed limestone may be suitable for surface material, base course, aggregate, road metal, and fill; large blocks may be suitable for riprap and rubble masonry. High chert content could limit usefulness of the limestone. Argillaceous limestone is inferior to coarse-grained limestone for construction purposes. Permeability is good in limestone bedrock and cherty soils, poor in clayey and silty soils; water usually flows in subsurface solution channels and voids developed along bedding planes and fractures. This unit contains several springs, the largest of which is McCraken Spring on upper Otter Creek. The unit is not suited for the disposal of liquid waste since there is high risk of polluting ground water supplies; however, ease of overburden excavation renders this unit locally suitable for disposal of solid waste.	Excavation of thick overburden generally is easy with hand tools. Excavation of bedrock is difficult; blasting is required. Excavating equipment has easy access to major portions of the unit through existing improved and unimproved roads. The overburden consists predominantly of residual silty and cherty clay soils and silty, moderately permeable claypan soils. In the vicinity of the cantonment area, the overburden is mantled by silt or loess (a homogeneous, unconsolidated, calcareous, silty deposit). Overburden thickness varies from 3 to 6 m (10 to 20 ft), and can be as much as 12 m (40 ft). Overburden is easily excavated by hand tools; workability of cherty clay substratum is more difficult. Blasting is necessary for the removal of limestone. Drilling rates vary from slow in bedrock to fast in soil which is chert-free. Compaction in limestone is difficult; crushing will be required. Cut slopes in limestone stand vertical unless undercut by erosion. Cuts in poorly drained overburden will require sheeting; excavations may flood.	There are presently no pits or quarries within the unit. Potential sites are on isolated ridges and in stream valleys where overburden is less than 3 m (10 ft). Access to most exposures is easy through existing roads.
2. Hard limestone interbedded with some dolomite and shale.	Extensive exposures occur within both the Pennyroyal plain and the Knobs, steep-sided, rounded hills forming the outer flank of the Blue Grass section. The most extensive occurrence, in the area between Mill and Cedar Creeks, is characterized by moderately to strongly rolling and locally intensively dissected uplands. North and east of this upland, the unit occupies steeply sloping, deeply dissected ridges bounded by rocky escarpments. Narrow exposures cap the bluffs along the Ohio River valley and the lower valley of Otter Creek. Residual soil thickness ranges between 1 and 7 m (3 and 25 ft). Rock is exposed chiefly in discontinuous ledges along steep valley slopes and on crests of steep escarpments. Local relief varies; mean local relief is approximately 40 m (131 ft). Maximum local relief, approximately 50 m (164 ft), occurs in the drainage basin of Mill Creek, between Buffalo Branch and Dorrets Run. The highest elevation in the unit, approximately 274 m (900 ft), is in the area of Dawson Knob (grid reference 073981); the lowest elevation, approximately 134 m (440 ft), occurs along the bluffs bordering the Ohio River valley (grid reference 856014). The degree of dissection varies from fine-textured on the steep slopes to moderate-textured on the uplands; the drainage pattern is characteristically dendritic, with strong rectangular dendritic elements occurring in the area between Mill and Cedar Creeks.	Consists of the Mississippian Salem and Harrodsburg Formations. The Salem Formation comprises limestone, shale, and dolomite. The limestone is of two types: the first is a yellowish brown to brownish gray, locally oolitic calcarenite (clastic limestone), and thinly crossbedded; the grains are generally rounded, sand-sized limestone pellets and well-sorted fossil fragments, locally silicified, and generally resistant to erosion. The second type is a yellowish gray, fine-grained, and poorly sorted calcisiltite (muddy limestone); it is evenly bedded where dolomitic, and locally contains scattered chert and fossil fragments in a fine-grained matrix. The shale is olive gray to medium gray, calcareous, and contains scattered to abundant, coarse fossil fragments; it is commonly interbedded and gradational with shaly, silty, and argillaceous limestone. The dolomite is light to medium gray, fine-grained, calcareous, and clayey, containing scattered fossil debris and quartz geodes; it is generally thick-bedded to massive, and weathers by spalling; basal contact is sharp. Thickness of the Salem Formation ranges from 24 to 43 m (80 to 140 ft). It generally occupies moderately to strongly rolling uplands overlying the Harrodsburg Formation. The Harrodsburg Formation consists of limestone and dolomite. The limestone is light gray to yellowish gray, coarse- to very coarse-grained, and fossil-fragmented (bioclastic); the matrix varies from sparry calcite to silt-size lime mud. It is locally thick-bedded, dolomitic, and cherty; beds range in thickness from 3 to 61 cm (1.2 to 24 in) and are generally crossbedded. The uppermost 3 to 4.6 m (10 to 15 ft) weathers to rounded slabs or blocks as thick as 0.9 m (3 ft); on ridgetops the formation weathers completely to orange-brown clay soil as much as 4.6 m (15 ft) thick, locally overlain by clay soil residue of Salem limestone; basal contact is sharp, and may be locally disconformable. Thickness ranges from 4.6 to 21 m (15 to 70 ft); the formation is thickest in the drainage basin of Mill Creek; it generally occupies upper slopes of stream valleys, gullies, and isolated ridgetops.	Permeability: very poor to fair Swelling potential: noncritical Frost susceptibility: slight Absorption, percent (3 samples): Average, 1.5; Range, 0.9 to 2.4 Los Angeles abrasion test, percent loss after 500 revolutions (3 samples): Average 30.0; Range: 27.7 to 34.1 Toughness (3 samples): Average: 5; Range: 4 to 6 Compressive strength, MPa (lb/in^2) (3 samples): Average, 147 (21,300); Range 132 (19,200) to 162 (23,460)	Large expanses of moderately to strongly rolling uplands in south-central and north-central portions of the reservation are suitable for some construction. The extensive, moderately rolling area between Mill and Cedar Creeks, in the south-central portion of the reservation, is suitable for multi-structures emplacement. Long, straight to curving alinements for roads and railroads are available throughout the unit. Access to most of the unit, which is a good source of construction materials, is relatively easy through existing roads. Roads may require moderate grades; cuts and fills as much as 10 m (33 ft) may be necessary locally; cuts will require blasting. Cherty clay substratum provides fair to poor material for fills and subgrades. On steep slopes, roads must have adequate drainage ditches and culverts to prevent washing. Bridging will be required at major streams which cross this unit. Where the lower slopes consist of soft shale, embankments and cuts could be difficult to stabilize and could slump when steep and wet. Stability of cut slopes is generally poor where the bedding planes dip into the cut. On slopes, thinly interbedded shale and limestone may require retaining walls or buttressing to prevent rockslides due to undercutting in shale; drainage maintenance may be needed. Foundation stability ranges from fair in shale to excellent in limestone. Well-drained soils provide good foundation for light structures, while limestone provides excellent foundation for heavy structures. Where foundations rest on shale, geotechnical investigations may be required to evaluate bearing capacities, swelling potential, and frost susceptibility. Prominent fractures trending N 10° E and N 70° W could adversely affect local foundation conditions. Solution weathering in limestone is possible, particularly along joints. This condition should be thoroughly investigated prior to construction; grouting may be locally required.	Overburden is easily excavated with hand tools; cherty soils may be difficult to work. Bedrock will require blasting. Excavating equipment has easy access through existing roads, although the generally dense vegetative cover limits trafficability in rural areas. Overburden consists predominantly of residual, moderately to well-drained, silty and clayey soils underlain by a cherty substratum; overburden thickness ranges from 1.5 to 6 m (5 to 20 ft) on the uplands and from 0.6 to 3 m (2 to 10 ft) on the slopes. Excavation is easy to the base of the weathered material with most power equipment; but becomes increasingly difficult at depth. Blasting or quarrying is necessary for the removal of limestone. Drilling rates vary from slow in hard limestone to fast in soft shale. Compaction is generally difficult and may require crushing and mixing with binder material. Cut slopes in limestone stand vertical unless undercut by erosion, or by slides in the underlying shale. Cut slopes in shale are less stable and may erode easily; they may slump when steep and wet. Drainage maintenance may be required in some excavations.	Two limestone quarries (grid reference 943945 and 962964) are in operation on the reservation, providing a variety of construction materials. A large exposure of relatively pure limestone, greater than 20 m (65 ft) thick, occurs in the Impact Area (grid reference 976959).

E. ENGINEERING GEOLOGY (Continued)

MAP UNIT	TOPOGRAPHY	ROCK DESCRIPTION	PHYSICAL CONSTANTS	ENGINEERING EVALUATION	EXCAVATION FACTORS	PITS AND QUARRIES
				The Salem and Harrodsburg Limestones are good sources of construction materials. These limestones have been used for road metal, aggregate, fill, base course, and mineral filler for asphalt concrete; they are also locally used as dimension stone. Large blocks are suitable for light riprap and rubble masonry. Permeability is poor to very poor in shale and fair to poor in limestone; springs issue locally along joint or bedding planes in the limestone and along the contact of limestone and underlying shale. Due to its generally slow percolation, the unit is unsatisfactory for the disposal of liquid wastes; however, the ease of excavation of the overburden and the relatively low risk of polluting ground water supplies make the unit suitable for the disposal of solid wastes.		
3. Interbedded shale, siltstone, and limestone.	Exposures occur along the easternmost boundary of the Pennyroyal plain and along considerable portions of the Knobs in the east-central and eastern parts of the reservation. Minor exposures are found along the slopes of lower Otter Creek and at the Muldraugh Gas Storage Field. Isolated exposures are scattered throughout the southern portion of the reservation, where they form such steep-sided knobs as Sugar Loaf and Orms Knob. The major portion of the unit occupies steep slopes bounded by narrow, deeply incised stream valleys and gullies; locally, slopes exceed 100 percent and form sharp-crested rocky escarpments. Lower slopes are covered primarily by stony soils as thick as 3 m (10 ft); soils are progressively thinner on the upper slopes, where thickness ranges from 0.3 to 0.6 m (1 to 2 ft). Rock outcrops are predominantly confined to stream bottoms and steep valley walls. Local relief varies considerably; however, it is generally greater than 50 m (164 ft). Maximum local relief, approximately 100 m (328 ft), occurs at the extreme northeastern corner of the reservation. The highest elevation, approximately 244 m (800 ft), occurs at several locations on the reservation; the lowest elevation, approximately 122 m (400 ft), is near the confluence of Otter Creek and Hog Hollow (grid reference 855010). Drainage is moderately textured, with linear dendritic patterns predominating.	Contains the oldest strata outcropping on the reservation; it consists of the New Albany Shale (Middle and Upper Devonian) and the various members of the Borden Formation (Mississippian). The New Albany Shale outcrops in a short, sinuous band in the streambed of Crooked Creek, immediately to the west of Orms Knob. The shale is dark gray to grayish black, containing phosphate nodules in the uppermost 0.9 m (3 ft); it is thinly laminated and well jointed. It is approximately 11 m (35 ft) thick. The Borden Formation consists, in ascending order, of the following members: the New Providence Shale, an olive gray to grayish green, illitic, micaceous, fossiliferous, locally iron-stained shale that contains scattered sideritic concretions; the Kenwood Siltstone, composed of interbedded light gray, clayey, sandy, laminated siltstone and grayish black shale; the Nancy member, which consists of gray, silty and clayey, unevenly fissile, locally calcareous shale interbedded with minor amounts of siltstone and yellowish brown, crinoidal limestone; the Holtsclaw Siltstone, a gray, clayey, unevenly laminated, fossiliferous siltstone interbedded with gray silty shale; the Floyds Knob bed, generally a single glauconitic bed; and the Muldraugh member, a gray, clayey and silty, siliceous, calcareous dolosiltstone interbedded with gray, clayey and silty, siliceous, dolomitic, fossiliferous limestone. Bedding is thin to moderately thick. The combined thickness of the Borden Formation ranges from a minimum of approximately 30.5 m (100 ft) in the valley of Otter Creek to a maximum of 128 m (420 ft) in the eastern portion of the reservation.	Permeability: poor Swelling potential: slight to none Frost susceptibility: slight to high Muldraugh member only Absorption, percent (2 samples): 3.6 and 4.6 Los Angeles abrasion test, percent loss after 500 revolutions (2 samples): 29.5 and 30.7 Toughness (1 sample): parallel to bedding plane, 2; perpendicular to bedding plane, 8 Compressive strength, MPa (lb/in^2) (2 samples): parallel to bedding plane, 65.4 (9490) and perpendicular to bedding plane, 121 (17,610); and 109 (15,790)	Occupies predominantly narrow, steep slopes bounded by steep escarpments. It is generally unsuited for multi-structures emplacement and transportation route alinements. Access to most exposures is difficult. Roads crossing the unit frequently require deep sidehill cuts and fills. Extensive grading is locally necessary; minor bridging will be required. Cut-slope stability is generally poor; the shale, which forms the major portion of the unit, erodes easily. On vertical slopes, limestone blocks tend to loosen and fall due to undercutting of shale; rockslides could occur locally. Foundation stability varies from poor in most shaly layers to good in resistant limestone layers. Wet slopes on shale bedrock may be subject to sliding; slopes generally provide poor to fair foundations for light and heavy structures. Roads on slopes require adequate drainage ditches and culverts to prevent washing. The New Albany Shale, locally underlying Unit 5 at shallow depths, may provide good foundations for heavy structures. Clay shale from the New Providence Shale member is used in making brick, tile, and expanded shale aggregate; analyses of samples indicate that it may also be suitable for lightweight aggregate and structural tile. Siltstone from the Kenwood member has been used as dimension stone for foundations and facings. Limestone from the Muldraugh member has been used for road metal, subgrade, and fill. The unit is unsuitable for the disposal of both solid and liquid wastes due to slow percolation rates, excavation difficulties, and inaccessibility.	The majority of the rocks composing the unit will not be easily excavated by hand or small power equipment. Limestone will generally require blasting. Access to most exposures will be difficult for excavating equipment. Vegetative cover is generally dense and limits trafficability in rural areas. Overburden consists of stony soil up to 3 m (10 ft) thick on the lower slopes; on the upper slopes, the overburden is 0.3 to 0.6 m (1 to 2 ft) thick; rock outcrops occur predominantly in stream bottoms and steep valley slopes. Drainage must be provided for excavations in shale and siltstone; in places where the material is poorly drained, sheeting will be required. Seepage is common, particularly along the contact of the limestone with the underlying shale or siltstone. Cut slopes in limestone stand vertical unless undercut by erosion; in shale, cut slopes tend to be unstable and erode readily when they are in excess of 10 degrees.	There are no quarries in this unit on the reservation. Potential sites include the area between Dawson Knob and Jeff Lee Ridge, and the lower ridge slopes in the extreme northeastern corner of the reservation, where the New Providence shale member is extensively exposed.
4. Gravel, some sand, silt, and clay.	Consists of a few small, isolated exposures of terrace deposits that cap scattered ridgetops in the Pennyroyal plain and the Knobs. The most extensive occurrence is an elongated northeasterly trending upland surface at Dawson Knob. In addition to small exposures on Hooker Mountain and the upland surface between Mill and Cedar Creeks, other exposures occur in the valley south of Jeff Lee Ridge (grid reference 054946) and on an upland surface at grid reference 944037. Maximum local relief on Dawson Knob is approximately 24.4 m (80 ft); local relief in the other areas is generally less than 10 m (33 ft). The maximum elevation, approximately 302 m (990 ft), is on Dawson Knob. The lowest elevation, approximately 140 m (459 ft), occurs in the area south of Jeff Lee Ridge (grid reference 054946). The drainage pattern is coarse-textured dendritic.	Gravel, sand, silt, and clay of Late Tertiary (Pliocene) and Early Quaternary (Pleistocene) age. The gravel consists largely of granules, pebbles, and sparse cobbles of chert, siltstone, geodes, and silicified limestone averaging less than 2.5 cm (1 in) in diameter, yellowish orange to yellowish brown, rounded to subangular, overlain by, and interbedded with, some sand, silt, and silty clay. Deposits occupy terraces at different levels. The deposit on Dawson Knob is characterized by brown, subrounded chert gravel; basal gravel contains angular chert blocks as much as 30 cm (12 in) square and 15 cm (6 in) thick. The total deposit is approximately 27 m (90 ft) thick; on Hooker Mountain the deposits are less than 4.6 m (15 ft) thick.	Permeability: moderate to high Swelling potential: noncritical Frost susceptibility: slight Plasticity: nonplastic	Small, isolated exposures associated with this unit do not permit continuous alinements; it can be locally used in conjunction with adjacent units. Access is difficult with conventional vehicles. Minor grading and cut-and-fill are required; bridging will not be necessary. Cut slopes will require support. The unit is subject to erosion if not stabilized by vegetation. Foundation stability is generally good; clay between grains could result in poor bearing strengths when heavy loads are exerted on the material. Frost susceptibility is generally slight, except when clay content is high. Materials may be suitable for use as road metal, aggregate, base course, surfacing,and fill. Unit 4 is generally satisfactory for the disposal of liquid and solid wastes; moderate to high permeability, however, would result in contamination of ground water supplies.	Excavation is easy with power equipment, moderately difficult with hand tools, particularly where cobbles are present; access to most exposures is difficult. Drilling rates are moderate to high. Compaction of the material is moderately easy when cobbles are absent. Cut faces will require protection from collapsing.	No pits or quarries occur in this unit on the reservation. The deposit on Dawson Knob is about 27 m (90 ft) thick; however, access is difficult. The deposits south of Jeff Lee Ridge (grid reference 055947) are smaller in extent and thinner, but more readily accessible.
5. Calcareous clay, little silt, sand, and gravel.	Separates the Pennyroyal plain on the west from the Knobs on the east. Its extensive, nearly flat to gently sloping, partially dissected lacustrine plains, along the Salt River and Rolling Fork, are bounded by intensely dissected, steep to nearly vertical, sharp-crested rocky escarpments. Extensive, flat to gently rolling terrain occurs in areas locally known as Hays Flats, Glenn Meadows, and Arnold Bottoms, and also in the extreme northeastern corner of the reservation, south of Duck Lake. Short, steep gullies occur along the major streams. Soil thickness varies from 1.5 to 18 m (5 to 60 ft); rock is generally more than 1.5 m (5 ft) deep. Mean local relief is generally less than 5 m (16 ft); maximum local relief, approximately 30 m (98 ft), occurs in the narrow valley of Mud Run, north of Hays Flats (grid reference 087954). The highest elevation, approximately 168 m (550 ft), occurs in the narrow valley of Mud Run, southeast of Jeff Lee Ridge (grid reference 087954); the lowest elevation, approximately 120 m (394 ft), occurs along the banks of major streams. The drainage pattern is predominantly dendritic, becoming rectangular dendritic along steep-sided, narrow stream valleys, such as those at Cedar Creek and Cedar Point Branch.	Lacustrine and alluvial deposits of Pleistocene age. The lacustrine deposits contain two distinct clay layers; the upper layer is yellowish brown to yellowish orange, slightly silty, calcareous, and has an average thickness of 8.5 m (28 ft) in the valley of Rolling Fork. Exposures are grayish yellow to grayish orange and are mantled by irregular caliche-like concretions. The lower clay layer is dark gray to greenish gray, silty, calcareous, and has an average thickness of 9.5 m (31 ft). The underlying, older alluvium consists of fine to medium, poorly sorted sand and gravel, with some interbedded olive gray, silty, noncalcareous clay. The alluvial deposits are approximately 3 m (10 ft) thick.	Permeability: poor Swelling potential: high Frost susceptibility: moderate to high Plasticity index, minimum: 12 Liquid limit, minimum: 35 Optimum moisture, percent dry weight (approximately): 17 to 28 Maximum dry weight, kg/m^2 (lb/ft^2): 1282 to 1602 (80 to 100)	Suitability is severely limited due to low bearing strength of materials. Straight to sinuous alinements are available for roads and railroads; extensive, nearly flat areas such as Hays Flats (grid reference 050920) and Glenn Meadows (grid reference 047985) may be suitable for temporary structures. Access is generally through light-duty, unimproved roads; local flooding could impact trafficability. Cut-and-fill is generally minor; deep fills, requiring time for settling or stabilizing, may be necessary. Cut slopes are unstable; they require sheeting and adequate drainage. Poorly drained, clayey soils provide generally poor subgrade; thick base course materials may be required locally. Bridging is required at major stream crossings. Foundation stability of the thick surface clay layer is poor; it is generally not suitable for heavy structures. Under heavy traffic, roads will tend to yield and buckle. Natural and artificial cuts are unstable. Compaction is good to poor. Slabs or spread footings are recommended for light structures; piers or pilings are required for heavy structures. Compact shale bedrock, locally near surface, could provide suitable foundation for heavy structures. Blasting may be required. Placement of foundations near stream channels or gullies should be avoided because of poor lateral confinement and potential flood damage. Detailed geotechnical evaluations are recommended prior to construction.	Easily excavated by hand tools; access is generally easy through existing unimproved roads; access is limited during wet periods. Overburden consists of poorly drained, silty clay soils 0.6 to 0.9 m (2 to 3 ft) thick. Excavations may be flooded due to poor drainage conditions; walls of excavations will generally require sheeting to prevent slumping due to seepage from moist substratum. Workability and compactibility of soils are difficult in wet weather. Fast drilling rates are anticipated.	There are no existing pits or quarries; access to potential sites is relatively easy through unimproved roads; access during wet periods will be severely limited.

E. ENGINEERING GEOLOGY (Continued)

MAP UNIT	TOPOGRAPHY	ROCK DESCRIPTION	PHYSICAL CONSTANTS	ENGINEERING EVALUATION	EXCAVATION FACTORS	PITS AND QUARRIES
6. Poorly cemented sandstone.	Occupies a narrow, elongate, northeasterly trending ridge in the Pennyroyal plain immediately west of the cantonment area. Lower portions of the ridge are characterized by slump blocks of sandstone and well-sorted sand, which appear to blend with the surrounding karst topography of Unit 1. Soil cover is approximately 0.6 to 1.5 m (2 to 5 ft) thick, and consists of sandy and silty loam. Mean local relief is approximately 15 m (50 ft); the maximum local relief, approximately 55 m (180 ft), is in the vicinity of Snow Mountain (grid reference 877947). The highest elevation is 274 m (900 ft) on Snow Mountain. The lowest elevation, approximately 198 m (650 ft), occurs southwest of Snow Mountain, along the eastern slope of Otter Creek (grid reference 872930).	This late Mississippian sandstone member of the Mooretown Formation consists of variegated, fine- to medium-grained, well-sorted, thick-bedded, quartzose sand, poorly to moderately well cemented with quartz and iron oxide. Quartz granules are present locally in basal exposures. Clay occurs as green pebbles and as red filling in fractures; fractures and slumping of the lower portion of the unit could be the result of solution channels in the underlying St. Louis Limestone. Unit 6 is approximately 37 m (120 ft) thick.	Permeability: good Swelling potential: noncritical Frost susceptibility: very slight *Compressive strength of mortar (mix 1:3), MPa (lb/in^2): 7-day, 9.8 (1420); 28-day, 17.5 (2538) *Sieve analysis: total percent passing sieve # 30 = 100; # 50 = 75; # 100 = 7; # 200 = 3.5 *Sample from Tip Top pit.	No extensive terrain is available for multistructures emplacement; short, straight alinements are available for roads. Access is easy through several existing roads. Cut-and-fill is locally required. Cut slopes are very unstable; the entire unit is subject to slumping. Grading can be minimized if alinements for roads follow the northeast-southwest orientation of the ridge. There are no major streams which would require bridging. Slumping or sliding would greatly impact trafficability. Foundation stability is generally very poor; the unit is not recommended for most construction purposes. Sand from this unit is suitable for use as blending sand for aggregate base course and fill. The unit is not suitable for disposal of liquid and solid wastes.	Sand can be easily excavated with light power equipment and hand tools. Access is easy through several existing roads. Vegetation, consisting predominantly of dense scrub, covers most of the western portion of the unit. The overburden consists of residual sandy and clayey soils 0.6 to 1.5 m (2 to 5 ft) thick. Mixtures of sandstone slump blocks, residual limestone, clay, and chert occur along the periphery of the unit. Working faces may require support due to slumping. Large blocks of poorly cemented sand will crumble readily under roller action.	An excellent source of generally clean, well-sorted sand; access to abandoned sand pits in the vicinity of Tip Top (grid reference 888966) is easy through existing roads.
7. Sand and gravel, mantled by clay and silt.	Occupies the nearly flat, sometimes narrow, alluvial plains of the Ohio River and its tributaries. The only two major exposures, in the Ohio River valley, are bounded by steep bluffs locally dissected by narrow, steep-sided valleys. Mean local relief is generally less than 10 m (33 ft); maximum local relief, approximately 4.4 m (145 ft), is in the extreme northwest corner of the reservation. In this area, elevations range from 160 m (528 ft) on an elongated sandy ridge (grid reference 862037) to 116 m (380 ft) along the Ohio River. With the exception of the area surrounding the ridge in the northwest corner of the reservation, the major portion of this unit is flood prone.	Recent alluvium and Pleistocene outwash deposits, including wind-deposited sand. Recent alluvium in the flood plain of the Ohio River, locally as much as 15 m (49 ft) thick, consists predominantly of clay, silt, fine sand, and organic debris, with minor amounts of locally derived gravel. Alluvium in major streams consists predominantly of sand, with some gravel, silt, and clay; gravel is largely composed of pebbles, cobbles, and scattered boulders of chert, limestone, and sandstone. The outwash, occupying the higher terraces in the Ohio River valley, consists of a thick layer of clay and silt, underlain by a sequence of sand and gravel which can be as much as 21 m (70 ft) thick. An elongate, narrow ridge in the Ohio River valley, in the extreme northwest corner of the reservation, consists of yellowish brown, very fine to fine, well-sorted, crossbedded, eolian (wind-deposited) sand, composed of angular quartz grains. Thickness of the unit ranges from 0 to greater than 46 m (0 to greater than 150 ft).	Permeability: moderate to good Swelling potential: noncritical Frost susceptibility: slight to moderate	Predominantly flat flood plains and gently sloping outwash deposits in the Ohio River valley provide straight to curving alinements generally suitable for roads and railroads; access is easy through existing roads. Local flooding is likely to impact trafficability during wet periods. Narrow flood plains of most streams on the reservation are generally not suitable for construction due to high flood hazard. The generally flat alluvial plains of the Ohio River below elevation 140 m (459 ft) will require level or low grades and minimum cut-and-fill. Embankments and high fills may be required locally to keep transportation routes above base flood elevations. Alluvial deposits are moderately suitable for subgrades and generally require mixing with coarser materials. Bridging will not be necessary since most flows can be contained in culverts. Flood hazard is greatly reduced at elevations higher than 140 m (459 ft). Foundation stability of the upper 10 to 15 m (33 to 49 ft) is generally poor to fair, but improves with depth due to the presence of compacted sand and gravel layers. Surficial deposits may be subject to frost action; organic-rich layers may compress under load when wet which, in turn, could result in heaving of foundation slabs. Foundations for structures will generally require spread footings or slabs to prevent settling. Heavy structures will require pilings or piers resting on stiff clay or dense sand and gravel layers. Bedrock is generally encountered at depths greater than 30 m (100 ft). Sand and gravel have been locally excavated from terrace deposits along the Ohio River; scattered drilling indicates that sand and gravel deposits are abundant along the Ohio River, but their extent is not fully known. Not suitable for solid and liquid waste disposal because of its high flooding potential and great risk of polluting ground water supplies.	Alluvial deposits are easily excavated with power equipment and hand tools. Access to exposures in the Ohio River valley is easy during most of the year through existing roads; exposures in flood plains of tributary streams are generally accessible through unimproved roads. Excavations are subject to flooding from river or seepage; walls of excavations may require sheeting to prevent slumping in poorly drained soils, adequate drainage maintenance must be provided.	Alluvium from a pit along Mill Creek (grid reference 965895) is used for fill. Sand and gravel deposits are abundant along the Ohio River above flood plain elevations, however, their extent and distribution has not been established. Well logs indicate that extensive sand and gravel deposits occur locally at depths greater than 15 m (49 ft) in the Ohio River valley. An abandoned clay pit (grid reference 915047) was the source of material for brick and tile manufacture.

F. SPECIAL PHYSICAL PHENOMENA

1. EARTHQUAKES

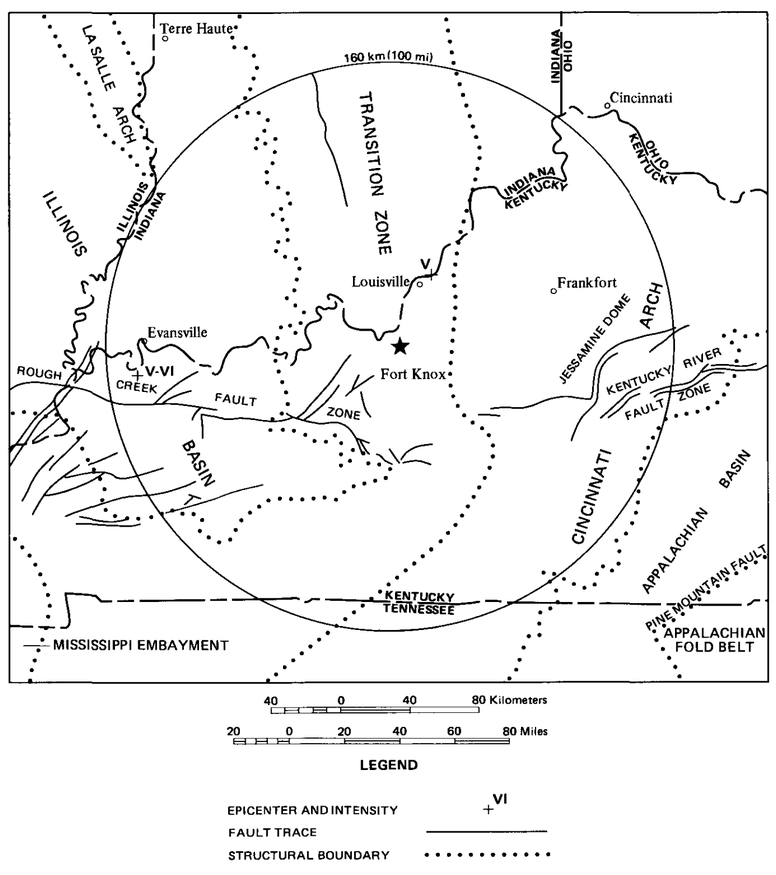
The maximum earthquake intensity that could be expected at Fort Knox probably would not exceed Intensity VII (Modified Mercalli Scale; see below). The Fort Knox area could experience ground motions of less than Intensity IV from time to time in response to distant Intensity V to VII earthquakes.

Historic earthquake activity in the area around Fort Knox has been relatively mild. The Seismotectonic Map of the Eastern United States indicates that the seismic frequency of epicenters is less than four per 10,000 square kilometers (3860 square miles) in the region. As shown on the accompanying regional fault and earthquake epicenter map, only two shocks of Modified Mercalli Intensity V or greater have been recorded within a 160-kilometer (100-mile) radius of Fort Knox. The closest recorded earthquake epicenter to Fort Knox was approximately 52 kilometers (32 miles) to the north-northeast in the Ohio River valley near Louisville, on 11 December 1968. This earthquake, which corresponded to Intensity V on the Modified Mercalli Scale, apparently was not felt in the Fort Knox area. No specific structural control has been indicated for this earthquake.

The closest major seismic activity to Fort Knox was three earthquakes near New Madrid, Missouri, 354 kilometers (220 miles) to the west-southwest. These earthquakes, in 1811-1812, were the largest ever recorded in the central and eastern United States, corresponding to a devastating Intensity XII. The shocks were reportedly felt over a 5-million-square-kilometer (2-million-square-mile) area; their strength was reported to be less than Intensity VII in the vicinity of Fort Knox.

Fort Knox is in a gently dipping transition zone between two major tectonic features: the Cincinnati Arch on the east and the southern flank of the Illinois Basin on the west. The Cincinnati Arch is a broad upwarp whose axis trends north-northeasterly across east-central Kentucky, passing east of the city of Frankfort. The rocks within this zone are limestones and shales which dip west from the Cincinnati Arch into the Illinois Basin. This basin is a moderately deep, north-northwesterly trending structural trough whose southern flank is marked by a series of faults composing the easterly trending Rough Creek fault zone. The eastern terminus of this fault zone is approximately 21 kilometers (13 miles) southwest of Fort Knox. There is little historic evidence of movement on the Rough Creek fault zone in Kentucky.

REGIONAL FAULT AND EARTHQUAKE EPICENTER MAP



MODIFIED MERCALLI INTENSITY (DAMAGE) SCALE OF 1931 (ABRIDGED)

I. Not felt except by a very few under especially favorable circumstances.

II. Felt only by a few persons at best, especially on upper floors of buildings. Delicately suspended objects may swing.

III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motorcars may rock slightly. Vibration like passing of truck. Duration estimated.

IV. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make creaking sound. Sensation like heavy truck striking building. Standing motorcars rocked noticeably.

V. Felt by nearly everyone, many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.

VI. Felt by all, many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.

VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motorcars.

VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motorcars disturbed.

IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.

X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.

XI. Few, if any, masonry structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.

XII. Damage total. Waves seen on ground surface. Lines of sight and level distorted. Objects thrown upward into the air.

2. LANDSLIDES

Landslides are scattered within a narrow zone in the western portion of Fort Knox. These slides, shown on the Engineering Geology map, flank the slopes of the north-northeasterly trending low ridge, locally called March Ridge. They generally are less than 245 meters (800 feet) wide, and their upper surfaces are characterized by rough, gullied terrain and relatively steep slopes.

The landslides are primarily slump-block deposits resulting from downward movement or differential settling of loose to poorly consolidated materials derived from the lower sandstone strata of Unit 6, largely disintegrated to sand. An excellent section of slumped sand and blocks of sandstone is exposed in an abandoned sandpit at grid reference 888966. The sands are suitable for aggregate base course and fill. These materials, however, are not suitable for other construction uses because they are weakly cemented and poorly resistant to erosion. Foundation stability is very poor.

FORT KNOX, KENTUCKY
TERRAIN ANALYSIS

ENGINEERING GEOLOGY

SOME ENGINEERING USES

1. Interbedded fine-grained limestone and dolomite, little shale.
2. Hard limestone interbedded with some dolomite and shale.

FEW ENGINEERING USES

3. Interbedded shale, siltstone, and limestone.
4. Gravel, some sand, silt, and clay.
5. Calcareous clay, little silt, sand, and gravel.
6. Poorly cemented sandstone.
7. Sand and gravel, mantled by clay and silt.

NOTE: Number refers to entry in table.

CONSTRUCTION MATERIALS

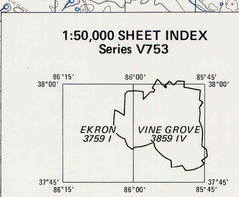
Rock quarry (limestone).

Abandoned borrow pit or quarry (S: Sand ; G: Gravel; L: Limestone).

SPECIAL PHYSICAL PHENOMENA

Landslide deposits, chiefly slump; unsuited for most engineering uses.

1:50,000 SHEET INDEX
Series V753



Scale 1:50,000

1000 500 0 1000 2000 3000 4000 5000 Meters

1 ½ 0 1 2 3 Statute Miles

CONTOUR INTERVAL 10 METERS
SUPPLEMENTARY CONTOURS 5 METERS

Prepared by Dames & Moore, Washington, DC, under the direction of the Terrain Analysis Center, U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia. March 1979.

G. VEGETATION

Five vegetation types, forests, low forests, scrub, grasslands, and agricultural lands, are significant to military training and operations at Fort Knox.

Forests compose 74 percent of the vegetative cover on the reservation, principally in the north, east, and west portions. Deciduous broadleaf and mixed evergreen needleleaf-deciduous broadleaf are the principal forest types on the reservation. Approximately 60 percent of the dominant and codominant tree cover is the oak-hickory type found on ridgetops and southern slopes. The remaining forest cover consists mainly of the central hardwood forest type found on northern slopes and in coves, including ash, beech, black locust, cherry, elm, hickory, oak, maple, walnut, and yellow poplar. In the bottom lands along creeks and rivers, the common species include black gum, cottonwood, elm, hickory, oak, river birch, silver maple, boxelder, sweetgum, sycamore, and willow. Evergreen needleleaf plantations account for 1 percent of the forests; species include Virginia, white, Austrian, loblolly, and shortleaf pine.

Low forests, consisting of deciduous broadleaf plantations, compose 1 percent of the vegetative cover on the reservation. Two areas, in the northern and western parts of the reservation, have been planted to cottonwood, sweetgum, and black walnut. Stem diameters are small and tree spacing is nearly open to medium density.

Deciduous broadleaf scrub composes 5 percent of the vegetative cover; all of the scrub vegetation is nearly open to medium density. The majority of the scrub vegetation is near training areas and range sites. Major species include black locust, sassafras, sumac, elm, ash, hickory, and redcedar.

Grasslands compose 4 percent of the vegetative cover and are restricted in distribution to the artillery and aerial gunnery ranges. Average grass height is from 0.4 to 0.6 meter (1.5 to 2 feet). Major species include meadow fescue, broomsedge, little bluestem, panic grasses, Johnson grass, barnyard grass, and foxtail grasses. Grassland vegetation is subject to frequent range fires.

Vegetation types which provide the optimum cover and concealment possibilities for foot troops and vehicles are the dense and medium dense stands of deciduous broadleaf, mixed evergreen needleleaf-deciduous broadleaf forest, and evergreen needleleaf plantations. The deciduous broadleaf and mixed evergreen needleleaf-deciduous broadleaf forests provide excellent cover and concealment potential from early May through late October when the trees are in leaf; excellent cover and fair to good concealment potential exists during the leafless season. The vegetation types which provide the least cover and concealment possibilities include the deciduous broadleaf scrub, grasslands, and agricultural lands.

The location and extent of the significant vegetation types on Fort Knox are shown on the accompanying Vegetation map. Descriptive details of each map unit are included in the table below.

MAP UNIT	DESCRIPTION	DISTRIBUTION	REMARKS	COVER	CONCEALMENT
1. Evergreen needleleaf trees; nearly open to medium spacing.	Coniferous species compose 100 percent of each stand. These coniferous plantation areas have been planted to a variety of pines including Austrian, loblolly, shortleaf, white, and Virginia pine. Tree spacing within the plantation generally varies from 3 to 5 m (10 to 16 ft). Crown cover density ranges from 15 to 50 percent. Pine stem heights range from 4 to 7 m (12 to 22 ft). Stem diameters range from 8.9 to 16.5 cm (3.5 to 6.5 in). Undergrowth is extremely sparse and consists of meadow fescue, broomsedge, bluegrass, and panic grasses.	Occurs in two main locations, one southwest of the cantonment area near Gander Branch and Dry Branch; the other consists of scattered small acreages along South Boundary Road from Mill Creek Base Camp to Cedar Creek Base Camp.		Cover for foot troops from flat-trajectory fire of small arms is good.	Concealment for foot troops from aerial and ground observation is good to excellent year round. Concealment of vehicles from aerial observation is fair to good year round. Concealment of vehicles from ground observation is good year round.
2. Deciduous broadleaf trees; medium to dense spacing.	Deciduous species compose 75 percent or more of each stand. Dominant trees include red oak, black oak, white oak, chestnut oak, post oak, yellow poplar, basswood, red maple, pignut, shagbark and bitternut hickory, sugar maple, sycamore, walnut, American elm, red elm, white ash, beech, black locust, cherry, sweetgum, cottonwood, and redcedar. Spacing between trees averages greater than 5 m (16 ft). Crown cover density is 50 to 100 percent. Oak and hickory stem heights average 12 to 23 m (40 to 75 ft). Maple, sycamore, and redcedar stem heights range from 3 to 11 m (10 to 35 ft). Oak and hickory stem diameters range from 35.6 to 50.8 cm (14 to 20 in). Poplar and basswood stem diameters average 25.4 to 35.6 cm (10 to 14 in). Undergrowth is generally sparse where crown cover density is 80 to 100 percent, becoming more prominent as the crown cover density decreases. Spicebush, sassafras, dogwood, blackberry, greenbrier, honeysuckle, wild grape, trumpet creeper, Virginia creeper, and poison ivy are common undergrowth species. Undergrowth heights average 2 m (6 ft) or less except for climbing vines.	Common vegetation throughout the north, east, and west portions of the reservation. Occurs on ridgetops, on all slope aspects, in cove areas, and along river bottoms.	This vegetation type includes the largest volume and densest timber growth on the reservation. Small acreages of this cover type are periodically logged in the northeast (Mount Eden) portion of the reservation. Clearing for access would involve major efforts and vegetation recovery time would be slow with the possibility of surface erosion on steep slopes.	Cover for foot troops from flat-trajectory fire of small arms is excellent.	Foot troop concealment is excellent, from both aerial and ground observation when trees are in leaf (early May through late October). During the leafless season concealment for foot troops is fair to good from both aerial and ground observation. Concealment for vehicles from aerial and ground observation during the period when trees are in leaf is excellent and generally fair to good during the leafless season.
3. Deciduous broadleaf trees; nearly open to medium spacing.	Deciduous species compose 75 percent or more of each stand, mainly red oak, white oak, yellow poplar, basswood, red maple, black oak, sugar maple, pignut and shagbark hickory, white ash, American elm, red elm, sycamore, and redcedar. Tree spacing is 3 to 6 m (10 to 20 ft). Crown cover density averages 20 to 50 percent. Oak and hickory stem heights average from 4 to 11 m (14 to 35 ft). Sugar maple stem heights range from 3 to 8 m (11 to 25 ft). Oak and hickory stem diameters average 25.4 to 40.6 cm (10 to 16 in). Yellow poplar and basswood stem diameters average 25.4 to 35.6 cm (10 to 14 in). Undergrowth varies from moderately sparse to moderately dense. Common undergrowth species include black locust, dogwood, persimmon, sumac, wild plum, redcedar, sassafras, honeysuckle, greenbrier, blackberry, and buckberry.	Locally common throughout the reservation. This cover type is on all slope aspects, in cove areas, and along river bottom and tributary locations.	This vegetation has the same composition as Unit 2, although it has a more open canopy and occupies less extensive areas on the reservation.	Cover for foot troops from flat-trajectory fire of small arms is good to excellent.	Concealment for foot troops is good from aerial and ground observation when trees are in leaf. During the leafless season, concealment for foot troops from aerial and ground observation is fair to poor. Concealment for vehicles from aerial observation when the trees are in leaf is fair and during the leafless season is poor. Concealment of vehicles from ground observation is fair to poor during both leaf and leafless seasons.
4. Mixed evergreen needleleaf and deciduous broadleaf trees; medium to dense spacing.	Deciduous species predominate; pockets of coniferous species compose 30 to 65 percent of each stand. Dominant species include red oak, black oak, yellow poplar, basswood, red maple, sugar maple, walnut, American elm, red elm, white ash, beech, pignut and shagbark hickory, and Virginia pine. Spacing between trees averages greater than 5 m (16 ft). Crown cover density is 50 to 100 percent. Oak and hickory stem heights average 12 to 23 m (40 to 75 ft). Virginia pine stem heights average 11 to 21 m (35 to 70 ft). Oak and hickory stem diameters average 35.6 to 50.8 cm (14 to 20 in). Pine stem diameters average 25.4 to 35.6 cm (10 to 14 in). Undergrowth consists mainly of woody species including seedlings of major overstory trees, spicebush, dogwood, sassafras, greenbrier, honeysuckle, wild grape, trumpet creeper, sumac, and redcedar. Undergrowth height generally averages 2 m (6 ft) or less except for climbing vines.	Restricted to the eastern and southeastern portions of the reservation. Common in the vicinity of Orms and Stark Knobs, and south of Hays Flats.	This cover type is found in steep areas.	Cover for foot troops from flat-trajectory fire of small arms is excellent.	Concealment for foot troops is excellent from aerial and ground observation when trees are in leaf, and good during the leafless season. Vehicle concealment from aerial observation during the period when trees are in leaf is excellent and fair to good during the leafless season. Concealment of vehicles from ground observation is excellent when trees are in leaf and fair to good during the leafless season.
5. Mixed evergreen needleleaf and deciduous broadleaf trees; nearly open to medium spacing.	Deciduous species predominate; pockets of coniferous species compose 30 to 65 percent of each stand. Dominant species in association with Virginia pine include red oak, black oak, yellow poplar, basswood, red maple, sugar maple, walnut, American elm, red elm, white ash, beech, and pignut and shagbark hickory. Tree spacing is from 3 to 6 m (10 to 20 ft). Crown cover density ranges from 20 to 50 percent. Oak, hickory, and pine stem diameters range from 19 to 40.6 cm (7.5 to 16 in). Undergrowth includes spicebush, dogwood, sassafras, greenbrier, trumpet creeper, honeysuckle, sumac, redcedar, and blackberry.	Limited to the central and east-central portions of the reservation.		Cover for foot troops from flat-trajectory fire of small arms varies from fair to good.	When the trees are in leaf, concealment for foot troops from aerial and ground observation is fair to good. Foot troop concealment during the leafless season is fair to poor. Vehicle concealment from aerial and ground observation during the season when trees are in leaf is fair, but poor during the leafless season.

G. VEGETATION (Continued)

MAP UNIT	DESCRIPTION	DISTRIBUTION	REMARKS	COVER	CONCEALMENT
6. Deciduous broadleaf trees; nearly open to medium spacing; plantations.	Deciduous species compose 100 percent of each stand. The plantation areas have been planted to cottonwood, sweetgum, and black walnut. Tree spacing within the plantations varies from 3 to 5 m (10 to 16 ft). Crown cover density ranges from 10 to 40 percent. Cottonwood, sweetgum, and black walnut stem heights range from 3 to 5 m (10 to 18 ft). Stem diameters generally range from 6.4 to 11.4 cm (2.5 to 4.5 in). Undergrowth is sparse and where present consists mainly of herbaceous plants, ragweed, beggar weed, horseweed, broomsedge, and bluegrass. Shrubby plants include sumac, wild plum, blackberry, and buckberry.	Occurs in two locations, one within the flood plain in the northern portion of the reservation (north of U.S. Highways 60/31 W); this is a cottonwood and sweetgum planting. The other is west of Mill Creek, east of Sanders Spring in the central portion of the reservation; this is planted to black walnut.		Cover for foot troops from flat-trajectory fire of small arms is fair to poor.	When the trees are in leaf, concealment for foot troops from aerial observation is fair; concealment from ground observation is fair to good. Foot troop concealment during the leafless season is poor. Vehicle concealment from aerial and ground observation during the season when trees are in leaf is fair and during the leafless season is poor to nonexistent.
7. Deciduous broadleaf scrub; nearly open to medium spacing.	Deciduous species compose 75 percent or more of each stand with some redcedar interspersed. Tree species include sassafras, black locust, hawthorn, persimmon, sumac, American elm, red elm, white ash, and pignut and shagbark hickory. Tree spacing averages 6 to 12 m (20 to 40 ft). Crown cover density ranges from 10 to 25 percent. Stem heights generally range from 2 to 5 m (5 to 16 ft). Stem diameters range from 2.5 to 11.4 cm (1 to 4.5 in). Undergrowth is moderate to dense and consists of fleabane, barnyard grass, meadow fescue, panic grasses, white snakeroot, cocklebur, horseweed, goldenrod, ragweed, foxtail grass, ground ivy, ironweed, joe-pye weed, wild rose, and hedge bindweed.	Scattered over the entire reservation. Most abundant in portions of the artillery impact area, aerial gunnery ranges, and the Yano Tank Range area.		Cover for foot troops from flat-trajectory fire of small arms is poor to nonexistent.	When the trees are in leaf, concealment for foot troops from aerial and ground observation is poor; during the leafless season, concealment is nonexistent. Concealment for vehicles from aerial and ground observation is nonexistent.
8. Grasslands.	Short grasses consist of meadow fescue, broomsedge, foxtail grass, panic grasses, Johnson grass, barnyard grass, and fall panicum. These grasses do not generally exceed 1 m (3 ft) with the average being 0.4 to 0.6 m (1.5 to 2 ft). Shrubs interspersed in the grasslands include, black locust, sumac, sassafras, American elm, red elm, white ash, pignut and shagbark hickory, wild rose, and blackberry. Herbaceous species include cocklebur, field thistle, teasel, goldenrod, ironweed, ground ivy, mullein, and hedge bindwood.	Limited primarily to the artillery and aerial gunnery ranges and impact areas on the eastern and southeastern portions of the reservation.	Much of the impact areas have been and continue to be subject to range fires which burn off the grassland vegetation at frequent intervals.	Cover for foot troops from flat-trajectory fire of small arms is nonexistent.	Concealment for foot troops from aerial and ground observation is nonexistent year round. Concealment for vehicles from aerial and ground observation is nonexistent year round.
9. Agricultural lands.	Field crops include corn, soybeans, wheat, and hay. Heights range from 0.4 to 2 m (1.5 to 6 ft) in late summer and early fall when crops are more mature.	Found on the reservation boundary in the east along and south of the Salt River, in the south along Mud Creek, and in the west, south of Lickskillet.		Cover for foot troops from flat-trajectory fire of small arms is nonexistent.	Concealment for ground troops from aerial and ground observation is poor to nonexistent during active growing season (early June through late October) and nonexistent the rest of the year. Concealment for vehicles from aerial and ground observation is nonexistent year round.

FORT KNOX, KENTUCKY
TERRAIN ANALYSIS

VEGETATION

FORESTS

1. Evergreen needleleaf trees; nearly open to medium spacing.
2. Deciduous broadleaf trees; medium to dense spacing.
3. Deciduous broadleaf trees; nearly open to medium spacing.
4. Mixed evergreen needleleaf and deciduous broadleaf trees; medium to dense spacing.
5. Mixed evergreen needleleaf and deciduous broadleaf trees, nearly open to medium spacing.

LOW FORESTS

6. Deciduous broadleaf trees; nearly open to medium spacing; plantations.

SCRUB

7. Deciduous broadleaf scrub; nearly open to medium spacing.

GRASSLANDS

8. Short grasses.

AGRICULTURAL LANDS

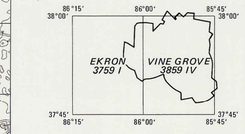
9. Field crops.

OPEN

OPEN — 10. Built-up and heavily used areas. Vegetation is not a significant factor.

NOTE: Number refers to entry in table.

1:50,000 SHEET INDEX
Series V753



Scale 1:50,000

1000 500 0 1000 2000 3000 4000 5000 Meters

1 ½ 0 1 2 3 Statute Miles

CONTOUR INTERVAL 10 METERS
SUPPLEMENTARY CONTOURS 5 METERS

Prepared by Dames & Moore, Washington, DC, under the direction of the Terrain Analysis Center, U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia. March 1979.

H. CLIMATE

The climate of the Fort Knox, Kentucky, area is classified as humid continental; seasons are well defined. Predominant climatic factors are its mid-latitude location under the average track of many of the storm systems that move across the continent, and its mean annual precipitation of 1094.99 millimeters (43.11 inches).

The Bermuda-high, a semipermanent high pressure cell centered in the Atlantic Ocean, dominates summer weather. The influx of warm moist air from the south causes the days to be generally hot and humid. The mean maximum daily temperature in July, the hottest month, is 30.7°C (87.3°F); temperatures greater than 32.2°C (90°F) are experienced an average of 25 days a year. The highest temperature on record was 41.7°C (107°F) in July, 1901. Summer temperatures and humidities may cause heat stress to unacclimatized personnel in strenuous training.

Winters are mild. January, the coldest month, has a mean daily minimum temperature of -4.2°C (24.5°F). Polar air masses occasionally penetrate the area and below-freezing temperatures occur an average of 91 days a year. The lowest temperature on record was -28.9°C (-20.0°F) in January, 1963.

Precipitation is nonseasonal. Most of it falls during the spring and summer months in association with storms moving in from the Gulf of Mexico and with thunderstorms which occur approximately 45 days a year. The mean monthly precipitation during the wettest month, March, is 128.3 millimeters (5.05 inches); the driest month, October, has a mean monthly precipitation of 59.7 millimeters (2.35 inches). The maximum monthly precipitation on record was 486.9 millimeters (19.17 inches) in January, 1937; the minimum monthly amount was 1.8 millimeters (0.07 inches) in October, 1908. The maximum 24-hour precipitation on record was 177.0 millimeters (6.97 inches) in March, 1964. Snowfall averages 398.8 millimeters (15.7 inches) a year, mostly between November and March. The maximum 24-hour snowfall on record was 381.0 millimeters (15.0 inches) in December, 1917.

Prevailing winds are from the south at average speeds of less than 8.6 knots (16 kilometers per hour or 10 miles per hour); however, the strongest winds are usually associated with thunderstorms and are from the west or northwest. The "fastest-mile" sustained wind speed in the area was 58.8 knots (109 kilometers per hour or 68 miles per hour) in May, 1915.

Since complete and long-record climatological observations do not exist for Fort Knox/Godman AAF, some of the data presented below are derived from U.S. Weather Service records at Standiford Field, Bowman Field, and downtown Louisville, all of which are approximately 48 kilometers (30 miles) north-northeast of the Fort Knox cantonment. Similar conditions prevail at all of these sites.

See the table below for climatic and ephemeral data.

CLIMATIC SUMMARY*

FORT KNOX, KENTUCKY/GODMAN AAF — LATITUDE 37°55'N — LONGITUDE 85°58'W — ELEVATION 230 m (753 ft)

PARAMETER DESCRIPTION	UNIT OF MEASURE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	YEARS OF RECORD
Absolute maximum temperature†	°C	26.1	25.6	31.1	32.8	36.7	38.9	41.7	40.6	40.0	33.3	28.9	23.3	41.7	105
	°F	79	78	88	91	98	102	107	105	104	92	84	74	107	105
Mean daily maximum temperature†	°C	5.6	7.2	12.2	19.4	24.2	28.7	30.7	30.4	26.9	21.3	12.7	6.7	18.8	30
	°F	42.0	45.0	54.0	66.9	75.6	83.7	87.3	86.8	80.6	70.3	54.9	44.1	65.9	30
Mean daily minimum temperature†	°C	-4.2	-3.1	1.1	7.1	12.2	17.2	19.1	18.3	14.3	7.7	1.7	-2.7	7.4	30
	°F	24.5	26.5	34.0	44.8	53.9	62.9	66.4	64.9	57.7	45.9	35.1	27.1	45.3	30
Absolute minimum temperature†	°C	-28.9	-28.3	-18.3	6.1	-0.5	5.5	9.4	7.2	0.5	-5.0	-18.3	-22.8	-28.9	105
	°F	-20	-19	-1	21	31	42	49	45	33	23	-1	-9	-20	105
Mean number days with maximum temperature ≥ 32.2°C (90°F) †		0	0	0	0	#	5	9	8	3	0	0	0	25	17
Mean number days with minimum temperature ≤ 0.0°C (32°F) †		24	21	12	2	#	0	0	0	0	2	10	20	91	17
Normal heating degree-days (base 18.3°C/65°F) †		983	818	661	286	105	5	0	1	35	241	600	911	4646	30
Normal cooling degree-days (base 18.3°C/65°F) †		0	0	10	13	99	254	369	338	158	27	2	0	1270	30
Mean dew point temperature	°C	-2.2	-1.1	0.6	6.7	12.2	17.2	18.9	18.9	14.4	8.3	1.1	-1.7	7.8	12
	°F	28	30	33	44	54	63	66	66	58	47	34	29	46	12
Mean percent relative humidity		76	73	69	66	69	71	72	73	70	70	70	75	71	12
Mean precipitation	mm	89.66	88.14	128.27	104.14	106.68	102.87	95.50	75.95	74.68	59.69	84.58	84.84	1094.99	37
	in	3.53	3.47	5.05	4.10	4.20	4.05	3.76	2.99	2.94	2.35	3.33	3.34	43.11	37
Mean number days with precipitation ≥ 2.54 mm (0.1 in) †		12	11	13	12	11	10	11	8	8	7	10	11	125	30
Absolute maximum precipitation †	mm	486.92	249.94	378.71	281.94	243.33	256.79	418.08	267.46	213.61	204.47	231.65	214.12	1508.51	77
	in	19.17	9.84	14.91	11.10	9.58	10.11	16.46	10.53	8.41	8.05	9.12	8.43	59.39	77
Absolute minimum precipitation †	mm	20.83	4.32	4.32	6.35	16.00	8.89	6.35	3.81	6.68	1.78	6.35	16.51	606.55	77
	in	0.82	0.17	0.12	0.25	0.63	0.35	0.25	0.15	0.27	0.07	0.25	0.65	23.88	77
Absolute maximum 24-hr precipitation †	mm	107.95	127.00	177.04	123.19	116.84	130.56	139.70	96.01	107.19	128.52	90.93	112.01	177.04	106
	in	4.25	5.00	6.97	4.85	4.60	5.14	5.50	3.78	4.22	5.06	3.58	4.41	6.97	106
Mean number days with thunderstorms †		1	1	3	4	6	8	8	7	3	2	1	1	45	30
Mean snowfall	mm	137.16	106.68	96.52	5.08	0.0	0.0	0.0	0.0	0.0	0.0	40.89	60.96	447.04	39
	in	5.4	4.2	3.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	1.6	2.4	17.6	39
Mean number days with snowfall ≥ 25.4 mm (1.0 in) †		2	1	1	#	0	0	0	0	0	0	#	1	5	30
Absolute maximum snowfall †	mm	624.8	442.0	581.7	81.3	25.4	0.0	0.0	0.0	0.0	88.9	334.3	609.6	1275.1	77
	in	24.6	17.4	22.9	3.2	1.0	0.0	0.0	0.0	0.0	3.5	13.2	24.0	50.2	77
Mean pressure altitude	m	163.1	174.7	192.6	202.1	205.7	209.7	203.0	202.7	191.7	179.2	171.3	163.7	188.4	
	ft	535	573	632	663	675	688	666	665	629	588	562	537	618	
Mean wind speed †	knots	11.2	11.4	12.1	11.5	9.3	8.5	7.7	7.4	7.8	8.3	10.4	10.7	9.7	30
	kmph	15.6	15.9	16.9	16.1	13.0	11.9	10.8	10.3	10.9	11.6	14.5	15.0	13.5	30
	mph	9.7	9.9	10.5	10.0	8.1	7.4	6.7	6.4	6.8	7.2	9.0	9.3	8.4	30
Prevailing wind direction †		S	NW	NW	SW	SE	SE	S	N	SE	SE	S	S	S	15
Percent frequency of surface wind speed ≥ 28 knots (51.9 kmph or 32.2 mph)		0.1	0.4	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.1	12
Percent frequency of surface wind speed ≥ 17 knots (31.5 kmph or 19.6 mph)		8.2	8.3	9.4	9.3	3.4	1.4	0.7	0.2	1.0	1.9	7.2	6.5	4.8	12
Mean number days with surface wind ≥ 17 knots (31.5 kmph or 19.6 mph) and no precipitation	(at 1900 LST)	1.9	1.1	1.6	1.4	0.2	0.2	0.3	0.1	0.2	0.2	1.3	1.4	9.9	12
	(at 0100 LST)	2.7	1.4	1.5	0.8	0.4	0.0	0.0	0.0	0.1	0.2	1.6	0.8	9.5	12
	(at 0700 LST)	1.9	1.1	2.0	1.4	0.3	0.1	0.1	0.0	0.0	0.5	0.8	1.2	9.4	12
	(at 1300 LST)	3.7	4.5	5.0	6.0	2.5	1.3	0.4	0.2	0.9	1.8	5.2	4.4	35.9	12
Mean number days with surface wind 4 to 10 knots (7.4 to 18.5 kmph or 4.61 to 11.52 mph) and temperature 0.6 to 31.7° C (33° to 89° F) and no precipitation	(at 1900 LST)	12.9	13.7	18.2	18.4	21.2	19.0	19.3	15.9	15.3	17.5	16.2	14.0	201.6	12
	(at 0100 LST)	8.3	10.9	13.3	17.8	17.9	15.4	14.7	10.4	14.3	15.3	12.4	9.3	160.0	12
	(at 0700 LST)	6.7	7.3	11.1	17.4	19.2	16.6	17.1	11.3	13.8	14.3	10.7	8.0	153.5	12
	(at 1300 LST)	9.3	11.2	12.7	12.9	17.4	16.7	18.0	16.3	17.4	18.2	12.7	11.8	174.6	12
Fastest one-minute wind speed †	knots	43	53	49	50	50	50	52	45	50	33	52	53	53	30
	kmph	80	98	90	92	92	93	97	84	92	61	97	98	98	30
	mph	50	61	56	57	57	58	60	52	57	38	60	61	61	30
Mean number days with an occurrence of visibility ≤ 0.8 km (0.5 mi)		3.4	2.9	1.4	0.8	0.8	0.8	1.6	1.3	1.6	1.4	1.7	2.7	20.4	12
Percent frequency ceiling ≤ 1524 m (5000 ft) or visibility ≤ 8.05 km (5 mi)		55.9	47.7	42.0	31.2	24.8	21.9	21.7	19.6	16.3	26.5	37.1	46.3	32.6	12
Percent frequency ceiling ≤ 457.2 km (1500 ft) or visibility ≤ 4.83 km (3 mi)	(for 0000-0200 LST)	28.0	20.1	14.8	8.0	7.7	4.4	4.8	3.9	4.8	9.9	13.1	19.3	11.6	12
	(for 0300-0500 LST)	27.8	21.8	17.4	11.1	12.6	9.4	13.7	10.8	11.5	13.7	17.2	19.8	15.6	12
	(for 0600-0800 LST)	35.8	32.5	21.3	15.2	13.2	11.6	14.0	14.1	14.4	22.0	25.8	28.3	20.7	12
	(for 0900-1100 LST)	33.4	27.0	18.4	10.6	11.1	7.5	6.4	6.7	9.6	11.6	18.0	26.1	15.5	12
	(for 1200-1400 LST)	28.6	21.7	12.7	8.4	8.4	4.3	3.8	2.5	4.4	6.5	12.0	18.8	11.0	12
	(for 1500-1700 LST)	27.1	20.7	12.5	6.4	6.1	3.0	2.9	0.6	1.9	5.7	9.9	17.6	9.5	12
	(for 1800-2000 LST)	28.0	18.6	11.0	5.7	5.3	2.4	1.0	1.3	1.7	5.3	8.7	18.1	8.9	12
	(for 2100-2300 LST)	27.4	18.5	11.5	6.4	5.6	3.1	1.9	2.2	2.9	6.6	9.5	19.1	9.6	12
Percent frequency ceiling ≤ 91.4 m (300 ft) or visibility ≤ 1.61 km (1 mi)	(for 0000-0200 LST)	4.7	5.7	1.5	1.2	2.2	0.9	1.5	0.9	1.4	1.2	1.9	3.3	2.2	12
	(for 0300-0500 LST)	4.3	6.6	2.3	1.3	3.0	2.2	4.1	2.1	3.0	2.2	2.8	4.1	3.2	12
	(for 0600-0800 LST)	7.2	6.4	4.0	2.1	1.8	0.8	1.6	2.2	3.1	3.5	5.0	5.8	3.6	12
	(for 0900-1100 LST)	5.6	3.7	2.3	0.4	0.7	0.2	0.1	0.2	0.3	0.5	2.0	3.7	1.6	12
	(for 1200-1400 LST)	3.7	2.5	2.2	0.5	0.4	0.5	0.3	0.0	0.0	0.0	1.2	1.8	1.1	12
	(for 1500-1700 LST)	4.0	2.9	1.9	0.1	0.3	0.1	0.4	0.1	0.1	0.4	0.6	3.2	1.2	12
	(for 1800-2000 LST)	5.2	3.6	1.5	0.3	0.8	0.0	0.1	0.0	0.1	0.3	0.7	3.2	1.3	12
	(for 2100-2300 LST)	5.2	4.3	0.9	0.7	0.8	0.3	0.3	0.2	0.4	0.4	1.6	3.6	1.6	12
Mean number days with sky cover ≤ 30 percent and visibility ≥ 4.83 km (3 mi)	(at 1900 LST)	8.2	7.8	8.0	5.7	6.2	8.6	9.1	11.2	13.7	15.9	11.2	8.5	114.1	12
	(at 0100 LST)	9.1	10.1	12.1	13.0	14.4	16.4	17.5	20.1	19.8	19.2	13.0	11.2	175.9	12
	(at 0700 LST)	6.8	6.9	7.3	7.4	8.2	9.9	8.7	9.8	12.8	12.3	8.6	8.6	107.3	12
	(at 1300 LST)	5.1	6.5	6.7	5.8	4.6	5.3	4.5	4.7	11.2	11.7	8.8	7.2	82.1	12
Mean number days with ceiling ≥ 304.8 m (1000 ft) and visibility ≥ 4.83 km (3 mi)	(at 1900 LST)	24.0	23.7	28.1	29.0	29.7	29.3	30.7	30.8	29.6	29.8	28.1	26.6	339.4	12
	(at 0100 LST)	23.8	23.4	27.6	28.6	29.1	29.1	29.9	30.2	29.0	29.1	27.5	26.6	333.9	12
	(at 0700 LST)	23.3	21.1	25.5	26.5	27.6	26.7	26.4	25.7	26.2	24.8	24.1	25.0	302.9	12
	(at 1300 LST)	24.6	23.6	28.2	28.4	29.1	29.0	30.5	30.2	29.4	29.4	27.3	26.3	336.0	12

CLIMATIC SUMMARY (Continued)*

FORT KNOX, KENTUCKY/GODMAN AAF — LATITUDE 37°55'N — LONGITUDE 85°58'W — ELEVATION 230 m (753 ft)

PARAMETER DESCRIPTION	UNIT OF MEASURE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	YEARS OF RECORD
Mean number days with ceiling ≥ 609.6 m (2000 ft) and visibility ≥ 4.83 km (3 mi) and surface wind ≤ 10 knots (18.5 kmph or 11.5 mph)	(at 1900 LST)	14.9	12.3	16.1	17.0	21.6	24.9	26.7	29.2	21.4	26.8	19.7	18.0	254.6	12
	(at 0100 LST)	14.0	13.0	16.2	19.6	23.9	25.3	28.0	28.6	25.9	25.6	17.6	15.6	253.3	12
	(at 0700 LST)	12.4	11.5	15.1	16.7	21.7	22.0	23.6	24.7	22.6	20.6	15.2	13.4	219.5	12
	(at 1300 LST)	8.5	7.8	9.5	9.7	13.3	17.6	20.5	23.0	16.7	16.3	10.7	10.1	163.7	12
Mean number days with ceiling ≥ 762.0 m (2500 ft) and visibility ≥ 4.83 km (3 mi)	(at 1900 LST)	19.8	19.5	25.4	26.6	28.3	28.4	29.7	30.2	29.2	28.6	25.9	22.4	314.0	12
	(at 0100 LST)	19.8	20.6	24.4	26.3	28.2	28.1	29.6	29.5	28.7	27.7	25.4	22.8	311.1	12
	(at 0700 LST)	17.6	17.6	21.7	23.6	26.2	25.1	25.1	25.3	24.8	23.1	21.2	21.0	272.3	12
	(at 1300 LST)	18.2	18.6	22.7	24.6	25.3	26.7	27.9	28.2	27.0	27.2	23.4	21.0	290.8	12
Mean number days with ceiling ≥ 1828.8 m (6000 ft) and visibility ≥ 4.83 km (3 mi)	(at 1900 LST)	15.8	16.3	19.7	21.2	24.6	25.1	26.8	28.2	26.8	25.4	21.2	18.4	269.5	12
	(at 0100 LST)	15.2	16.3	19.1	22.7	25.4	26.4	27.7	28.0	27.2	25.7	20.7	17.9	272.3	12
	(at 0700 LST)	14.1	13.8	16.2	19.6	22.9	23.2	23.1	23.5	23.3	20.1	17.2	16.6	233.6	12
	(at 1300 LST)	14.1	15.3	16.6	17.6	18.2	19.0	19.4	21.2	22.7	22.7	18.9	17.5	223.2	12
Mean number days with ceiling ≥ 3048.0 m (10,000 ft) and visibility ≥ 4.83 km (3 mi)	(at 1900 LST)	14.4	15.0	18.2	19.5	22.8	23.6	25.1	26.8	25.7	24.1	19.7	16.1	251.0	12
	(at 0100 LST)	13.7	14.7	17.3	20.0	23.7	24.6	26.4	27.2	26.4	24.5	18.4	16.4	253.3	12
	(at 0700 LST)	13.0	12.4	14.5	16.5	20.5	21.8	21.7	21.8	21.1	18.6	15.2	15.6	212.7	12
	(at 1300 LST)	13.1	14.0	15.0	16.3	16.9	17.8	18.2	19.9	21.8	21.6	17.3	16.3	208.2	12

*Note: # = Less than 0.5 day; LST = Local Standard Time.

†Data derived from records at Standiford Field (1947 to 1977, latitude 38°11'N, longitude 85°44'W, elevation 151 m or 497 ft), at Bowman Field (1930 to 1947, latitude 38°13'N, longitude 85°40'W, elevation 164 m or 539 ft), and at Louisville (pre-1930, latitude 38°15'N, longitude 85°45'W, elevation 139 to 142 m or 457 to 466 ft).

EPHEMERIS FOR FORT KNOX, KENTUCKY
(EASTERN STANDARD TIME)

DATE	NAUTICAL TWILIGHT BEGINNING	NAUTICAL TWILIGHT END	SUNRISE	SUNSET	DATE	NAUTICAL TWILIGHT BEGINNING	NAUTICAL TWILIGHT END	SUNRISE	SUNSET	DATE	NAUTICAL TWILIGHT BEGINNING	NAUTICAL TWILIGHT END	SUNRISE	SUNSET	DATE	NAUTICAL TWILIGHT BEGINNING	NAUTICAL TWILIGHT END	SUNRISE	SUNSET
January 1	0658	1838	0800	1735	April 1	0532	2004	0630	1907	July 1	0415	2120	0525	2010	October 1	0542	1924	0639	1827
January 11	0658	1846	0800	1744	April 11	0516	2015	0615	1916	July 11	0421	2117	0531	2008	October 11	0551	1909	0648	1812
January 21	0656	1855	0756	1755	April 21	0500	2026	0601	1925	July 21	0430	2109	0538	2002	October 21	0601	1856	0658	1759
February 1	0649	1906	0748	1807	May 1	0446	2037	0548	1934	August 1	0442	2058	0547	1953	November 1	0611	1844	0709	1745
February 11	0641	1916	0739	1818	May 11	0433	2048	0538	1943	August 11	0453	2045	0555	1942	November 11	0620	1835	0720	1736
February 21	0630	1926	0727	1829	May 21	0422	2059	0529	1952	August 21	0503	2030	0604	1929	November 21	0630	1829	0730	1729
March 1	0619	1934	0716	1837	June 1	0414	2109	0523	2000	September 1	0514	2012	0613	1914	December 1	0639	1826	0741	1725
March 11	0605	1944	0702	1847	June 11	0411	2116	0521	2006	September 11	0524	1956	0622	1858	December 11	0647	1827	0749	1725
March 21	0550	1953	0646	1856	June 21	0411	2120	0522	2009	September 21	0533	1940	0630	1843	December 21	0653	1831	0756	1728

I. CROSS-COUNTRY MOVEMENT

MAP UNIT	GENERAL TERRAIN CONDITIONS*†	MOVEMENT OF TRACKED VEHICLES‡	MOVEMENT OF WHEELED VEHICLES§	MOVEMENT OF FOOT TROOPS
1. Nearly level to gently rolling open areas.	Nearly level to gently sloping open areas, many purposely cleared for maneuvers, are scattered throughout the reservation. Most slopes are less than 15 percent. Soils are largely silts and clays with good bearing capacity when dry. Low-lying areas are subject to poor drainage and occasional flooding. Sinkholes, generally less than 10 m (33 ft) deep, are prevalent in the western portion of the reservation; sinkholes occasionally fill with water after heavy rains. Streams are generally narrow, shallow, and intermittent. Underground pipelines near the surface west of and parallel to U.S. Highway 31W lead to and from Muldraugh Gas Storage Field, a fenced area centered at grid reference 872985.	Movement generally easy in any direction when soils are dry. Sinkholes can be easily bypassed. Clayey soil could slow movement during wet seasons. Low-lying areas impassible during occasional flooding. Muldraugh Gas Storage Field and underground pipeline areas should be avoided except at designated tank crossings.	Movement generally easy in any direction. Slowed during wet seasons by slick soil conditions, particularly in low-lying areas. Sinkholes and occasionally flooded areas present local obstacles.	Movement unhindered in any direction.
2. Nearly level to gently rolling grasslands.	Nearly level to gently sloping alluvial terraces and gently sloping uplands, mostly in the southeastern portion of the reservation. Slopes are less than 8 percent. Vegetation is mainly short grasses generally less than 1 m (3 ft) high. Silty soils, underlain by claypan, are subject to poor drainage and occasional flooding; good bearing strength when dry.	Movement unrestricted when soils are dry. Tanks could mire during wet seasons; movement in trace should be avoided. APC less severely affected. Some areas impassible during flooding.	Movement unrestricted when soils are dry. Movement may be greatly restricted during wet seasons due to slick, poorly drained soils. Movement prohibited in some areas during flooding.	Movement generally easy in any direction.
3. Gently rolling, scrub-covered uplands.	Gently sloping scrub-covered uplands are scattered throughout the reservation; small agricultural plots occur just inside the reservation periphery in the east, south, and west. Most slopes are less than 15 percent. Nearly open to medium spaced deciduous scrub; average spacing 6 to 12 m (20 to 40 ft) with 2.5 to 11.4 cm (1 to 4.5 in) stem diameters. Undergrowth is moderate to dense. Silt and clay soils, generally firm when dry. Low-lying areas are subject to seasonal flooding and poor drainage during wet seasons. Potentially unstable landslide (slump) areas west of the cantonment area. Underground pipelines are near the surface west of and parallel to U.S. Highway 31W.	Movement somewhat slowed by woody vegetation; generally easy in open areas. Tanks and APC could mire during wet seasons, especially where vegetation must be knocked down or detoured. Landslide terrain and occasional flooding could limit local movement. Visibility moderately impaired in locally dense vegetation. Underground pipeline areas should be avoided except at designated tank crossings.	Movement moderately slowed by woody vegetation; generally easy in open areas. Movement may be severely restricted during wet seasons by slick soil conditions, particularly in low-lying areas. Flooding prohibits movement locally. Landslide terrain could present local obstacles. Visibility moderately impaired in locally dense vegetation.	Movement easy in open areas. Slightly slowed by vegetation and occasional flooding.
4. Thinly wooded, gently sloping uplands.	Variable tracts of forests cover predominantly gently rolling uplands throughout the reservation. Slopes are generally between 0 and 8 percent, rarely exceeding 30 percent. Vegetation is primarily deciduous trees, with nearly open to medium spacing, and moderately sparse to moderately dense undergrowth. Tree spacing averages greater than 5 m (16 ft). Stem diameters vary from 25.4 to 50.8 cm (10 to 20 in). Soils are mainly silt and clay with good bearing strength when dry. Some low-lying areas are poorly drained and subject to occasional flooding. Sinkholes, similar to those in Unit 1, are prevalent in the western portion of this unit. Potentially unstable landslide (slump) areas occur west of the cantonment area. Streams vary in width; some stream valleys are steeply sloping. Underground pipelines, described in Unit 1, occur near the surface.	Movement moderately slowed by forests; generally easy in open areas. Miring could occur during wet seasons. Sinkholes, landslide terrain, and periodically flooded areas restrict local movement. Steeply sloping valley walls are hindrances; most streams are fordable. Visibility moderately impaired in wooded areas. Underground pipelines present problems similar to Unit 1.	Movement moderately slowed by forests; generally easy in open areas. Movement could be severely restricted during wet seasons, particularly in low-lying areas; flooding prohibits movement locally. Sinkholes, landslide terrain, and some stream valleys provide local obstacles. Visibility moderately impaired in wooded areas.	Movement easy in open areas. Slightly slowed by vegetation and occasional flooding.
5. Gently rolling, densely forested uplands.	Variable tracts of gently sloping forests, with medium to dense spacing, are scattered throughout the reservation. Slopes are predominantly 0 to 8 percent; some slopes are as steep as 30 percent. Dominant vegetation is deciduous trees with average trunk spacing 3 to 6 m (10 to 20 ft) and average stem diameters 19 to 40.6 cm (7.5 to 16 in). Some tree stands occur as plantations with trunk spacing 3 to 5 m (10 to 16 ft). Undergrowth is generally sparse. Soils are mainly silt and clay with good bearing strength when dry. Some low-lying areas are poorly drained and subject to occasional flooding. Sinkholes, similar to those in Unit 1, are prevalent in the western portion of this unit. Potentially unstable landslide (slump) areas occur west of the cantonment area. Streams vary in width; some stream valleys are steeply sloping. Underground pipelines, described in Unit 1, occur near the surface.	Movement severely slowed by dense forests. Unidirectional movement easy through some plantations. Miring creates additional hindrance during wet seasons. Some occasionally flooded areas restrict movement locally. Sinkholes, landslide terrain, steep stream valleys, and deep stream channels present local obstacles. Visibility is severely impaired. Underground pipelines present problems similar to Unit 1.	Movement severely hindered by forests. Unidirectional movement easy through some plantations. Movement additionally hindered during wet seasons, particularly in low-lying areas. Occasional flooding precludes local movement. Sinkholes, landslide terrain, and steep valleys, present local obstacles.	Movement slightly slowed by vegetation and occasional flooding.
6. Moderately to steeply sloping, wooded uplands.	Moderately to steeply sloping, nearly open to moderately dense deciduous and mixed deciduous and evergreen forests are scattered throughout the northwestern and eastern portions of the reservation. Slopes vary from 30 to 45 percent. Spacing between trees averages greater than 5 m (16 ft); stem diameters range from 25.4 cm (10 in) for pine, poplar, and basswood, to 50.8 cm (20 in) for oak and hickory. Undergrowth is generally sparse. Soils are shallow with numerous limestone outcrops. Streams vary in width; some stream valleys are steeply sloping.	Movement generally difficult due to steep slopes, forests, rock outcrops, and loose, rocky soils. Movement easier in open areas. Bluffs along streams and adjacent steeply sloping areas channelize movement along bottom lands. Visibility is moderately impaired in wooded areas.	Movement not practical for long distances due to steep slopes, randomly spaced trees, and loose, rocky soil. Limited movement in openings; extreme caution should be observed. Visibility is moderately impaired in wooded areas.	Movement slow but not difficult; limitations due to steep slopes, trees, and loose, rocky terrain.
7. Densely wooded terrain; most slopes steep.	Moderately to steeply sloping, dense forests are scattered throughout the northeastern and eastern portions of the reservation. Slopes vary from 30 to 45 percent. Vegetation is mostly deciduous trees with some evergreen trees in mixed stands. Tree spacing averages 3 to 6 m (10 to 20 ft) and stem diameters vary from 19 to 40.6 cm (7.5 to 16 in). Undergrowth varies from moderately sparse to moderately dense. Soils are shallow with numerous limestone outcrops. Streams vary in width; some stream valleys are steeply sloping.	Movement generally prohibited by steep slopes, dense vegetation, and loose, rocky surfaces. Bluffs along streams and adjacent steeply sloping areas channelize movement along bottom lands. Visibility severely impaired. Foot reconnaissance generally necessary to locate detours.	Movement not practical.	Movement slow but not difficult; limitations due to steep slopes, trees, and loose, rocky terrain.
8. Very steep terrain associated with rocky escarpments.	Dominantly very steeply sloping to nearly vertical rock escarpments along the Ohio River valley and in valleys throughout the eastern half of the reservation. Slopes exceed 45 percent. Vegetation is chiefly deciduous trees with highly variable spacing. Numerous hard limestone rock ledges outcrop on steep slopes, and potential for rockfalls is high.	Extremely steep slopes and rocky escarpments form insurmountable barriers. Movement possible only through gaps in escarpments.	Steep slopes and rocky escarpments form insurmountable barriers.	Steep slopes invariably hinder troop movement. Mobility at escarpments is extremely difficult but not impossible. Sheer cliffs can only be scaled by troops experienced in rock climbing techniques.

*Dry period - The period when most soils are firm and trafficable. In most years this period extends from August through October. Climatic variations may alter this time period.

†Wet period - The period when soil moisture is relatively high and bearing strengths low. In most years this period extends from approximately November through July. Climatic variations may alter this time period.

‡Comments apply to the M-60 tank and the M-113 armored personnel carrier.

§Comments apply to the M-35, 2½-ton truck and the M-151, ¼-ton truck.

FORT KNOX, KENTUCKY
TERRAIN ANALYSIS

CROSS-COUNTRY MOVEMENT

This map deals with cross-country movement, or movement away from roads, and is primarily intended for use in planning operations. For determining exact driving routes, reconnaissance on the ground is required. Data on the terrain factors and the evaluations are generalized to suit the scale of the map. Many areas of minor areal extent, such as small tracts of forest, cleared areas, and depressions, are too small to portray. Areas with no color represent built-up areas and are not evaluated.

The predicted movement ratings are those believed to prevail in most years. Variations in these evaluations may occur from year to year and even within a season due to abnormal variations in the weather. The evaluations are based on terrain conditions as they are known at present. Future alterations of the terrain, such as timber clearing operations, artificial drainage, and road construction, would obviously change cross-country movement conditions.

EVALUATION OF TERRAIN FOR CROSS-COUNTRY MOVEMENT

1. Nearly level to gently rolling open areas.
2. Nearly level to gently rolling grasslands.
3. Gently rolling, scrub-covered uplands.
4. Thinly wooded,gently sloping uplands.
5. Gently rolling, densely forested uplands.
6. Moderately to steeply sloping, wooded uplands.
7. Densely wooded terrain; most slopes steep.
8. Very steep terrain associated with rocky escarpments.

NOTE: Number refers to entry in table.

PREDICTED MOVEMENT RATINGS FOR:

	TANK (M-60)		APC (M-113)		2½-TON TRUCK (M-35)		¼-TON TRUCK (M-151)		FOOT TROOPS	
	Dry Period*	Wet Period†	Dry Period*	Wet Period†	Dry Period*	Wet Period†	Dry Period*	Wet Period†	Dry Period*	Wet Period†
1.	Good	Fair	Good	Fair	Good	Fair	Good	Fair	Good	Good
2.	Good	Poor	Good	Poor	Good	Poor	Good	Poor	Good	Good
3.	Good	Poor	Good	Poor	Fair	Poor	Fair	Poor	Good	Fair
4.	Fair	Poor	Fair	Poor	Fair	Poor	Fair	Poor	Good	Fair
5.	Fair	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Fair	Fair
6.	Poor	Poor	Poor	Poor	Poor	Unsuited	Poor	Unsuited	Fair	Poor
7.	Poor	Unsuited	Poor	Unsuited	Unsuited	Unsuited	Unsuited	Unsuited	Fair	Poor
8.	Unsuited	Unsuited	Unsuited	Unsuited	Unsuited	Unsuited	Unsuited	Unsuited	Poor	Poor

*Dry period - The period when most soils are firm and trafficable. In most years this period extends from August through October. Climatic variations may alter this time period.

†Wet period - The period when soil moisture is relatively high and bearing strenghs low. In most years this period extends approximately November through July. Climatic variations may alter this time period.

EXPLANATION OF RATING TERMS

Good — Conditions permit free movement in any direction. Terrain will permit 12 or more passes in trace of an M-60 tank or permit at least one maneuver (starts, sharp turns, or crossing of tracks) at one location.

Fair — Conditions moderately hinder progress or moderately restrict choices of direction for movement. Terrain will permit 3 to 12 passes in trace of an M-60 but maneuvering will be difficult.

Poor — Conditions severely hinder progress or greatly restrict choice of movement routes. Terrain will probably permit up to 3 passes in trace of an M-60. Very cautious driving required. Movement in trace should be avoided.

Unsuited — Conditions preclude all but local movement. Engineer work required for vehicular movement.

Impact area - off limits to vehicles and foot troops due to the danger of unexploded munitions.

Escarpment (slope > 100%). Barbs point downslope.

IMPACT AREA

CANTONMENT AREA

1:50,000 SHEET INDEX
Series V753

EKRON 3759 I
VINE GROVE 3859 IV

Scale 1:50,000

1000 500 0 1000 2000 3000 4000 5000 Meters

1 ½ 0 1 2 3 Statute Miles

CONTOUR INTERVAL 10 METERS
SUPPLEMENTARY CONTOURS 5 METERS

Prepared by Dames & Moore, Washington, DC, under the direction of the Terrain Analysis Center, U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia. March 1979.

J. LINES OF COMMUNICATION

1. ROADS

There are more than 300 paved roads on the Fort Knox reservation, the majority in the cantonment area. In most cases outside the cantonment area, the shoulder is considered part of the road width. Cantonment streets in less developed areas usually have a shoulder; however, many cantonment area streets are curbed on both sides. Narrow cantonment streets have frequent contiguous parking areas demarcated by curbed islands and painted lines. The majority of the roads outside the cantonment area and connecting through routes in the cantonment area, were selected to represent the road patterns on the map and in the table. Total length of portrayed roads is approximately 400 kilometers (256 miles).

U.S. Highway 31W traverses the west-central portion of the reservation in a generally north-south direction. Although the right-of-way is not considered to be part of Fort Knox, it is an important communication link.

Conventional vehicles are restricted by impact areas and poor road conditions to the cantonment area and the western and southern parts of the reservation. There are no designated tank trails on Fort Knox. Tanks utilize all of the roads on the reservation, but protective treads are required within the cantonment area.

There are 24 bridges on the Fort Knox reservation.

ROUTE NUMBER/NAME	ROUTE LOCATION (GRID REFERENCE) FROM	TO	LENGTH OF SEGMENT km	(mi)	MILITARY LOAD CLASSIFICATION	ROUTE TYPE	SURFACE CONSTRUCTION MATERIALS	SURFACE WIDTH/CONDITION	SHOULDER CONSTRUCTION MATERIALS	SHOULDER WIDTH/CONDITION	REMARKS
CANTONMENT ROADS											
Beard Avenue											
Segment a	919913	921914	0.2	(0.1)	No data	All weather	Bituminous	7.9 m (26 ft)/fair	No shoulder		Secondary; 2.4 m (8 ft) parking zone.
Segment b	926915	929912	0.5	(0.3)	No data	All weather	Bituminous	6.7 to 7.3 m (22 to 24 ft)/good	No shoulder		Secondary; 2.4 m (8 ft) parking zone.
Bennett Avenue	920914	926914	0.8	(0.5)	No data	All weather	Asphaltic concrete	7.9 m (26 ft)/fair	No shoulder		Secondary
Brandenburg Station Road	868979	916955	6.8	(4.2)	46	All weather	Bituminous	7.3 to 10.4 m (24 to 34 ft)/good	Earthen	1.8 to 2.4 m (6 to 8 ft)/good to fair	Primary, extends beyond the cantonment area.
Brave Rifles Regiment Avenue											
Segment a	911963	928965	1.6	(1.0)	No data	All weather	Asphaltic concrete	9.8 m (32 ft)/fair	No shoulder		Primary
Segment b	928965	935967	0.6	(0.4)	No data	All weather	Asphaltic concrete	7.9 to 8.5 m (26 to 28 ft)/good	No shoulder		Secondary
Bullion Boulevard											
Segment a	913958	915943	1.4	(0.9)	16	All weather	Bituminous	6.7 m (22 ft)/excellent	No shoulder		Primary; recently repaved.
Segment b	915943	910927	1.4	(0.9)	16	All weather	Asphaltic concrete	9.1 to 10.4 m (30 to 34 ft)/excellent	No shoulder		Primary; recently repaved.
Chaffee Avenue											
Segment a	884952	900941	2.1	(1.3)	No data	All weather	Bituminous	6.1 to 12.8 m (20 to 42 ft)/good	Gravel	3 m (10 ft)/good	Secondary; shoulder only part way.
Segment b	900941	901941	0.2	(0.1)	No data	All weather	Concrete	12.8 to 19.5 m (42 to 64 ft)/good	Bituminous	3 m (10 ft)/fair	Primary; four and five lane underpass; clearance unknown.
Segment c	901941	907946	0.6	(0.4)	No data	All weather	Bituminous	12.8 m (42 ft)/fair	Asphalt	3 m (10 ft)/fair	Primary; four lanes.
Segment d	907946	915946	0.8	(0.5)	No data	All weather	Asphaltic concrete	11 to 13.4 m (36 to 44 ft)/fair	No shoulder		Primary
Segment e	915946	917944	0.3	(0.2)	No data	All weather	Bituminous	12.2 m (40 ft)/good	No shoulder		Primary; railroad overpass restricts each lane to 4.9 m (16 ft); 4.1 m (13.4 ft) vertical clearance.
Segment f	917944	921945	0.3	(0.2)	No data	All weather	Portland cement concrete	6.1 m (20 ft)/fair	No shoulder		Primary
Dixie Street											
Segment a	918944	930932	1.3	(0.8)	No data	All weather	Bituminous	9.1 to 10.4 m (30 to 34 ft)/fair	No shoulder		Primary
Segment b	930932	935931	1.1	(0.7)	No data	All weather	Asphaltic concrete	9.8 m (32 ft)/fair	No shoulder		Primary
E Street											
Segment a	924954	924950	0.3	(0.2)	No data	All weather	Bituminous	6.1 m (20 ft)/good	No shoulder		Primary
Segment b	924950	926945	0.5	(0.3)	No data	All weather	Asphaltic concrete	6.1 m (20 ft)/good	No shoulder		Primary
8th Armored Division Drive	899948	905931	1.4	(0.9)	No data	All weather	Bituminous	9.1 to 9.8 m (30 to 32 ft)/good	No shoulder		Secondary
Eisenhower Avenue											
Segment a	911953	913953	0.3	(0.2)	No data	All weather	Portland cement concrete	6.1 to 8.5 m (20 to 28 ft)/good	No shoulder		Bullion Boulevard overpass restricts lanes horizonally; 3.5 m (11.5 ft) vertical clearance.
Segment b	913953	949957	3.5	(2.2)	No data	All weather	Bituminous	9.1 to 12.8 m (30 to 42 ft)/good	Gravel	1.2 to 1.8 m (4 to 6 ft)/good	Railroad overpass restricts each lane to 4.9 m (16 ft); 3.4 m (11.3 ft) vertical clearance.
Eleventh Avenue											
Segment a	916937	922937	0.6	(0.4)	No data	All weather	Portland cement concrete	4.9 to 10.4 m (16 to 34 ft)/fair	Gravel	2.4 m (8 ft)	Secondary
Segment b	922937	927939	0.5	(0.3)	No data	All weather	Asphaltic concrete	6.7 m (22 ft)/good	Gravel	0.6 to 1.2 m (2 to 4 ft)	Secondary
Segment c	927939	937939	1.1	(0.7)	No data	All weather	Asphaltic concrete	6.7 m (22 ft)/good	Dirt	0.6 to 1.2 m (2 to 4 ft)/poor	Primary
Estrada Avenue	919930	928912	3.4	(2.1)	No data	All weather	Bituminous	6.1 to 8.5 m (20 to 28 ft)/good	No shoulder		Secondary
Gold Vault Road	913931	925944	2.6	(1.6)	No data	All weather	Asphaltic concrete	9.8 to 10.4 m (32 to 34 ft)/good	Gravel	1.5 m (5 ft)/poor	Primary; railroad overpass, 4.1 m (13.5 ft) vertical clearance.
Knox Street											
Segment a	914966	915961	0.5	(0.3)	No data	All weather	Bituminous	6.1 m (20 ft)/good	No shoulder		Secondary
Segment b	915961	916954	0.6	(0.4)	No data	All weather	Asphaltic concrete	7.3 m (24 ft)/good	No shoulder		Secondary
Segment c	916954	917939	1.4	(0.9)	No data	All weather	Asphaltic concrete	11 to 19.2 m (36 to 63 ft)/fair	No shoulder		Primary
Ninth Avenue											
Segment a	921940	923941	0.2	(0.1)	No data	All weather	Portland cement concrete	7.9 m (26 ft)/good	No shoulder		Secondary
Segment b	923941	945953	2.7	(1.7)	No data	All weather	Bituminous	10.4 m (34 ft)/fair to good	Gravel	1.2 to 1.8 m (4 to 6 ft)	Primary
North Delaware Street	942967	942951	1.7	(1.1)	No data	All weather	Bituminous	6.1 to 7.3 m (20 to 24 ft)/good	Gravel	0.6 to 1.2 m (2 to 4 ft)/good	Primary and secondary; shoulder found along primary road.
Old Ironsides Avenue											
Segment a	920966	920964	0.2	(0.1)	No data	All weather	Bituminous	6.7 m (22 ft)/fair	Gravel	0.9 m (3 ft)/poor	Secondary
Segment b	920964	921955	1.0	(0.6)	No data	All weather	Asphaltic concrete	9.8 m (32 ft)/good	Gravel	0.9 m (3 ft)/fair	Secondary
Segment c	921955	920953	0.3	(0.2)	No data	All weather	Bituminous	9.1 m (30 ft)/good to excellent	No shoulder		Primary
Segment d	920953	922942	1.1	(0.7)	No data	All weather	Asphaltic concrete	7.9 m (26 ft)/good	No data		Primary

J. LINES OF COMMUNICATION (Continued)

1. ROADS (Continued)

ROUTE NUMBER/NAME	ROUTE LOCATION (GRID REFERENCE) FROM	TO	LENGTH OF SEGMENT km	(mi)	MILITARY LOAD CLASSIFICATION	ROUTE TYPE	SURFACE CONSTRUCTION MATERIALS	SURFACE WIDTH/CONDITION	SHOULDER CONSTRUCTION MATERIALS	SHOULDER WIDTH/CONDITION	REMARKS
CANTONMENT ROADS (Continued)											
Old Ironsides Avenue (Continued)											
Segment e	922942	922939	0.5	(0.3)	No data	All weather	Bituminous	10.4 m (34 ft)/good	No data		Primary
Segment f	922939	923936	0.3	(0.2)	No data	All weather	Asphaltic concrete	9.8 m (32 ft)/good	No data		Secondary
Segment g	923936	924933	0.3	(0.2)	No data	All weather	Bituminous	7.9 m (26 ft)/fair	Gravel	0.9 m (3 ft)/poor	Secondary
Orinoco Street	931957	932957	0.2	(0.1)	No data	All weather	Bituminous	6.1 m (20 ft)/fair	No shoulder		Primary; with asphalt parking zones.
Park Road	913957	921938	2.7	(1.7)	No data	All weather	Bituminous	7.3 to 11 m (24 to 36 ft)/good	No shoulder		Primary; recently paved; railroad overpass restricts each lane to 4.9 m (16 ft); 3.3 m (10.8 ft) overhead clearance.
Pickett Road	931960	940970	1.3	(0.8)	No data	All weather	Bituminous	7.3 to 8.5 m (24 to 28 ft)/fair	Gravel	0.6 to 1.8 m (2 to 6 ft)/fair	Primary
Pilot Street											
Segment a	910951	910953	0.3	(0.2)	No data	All weather	Asphaltic concrete	6.1 m (20 ft)/good	No shoulder		Secondary
Segment b	910953	911955	0.6	(0.4)	No data	All weather	Portland cement concrete	8.5 m (28 ft)/good	No shoulder		Primary
Radio Street	931947	932945	0.3	(0.2)	No data	All weather	Bituminous	7.3 m (24 ft)/good	Gravel	0.3 m (1 ft)/good	Primary
Seventh Avenue	960941	949957	3.5	(2.2)	No data	All weather	Portland cement concrete	9.1 to 10.4 m (30 to 34 ft)/fair to good	No shoulder		Primary
Upton Road	929961	942967	1.3	(0.8)	No data	All weather	Bituminous	6.7 m (22 ft)/good	Gravel	0.6 to 1.2 (2 to 4 ft)/fair	Primary
Vine Grove Road	881904	917944	6.2	(3.8)	60	All weather	Bituminous	6.1 to 9.1 m (20 to 30 ft)/fair	No data		Primary; extends beyond cantonment area; road narrows at bridge.
Wilson Road											
Segment a	913026	936950	8.6	(5.3)	No data	All weather	Bituminous	9.8 m (32 ft)/fair to good	No data		Primary; extends beyond cantonment area.
Segment b	936950	928908	4.5	(2.8)	No data	All weather	Asphaltic concrete	9.1 m (30 ft)/good	Gravel	0.9 to 1.3 m (3 to 6 ft)/good	Primary; extends beyond cantonment area.
Yellowstone Street	931960	932957	0.3	(0.2)	No data	All weather	Bituminous	6.1 m (20 ft)/fair	No data		Primary
ROADS OUTSIDE THE CANTONMENT AREA											
Baker Road	902976	923994	3.4	(2.1)	No data	All weather	Portland cement concrete	5.5 m (18 ft)/fair	No data		
Bank Road	893998	891000	0.3	(0.2)	No data	All weather	Bituminous	7.3 m (24 ft)/good	No data		
Basham Road North	841977	844942	3.4	(2.1)	No data	Fair weather	Gravel	6.1 m (20 ft)/fair	No data		
Beech Grove Road	037964	085991	8.0	(5.0)	No data	Fair weather	Improved dirt	4.3 m (14 ft)/fair	No data		
Brumfield Range Road	960911	954898	3.7	(2.3)	30	All weather	Bituminous	7.3 m (24 ft)/fair	No data		
Carbine Range Road	899990	893998	1.0	(0.6)	No data	All weather	Bituminous	7.3 m (24 ft)/good	No data		
Carpenter Test Road											
Segment a	888974	880006	3.0	(1.9)	No data	All weather	Asphaltic concrete	7.3 m (24 ft)/good	Gravel	2.4 m (8 ft)/good	
Segment b	880006	865052	6.0	(3.7)	No data	Fair weather	Gravel	7.3 m (24 ft)/good	No data		
Cedar Creek Road	031917	030869	6.0	(3.7)	No data	Fair weather	Gravel	4.3 m (14 ft)/poor	No shoulder		Two ruts; dirt in various locations.
Chappel Ridge Road	991018	038039	7.5	(4.7)	No data	Fair weather	Unimproved dirt	6.1 m (20 ft)/fair	No data		
484th Engineer Road	899990	912987	1.5	(0.9)	No data	Fair weather	Gravel	6.1 m (20 ft)/poor	No data		
Gas Pump Road											
Segment a	855008	869990	2.4	(1.5)	No data	Fair weather	Unimproved dirt	4.3 m (14 ft)/poor	No data		
Segment b	868989	877988	1.0	(0.6)	No data	Fair weather	Gravel	7.3 m (24 ft)/fair	No data		
Hays Flats Road	0319917	098936	7.5	(4.7)	No data	Fair weather	Gravel	6.1 m (20 ft)/fair	No data		Crosses impact area.
Kentucky Highway 1638	850976	882994	4.0	(2.5)	No data	All weather	Bituminous	6.7 m (22 ft)/fair	No shoulder		Bridge over Otter Creek; two lanes; narrow.
Knob Road											
Segment a	062934	092901	4.5	(2.8)	No data	Fair weather	Gravel	4.3 m (14 ft)/poor	No data		Crosses impact area.
Segment b	092901	102889	1.5	(0.9)	No data	All weather	Bituminous	5.5 m (18 ft)/poor	No data		Crosses impact area.
Liggett Road	887995	893998	0.8	(0.5)	No data	Fair weather	Gravel	6.7 m (22 ft)/poor	No data		
Main Range Road											
Segment a	926977	954898	11.3	(7.0)	30	All weather	Bituminous	7.3 m (24 ft)/good	No data		Road narrows at bridge.
Segment b	923993	931043	5.0	(3.1)	30	All weather	Bituminous	7.3 m (24 ft)/good	No data		Road narrows at bridge.
Mount Eden Church Road	020998	047052	6.5	(4.0)	No data	Fair weather	Gravel	6.1 m (20 ft)/fair	No data		
Muldraugh Magazine Road											
Segment a	901977	899989	2.5	(1.6)	No data	All weather	Bituminous	9.1 m (30 ft)/good	No data		Primary
Segment b	899989	889995	1.5	(0.9)	No data	All weather	Bituminous	7.3 m (24 ft)/good	No data		Primary
North Boundary Road	986065	039042	7.0	(4.3)	No data	Fair weather	Gravel	6.1 m (20 ft)/fair	No data		
Old Kentucky Highway 251	010876	012846	3.0	(1.9)	No data	All weather	Bituminous	7.9 m (26 ft)/good	Earthen	1.2 m (4 ft)/fair	
Old Salt River Road											
Segment a	832968	844976	1.4	(0.9)	No data	Fair weather	Gravel	5.5 m (18 ft)/poor	No data		
Segment b	853973	887995	4.0	(2.5)	No data	Fair weather	Gravel	9.1 m (30 ft)/good	Gravel	0.9 to 1.3 m (3 to 6 ft)/fair	Tank training area; gravel dispersed, but good road.
Pinwheel Road											
Segment a	854970	880923	6.0	(3.7)	16	Fair weather	Gravel	6.1 m (20 ft)/fair	No shoulder		
Segment b	880923	887912	1.1	(0.7)	16	All weather	Bituminous	7.3 m (24 ft)/fair	Earthen	0.9 m (3 ft)/fair	
Pitts Point Road	997998	083035	14.3	(8.9)	30	Fair weather	Gravel	6.1 m (20 ft)/fair	No data		
Pitts Point Road South	031971	052926	5.5	(3.4)	No data	Fair weather	Improved dirt	6.1 m (20 ft)/poor	No data		
Poorman Range Road	935930	967939	4.0	(2.5)	30	All weather	Asphaltic concrete	7.3 m (24 ft)/good	No data		Road narrows at bridge.
Porter River Range Road											
Segment a	950956	961961	1.5	(0.9)	24	All weather	Bituminous	6.1 to 8.5 m (20 to 28 ft)/good	No data		Road narrows at bridge.

J. LINES OF COMMUNICATION (Continued)

1. ROADS (Continued)

ROUTE NUMBER/NAME	ROUTE LOCATION (GRID REFERENCE) FROM	TO	LENGTH OF SEGMENT km	(mi)	MILITARY LOAD CLASSIFICATION	ROUTE TYPE	SURFACE CONSTRUCTION MATERIALS	SURFACE WIDTH/CONDITION	SHOULDER CONSTRUCTION MATERIALS	SHOULDER WIDTH/CONDITION	REMARKS
ROADS OUTSIDE THE CANTONMENT AREA (Continued)											
Porter River Range Road (Continued)											
Segment b	961961	011989	9.5	(5.9)	24	Fair weather	Gravel	4.3 to 6.1 m (14 to 20 ft)/good	No data		Road narrows at bridge.
Post Road	901923	910927	1.0	(0.6)	No data	All weather	Bituminous	7.3 m (24 ft)/fair	No data		
Railway Trestle Road											
Segment a	881004	913027	5.0	(3.1)	30	All weather	Bituminous	7.9 m (26 ft)/fair	No data		Road narrows at bridge.
Segment b	924034	927031	0.5	(0.3)	No data	Fair weather	Gravel	6.1 m (20 ft)/fair	No data		Passes under railroad; no clearance data.
7th Armored Division Cut-off Road	939945	942909	4.0	(2.5)	No data	Fair weather	Gravel	9.7 m (32 ft)/poor	No data		
7th Armored Division Road											
Segment a	929915	010877	11.2	(7.0)	30	All weather	Asphaltic concrete	6.7 m (22 ft)/good	No data		Road narrows at bridge.
Segment b	010877	024889	1.7	(1.0)	30	Fair weather	Gravel	6.7 m (22 ft)/fair	No data		Road narrows at bridge.
Snow Mountain Road	872959	876946	1.5	(0.9)	No data	All weather	Bituminous	5.5 m (18 ft)/good	No shoulder		
South Boundary Road											
Segment a	965835	031869	11.2	(7.0)	30	All weather	Bituminous	10.7 m (35 ft)/good	No data		
Segment b	030869	092860	7.2	(4.5)	30	Fair weather	Gravel	6.7 m (22 ft)/fair	No data		Road narrows at bridge.
Steeles Range Road	946909	965919	2.5	(1.6)	30	All weather	Bituminous	6.1 m (20 ft)/fair	No data		
Twin Bridges Road	841964	854973	1.8	(1.1)	65	Fair weather	Gravel	4.3 m (14 ft)/fair	No data		
U.S. Highway 60	844942	923994	8.5	(5.3)	No data	All weather	Tar and chip aggregate	7.3 m (24 ft)/fair	No shoulder		
U.S. Highway 31W	911037	918908	15.0	(9.0)	No data	All weather	Asphalt	25.6 m (84 ft)/good	Gravel	0.9 to 1.8 m (3 to 6 ft)/poor	Four lanes; right-of-way not part of reservation, but can be closed under military emergency.
West Point Well Field Road	891037	912048	2.7	(1.7)	No data	Fair weather	Gravel	3.6 m (12 ft)/poor	No data		
Unnamed paved roads			11.0	(6.8)	No data	All weather	Bituminous	No data	No data		
Unnamed gravel roads			1.0	(0.6)	No data	Fair weather	Gravel	No data	No data		
Unnamed improved dirt roads			73.0	(45.4)	No data	Fair weather	Improved dirt	No data	No data		
Unnamed unimproved dirt roads			30.0	(18.6)	No data	Fair weather	Unimproved dirt	No data	No data		

ROAD BRIDGES

BRIDGE NUMBER	ROUTE DESIGNATION	GRID REFERENCE	FEATURE CROSSED	MILITARY LOAD CLASSIFICATION*	W	T	DIMENSIONS	CLEARANCE	TYPE/CONSTRUCTION MATERIALS	CONDITION	REMARKS
1	Porter River Range Road	967968	Mill Creek	(2)	No data		21 m (70 ft) long 6.7 m (22 ft) wide Roadway width 6.1 m (20 ft)	Unlimited vertical 6.1 m (20 ft) horizontal	Steel I-beam superstructure; concrete deck	Poor	Seriously overloaded prior to construction of Bridge 1A; overloading caused cracking of two concrete bents. Sounding of bents indicates they are structurally adequate for post load limit of 24W-24T. Recommendation has been made for replacement as soon as possible.
				(1)	24	24					
1A	Porter River Range Road	967968	Mill Creek	(2)	No data		21.5 m (70.5 ft) long 6.4 m (21 ft) wide Roadway width 4.1 m (13.5 ft)	Unlimited vertical 4.1 m (13.5 ft) horizontal	Double truss, single story military Bailey bridge; timber deck	Fair	Built to relieve heavy vehicle traffic from Bridge 1. Temporary; abutments made of telephone poles; slope stability of abutments should be watched.
				(1)	60	60					
2	Main Range Road	963958	Mill Creek	(2)	30	30	56.7 m (186 ft) long 6.7 m (22 ft) wide Roadway width 6.1 m (20 ft)	Unlimited vertical 6.1 m (20 ft) horizontal	Steel I-beam superstructure; timber deck	Fair	
				(1)	80	68					
3	Poorman Range Road	955932	Mill Creek	(2)	30	30	26 m (85 ft) long 5.8 m (19 ft) wide Roadway width 5.6 m (18.5 ft)	Unlimited vertical 5.6 m (18.5 ft) horizontal	Steel I-beam superstructure; timber deck	Fair	
				(1)	80	70					
4	Main Range Road	955903	Mill Creek	(2)	30	30	24 m (80 ft) long 6.1 m (20 ft) wide Roadway width 5.8 m (19 ft)	Unlimited vertical 5.8 m (19 ft) horizontal	Steel I-beam superstructure; timber deck	Fair	
				(1)	80	62					
5	Brumfield Range Road	967900	Mill Creek	(2)	60	42	31.1 m (102 ft) long 7.9 m (26 ft) wide Roadway width 7.3 m (24 ft)	Unlimited vertical 7.3 m (24 ft) horizontal	Steel I-beam superstructure; timber deck	Fair	Handrail is rotting and needs replacement.
				(1)	65	42					
6	Brumfield Range Road	967901	Tributary to Mill Creek	(2)	30	30	6.2 m (20.5 ft) long 7.9 m (26 ft) wide Roadway width 7.2 m (23.5 ft)	Unlimited vertical 7.2 m (23.5 ft) horizontal	Steel I-beam superstructure; timber deck	Fair	
				(1)	50	30					
7	7th Armored Division Road	974871	Mill Creek	(2)	30	30	21 m (68 ft) long 6.1 m (20 ft) wide Roadway width 5.8 m (19 ft)	Unlimited vertical 5.8 m (19 ft) horizontal	Steel I-beam superstructure; timber deck	Fair	
				(1)	80	65					
8	South Boundary Road	031858	Cedar Creek	(2)	No data		9.1 m (30 ft) long 11 m (35 ft) wide Roadway width 11 m (35 ft)	Unlimited vertical Unlimited horizontal	Three metal culverts	Fair	Each culvert 3 m (10 ft). At flood stage, if culverts aren't clean, the water could seriously damage the roadway.
				(1)	80	70					
9	South Boundary Road	980845	Mill Creek	(2)	30	30	11 m (35 ft) long 6.1 m (20 ft) wide Roadway width 5.8 m (19 ft)	Unlimited vertical 5.8 m (19 ft) horizontal	Steel I-beam superstructure; timber deck	Fair	
				(1)	80	70					
10	Steeles Range Road	946909	Mill Creek	(2)	30	30	28 m (92 ft) long 6.1 m (20 ft) wide Roadway width 5.8 m (19 ft)	Unlimited vertical 5.8 m (19 ft) horizontal	Steel I-beam superstructure; timber deck	Fair	
				(1)	80	70					
11	Vine Grove Road	892916	Gander Branch	(2)	60	60	4.3 m (14 ft) long 7.3 m (24 ft) wide Roadway width 5.5 m (18 ft)	Unlimited vertical 7.3 m (24 ft) horizontal	Concrete culvert with steel reinforcing; wooden guardrails	Fair	
				(1)	80	70					
12	Twin Bridges Road	853967	Otter Creek	(2)	No data		36.6 m (120 ft) long 4.1 m (13.5 ft) wide Roadway width 4.1 m (13.5 ft)	Unlimited vertical 4.1 m (13.5 ft) horizontal	Military panel bridge; metal grid deck	Fair	U.S. Army single lane steel panel bridge, designated T-8.
				(1)	65	65					
13	Pinwheel Road	880923	Dry Branch	(2)	No data		18 m (60 ft) long 6.7 m (22 ft) wide Roadway width 4.6 m (15 ft)	Unlimited vertical 4.6 m (15 ft) horizontal	Timber trestle bridge; timber deck	Poor	Severe erosion undermining wing walls.
				(1)	16	16					
14	Brandenburg Station Road	897976	Illinois Central Railroad; 3 m (10 ft) paved road; powerline	(2)	55	46	101 m (331 ft) long 9.8 m (32 ft) wide Roadway width 7.3 m (24 ft)	Unlimited vertical 9.1 m (30 ft) horizontal	Concrete T-beam superstructure; concrete slab deck	Fair	Concrete sidewalk, 0.6 m (2 ft). Joints are expanding.
				(1)	66	56					

J. LINES OF COMMUNICATION (Continued)

1. ROADS (Continued)

ROAD BRIDGES (Continued)

BRIDGE NUMBER	ROUTE DESIGNATION	GRID REFERENCE	FEATURE CROSSED	MILITARY LOAD CLASSIFICATION*	W	T	DIMENSIONS	CLEARANCE	TYPE/CONSTRUCTION MATERIALS	CONDITION	REMARKS
15	Brandenburg Station Road	890974	U.S. Highway 31W	(2) (1)	60 80	60 70	54.9 m (180 ft) long 9.8 m (32 ft) wide Roadway width 7.3 m (24 ft)	Unlimited vertical 9.1 m (30 ft) horizontal	Concrete T-beam superstructure; concrete slab deck	Fair	Concrete sidewalk, 0.8 m (2.5 ft).
16	Pitts Point Road	078034	Tributary to Woodland Creek	(2) (1)	30 50	30 40	9.1 m (30 ft) long 6.7 m (22 ft) wide Roadway width 6.2 m (20.5 ft)	Unlimited vertical 6.2 m (20.5 ft) horizontal	Steel I-beam superstructure; timber deck	Fair	
17	Pitts Point Road	071031	Woodland Creek	(2) (1)	30 50	30 40	6.7 m (22 ft) long 6.7 m (22 ft) wide Roadway width 6.2 m (20.5 ft)	Unlimited vertical 6.2 m (20.5 ft) horizontal	Steel I-beam superstructure; timber deck	Fair	
18	Railway Trestle Road	913026	Poplar Spring Branch	(2) (1)	30 50	30 35	12 m (38 ft) long 7.3 m (24 ft) wide Roadway width 6.7 m (22 ft)	Unlimited vertical 6.7 m (22 ft) horizontal	Concrete slab superstructure; concrete deck	Fair	
19	Bullion Boulevard	914954	Eisenhower Avenue	(2) (1)	No data 16	16	9.8 m (32 ft) long 7.9 m (26 ft) wide Roadway width 7.3 m (24 ft)	Unlimited vertical 7.3 m (24 ft) horizontal	Concrete T-beam superstructure; concrete deck	Poor	Clear height is 3.5 m (11.5 ft); underside of stringers have been chipped by high vehicles; reinforcement bars are exposed.
20	Dry Branch Road	904943	Tributary to Dry Branch		No data		13 m (44 ft) long 4.9 m (16 ft) wide Roadway width 3.8 m (12.5 ft)	Unlimited vertical 3.8 m (12.5 ft) horizontal	Timber trestle bridge; timber deck	Poor	Bridge is chained off.
21	Porter River Range Road	973973	Tributary to Mill Creek	(2) (1)	30 70	30 55	8.5 m (28 ft) long 6.1 m (20 ft) wide Roadway width 5.5 m (18 ft)	Unlimited vertical 5.5 m (18 ft) horizontal	Concrete slab superstructure; concrete deck	Fair	
22	Hays Flats Road	031917	Rolling Fork	No data			169 m (556 ft) long 5.5 m (18 ft) wide Roadway width 4.6 m (15 ft)	3.4 m (11 ft) vertical 4.9 m (16 ft) horizontal	Steel trestle bridge; timber deck	Poor	Abandoned; deck is overgrown and rotting. Unsafe. Used for emergency escape on foot from Hays Flats impact Area.
23	Pitts Point Road	000004	Salt River	No data			36 m (119 ft) long 4.9 m (16 ft) wide Roadway width 3.8 m (12.5 ft)	Unlimited vertical Unlimited horizontal	Pontoon bridge; metal tracks	Good	Five pontoons. Kept parallel to current unless in use. Not useable during high water flows. Rope pulley used to maneuver into place.
24	Muldraugh Magazine Road	902993	Illinois Central Railroad Spur	No data			19.2 m (63 ft) long 7.3 m (24 ft) wide Roadway width 6.4 (21 ft)	Unlimited vertical 6.4 (21 ft) horizontal	No data	No data	

*W=Wheeled; T=Tracked; (1)=one-way; (2)=two-way

2. RAILROADS

Fort Knox contains approximately 27 kilometers (17 miles) of U.S. Government owned, standard gage track connected to the main line of the Illinois Central Gulf Railroad. All U.S. Government owned track at Fort Knox is associated with freight and storage yard facilities. Approximately 5.6 kilometers (3.5 miles) of track serve the 12 magazines in the Muldraugh Ammunition Storage Area. Other tracks serve the warehouse-utilities-supply area, the consolidated field maintenance area, and various other relatively small facilities. Existing trackage is sufficient in all areas that need railroad facilities.

Two railroad main lines traverse the reservation. The Illinois Central Gulf Railroad passes through the cantonment area east of Godman Army Airfield, roughly paralleling the U.S. Highway 31W right-of-way. This main line is presently used for freight; however, it could be used to ship troops by rail in emergencies. The Louisville and Nashville Railroad crosses the extreme northwest corner of the reservation; it does not connect with Fort Knox rail facilities.

There are seven railroad bridges on the reservation, all owned and maintained by the Illinois Central Gulf Railroad. Two cross tributaries of the Ohio River in the northwest portion of the reservation. Five cross roads in the cantonment area. Road clearances are posted at each railroad bridge in the cantonment. Illinois Central Gulf is presently sandblasting and refacing the railroad bridges in the cantonment area.

IDENTIFICATION NUMBER	SEGMENT OF TRACK (GRID REFERENCE) FROM	TO	LENGTH OF SEGMENT m	(ft)	OWNERSHIP OF LINE AND CONDITION OF TRACK	TRACK AND BED CHARACTERISTICS	CROSSOVERS (GRID REFERENCE)	SIDINGS AND WYES (GRID REFERENCE)	VOLUME OF TRAFFIC	REMARKS
1					U.S. Government owned; good condition unless otherwise noted.	Single track, standard gage (1.44 m or 4 ft 8.5 in); maximum grade 2.25%; minimum radius of curvature 457.2 m (1500 ft); ballast material: limestone; weight of rails (unless otherwise noted): 44.6 kg/m (90 lb/yd).		Wye at 907967 and 916955. Sidings are listed separately as segments.	100 to 299 car movements per month unless otherwise noted.	Consists of several interconnected rail yards and sidings. All sidings are shown on accompanying figure. Connects with main line of Illinois Central Gulf Railroad at grid reference 903970. Just refurbished.
Segment a	903969	915956	1680	(5512)			910962			
Segment b	910963	914957	719.9	(2362)			911962			
Segment c	910962	914959	480.1	(1575)			No crossovers			
Segment d	917955	921955	240	(787)			No crossovers			
Segment e	913958	916953	576.1	(1890)	Fair condition		No crossovers			
Segment f	904969	894998	4828	(15,840)			901976, 903993, 898994		5 to 24 car movements per month.	Track into the ammunition storage yard.
Segment g	900994	895999	804.7	(2640)			899995		5 to 24 car movements per month.	Siding in ammunition storage yard.
Segment h	909968	912969	431.9	(1417)		Weight of rails: 30 kg/m (60 lb/yd)	No crossovers			Track into salvage yard.
Segment i	907968	935953	4032	(13,228)			908968, 914970, 918970, 928966, 929961, 930959, 932957			Track into storage yard.
Segment j	914970	917972	312.1	(1024)			No crossovers		No data	Siding to track segment 1i.
Segment k	918971	923971	527.9	(1732)			No crossovers			Siding to track segment 1i.
Segment l	933956	935954	360	(1181)			No crossovers			Siding to track segment 1i.
Segment m	933956	936954	431.9	(1417)			No crossovers			Siding to track segment 1i.
Segment n	916950	916950	122	(400)	Fair condition	Weight of rails: 39.7 kg/m (80 lb/yd)	No crossovers			
Segment o	916950	916950	122	(400)	Fair condition	Weight of rails: 39.7 kg/m (80 lb/yd)	No crossovers			

J. LINES OF COMMUNICATION (Continued)

2. RAILROADS (Continued)

IDENTIFICATION NUMBER	SEGMENT OF TRACK (GRID REFERENCE) FROM	TO	LENGTH OF SEGMENT m (ft)	OWNERSHIP OF LINE AND CONDITION OF TRACK	TRACK AND BED CHARACTERISTICS	CROSSOVERS (GRID REFERENCE)	SIDINGS AND WYES (GRID REFERENCE)	VOLUME OF TRAFFIC	REMARKS
1 (Continued)									
Segment p	916950	916950	83.8 (275)			No crossovers			
Segment q	916951	915948	623.9 (2047)		Weight of rails: 39.7 kg/m (80 lb/yd)	No crossovers			
Segment r	916950	916948	244 (800)		Weight of rails: 37.2 kg/m (75 lb/yd)	No crossovers			
Segment s	916950	917946	480.1 (1575)		Weight of rails: 37.2 kg/m (75 lb/yd)	917948			
Segment t	916950	917946	527.9 (1732)			917948			
Segment u	916950	917946	623.9 (2047)			917948			
Segment v	917946	914922	2544 (8346)	Fair to good condition		917945, 917943, 917939, 916937, 916935			Warehouse siding. Extends into borrow area.
Segment w	917944	916932	1056 (3464)			917943, 917939, 916937, 916935			Warehouse siding.
Segment x	917944	917940	384 (1260)			917943			
Segment y	916931	917938	576.1 (1890)		Weight of rails: 37.2 kg/m (75 lb/yd)	917937, 917935			Warehouse siding.
Segment z	916931	917938	719.9 (2362)		Weight of rails: 37.2 kg/m (75 lb/yd)	917937, 917935			Warehouse siding.
Segment aa	917932	918937	623.9 (2047)		Weight of rails: 39.7 kg/m (80 lb/yd)	918937, 917935			Warehouse siding.
Segment bb	917932	918937	623.9 (2047)		Weight of rails: 39.7 kg/m (80 lb/yd)	918937, 917935			Warehouse siding.
Segment cc	918933	919938	480.1 (1575)		Weight of rails: 39.7 kg/m (80 lb/yd)	919937, 919935			Warehouse siding.
Segment dd	919937	919939	239 (785)		Weight of rails: 39.7 kg/m (80 lb/yd)	919937			Warehouse siding.
Segment ee	919937	920939	288 (945)		Weight of rails: 39.7 kg/m (80 lb/yd)	919937			Warehouse siding.
Segment ff	916931	919935	576.1 (1890)		Weight of rails: 39.7 kg/m (80 lb/yd)	919935			Warehouse siding.
Segment gg	915930	919933	480.1 (1575)		Weight of rails: 37.2 kg/m (75 lb/yd)	No crossovers			
Segment hh	916931	919933	384 (1260)		Weight of rails: 37.2 kg/m (75 lb/yd)	No crossovers			
2	920032	909911	17,703 (58,080)	Illinois Central Gulf Railroad; fair to good condition unless otherwise noted.	Single track, standard gage (1.44 m or 4 ft 8.5 in); ballast material: MTL 2; weight of rails (unless otherwise noted): 55.5 kg/m (112 lb/yd).	884007, 887995, 897977	Sidings are listed separately as segments.	Average five trains each way per day.	Main line. Freight only. All segments are sidings to Illinois Central Gulf Railroad and are shown on accompanying figure.
Segment a	902971	900974	552 (1811)	Poor condition	Weight of rails: 33.5 kg/m (67.5 lb/yd)	No crossovers		100 to 299 car movements per month.	
Segment b	901973	900973	180 (590)	Poor condition	Weight of rails: 33.5 kg/m (67.5 lb/yd)	No crossovers			
Segment c	916952	915947	672.1 (2205)			No crossovers			
Segment d	915951	915948	480.1 (1575)			No crossovers			
Segment e	915953	945947	480.1 (1575)		Weight of rails: 39.7 kg/m (80 lb/yd)	No crossovers		100 to 299 car movements per month.	
Segment f	915953	915952	171 (520)		Weight of rails: 44.6 kg/m (90 lb/yd)	No crossovers		100 to 299 car movements per month.	
Segment g	915939	915933	792.5 (2600)		Weight of rails: 44.6 kg/m (90 lb/yd)	No crossovers		100 to 299 car movements per month.	
3	912049	853020	9144 (30,000)	Louisville and Nashville Railroad; no data on condition.	Single track, standard gage (1.44 m or 4 ft 8.5 in); ballast material: slag; weight of rails: 49.6 to 57 kg/m (100 to 115 lb/yd).	No crossovers	No sidings or wyes.	Three to five trains per day.	Main line. Does not connect with the reservation. Not shown on accompanying figure.

J. LINES OF COMMUNICATION (Continued)

2. RAILROADS (Continued)

RAILROAD SIDINGS ENLARGEMENT

FOR CONTINUATION SEE INSET AT LOWER RIGHT



J. LINES OF COMMUNICATION (Continued)

2. RAILROADS (Continued)

RAILROAD BRIDGES

IDENTIFICATION NUMBER	LOCATION (GRID REFERENCE)	FEATURE CROSSED	NUMBER OF TRACKS	ROADWAY WIDTH m	(ft)	CLEARANCE HORIZONTAL m	(ft)	CLEARANCE VERTICAL m	(ft)	DECK MATERIAL	OVERALL LENGTH m	(ft)	TYPE OF STRUCTURE	REMARKS
1	912026	Poplar Spring Branch	One	3.4	(11)	3.6	(12)	No data		No data	176	(578)	Steel viaduct on concrete pedestals.	Fixed load 893 kg/m (600 lb/ft).
2	904024	Tioga Creek	One	3.4	(11)	3.6	(12)	No data		No data	215.5	(707)	Steel viaduct on concrete pedestals.	Fixed load 893 kg/m (600 lb/ft).
3	915954	Eisenhower Avenue	Two	8.8	(29)	8.8	(29)	Unlimited		Concrete	29	(96)	Reinforced concrete (seven piers including wing walls).	0.9 m (3 ft) walkway on one side.
4	915946	Chaffee Avenue	One	4.3	(14)	4.3	(14)	Unlimited		Concrete	30	(99)	Reinforced concrete (seven piers including wing walls).	Walkway.
5	915943	Vine Grove Road	One	4.0	(13)	4.0	(13)	Unlimited		Concrete	35.7	(117)	Reinforced concrete (seven piers including wing walls).	
6	915939	Park Road	One	4.3	(14)	4.3	(14)	Unlimited		Concrete	29	(94)	Reinforced concrete (seven piers including wing walls).	Walkway.
7	915930	Gold Vault Road	Two	11	(37)	11	(37)	Unlimited		Concrete	13	(44)	Steel girders on two concrete piers.	Two walkways.

3. AIRFIELDS

Fort Knox has one airfield, Godman Army Airfield, which is within the cantonment area. The airfield is used for both fixed-wing and rotary-wing aircraft. There are four runways, all in poor to fair condition. The north-south instrument runway has been rehabilitated with spot repairs, and 7.6 centimeters (3 inches) of asphalt concrete have been added. Two runways, the northeast-southwest and east-west runways, are permanently closed. The bearing capacity of the operational runways is satisfactory for handling light aircraft, with occasional use by heavier aircraft; prior permission, however, is required for aircraft over gross weight 15,875.9 kilograms (35,000 pounds).

There are six nonoperational airstrips on the reservation: four function as helicopter landing zones as discussed below; two are abandoned. The abandoned airstrips are in the impact area and are identified in Section L, Non-Urban Culture Features.

MAP NUMBER AND NAME; LOCATION; CLASSIFICATION; AND TYPE	ELEVATION AND STATUS	RUNWAY DESCRIPTION	TAXIWAY, PARKING, APRON, AND HARDSTAND AREA DESCRIPTION	BUILDING DESCRIPTION	POL FACILITIES	NAVIGATIONAL AIDS	REMARKS
1. Godman Army Airfield; 908954; Army; Airfield.	230 m (753 ft); Operational	North-South Runway 1580 x 45.7 m (5185 x 150 ft); azimuth, 170°-350°; maximum weight bearing capacity, S14, T20*, 10 cm (4 in) asphalt over 15 cm (6 in) crushed stone penetrated with asphalt. Northwest-Southeast Runway 1448 x 45.7 m (4750 x 150 ft); azimuth, 150°-330°; maximum weight bearing capacity, T20; 2.5 cm (1 in) bituminous concrete over 15 cm (6 in) crushed stone penetrated with asphalt. Northeast-Southwest Runway 1371 x 45.7 m (4500 x 150 ft); azimuth, 040°-220°; maximum weight bearing capacity, S10, T15; surface material same as northwest-southeast runway; permanently closed. East-West Runway 1524 x 45.7 m (5000 x 150 ft); azimuth, 090°-270°; maximum weight bearing capacity 2722 kg (6000 lb); surface material same as northwest-southeast runway; permanently closed.	Taxiways Eight taxiways; 15 m (50 ft) wide, maximum weight bearing capacity: taxiways 1, 2, and 3 - 99,792 kg (22,000 lb); taxiways 4, 5, 6, and 7 - 56,700 kg (125,000 lb); taxiway 8 - 40,824 kg (90,000 lb), surface material: taxiways 1, 4, 5, 6, and 7 - 2.5 cm (1 in) bituminous concrete over 15 cm (6 in) crushed stone penetrated with asphalt; taxiways 2, 3, and 8 - 15 cm (6 in) concrete on clay base. Turning Areas 5574 m^2 (60,000 ft^2) total area; maximum weight bearing capacity, same as associated runway; concrete surface. Parking and Hangar Aprons 17,401.6 m^2 (187,315 ft^2) total concrete area including runway parking; maximum weight bearing capacity, 2722 to 99,792 kg (6000 to 220,000 lb); concrete surface. 52,064.9 m^2 (560,440 ft^2) total bituminous concrete area; maximum weight bearing capacity, 54,432 kg (120,000 lb); bituminous concrete surface.	Four Combined Hangar and Maintenance Facilities Building number 5220, also contains administration and terminal facilities: concrete foundation, brick walls, built-up roof; 74 m long x 36.6 m wide x 9.8 m high (242 x 120 x 32 ft). Building number 5222: concrete foundation, masonry with metal walls, built-up roof; 52.2 m long x 48.5 m wide x 12.1 m high (171.3 x 159 x 39.8 ft). Building number 5253, light aircraft hangar: concrete foundation, steel frame with concrete block walls, built-up roof; 49.3 m long x 35.6 m wide x 6.2 m high (161.7 x 116.8 x 20.3 ft). Building number 5256: reinforced concrete foundation, metal siding and concrete block walls, built-up roof; 40.4 m long x 38.9 m wide x 7.9 m high (132.5 x 127.8 x 25.8 ft). Administration and Terminal Buildings Building number 5220, administrative offices and control tower: construction materials listed under hangar; 4645 m^2 (50,000 ft^2). Education buildings, numbers 5214, 5217: concrete foundations; building number 5214 has wooden walls and shingle roof; building number 5217 has concrete block walls, built-up roof; combined area 1328.5 m^2 (14,300 ft^2). Fire station, building number 5223: concrete block foundation, brick exterior and concrete block interior walls, built-up roof, 526.7 m^2 (5670 ft^2). Aero Club, building number 5252: concrete foundation, concrete block walls, built-up roof, 144.8 m^2 (1559 ft^2). Maintenance Facilities Other Than Hangars Building 5232: concrete foundation, metal walls and roof; 1223 m^2 (13,165 ft^2). Other Buildings (Including heating plant, flammable storage, general storehouses), building number 5213: concrete foundation, brick walls, built-up roof, 186 m^2 (2000 ft^2); building number 5215: concrete foundation, brick walls, tile roof, 54.8 m^2 (590 ft^2); building number 5216: concrete foundation, wooden walls, shingle roof, 867 m^2 (9333 ft^2); buildings numbers 5250, 5254, 5255, 5257, 5260, 5261: concrete foundations, concrete block walls, built-up roofs, combined area 76.2 m^2 (820 ft^2).	Five Tanks Totaling 200,605 liters (53,000 gal) Three tanks - 45,420 liters (12,000 gal), underground, U.S. aviation fuel, JP-4; one tank - 45,420 liters (12,000 gal), underground, aviation gasoline, 100/130 octane; one tank - 18,925 liters (5000 gal), underground, Aero Club. Six Fuel Trucks JP-4 - one 7570 liter (2000 gal) and three 4542 liter (1200 gal); aviation gasoline - two 4542 liter (1200 gal).	Control Tower 248 m (813 ft) above mean sea level, 18 m (60 ft) high; VHF Omnidirectional Range (VOR), Automatic Direction Finding/Nondirectional Beacon (ADF/NDB), and Ground Control Approach (GCA)-Precision Approach Radar. Lights Rotating beacon, top elevation 247 m (810 ft); four lighted wind direction indicators; high intensity approach lights (runway 17-35); high intensity runway lights (white); flush mounted, blue lights on taxiways.	North-south runway (17-35) approach on 35. Caution: deer may be on runways. East-west runway permanently closed in 1953 and northeast-southwest runway permanently closed in 1961. Closed runways are used for taxiways and parking. Active runways have received a seal coat to mitigate wet subgrade due to seepage of surface water through pavement cracks. North overrun of north-south runway not standard due to interference with Illinois Central Railroad main line and ground levels. Helicopter landing pad at junction of north-south, northeast-southwest, and east-west runways.

*Runway weight bearing capacity in pounds (gross weight of aircraft) is determined by adding 000 to figure following S, T. Runway weight bearing capacity given is for unlimited operations. Aircraft weight higher than given requires prior permission from aerodrome controlling authority.

S - Runway weight bearing capacity for aircraft with single-wheel type landing gear (C-47, F100).

T - Runway weight bearing capacity for aircraft with twin-wheel type landing gear (C-9A).

For further information, see DOD Flight Information Publication (enroute IFR-Supplement United States).

J. LINES OF COMMUNICATION (Continued)

4. PIPELINES

Ten pipeline rights-of-way cross the reservation: three contain water lines, six contain natural gas lines, and one contains a crude oil line. Pipe dimensions and number of buried pipes vary within each right-of-way; not all junctions are shown on the accompanying Lines of Communication map.

Approximately 6.4 kilometers (4 miles) northwest of the cantonment area, the Louisville Gas and Electric Company retains operating rights to the 315.8-hectare (780-acre) Muldraugh Gas Storage Field, an underground gas storage field, collecting system, and pumping station. Approximately 50 wells in this field are interconnected to the most extensive network of pipelines that cross the reservation. Most of the pipelines are transmission lines which carry natural gas into and away from the storage areas; consequently, throughput figures are irrelevant.

MAP NUMBER	GRID REFERENCE FROM	GRID REFERENCE TO	STATUS	OWNERSHIP	PIPELINE CHARACTERISTICS	TANK CROSSING SITES (GRID REFERENCE)	REMARKS
1a	912049	855008	Operative	Texas Gas Transmission Corporation	66 cm (26 in) diameter pipe; 8 km (5 mi) across the reservation; gas line; average burial depth 76.2 cm (30 in); rated capacity 10.6×10^6 m^3/day (374.1×10^6 ft^3/day); average throughput 7.5×10^6 m^3/day (266.1×10^6 ft^3/day).	No data	Three underground pipelines within the same right-of-way; no gas pumping stations on the reservation. Problems encountered when tanks ruptured the lines; off limits to tanks now.
1b	912049	855008	Operative	Texas Gas Transmission Corporation	66 cm (26 in) diameter pipe; 8 km (5 mi) across the reservation; gas line; average burial depth 76.2 cm (30 in); rated capacity 10.6×10^6 m^3/day (374.1×10^6 ft^3/day); average throughput 7.5×10^6 m^3/day (266.1×10^6 ft^3/day).	No data	
1c	912049	855008	Operative	Texas Gas Transmission Corporation	66 cm (30 in) diameter pipe; 8 km (5 mi) across the reservation; gas line; burial depth 76.2 cm (30 in) to 1.2 m (4 ft); rated capacity 16.2×10^6 m^3/day (572.3×10^6 ft^3/day); average throughput 10.9×10^6 m^3/day (385.7×10^6 ft^3/day).	No data	
2	857945	916940	Operative	U.S. Government	40.6 cm (16 in) diameter pipe; 6.9 km (4.3 mi) across the reservation; water line; burial depth 91.4 cm (36 in); rated capacity 18.9×10^6 to 22.7×10^6 liters/day (5×10^6 to 6×10^6 gal/day); actual throughput 13.2×10^6 liters/day (3.5×10^6 gal/day); pumping station at grid reference 857945.	863946 870950 873951	Raw water line from Otter Creek to reservation treatment plant.
3	902048	887009	Operative	U.S. Government	61 cm (24 in) diameter pipe; 4.8 km (3 mi) across the reservation; water line; burial depth 91.4 to 106.7 cm (36 to 42 in); actual throughput 49.2×10^6 liters/day (13×10^6 gal/day).	No data	Raw water line from 11 pumping wells near West Point, KY, to reservation treatment plant.
4	896046	903908	Operative	Hardin County Water District	35.6 cm (14 in) diameter pipe; 16.6 km (10.3 mi) across the reservation; water line; burial depth 76.2 cm (30 in); rated capacity 13.2×10^6 liters/day (3.5×10^6 gal/day); actual throughput 7.6×10^6 liters/day (2×10^6 gal/day); pumping station at grid reference 878993.	No data	Problems encountered when tanks ruptured the lines; off limits to tanks now.
5	096876	087853	Operative	Mid Valley Pipeline Company	55.9 cm (22 in) diameter pipe; 2.6 km (1.6 mi) across the reservation; crude oil line; burial depth 91.4 cm (36 in); no throughput data.	No data	
6a	912049	902047	Operative	Louisville Gas and Electric Company	30.5 cm (12 in) diameter pipe; 1 km (0.6 mi) across the reservation; gas line; average burial depth 76.2 cm (30 in); rated pressure 28.1 kg/cm^2 (400 lb/in^2); actual pressure 22.9 kg/cm^2 (325 lb/in^2).	No crossings	Nine sections of underground pipeline within the same right-of-way. All carry gas in and out of Muldraugh storage and well field. Well field has approximately 50 wells; lines from 10.2 to 40.6 cm (4 to 16 in). Summer minimum 10.5 kg/cm^2 (150 lb/in^2) pressure; winter usage 21.1 kg/cm^2 (300 lb/in^2) pressure.
6b	912049	896046	Operative	Louisville Gas and Electric Company	40.6 cm (16 in) diameter pipe; 1.6 km (1 mi) across the reservation; gas line; average burial depth 76.2 cm (30 in); rated pressure 28.1 kg/cm^2 (400 lb/in^2); actual pressure 22.9 kg/cm^2 (325 lb/in^2).	No crossings	
6c	912049	896046	Operative	Louisville Gas and Electric Company	50.8 cm (20 in) diameter pipe; 1.6 km (1 mi) across the reservation; gas line; average burial depth 76.2 cm (30 in); rated pressure 28.1 kg/cm^2 (400 lb/in^2); actual pressure 22.9 kg/cm^2 (325 lb/in^2).	No crossings	
6d	896046	883010	Operative	Louisville Gas and Electric Company	50.8 cm (20 in) diameter pipe; 5.3 km (3.3 mi) across the reservation; gas line; average burial depth 76.2 cm (30 in); rated pressure 28.1 kg/cm^2 (400 lb/in^2); actual pressure 22.9 kg/cm^2 (325 lb/in^2).	No data	
6e	896046	883010	Operative	Louisville Gas and Electric Company	50.8 cm (20 in) diameter pipe; 5.3 km (3.3 mi) across the reservation; gas line; average burial depth 76.2 cm (30 in); rated pressure 28.1 kg/cm^2 (400 lb/in^2); actual pressure 22.9 kg/cm^2 (325 lb/in^2).	No data	
6f	883010	867988	Operative	Louisville Gas and Electric Company	50.8 cm (20 in) diameter pipe; 2.6 km (1.6 mi) across the reservation; gas line, average burial depth 76.2 cm (30 in); rated pressure 28.1 kg/cm^2 (400 lb/in^2), actual pressure 22.9 kg/cm^2 (325 lb/in^2).	No data	
6g	883010	867988	Operative	Louisville Gas and Electric Company	40.6 cm (16 in) diameter pipe; 2.6 km (1.6 mi) across the reservation; gas line; average burial depth 76.2 cm (30 in); rated pressure 28.1 kg/cm^2 (400 lb/in^2), actual pressure 22.9 kg/cm^2 (325 lb/in^2).	No data	
6h	875995	867988	Operative	Louisville Gas and Electric Company	40.6 cm (16 in) diameter pipe; 1 km (0.6 mi) across the reservation; gas line; average burial depth 76.2 cm (30 in); rated pressure 28.1 kg/cm^2 (400 lb/in^2); actual pressure 22.9 kg/cm^2 (325 lb/in^2).	No data	Connects pipeline number 8a, below, with the compressor station (grid reference 867988) at Muldraugh storage field.

J. LINES OF COMMUNICATION (Continued)

4. PIPELINES (Continued)

MAP NUMBER	GRID REFERENCE FROM	GRID REFERENCE TO	STATUS	OWNERSHIP	PIPELINE CHARACTERISTICS	TANK CROSSING SITES (GRID REFERENCE)	REMARKS
6i	875995	867988	Operative	Louisville Gas and Electric Company	40.6 cm (16 in) diameter pipe; 1 km (0.6 mi) across the reservation; gas line; average burial depth 76.2 cm (30 in); rated pressure 28.1 kg/cm^2 (400 lb/in^2); actual pressure 22.9 kg/cm^2 (325 lb/in^2).	No data	Connects pipeline number 8a, below, with the compressor station (grid reference 867988) at Muldraugh storage field.
7	867988	860986	Operative	Louisville Gas and Electric Company	Two pipes, each 40.6 cm (16 in) diameter, 1 km (0.6 mi) across the reservation; gas lines; average burial depth 76.2 cm (30 in); rated pressure 28.1 kg/cm^2 (400 lb/in^2); actual pressure 24.6 kg/cm^2 (350 lb/in^2).	No data	Two pipes within same right-of-way. Connects compressor station (grid reference 867988) at Muldraugh storage field with points west.
8a	959069 940054 911039	944057 929048 875995	Operative	Louisville Gas and Electric Company	50.8 cm (20 in) diameter pipe; 13.4 km (8.3 mi) across the reservation; gas line; average burial depth 76.2 cm (30 in); rated pressure 50.6 kg/cm^2 (720 lb/in^2); actual pressure 35.2 kg/cm^2 (500 lb/in^2).	No data	Two connecting sections of underground pipeline along the same right-of-way. Connected at grid reference 875995 with two pipes, 6a and 6b above, leading to the compressor station at grid reference 867988.
8b	875995	902907	Operative	Louisville Gas and Electric Company	40.6 cm (16 in) diameter pipe; 10 km (6.2 mi) across the reservation; gas line; average burial depth 76.2 cm (30 in); rated pressure 50.6 kg/cm^2 (720 lb/in^2); actual pressure 35.2 kg/cm^2 (500 lb/in^2).	No data	
9	869985	883993	Operative	Louisville Gas and Electric Company	10.2 cm (4 in) diameter pipe; 1.8 km (1.1 mi) across the reservation; gas line; average burial depth 76.2 cm (30 in); rated pressure 14.1 kg/cm^2 (200 lb/in^2); actual throughput 5.6 x 10^3 m^3/hr (2 x 10^5 ft^3/hr).	No data	Serves Muldraugh.
10a	867987	899952	Operative	Louisville Gas and Electric Company	Two pipes, each 20.3 cm (8 in) diameter; 5 km (3.1 mi) across the reservation; gas line; average burial depth 76.2 cm (30 in); rated pressure 14.1 kg/cm^2 (200 lb/in^2); actual pressure 12 kg/cm^2 (170 lb/in^2).	No data	Two pipes within same right-of-way. One splits off to serve Fort Knox; the other continues. See pipeline number 10b, below.
10b	899952	919907	Operative	Louisville Gas and Electric Company	20.3 cm (8 in) diameter pipe; 5 km (3.3 mi) across the reservation; gas line; average burial depth 76.2 cm (30 in); rated pressure 14.1 kg/cm^2 (200 lb/in^2); actual pressure 12 kg/cm^2 (170 lb/in^2).	No data	Serves Radcliff.

5. HELICOPTER LANDING ZONES

There are 32 designated helicopter landing zones on the reservation, 14 of which are listed as active by Godman Army Airfield. Of the active helicopter landing zones, four are abandoned airstrips at distant points on the reservation.

Two hard-surfaced helicopter landing pads are in the cantonment area, one at Ireland Army Hospital and one at Godman Army Airfield. The helipad at Godman Army Airfield, originally a turning area constructed during World War II, is at the junction of the operational north-south runway, the closed northeast-southwest runway, and the closed east-west runway.

Godman Army Airfield employs and maintains a large contingent of rotary-wing aircraft. Parking areas for helicopter operations occupy the east apron; special parking pads are also along the edges and north of the closed east-west runway. Helicopter parking areas are given first priority maintenance.

MAP NUMBER AND NAME		LOCATION (GRID REFERENCE)	DIMENSIONS	AZIMUTH	ELEVATION m	ELEVATION (ft)	SURFACE MATERIAL	RESTRAINTS	REMARKS
1.	Basham's Corner	843944	Not applicable	No data	223	(730)	Dirt and gravel	No data	Abandoned airstrip.
2.	Otter Creek	867932	549 x 15 m (1800 x 50 ft)	160-340°	177	(580)	Grass	March Ridge to east.	"H" in planking.
3.	Tobacco Leaf Lake	895921	Not applicable	No data	216	(710)	Dirt	No data	Active.
4.	Brooks Field	925946	23 x 15 m (75 x 50 ft)	087-267°	221	(725)	Grass	Nearby buildings.	Current helipad location is mapped; proposed helipad will be east of the hospital complex. Helipad restricted to emergency use only.
5.	Ireland Army Hospital	926949	33.5 x 29 m (110 x 94 ft)	087-268°	223	(730)	Concrete	Helipad obstructions are not critical; nearby buildings.	Active.
6.	School Building Pad	925962	Not applicable	No data	224	(735)	Grass	Nearby buildings.	
7.	Holder Complex	925977	Not applicable	No data	235	(770)	Grass	Nearby buildings.	Active.
8.	Lawley Range	924995	Not applicable	No data	241	(790)	Grass	No data	
9.	Pell Range	929021	Not applicable	No data	219	(720)	Dirt	No data	
10.	Longstreet	931042	Not applicable	No data	213	(700)	Grass	No data	
11.	Blackhawk	936962	Not applicable	No data	213	(700)	Grass	No data	
12.	Skydivers Road	939928	Not applicable	No data	219	(720)	Grass	No restraints.	
13.	Tolgate Range	935979	Not applicable	No data	226	(740)	Dirt	No data	
14.	Canby Range	949968	Not applicable	No data	226	(740)	Grass	No data	
15.	French Range	947968	Not applicable	No data	223	(730)	Grass	No data	
16.	Lee Pistol Range	966941	Not applicable	No data	219	(720)	Dirt	No data	
17.	Boydston	969927	Not applicable	No data	223	(730)	Dirt	No data	
18.	Steeles Range	960912	Not applicable	No data	210	(690)	Grass	No data	Active.
19.	Baum Range	979871	Not applicable	No data	207	(680)	Dirt	No data	
20.	Easy Gap	980985	Not applicable	No data	171	(560)	Dirt	No data	Active.
21.	Crane Range	984994	Not applicable	No data	166	(545)	Dirt	No data	
22.	McFarland-Oliver Tank Range	000003	Not applicable	No data	131	(430)	Dirt and gravel	No data	Active.
23.	St. Vith	991871	457 x 15 m (1500 x 50 ft)	090 - 270°	229	(750)	Concrete	No data	Abandoned airstrip. Active.
24.	Cedar Creek North	030875	Not applicable	No data	140	(460)	Dirt	No data	Active.
25.	Mount Eden Base Camp North	038039	Not applicable	No data	256	(840)	Dirt	No data	Active.

J. LINES OF COMMUNICATION (Continued)

5. HELICOPTER LANDING ZONES (Continued)

MAP NUMBER AND NAME	LOCATION (GRID REFERENCE)	DIMENSIONS	AZIMUTH	ELEVATION m	ELEVATION (ft)	SURFACE MATERIAL	RESTRAINTS	REMARKS
26. Mount Eden Base Camp South	033015	Not applicable	No data	232	(760)	Dirt	No data	Abandoned airstrip. Active.
27. Cedar Creek South	037862	549 x 15 m (1800 x 50 ft)	097-277°	223	(730)	Grass	No data	Abandoned airstrip. Active.
28. Wilcox Lake	065022	549 x 15 m (1800 x 50 ft)	025-205°	137	(450)	Grass	No data	Active. Has wind sock.
29. Yano Tank Range	086859	Not applicable	No data	137	(450)	Dirt	No data	
30. Twin Knobs	095889	44 x 38 m (145 x 125 ft)	No data	137	(450)	Concrete	No data	
31. West Point	910043	Not applicable	No data	134	(440)	Grass	No data	Active. Has wind sock.
32. Godman AAF	906958	183 x 122 m (600 x 400 ft)	No data	226	(740)	Concrete	No data	

K. URBAN AREA (CANTONMENT AREA)

TROOP BILLETS

TYPE	NUMBER OF BUILDINGS	CAPACITY	CONDITION	REMARKS
Trainees				Most trainee billets have space allotted for cadre which has been deducted from total capacity shown.
Adequate	5	929	Good	For FY 1980 there are no plans for demolition; no construction or renovation has been approved for the next five years.
Substandard-may be made adequate	8	1544	Fair	
Substandard-may not be made adequate	87	4268	Poor	
Total	100	6741		Long-range plans (beyond FY1980) include upgrading of some substandard structures.
Permanent Party				
Adequate	29	11,109	Good	
Substandard-may be made adequate	9	1335	Fair	
Substandard-may not be made adequate	170	7381	Poor	
Total	208	19,825		

QUARTERS

TYPE	NUMBER OF BUILDINGS	CAPACITY	CURRENT LOAD*	YEAR OF CONSTRUCTION	CONDITION†	REMARKS
BOQ						
Permanent Total	24	565 men	546			Permanent structures show an occupancy rate flux of from 82 to 89 percent capacity annually.
Farquar Hall (VOQ)	1	8	5	1934	Good	Farquar Hall is seldom used to capacity due to use as Visiting Officers Quarters (VOQ)
Yeomans Hall	1	10	10	1935	Good	
Cornwell Apts	4	61	57	1954	1 Good, 1 Fair 2 Poor	
Craig Apts	8	160	157	1962	1 Good, 7 Poor	
Steindam Apts	7	250	245	1974	5 Fair, 2 Poor	Major rehabilitation is needed to bring Steindam's seven buildings to adequate standards.
Knierim Apts	3	76	72	1959	2 Good, 1 Fair	Knierim Apartments are nurses' quarters; adjacent to Ireland Army Hospital; contain kitchenettes, so no central mess facility is required.
Temporary Total	26	875 men	265			Temporary structures show an occupancy rate flux of from 40 to 50 percent capacity annually.
in 4000 area	10	307	146	1941	3 Good, 1 Fair 6 Poor	Used by geographical bachelors (men temporarily away from their families) and some enlisted men.
in 5000 area	3	105	93	1941	1 Good, 2 Fair	Used for some TDY, some permanent party; tentative plans to vacate and shift use to 4000 area, due to many complaints received from occupahts.
in 6000 area	13	463	26	1941-1942	2 Fair, 11 Poor	Used in spring and summer only for active duty training, summer camp.
BEQ						
Permanent Total (Newgarden Apts)	1	200 men	191	1954	Good	Constructed under the Wherry Act in 1954, Newgarden was family housing-efficiency apartments, later converted to BOQ units. In January 1976 it was converted to a 200-man BEQ with its own post office, branch post exchange, barber shop, dry cleaner, TV repair shop, and snack bar. It has no air conditioning, and is considered adequate, but could be improved.
Guest Houses						
Permanent Total (Wickam)	1	76 rooms		1970	Fair	Designed at 88 units, the capacity of Wickam varies widely, depending on whether individuals are members of incoming families or individuals visiting Fort Knox. The Chief Billeting Manager estimates that 322 men maximum could be placed in Wickam, and 68 men maximum could be placed in Lorrain Annex, if necessary.
Temporary Total (Lorrain Annex)	1	18 rooms		1942	Poor	

No changes, demolition, or construction is planned through FY1980 for any quarters types.

*Current Load based of figures obtained 23 August 1978.
†Based on the condition code devised for the Integrated Facilities System Report and derived from a formula of 10 weighted inspection components. This formula yields C_1 - satisfactory = Good; C_2 - marginal (needs minor repairs, painting, etc.) = Fair; and C_3 - unsatisfactory (needs major work, painting, etc.) = Poor. A "Poor" building is not necessarily inadequate, but requires work which could bring it up to a fair or better condition.

FAMILY HOUSING

TYPE	NUMBER OF BUILDINGS	NUMBER OF FAMILY UNITS	CURRENT LOAD	YEAR OF CONSTRUCTION	CONDITION†	REMARKS
General						All family housing units are permanent, except for those from WWII along Custer Drive.
	1	1	1	1939	Excellent	Commanding General's residence on Fifth Avenue at Old Ironsides Avenue.
	3	3	3	1934	Excellent	All are brick.
	1	1 of 2*	1	1939	Excellent	
Colonel						
	21	21	19	1934	Excellent	Along Fourth Avenue, Fifth Avenue, Chaffee Avenue, and B Street, colonels' housing consists of pre-WWII brick single and duplex units.
	14	28	26	1934	Excellent	
	4	8	8	1939	Excellent	
	1	1 of 2*	1	1939	Excellent	
Lt. Col/Major						
	1	1	1	1936	Excellent	Area includes eight units in use by liaison officers to Fort Knox.
	30	60	56	1939	Excellent	Lower Fifth Avenue.
	24	48	48	1956	Excellent	Godman area.
	8	8	8	1957	Excellent	Edwards Street; single units.
	30	30	30	1958	Excellent	Matthews Place; single units.
CGO/WO						
	5	5	5	1937	Good	Water Street; brick with basement, four bedrooms.
	31	31	31	1940	Excellent	Oakland Avenue; stucco with basement, converted from duplexes in 1960.
	2	2	2	1941	Good	
	126	252	247	1958	Excellent	Van Voorhis Manor; brick duplexes, multiple unit with four or eight per building, two or three bedrooms.
	202	448	436	1959	Excellent	
	31	31	25	1942	Good	Custer Drive and Farragut area; frame. Near post cemetery; semipermanent, acquired in 1941 with the land, rehabilitated, and relocated in 1942.
NCO						
	1	1	1	1933	Excellent	"400" area and J Street; brick, single and duplex residences with basements and garages, three or four bedrooms.
	19	46	35	1934	Excellent	
	23	46	37	1938	Excellent	
	1	1	1	1950	Excellent	
	134	878	820	1951	Good	Includes Prichard Place, Gaffey Heights, Rose Terrace; brick, multiple row-type, two or three bedrooms.
	81	536	460	1952	Good	Presslers Grove; brick, multiple row-type with basement, three bedrooms.
	29	177	164	1957	Excellent	Littlefield Loop; brick veneer, multiple row-type, two or three bedrooms.
	90	424	410	1958	Excellent	Dietz Acres; brick veneer, multiple row-type, two or three bedrooms.
	101	676	676	1959	Excellent	Van Voorhis Manor; brick, multiple row-type, two or three bedrooms.
	61	198	190	1961	Excellent	Morand Manor; redwood, duplex, three bedrooms.
	84	168	168	1962	Excellent	New Dietz Acres; redwood, duplex, three bedrooms.
Totals	1159	4130	3986 (94.7% occupancy)			The present facilities are considered adequate and no changes to family housing are planned through FY1980. The only shortage is for families with a five bedroom requirement.

*One diverted from housing/Colonel.
†Based on verbal assessment by the Chief, Housing Division, Directorate of Industrial Operations.

K. URBAN AREA (CANTONMENT AREA) (Continued)

SCHOOLS AND MEDICAL FACILITIES

TYPE	CAPACITY	CURRENT LOAD	REMARKS
Schools			
Child Care Center (Gold Vault Academy)	425	150 to 200 3- and 4-year olds 100 drop-ins for hourly care	Adequate care is possible in the former nonstandard barrack, building number 5101, built in 1938. This former barrack is isolated from troop housing and is too small and too distant from other troop units to be considered adequate housing for any Fort Knox unit. Building number 5101 is surrounded by officer housing in a family quarters area south of Godman Army Airfield. The 781.9 m^2 (8416 ft^2) is ample for nursery use, which includes service to about 50 families for hourly drop-in care. No changes are anticipated through FY1980.
Dependent Schools	maximum/optimum*		There are 10 dependent-school areas in the Fort Knox cantonment under control of the U.S. Commissioner of Education, who is under the authority of the Department of Health, Education and Welfare. Indefinite term real estate permits involving 1 km^2 (250.65 acres) for the 10 areas have been granted by the Department of the Army for the construction and operation of dependent schools at Fort Knox.
Total Pupils	4373/3500 to 3900	4147	
Elementary			Dr. Haun, Superintendent, expects enrollment for Fort Knox dependent schools to hold at around 4000 pupils through FY1980. Facilities are considered more than adequate to meet anticipated needs.
Crittenberger	570/450	396	
Van Voorhis	1020/1020	649	
Mudge	570/450	386	
Pierce	540/400	397	
Stevens	450/360	260	
Kingsolver	420/420	294	
Scott	803/400	235	
Middle			
Walker	400/400	351	
Macdonald	600/600	457	
High			
Fort Knox	780/780	722	
Higher Education			The Fort Knox Education Center is in Briscoe Hall. A number of colleges and universities offer classes here.
Medical Facilities			The hospital and medical area are in the center of the cantonment, bounded by Fifth Avenue on the north, Wilson Avenue on the east, Seventh Avenue on the south, and E Street on the west.
Hospitals			
Ireland U.S. Army Hospital (building number 851)	225 beds authorized		Ireland U.S. Army Hospital on Ireland Avenue was completed in February 1957, as a 500-bed hospital expandable to a capacity of 1000 beds. The present hospital is authorized to operate at a 225-bed capacity. It includes offices for the Post Surgeon, hospital chaplain, and other related activities. An addition of 14,121 m^2 (152,000 ft^2) is under construction (due for completion June, 1980) with corresponding increased parking. A helipad, west of building number 1002, is used only for emergencies by the hospital.
Clinic Facilities	4 units		Present construction will add approximately 290 m^2 (100,000 ft^2) of new clinic space to the hospital. Building number 1002 is used for clinics and administrative space. Troop Medical Clinics are required to support permanent troop housing. Existing facilities are in five buildings.
Dental Clinics			Dental clinics are permanent facilities. A new dental clinic is planned for construction during FY1979 at Brave Rifles Avenue and Wilson Road. One chair also will be added in Ireland Army Hospital.
Dental Hygiene	0 chairs		
Craven	26 chairs		
Nelson	28 chairs		
Margetis	27 chairs		
#4	13 chairs		
#5	2 chairs		
#6	8 chairs		
Hospital (IAH)	7 chairs		
Total	111 chairs		These facilities fill the present mission requirements, and no additions beyond the present construction are projected to FY1980.

*This figure is based on an optimum pupil-teacher ratio of 28 to 1.

RECREATION FACILITIES

TYPE	CAPACITY	REMARKS
Outdoor Facilities		
Golf Courses (2) Mini-Golf Course (1)		Two 18-hole golf courses each have a club and permanent pro shop. Lindsey Golf Course is maintained by the Officers' Open Mess Club and is restricted to members and their guests. Anderson Golf Course is open to all personnel. The two golf courses are in good condition and adequate for future requirements. There is one 9-hole par 3 mini-golf course.
Multi-Courts (5)		Multiple courts in enlisted housing areas provide facilities for basketball, tennis, and volleyball.
Outdoor Swimming Pools (8) Wading Pools (7)		Two pools, one each at the Brick Mess and Lindsey Golf Club, are reserved for officers and their families and guests. The remaining six serve the entire post. These pools are all in use during the swimming season, although the older, WWII pools need constant maintenance and replacement. Existing plans do not indicate any changes through FY1980.
Parks (4)		Four parks are within the cantonment area. Thorne, Keyes, and Minue Parks each have a shelter house and picnic tables. Ninninger Park has picnic tables only.
Football Fields (3)	4000 seats (Fort Knox HS field)	One lighted field serves Fort Knox High School. One lighted field, at Blackhorse Regiment Avenue and Hell on Wheels Division Avenue, superimposed on Twin Fields softball field, and one in Keyes Park, have portable temporary bleachers.
Softball Fields (12)		Nine fields are fitted for night play with lights. All fields are in good condition for daytime play. There are another six unmaintained fields near housing areas which are used for practice fields.
Baseball Fields (6)	5000 seats (Cornwell Field)	Cornwell Field at Knox Street and Third Avenue has permanent bleachers, lights, and latrines. Babe Ruth Field in Keyes Park, is lighted and is used as the Youth Activity Program field. There are two unlighted little league fields in Van Voorhis Manor and two near Fort Knox High School and Mississippi Street.
Tennis Courts (23)		Tennis courts are concrete topped with resilient surfacing material. Two new courts are planned near Fort Knox High School (adjacent to two existing courts) for completion during FY1979.
Soccer Fields (5)		Three fields are near Kingsolver Elementary (building number 1488), one is along Conroy Avenue in Van Voorhis Manor, and another is superimposed across the outfield of the two Little League fields in the same area.
Outdoor Archery Range (1)		Located in Dietz Acres.
Riding Stables and Track (1)		In various locations throughout the housing areas.
General Purpose Playgrounds (112)		A motorcycle track in the main post side of the intersection of U.S. Highway 31W and U.S. Highway 60. Two smaller bike trails are planned: one for Dietz Acres and one for Van Voorhis Manor, each with a 75 cc minibike capacity.
Dirt Track	bikes up to 250 cc	
Indoor Facilities		
Field Houses (2) Swimming Pool (1)	1500 seats each 3083 m^2 (33,188 ft^2) 2243 m^2 (24,114 ft^2)	Used for a wide variety of activities, the permanent Gammon Field House includes the heated indoor swimming pool, which is used in convalescent treatment of ambulatory patients. The mobilization-type Sadowski Field House has a stage and can seat up to 5000 if folding chairs are used.
Gymnasiums (3)	one 100 seats/1404 m^2 (15,110 ft^2) two 500 seats/1878 m^2 (20,219 ft^2)	Godman Gymnasium is very small and is used as the headquarters for the Youth Activity Program. Smith and Otto Gymnasiums (buildings numbers 5927 and 6591) are adjacent to troop housing areas.
Theaters (5)	1000 seats 906 seats 863 seats 500 seats 175 seats	Four theaters with stages and one without serve Fort Knox. The small 175-seat theater is a dinner theater. Building number 7060 (906 seats), built in 1941, is scheduled for replacement after FY1980. The other buildings are all in good condition.
Bowling Centers (2)	24 lanes each	Opened in 1965 (building number 1610) and 1970 (building number 2385). An additional 22-lanes are proposed, but not presently funded.
Handball Courts (8)		Permanent handball courts are located two each in Gammon Field House, Smith, and Otto Gymnasiums, and a permanent prefab building (number 5911) adjacent to Smith.
Basketball Courts (4)		Indoor basketball courts are in each of the Field Houses, and in Smith and Otto Gymnasiums.

K. URBAN AREA (CANTONMENT AREA) (Continued)

RECREATION FACILITIES (Continued)

TYPE	CAPACITY	REMARKS
Libraries (4)		The Main Library maintains one branch. Ireland Army Hospital MEDDAC maintains its own library. There is also a library in the Armored School.
Recreation Centers (3)	2582 m^2 (27,789 ft^2) 1756 m^2 (18,899 ft^2) 800 m^2 (8611 ft^2)	Copple Recreation Center, the Community Center and TAHO (Teenage Hangout), buildings numbers 6590, 6649, and 1338, respectively, serve as designated Recreation Centers at Fort Knox. However, nearly 100 other buildings are also used for such recreational purposes as craft shops and special interest clubs.

TELECOMMUNICATIONS

TYPE	CAPACITY AND CURRENT LOAD	REMARKS
Unofficial Telephone		South Central Bell Telephone operates and maintains an exchange at the north end of the Rose Terrace family housing are of Fort Knox. It supplies service to 1250 sets of quarters for users in that area of the post as well as serving as exchange for other Fort Knox-owned trunks.
Official Telephone	7600 dial telephone exchange servicing 6803 subscribers - 14,759 instruments	The communications-electronics systems at Fort Knox are owned, operated, and maintained by the government through the tenant United States Army Communications Command Agency on the post. The agency supports host installation emergency communication operations, provides administrative control for all communications service authorized for the states of Kentucky and Ohio, and operates a post military affiliate radio system (MARS) station.
	11-position administrative switchboard (processes nondialed calls; provides operator assistance)	
	300-line, 1-position switchboard (fire reporting) servicing 141 lines	
	100-line, 2-position switchboard (range control) servicing 75 lines	
	1 private automatic exchange (PAX) 100 lines, 79 subscribers - 11 instruments	Command and control net (USAARMC).
	1 private automatic exchange (PAX) 50 lines, 44 subscribers - 62 instruments	Command and control net (USAARMC).
	1 emergency notification system 60-station "hot line"	
	40 AUTOVON network trunks	Secure voice (AUTOSEVOCOM) capability.
	15 foreign exchange trunks	To and from Louisville, KY.
	2 foreign exchange trunks	To Elizabethtown, KY.
	8 outdial WATS lines	
	129 trunks	Between Fort Knox and Rose Terrace exchange of South Central Bell Telephone Company.
		New hospital modifications, scheduled for completion January, 1979, include a 1000-line internal (to the hospital) dial central PBX satellite-relayed system, which will relay through the central post military exchange to obtain outside line numbers.
		Plans also included a transfer of all commercial, Class B subscribers from the official to the unofficial system within the next two and a half years. Since the official system has 7 to 8 percent expansion ability, and the transfer of Class B customers will leave nearly 50 percent present capacity available for military expansion, the official system is more than adequate to meet future needs.

ELECTRICITY

SUBSTATIONS	TRANSFORMERS	CAPACITY	LOAD	REMARKS
			Peak demand July, 1978: 31,130 kW Annual comsumption FY1977: 130.193x10^9Wh	The Louisville Gas and Electric Company (LG&E) supplies electric service to the post. Highest electrical demands have historically occurred during July and August, due to the heavy use of air conditioners. Spring and fall are periods of minimal demand.
Tip Top Substation	34kV	10.325x10^6 kWh/month		The Tip Top Substation also furnishes service to Cloverport, KY, through a 138kV line, owned by LG&E, which is tied into two other utility systems: Southern Indiana Gas and Electric Company (Owensboro Municipal Plant) and Kentucky Utilities Company (Green River Plant).
Primary unit substations (9)	34kV to 4160 volts	52.75MVA at 4160 volts		
Substation (1)	34kV to 12.47kV	20MVA at 12.47kV		The primary and secondary unit substations and the distribution system are owned and maintained by the government.
Secondary unit substations (2)	34kV to utilization	5MVA at utilization voltage		A feeder line owned by Kentucky Utilities Company serves as an emergency 33kV feeder. It is connected to the Tip Top Substation from the old main post substation, but is of reduced value because of heavy user demands along U.S. Highway 31W between Fort Knox and Elizabethtown, KY.
				There are six standby generating plants at Fort Knox. Three major plants are at: Ireland Army Hospital (750 kV); the radio transmitter building at the south end of the post on Wilson Road (15kV); and the radio receiver building at the north end of the post (10kV). Additional units on standby represent a total emergency generating capacity of over 1500kV.

NATURAL GAS

CAPACITY	CURRENT LOAD	REMARKS
6,788,474 m^3 (239,706 x 10^3 ft^3) daily maximum	553,090 m^3 (19,530 x 10^3 ft^3) maximum daily draw*	Natural gas is supplied to Fort Knox by the Louisville Gas and Electric Company (LG&E) and is pipeline limited with controls on quality and cost. LG&E purchases all of its natural gas from Texas Gas Transmission Corporation at rates and terms regulated by the FPC. The present purchase contract, expiring in 1988, provides for a maximum daily delivery of 678,772 m^3 at 1.04 kg/cm^2 absolute (239,706 x 10^3 ft^3 at 14.73 lb/in^2 absolute). Peak periods occur in winter when heating demands are greatest.
85,483,863 m^3 (3,018,498 x 10^3 ft^3) estimated annual maximum delivery	53,929,351 m^3 (1,904,285 x 10^3 ft^3) estimated consumption January through July 1978	Steel and plastic pipe, with cathodic protection to halt corrosion, constitute the system. The distribution system is adequate for all designed uses.
		Demands until FY1980 are stable. In case of natural gas curtailment, there is a fuel oil supply reserve of 3142 x 10^3 liters (830 x 10^3 gal) in three underground storage tanks; parked railroad tank cars hold an additional 378.5 x 10^3 liters (100 x 10^3 gal).

*Current load, calculated on FY1978 "worst case" basis: 9,759,387 m^3 (344,649.5 x 10^3 ft^3) (heaviest actual month of use, FY1978) divided by 30 days x 1.7 (estimated peak load factor) = 553,090 m^3 (19,530 x 10^3 ft^3) maximum daily draw.

K. URBAN AREA (CANTONMENT AREA) (Continued)

WATER SUPPLY

TYPE	CAPACITY	CURRENT LOAD*	REMARKS
Supply			
Well Fields	(see Muldraugh Treatment Plant)		Water for the post is furnished by government-owned systems. Both sources provide water of sufficiently low bacterial count and hardness to require only minimum treatment. The underground water supply is drawn from approximately 30 m (100 ft) below the alluvial low plains along the Ohio River, south of West Point, furnishing raw water to the Muldraugh Treatment Plant. There are 17 wells, 14 of which are active and adequate for possible increased needs.
Otter Creek	(see Central Filtration Plant)		Otter Creek supplies raw surface water to the Central Filtration Plant via the Otter Creek pumping station.
Treatment			
Muldraugh Treatment Plant	26.5×10^6 lpd† (7×10^6 gpd)	15 to 19 $\times 10^6$ lpd (4 to 5×10^6 gpd)	The water distribution system throughout the cantonment area consists of trunk mains and branch mains which are all loop connected. The distribution system provides ample flow capacity at pressure averaging 3.5 kg/cm^2 (50 lb/in^2) to all existing and planned building areas. Expansion of the existing system will provide adequate volume and pressure for all planned permanent facilities. The Muldraugh plant is a permanent structure of reinforced concrete and concrete block, in good condition. It consists of an aerator, softening plant, sedimentation basins, filters, and clear well. Raw water is received through a 61-cm (24-in) cast iron main from the West Point well field. The water is softened and one part per million fluoride is added.
Central Filtration Plant	15×10^6 lpd (4×10^6 gpd)	4 to 8 $\times 10^6$ lpd (1 to 2×10^6 gpd)	The central plant is in a concrete structure and is in good condition. The plant consists of softening equipment which reduces the hardness to approximately 100 parts per million, sedimentation basins, three filters, and two clear wells. Raw water is received through a 41-cm (16-in) cast iron main from the Otter Creek pumping station. One part per million fluoride is added to the finished water. Both plants operate 7 days a week, 24 hours a day to maintain a water supply during the summer to meet the increased demands and assure ample reserve for fire protection.
Storage			
Elevated Tanks (total)	7,604,443.5 liters (2,009,100 gal)	75% capacity	Five elevated storages tanks are within the cantonment. The overflow elevation of all tanks is 262.5 m (861.2 ft) above sea level; filling is controlled by altitude valves. Tanks are lighted on top for obstruction warning to Godman Army Airfield.
1	75,700 liters (200,000 gal)		
2	1,926,943.5 liters (509,100 gal)		
3	1,892,250 liters (500,000 gal)		
4	1,892,250 liters (500,000 gal)		
5	1,135,500 liters (300,000 gal)		
Ground Reservoirs (total)	13,531,375 liters (3,575,000 gal)	75% capacity	All elevated storage tanks and ground reservoir storage tanks are in good condition. Combined storage capacity is ample for existing requirements.
	1,892,500 liters (500,000 gal)		
	7,570,000 liters (2,000,000 gal)		
	3,785,000 liters (1,000,000 gal)		
	283,875 liters (75,000 gal)		

*Based on June 1978 figures.

†Liters per day; gallons per day.

SEWERAGE

PLANT	CAPACITY	AVERAGE DAILY FLOW	PEAK RECORD FLOW*	REMARKS
Sewage Treatment Plant	22.7 x 10^6 lpd (6 x 10^6 gpd) design capacity	13.6 x 10^6 lpd (3.6 x 10^6 gpd)	13.6 x 10^6 lpd (3.6 x 10^6 gpd)	The sanitary sewer system consists of a series of branch, collector, and trunk sewers, manholes, ejector stations, pumping stations, and a sewage treatment and disposal plant. Due to natural ground elevations, the system is divided into four sections which are adequate for all developed areas. The collecting lines, mains, and trunk lines are of vitrified clay pipe, ranging in diameter from 15 to 76 cm (6 to 30 in), with some reinforced concrete pipe sections; joints are either cement or premolded asphalt. Manholes are of either brick or preformed concrete with cast iron covers. Collector sewers are distributed so as to permit redevelopment within the cantonment area without major changes. Collector mains, trunk lines, and sewage treatment plant capacities are adequate to serve anticipated extensions of the system. Infiltration of surface water into the sanitary sewer system has been excessive. An inspection to determine where the infiltration problems were and how to correct them included visual inspection of representative manholes in each of 26 substations, a TV inspection in a portion of the system, and determinations as to where pipe needed to be replaced, joints filled, manholes repaired, etc. A construction contract was awarded for remedial work for this portion of the system. Other sections are being TV inspected so that contracts can be let for the remaining remedial work. The Sewage Treatment Plant is approximately 0.4 km (0.25 mi) south of Ninth Avenue and approximately 2 km (1.2 mi) east of Wilson Road, with access off Ninth Avenue. The plant provides complete treatment. All structures are constructed of reinforced concrete and are permanent. The plant was renovated in 1977 to permit more efficient secondary treatment in order to comply with EPA water quality standards.
Pumping Stations (4)				
Station 1	2 pumps - 75 gpm at 62 foot head			
Station 2	2 pumps - 2000 gpm at 66 foot head			
Station 3	3 pumps - 500 gpm at 70 foot head			
Station 4	3 pumps - 1 pump, 1250 gpm at 94 foot head; 2 pumps, 700 gpm at 61 foot head			

*Runoff during heavy rains may swell peak flow rates for an hour or two, and in an isolated case may reach as much as 30.3 x 10^6 lpd (8 x 10^6 gpd), but most peak flow records kept indicate 13.6 x 10^6 lpd (3.6 x 10^6 gpd) as normal.



FORT KNOX, KENTUCKY
TERRAIN ANALYSIS

URBAN AREA (CANTONMENT AREA)

AREA FEATURES

- Family Housing, Officers
- Family Housing, NCO
- Barracks, Troop Quarters
- Bachelor Officer Quarters, Female
- Bachelor Officer Quarters, Male
- Bachelor Enlisted Quarters
- Guest Houses
- Parade Grounds
- Recreation Facilities

POINT FEATURES

1. Post Headquarters
2. Post Hospital
3. Officers' Open Mess
4. Post Exchange
5. Commissary
6. Post Office
7. Dependent School
8. Post Chapel
9. Directorate of Facilities Engineering
10. Central Water Filtration Facility
11. Sewage Treatment Facility
12. Electrical Power Substation
13. Water Storage Tank
14. Post Museum
15. Education Center
16. Telephone Exchange
17. Recreation Facility, Indoor

L. NON-URBAN CULTURE FEATURES

On the Fort Knox reservation, there are over 280 manmade features outside the cantonment area which could either positively or negatively affect military training or operations. Most of these features, depicted on the accompanying map and described below, consist of various types of buildings, cemeteries, revetments, and towers, many of which are associated with the various ranges on the reservation. The manmade features included are those that existed as of August,1978.

MAP NUMBER	GRID REFERENCE	DESCRIPTION
1	858047	Cemetery, Streible: 12 graves*.
2	862043	Waiting shelter: 17.8 m^2 (192 ft^2), all concrete, permanent.
3	868036	U.S. Armor School: Two general instruction buildings, one 41.8 m^2 (450 ft^2), concrete, wood, temporary, one 104.1 m^2 (1120 ft^2), concrete, wood, temporary.
4	863038	Cemetery, Stewart: Two graves.
5	876029	Cemetery, Weathers: 54 graves.
6	854023	Cemetery.
7	859019	Cemetery.
8	885016	Cemetery, Boone: Civil War cemetery.
9	873015	Twin Caves. Two horizontal openings (adits): North side, 1.2 x 0.9 m (4 x 3 ft); south side, 4.6 x 0.8 m (15 x 2.5 ft) with 15° downslope at opening, leveling off into hillside.
10	882012	Community building: 100.3 m^2 (1080 ft^2), concrete, steel, temporary; detached latrine, 6.7 m^2 (72 ft^2), concrete, concrete block, semipermanent.
11	879004	At Armor Board Test Area: Sentry station, 7.4 m^2 (80 ft^2), concrete block, permanent; inflammable materials storage, 51.1 m^2 (550 ft^2), concrete block, permanent; general purpose laboratory, 1381.1 m^2 (14,866 ft^2), concrete, steel, block and brick, permanent; perimeter chainlink fence.
12	882993	Family housing unit: LTC/Maj., 202.2 m^2 (2176 ft^2), concrete, wood, brick, permanent (see Section K, Urban Area); waiting shelter, 17.8 m^2 (192 ft^2), concrete, block, permanent.
13	881991	Cemetery, Withers: 25 graves.
14	875985	Cemetery.
15	corner points 865987 874993 867978 879981	At Muldraugh Gas Storage Field (leased to Louisville Gas and Electric Company): 316 hectares (780 acres); compressor station, approximately 2508.4 m^2 (27,000 ft^2), all steel; three purification plants; office buildings, all prefabricated metal, permanent (21 buildings in all); approximately 50 wells; collection system, well heads and storage, pumping, and associated buildings restrict use of approximately 91 hectares (225 acres).
16	851963	Cemetery.
17	856952	Ruins, Grahamton: Cotton and flour mill on the west bank of Otter Creek at U.S. Highway 60; concrete foundation slabs are imbedded in side of steep ravine at bottom of bridge.
18	854951	Rod and Gun Club: One building, 475.4 m^2 (5117 ft^2), concrete, wood, temporary; one building, 223.5 m^2 (2406 ft^2), concrete and steel, permanent.
19	856953 to 857957	At Grahamton, Camp Carlson (summer camp and recreation area): Recreation building, 280.4 m^2 (3018 ft^2), concrete, wood, temporary; one family housing unit, 85.8 m^2 (924 ft^2), concrete, brick, permanent; one general purpose administration building, 108.9 m^2 (1172 ft^2), concrete, wood, temporary; four recreation buildings, each 52.9 m^2 (569 ft^2), concrete, wood, temporary; four recreation buildings, each 85.5 m^2 (920 ft^2), concrete, wood, semipermanent.
20	857946	Game Farm: Family housing unit, 82.7 m^2 (890 ft^2), concrete, wood, brick, permanent; Otter Creek water pump station, 171.8 m^2 (1849 ft^2), concrete, brick, permanent; building, 74.3 m^2 (800 ft^2), concrete, concrete block, temporary; other structures from this site sold or demolished FY 1978.
21	856952	Cemetery, Grahamton East (church cemetery): 181 graves.
22	861951	Cemetery, Grahamton West (Thompson, church cemetery): 91 graves.
23	corner points 873951 875946 879949 877954	At Snow Mountain: 28.2-hectare (69.8-acre) area at elevation 228.5 to 274.3 m (750 to 900 ft) above mean sea level. Department of the Army will demolish 32 of 37 facilities during spring-summer 1979, leaving one ground storage water tank, 283,875 liters (75,000 gal), concrete, permanent; water pump station (unpotable), 43.7 m^2 (470 ft^2), concrete, permanent; water pump station (potable), 8.1 m^2 (87 ft^2); septic tank and drain field, 1892.7 liters (500 gal); MARS radio transmitter building, 195.5 m^2 (2104 ft^2), concrete, permanent; radio tower, height approximately 6.1 m (20 ft), steel construction; area enclosed by chainlink perimeter fencing.
24	883960	Tip Top Power Station: Privately owned by Louisville Gas and Electric Company.
25	869929	Cemetery.
26	896921	Cemetery.
27	906927	Cemetery.
28	907924	Cemetery.
29	918906	General storehouse: 92.9 m^2 (1000 ft^2), concrete-reinforced, concrete block, permanent$_{(1)}$ (see footnotes); family housing unit, 358.6 m^2 (3860 ft^2), concrete-reinforced, brick, permanent.
30	929899	XMTR radio building: 49.1 m^2 (528 ft^2), concrete-reinforced, block, permanent; power plant, 15 kW standby generator, 21.5 m^2 (231 ft^2), concrete, concrete block, permanent; detached latrine, 16.5 m^2 (178 ft^2), concrete block, permanent$_{(2)}$.
31	927915	Cemetery, Stithton: 43 graves.
32	928920	Cemetery, Bogart.
33	937932	Cemetery, Davis (Wilson Road): 75 graves.
34	934940	Cemetery, Brady (NCO Club): 39 graves.
35	926939	Cemetery, Sutherland (Gold Vault Road): 12 graves.
36	914944	Cemetery, Jones (BOQ #4): 44 graves.
37	910945	Cemetery, St. Patrick's (Catholic Church cemetery, at present is the post cemetery): 313 graves.
38	906942	Cemetery, Pearson.
39	948947	Cemetery, Calvin #1 (sewage plant); 20 graves.
40	950955	Gas chamber: 129.3 m^2 (1392 ft^2), concrete, concrete block, permanent.
41	934954	Cemetery.
42	931960	Cemetery, Johnson: 23 graves.
43	943966	Cemetery, Straney: 24 graves.
44	939969	Range operations building: 314.6 m^2 (3386 ft^2), concrete, concrete block and brick, permanent.
45	900967	Cemetery, Hart: 27 graves.
46	897973	Cemetery, Montgomery (Tip Top): 18 graves.
47	907973	Cemetery.
48	898979	Radio transmitter: Building, 93.4 m^2 (1005 ft^2), concrete, concrete block, permanent; power plant, 10 kW standby generator, 38.4 m^2 (413 ft^2), all concrete, permanent.
49	892985	Cemetery, Muth.
50	906983	Cemetery, Ray: 10 graves.
51	925982	Cemetery, Davis: 14 graves.
52	907997	Cemetery, Wilkerson: 30 graves.
53	corner points 888002 897013 901994 900009	Muldraugh Ammunition Storage Area: General storehouse, 383.7 m^2 (4130 ft^2), concrete, steel, permanent; heating plant, 115 m^2 (1238 ft^2), concrete, steel, permanent; supply building, 299.4 m^2 (3223 ft^2), concrete, steel and brick, semipermanent; fuse detonator magazine, 37.2 m^2 (400 ft^2), concrete and brick, permanent; fuse detonator magazine and high explosive magazine, each 149.4 m^2 (1608 ft^2), all concrete, permanent; chemical storehouse, 89.5 m^2 (963 ft^2), concrete, wood, temporary; igloo storage, 99.3 m^2 (1069 ft^2), all concrete, permanent; general storehouse and high explosive magazine, each 63.9 m^2 (688 ft^2), concrete and wood, semipermanent; two pyrotechnic magazines, each 127.5 m^2 (1372 ft^2), concrete and wood, semipermanent; high explosive magazine and fuse detonator magazine, each 126.3 m^2 (1360 ft^2), concrete and steel, semipermanent; 13 structures including nine high explosive magazines, two pyrotechnic magazines, two storehouses, and one fuse detonator magazine, each 126.3 m^2 (1360 ft^2), concrete and steel, semipermanent; high explosive magazine, 18.6 m^2 (200 ft^2), concrete and steel, semipermanent; seven high explosive magazines, each 126.3 m^2 (1360 ft^2), concrete, steel, semipermanent; 12 high explosive magazines, each 224.8 m^2 (2420 ft^2) permanent.
54	886009	At Muldraugh Water Treatment Plant: Building, 1725.7 m^2 (18,575 ft^2), concrete, concrete block, permanent (see Section K, Urban Area); ground water storage, 3,785,412 liters (1,000,000 gal); 600 kV electrical substation; perimeter chainlink fence.
55	887009	2500 kV electrical substation.
56	896019	Cemetery, McIntire.
57	891027	Sherman Tank Monument: mounted on slabs from dismantled Grahamton welcome sign.
58	corner points 886057 888053 902060 904057	At West Point water well field: 17 water wells, raised 8.2 m (27 ft) above ground level (to be above maximum flood stage), each 9.3 m^2 (100 ft^2); 14 original wells are concrete, spaced approximately 304.8 m (1000 ft) apart; three new wells are steel, placed between existing wells, spaced approximately 152.4 m (500 ft) apart (see Section K, Urban Area).
59	931049	Cemetery, Fort Hill.
60	930043 and	At Longstreet Range, number 9402, two sites (small arms). At site 1: Latrine, 16.4 m^2 (177 ft^2), concrete, block, permanent$_{(3)}$; tower, height 7.3 m (24 ft), base 7.5 m^2 (81 ft^2), all wood, temporary$_{(4)}$; general storehouse, 76.6 m^2 (825 ft^2), concrete, wood, temporary.
61	931042	At site 2: Tower, height 4.9 m (16 ft), base 6.4 m^2 (69 ft^2), concrete, wood, temporary$_{(5)}$; one concrete tent base, approximately 26.8 m^2 (288 ft^2)$_{(6)}$; 72 pop-up targets, concrete base.
62	941038	Cemetery, Long: 15 graves.
63	943032	Cemetery, Long.
64	929030 and	Ditto Hill Ranges, (unused) numbers 9403 (trainfire) and 9404 (combat). At Range 9403: Latrine$_{(3)}$; tower$_{(5)}$; general instruction building, 92.1 m^2 (991 ft^2), concrete, steel, semipermanent$_{(7)}$; storage, 74.3 m^2 (800 ft^2), concrete, block, permanent$_{(8)}$; bleacher cover, 77.9 m^2 (839 ft^2), concrete, wood, temporary.
65	930025	At Range 9404: Two storage buildings, one 92.9 m^2 (1000 ft^2)$_{(9)}$, one 5 m^2 (54 ft^2)$_{(10)}$, both concrete, block, temporary; 96 pop-up targets, concrete base.
66	930026	Cemetery, Field.
67	914027	Cemetery.
68	928017	At Pells Range, number 9405 (trainfire): Latrine$_{(3)}$, semipermanent; tower$_{(5)}$; general instruction building$_{(7)}$; two storage buildings, one 113.2 m^2 (1218 ft^2), concrete, wood, temporary, one$_{(8)}$, semipermanent; 112 pop-up targets, concrete base.
69	926013	At Rice Range, number 9406 (trainfire): Latrines, one 16.5 m^2 (178 ft^2), semipermanent, one 15.6 m^2 (168 ft^2), temporary, both of concrete and wood; tower$_{(5)}$; storage, 37.2 m^2 (400 ft^2), concrete, block, permanent$_{(11)}$; one concrete tent base$_{(6)}$.
70	925007	At Morgan Range, number 9407 (trainfire): Latrine$_{(3)}$; tower$_{(5)}$; storage$_{(8)}$; two concrete tent bases$_{(6)}$; 108 pop-up targets, concrete base.
71	925005	At Dripping Springs Range, number 9408 (trainfire): Latrine$_{(3)}$; tower$_{(5)}$; 108 pop-up targets, concrete base.
72	924999	At Heins Range, (unused) number 9409 (trainfire): Latrine$_{(3)}$; tower$_{(5)}$; storage, 113.3 m^2 (1220 ft^2), concrete, wood, temporary; one concrete tent base$_{(6)}$; 96 pop-up targets, concrete base.
73	925003	Cemetery, Pleasant View: 252 graves.
74	922995	Sentry station: 11.9 m^2 (128 ft^2), concrete, block, permanent.
75	924994	At Lawley Range, number 9410 (special weapons): Tower$_{(5)}$; storage$_{(1)}$; two bleacher covers, each 78.5 m^2 (845 ft^2), wood, temporary.
76	899015	Radio Range Building (navigational aid for Godman Army Airfield): 20.1 m^2 (216 ft^2), concrete, wood, temporary; abandoned .
77	925992	At O'Brien Range, number 9411 (trainfire): Two latrines, one 16.6 m^2 (179 ft^2), all concrete, permanent, one 15.5 m^2 (167 ft^2), concrete, wood, permanent; tower$_{(4)}$; storage$_{(11)}$.
78	925987	At Garvin Range, number 9412 (special weapons): Latrine, 15.4 m^2 (166 ft^2), concrete, block, permanent; tower$_{(4)}$; instruction building, 1003.4 m^2 (10,800 ft^2), concrete, block, permanent$_{(12)}$; storage$_{(11)}$.
79	926983	At Wilson Range, number 9413 (projectile, tank tables I and IV): Latrine$_{(3)}$; instruction building$_{(12)}$; target control station, 8 m^2 (86 ft^2), concrete, block, permanent.

L. NON-URBAN CULTURE FEATURES (Continued)

MAP NUMBER	GRID REFERENCE	DESCRIPTION
80	928979	At Frazier Range, number 9414 (small arms): Tower$_{(4)}$; three applied instruction buildings, one 2999.4 m^2 (32,228.5 ft^2), one 1785.2 m^2 (19,216 ft^2), one 854.7 m^2 (9200 ft^2), each reinforced concrete, permanent; target storage, 76.8 m^2 (827 ft^2), concrete, wood, semipermanent; 140 pop-up targets, concrete base.
81	933977	At Finney Range, number 9415 (tank table IV): Latrine$_{(3)}$; tower, 2.4 m^2 (26 ft^2), all wood, temporary$_{(13)}$; target control station, 14.6 m^2 (157 ft^2), concrete, block, temporary; storage, 31.6 m^2 (340 ft^2), wood, temporary.
82	936979	At Tollgate Range, number 9416 (tank table V): Latrine$_{(3)}$; two general instruction buildings, one 300 m^2 (3224 ft^2), concrete, wood, temporary, one 94.6 m^2 (1018 m^2), concrete, block, wood, temporary$_{(14)}$.
83	938976	At Mendick Range, number 9417 (tank table V): Latrines$_{(3)}$; storage$_{(1)}$; inactive.
84	941975	At George Range, number 9418 (trainfire): Three latrines, two$_{(3)}$, one 15.6 m^2 (168 ft^2), block, wood, temporary; tower$_{(5)}$; general instruction building, 70.3 m^2 (757 ft^2), concrete, wood, temporary; storage$_{(1)}$; target storage shed, 11.9 m^2 (127 ft^2), all wood, temporary; 108 pop-up targets, concrete base.
85	943973	At Blair Range, number 9419 (trainfire): Latrine, 92.9 m^2 (1000 ft^2), concrete, block, permanent; tower$_{(5)}$; bleacher cover, 36.4 m^2 (392 ft^2), all wood, temporary; storage$_{(1)}$; one concrete tent base$_{(6)}$; 108 pop-up targets.
86	941970	Forest Hill Range, number 9420, two adjacent sites (rifle). At site 1: Latrine$_{(2)}$; tower$_{(5)}$; three storage buildings, one 92.9 m^2 (1000 ft^2), concrete, block, semipermanent, one$_{(1)}$, one$_{(5)}$; bleacher cover, 70.3 m^2 (757 ft^2), concrete, wood, temporary. At site 2: Latrine$_{(3)}$, semipermanent; 108 pop-up targets, concrete base.
87	943969	At French Range, number 9421 (rifle): Latrine$_{(3)}$, semipermanent; tower$_{(5)}$; storage, 74.3 m^2 (800 ft^2), concrete, block, semipermanent$_{(15)}$; bleacher cover, 78 m^2 (840 ft^2), concrete, wood, temporary$_{(16)}$.
88	948969	At Canby Hill Range, number 9422 (rifle): Latrine$_{(3)}$; tower$_{(5)}$; storage$_{(11)}$; bleacher cover, 72.1 m^2 (776 ft^2), all wood, temporary$_{(17)}$.
89	953968	At Clark Range, number 9423: Latrine$_{(3)}$; tower$_{(5)}$; bleacher cover$_{(17)}$; two concrete tent bases$_{(6)}$.
90	957968	At Finnegan Range, number 9424 (pistol): Latrine$_{(3)}$, semipermanent; tower$_{(5)}$; storage$_{(8)}$, semipermanent; bleacher cover$_{(16)}$.
91	960967	At F.B.I. Range, number 9426 (pistol): Latrine$_{(3)}$; tower$_{(5)}$; storage$_{(15)}$; bleacher cover, 78.5 m^2 (845 ft^2), concrete, wood, temporary.
92	971972	At House Range, number 9451: Latrine$_{(2)}$; storage, 46.5 m^2 (500 ft^2), block, wood, temporary; abandoned.
93	972974	At Brown Range, number 9453 (small arms): Latrine, 20.4 m^2 (220 ft^2), concrete, wood, temporary$_{(18)}$; tower, base 5.9 m^2 (64 ft^2), all wood, temporary; target storage, 46.1 m^2 (496 ft^2), block, wood, temporary; 70 pop-up targets, concrete base.
94	978985	At Easy Gap Range, number 9461 (small arms, defense): Two target storage buildings, each 41.8 m^2 (450 ft^2), block, wood, temporary; 20 pop-up targets, concrete base.
95	979988	At Easy Gap Range, number 9462 (small arms, close combat): Two latrines, each 17.4 m^2 (187 ft^2), concrete, block, permanent$_{(19)}$; one latrine$_{(2)}$; tower, base 5.9 m^2 (64 ft^2), all wood, temporary$_{(20)}$; general instruction building, 93.7 m^2 (1009 ft^2), concrete, steel, sheet metal, semipermanent.
96	983996	At Crane Range, number 9466 (rifle): Latrine$_{(19)}$; tower, base 4.6 m^2 (49 ft^2), all wood, temporary; bleacher cover, 72.5 m^2 (780 ft^2), concrete, wood, temporary; storage, 117.1 m^2 (1260 ft^2), concrete, wood, temporary; five concrete tent bases$_{(6)}$.
97	950988	Cemetery, Smith.
98	965000	Cemetery, Davis.
99	959000	Cemetery, Dorsey.
100	965053	Cemetery, Ormes.
101	954059	Cemetery, Johnson.
102	994049	Cemetery, Skinner.
103	003044	Cemetery, Anderson: four graves.
104	009032	Cemetery, Ridgeway: 51 graves.
105	990018	Cemetery, Chappel Ridge.
106	998999	At McFarland-Oliver Range, number 9468 (projectile): Latrine$_{(19)}$; tower, base 13.4 m^2 (144 ft^2), all wood, temporary; target storage building, 50.5 m^2 (544 ft^2), concrete, wood, sheet metal, temporary.
107	000995	Cemetery.
108	985993	Two concrete tent bases$_{(6)}$.
109	981987	Cemetery.
110	981984	At Easy Gap Range, number 9457 (small arms): Tower$_{(20)}$; target storage, 19. m^2 (204 ft^2), all wood, temporary.
111	983977	At Kennedy Range, number 9456 (small arms): Two latrines, one$_{(19)}$, one 15.9 m^2 (171 ft^2), concrete, block, permanent; storage, 111.3 m^2 (1198 ft^2), all wood, temporary; target storage$_{(8)}$; control tower; seven concrete tent bases$_{(6)}$; target pit; observation bunker, concrete.
112	974973	Cemetery, unnamed: five graves.
113	973972	At Scott Mountain Range, number 9452 (small arms): Target storage, 41.8 m^2 (450 ft^2), all wood, temporary$_{(21)}$.
114	986965	Cemetery, Burchan: 170 graves.
115	958966	Cemetery, Harrison: 28 graves.
116	958960	Cemetery, Canby Hill.
117	965957	At McKie Range, (unused) number 9429 (combat): Tower, 6.7 m^2 (72 ft^2), all wood, temporary; target storage, 15.6 m^2 (168 ft^2), concrete, wood, temporary$_{(22)}$; one bunker; nine concrete pop-up targets.
118 and 119	962954 and 962951	At Burcham Range, (unused) numbers 9430 and 9431: Tower, 4.6 m^2 (50 ft^2), concrete, wood, temporary; target storage shed$_{(22)}$; abandoned.
120	963946	At Lee Range, (unused) number 9432 (small arms): Latrine$_{(3)}$; tower, 3.3 m^2 (36 ft^2), all wood, temporary; storage$_{(8)}$; abandoned.
121	957943	Cemetery, Calvin #2.
122	966942	At Danner Range, number 9435 (rocket and pistol): Two latrines, one$_{(18)}$, one$_{(3)}$; storage, 112.9 m^2 (1215 ft^2), concrete, wood, temporary; bleacher cover, 96.4 m^2 (1038 ft^2), concrete, wood, temporary$_{(23)}$.
123	984947	Cemetery, Cedar Grove: 35 graves.
124	970935	At Donnelly Range, number 9437 (tank table VII): Latrine$_{(3)}$; tower, 3.6 m^2 (39 ft^2), all wood, temporary; one concrete tent base$_{(6)}$.
125	975933	Cemetery, Gentry: 32 graves.
126	968934	Three concrete tent bases$_{(6)}$.
127	967929	At Mill Creek Range, number 9439 (grenade): Two latrines$_{(3)}$; tower, height 2.7 m (9 ft), base 3.3 m^2 (36 ft^2), all concrete, permanent; six concrete throwing bunkers; storage, 112.6 m^2 (1212 ft^2), concrete, wood, temporary$_{(24)}$; bleacher cover, 60.4 m^2 (650 ft^2), all wood, temporary.
128	970928	At Boydston Range, number 9438 (tank table VI): Latrine$_{(3)}$; tower, height 10.7 m (35 ft), base 5 m^2 (54 ft^2), concrete, wood, temporary; storage$_{(24)}$; bleacher cover, 60.4 m^2 (650 ft^2), concrete, wood, temporary; one concrete tent base$_{(6)}$.
129	986926	Cemetery, Phillips: 124 graves.
130	999915	Cemetery, Patterson Chapel: 125 graves.
131	938932	One concrete tent base$_{(6)}$.
132	965919	At Ames Range, number 9440 (tank table VI): Latrine$_{(3)}$; tower, 3.3 m^2 (36 ft^2), all wood, temporary; storage$_{(1)}$; one concrete tent base$_{(6)}$.
133	966916	At Steels Range, number 9441 (tank table VI): Latrine$_{(3)}$; four storage buildings, one 102.9 m^2 (1108 ft^2), concrete, wood, temporary, one 11.8 m^2 (127 ft^2), block, wood, temporary, one 82.8 m^2 (891 ft^2), block, wood, metal, temporary, one 109.5 m^2 (1179 ft^2), block, wood, metal, temporary; wash platform; one concrete tent base$_{(6)}$.
134	958905	Cemetery.
135	949908	Cemetery, Cowley (Twin Bridges): 18 graves.
136	944906	Latrine: 1.5 m^2 (16 ft^2), concrete, block, permanent$_{(25)}$.
137	943911	Two concrete tent bases$_{(6)}$.
138	940913	Two concrete tent bases$_{(6)}$.
139	941907	Latrine$_{(25)}$.
140	939906	Latrine$_{(2)}$.
141	936906	General storehouse$_{(8)}$.
142	938907	Latrine$_{(25)}$.
143	939902	Latrine$_{(2)}$.
144	953896	At 7th Armored Division Road and Brumfield Road: Two latrines$_{(2)}$.
145	954896	Latrine: 16.5 m^2 (178 ft^2), concrete, wood, semipermanent.
146	962894	Cemetery, Lincoln Memorial (church cemetery): 67 graves.
147	971907	At Brumfield Range, number 9442 (subcaliber tank gunnery): Latrine$_{(3)}$; tower, 3.6 m^2 (39 ft^2), all wood, temporary; storage, 111.3 m^2 (1198 ft^2), concrete, wood, temporary; hoist shed.
148	978899	At Crumb Range, number 9443 (tank table V): Latrines; tower; storage$_{(9)}$.
149	996891	Cemetery.
150	003876	Cemetery, Atcher: 59 graves.
151	991872	At St. Vith Range, number 9445 (tank table IV): Two latrines, one 15.4 m^2 (166 ft^2), concrete block, permanent, one latrine$_{(3)}$; three towers, two$_{(13)}$, one tower, height is one story, base 16.7 m^2 (180 ft^2), concrete, block, permanent; permanent bleachers, 880-man capacity.
152	982873	At Baum Range, number 9444 (tank tables VI, VII, and VIII): Latrine$_{(3)}$; applied instruction building, 167.2 m^2 (1800 ft^2), concrete, block, permanent; observation tower with range finder (bunker), 11.3 m^2 (122 ft^2), concrete, block, permanent; general storehouse, 74.3 m^2 (800 ft^2), concrete, wood, temporary; permanent bleachers, 880-man capacity.
153	977877	Cemetery, Bird: 50 graves.
154	976869	Latrine: 1.5 m^2 (16 ft^2), concrete, fiberglass, permanent$_{(26)}$.
155	978865	Latrine$_{(26)}$.
156	984864	Latrine$_{(26)}$.
157	962854	Cemetery, Shelton: 15 graves.
158	968844	Cemetery, Gunning: 30 graves.
159	973840	Two concrete tent bases$_{(6)}$.
160	975839	One concrete tent base$_{(6)}$.
161	979844	Tank wash platform.
162	980845	Water pump building: 4.2 m^2 (45 ft^2), concrete, block, permanent.
163	979852	Cemetery, Owens: 51 graves.
164	984846	One concrete tent base$_{(6)}$.
165	983845	At bivouac 4: One latrine; two concrete tent bases$_{(6)}$.
166	987847	At bivouac 5: One latrine; two concrete tent bases$_{(6)}$.
167	988847	One concrete tent base$_{(6)}$.
168	995851	At bivouac 7: One latrine; six concrete tent bases$_{(6)}$.
169	994846	At bivouac 6: One latrine; eight concrete tent bases$_{(6)}$.
170	997847	Six concrete tent bases$_{(6)}$.
171	999853	Latrine$_{(18)}$.
172	002851	Latrine$_{(18)}$.
173	004848	At bivouac 8: One latrine; seven concrete tent bases$_{(6)}$.
174	011846	Latrine$_{(18)}$.
175	011847	Latrine$_{(18)}$.
176	009848	Latrine$_{(18)}$.
177	006848	Latrine$_{(18)}$.
178	006856	Cemetery, Thomas or McCullum: 30 graves.
179	013859	Cemetery, Old Kentucky Highway 251 and Cedar Creek: 25 graves.
180	005862	Cemetery, Douglas: 80 graves.
181	014860	At bivouac 11: One latrine; one concrete tent base$_{(6)}$.
182	019864	Latrine$_{(18)}$.

L. NON-URBAN CULTURE FEATURES (Continued)

MAP NUMBER	GRID REFERENCE	DESCRIPTION
183	019866	Latrine(18).
184	018867	Latrine(18).
185	018868	Latrine(18).
186	024880	Cemetery, Williams: 23 graves.
187	023889	Cemetery, Cedar Creek: 148 graves.
188	028881	At Cedar Creek Range, number 9497 (tank tables VI, VII, and VIII): Latrine(3); control tower, 16.7 m^2 (180 ft^2), concrete, block, permanent; storage, 111.3 m^2 (1198 ft^2), concrete, wood, semipermanent; target storage, 251.1 m^2 (2703 ft^2), concrete, wood, metal, temporary; loading and unloading dock, length 15.5 m (51 ft), width 2.4 m (8 ft), concrete, permanent(27); instruction building, 167.2 m^2 (1800 ft^2), concrete, block, permanent.
189	041884	Cemetery, Hagan: 50 graves.
190	048892	Cemetery.
191	058902	Cemetery, Daugherty: Seven graves.
192	059892	Cemetery.
193	071893	Cemetery, Howlett: Five graves.
194	083889	Abandoned airstrip: Runway length 457.2 m (1500 ft), width 15.2 m (50 ft), azimuth 100°-280°, surface turfed, poor condition.
195	081864	At Yano Number 3 Range, (unused) number 9449: Latrine(18); two towers, one 14.4 m^2 (155 ft^2), wood, temporary, one tower(13); storage, 94.1 m^2 (1013 ft^2).
196	095887	Five concrete tent bases(6).
197	094900	Cemetery, Dawson.
198	094932	Cemetery, Lee: 40 graves.
199	090934	Abandoned airstrip: Runway length 457.2 m (1500 ft), width 15.2 m (50 ft), azimuth 53°-233°, surface turfed, poor condition.
200	071945	Cemetery, Viers: 40 graves.
201	054947	Cemetery, Glenn: 20 graves.
202	046948	Cemetery, Jeff Henry Lee: 15 graves.
203	033919	Cemetery, Sycamore: Eight graves.
204	025945	Cemetery, Hays: Five graves.
205	045958	Cemetery, Sullen: 15 graves.
206	039959	Cemetery, Snellen.
207	032968	Cemetery, Pitts Point (Catholic Church cemetery): 200 graves.
208	028968	Cemetery, Froman: 10 graves.
209	015958	Cemetery, Carr: Seven graves.
210	008957	Cemetery, Woolridge or Woodridge: 40 graves.
211	003969	Cemetery, Crandell: 30 graves.
212	032972	Cemetery, Pitts Point (church cemetery): 225 graves.
213	027975	Cemetery, Hardy: Six graves.
214	028992	Cemetery, Congrove: 10 graves.
215	034996	Cemetery, Hosclaw: Nine graves.
216	049008	Cemetery, Troutman: 20 graves.
217	057974	Cemetery.
218	073978	Cemetery, Dawson Knob.
219	069004	Cemetery, Joyce.
220	056011	At Wilcox Lake Range, number 9469 (aerial gunnery): Two latrines(2); tower, height 4.6 m (15 ft); platform on stilts, all wood, temporary.
221	073020	Three concrete tent bases(6).
222	057032	Cemetery, Johnson: 16 graves.
223	034017	At Mount Eden Church Range, number 9470 (artillery, bivouac site): Two latrines(18); general instruction building, 320 m^2 (3444 ft^2), concrete, steel, sheet metal, permanent(28); detached shower, 28.6 m^2 (308 ft^2), concrete, wood, temporary(29); nine concrete tent bases(17).
224	029021	Latrine(18).
225	037025	Cemetery, Froman: 53 graves.
226	041045	At Mount Eden Church (North-bivouac site): Three latrines(19); general instruction building(28); detached shower(29); 23 concrete tent bases(6).
227	033043	Cemetery, Myers: 20 graves.
228	025054	Cemetery, George Key.
229	040886	Latrine(18).
230	049862	Latrine(18).
231	054860	Latrine(18).
232	063853	Latrine(18).
233	866987	Microwave tower: Height approximately 76.2 m (250 ft), all steel; erected, owned, and maintained by Louisville Gas and Electric Company.
234	837979	At bivouac 12: One concrete tent base(6).
235	843945	One concrete tent base(6).
236	887908	At bivouac 13: One concrete tent base(6).
237	000003	Waiting shelter: 15.9 m^2 (840 ft^2), concrete, steel, sheet metal, temporary.
238	980930	At Boydston Range, number 9438 (tank table VI): Moving target track, length 3822.3 m (12,541 ft), rail 19.8 kg/m (40 lb/yd)(30), electrical remote control potential, uses four gasoline powered gang cars; car shelter.
239	028895	At Cedar Creek Range, number 9447 (tank tables VI, VII, and VIII): Moving target track, length 1097.1 m (3600 ft), rail(30), electrical remote control potential, four gasoline powered gang cars, gravity return; two car shelters; concrete bunker.
240	072868	At Yano Number 3 Range, (unused) number 9449: Moving target track, length 3017.4 m (9900 ft), rail(30), electrical remote control potential, four gasoline powered gang cars.
241	986883	At Baum Range, number 9444 (tank tables VI, VII, and VIII): Moving target track, length 365.7 m (1200 ft), four cylinder Jeep engine, cable driven, 1.3 cm (0.25 in) steel; bunkers revetted, 35 m (15 ft); loading dock(27).
242	993887	At St. Vith Range, number 9445 (tank table IV): Moving target track.
243	971917	At Steels Range, number 9441 (tank table VI): Moving target track, length 2459.6 m (8070 ft), rail(30).
244	958069 to 943056 940053 to 930048 911039 to 883960	Powerline, Louisville Gas and Electric Company: 138 kV, all copper wire; class 5 poles, height 7.6 m (25 ft).
245	883960 to 848974	Powerline, Louisville Gas and Electric Company: 33 kV, copper wire; class 2 and 3 poles.
246	883960 to 843943 853949 to 845941	Powerline, Meade County Rural Electric Company: 69 kV; steel towers, average height 24.4 m (80 ft). Same right-of-way, powerline to Cloverport, Louisville Gas and Electric Company: 138 kV; class 5 wood poles.
247	958069 to 943056 937054 to 927965 885956 to 905026 887010 to 900023 893949 to 902941	Powerline, Louisville Gas and Electric Company (loop): 33 kV, all copper wire, high tension line; class 2 and 3 poles; connection to Kentucky Utility (see Map Number 248).
248	909939 to 910911	Powerline, Kentucky Utilities Company: 33 kV, Dix feeder high tension line; class 2 and 3 poles.
249	941891 to 951880	Powerline, Nolin Rural Electric Company: 12 kV, class 2 and 3 poles.
250	838971 to 857958	Cable communication distribution: One circuit, 104 copper wire on wooden brackets, open wire, and rural distribution; 7.6 to 12.2 m (30 to 40 ft) class 2, 3, or 5 poles(31).
251	880003 to 886008	Communications cable, underground: 12 pairs of 19 gage cable.
252	866050 to 880004	Communications cable: Open wire, one circuit, 104 copper wire on wooden brackets; poles(31).
253	887008 to 904017 904017 to 890010	Communications cable: Open wire, one circuit, 104 copper wire on wooden brackets; poles(31).
254	875013 to 881017	Communications cable: Open wire, one circuit, 104 copper on wooden brackets; poles(31).
255	887995 to 891001	Communications cable, underground: Six pairs of 19 gage figure 8 cable.
256	901975 to 908983	Communications cable, underground: Two pairs of 19 gage figure 8 cable.
257	901975 to 908981	Communications cable: Open wire, one circuit, 104 copper wire on wooden brackets; poles(31).
258	900023 to 903046	Powerline, post internal distribution: Three # 10/8, one # 6 braided and solid, bare primary cable; 26 pairs # 19 braided and solid control cables; 7.6 m (25 ft) class 2 and 3 poles(32).
259	888056 to 902058 897057 to 902046	Powerline, post internal distribution: 4160 V, 3ø, 3 W; poles(32).
260	893039 to 907047	Powerline, post internal distribution: 2400 V/4160 V, 3ø, 4 W; poles(32).
261	880005 to 889000	Powerline, post internal distribution: Three # 4 copper clad steel; poles(32).
262	883960 to 919991	Powerline, post internal distribution: 33 kV feeder line, all copper; poles(32).
263	891965 to 898978	Powerline, post internal distribution: Four # 2/0; poles(32).
264	932043 to 936978 943973 to 973898	Powerline, post internal distribution (Range): Four # 4 all copper; poles(32).
265	991872 to 980846 012845 to 026880 074863 to 082868 961960 to 001003	Powerline, post internal distribution: Poles(32).
266	931042 to 962873	Range communication: Rural distribution, two range cables (51 type 22 and one type 50) with one pair idle; poles(31).
267	958909 to 973898 and 964869 to 014847	Range communication: Open wire, two circuits, 104 copper wire on wooden brackets; poles(31). Range communication: Open wire, six circuits, 104 copper wire on wooden brackets; poles(31).
268	014847 to 029873	Range communication: Open wire, six circuits, five circuits on one 10-pin cross arm, one circuit on wooden brackets; poles(31).
269	029873 to 024887	Range communication: Open wire, one circuit, 104 copper wire on wooden brackets; poles(31).
270	029876 to 029896	Range communication (underground): Two pairs.
271	030868 to 071854 073855 to 087856	Range communication: Open wire, three circuits, 104 copper wire on one 10-pin cross arm: poles(31).
272	083868 to 092861 090878 to 097936	Range communication: Open wire, one circuit, 104 copper wire on wooden brackets; poles(31).
273	963873 to 001875	Range communication (underground): 26 pairs.
274	962873 to 012850	Range communication: Six circuits, 104 wire, five circuits on one 10-pin cross arm, one circuit on wooden brackets; poles(31).
275	007875 to 012848	Range communication (underground).
276	961960 to 987001	Range communication: One cable, 25 pairs of 19 gage compact "8" with one 134 support wire; poles(31).
277	987001 to 001003	Range communication: 12 pairs figure 8 cable.
278	002005 to 047053	Range communication: Six pairs multidrop crossing the Salt River; open wire, six pair row; poles(31).
279	038029 to 071032	Range communication: One circuit, 104 copper wire on wooden brackets; poles(31).
280	925979 to 926972	CATV underground cable: Coaxial cable trunk from cantonment area to building number 9308.

L. NON-URBAN CULTURE FEATURES (Continued)

Footnotes:

*Cemeteries show approximate number of graves.

Subscript
Number

(1) Storehouse: 92.9 m^2 (1000 ft^2), concrete, block, permanent.
(2) Latrine: 16.5 m^2 (178 ft^2), concrete, block, permanent.
(3) Latrine: 16.4 m^2 (177 ft^2), concrete, block, permanent.
(4) Tower: base 7.5 m^2 (81 ft^2), concrete, wood, temporary.
(5) Tower: height 4.9 m (16 ft), base 6.4 m^2 (69 ft^2), concrete, wood, temporary.
(6) Concrete tent base: standard size approximately 26.8 m^2 (288 ft^2).
(7) General instruction building: 92.1 m^2 (991 ft^2), concrete, steel, semipermanent.
(8) Storehouse: 74.3 m^2 (800 ft^2), concrete, block, permanent.
(9) Storehouse: 92.9 m^2 (1000 ft^2), concrete, block, temporary.
(10) Storehouse: 5 m^2 (54 ft^2), concrete, block, temporary.
(11) Storehouse: 37.2 m^2 (400 ft^2), concrete, block, permanent.
(12) General instruction building: 1003.4 m^2 (10,800 ft^2), concrete, block, permanent.
(13) Tower: base 2.4 m^2 (26 ft^2), all wood, temporary.
(14) General instruction building: 94.6 m^2 (1018 ft^2), concrete, block, temporary.
(15) Storehouse: 74.3 m^2 (800 ft^2), concrete, semipermanent.
(16) Bleacher cover: 78 m^2 (840 ft^2), concrete, wood, temporary.
(17) Bleacher cover: 72.1 m^2 (776 ft^2), all wood, temporary.
(18) Latrine: 20.4 m^2 (220 ft^2), concrete, wood, temporary.
(19) Latrine: 17.4 m^2 (187 ft^2), concrete, block, permanent.
(20) Tower: base 5.9 m^2 (64 ft^2), all wood, temporary.
(21) Target storage: 41.8 m^2 (450 ft^2), all wood, temporary.
(22) Target storage: 15.6 m^2 (168 ft^2), concrete, wood, temporary.
(23) Bleacher cover: 96.4 m^2 (1038 ft^2), concrete, wood, temporary.
(24) Storehouse: 112.6 m^2 (1212 ft^2), concrete, wood, temporary.
(25) Latrine: 1.5 m^2 (16 ft^2), concrete, permanent.
(26) Latrine: 1.5 m^2 (16 ft^2), concrete, fiberglass, permanent.
(27) Loading and unloading dock: length 15.5 m (51 ft), width 2.4 m (8 ft), concrete, permanent.
(28) General instruction building: 320 m^2 (3444 ft^2), concrete, steel, sheet metal, permanent.
(29) Detached shower: 28.6 m^2 (308 ft^2), concrete, wood, temporary.
(30) Moving target track: 19.8 kg/m (40 lb/yd) test rail.
(31) Communication cables are carried on 7.6 to 12.2 m (25 to 40 ft) tall, class 2, 3, or 5 poles as determined by terrain and load.
(32) Post internal power distribution is carried on 7.6 m (25 ft) tall, class 2 and 3 poles.

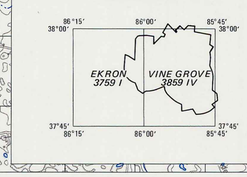
FORT KNOX, KENTUCKY
TERRAIN ANALYSIS

NON-URBAN CULTURE FEATURES

- Abandoned Airstrip
- Building
- Cemetery
- Tower (range)
- Tower (radio)
- Tower (microwave)
- OX Oxidation Pond
- Ammunition Dump
- RA Recreation Area
- Cave
- Power Substation
- Monument
- Gas Chamber
- OP Observation Bunker
- P Pump Station
- Permanent Bleachers
- Ruins
- Wells (water, gas)
- —T— Telephone
- --T-- Telephone (underground)
- MT Moving Target Track
- Powerline
- —x— Fence
- —V— CATV
- Bivouac Site

NOTE: Number on map refers to entry in table.

1:50,000 SHEET INDEX
Series V753



Scale 1:50,000

1000 500 0 1000 2000 3000 4000 5000 Meters

1 ½ 0 1 2 3 Statute Miles

CONTOUR INTERVAL 10 METERS
SUPPLEMENTARY CONTOURS 5 METERS

Prepared by Dames & Moore, Washington, DC, under the direction of the Terrain Analysis Center, U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia. March 1979.

III. OFF-POST FEATURES

A. AIRFIELDS

Standiford Field, approximately 35 kilometers (22 miles) northeast of the reservation, is the only airfield within a 50-mile radius of Fort Knox which will support aircraft as large as the C-130A. It was used by the Army during maneuvers in the spring of 1978, when 150 C-130A's were handled in a week and a half.

Standiford Field serves Louisville, Kentucky, and accommodates private and commercial flight operations. The Kentucky Air National Guard is a tenant of the airfield and may use the runways upon request. Air National Guard facilities are on the east side of the airfield, connected by their own taxiway.

The airport owns only one small maintenance hangar. The majority of the old airport hangars are no longer owned by the airfield nor are they situated on the airport proper. These hangars have been converted for use by private firms.

NAME; LOCATION; TYPE; AND CLASSIFICATION	ELEVATION; AND STATUS	RUNWAY DESCRIPTION	TAXIWAY, PARKING, APRON, AND HARDSTAND AREA DESCRIPTION	BUILDING DESCRIPTION	POL FACILITIES	NAVIGATIONAL AIDS	REMARKS
Standiford Field; 38°11'N, 85°44'W; Civil; Airfield; joint-use facility with Kentucky Air National Guard as tenant.	152 m (497 ft); operational.	North-South Runway 01-19 2377.4 x 45.7 m (7800 x 150 ft); azimuth 013°-193°; maximum weight bearing capacity S75, T170, ST175, TT360*; concrete surface, wire combed; excellent condition. East-West Runway 11-29 2209.8 x 45.7 m (7250 x 150 ft); azimuth 113°-293°; runway closed for construction, planned completion December 1978, will have same weight bearing capacity and surface as north-south runway. Northeast-Southwest Runway 06-24 1524 x 45.7 m (5000 x 150 ft); azimuth 060°-240°; maximum weight bearing capacity S75, T170, TT360; concrete surface; closed, used for parking.	SHARED FACILITIES Taxiways Approximately 8; 24.4 m (80 ft) wide; weight bearing capacities are the same as associated runways; concrete and asphalt surfaces. CIVILIAN FACILITIES Parking Area, Apron, and Hardstand 187,740 m² (2,020,082 ft²) approximate total area; maximum weight bearing capacity same as north-south runway; concrete and/or concrete overlaid with asphalt surfaces. MILITARY FACILITIES Parking Area, Apron, and Hardstand 54,300 m² (584,914 ft²) approximate total area; maximum weight bearing capacity same as north-south runway; 25 cm (10 in) concrete surface.	CIVILIAN FACILITIES Hangars One hangar now used for airport maintenance: approximately 104 m² (1120 ft²), masonry, good condition. Falls City hangar: approximately 3752 m² (40,380 ft²), corrugated metal, good condition. Two other hangars privately owned and converted to manufacturing: Aluminum Cruisers, 6193 m² (66,653 ft²), corrugated metal, good condition; Bremner Biscuits, 21,273 m² (228,960 ft²), wood beam masonry, fair condition. Maintenance Facilities 11 buildings: approximate total area 37,388 m² (402,413 ft²); corrugated steel and metal, masonry, brick, and stone; all in fair to good condition. Administration and Terminal Building Lee Terminal: approximate total area 21,369 m² (230,000 ft²). MILITARY FACILITIES Hangars One hangar: 3716 m² (40,000 ft²); concrete; good condition. Maintenance Facilities Part of hangar listed above. Administration and Terminal Building One building: total area - no data; concrete; good condition.	CIVILIAN FACILITIES Jet A Kerosene: underground storage 719,150 liters (190,000 gal); Eastern: 567,750 liters (150,000 gal), Piedmont: 151,400 liters (40,000 gal). 100 octane: 75,700 liters (20,000 gal). Falls City Flying Service provides contract fuel, with and without icing inhibitor. Seven pumping trucks (Eastern and Piedmont each own one truck). MILITARY FACILITIES U.S. aviation fuel (MIL-SPECS) JP-4: underground storage 378,500 liters (100,000 gal). Four trucks pump 1135.5 lpm† (300 gpm).	Control Tower 23.8 m (78 ft) high. Scheduled weather broadcast; VORTAC; VHF direction finder call approach control; ILS runway 29 out of service until further notice. Lights Green and white rotating beacon; approach lights; high intensity runway lights; high intensity approach lights; sequenced flashing lights; visual approach slope indicator systems; runway centerline lights.	Transients subject to possible lodging fee. Runway 11-29 closed through December 1978. Approach end engagement 20 minutes prior notice required. Depart end engagement required at final approach fix inbound. Air National Guard service available, official business only with approval of authority, Monday-Friday 1200-2030 Z (daylight savings time 1100-1930 Z). Prior permission required other times for ramp use and servicing. Special arrangements have been made with the military to handle their needs; extra parking areas have been made available and runways have been closed. Maneuvers involving 150 C-130A's in a week and a half took place in spring 1978.

*Runway weight bearing capacity in pounds (gross weight of aircraft) is determined by adding 000 to figure following S, T, ST, TT. Runway weight bearing capacity given is for unlimited operations. Aircraft weight higher than given requires prior permission from aerodrome controlling authority.

S - Runway weight bearing capacity for aircraft with single-wheel type landing gear (C-47, F100).
T - Runway weight bearing capacity for aircraft with twin-wheel type landing gear (C-9A).
ST - Runway weight bearing capacity for aircraft with single-tandem landing gear (C-130).
TT - Runway weight bearing capacity for aircraft with twin-tandem type (includes quadricycle) landing gear (B-52, C-135).
For further information, see DOD Flight Information Publication (enroute IFR-Supplement United States).

†Liters per minute; gallons per minute.

B. URBAN AREAS

Twenty-seven urban areas within 50 miles of the reservation had 1970 census populations greater than 2500. Eight of these are in Indiana; although some are not far from the reservation, the Ohio River (the border between Indiana and Kentucky) acts as a barrier to commuters. The remaining 19 urban areas are in Kentucky, with a concentration of urban areas around the largest city, Louisville. The resources for growth in these cities are good, however, some limitations exist on natural gas supplies and housing availability.

Salem and Tell City, Indiana, north and east of the reservation respectively, are on the fringe of the 50-mile radius and would represent considerable commuting time to Fort Knox. Corydon, northwest of the reservation is easily accessible to Fort Knox and resources for growth are good. Sellersburg and Charlestown, Indiana, immediately north of the Louisville metropolitan area are also areas of growth. Clarksville, Jeffersonville, and New Albany, are the three largest urban areas within the 50-mile radius in Indiana. They are presently experiencing growth as the Louisville metropolitan area expands northward.

The Louisville-Jefferson County population center, northeast of the reservation, represents eight Kentucky urban areas: Jeffersontown, Louisville, Okolona, St. Matthews, Shively, and the unincorporated areas of Buechel, Pleasure Ridge Park, and Valley Station. The majority of the industry in this area is concentrated in Louisville, with its port facilities along the Ohio River; the remaining areas are primarily residential. Growth in this area is limited by the curtailment of natural gas service by the Texas Gas Transmission Corporation which supplies gas to the local distributor, Louisville Gas and Electric.

With the exception of Radcliff and Vine Grove the remaining Kentucky cities, Bardstown, Campbellsville, Elizabethtown, Hodgenville, Lebanon, Leitchfield, Shelbyville, Shepherdsville, and Springfield are seats of their respective county governments. Radcliff and Vine Grove, south of the cantonment area, provide the closest, most widely used residential area for housing military personnel. Elizabethtown, southeast of the cantonment area also houses a number of military personnel. Resources for growth in these areas are good. Natural gas supplies are adequate for most residential uses, however, curtailments have been imposed on commercial and industrial users when necessary.

The most recent available data were used to compile the table below.

NAME AND LOCATION	POPULATION	HOUSING AVAILABILITY	EDUCATIONAL FACILITIES	MEDICAL FACILITIES	RECREATIONAL FACILITIES	UTILITIES AND SERVICES
Bardstown, KY 85°28'W 37°49'N	1970: 5816 1975: 6671 (1977 data)	Single-Family Units Total occupied units: 6639 Owner occupied units: 5094 (1977 data, Nelson County) Average sale price: $26,500 to $45,000 Average monthly rent: $150 Trailer court monthly rent: $125 Many new houses under construction. Multi-Family Units Average monthly rent: 1 Bedroom: $135 plus utilities 2 Bedroom: $150 to $200 plus utilities (1978 data)	Public Schools 1 Elementary School (grades K through 5) 1978 enrollment: 725 Enrollment capacity: 800 1 Middle School (grades 6 through 8) 1978 enrollment: 340 Enrollment capacity: 400 1 High School (grades 9 through 12) 1978 enrollment: 535 Enrollment capacity: 600 Private Schools 1 Elementary School 1978 enrollment: 488 1 High School 1978 enrollment: 314 Vocational Schools Nelson County Area Vocational Education Center, curriculum in health and personal service occupations and industrial education. (1978 data)	Flaget Memorial Hospital 52 beds 2 beds ICU/CCU* 2 Nursing homes 196 beds Home health care provided by Community Health Service. Mental health services available. Doctors Total: 23 Doctor/population ratio: 1/290† Dentists Total: 7 Ratio: 1/953† (1978 data)	Public Municipal Park Picnic area Playground 2 Basketball courts 1 Volleyball court Horseshoe pitching Jaycee Park Pavilion Picnic area Playground Reservoir fishing 1 Swimming pool 1 Golf course 3 Tennis courts 5 Baseball diamonds 4 Football fields Tourmobile Private 1 Country club 1 Tennis court 1 Drive-in movie theater 1 Bowling facility 1 Skating rink 1 Lighted croquet court (1978 data)	Electric Bardstown Municipal Light and Water Company Source of power: Kentucky Utilities Company Total generating capacity: 2,238,400 kW Supply: adequate Plans to add two 510,000 kW units for completion in 1981 and 1983. Heating Fuels Natural gas from Louisville Gas and Electric Company Supply: adequate 6 Propane distributors 6 Distillate fuel distributors Water Supply Source: Sympson Lake Treatment plant capacity: 8.5 x 10⁶ lpd‡ (2.25 x 10⁶ gpd) Average daily consumption: 6.056 x 10⁶ liters (1.6 x 10⁶ gal) Peak daily consumption: 7.2 x 10⁶ liters (1.9 x 10⁶ gal) Storage capacity: 8.2 x 10⁶ liters (2.165 x 10⁶ gal)

NAME AND LOCATION	POPULATION	HOUSING AVAILABILITY	EDUCATIONAL FACILITIES	MEDICAL FACILITIES	RECREATIONAL FACILITIES	UTILITIES AND SERVICES
Bardstown (Continued)						Type of treatment: coagulation, sedimentation, filtration, softening, fluoride adjustment, disinfection. Plans to increase treatment plant capacity to 11.4 x 10^6 lpd (3.0 x 10^6 gpd) and the construction of a 0.95 x 10^6 liter (0.25 x 10^6 gal) elevated storage tank. Expected individual well yields: 19 lpm (5 gpm) or less Sewage Disposal Bardstown Municipal Sewage Service Design capacity: 2.84 x 10^6 lpd (0.75 x 10^6 gpd) Average daily flow: 2.27 x 10^6 liters (0.6 x 10^6 gal) Type of treatment: secondary; comminutor, clarifier, trickling filters, anaerobic digestion, drying beds. Plans to expand the capacity of the sewage treatment plant to 11.4 x 10^6 lpd (3.0 x 10^6 gpd) with tertiary treatment. Solid Waste Disposal Municipal landfill (1978 data)
Buechel, KY (unincorporated) 85°39'W 38°11'N	1970: 5359 (1977 data)	Single-Family Units Average sale price: $65,000 to $87,000 Average monthly rent: $275 Multi- Family Units Vacancy rate: < 1 percent Average monthly rent: $250 plus utilities 200 new townhouse starts. For additional data on vacancy rates and total number of units, see data for Jefferson County under Louisville below. (1978 data)	Part of Jefferson County school system, see Louisville below.	Use Jefferson County facilities, see Louisville below.	Use Jefferson County facilities, see Louisville below.	Electric See listing under Louisville below. Heating Fuels See listing under Louisville below. Water Supply See listing under Louisville below. Sewage Disposal Parts served by Metropolitan Sewer District, see listing under Louisville below. The majority of Buechel, built prior to 1972, is served by septic tanks; new developments are served by small "package" plants. The 201 Facilities Plan for Jefferson County recommends that these small non-point pollution sources be phased out. Solid Waste See listing under Louisville below. (1978 data)
Campbellsville, KY 85°20'W 37°21'N	1970: 7598 1975: 7503 (1977 data)	Single-Family Units 68 percent of total housing units are owner occupied. 21 percent of total housing units are rental homes. 7.2 percent of housing is substandard. 6539 new house starts. (1977 data, Taylor County) Average sale price: $32,000 to $42,000 400 housing units managed by FHA, average sale price: $30,000 Multi- Family Units No large apartment complexes in Campbellsville; there are 4, 6, and 8 unit buildings. Total units: approximately 75 to 80 Vacancy rate: 0 percent Average monthly rent: 1 Bedroom: $125 plus utilities 2 Bedroom: $175 plus utilities (1978 data)	Public Schools 2 Elementary Schools 1978 enrollment: 1288 Enrollment capacity: 1450 1 Middle School 1978 enrollment: 451 Enrollment capacity: 650 1 High School 1978 enrollment: 864 Enrollment capacity: 850 Colleges and Universities Campbellsville College 1975 enrollment: 711 (1978 data)	Taylor County Hospital 60 beds 4 beds ICU/CCU Plans to expand total beds to 90 and total ICU/CCU to 8. 2 Nursing homes 71 beds extended care 67 beds personal care Doctors Total: 23 Doctor/population ratio: 1/326 Dentists Total: 6 Ratio: 1/1251 (1978 data)	2 Parks 4 Playgrounds 1 Swimming pool 1 Nine-hole golf course 4 Tennis courts 2 Baseball diamonds 2 Football fields 5 hectares (12 acres) of land were added to one of the city parks to provide space for a new swimming pool and tennis courts. (1976 data)	Electric Kentucky Utilities Company Total generating capacity: 1,615,500 kW Supply: adequate Plans to add two 510,000 kW units for completion in 1981 and 1983. Heating Fuels Natural gas from Western Kentucky Gas Company Source of supply: Tennessee Gas Pipeline Company Supply: adequate 1 Propane and butane distributor 7 Distillate fuel oil distributors Water Supply Campbellsville Municipal Water and Sewer System Source: city reservoir and Green River Lake Treatment plant capacity: 22.71 x 10^6 lpd (6.0 x 10^6 gpd) Average daily flow: 7.57 x 10^6 liters (2.0 x 10^6 gal) Peak daily flow: 8.7 x 10^6 liters (2.3 x 10^6 gal) Storage capacity: 8.5 x 10^6 liters (2.235 x 10^6 gal) Type of treatment: coagulation, sedimentation, filtration, chlorination, fluoridation. Expected individual well yields: 19 lpm (5 gpm) or less Sewage Disposal Campbellsville Municipal Water and Sewer System Design capacity: 15.14 x 10^6 lpd (4.0 x 10^6 gpd) Average daily flow: 5.3 x 10^6 liters (1.4 x 10^6 gal) Type of treatment: secondary; aeration, clarifier, drying beds, screening. Solid Waste Municipal sanitary landfill (1976 and 1978 data)

B. URBAN AREAS (Continued)

NAME AND LOCATION	POPULATION	HOUSING AVAILABILITY	EDUCATIONAL FACILITIES	MEDICAL FACILITIES	RECREATIONAL FACILITIES	UTILITIES AND SERVICES
Charlestown, IN 85°40'W 38°27'N	1970: 5890 1977 est.: 5600 (1977 data)	Single-Family Units Total units: 23,692 Vacancy rate: 4.9 percent Average sale prices: $25,000 to $30,000 Multi-Family Units Total units: 6797 Vacancy rate: 4.9 percent Average monthly rent: 2 Bedroom: $130 plus utilities (1977 and 1978 data, Clark County)	Public Schools (Greater Clark County School System) 2 Elementary Schools (grades K through 5) 1978 enrollment: 982 1 Middle School (grades 6 through 8 and special education) 1978 enrollment: 502 1 Senior High School 1978 enrollment: 749 Private Schools 1 Elementary School (grades 1 through 8) 1978 enrollment: 80 (1977 and 1978 data)	Clark County Memorial Hospital, see Jeffersonville below. Doctors Total: 4 Doctor/population ratio: 1/1400 Dentists Total: 3 Ratio: 1/1867 (1978 data)	City park, 8 hectares (20 acres) Elks Country Club 2 Public playgrounds 1 Recreation center 2 Lighted little league ball parks 1 Lighted regulation ball park 1 Lighted softball park 3 All-weather tennis courts 1 Swimming pool 1 Township library (1977 data)	Electric Public Service Indiana Total generating capacity: 4219 MW Generating plants throughout P.S.I. are interconnected and can meet most demands. Supply: adequate Plans to add a coal fired unit and nuclear plant by 1984 will increase generating capacity by 889 MW. Heating Fuels Indiana Gas Company, Inc. Supply: adequate 3 Propane distributors Water Supply Charlestown Sewer and Water Department No data available Sewage Disposal Charlestown Sewer and Water Department Design capacity: 3.785×10^6 lpd (1.0×10^6 gpd) Present usage: 30 percent Solid Waste Municipal collection (1977 and 1978 data)
Clarksville, IN 85°47'W 38°17'N	1970: 13,806 1977 est.: 16,000 (1977 data)	Single-Family Units Average sale price: $18,000 to $125,000 Median sale price: $40,000 Multi-Family Units Average monthly rent: 1 Bedroom: $180 plus utilities 2 Bedroom: $215 plus utilities 3 Bedroom: $230 plus utilities For additional data on vacancy rates and number of units, see data for Clark County under Charlestown above. (1978 data)	Public Schools (Clarksville Independent School System) 2 Elementary Schools (grades K through 5) 1978 enrollment: 900 Enrollment capacity: 900 1 Middle School (grades 6 through 8) 1978 enrollment: 420 Enrollment capacity: 800 1 Senior High School 1978 enrollment: 698 Enrollment capacity: 900 In addition, the Greater Clark County Schools serve 725 local students. (1977 data) Private Schools 1 Elementary School (grades 1 through 8) 1978 enrollment: 458 1 Senior High School (grades 9 through 12) 1978 enrollment: 746 Enrollment capacity: 750 (1978 data)	Clark County Memorial Hospital, see Jeffersonville below. 2 Rest and nursing homes Mental health facility 50 beds 1 Retirement village with health facilities Doctors Total: 216 Doctor/population ratio: 1/74 Dentists Total: 22 Ratio: 1/727 (1977 and 1978 data)	8 Public parks, including 74-hectare (183-acre) Lapping Park 1 Nine-hole golf course 1 Public swimming pool Supervised summer activities by the Clarksville Parks and Recreation Board. (1977 data)	Electric Public Service Indiana, see listing under Charlestown above. Heating Fuels Indiana Gas Company, Inc. Supply: adequate Water Supply Indiana Cities Water Company Source: 12 wells Pumping capacity: 37.85×10^6 lpd (10×10^6 gpd) Average pumping rate: 30.28×10^6 lpd (8.0×10^6 gpd) Storage: 9.8×10^6 liters (2.6×10^6 gal) of well water in underground storage tanks. Clarksville and Jeffersonville share well facilities (served by same company); for additional well data see listing under Jeffersonville below. Sewage Disposal Clarksville Municipal Sewage 2 Treatment plants Treatment plants capacity (total): 7.9×10^6 lpd (2.1×10^6 gpd) Average daily flow: 6.1×10^6 liters (1.6×10^6 gal) Type of treatment: secondary Solid Waste Municipal collection (1978 data)
Corydon, IN 86°07'W 38°13'N	1970: 2719 1977: 3107 (1977 data)	Single-Family Units Average sale price: $29,000 to $40,000 Average monthly rent: $200 631 new house starts from 1975 to 1977. 662 new mobile homes from 1975 to 1977. Multi-Family Units Vacancy rate: < 1 percent Average monthly rent: 2 Bedroom: $200 plus utilities (1977 and 1978 data)	Public Schools (South Harrison Community School Corporation) Elizabeth Grade School (grades K through 4) 1978 enrollment: 275 Enrollment capacity: 250 2 Elementary Schools (grades K through 6) 1978 enrollment: 874 Enrollment capacity: 900 2 Grade Schools (grades K through 8) 1978 enrollment: 396 Enrollment capacity: 500 Corydon Junior High School (grades 6 through 8 plus special education) 1978 enrollment: 263 Enrollment capacity: 275 South Central Junior-Senior High (grades 7 through 12) 1978 enrollment: 416 Enrollment capacity: 400 Corydon Central High School (grades 9 through 12) 1978 enrollment: 753 Enrollment capacity: 550 Summit Street School (special education) 1978 enrollment: 8 Enrollment capacity: 15 Permit pending to approve 2 new high schools; will result in phasing out 3 outdated facilities and increase enrollment capacity by approximately 10 percent. Vocational training is included in the high school curriculum. Private Schools 1 Elementary School (grades 1 through 8) 1978 enrollment: 161	Harrison County Hospital 68 beds 3 beds ICU/CCU 2 Nursing homes Harrison County Public Health Service Doctors Total: 26 Doctor/population ratio: 1/120 Dentists Total: 5 Ratio: 1/621 (1978 data)	2 Picnic and playground areas 1 City swimming pool Rice Field (recreation area) Basketball courts Baseball diamonds Tennis courts, some lighted Corydon Country Club Golf course Swimming pool Numerous historic sites since Corydon was Indiana's first state capital. (1977 data)	Electric Harrison County Rural Electric Corporation Source of supply: Public Service Indiana See listing under Charlestown above. Heating Fuels Indiana Utilities Corporation Supply: adequate Liquid propane gas distributors available. Water Supply Municipal service Source: Big Indian Creek Treatment plant capacity: 3.785×10^6 lpd (1.0×10^6 gpd) Average daily flow: just under 3.785×10^6 liters (1.0×10^6 gal) Peak daily flow: just over 3.785×10^6 liters (1.0×10^6 gal) Storage capacity in two tanks: 1.89×10^6 liters (0.5×10^6 gal) Type of treatment: filtration Sewage Disposal Municipal sewage disposal plant Design capacity: 7.57×10^6 lpd (2.0×10^6 gpd) Average daily flow: 3.03×10^6 liters (0.8×10^6 gal) Type of treatment: secondary A 201 Facilities Plan recommends the upgrading of the treatment process to reduce the Biological Oxygen Demand. Solid Waste Municipal Sanitation Department: Sanitary landfill (1978 data)

NAME AND LOCATION	POPULATION	HOUSING AVAILABILITY	EDUCATIONAL FACILITIES	MEDICAL FACILITIES	RECREATIONAL FACILITIES	UTILITIES AND SERVICES
Corydon (Continued)			Colleges and Universities Selected courses offered by Indiana and Purdue Universities at Corydon Central High School. Extension courses are offered by Vincennes University. (1978 data)			
Elizabethtown, KY 86°52'W 37°42'N	1970: 11,748 1975: 14,152 (1977 data)	Single-Family Units Total occupied units: 15,799 Owner occupied units: 10,541 (1977 data, Hardin County) Average sale price: $30,000 to $200,000 Lack of homes in the $45,000 range; more substandard houses and high priced farms available. Average monthly rent: Houses: $250 to $400 Mobile homes: $100 to $175 and up Multi-Family Units Vacancy rate for all rentals <1 percent even though there has been an influx of new apartments Average monthly rent: 1 Bedroom: $150 to $200 plus utilities 2 Bedroom: $175 to $225 plus utilities 3 Bedroom: $225 to $350 plus utilities (1978 data)	Public Schools 3 Elementary Schools 1978 enrollment: 949 Enrollment capacity: 1050 1 Junior High School 1978 enrollment: 563 Enrollment capacity: 600 1 High School 1978 enrollment: 723 Enrollment capacity: 800 Private Schools 1 Elementary School 1976 enrollment: 157 Special Education 1976 enrollment: 50 Vocational Schools Elizabethtown State Vocational-Technical School Colleges and Universities Elizabethtown Community College 1975 enrollment: 1345 (1978 data)	Hardin Memorial Hospital 166 beds 8 beds psychiatric 1 bed ICU 1 bed CCU Plans for addition and modernization; will equal 191 beds and 15 psychiatric beds (1978 data) 3 Nursing homes 151 beds extended care 84 beds intermediate care 44 beds personal care (1976 data) 7 Renal dialysis stations in Hardin County to be licensed soon. (1978 data) Doctors Total: 68 Doctor/population ratio: 1/208 (1976 data) Dentists Total: 14 Ratio: 1/1011 (1978 data)	4 Public parks Freeman Lake Park, 32 hectares (80 acres) Picnic areas Playgrounds Shelter homes Boating Fishing University Park Tennis Volleyball Baseball Handball Softball Picnicking American Legion Park, 13 hectares (32 acres) 2 Swimming pools 1 Golf course Memorial Recreation Park Tennis Picnicking 1 Public 9-hole golf course 1 Semi-private golf club Swimming pool Tennis courts Hiking trails 1 Private country club Swimming pool 18-hole golf course Bowling facilities Indoor movie theater Outdoor movie theater (1978 data)	Electric Kentucky Utilities Company Total generating capacity: 1,615,500 kW Supply: adequate Plans to add two 510,000 kW units for completion 1981 and 1983. Heating Fuels Elizabethtown Gas Department Source of supply: Texas Gas Transmission Corporation Supply: inadequate 1 Propane and butane distributor 4 Distillate fuel oil distributors Water Supply City of Elizabethtown Water and Sewer Utilities Source: 2 wells, 2 springs, and Freeman Lake Treatment plant capacity: Plant No. 1, 9.46×10^6 lpd (2.5×10^6 gpd); Plant No. 2, 11.4×10^6 lpd (3.0×10^6 gpd) Average daily flow: 9.46×10^6 liters (2.5×10^6 gal) Peak daily flow: 13.25×10^6 liters (3.5×10^6 gal) Storage capacity: 8.96×10^6 liters (2.366×10^6 gal) Type of treatment: settling, flocculation, filtration, chlorination, fluoridation. Expected individual well yields: 189 to 757 lpm (50 to 200 gpm) Sewage Disposal City of Elizabethtown Water and Sewer Utilities 3 Treatment plants Design capacity: 9.84×10^6 lpd (2.6×10^6 gpd) Average daily flow: 5.68×10^6 liters (1.5×10^6 gal) Type of treatment: secondary; activated sludge, lagoon, trickling filter. Plans to build 2 new lagoons replacing outdated trickling filter plant; plans for another plant let spring 1979. Solid Waste Private collection County landfill (1978 data)
Hodgenville, KY 85°44'W 37°34'N	1970: 2562 1975: 2539 (1977 data)	Single-Family Units Total occupied units: 3697 Owner occupied units: 3033 (1977 data, Larue County) Average sale price: $10,000 to $70,000 Median sale price: $33,000 Multi-Family Units Vacancy rate: 0 percent (waiting lists) Average monthly rent: 2 Bedroom: $120 to $175 plus utilities (1978 data)	Public Schools 1 Kindergarten 1978 enrollment: 146 Enrollment capacity: 196 2 Elementary Schools 1978 enrollment: 979 Enrollment capacity: 1279 + 1 Middle School (grades 7 and 8) 1978 enrollment: 365 Enrollment capacity: 500 1 Senior High School 1978 enrollment: 866 Enrollment capacity: 866 Private Schools 1 Elementary School 1977 enrollment: 39 (1978 data)	Nearest hospital Hardin Memorial Hospital 18 km (11 mi), see Elizabethtown above. 1 Clinic, fully equipped with X-ray and laboratory services. Doctors Total: 5 Doctor/population ratio: 1/508 Dentists Total: 2 Ratio: 1/1270 (1977 data)	5 Playgrounds 1 Swimming pool 4 Tennis courts 2 Baseball diamonds 2 Softball fields 1 Community center 1 Nine-hole golf course 1 Country club Tourist attractions include the Abraham Lincoln Birthplace National Historical Site, Lincoln's Knob Creek Home, and the Lincoln Day Celebration. (1977 data)	Electric Kentucky Utilities Company Total generating capacity: 1,839,500 kW Supply: adequate Plans to add two 510,000 kW units for completion in 1981 and 1983. Heating Fuels Natural gas from Louisville Gas and Electric Company Source of supply: Texas Gas Transmission Corporation Supply: inadequate 3 Propane distributors 11 Distillate fuel oil distributors Water Supply Hodgenville Water Works Source: East Fork Nolin River and one lake Treatment plant capacity: 19.8×10^6 lpd (5.24×10^6 gpd) Average daily flow: 8.5×10^6 liters (2.25×10^6 gal) Peak daily flow: 10.4×10^6 liters (2.75×10^6 gal) Storage capacity: 30.28×10^6 liters (8.0×10^6 gal) Type of treatment: coagulation, settling, filtration, chlorination, fluoridation. Expected individual well yields: 189 to 757 lpm (50 to 200 gpm) Sewage Disposal Municipal sewage system Design capacity: 1.06×10^6 lpd (0.28×10^6 gpd) Average daily flow: at capacity Type of treatment: secondary; clarifier, drying beds. A 201 Facilities Plan has been completed and is being reviewed. Solid Waste Private collection Landfill (1978 data)

NAME AND LOCATION	POPULATION	HOUSING AVAILABILITY	EDUCATIONAL FACILITIES	MEDICAL FACILITIES	RECREATIONAL FACILITIES	UTILITIES AND SERVICES
Jeffersontown, KY 85°34'W 38°12'N	1970: 9701 1975: 11,150 (1977 data)	Single-Family Units Average sale price: $20,000 to $140,000 Median sale price: $45,000 Multi- Family Units Average monthly rent: 1 Bedroom: $185 to $225 plus utilities 2 Bedroom: $250 to $375 plus utilities For additional data on total housing units and vacancy rates see listing for Jefferson County under Louisville below. (1978 data)	Part of Jefferson County school system, see Louisville below.	Use Jefferson County facilities, see Louisville below.	Use Jefferson County facilities, see Louisville below.	Electric See listing under Louisville below. Heating Fuels See listing under Louisville below. Water Supply Treated water supplied by Louisville Water Company; Jeffersontown takes water from Louisville Water Company lines and separately pumps and stores this water. Average daily flow: 7.57×10^6 liters (2.0×10^6 gal) Storage capacity: 2.27×10^6 liters (0.6×10^6 gal) Sewage Disposal Jeffersontown Water Company Design capacity: 15.14×10^6 lpd (4.0×10^6 gpd) Average daily flow: 7.57×10^6 liters (2.0×10^6 gal) Type of treatment: secondary; activated sludge. Application pending November 1978 for expansion of plant to tertiary treatment. (1978 data)
Jeffersonville, IN 85°44'W 38°17'N (1977 data)	1970: 20,008 1977 est.: 23,700	Single-Family Units Average sale price: $35,000 Average monthly rent: $100 and up Multi-Family Units Average monthly rent: 1 Bedroom: $150 to $200 plus utilities 2 Bedroom: $175 to $225 plus utilities For additional data on total number of units and vacancy rates see listing for Clark County under Charlestown above. (1978 data)	Public Schools (Greater Clark County School System) 12 Elementary Schools (grades K through 6 plus special education) 1978 enrollment: 5440 2 Middle Schools (grades 7 and 8 plus special education) 1978 enrollment: 1389 1 Senior High School 1978 enrollment: 2942 1 Alternate school for special education 1978 enrollment: 150 Private Schools 1 Elementary School 1978 enrollment: 304 1 High School (no data) Vocational Schools Indiana Vocational Technical College (1978 data)	Clark County Memorial Hospital 232 beds 18 beds nursery 7 beds ICU Construction underway to be completed in 1980; 26 additional beds for new surgery and recovery suites. 5 Rest and nursing homes Mental health facility 50 beds Retirement home with health facilities Doctors Total: 216 Doctor/population ratio: 1/110 Dentists Total: 15 Ratio: 1/1580 (1978 data)	15 Public parks and playground/youth centers provide supervised activities; programs sponsored by the Jeffersonville Board of Parks and Recreation. Tennis facilities Elks Country Club (1977 data)	Electric Public Service Indiana, see listing under Charlestown above. Heating Fuels Indiana Gas Company, Inc. Supply: adequate 2 Propane distributors Water Supply Indiana Cities Water Company Source: 12 wells on 4 well fields; shared facilities with Clarksville with some pumped to New Albany. Pumping rates: average/capacity Babb Field (2 wells): 12.9×10^6 lpd (3.4×10^6 gpd)/ 13.2×10^6 lpd (3.5×10^6 gpd) Hertzsch Field (5 wells): 10.6×10^6 lpd (2.8×10^6 gpd)/ 12.1×10^6 lpd (3.2×10^6 gpd) Tenth Street (4 wells): 2.65×10^6 lpd (0.7×10^6 gpd)/ 4.54×10^6 lpd (1.2×10^6 gpd) Adtkins Field (1 well): 3.0×10^6 lpd (0.8×10^6 gpd)/ 3.785×10^6 lpd (1.0×10^6 gpd) Average pumping rate (total): 29.14×10^6 lpd (7.7×10^6 gpd) Pumping rate capacity (total): 33.69×10^6 lpd (8.9×10^6 gpd) Storage capacity: 9.84×10^6 liters (2.6×10^6 gal) of well water New wells have been dug at Hertzsch Field and Adtkins Field. Sewage Disposal Municipal Sewer Department Design capacity: 23.48×10^6 lpd (6.2×10^6 gpd) Average daily use: 9.46×10^6 liters (2.5×10^6 gal) Type of treatment: secondary. Solid Waste Municipal collection (1978 data)
Lebanon, KY 85°15'W 37°34'N	1970: 5528 1975: 5588 (1977 data)	Single-Family Units Total occupied units: 4556 Owner occupied units: 3443 (1977 data, Marion County) Number of rental homes: approximately 150 Vacancy rate: < 1 percent Average sale price (houses): $25,000 to $40,000 Multi-Family Units Average monthly rent: 2 Bedroom: $135 plus utilities (1978 data)	Public Schools 7 Elementary Schools (grades K through 6) 1978 enrollment: 1651 Enrollment capacity: 1800 2 Junior High Schools 1978 enrollment: 1103 Enrollment capacity: 1150 1 Senior High School 1978 enrollment: 975 Enrollment capacity: 1050 Private Schools 1 Elementary School 1978 enrollment: 533 Vocational Schools Marion County Area Vocational Education Center, with courses in business and office, health and personal services occupations, and industrial education. (1978 data)	Mary Immaculate Hospital 52 beds 1 Nursing home (in St. Catherine) 27 beds intermediate care 29 beds personal care Doctors Total: 24 Doctor/population ratio: 1/233 Dentists Total: 5 Ratio: 1/1118 (1978 data)	8 Tennis courts 1 Park 4 Playgrounds 1 Swimming pool 3 Baseball diamonds 2 Football fields 1 Civic center 1 Skating rink Sportsman's Lake Clubhouse Playground Fishing Picnicking Archery Lebanon Country Club (private) 9-hole golf course Swimming pool 2 Tennis courts (1978 data)	Electric Kentucky Utilities Company Total generating capacity: 2,238,400 kW Supply: adequate Plans to add two 510,000 kW units for completion in 1981 and 1983. Heating Fuels Natural gas from Western Kentucky Gas Company Source of supply: Tennessee Gas Pipeline Company Supply: adequate 5 Propane distributors (within 40 km or 25 mi) 10 Distillate fuel oil distributors (within 56 km or 35 mi) Water Supply Lebanon Water Works Company Source: Rolling Fork River Treatment plant capacity: 7.57×10^6 lpd (2.0×10^6 gpd) Average daily flow: 3.71×10^6 liters (0.98×10^6 gal) Peak daily flow: 4.54×10^6 liters (1.2×10^6 gal) Storage capacity: 5.12×10^6 liters (1.352×10^6 gal) Type of treatment: coagulation, sedimentation, filtration, chlorination, fluoridation.

NAME AND LOCATION	POPULATION	HOUSING AVAILABILITY	EDUCATIONAL FACILITIES	MEDICAL FACILITIES	RECREATIONAL FACILITIES	UTILITIES AND SERVICES
Lebanon (Continued)						Expected individual well yields: 19 lpm (5 gpm) or less Sewage Disposal City of Lebanon Sewer Department Design capacity: 3.785×10^6 lpd (1.0×10^6 gpd) Average daily flow: 2.65×10^6 to 2.84×10^6 liters (0.7×10^6 to 0.75×10^6 gal) Type of treatment: secondary; aeration, clarification, drying beds, grit chamber, polishing lagoons. A 201 Facilities Plan has been completed and approval by the EPA is pending. (1978 data)
Leitchfield, KY 86°18'W 37°29'N	1970: 2983 1975: 3894 (1977 data)	Single-Family Units Total occupied units: 4556 Owner occupied units: 3443 (1977 data, Marion County) Average sale price: $26,000 to $50,000 Median sale price: $35,000 Total rental units: approximately 100 Average monthly rent: $75 to $200 and up Median monthly rent: $135 Multi-Family Units Total units: 150 to 175 Vacancy rate: 0 percent Average monthly rent: 2 Bedroom: $175 and up plus utilities (1978 data)	Public Schools 3 Elementary Schools (grades K through 6) 1978 enrollment: 2076 Enrollment capacity: 2225 1 Middle School (grades 7 and 8) 1978 enrollment: 670 Enrollment capacity: 600 1 Senior High School (grades 9 through 12) 1978 enrollment: 1300 Enrollment capacity: 1500 1 Special Education School 1978 enrollment: 29 Enrollment capacity: 60 Private Schools 1 Elementary School 1978 enrollment: 128 Vocational Schools Grayson County Area Vocational Education Center, with courses in health and personal service occupations and industrial education. (1978 data)	Grayson County War Memorial Hospital 40 beds A new 75-bed hospital is under construction and scheduled for completion by March, 1979. 1 Comprehensive care center 2 Nursing homes 116 beds intermediate care 52 beds personal care Doctors Total: 12 Doctor/population ratio: 1/325 Dentists Total: 4 Ratio: 1/974 (1978 data)	Public 3 Parks 2 Playgrounds 2 Baseball diamonds 1 Municipal swimming pool Supervised summer recreation program including tennis and arts and crafts classes. As part of the program, the Grayson County Middle School gymnasium is opened to adults in the community for organized sports such as volleyball, badminton, floor tennis, and table tennis. Private 1 Movie theater 1 Drive-in theater 1 Lake and play fishing area 1 Nine-hole golf course available to residents on a membership basis. (1978 data)	Electric Kentucky Utilities Company Total generating capacity: 2,238,400 kW Supply: adequate Plans to add two 510,000 kW units for completion in 1981 and 1983. Warren Rural Electric Cooperative Corporation Source of supply: Tennessee Valley Authority Total generating capacity: 27,071,480 kW Supply: adequate Heating Fuels Natural gas from Leitchfield Utilities Source of supply: Texas Gas Transmission Corporation and private gas wells The city has contracted to purchase a minimum of 0.557×10^6 m^3 (6×10^6 ft^3) of natural gas per month from the owner of a private gas well in Shrewsbury, KY. Supply: adequate Water Supply Leitchfield Utilities Source: Rough River Reservoir Treatment plant capacity: 3.785×10^6 lpd (1.0×10^6 gpd) Average daily flow: 1.89×10^6 liters (0.5×10^6 gal) Peak daily flow: 3.03×10^6 liters (0.8×10^6 gal) Storage capacity: 2.9×10^6 liters (0.775×10 gal) Type of treatment: chemical and rapid sand filter. Expected individual well yields: 19 lpm (5 gpm) or less Sewage Disposal Leitchfield Utilities Design capacity: 1.14×10^6 lpd (0.3×10^6 gpd) Average daily flow: at capacity Type of treatment: secondary; trickling filter, digester, drying beds, primary and final settling tank. A 4.92×10^6 lpd (1.3×10^6 gpd) sewage treatment plant with secondary and partial tertiary treatment is being designed; construction is tentatively scheduled for late 1978. Solid Waste Municipal sanitary landfill (1978 data)
Louisville, KY 85°46'W 38°15'N	1970: 361,472 1975: 335,954 (1977 data)	Single-Family Units Total units: 181,685 Vacancy rate: 4.73 percent (1977 data, Jefferson County) Average sale price: $16,000 to $135,000 Median sale price: $36,000 Average monthly rent: $50 to $240 Vacancy rate (rentals): 4 percent Multi-Family Units Total units: 75,891 Vacancy rate: 4.73 percent (1977 data, Jefferson County) Average monthly rent: 1 Bedroom: $185 plus utilities 2 Bedroom: $225 plus utilities 3 Bedroom: $300 plus utilities (1977 and 1978 data)	Public Schools (Jefferson County) 103 Elementary Schools Percent utilization: 72.5 Enrollment capacity: 68,050 21 Middle Schools Percent utilization: 65.2 Enrollment capacity: 24,240 25 High Schools Percent utilization: 77.7 Enrollment capacity: 56,190 Jefferson Vocational Education Center Private Schools (Jefferson County) 87 elementary schools and 27 middle and senior high schools serve the Jefferson County area; these schools had a 1977 total enrollment of 33,198. Special Education (Jefferson County) 13 Special Education Schools 1978 enrollment: 498 Includes Kentucky School for the Blind, Louisville School for Autistic Children.	Jewish Hospital 441 beds 24 beds ICU/CCU Plans for construction; bed complement will remain same. Highlands Baptist Hospital 197 beds 60 beds psychiatric 4 beds ICU 5 beds CCU Plans for construction; bed complement will remain same. King's Daughters Hospital 76 beds 4 beds ICU/CCU Louisville General Hospital 309 beds 36 beds psychiatric 25 beds special purpose tuberculosis 20 beds ICU 6 beds CCU Methodist Evangelical Hospital 364 beds	Louisville and Jefferson County have 35 major parks and more than 100 smaller parks and playgrounds, covering approximately 2833 hectares (7000 acres). 239 Playgrounds 11 Swimming pools 9 Golf courses 145 Tennis courts 124 Baseball diamonds 31 Football fields 20 Lakes in 9 parks, totaling 66 hectares (163 acres) of water, are stocked with fish. 15 Community buildings 6 Bicycle trails 31 Hockey fields Numerous picnic facilities, tot lots, ice skating rinks, bridal paths, hiking trails, archery courses, squash, lawn bowling, cricket, and soccer. 2 Sports centers Kentucky Fair and Exposition Center (Kentucky State Fair) Downtown Convention Center Professional sports	Electric Louisville Gas and Electric Total generating capacity: 2369 MW hydroelectric and gas turbines Supply: adequate, reserves of approximately 20 percent. Plans to add another 425 MW generating plant by 1980. Heating Fuels Louisville Gas and Electric Company Source of supply: Texas Gas Transmission Corporation Supply: inadequate, 28 percent curtailment since 1973. No new customers are being taken and there are some customers with interrupted contracts. 19 Propane dealers serve the Louisville-Jefferson County area. Water Supply Louisville Water Company Source: Ohio River Treatment plant capacity: 1135.5×10^6 lpd (300×10^6 gpd) Average daily flow: 510.975×10^6 liters (135×10^6 gal) Peak daily flow: 651.02×10^6 liters (172×10^6 gal)

B. URBAN AREAS (Continued)

NAME AND LOCATION	POPULATION	HOUSING AVAILABILITY	EDUCATIONAL FACILITIES	MEDICAL FACILITIES	RECREATIONAL FACILITIES	UTILITIES AND SERVICES
Louisville (Continued)			Montessori Schools, and schools for the perceptually handicapped and emotionally disturbed. Colleges and Universities 12 Colleges and Universities in Jefferson County University of Louisville Bellarmine College Spalding College Jefferson Community College Louisville Presbyterian Theological Seminary Southern Baptist Theological Seminary Louisville Bible College College of Scriptures Simmons University Sullivan Junior College of Business Watterson College Spencerian (Business) College (1978 data)	Norton's Children's Hospital 465 beds 36 beds psychiatric St. Anthony Hospital 374 beds Plans to construct 6 room surgical facility. St. Joseph Infirmary 509 beds 8 beds ICU 8 beds CCU Plans to relocate and replace 509 bed facility with a new 484 bed facility on Poplar Level Road. SS. Mary and Elizabeth Hospital 331 beds 10 beds ICU 8 beds CCU Southwest Jefferson Community Hospital 150 beds Suburban Hospital 380 beds 8 beds ICU 8 beds CCU (1977 data) 3 Psychiatric hospitals Central State: 678 beds Our Lady of Peace: 314 beds Pleasant Grove: 69 beds Other hospitals Rehabilitation Center: 34 beds Veterans Administration: 444 beds 60 Long term care centers (nursing homes) in Jefferson County 1447 beds intermediate care 1545 beds personal care Louisville-Jefferson County Department of Health 5 full-time and 4 part-time health centers Environmental Health Services Doctors (Jefferson County) Total: 1322 Doctor/population ratio: 1/527[5] Dentists (Jefferson County) Total: 353 Ratio: 1/1974[5] (1978 data)	Horse racing Churchill Downs (Kentucky Derby) Miles Park Louisville Downs Belle of Louisville, paddlewheeler, tours the Ohio River J.B. Special Art Museum Louisville Orchestra Louisville and Jefferson County Youth Orchestra Kentucky Opera Association Actors Theatre of Louisville Carriage House Players Filson Club Tourist attractions in the area include Mammoth Caves National Park, KY, Hoosier National Forest, IN, and Nolin River Lake, KY. (1977 data)	Storage capacity: 262.62×10^6 liters (69.385×10^6 gal) total; 96.7×10^6 liters (25.55×10^6 gal) filtered water, 165.9×10^6 liters (43.835×10^6 gal) raw water in storage tanks. Type of treatment: sedimentation, coagulation, lime soda ash softening, dual media filtering. Plans to increase storage capacity by 9.46×10^6 liters (2.5×10^6 gal) within 5 years. Sewage Disposal Louisville and Jefferson County Metropolitan Sewer District (MSD) The MSD operates 9 treatment plant facilities in Jefferson County. In addition, approximately 365 "package" plants serve small subdivisions and industry. Design capacity: 408.2×10^6 lpd (107.846×10^6 gpd) Average daily flow: 380×10^6 lpd (100.4×10^6 gpd) Type of treatment: mostly secondary, some tertiary; facilities differ in type of treatment, but involve sedimentation, aeration, aerobic digestion, chlorination, air flotation thickening, and heat treatment. Plans are being implemented to increase Hite Creek Plant from 8.327×10^6 lpd (2.2×10^6 gpd) to 16.65×10^6 lpd (4.4×10^6 gpd) in approximately 1.5 years. The 201 Facilities Plan calls for the creation of 2 new plants, the first to be implemented within 5 to 7 years. One plant will have a design capacity of 170.325×10^6 lpd (45×10 gpd), the other 94.625×10^6 lpd (25×10^6 gpd). Solid Waste The Louisville Sanitation Department, Division of Waste Collection Municipal collection provided twice weekly. Incinerator (1978 data)
New Albany, IN 85°49'W 38°18'N	1970: 38,402 1977 est.: 40,800 1980 projection: 42,712 (1977 data)	Single-Family Units Total owner units: 10,171 Vacant units: 34 Vacancy rate: < 1 percent Total rental units: 4707 Vacant units: 62 Vacancy rate: 1 to 2 percent Average sale price: $27,000 to $75,000 Average monthly rent: $300 Multi-Family Units Total units (Floyd County): 3783 Average monthly rent: 2 Bedroom: $225 plus utilities (1977 and 1978 data)	Public Schools (New Albany-Floyd County Consolidated School Corporation) 16 Elementary Schools 1978 enrollment: 6299 Enrollment capacity: 7131 4 Secondary Schools 1978 enrollment: 5927 Enrollment capacity: 6350 Charles Allen Prosser Vocational Center 1978 enrollment: 1352 Enrollment capacity: 600 Private Schools 2 Elementary Schools (grades K through 8) 1978 enrollment: 621 Colleges and Universities Indiana University Southeast (1978 data)	Floyd County Memorial Hospital 260 beds 1 ICU/CCU 3 Nursing homes 1 Retirement home Silvercrest Children's Development Center Doctors Total: 46 Doctor/population ratio: 1/887 Dentists Total: 25 Ratio: 1/1632 (1978 data)	Public 16 Parks, approximately 183 hectares (453 acres) Fishing lakes, 5.7 hectares (14 acres) 11 Baseball diamonds 13 Basketball goals 1 Eighteen-hole golf course 1 Nine-hole par-3 golf course 16 Horseshoe pits 7 Shuffleboards 2 Swimming pools, 5197 m^2 (55,935 ft^2) 19 Tennis courts 2 Volleyball courts Private 2 Swimming clubs Skyline Tennis Club New Albany Country Club 1 Nine-hole golf course Private pool (1978 data)	Electric Public Service Indiana, see listing under Charlestown above. Heating Fuels Indiana Gas Company, Inc. Supply: adequate 1 Propane distributor Water Supply Indiana Cities Water Company Source: Ohio River and wells in Jeffersonville. Treatment plant capacity; 31.79×10^6 lpd (8.4×10^6 gpd) Average daily flow: 13.25×10^6 liters (3.5×10^6 gal) Storage capacity: 5.68×10^6 liter (1.5×10^6 gal) treated water reservoir, 4.92×10^6 liters (1.3×10^6 gal) in storage tanks, 90.84×10^6 liter (24×10^6 gal) raw water reservoir. In addition, New Albany pumps 7.57×10^6 lpd (2.0×10^6 gpd) from wells in Jeffersonville; see listing under Clarksville above. Sewage Disposal Municipal treatment plant Design capacity: 47.31×10^6 lpd (12.5×10^6 gpd) Average daily flow: 22.71×10^6 liters (6.0×10^6 gal) Type of treatment: secondary. Solid Waste Municipal collection (1978 data)

B. URBAN AREAS (Continued)

NAME AND LOCATION	POPULATION	HOUSING AVAILABILITY	EDUCATIONAL FACILITIES	MEDICAL FACILITIES	RECREATIONAL FACILITIES	UTILITIES AND SERVICES
Okolona, KY 85°41'W 38°08'N	1970: 17,643 (1977 data)	Single-Family Units Average sale price: $18,000 to $45,000 Median sale price: $27,000 Average monthly rent: 3 Bedroom: $250 to $350 Multi-Family Units Average monthly rent: 1 Bedroom: $165 plus utilities 2 Bedroom: $195 plus utilities 3 Bedroom: $225 plus utilities For additional data on total number of units and vacancy rates see listing for Jefferson County under Louisville above. (1978 data)	Part of Jefferson County school system, see Louisville above.	Use Jefferson County facilities, see Louisville above.	Use Jefferson County facilities, see Louisville above.	Electric See listing under Louisville above. Heating Fuels See listing under Louisville above. Sewage Disposal Okolona Sewer Construction District Design capacity: 9.84×10^6 lpd (2.6×10^6 gpd) Average daily flow: 8.33×10^6 liters (2.2×10^6 gal) Type of treatment: secondary; Chicago Pump extended aeration plant and aeration lagoon. As recommended in the 201 Facilities Plan for Jefferson County, the Okolona treatment facilities will be abandoned and wastewater will be treated at a proposed new Metropolitan Sewer District plant (next 2 to 3 years). Solid Waste See listing under Louisville above. (1978 data)
Pleasure Ridge Park, KY (unincorporated) 85°51'W 38°08'N	1970: 28,566 (1977 data)	Single-Family Units Average sale price: $18,000 to $55,000 Median sale price: $35,000 Average monthly rent: 1 Bedroom: $175 2 to 3 Bedroom: $220 to $350 Multi-Family Units Average monthly rent: 1 Bedroom: $170 plus utilities 2 Bedroom: $200 plus utilities 3 Bedroom: $230 plus utilities Vacancy rate: <1 percent For additional data on total number of units and vacancy rates see listing for Jefferson County under Louisville above.	Part of Jefferson County school system, see Louisville above.	Use Jefferson County facilities, see Louisville above.	Use Jefferson County facilities, see Louisville above.	Electric See listing under Louisville above. Heating Fuels See listing under Louisville above. Water Supply See listing under Louisville above. Sewage Disposal Part served by Metropolitan Sewer District; see listing under Louisville above. The majority of Pleasure Ridge Park is served with septic tanks (prior to 1972), while new developments are served by small "package" plants. The 201 Facilities Plan for Jefferson County recommends that these small non-point pollution sources be phased out. Solid Waste See listing under Louisville above. (1978 data)
Radcliff, KY 85°57'W 37°51'N	1970: 7881 1975: 11,890 (1977 data)	Single-Family Units Total units (Hardin County): 15,799 Owner occupied units: 10,541 Average sale price: $35,000 and up Average monthly rent: Houses: $270 to $350 Mobile homes: $100 to $175 and up Many new houses presently being constructed. Multi-Family Units Vacancy rate: <1 percent Average monthly rent: 1 Bedroom: $150 to $200 plus utilities 2 Bedroom: $175 to $225 plus utilities 3 Bedroom: $225 to $350 plus utilities (1978 data)	Public Schools 1 Elementary School 1978 enrollment: 1070 Enrollment capacity: 960 1 Junior High School 1978 enrollment: 694 Enrollment capacity: 660 1 Senior High School 1978 enrollment: 1327 Enrollment capacity: 1400 Private Schools (Hardin County) Elementary Schools 1976 enrollment: 2894 Junior High Schools 1976 enrollment: 961 High Schools 1976 enrollment: 741 (1976 and 1978 data)	Hardin Memorial Hospital, see Elizabethtown above. North Hardin County Comprehensive Care Center Nursing homes (Hardin County) 3 Extended care: 151 beds 2 Intermediate care: 84 beds 2 Personal care: 44 beds (1978 data)	3 Baseball diamonds 2 Tennis courts plus public use tennis courts at the high school City park Drive-in theater Bowling facility Skating rink Hardin County Playhouse A new recreation building is under construction which will feature 2 swimming pools and various club and organizational meeting rooms, including a senior citizens program. (1976 data)	Electric Kentucky Utilities Company Total generating capacity: 1,615,000 kW Plans to add two 510,000 kW units for completion in 1981 and 1983. East Kentucky Power Cooperative Source of power: Nolin Rural Electric Cooperative Corporation Total generating capacity: 496,000 kW Supply: adequate Heating Fuels Natural gas from Louisville Gas and Electric Company Source of supply: Texas Gas Transmission Corporation Supply: adequate 2 Propane and butane distributors Distillate fuel oil available through Elizabethtown. Water Supply Hardin County Water District No. 1 Source: wells along the Ohio River and spring-fed impoundments. Treatment plant capacities: Sanders Spring Plant: 4.54×10^6 lpd (1.2×10 gpd) Muldraugh Plant: 15.14×10^6 lpd (4.0×10^6 gpd) Average daily flow: 7.57×10^6 liters (2.0×10^6 gal) Peak daily flow: 8.327×10^6 liters (2.2×10^6 gal) Type of treatment: complete, consisting of aeration, prechlorination, coagulation, sedimentation, filtration, taste and odor, fluoride adjustment, disinfection. Expected individual well yields: 19 to 757 lpm (5 to 200 gpm) Sewage Disposal City of Radcliff Sewerage System 2 Treatment plants Design capacity: 5.68×10^6 lpd (1.5×10^6 gpd) Average daily flow: 3.785×10^6 liters (1.0×10^6 gpd) Type of treatment: secondary and tertiary; aeration, contact stabilization, clarification, two lagoons, one for further aeration and the second for final clarification and scrubbing, chlorination. Plans to increase the design capacity to 9.5×10^6 lpd (2.5×10^6 gpd) Solid Waste Private collection County landfill (1977 and 1978 data)

NAME AND LOCATION	POPULATION	HOUSING AVAILABILITY	EDUCATIONAL FACILITIES	MEDICAL FACILITIES	RECREATIONAL FACILITIES	UTILITIES AND SERVICES
St. Matthews, KY 85°39'W 38°15'N	1970: 13,152 1975: 12,276 (1977 data)	Single-Family Units Average sale price: $25,000 to $200,000 Median sale price: $50,000 Average monthly rent: 3 Bedroom: $275 to $420 Multi-Family Units None available in St. Matthews. For additional data on total number of houses and vacancy rates see listing for Jefferson County under Louisville above. (1978 data)	Part of Jefferson County school system, see Louisville above.	Use Jefferson County facilities, see Louisville above.	Use Jefferson County facilities, see Louisville above.	Electric See listing under Louisville above. Heating Fuels See listing under Louisville above. Water Supply See listing under Louisville above. Sewage Disposal Part served by Metropolitan Sewer District, see listing under Louisville above. Many areas served by septic tanks (prior to 1972) while new developments are served by small "package" plants. The 201 Facilities Plan for Jefferson County recommends that these small non-point pollution sources be phased out. Solid Waste See listing under Lousiville above. (1978 data)
Salem, IN 86°06'W 38°36'N	1970: 5041 1975: 5302 (1977 data)	Single-Family Units Average sale price: $10,000 to $80,000 Median sale price: $30,000 New subdivision started; 6 new homes: approximately $30,000 Multi-Family Units Vacancy rates: 0 percent (waiting lists) Average monthly rent: $125 to $200 plus utilities 2 Bedroom: $150 plus utilities (1978 data)	Public Schools 1 Elementary School (grades K through 5) 1978 enrollment: 1052 Enrollment capacity: 1052 1 Junior High School (grades 6 through 8) 1978 enrollment: 515 Enrollment capacity: 515 1 Senior High School 1978 enrollment: 721 Enrollment capacity: 721 Vocational training is included in the high school curriculum. Hopewell School for mentally retarded children. (1978 data)	Washington County Memorial Hospital 74 beds 3 beds ICU/CCU Williams Convalescent Center 121 beds Doctors Total: 64 Doctor/population ratio: 1/83 Dentists Total: 4 Ratio: 1/1326 (1978 data)	Salem's park system includes two community parks, one with regulation size swimming pool. The city also owns two lakes, the larger of which is 121 hectares (300 acres); boating and fishing are permitted on each. Western Hills Golf Club Salem Super Speedway, half-mile high-banked track has USAC sanctioned races. (1978 data)	Electric Public Service Indiana, see listing under Charlestown above. Heating Fuels Midwest Gas Corporation Supply: adequate 2 Propane distibutors Water Supply Salem Sewage and Water Company Source: 2 impounding reservoirs 2 Treatment plants Average daily flow: 6.1×10^6 liters (1.6×10^6 gal) Peak daily flow: 7.57×10^6 liters (2.0×10^6 gal) Storage capacity: 2 elevated tanks, 0.58×10^6 and 1.9×10^6 liters (0.15×10^6 and 0.5×10^6 gal); 1 underground storage facility, 3.785×10^6 liters (1.0×10^6 gal) Plans to update South Plant pumping capacity back up to its designed 3.785×10^6 lpd (1.0×10^6 gpd). Salem facilities also supply water to two nearby communities. Sewage Disposal Salem Sewage and Water Company Design capacity: 3.4×10^6 lpd (0.9×10^6 gpd) Average daily flow: 2.65×10^6 liters (0.7×10^6 gal) Type of treatment: tertiary; activated sludge. Solid Waste Municipal collection (1978 data)
Sellersburg, IN 85°45'W 38°24'N	1970: 3177 1977 est.: 3500 (1977 data)	Single-Family Units Average sale price: $30,000 to $40,000 No rentals available. Three subdivisions presently under construction. Multi-Family Units 3 Apartment complexes Vacancy rate: < 1 percent Average monthly rent: 1 Bedroom: $175 plus utilities 2 Bedroom: $225 plus utilities For additional data on total housing units and vacancy rates see listing for Clark County under Charlestown above. (1978 data)	Public Schools 4 Elementary Schools (grades K through 6, including special education) 1978 enrollment: 2076 Enrollment capacity: 2120 1 Middle School (grades 7 and 8) 1978 enrollment: 653 Enrollment capacity: 740 1 Senior High School (grades 9 through 12) 1978 enrollment: 1352 Enrollment capacity: 1375 Private Schools 1 Elementary School (grades 1 through 6) 1978 enrollment: 126 Indiana Vocational Technical College (1978 data)	Clark County Memorial Hospital, see Jeffersonville above. Doctors Total: 4 Doctor/population ratio: 1/875 Dentists Total: 1 Ratio: 1/3500 (1978 data)	1 Swimming pool Country Club with 9-hole golf course Little League Association Clark County State Forest and Deam Lake nearby. (1977 data)	Electric Public Service Indiana, see listing under Charlestown above. Heating Fuels Indiana Gas Company Supply: adequate 2 Propane distributors Water Supply Sellersburg Municipal Water Department Source: 3 deep wells Pumping station capacity: 7.57×10^6 lpd (2.0×10^6 gpd) Average daily flow: 5.3×10^6 liters (1.4×10^6 gal) Peak daily flow: 7.0×10^6 liters (1.85×10^6 gal) Storage capacity (2 tanks): 1 standing, 1.9×10^6 liters (0.5×10^6 gal); 1 elevated, 2.84×10^6 liters (0.75×10^6 gal) An availability study is being done for the use of an additional well on the Army Ammunition Dump nearby. Sewage Disposal Sellersburg Municipal Water Department Design capacity: 2.65×10^6 lpd (0.7×10^6 gpd) Average daily flow: at capacity Type of treatment: secondary. Solid Waste Municipal collection (1978 data)

B. URBAN AREAS (Continued)

NAME AND LOCATION	POPULATION	HOUSING AVAILABILITY	EDUCATIONAL FACILITIES	MEDICAL FACILITIES	RECREATIONAL FACILITIES	UTILITIES AND SERVICES
Shelbyville, KY 85°14'W 38°13'N	1970: 4182 1975: 4176 (1977 data)	Single-Family Units Total units: 6641 Vacancy rate: 6.5 percent Average sale price: $30,000 to $60,000 Median sale price: $48,000 Multi-Family Units Total units: 1008 Vacancy rate: 4 percent Average monthly rent: 1 Bedroom: $150 to $200 plus utilities 2 Bedroom: $200 to $225 plus utilities (1978 data, Shelby County) (1977 and 1978 data)	Public Schools 6 Elementary Schools (grades 1 through 5) 1978 enrollment: 1871 Enrollment capacity: 1970 2 Middle Schools (grades 6 through 8) 1978 enrollment: 1177 Enrollment capacity: 1240 1 Senior High School (grades 9 through 12) 1978 enrollment: 1586 Enrollment capacity: 1586 In addition there are 2 kindergarten classes with a 1978 enrollment of 85. Vocational Schools Shelby County Area Vocational Education Center. Courses offered in business and office and industrial education. (1978 data)	King's Daughter's Hospital 76 beds 6 beds ICU/CCU Shelby County Health Department, public health services. Doctors Total: 20 Doctor/population ratio: 1/209 Dentists Total: 8 Ratio: 1/522 (1978 data)	9 Baseball diamonds 5 Parks 3 Playgrounds 1 Swimming pool 9 Tennis courts 1 Country Club 1 Eighteen-hole golf course Swimming pool Tennis courts Clubhouse Guist Creek Lake, 132-hectare (325-acre) skiing and fishing lake. Wakefield-Searce Galleries A 53-hectare (132-acre) county park is under construction on Lake Shelby, a 40-hectare (100-acre) fishing lake. Plans for 8 baseball diamonds, an amphitheater, par-3 golf course, riding stables, tennis courts, swimming pool, golf driving range, boat launching ramp, and picnic areas. (1977 data)	Electric Kentucky Utilities Company Total generating capacity: 1,839,000 kW Supply: adequate Plans to add two 510,000 kW units for completion in 1981 and 1983. Heating Fuels Natural gas from Western Kentucky Gas Company Source of supply: Texas Gas Transmission Corporation Supply: adequate 2 Propane distributors 7 Distillate fuel oil distributors Water Supply Shelbyville Municipal Water and Sewer Commission Source: Guist Creek Lake Treatment plant capacity: 11.4×10^6 lpd (3.0×10^6 gpd) Average daily flow: 7.57×10^6 liters (2.0×10^6 gal) Peak daily flow: 9.46×10^6 liters (2.5×10^6 gal) Storage capacity: 3.785×10^6 liters (1.0×10^6 gal) Type of treatment: sedimentation, filtration, aeration, fluoridation, chlorination. Sewage Disposal Shelbyville Municipal Water and Sewer Commission Design capacity: 5.0×10^6 lpd (1.32×10^6 gpd) Average daily flow: 1.89×10^6 liters (0.5×10^6 gal) Type of treatment: secondary; primary clarifiers, trickling filter, secondary clarifiers, chlorine contact basin, heated primary digester, cold secondary digester, and drying beds. A 201 Facilities Plan has been completed and submitted to EPA for approval. Solid Waste Private collection Landfill (1978 data)
Shively, KY 85°48'W 38°12'N	1970: 19,223 1975: 19,018 (1977 data)	Single-Family Units Average sale price: $16,000 to $70,000 Median sale price: $34,000 Multi-Family Units Average monthly rent: 1 Bedroom: $150 plus utilities 2 Bedroom: $175 plus utilities For additional data on total number of units and vacancy rates see listing for Jefferson County under Louisville above. (1978 data)	Part of Jefferson County school system, see Louisville above.	Use Jefferson County facilities, see Louisville above.	Use Jefferson County facilities, see Louisville above.	Use Jefferson County facilities, see Louisville above.
Shepherdsville, KY 85°43'W 37°59'N	1970: 2769 1975: 3308 (1977 data)	Single-Family Units Total units: 842 Vacancy rate: 6.1 percent Average sale price: $13,000 to $80,000 Median sale price: $35,000 Average monthly rent: $250 to $400 Multi-Family Units Total units: 81 Vacancy rate: <1 percent Average monthly rent (unfurnished): 1 Bedroom: $150 to $200 plus utilities 2 Bedroom: $175 to $225 plus utilities 3 Bedroom: $225 to $350 plus utilities (1977 and 1978 data)	Public Schools (Bullitt County Schools) 1 Elementary School (grades 1 through 7) 1978 enrollment: 756 Enrollment capacity: at capacity 1 Junior High School (grades 7 through 9) 1978 enrollment: 951 Enrollment capacity: at capacity 1 Senior High School (grades 9 through 12) 1978 enrollment: 1736 Enrollment capacity: at capacity (1978 data)	2 Nursing homes 78 beds personal care Bullitt County Health Center Doctors Total: 3 Doctor/population ratio: 1/1103 Dentists Total: 2 Ratio: 1/1654 (1978 data)	1 Park 1 Playground 2 Golf courses 3 Baseball diamonds 1 Football field Supervised programs during summer and fall. (1977 data)	Electric Louisville Gas and Electric Company Total generating capacity: 1,509,000 kW Supply: adequate Heating Fuels Natural gas from Louisville Gas and Electric Company Source of supply: Texas Gas Transmission Corporation Supply: inadequate 6 Propane distributors 4 Distillate fuel oil distributors Water Supply Shepherdsville Water Works Source: Salt River Treatment plant capacity: 2.44×10^6 lpd (0.644×10^6 gpd) Average daily flow: 1.02×10^6 liters (0.27×10^6 gal) Peak daily flow: 1.17×10^6 liters (0.31×10^6 gal) Storage capacity: 0.57×10^6 liters (0.15×10^6 gal) Type of treatment: filtration, alum, lime, soda ash, chlorination. Sewage Disposal Shepherdsville Sewer Works Design capacity: 1.14×10^6 lpd (0.3×10^6 gpd) Average daily flow: 0.68×10^6 liters (0.18×10^6 gal) Type of treatment: secondary. Solid Waste Private collection Landfill (1977 to 1978 data)

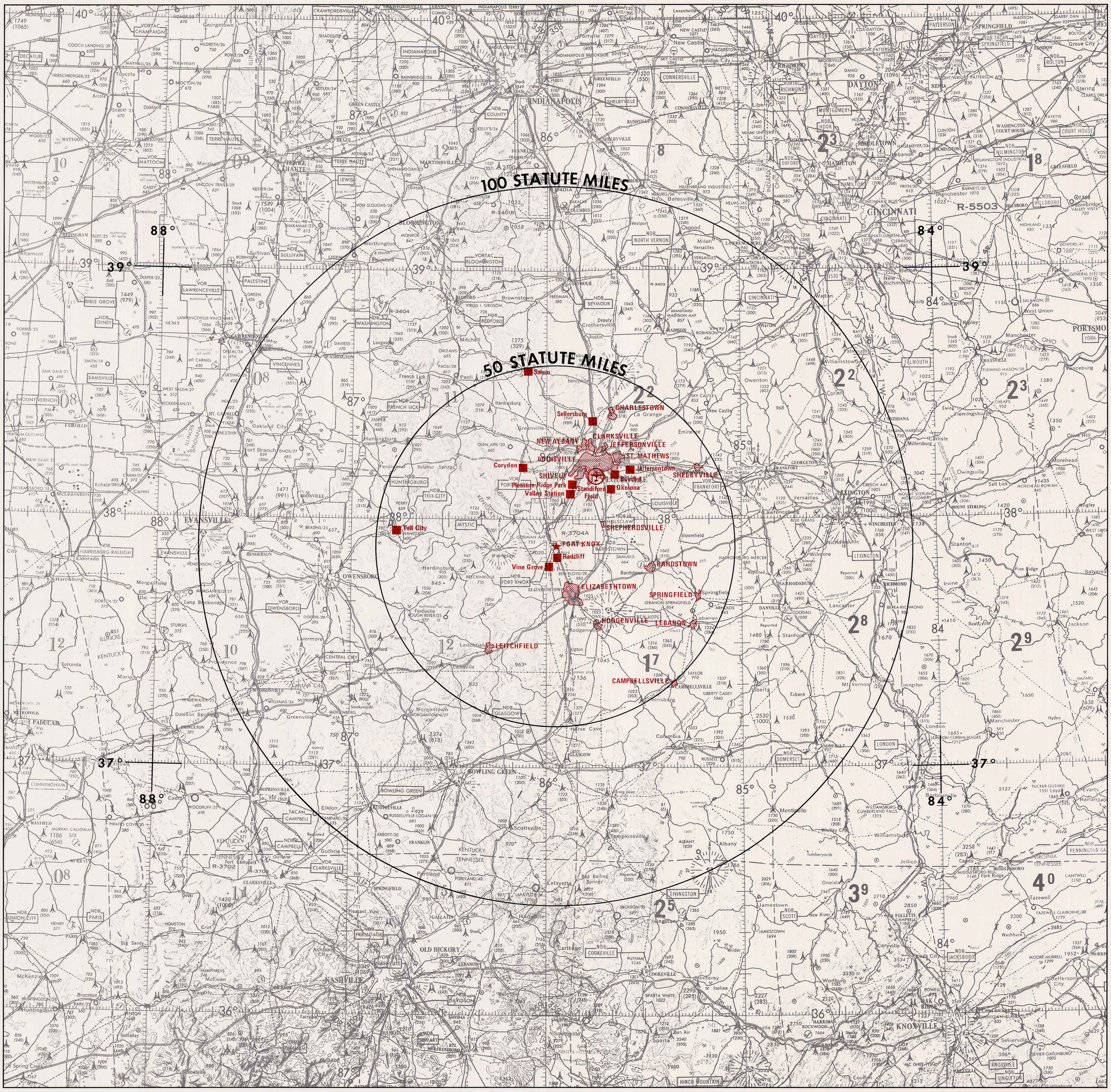
NAME AND LOCATION	POPULATION	HOUSING AVAILABILITY	EDUCATIONAL FACILITIES	MEDICAL FACILITIES	RECREATIONAL FACILITIES	UTILITIES AND SERVICES
Springfield, KY 85°13'W 37°41'N	1970: 2961 1975: 2780 (1977 data)	Single-Family Units Total occupied units: 3078 Owner occupied units: 2322 Average sale price: $32,000 Multi-Family Units Average monthly rent: 1 Bedroom: $150 plus utilities 2 Bedroom: $180 plus utilities (1978 data)	Public Schools 2 Elementary Schools (grades 1 through 8) 1978 enrollment: 1395 Enrollment capacity: 1375 1 Middle School (grades 7 and 8) 1978 enrollment: 212 Enrollment capacity: 300 1 Senior High School (grades 9 through 12) 1978 enrollment: 820 Enrollment capacity: 950 The school system also offers kindergarten and special education. Private Schools 1 Elementary School (grades 1 through 8) 1978 enrollment: 260 Enrollment capacity: 260 (1976 and 1978 data)	Mary Immaculate Hospital, see Lebanon above. 1 Nursing home 70 beds intermediate care Washington County Health Department, public health services. Doctors Total: 4 Doctor/population ratio: 1/695 Dentists Total: 4 Ratio: 1/695 (1978 data)	2 Parks 3 Playgrounds 1 Swimming pool 4 Tennis courts 3 Baseball diamonds 2 Football fields 1 Country Club 1 Drive-in theater 8.1-hectare (20-acre) city park under construction. Park will have baseball and softball diamonds, basketball and tennis courts, concession stands, and a picnic area. St. Catherine Junior College, 4.8 km (3 mi) from Springfield, offers plays, art exhibits, lectures, concerts, and a historical museum. Lincoln Homestead State Shrine, 8 km (5 mi) north. (1976 data)	Electric Kentucky Utilities Company Total generating capacity: 1,615,500 kW Supply: adequate Plans to add two 510,000 kW units for completion in 1981 and 1983. Heating Fuels Natural gas from Western Kentucky Gas Company Source of supply: Tennessee Gas Transmission Company Supply: inadequate 5 Propane distributors (within 32 km or 20 mi) 7 Distillate fuel oil distributors (within 32 km or 20 mi) Water Supply Springfield Water and Sewer Commission Source: 2 lakes Treatment plant capacity: 3.785×10^6 lpd (1.0×10^6 gpd) Average daily flow: 1.33×10^6 liters (0.35×10^6 gal) Peak daily flow: 1.7×10^6 liters (0.45×10^6 gal) Storage capacity: 2.65×10^6 liters (0.70×10^6 gal) Type of treatment: settled and sand filtered. Expected individual well yields: 19 lpm (5 gpm) or less Sewage Disposal Springfield Water and Sewer Company Design capacity: 2.4×10^6 lpd (0.64×10^6 gpd) Average daily flow: 1.77×10^6 liters (0.467×10^6 gal) Type of treatment: secondary; aeration, clarifier, drying beds. A 201 Facilities Plan, which recommends increasing the sewage treatment capacity to 3.785×10^6 lpd (1.0×10^6 gpd), has been submitted to EPA. Solid Waste Municipal collection Sanitary landfill (1978 data)
Tell City, IN 86°46'W 37°57'N	1970: 7827 1975: 8485 (1977 data)	Single-Family Units 300 lots being developed. No rental homes available. Average sale price: $30,000 to $75,000 Multi-Family Units Very few apartments available. Vacancy rate: < 1 percent Average monthly rent: 1 Bedroom: $175 plus utilities 2 Bedroom: $200 plus utilities (1978 data)	Public Schools 4 Elementary Schools (grades K through 8) 1978 enrollment: 1726 1 Senior High School (grades 9 through 12) 1978 enrollment: 942 Special Education 1978 enrollment: 35 Vocational classes are available at the high school through Ivy-Tech with minimum of 10 per class. (1978 data)	Perry County Memorial Hospital 98 beds 4 beds ICU/CCU 1 Convalescent center 173 beds Doctors Total: 7 Doctor/population ratio: 1/1212 Dentists Total: 7 Ratio: 1/1212 (1978 data)	John F. Kennedy Memorial Swimming Pool Hoosier Heights Country Club 1 Nine-hole golf course Tennis courts Softball fields Basketball courts Horseshoe pits Playgrounds Little League, Pony League, and semi-pro baseball diamonds Tell City Yacht Club Marina Tell City's annual Schweizer Fest (1977 data)	Electric Tell City Electric Department Source of supply: Southern Indiana Gas and Electric Company Total generating capacity: 750,000 kW Supply: adequate A coal fired plant, scheduled to open in early 1979, will add 250,000 kW to the total generating capacity. Another 250,000 kW unit is planned for completion in 1985 or 1986. Heating Fuels Ohio Valley Gas Corporation Supply: adequate Water Supply Tell City Water Department Source: wells Pumping capacity: 12.3×10^6 lpd (3.2×10^6 gpd) Average daily flow: 3.785×10^6 liters (1.0×10^6 gal) Peak daily flow: 4.6×10^6 liters (1.225×10^6 gal) Storage capacity: after pumping from wells, water is chlorinated, then stored in a 3.6×10^6 liter (0.95×10^6 gal) reservoir. Two additional storage tanks, 24.2×10^6 and 2.6×10^6 liters (6.4×10^6 and 0.7×10^6 gal) Sewage Disposal Tell City Sewage Department Design capacity: 4.5×10^6 lpd (1.2×10^6 gpd) Average daily flow: 5.7×10^6 lpd (1.5×10^6 gpd) Type of treatment: primary; activated sludge. Solid Waste Municipal collection Landfills (1978 data)

B. URBAN AREAS (Continued)

NAME AND LOCATION	POPULATION	HOUSING AVAILABILITY	EDUCATIONAL FACILITIES	MEDICAL FACILITIES	RECREATIONAL FACILITIES	UTILITIES AND SERVICES
Valley Station, KY (unincorporated) 85°52'W 38°07'N	1970: 24,471 (1977 data)	Single-Family Units Average sale price: $16,000 to $65,000 Median sale price: $25,000 Average monthly rent: $350 to $400 Multi-Family Units Average monthly rent: 2 Bedroom: $185 **For additional data on total number of housing units and vacancy rates see listing for Jefferson County under Louisville above.** (1978 data)	Part of Jefferson County school system, see Louisville above.	Use Jefferson County facilities, see Louisville above.	Use Jefferson County facilities, see Louisville above.	Electric See listing under Louisville above. Heating Fuels See listing under Louisville above. Water Supply See listing under Louisville above. Sewage Disposal Small part served by Metropolitan Sewer District, see listing under Louisville above. The majority of Valley Station is served with septic tanks (prior to 1972) while new developments are served by small "package" plants. The 201 Facilities Plan for Jefferson County recommends that these small non-point pollution sources be phased out. Solid Waste See listing under Louisville above. (1978 data)
Vine Grove, KY 85°59'W 37°49'N	1970: 2987 1975: 3189 (1977 data)	Single-Family Units Total occupied units: 15,799 Owner occupied units: 10,541 (1977 data, Hardin County) 6 new subdivisions being constructed, approximately 223 houses. Average sale price: $30,000 and up Average monthly rent: Houses: $250 to $400 Mobile homes: $100 to $175 and up Multi-Family Units Average monthly rent: 1 Bedroom: $150 to $200 2 Bedroom: $175 to $225 3 Bedroom: $225 to $350 (1978 data)	Public Schools 1 Elementary School 1978 enrollment: 773 Enrollment capacity: 700 1 Junior High School 1978 enrollment: 577 Enrollment capacity: 650 Private Schools (Hardin County) Elementary Schools 1976 enrollment: 2894 Junior High Schools 1976 enrollment: 961 Senior High Schools 1976 enrollment: 741 (1976 and 1978 data)	Hardin Memorial Hospital, see Elizabethtown above. Doctors Total: 1 Doctor/population ratio: 1/3189 Dentists Total: 4 Ratio: 1/797 (1978 data)	Tennis courts Baseball diamonds Softball fields Football fields 1 Park Playgrounds Village green with a bandstand 1 Private golf course 1 Private swimming pool (1976 data)	Electric Kentucky Utilities Company Total generating capacity: 1,615,500 kW Supply: adequate Nolin Rural Electric Cooperative Corporation Source of power: East Kentucky Power Cooperative Total generating capacity: 496,000 kW Supply: adequate Heating Fuels Natural gas from Louisville Gas and Electric Company Source of supply: Texas Gas Transmission Corporation Supply: inadequate 3 Propane and butane distributors (in Canmer and Radcliff) 4 Distillate fuel oil distributors (in Elizabethtown) Water Supply Vine Grove Water and Sewer Source: Brushy Fork Creek, Otter Creek, and Peck Springs Treatment plant capacity: 1.36×10^6 lpd (0.36×10^6 gpd) Average daily flow: 0.85×10^6 liters (0.225×10^6 gal) Peak daily flow: 1.1×10^6 liters (0.3×10^6 gal) Storage capacity: 1.8×10^6 liters (0.476×10^6 gal) Type of treatment: chlorination, fluoridation, lime alum. Application has been filed for a water system improvement project which includes a new 2.8×10^6 liter (0.75×10^6 gal) water treatment plant and a new 0.76×10^6 liter (0.2×10^6 gal) elevated storage tank. Sewage Disposal Vine Grove Water and Sewer Design capacity: 0.61×10^6 lpd (0.16×10^6 gpd) Average daily flow: 0.76×10^6 liters (0.2×10^6 gal) Type of treatment: primary (partial secondary); primary digester, trickling filter, chlorine, drying beds. **Construction is presently underway to expand pipeline capacities. A 201 Facilities Plan is being reviewed which recommends the connecting of the Vine Grove and Radcliff sewage systems.** Solid Waste Private collection County landfill (1976 and 1978 data)

*ICU/CCU = intensive care unit/coronary care unit.
†Ratios for each city derived using most recent population estimate.
‡lpd = liters per day; gpd = gallons per day.
§ Ratios determined using totals for latest Jefferson County population (696,832).

FORT KNOX, KENTUCKY
TERRAIN ANALYSIS



OFF-POST FEATURES

- Urban Area
- Airfield
- Cantonment Area

Prepared by Dames & Moore, Washington, DC, under the direction of the Terrain Analysis Center, U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia. March 1979.

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AERIAL PHOTOGRAPHY

117. [Black and white contact prints]. Scale 1:51,000. April-May 1977. Flown by Defense Mapping Agency Tactical Command, Mission Number S 77-2. Available at U.S. Army Engineer Topographic Laboratories, Terrain Analysis Center, Fort Belvoir, VA.

PERSONAL COMMUNICATIONS

118. Mr. Isaac Duff. August-September 1978. Wildlife Officer, Directorate of Facilities Engineering, Fort Knox, KY. Interviews and reconnaissance of reservation concerning water resources and vegetation.

119. Mr. Curtis Hannum. August-September 1978. U.S. Geological Survey, Louisville, KY. Interview and letter concerning water resources.

120. Mr. W.H. Jackson. 16 August 1978. U.S. Geological Survey, Louisville, KY. Interview concerning water resources.

121. Mr. Jerome Lawson. August-September 1978. Land Management Officer, Directorate of Facilities Engineering, Fort Knox, KY. Interviews concerning water resources and vegetation.

122. Mr. Robert Mullins. 16 August 1978. U.S. Army Engineer District, Louisville, KY. Interview concerning water resources.

123. Mr. John Santos. 16 August 1978. U.S. Geological Survey, Louisville KY. Interview concerning water resources.

124. Mr. Gene Summerville. 16 August 1978. U.S. Army Engineer District, Louisville, KY. Interview concerning water resources.

125. Lt. Col. Donald Pearsall. 19 September 1978. Land Management Officer, Military Liaison, Directorate of Facilities Engineering, Fort Knox, KY. Interview concerning aerial reconnaissance survey of entire reservation to assist in vegetation delineation and to aid in cover and concealment evaluation.

126. Mr. Donald Torrence. 19 September 1978. Forestry Officer, Directorate of Facilities Engineering, Fort Knox, KY. Interview concerning timber stocking, volumes, densities, species and distribution of tree species. Also delineation of locations and extent of plantation plantings.

127. Mr. D.S. Bechly. 10 October 1978. Engineer - Structures, Illinois Central Gulf Railroad, Chicago, IL. Letter concerning railroad bridges.

128. Mr. Lamm. 18 September 1978. Division Engineer, Louisville and Nashville Railroad, Evansville, IN. Telephone conversation concerning the railroad.

129. CPT Boyd Mitchell. 16 August 1978. Airfield Operations, Godman Army Airfield, Fort Knox, KY. Interview concerning Godman Army Airfield and helicopter landing zones.

130. Mr. John Nicklias. 15 August 1978. Foreman, Natural Gas Department, Louisville Gas and Electric Company, Louisville, KY. Interview concerning pipelines.

131. Mr. North. 18 September 1978. Illinois Central Gulf Railroad, Chicago, IL. Telephone conversation concerning the railroad.

132. Mr. Jack Spratt. 15 August 1978. Chief Gas Load Dispatcher, Louisville Gas and Electric Company, Louisville, KY. Interview concerning pipelines.

133. Mr. Mark T. Carr. August 1978. Chief, Maintenance Division, U.S. Army Communications Command Agency, Fort Knox, KY. Interview concerning routing of communication lines to ranges.

134. Mr. Richard Decatur. August 1978. Chief, Facilities Branch, Plants and Operations, Directorate of Industrial Operations, Fort Knox, KY. Interview concerning allocation of billet spaces for troop housing.

135. Dr. H. Haun. August 1978. Superintendent of Post Dependent Schools, Personnel Services Division, Directorate of Personnel and Community Activities, Fort Knox, KY. Interview concerning schools on the reservation.

136. Mr. George E. Hesson. August 1978. Chief, Operations Division, U.S. Army Communications Command Agency, Fort Knox, KY. Interview concerning communications at Fort Knox.

137. Mrs. Moore. September 1978. Secretary to Dr. Haun, Dependent Schools, Personnel Services Division, Directorate of Personnel and Community Activities, Fort Knox, KY. Telephone conversation concerning current enrollment figures for dependent schools on the reservation.

138. Mr. Duane R. Nelson. August 1978. Environmental and Energy Control Office, Directorate of Facilities Engineering, Fort Knox, KY. Interview concerning utilities on the reservation.

139. CPT Robert D. Pollard. August 1978. Operations Officer, U.S. Army MEDDAC, Fort Knox, KY. Interview concerning medical facilities on the reservation.

140. Mr. Rick Stith. August 1978. Master Planning Branch, Directorate of Facilities Engineering, Fort Knox, KY. Interview concerning Master Plan changes through FY 1980.

141. Mr. J.O. Sullins. September 1978. Administrative Office, Recreation Services Division, Directorate of Personnel and Community Activities, Fort Knox, KY. Telephone conversation concerning recreation facilities.

142. Mr. I.D. Tubbs. August 1978. Chief, Housing Division, Directorate of Industrial Operations, Fort Knox, KY. Interview concerning family housing on the reservation.

143. Mr. George Dille. August 1978. Range Command, Directorate of Plans and Training, Fort Knox, KY. Interview concerning plans for future range modifications.

144. Mr. J.G. Kelley. September 1978. Range Division, Directorate of Plans and Training, Fort Knox, KY. Telephone conversation concerning compiled range information.

145. SFC Gilbert J. Syvertsen. August 1978. Operations Branch, Range Division, Directorate of Plans and Training, Fort Knox, KY. Interview concerning range features.

146. Lt. Col. J.G. Towle. August 1978. Chief, Range Division, Directorate of Plans and Training, Fort Knox, KY. Interview concerning facilities and features of ranges.

147. LT Joan York. August 1978. Historical Officer, Patton Museum of Cavalry and Armor, Directorate of Plans and Training, Fort Knox, KY. Interview concerning historical features of the reservation.

148. Mr. William J. Alexander. August 1978. Realtor, Century 21 - Peter C. Roberts Realtors. Telephone conversation concerning housing in Buechel, KY.

149. Mr. Jim Almond. September 1978. Area Manager, Public Service Indiana. Telephone conversation concerning adequacy of supplies and future plans.

150. Mrs. Wilma Berlin. August 1978. Jefferson County Board of Education, Louisville, KY. Interview concerning schools in the Jefferson County area.

151. Ms. Jill Brown. August 1978. Research Planner, Kentuckiana Regional Planning and Development Agency, Louisville, KY. Telephone conversation, interview, and literature concerning sources of data for Indiana and Kentucky cities.

152. Mr. Kenneth Brown. September 1978. Chief Engineer, Salem Water and Sewage System, Salem, IN. Telephone conversation concerning plant specifications and future plans.

153. Mr. Larry Browner. September 1978. Director of Pupil Personnel, Hardin County School System. Telephone conversation and letter concerning enrollment capacities of elementary, middle, and senior high schools serving Vine Grove and Radcliff, KY.

154. Mr. Donald E. Buchanan. September 1978. Director of Industrial Development, Kentucky Utilities Company, Lexington, KY. Letter concerning service area and adequacy of supply.

155. Mr. Frank Campbell. September 1978. Vice President - Chief Engineer, Louisville Water Company, Louisville, KY. Telephone conversation concerning water supply plant specifications and future plans.

156. Mr. Eddie N. Deep. August 1978. Eddie N. Deep Agency. Telephone conversation concerning housing in Lebanon, KY.

157. Mr. Edlisoir. September 1978. Indiana Cities Water Corporation, New Albany, IN. Telephone conversation concerning water supply plant specifications and future plans.

158. Mr. R.J. Endres. September 1978. Chief, Operations Division, Office of Airports Programs, Department of Transportation, Federal Aviation Administration. Letter containing Airport Master Record, FAA Form 5010-1 for Standiford Field, Louisville, KY.

159. CPT Frazier. August 1978. Kentucky Air National Guard. Interview concerning Air National Guard Facilities at Standiford Field, Louisville, KY.

160. Mr. Milton K. Graham. September 1978. Superintendent of Schools, Bardstown Independent School System, Bardstown, KY. Telephone conversation concerning present enrollment and enrollment capacities of elementary, middle, and senior high schools.

161. Mr. Walt Green. August 1978. Superintendent, Taylor County Board of Education. Letter concerning present enrollment and enrollment capacity for elementary, middle, and senior high schools serving Campbellsville, KY.

162. Mr. Bill Hamilton. August 1978. Engineer, Standiford Field, Louisville, KY. Interview concerning Standiford Field.

163. Ms. Linda Holman. August 1978. City Clerk, Vine Grove, KY. Telephone conversation concerning housing in Vine Grove, KY.

164. Mr. Cletus Hunt. August 1978. Planning Advisor, Lincoln Trail Area Development District, KY. Interview concerning availability of data and data sources for off-post investigation.

165. Ms. S. Joann. September 1978. Office of Catholic Education, Archdiocese of Indianapolis, Indianapolis, IN. Letter concerning school enrollment in Indiana.

166. Mr. Earl Jones. August 1978. Realtor. Telephone conversation concerning housing in Hodgenville, KY.

167. Mr. Paul E. Kerrick. August 1978. Director of Pupil Personnel, Elizabethtown City Schools. Letter concerning present enrollment capacity for elementary, middle, and senior high schools serving Elizabethtown, KY.

168. Mr. William Klaphike. August-September 1978. Planning, Research and Development, Jefferson County Public Schools, Louisville, KY. Interview and letter concerning present enrollment and enrollment capacities for elementary, middle, and senior high schools.

169. Mr. James Kimbrough. August 1978. Kentuckiana Regional Planning and Development Agency, Louisville, KY. Interview and literature concerning health facilities in the Louisville Metropolitan Area.

170. Mr. Larry Lee. August 1978. City Planner, Elizabethtown, KY. Telephone conversation concerning housing in Elizabethtown, KY.

171. Mrs. Lewis. September 1978. Housing Division, Off-Post Housing, Fort Knox, KY. Telephone conversation concerning type and availability of data for off-post housing in nearby communities.

172. Mr. Bob Love. August 1978. Bob Love Real Estate. Telephone conversation concerning housing in Sellersburg, IN.

173. Mr. Luker. September 1978. Southern Indiana Gas and Electric. Telephone conversation concerning electric supply specifications and adequacy, and future plans for Tell City, IN.

174. Mr. Ken Marshall. August 1978. Ken Marshall Realtors. Telephone conversation concerning housing in Shelbyville, KY.

175. Mr. Thomas J. McBride. September 1978. Superintendent, Wastewater Treatment Division, Louisville - Jefferson County Metropolitan Sewer District, Louisville, KY. Letter concerning sewage facilities in their service area.

176. Mr. Michael J. McGill. September 1978. Manager, Gas Market Services, Louisville Gas and Electric Company, Louisville, KY. Telephone conversation and letter concerning natural gas supplies in their service area.

177. Mr. Miller. October 1978. West Clark Community School System. Telephone conversation concerning present enrollment and enrollment capacities of elementary, middle, and senior high schools serving Sellersburg, IN.

178. Mr. Thomas A. Pack. September-October 1978. Director of Pupil Personnel, Bullitt County Schools. Telephone conversation and letter concerning present enrollment and enrollment capacities of elementary, middle, and senior high schools serving Shepherdsville, KY.

179. Ms. Joyce Payne. September 1978. Assistant to Superintendent of Schools, Marion County, KY. Telephone conversation concerning present enrollment and enrollment capacity of schools serving Lebanon, KY.

180. Mr. Rogers. September 1978. Superintendent of Schools, Tell City, IN. Telephone conversation concerning present enrollment and enrollment capacities of elementary, middle, and senior high schools.

181. Mr. Everett G. Sanders. September 1978. Superintendent of Schools, Larue County, KY. Telephone conversation concerning present enrollment and enrollment capacities of elementary, middle, and senior high schools serving Hodgenville, KY.

182. Mr. Steve Scaggs. September 1978. Elizabethtown, KY, Sewage Disposal Plant. Telephone conversation concerning plant specifications and future plans.

183. Mr. Jerry Schlosser. August 1978. Jerry Schlosser Realtor. Telephone conversation concerning housing in Leitchfield, KY.

184. Ms. Sherrin Scholl. August-September 1978. Health Planning Advisor, Lincoln Trail Area Development District, KY. Letter and interview concerning medical/health facilities in their district.

185. Mr. Smith. September 1978. Corydon Sewage Disposal Plant. Telephone conversation concerning plant specifications and future plans.

186. Mr. Ron Talone. August 1978. Housing Planner, Kentuckiana Regional Planning and Development Agency, Louisville, KY. Interview and literature concerning housing in the Louisville metropolitan area.

187. Mr. Gary Tyler. August 1978. Executive Vice President, Clark County Chamber of Commerce, Jeffersonville, IN. Interview concerning information sources in Indiana and acquisition of community resumes for Indiana cities.

188. Mr. Jack Waff. September 1978. Acting Superintendent, Washington County Board of Education. Telephone conversation concerning present enrollment and enrollment capacities of elementary, middle, and senior high schools serving Springfield, KY.

189. Mr. Bob Ward. September 1978. Sales representative, Western Kentucky Gas Company, Shelbyville, KY. Telephone conversation concerning the adequacy of natural gas supplies in Shelbyville, KY.

190. Ms. Sandy Weir. August 1978. Research Planner, Kentuckiana Regional Planning and Development Agency, Louisville, KY. Interview and literature concerning school data for Louisville Metropolitan Area.

191. Mr. Jim West. August 1978. Housing Division, Off-Post Referral, Directorate of Industrial Operations, Fort Knox, KY. Interview concerning availability and nature of off-post housing in vicinity of Fort Knox.

192. Mr. Don Wheatley. September 1978. Sales Representative, Western Kentucky Gas Company, Campbellsville, KY. Telephone conversation concerning the adequacy of natural gas supplies in Campbellsville, KY.

193. Mr. Blaine Wisemen. August 1978. President, Old Capital Bank, Corydon, IN. Interview concerning housing in Corydon, IN.

194. Mr. Tom Witherspoons. September 1978. Jeffersontown Water Company, Jeffersontown, KY. Telephone conversation concerning sewage plant specifications and future plans.

195. Assistant to Mr. Ed Merritt. September 1978. Sales Representative, Western Kentucky Gas Company, Lebanon and Springfield, KY. Telephone conversation concerning the adequacy of natural gas supplies in Lebanon and Springfield, KY.

IV. LIST OF SOURCES (Continued)

196. Bartman and Sapp Realty Company. August 1978. Telephone conversation concerning housing in Campbellsville, KY.

197. Century 21 - Bush Realty 111, Inc. August 1978. Telephone conversation concerning housing in Clarksville, IN.

198. Century 21 - Cable Realtors. August 1978. Telephone conversation concerning housing in Jeffersonville, IN.

199. Century 21 - Clark Realtors. August 1978. Telephone conversation concerning housing in New Albany, IN.

200. Century 21 - Stone Company. August 1978. Telephone conversation concerning housing in Bardstown, KY.

201. Clark County Memorial Hospital, Clark County, IN. September 1978. Telephone conversation concerning the hospital.

202. Clarksville City Manager. September 1978. Telephone conversation concerning housing availability in Clarksville, IN.

203. Clarksville Independent School System. September 1978. Telephone conversation concerning present enrollment and enrollment capacities of elementary, middle, and senior high schools serving Clarksville, IN.

204. Clarksville Sewage Department, Clarksville, IN. September 1978. Telephone conversation concerning plant specifications and future plans.

205. Crow Pugh Realtors. August 1978. Telephone conversation concerning housing in Shepherdsville, KY.

206. Fletcher Realtors. August 1978. Telephone conversation concerning housing in Salem, IN.

207. Floyd County Memorial Hospital, Floyd County, IN. September 1978. Telephone conversation concerning the hospital.

208. Grayson County Board of Education. September 1978. Telephone conversation concerning present enrollment and enrollment capacities for elementary, middle, and senior high schools serving Leitchfield, KY.

209. Greater Clark County School System. September 1978. Telephone conversation concerning present enrollment and enrollment capacities of elementary, middle, and senior high schools serving Charlestown and Jeffersonville, IN.

210. Harrison County Hospital, Harrison County, IN. September 1978. Telephone conversation concerning the hospital.

211. Home Realtors. August 1978. Telephone conversation concerning housing in Radcliff, KY.

212. Indiana Gas Company, Indianapolis, IN. September 1978. Telephone conversation concerning adequacy of natural gas supply.

213. Midwest Natural Gas Corporation, Washington, IN. September 1978. Telephone conversation concerning adequacy of natural gas supply.

214. Municipal Water Service, Corydon. September 1978. Telephone conversation concerning water supply facilities and planned expansion for Corydon, IN.

215. New Albany Sewage Disposal Plant. September 1978. Telephone conversation concerning plans for future expansion of New Albany, IN, sewage system.

216. Okolona Sewer Construction District. September 1978. Telephone conversation concerning sewage plant specifications and future plans for Okolona, KY.

217. Perry County Memorial Hospital, Perry County, IN. September 1978. Telephone conversation concerning the hospital.

218. Peters Insurance and Real Estate Agency. August 1978. Telephone conversation concerning housing in Charlestown, IN.

219. Radcliff City Hall. September 1978. Telephone conversation concerning recreational facilities in Radcliff, KY.

220. Radcliff Water and Sewage Plant, Radcliff, KY. September 1978. Telephone conversation concerning plant specifications and future plans.

221. Salem Superintendent of Schools. September 1978. Telephone conversation concerning present enrollment and enrollment capacities of schools serving Salem, IN.

222. Sellersburg Sewage and Water Department, Sellersburg, IN. September 1978. Telephone conversation concerning plant specifications and future plans.

223. Shelbyville Board of Education. September 1978. Telephone conversation concerning present enrollment and enrollment capacities of schools serving Shelbyville, KY.

224. Shepherdsville City Clerk. September 1978. Telephone conversation concerning the number of doctors and dentists in Shepherdsville, KY.

225. Springfield Water and Sewer Commission, Springfield, KY. September 1978. Telephone conversation concerning plant specifications and future plans.

226. Taylor County Hospital, Taylor County, KY. September 1978. Telephone conversation concerning the hospital.

227. Tell City Chamber of Commerce. September 1978. Literature concerning Tell City, IN.

228. Tell City Sewage Department, Tell City, IN. September 1978. Telephone conversation concerning sewage plant specifications and future plans.

229. Tell City Water Department, Tell City, IN. September 1978. Telephone conversation concerning water plant specifications and future plans.

230. Washington County Memorial Hospital, Washington County, KY. September 1978. Telephone conversation concerning the hospital.