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Bank Erosion Survey of the Main Stem of the Kankakee River in Illinois and Indiana

by

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William C. Bogner, and Jim Slowikowski

Prepared for the
Illinois Department of Natural Resources
and Office of Realty and Environmental Planning

Conservation 2000 Ecosystem Report
March 2001

Illinois State Water Survey
Watershed Science Section
Champaign, Illinois

A Division of the Illinois Department of Natural Resources

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by Nani G. Bhowmik, David T.W. Soong, Erin Bauer, and Misganaw Demissie

Abstract

This report is the second of a series of three reports being prepared for the work done on the Kankakee River based on a Conservation 2000 Grant from the Illinois Department of Natural Resources. The present report focuses on the bank erosion mapping of the main stem of the Kankakee River from Route 30 Bridge in Indiana to the mouth of the Kankakee River with the Illinois River near Wilmington. A total of 111.8 river miles were mapped during a boat trip November 19 – December 1, 1998. The relative magnitude of erosion was based on a visual assessment of the river banks during a boat trip along the main stem of the river. No actual measurements were taken. However, the extent of erosion was noted on 7.5-minute quadrangle maps based on visual observations. A series of 27 maps has been developed in which bank erosion identified on both sides of the river ranged from minor to high erosion. This analysis has shown that 10.4 river bank miles had severe erosion, 39.4 bank miles had moderate erosion, 70.8 bank miles had minor erosion, 46.3 bank miles were stable, 46.7 river bank miles were artificially protected, and data on 10.0 bank miles could not be collected because snags, islands, etc. made the banks inaccessible. This is a first attempt to map existing bank erosion conditions of the main stem of the Kankakee River.

Keywords: *Bank erosion, Kankakee River, Illinois, Indiana, Survey, Maps.*

Introduction

This report is intended to be a comprehensive description of existing bank erosion conditions on the 111.8 miles of the main stem of the Kankakee River from Route 30 Bridge in Indiana to the mouth of the Kankakee River with the Illinois River near Wilmington. An earlier Interim Report (Bhowmik and Demissie, 2000) already has summarized work completed during the first year of the project. That report already has described, in detail, the bank conditions of the Kankakee River both in Illinois and Indiana. The present report provides only a brief summary of bank erosion conditions in both states for the main stem of the Kankakee River. For a detailed description of bank erosion conditions for each segment of the Kankakee River, readers are referred to Bhowmik and Demissie (2000).

Bank condition maps in the appendix have been produced in color to convey a detailed description of the bank. A CD containing the color maps and the report has been prepared and is also available from the Illinois State Water Survey.

Background

Figure 1 shows the drainage basin of the Kankakee River in Illinois and Indiana. The highlighted section shows the area traveled by boat to survey the bank erosion conditions of the main channel. The following materials are summarized from Bhowmik and Demissie (2000).

Acknowledgments

This research was conducted by the authors as part of their regular duties at the Illinois State Water Survey. The project was partially funded by a grant from the Illinois Department of Natural Resources (IDNR) under the Conservation 2000 program. Paul Vehlow and Bill White, IDNR, served as the Project Managers. J.R. Black, Kankakee River Basin Partnership, and Jim Mick, IDNR, were instrumental in initiating the project and provided extremely valuable guidance while the project was being conducted. Eva Kingston edited the report, Linda Hascall provided graphic services and prepared the final layout, and Linda Dexter and Dawn Amrein prepared the copy. To all of them and many other Water Survey staff, the authors offer a hearty thank you.

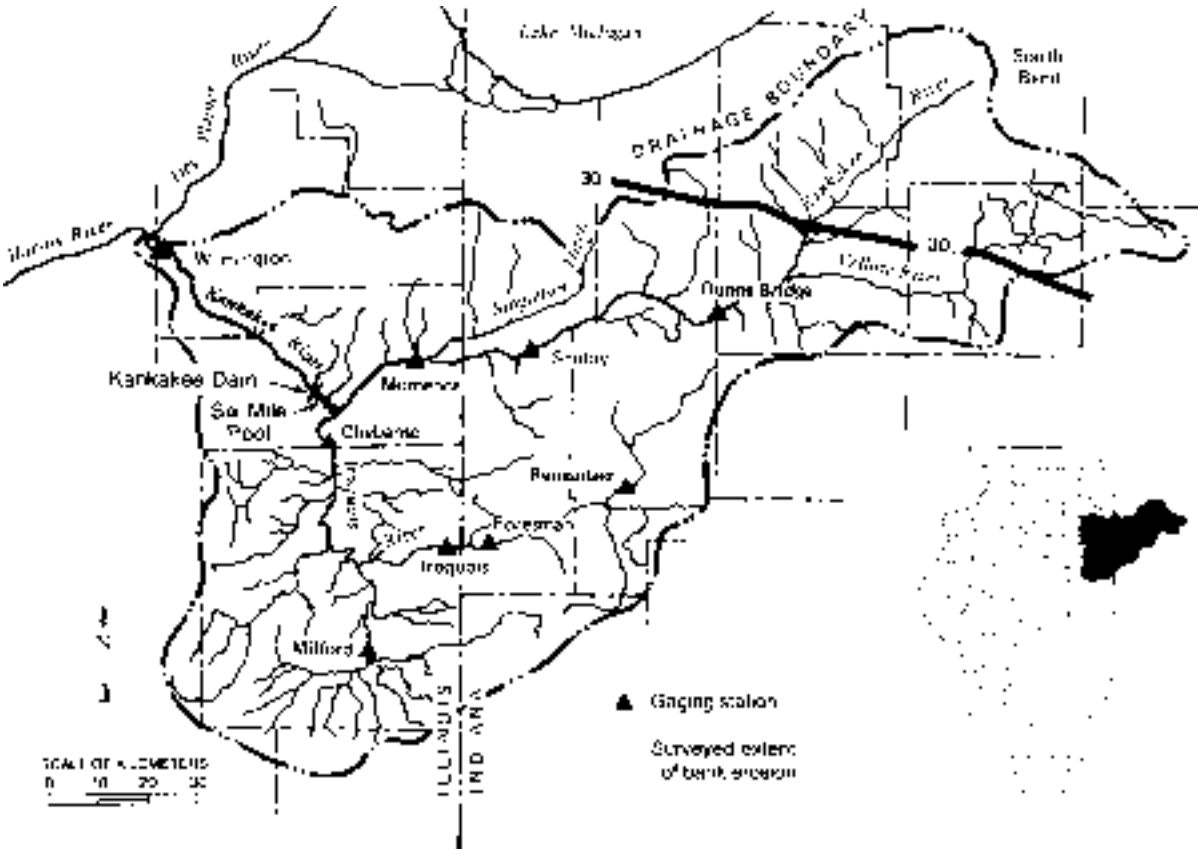

Figure 1. Drainage basin of the Kankakee River in Illinois and Indiana

The views expressed in this report are those of the authors and do not necessarily reflect the views of the sponsor or of the Illinois Department of Natural Resources.

Bank Erosion Conditions

Bank conditions for the Kankakee River were qualitatively assessed during the field reconnaissance survey from the Route 30 Bridge in Starke County, Indiana, to the confluence of the Kankakee, Des Plaines, and Illinois Rivers. A total of 111.8 miles of riverbank conditions were evaluated November 19 – December 1, 1998. Bank conditions could be observed easily during this time due to the low river stage and reduced riparian foliage of the season. Bank conditions described during the reconnaissance survey refer only to near shore bank conditions that could be associated with hydraulic forces of river flow and also visible from a boat.

Methodology

The field reconnaissance survey was conducted from a boat traveling in the downstream direction. Observations of bank features were recorded on U.S. Geological Survey (USGS) quadrangle maps with a survey system previously developed and used on the upper Mississippi and Illinois Rivers (Bhowmik et al., 1997). The goal of this component of the project was to survey present bank erosion features. The objective did not include a comparison of existing bank erosion with historical bank erosion rates since those data are not available. The survey details bank features, erosion and deposition features, causative processes, and bed features. Causative factors include hydraulic forces, such as potential of high velocity, secondary circulation, inside or outside of a bend, wave forces, potential of seepage, and others. Attributes of the riverbank describe and identify the severity of erosion along the bank and regions of the bank that are considered stable or are protected by rock or other structures. The same attributes were used to describe the bank conditions of river islands. Table 1 lists the classes of information recorded.

In addition to these records, the location of pump stations, USGS streamgages, boat ramps, bed material sample sites, established stands of trees, and regions of relatively new above water level accumulation of sand were also marked on the quadrangle maps for reference purposes.

Description Format

The description format used in Bhowmik and Demissie (2000) presented a general overview of the survey data on each 7.5-minute USGS quad map in the Indiana portion and in Illinois, relative to map sections indexed as shown in the appendix. These survey data have been transferred into a Geographical Information System (GIS) database. Table 2 provides unified soil classifications used in these descriptions.

Bank Condition Maps

Bank conditions on both sides of the river were mapped on 7.5-minute quad maps (appendix). All maps have been color coded to identify erosion severity and/or bank stability conditions on both sides of the river. This is the first attempt in the history of Kankakee River investigations

Table 1. Parameters Used in Describing Bank Conditions (after Bhowmik and Demissie, 2000)

Classification	*Parameters*	*Description*	*Classification*	*Parameters*	*Description*
Bank Features	Bank angle	Approximation in degrees		Undercut below tree roots	Location and degree
	Bank height	Approximation in feet		Down trees with bank failures	As observed
	Soil composition	Universal soil classification codes, also noted homogenous or composite soils		Trees with exposed roots	As observed
				Trees with buried roots	As observed
	Bank attributes	Mature trees, pasture, weeds, rocks, graded land, and artificial structures		Sediment accretion	Size and location noted
			Island Erosion Features	Head erosion	As observed
				Tail deposition	As observed
	Stable or erosion	Color coded with assigned attributes	Causative Processes	Rework and transport by Current	
Erosion/Deposition Features	Scarp	Location and height		Waves	
	Berm	As observed		Constrictions	
	Bench	Width, angle, and soil types		Piping/seepage	
	Tension cracks	As observed		Surface drainage	
	Horizontal soil layer or lenses	As observed		Animal activities on bank	
				Human activities on bank	
	Mass wasting	Location and height	Bed Features	Substrate	Gravel, rocks, sand, sand bars, and bedrock
	Rotational slip				
	Plane slip			Depth	Measured sounding depths
	Undercut below water stages				

Table 2. Unified Soil Classification System (after Waterways Experiment Station, 1982)

Major Division		*Type*	*Letter symbol and typical names*
COARSE-GRAIN SOILS	GRAVELS		GW: gravel, well graded, gravel-sand mixtures, little or no fines
>50 percent of material is retained on #200 sieve	>50 percent of Coarse fraction is Retained on #4 sieve	Clean gravels	GP: gravel, poorly graded, gravel-sand mixtures, little or no fines
		Gravels with fines	GM: silty gravel, gravel-sand silt, mixtures
			GC: clayey gravel, gravel-sand-clay mixtures
	SAND >50 percent of coarse fraction passes #4 sieve	Clean sands	SW: sand, well graded, gravelly sands sand, poorly graded, gravelly sands
		Sands with fines	SM: silty sand, sand-silt mixtures
			SC: clayey sand, sand-clay mixtures
FINE-GRAINED SOILS >50 percent of material passes a #200 sieve		Silts and clays LL<50	ML: silt and very fine sand, silty or clayey fine sand or clayey silt CL: lean clay, sandy clay, silty clay, of low to medium plasticity
		Silts and clays LL>50	OL: organic silts and organic silty clays of low plasticity MH: silt, fine sandy or silty soil with high plasticity CH: fat clay, inorganic clay of high plasticity OH: organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT: peat, and high organic soil

Notes:
#4 sieve: particles with diameter of 4.75 mm or less can go through.
#200 sieve: particles with diameter of 0.075 mm or less can go through.
LL: Liquidation Limit

that such detailed bank condition maps have been prepared. Readers are referred to Bhowmik and Demissie (2000) for a detailed description of each segment of the bank conditions.

General Description of Illinois Bank Conditions

Channel features in Illinois were much more variable than those in Indiana and included long pool-riffle sequences, rock ledges and sand bars, broad and sharp meanders, and islands. General bank features in Illinois ranged from sand-and-gravel deposits along the water's edge to mild bank slopes and human-made graded slopes to natural rock cliffs, and human-made bank protection structures. Dwellings located within 100 feet of the riverbank were common. Figure 2 shows an index map of the Kankakee River in Illinois. This segment of the Kankakee River is 60 miles long starting at the mouth of the river with the Des Plaines and Illinois Rivers. Individual maps for different lengths of the river contain legends and other descriptive information (see appendix).

General Description of Indiana Bank Conditions

Channelization of the Kankakee River in Indiana by public and private groups was completed by 1918 (Bhowmik et al., 1980). The channel is generally trapezoidal in shape. High water marks were generally visible at the top of the scarps. Eddies induced by the presence of trees and tree bank slopes were observed near the top of the bank. Bhowmik and Demissie (2000) described the bank conditions for each of the surveyed quad maps. Figure 3 is the index map for Indiana bank conditions. Again, individual maps for different lengths of the river contain legends and other descriptive information (see appendix).

Bank Erosion Conditions

Field survey data collected November 19 – December 1, 1998 were used to estimate the relative magnitudes of bank erosion on the main stem of the Kankakee River for 111.8 river miles from its mouth with the Des Plaines and Illinois Rivers to Route 30 Bridge in Indiana. A GIS was used to determine the relative magnitudes of the river bank conditions that were observed to have a specific type of bank erosion. Bank erosion was categorized as severe, moderate, minor, stable, rock or protected, and areas where information could not be gathered. Table 3 summarizes these data.

A total of 223.6 river bank miles were evaluated on a stretch of river extending 111.8 miles. Out of this total, 103 river bank miles are located in Indiana, and 120.6 river bank miles are located in Illinois. About 10.4 river bank miles in Indiana and Illinois (94.6 percent of the total) showed severe bank erosion (table 3). Relatively more severe bank erosion was noticed in Indiana than in Illinois.

About 39.4 river bank miles (17.6 percent of the total) showed moderate bank erosion in Illinois and Indiana. About 70 percent of this moderate bank erosion occurred in Indiana and another 30 percent in Illinois.

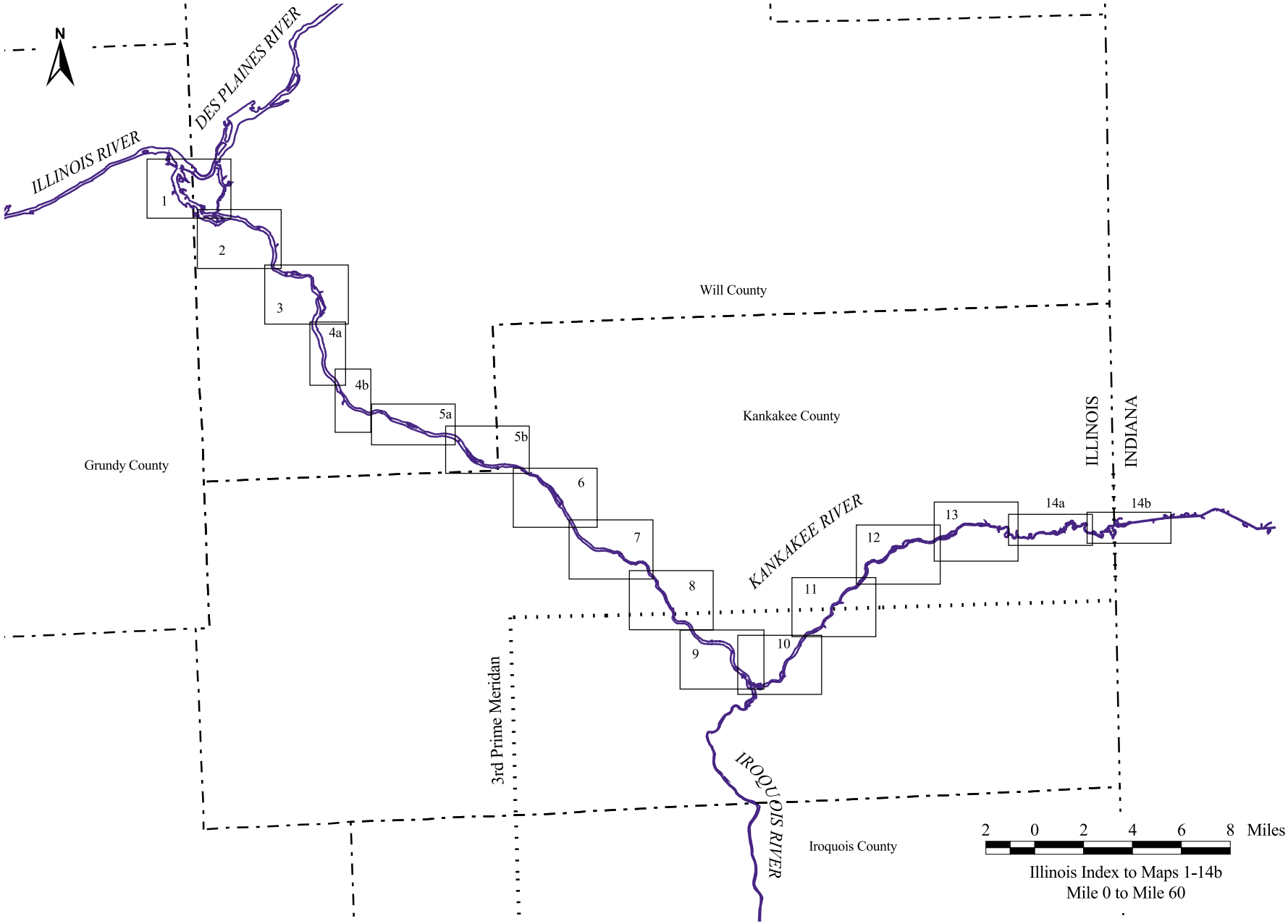

Figure 2. Index map for the Illinois portion of the Kankakee River

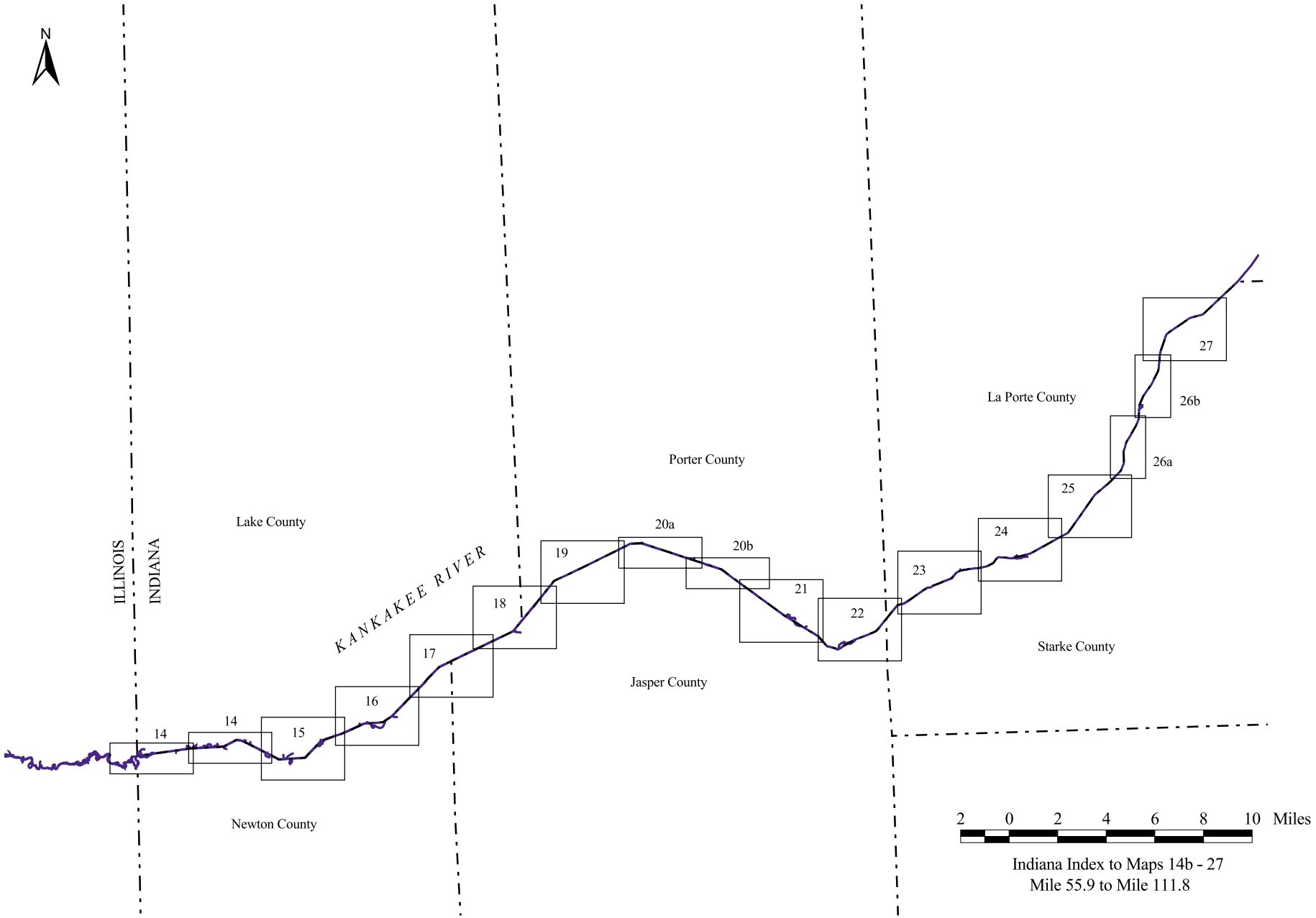

Figure 3. Index map for the Indiana portion of the Kankakee River

Table 3. Bank Erosion Conditions of the Main Stem of the Kankakee River in Indiana and Illinois

Bank erosion conditions	*Bank miles*		*Percent of bank miles*		*Percent of total bank miles*
	Indiana	*Illinois*	*Indiana*	*Illinois*	
Severe	7.4	3.0	7.2	2.5	4.6
Moderate	27.7	11.7	26.9	9.7	17.6
Minor	46.9	23.9	45.6	19.8	31.7
Stable	5.6	40.7	5.4	33.7	20.7
Rock or Protected	13.4	33.3	13.0	27.7	20.9
Data could not be collected	2.0	8.0	1.9	6.6	4.5
Total	103.0	120.6	100.0	100.0	100.0

This analysis also showed that about 31.7 percent of the total river bank miles exhibited minor erosion (21 percent in Indiana and 10.7 percent in Illinois). This translates to 46.9 river bank miles in Indiana and 23.9 river bank miles in Illinois exhibiting minor bank erosion.

In general, minor to severe erosion was exhibited in about 82 river bank miles in Indiana and 38.6 river bank miles in Illinois. In terms of individual states, about 80 percent of the Indiana river bank miles exhibited some type of erosion, and 20 percent of the river bank miles were either stable, protected by structural means, or in locations where data could not be collected. As explained previously, there were reaches of the river in which banks were either obscured by snags or behind islands that were inaccessible from the boat.

Similar analyses for Illinois showed that 38.6 river bank miles in Illinois exhibited some kind of erosion (minor to severe), and 82 river bank miles either were stable or protected by structural means or in locations where data could not be collected due to the presence of obstructions to the bank such as islands, etc. Thus 32 percent of the river bank miles in Illinois demonstrated some type of erosion, and 68 percent were essentially stable due to natural conditions or protected by artificial means or in locations where data could not be collected

Remarks

It appears that severe bank erosion is not a major problem except for about 10.4 river bank miles in both Illinois and Indiana. The Kankakee River in Indiana exhibited relatively more bank erosion than in Illinois. This is probably because the river has been channelized in Indiana, and it still may be trying to develop a meandering pattern even though the banks do have mature stands of trees stabilizing the banks. More river bank miles in Illinois, 33.3 river bank miles compared to 13.4 river bank miles in Indiana, are protected by artificial means. It appears that a significant amount of severe bank erosion sites in Illinois already have been protected by structural or artificial means. This is probably due to the fact that there are more urban areas, human

habitation, or both close to the river in Illinois than in Indiana. In any case, 7.4 river bank miles in Indiana and 3 river bank miles in Illinois still exhibited severe bank erosion requiring attention.

Erosion and sedimentation are naturally occurring processes that could never be stopped. However, actions and activities could be implemented to reduce excessive erosion and sedimentation.

Bank erosion delivers the sediment load to a river immediately, and these sediments are available either to obstruct the conveyance of the channel or are transported downstream where they cause sedimentation problems. Eroded river bank materials do not have to go through the same process as those occurring at a watershed scale and thus can drop some loads immediately into the flowing stream. Thus, in addressing the sediment transport problems of a river such as the Kankakee River, one of the first areas requiring remedial measures with immediate results would be the eroded river banks. Such action or actions may be implemented to address severe to minor erosion problems on 120.6 river bank miles in Indiana and Illinois. This will prevent at least some of the eroded materials from the river banks from being available to move as sediment loads to create problems as sand bars or constriction of the river channel. These preventive measures to address the river bank erosion problems do not preclude action or actions on the implementation of best management practices on the watershed and also in-channel sediment management alternatives such as selective dredging, sediment retention ponds, and others.

Summary

This report has been prepared to present a survey of the bank erosion of the main stem of the Kankakee River from Route 30 bridge in Indiana to the river's mouth with the Des Plaines River and Illinois River in Illinois. This qualitative surveying was completed in November and December 1998 while traveling on boats. Erosion and stable banks were mapped on 7.5-minute quadrangle maps with detailed field notes. Field sampling for bed and bank materials that also were done at the same time are reported in a previous report. All field notes were transferred into GIS formats, and those maps are included with this report.

The analyses of the bank erosion showed that 10.3 of 223.6 river bank miles exhibited severe bank erosion. About 40 river bank miles and 71 river bank miles showed moderate and minor bank erosion, respectively. About 46 river bank miles were essentially stable or have been stabilized already.

The Indiana portion of the river had many more river bank miles with severe to minor erosion than the Illinois portion of the river. In terms of river bank miles, 82 river bank miles in Indiana exhibited some kind of erosion compared to 38.6 river bank miles in Illinois. Expressing this in terms of a percentage, about 54 percent of the river bank miles examined on the Kankakee River in Indiana and Illinois exhibited some type of erosion.

Eroded bank materials are immediately delivered to the river and are thus available for transport or for deposit in other parts of the river where they are not wanted. Thus attention and/or action plans should be developed to address these erosion problems and sites on the main stem of the Kankakee River.

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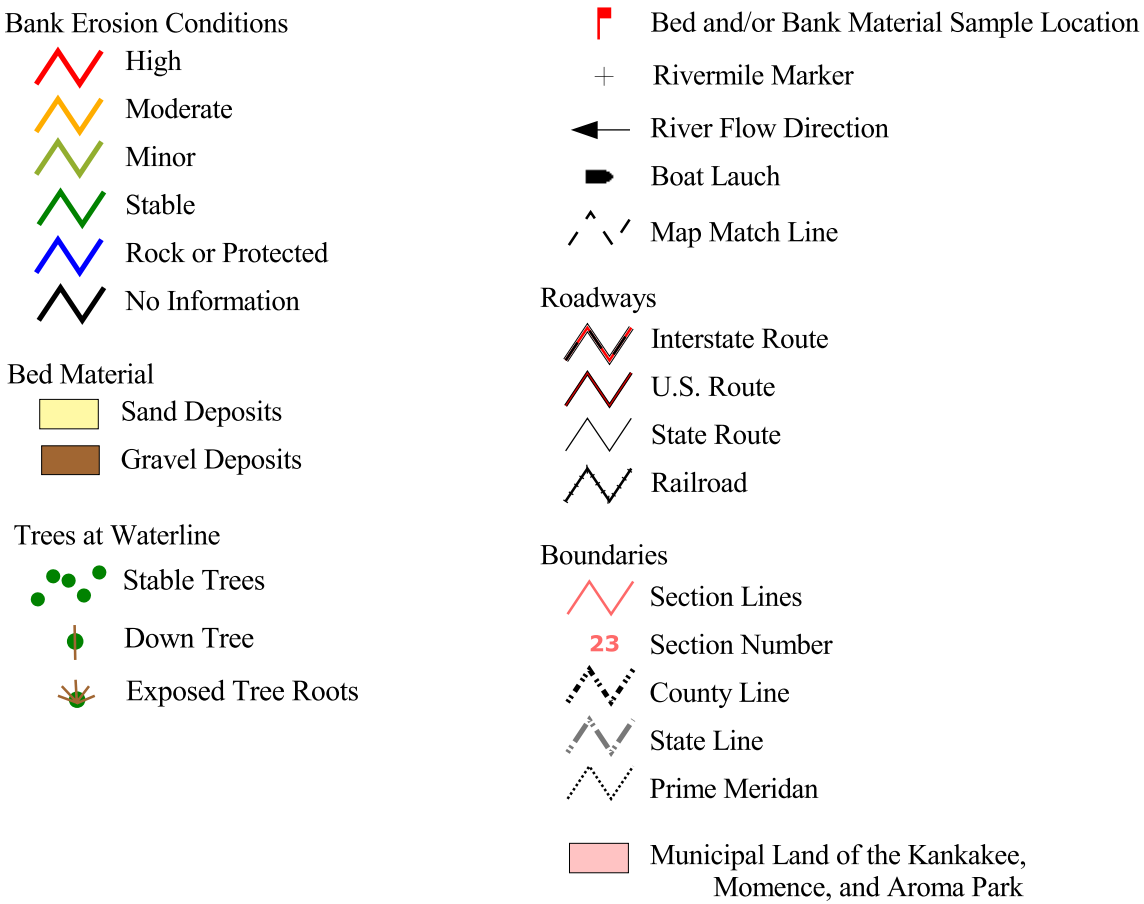
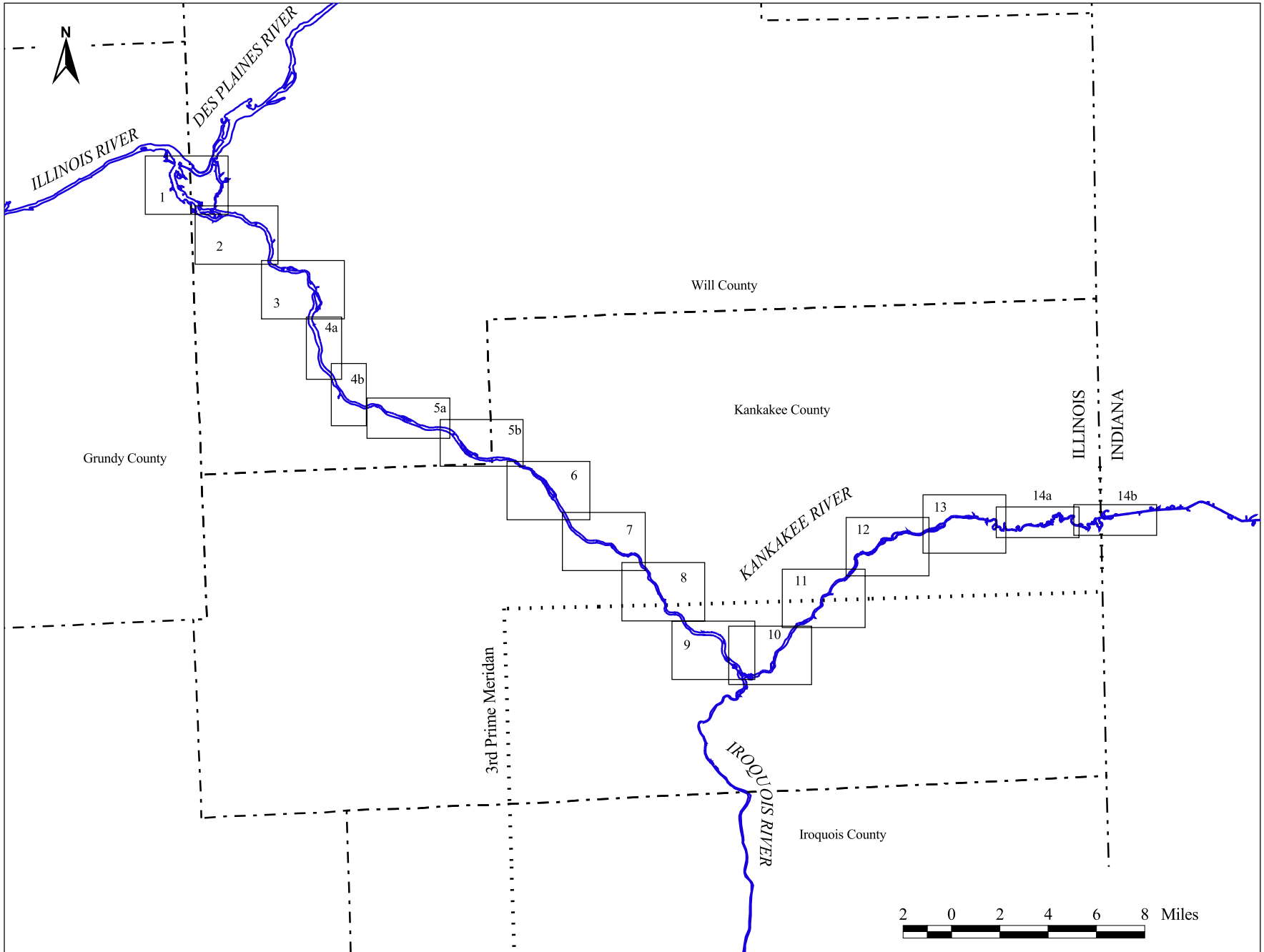
Waterways Experiment Station. 1982. *The Unified Soil Classification System. Technical Memorandum No. 3357. Appendix A: Characteristics of Soil Groups Pertaining to Embankments and Foundations. Appendix B: Characteristics of Soil Groups Pertaining to Roads and Airfields.* Geotechnical Laboratory, U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS.

Appendix: Bank Condition Maps of the Main Stem of the Kankakee River in Illinois and Indiana (Survey work done November – December 1, 1998)

Appendix: Bank Condition Maps of the Main Stem of the Kankakee River in Illinois and Indiana (Survey work done November - December 1, 1998)

Legend

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ILLINOIS RIVER
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Will County
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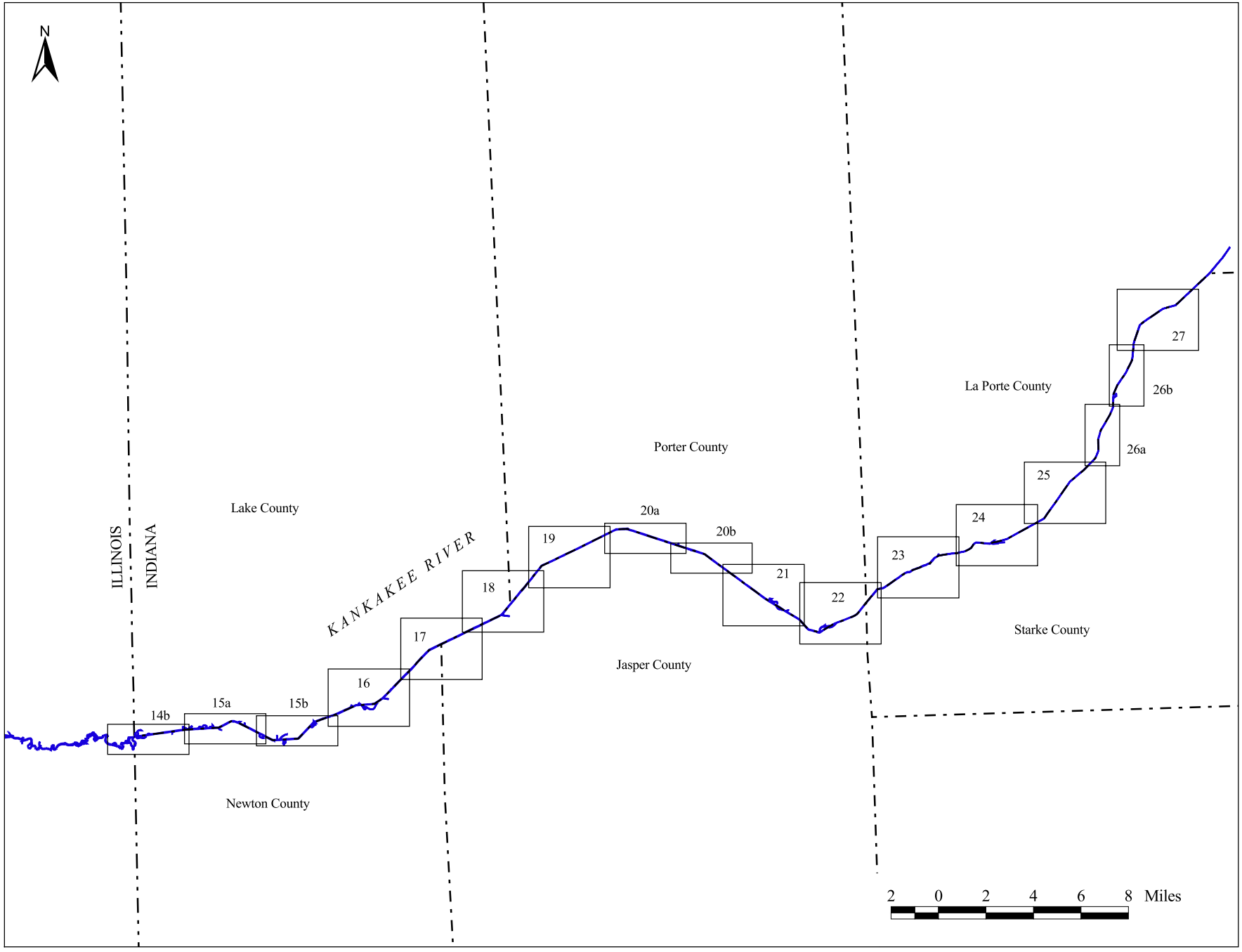
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ILLINOIS
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Jasper County
Newton County
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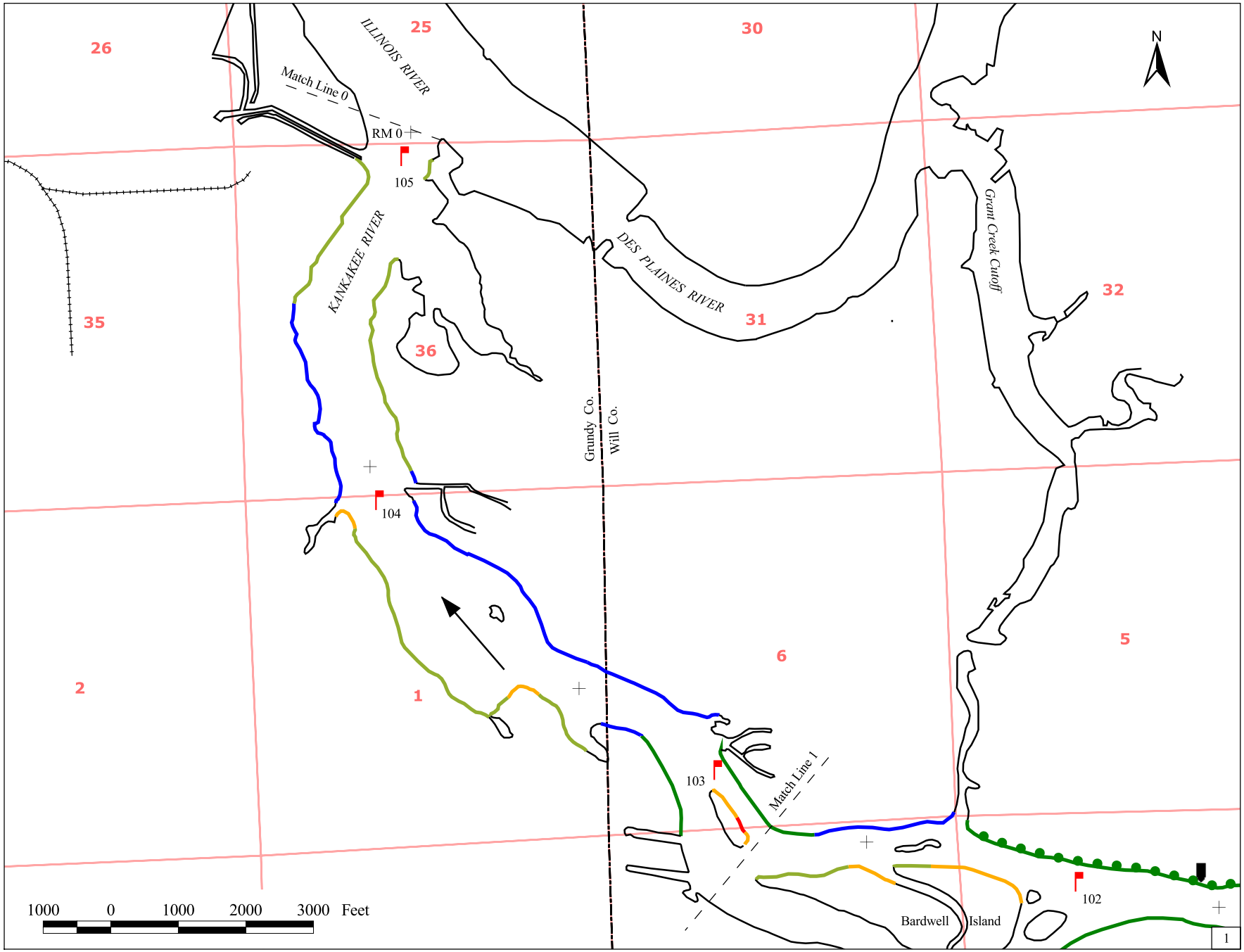
26
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105
KANKAKEE RIVER
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Grundy Co.
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103
Match Line 1
102
Bardwell Island
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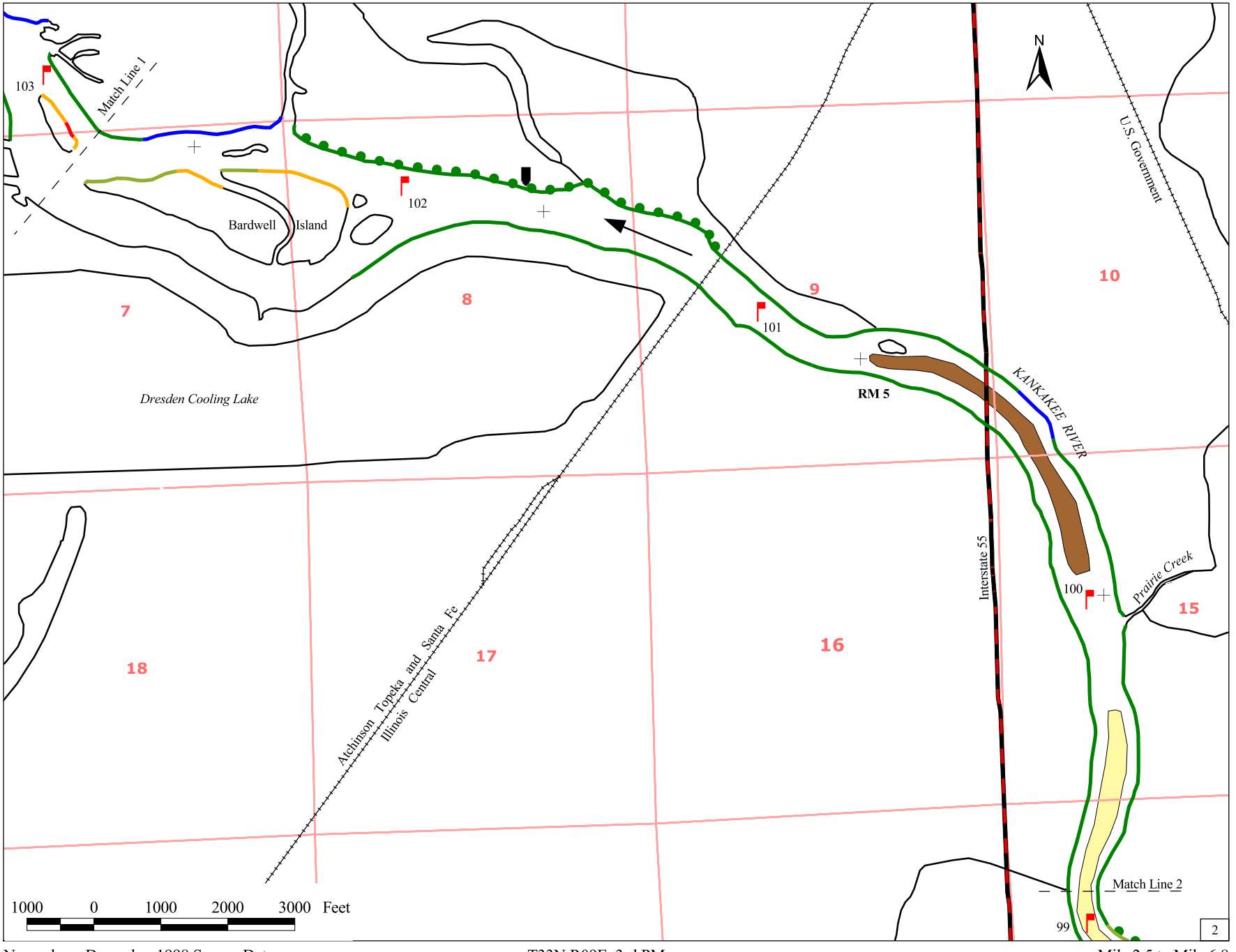
N
103
Match Line 1
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Bardwell Island
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U.S. Government
Dresden Cooling Lake
7
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Interstate 55
Prairie Creek
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Atchinson Topeka and Santa Fe
Illinois Central
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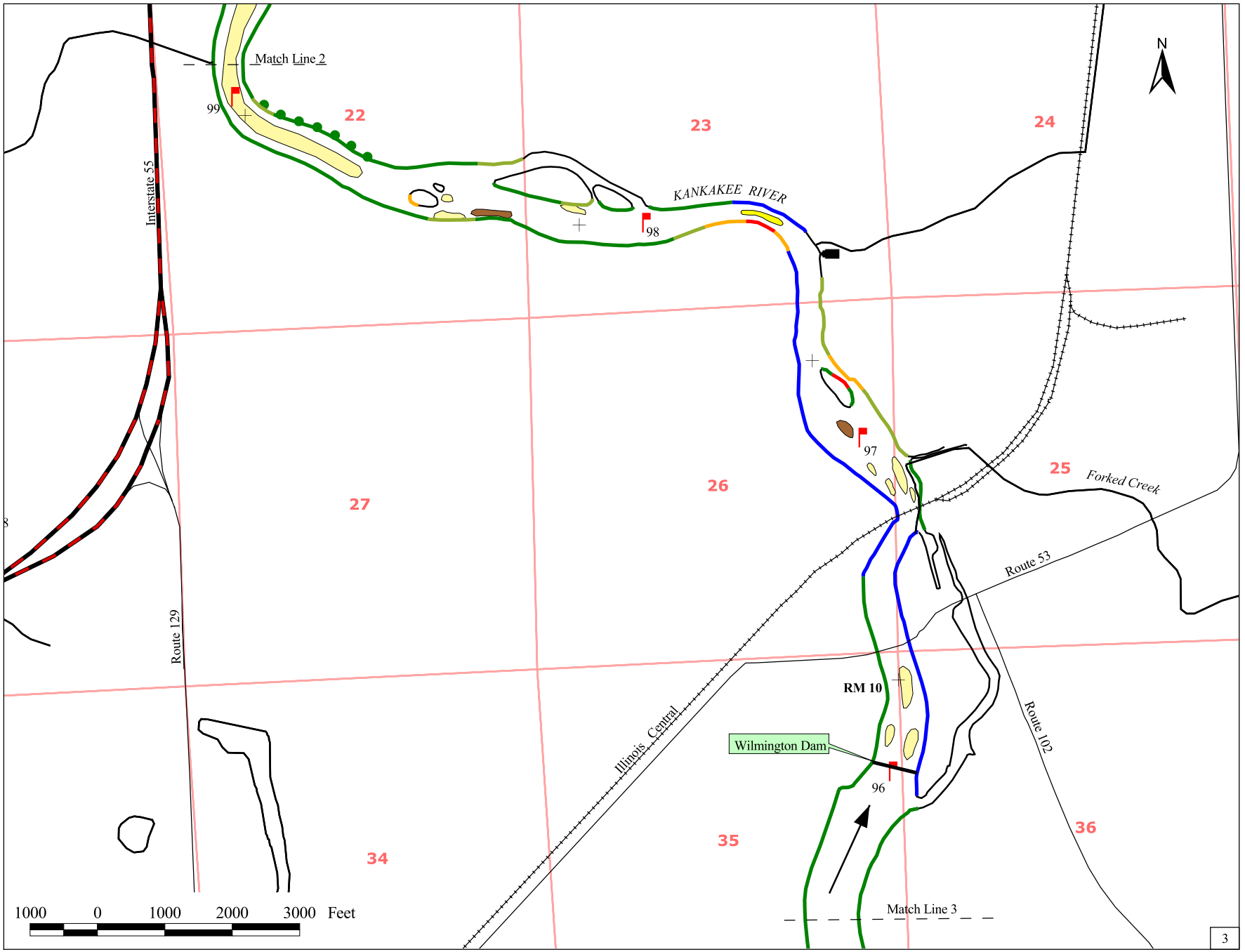
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22
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24
Interstate 55
KANKAKEE RIVER
98
97
25
Forked Creek
26
27
Route 53
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RM 10
Illinois Central
Wilmington Dam
96
Route 102
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36
34
Match Line 3
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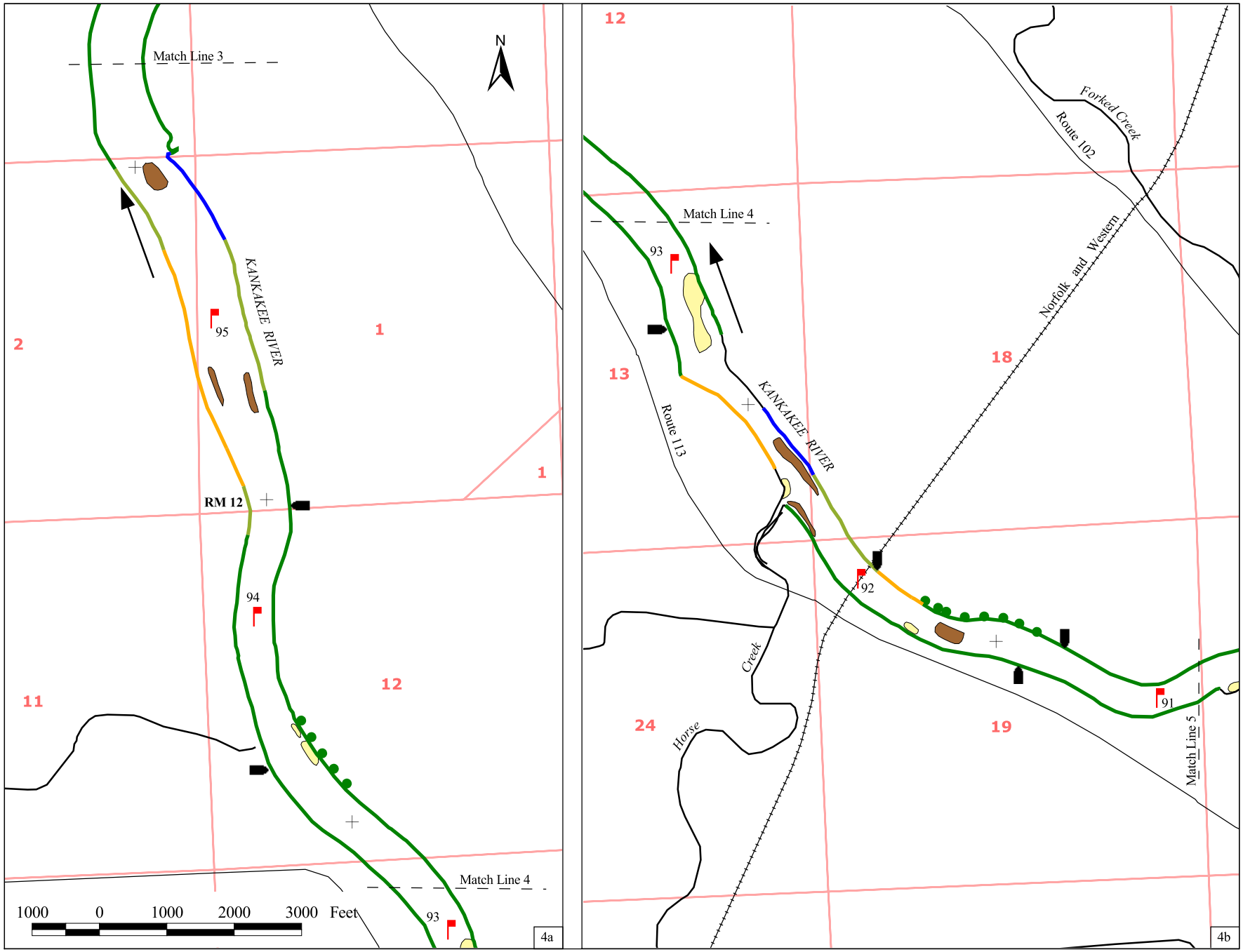
3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Route 102
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Horse
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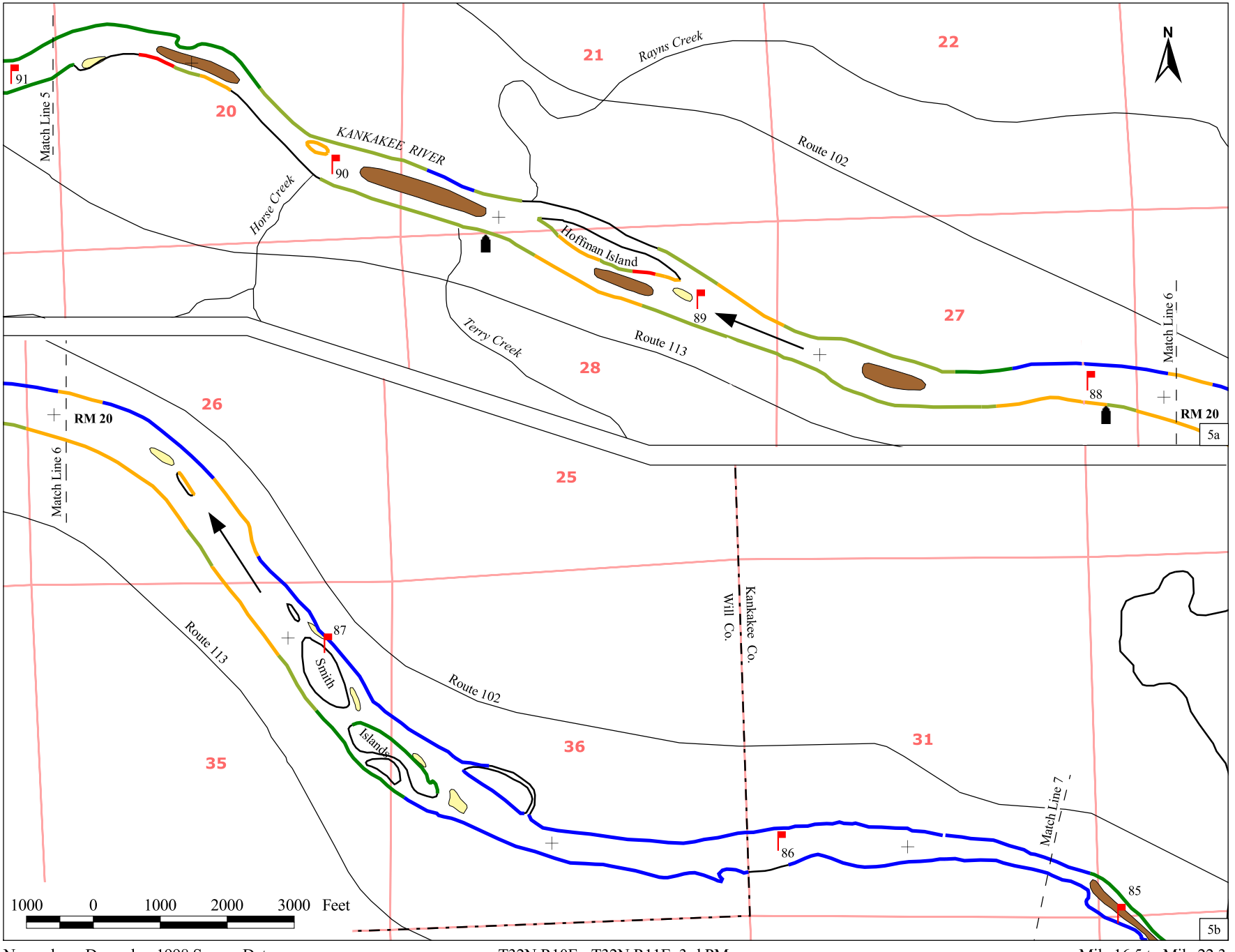
91
Match Line 5
4b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Route 113
Match Line 5
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Match Line 7
RM 20
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Will Co.
Smith
Islands
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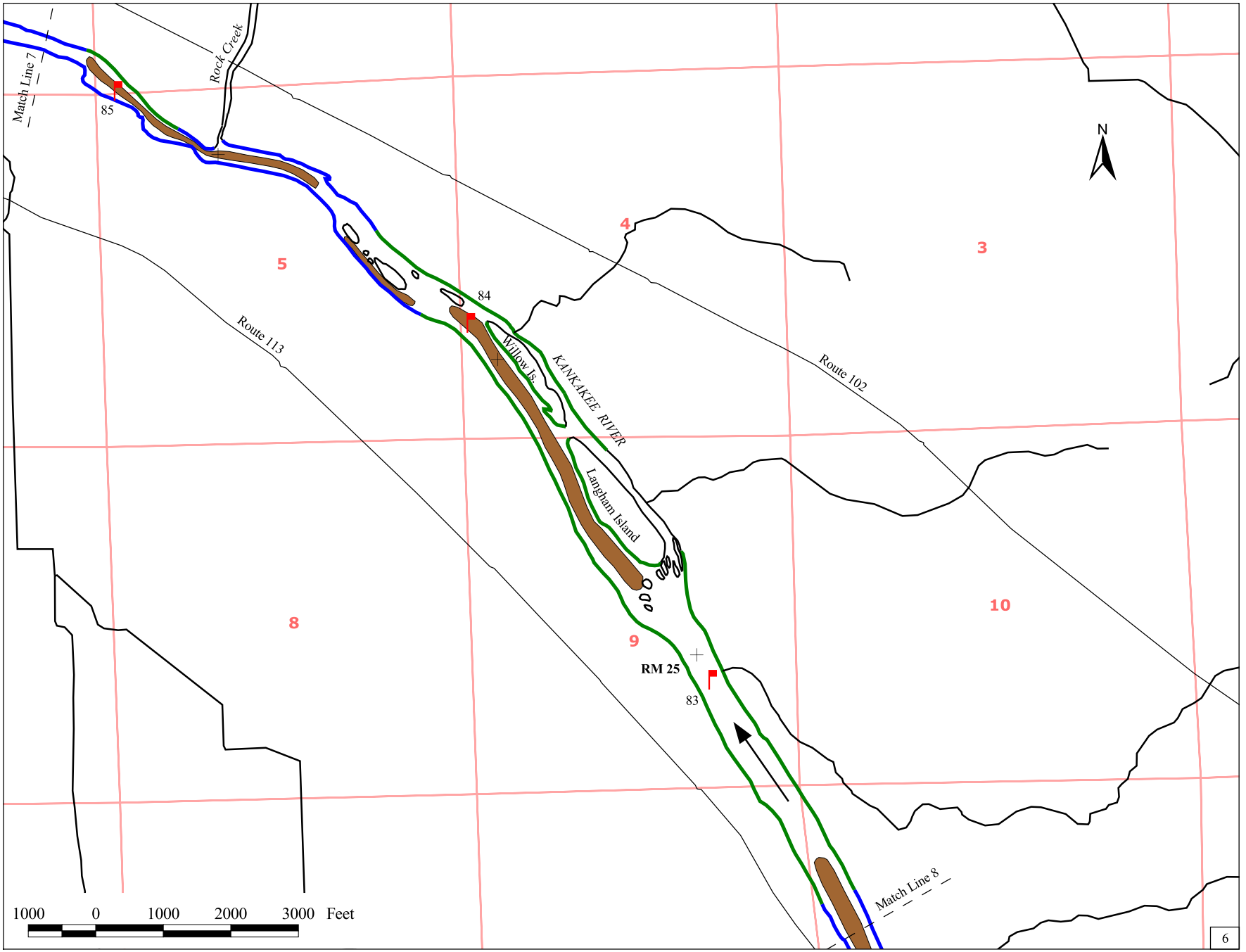
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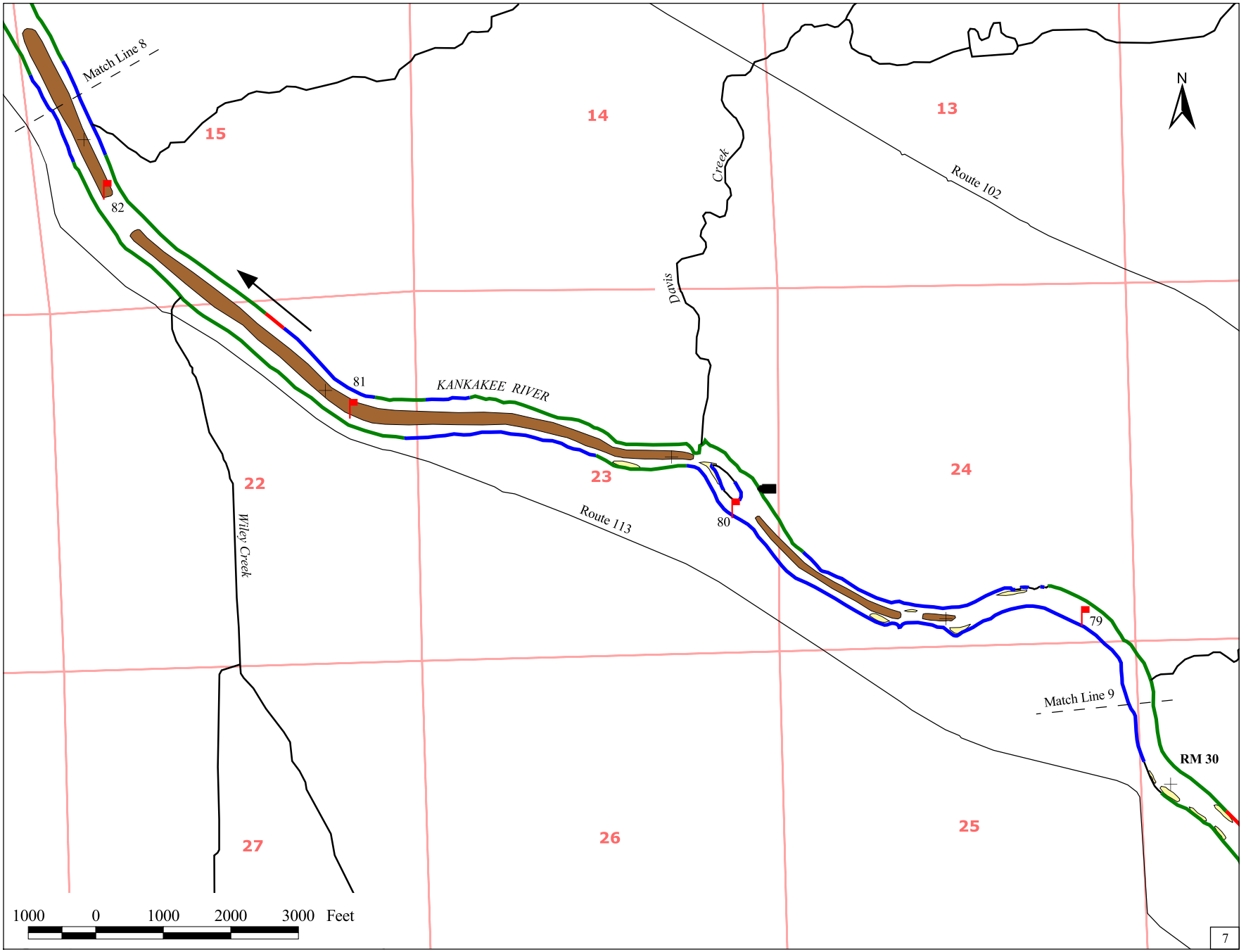
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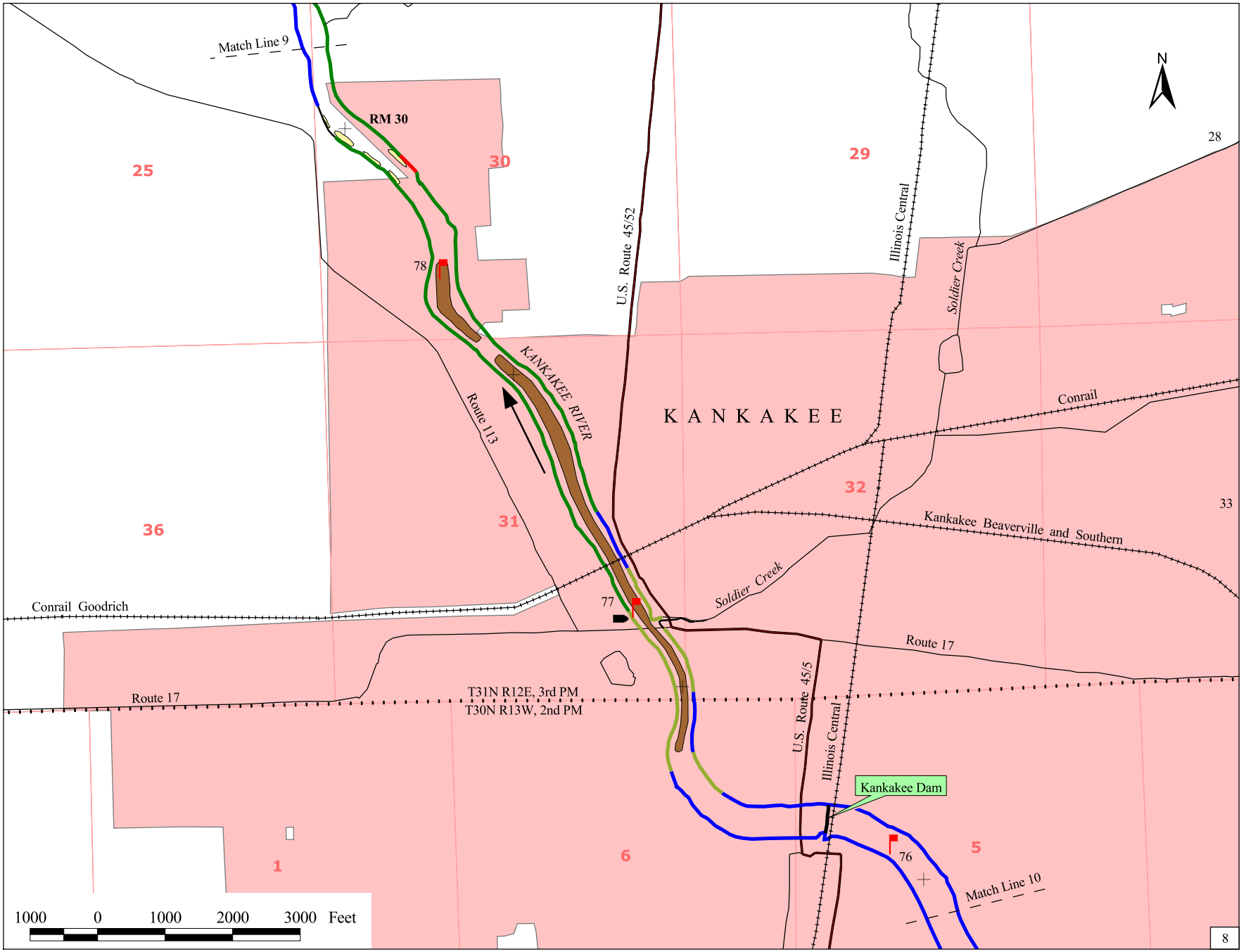
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29
28
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U.S. Route 45/52
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Route 113
KANKAKEE
Conrail
32
33
36
31
Kankakee Beaverville and Southern
Soldier Creek
77
Conrail Goodrich
Route 17
Route 17
T31N R12E, 3rd PM
T30N R13W, 2nd PM
U.S. Route 45/5
Illinois Central
Kankakee Dam
1
6
5
76
Match Line 10
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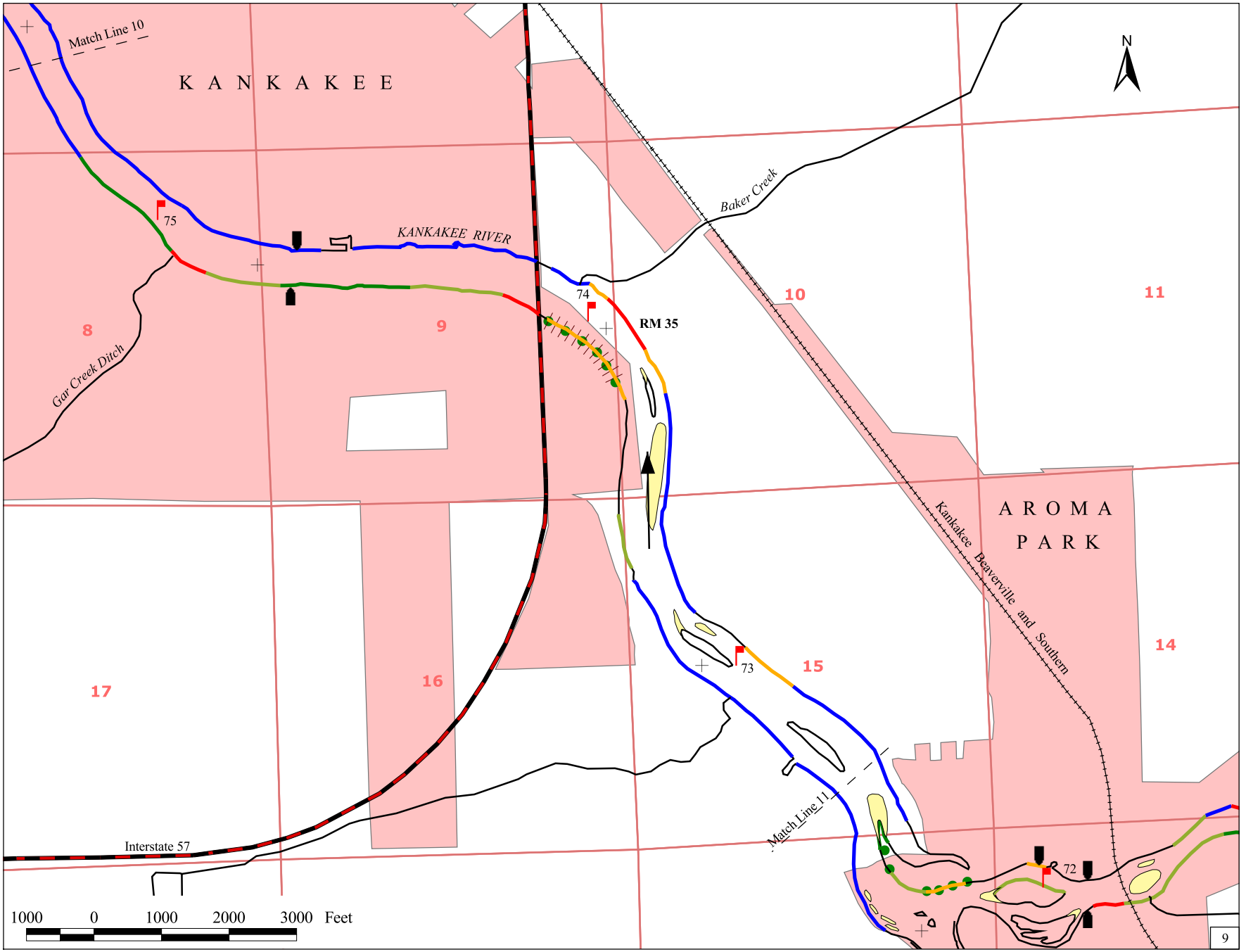
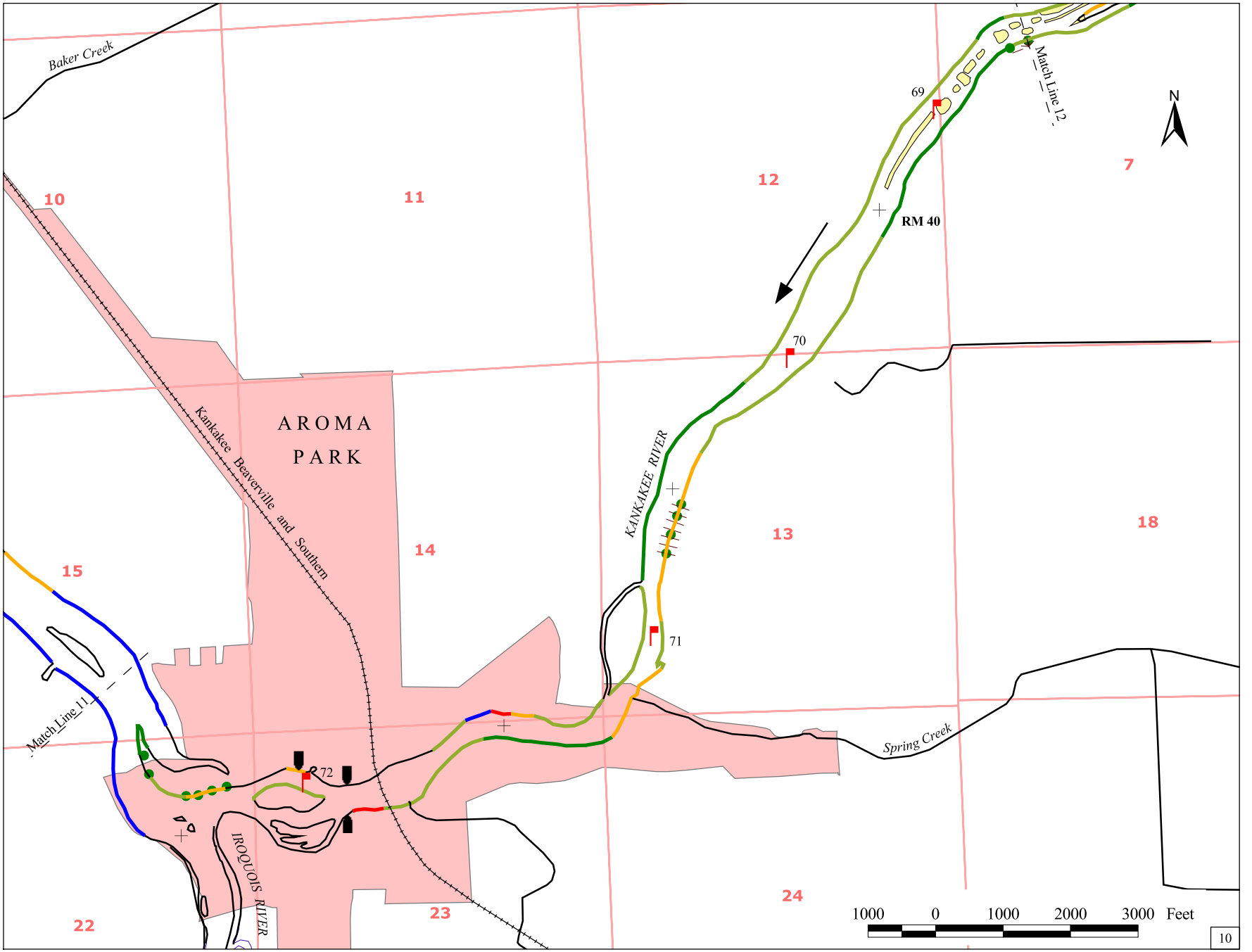
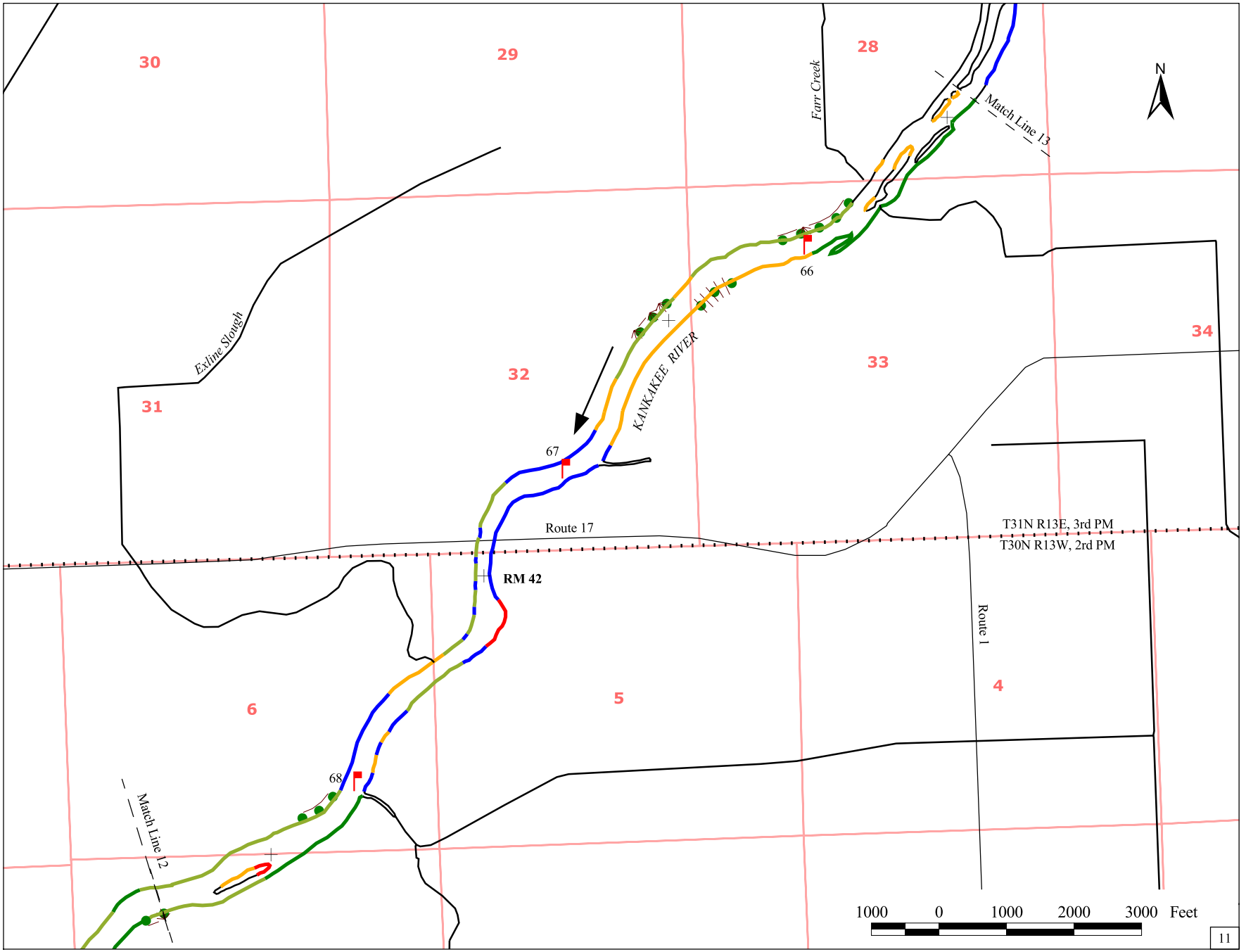
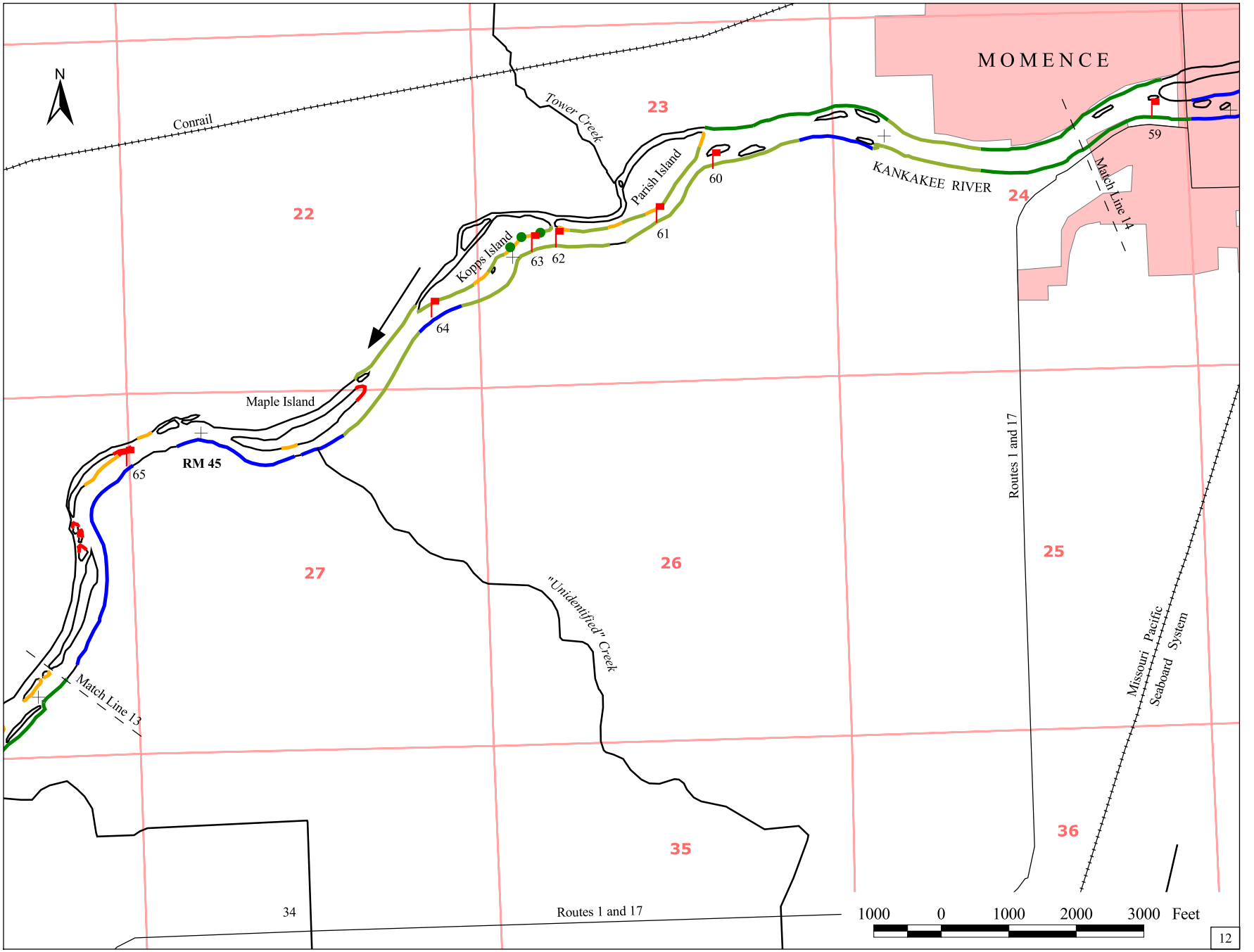
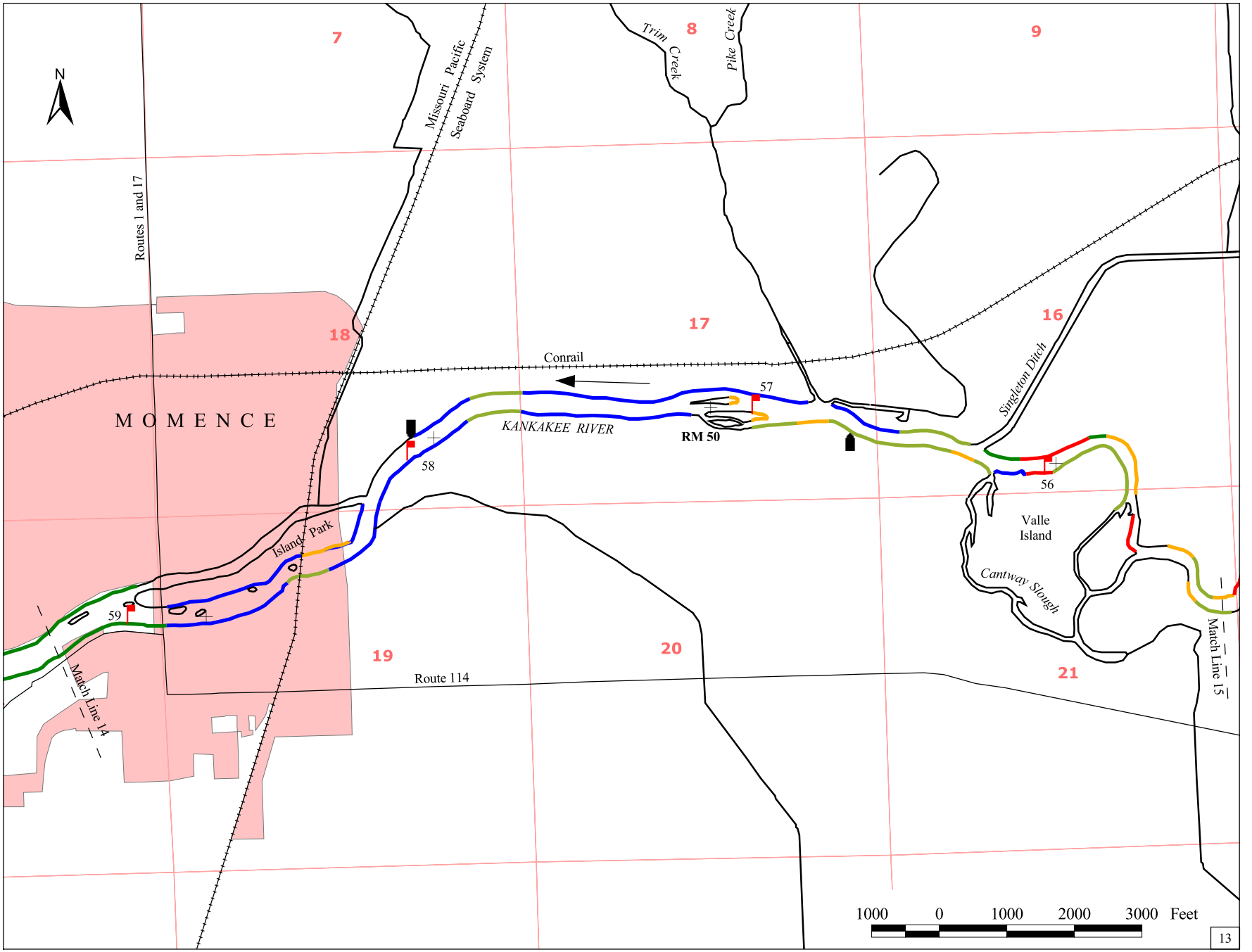
N
8

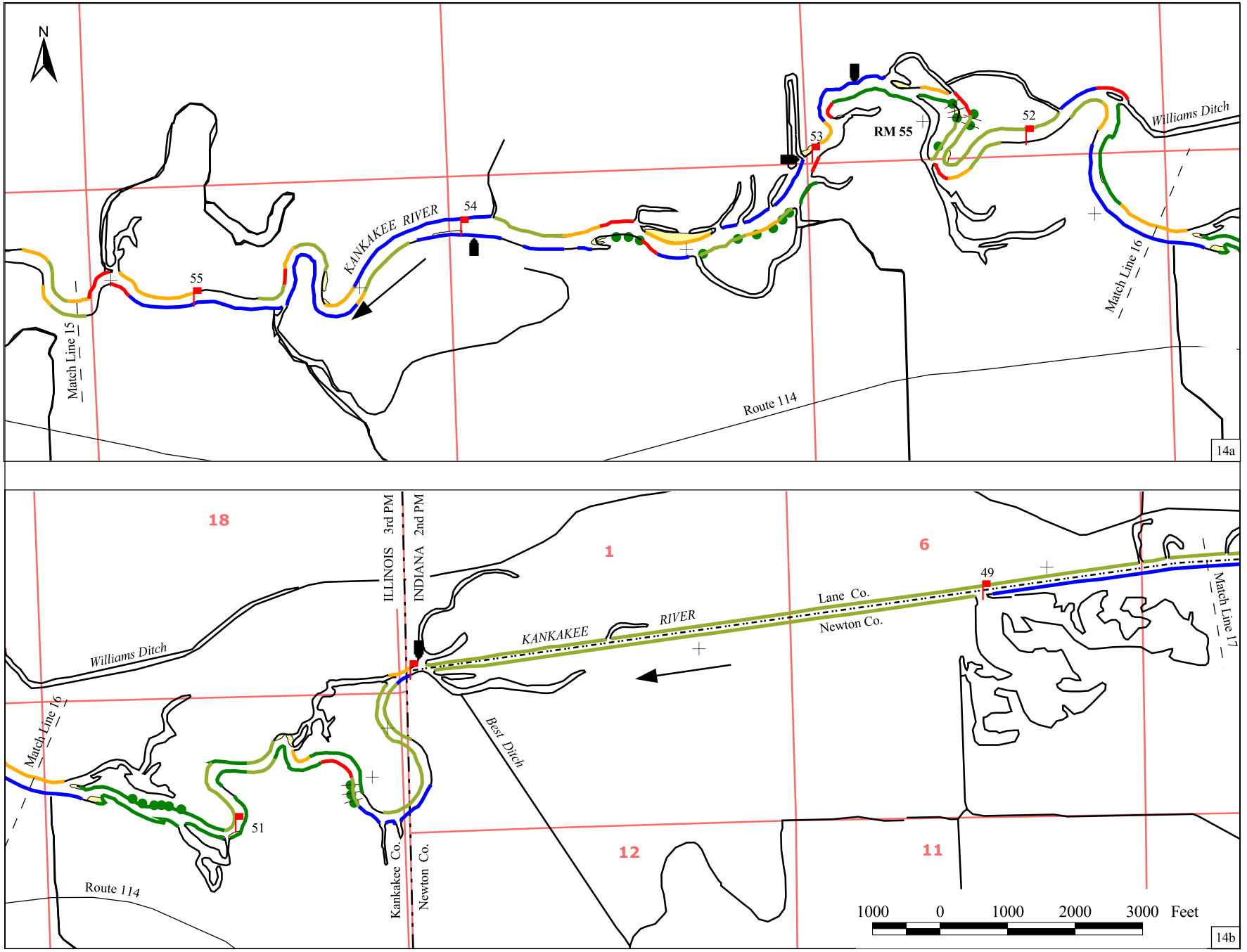

Match Line 10
K A N K A K E E
N
75
KANKAKEE RIVER
Baker Creek
74
RM 35
8
9
10
11
Gar Creek Ditch
A R O M A
P A R K
Kankakee Beaverville and Southern
14
15
73
16
17
Match Line 11
Interstate 57
72
1000 0 1000 2000 3000 Feet
9

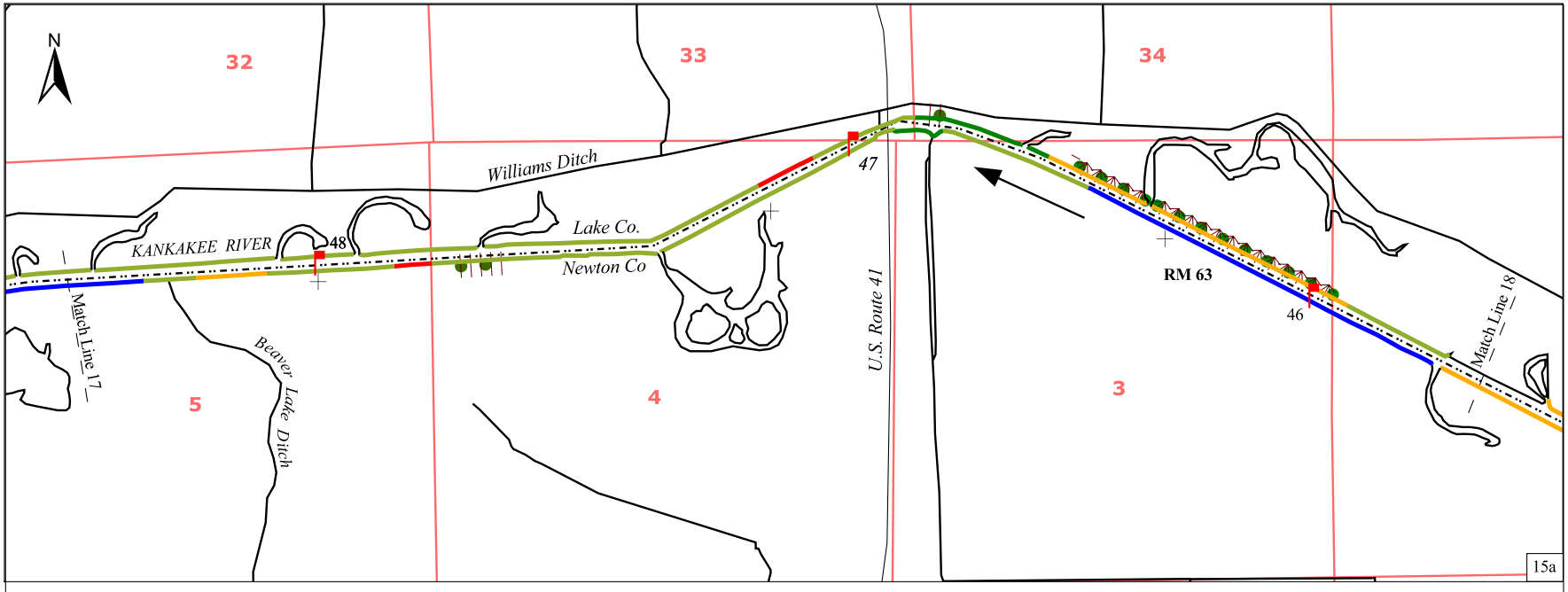

Baker Creek
Match Line 12
69
N
7
10
11
12
RM 40
70
AROMA
PARK
Kankakee Beaverville and Southern
KANKAKEE RIVER
14
13
18
15
71
Match Line 11
72
Spring Creek
IROQUOIS RIVER
22
23
24
1000 0 1000 2000 3000 Feet
10

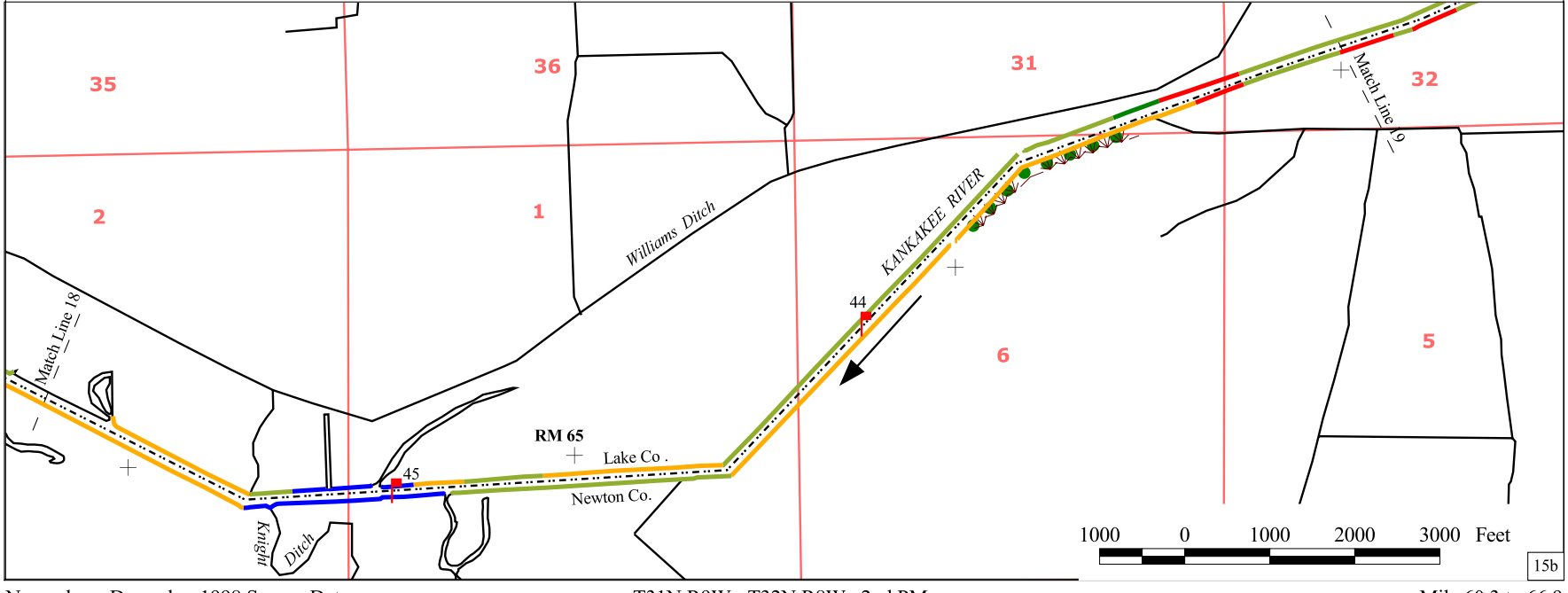

30
29
28
31
32
33
34
6
5
4
Farr Creek
Match Line 13
Exline Slough
KANKAKEE RIVER
66
67
68
Route 17
RM 42
T31N R13E, 3rd PM
T30N R13W, 2rd PM
Route 1
Match Line 12
N
1000 0 1000 2000 3000 Feet
11

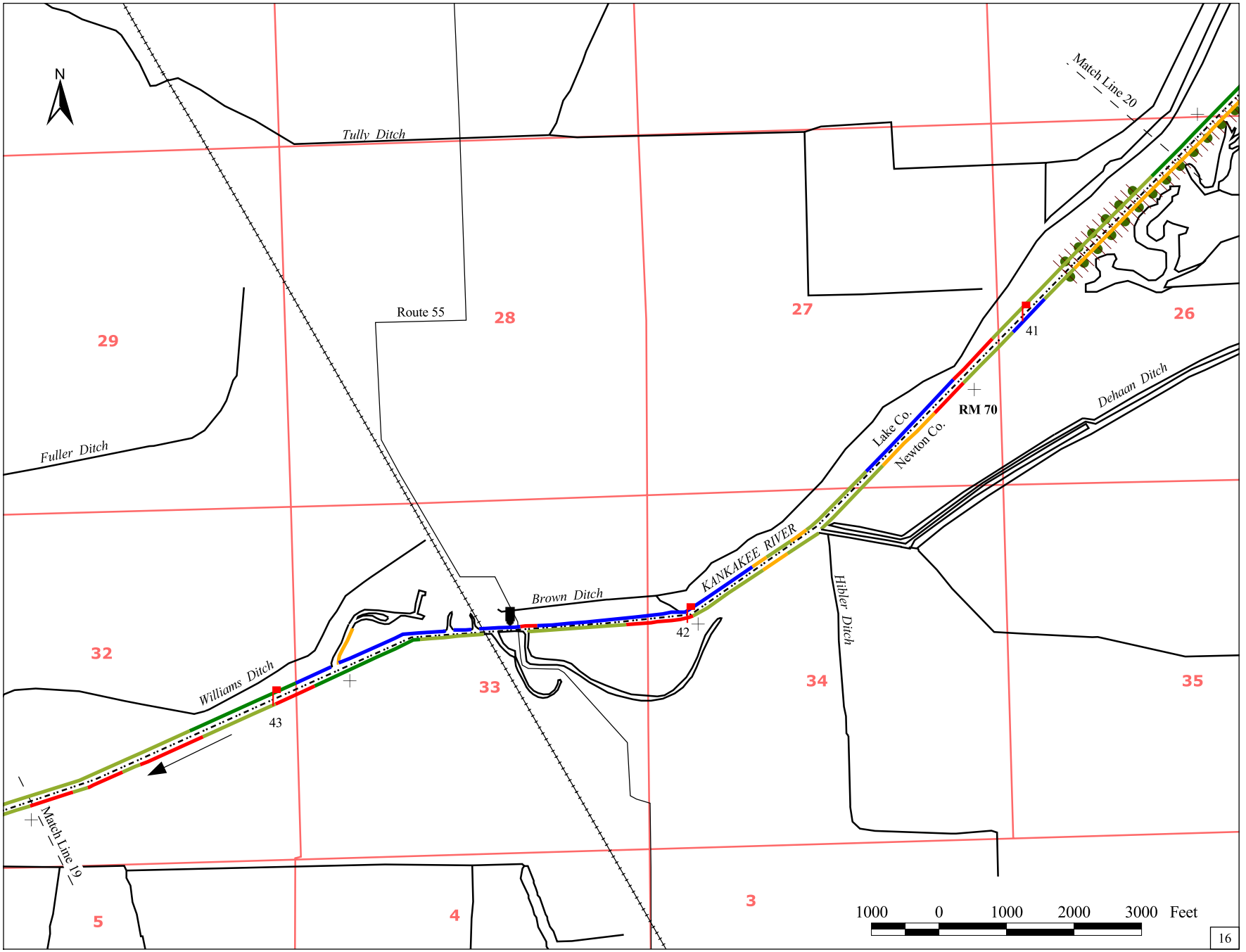

N
MOMENCE
Conrail
Tower Creek
23
22
24
25
26
27
35
36
34
Parish Island
Kopps Island
KANKAKEE RIVER
59
60
61
62
63
64
65
Maple Island
RM 45
Match Line 14
Match Line 13
Routes 1 and 17
"Unidentified" Creek
Missouri Pacific Seaboard System
Routes 1 and 17
1000 0 1000 2000 3000 Feet
12

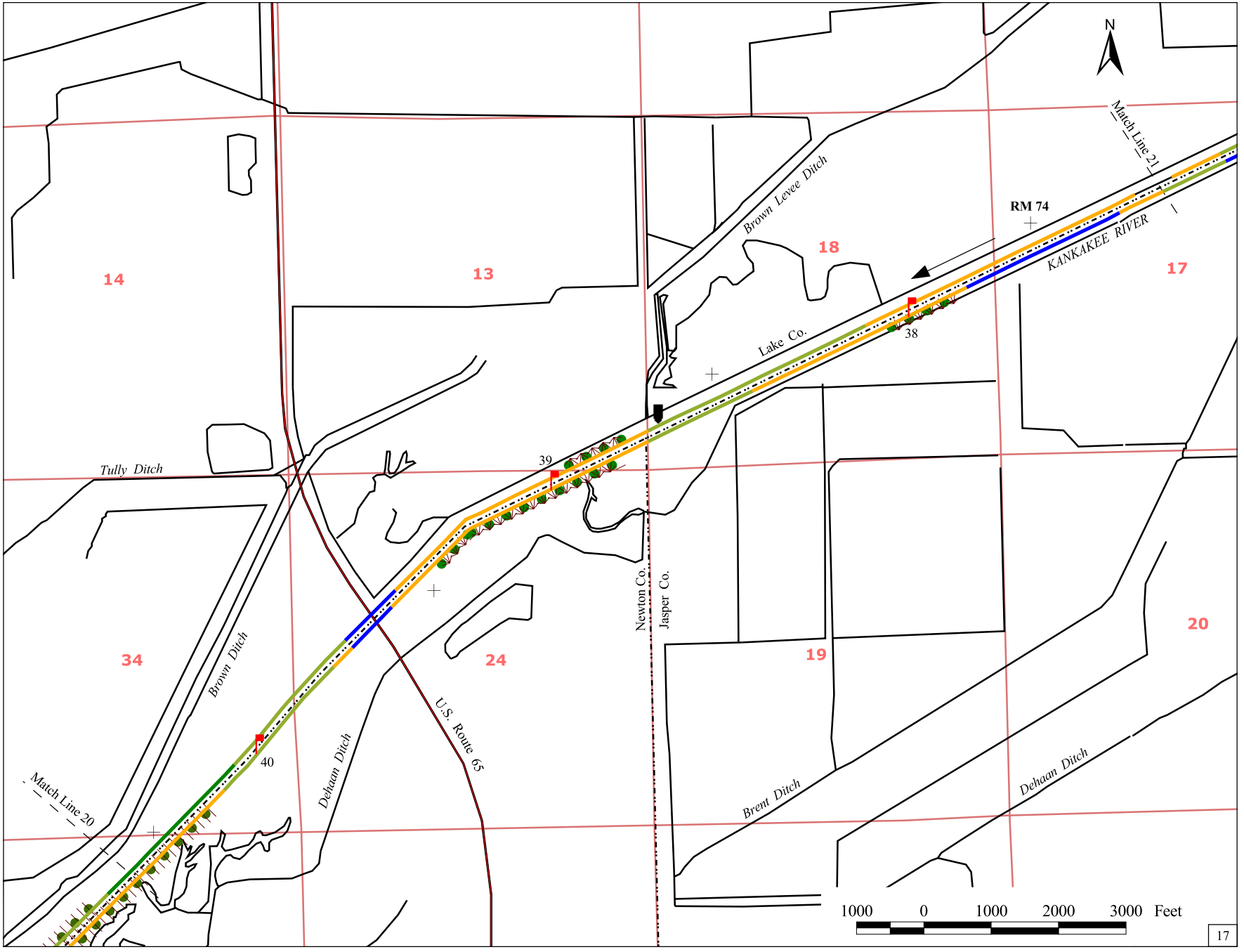

N
7
8
9
Trim Creek
Pike Creek
Missouri Pacific
Seaboard System
Routes 1 and 17
18
17
16
Conrail
MOMENCE
KANKAKEE RIVER
RM 50
57
58
56
Singleton Ditch
Valle
Island
Island Park
Cantway Slough
59
19
20
21
Route 114
Match Line 14
Match Line 15
1000 0 1000 2000 3000 Feet
13

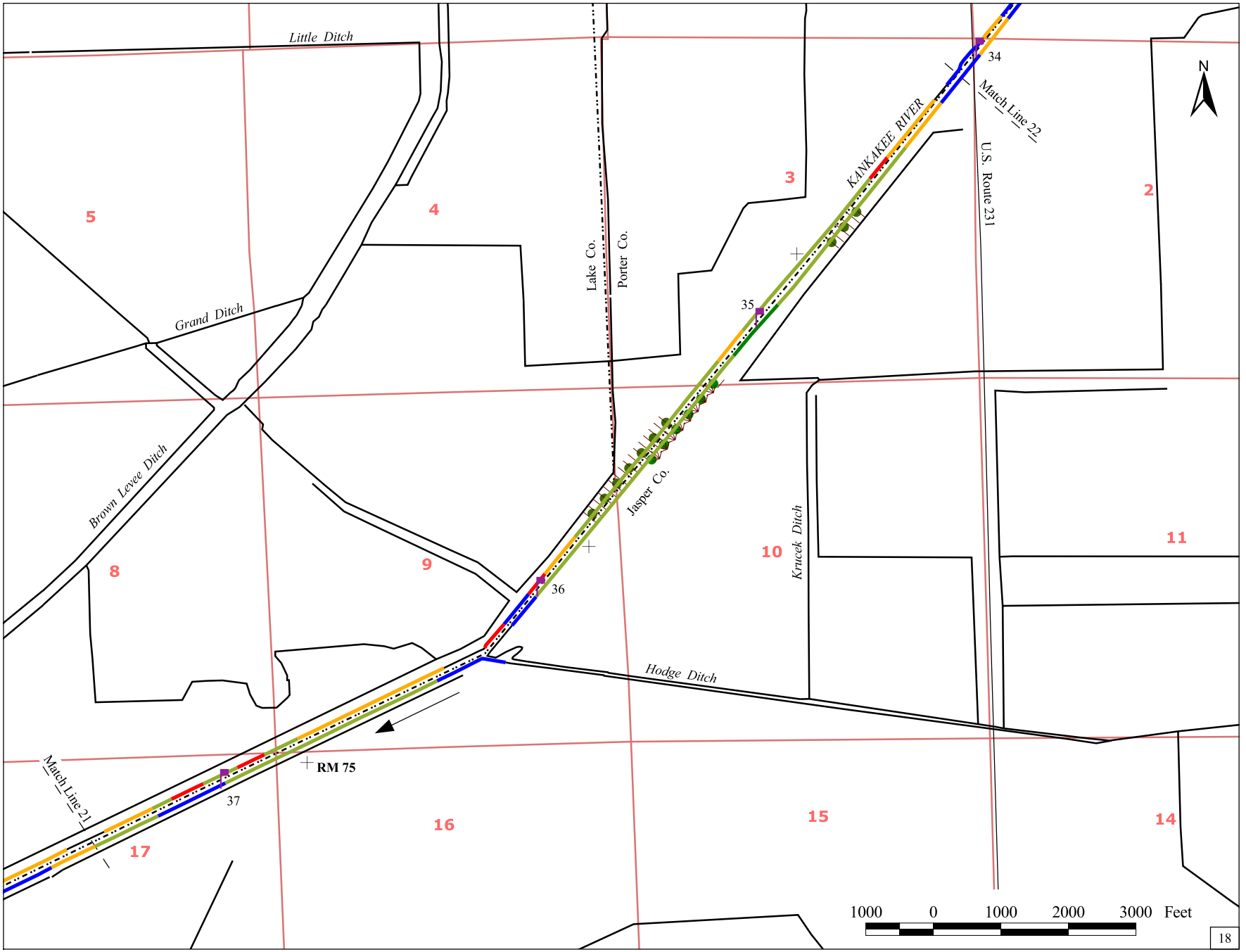

N
RM 55
52
53
54
55
KANKAKEE RIVER
Williams Ditch
Match Line 15
Match Line 16
Route 114
14a
18
1
6
ILLINOIS 3rd PM
INDIANA 2nd PM
49
Lane Co.
Newton Co.
KANKAKEE RIVER
Match Line 17
Williams Ditch
Match Line 16
Best Ditch
51
12
11
Route 114
Kankakee Co.
Newton Co.
1000 0 1000 2000 3000 Feet
14b

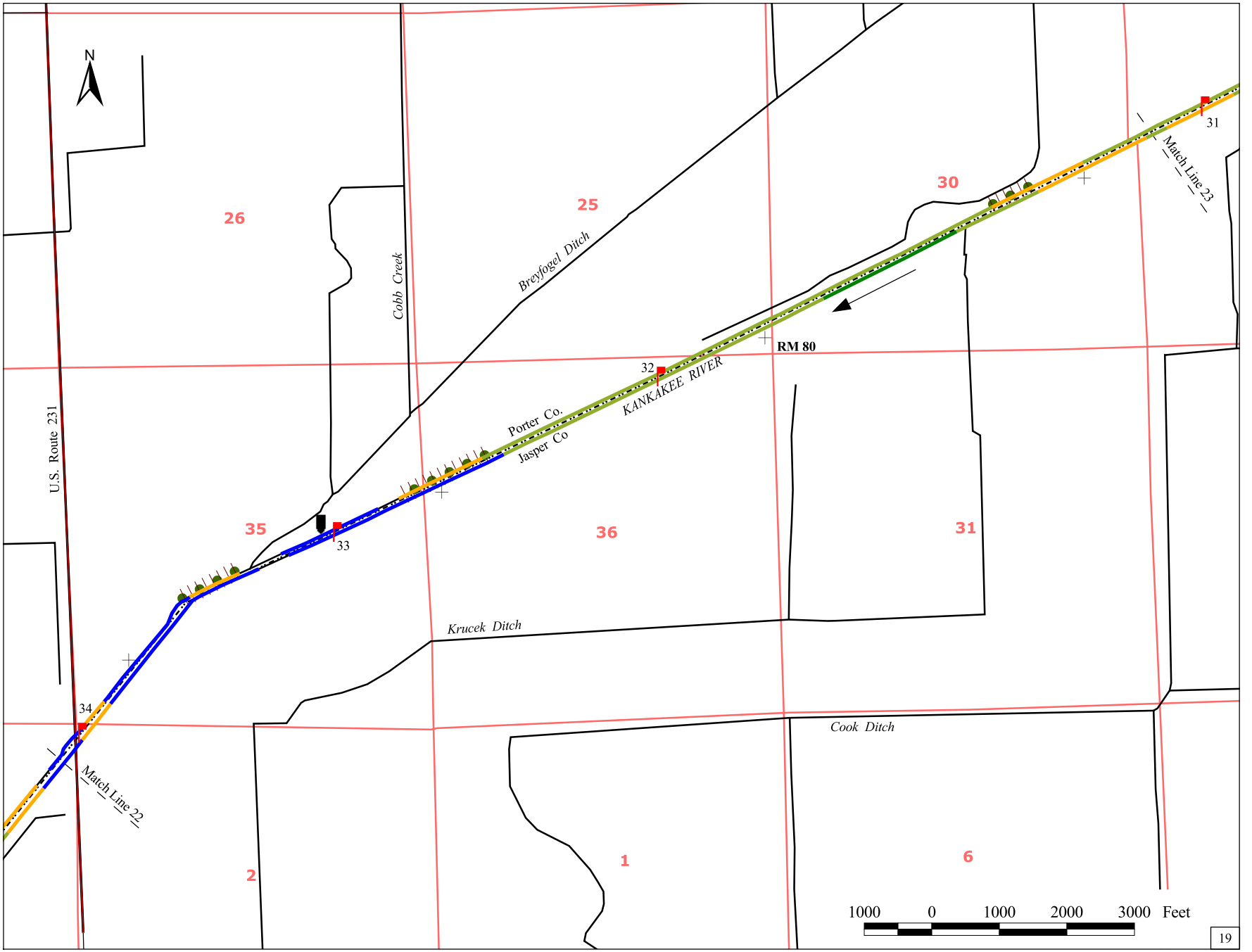

N
32
33
34
Williams Ditch
47
KANKAKEE RIVER
48
Lake Co.
Newton Co
U.S. Route 41
RM 63
46
Match Line 17
Beaver Lake Ditch
5
4
3
Match Line 18
15a

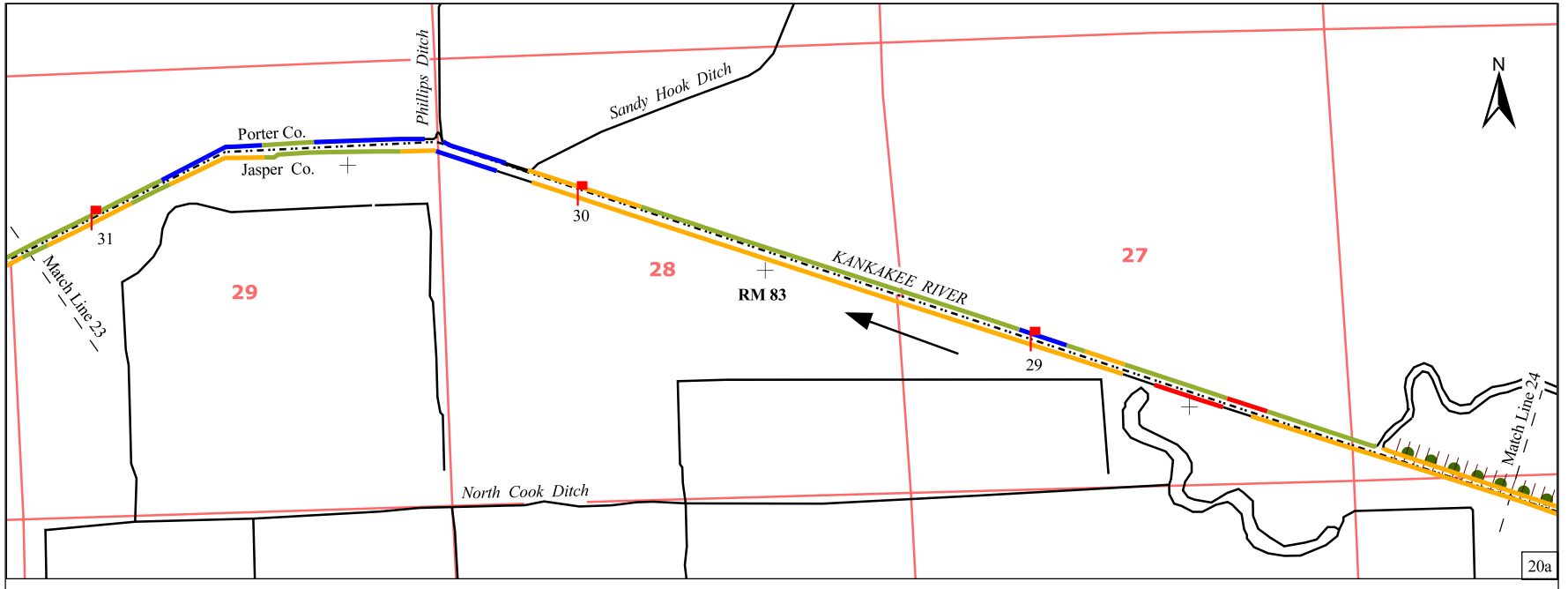

35
36
31
32
2
1
Williams Ditch
KANKAKEE RIVER
Match Line 18
Match Line 19
44
6
5
RM 65
Lake Co .
45
Newton Co.
Knight Ditch
1000 0 1000 2000 3000 Feet
15b

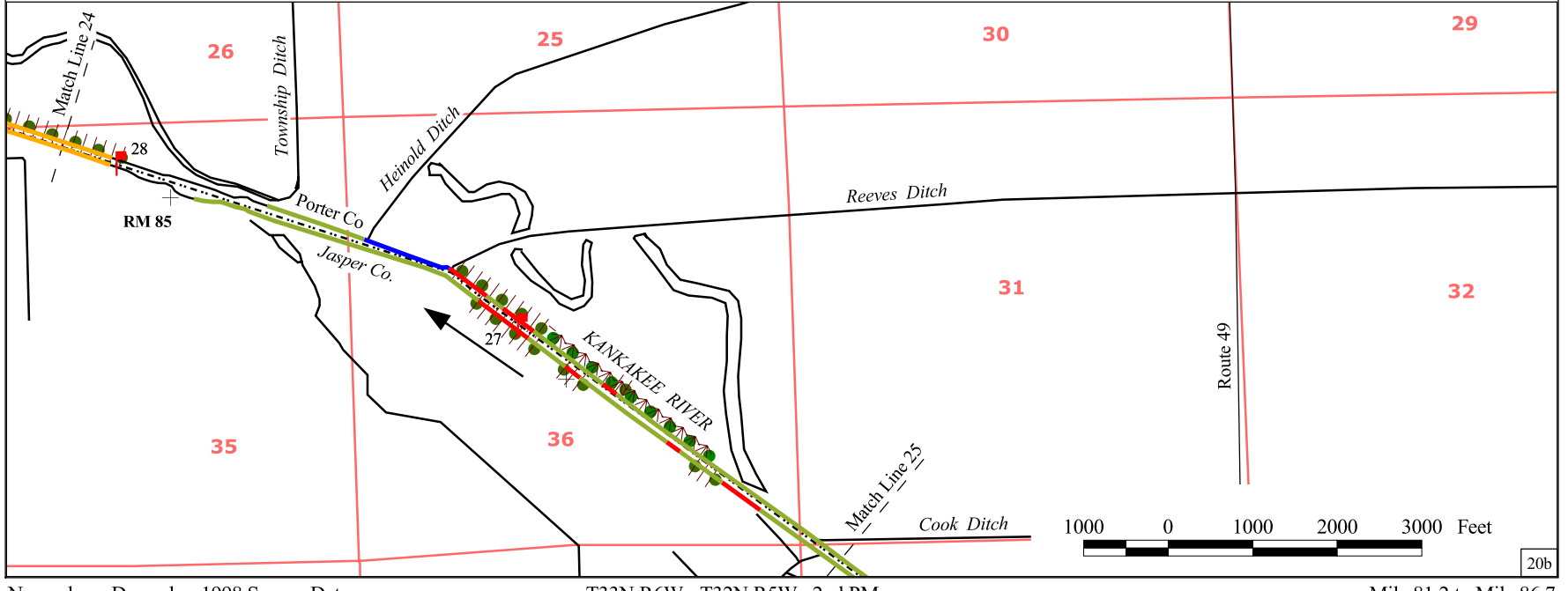

N
Tully Ditch
Match Line 20
Route 55
28
27
26
29
41
RM 70
Lake Co.
Newton Co.
Dehaan Ditch
Fuller Ditch
KANKAKEE RIVER
Brown Ditch
42
Hibler Ditch
32
33
34
35
Williams Ditch
43
Match Line 19
5
4
3
1000 0 1000 2000 3000 Feet
16

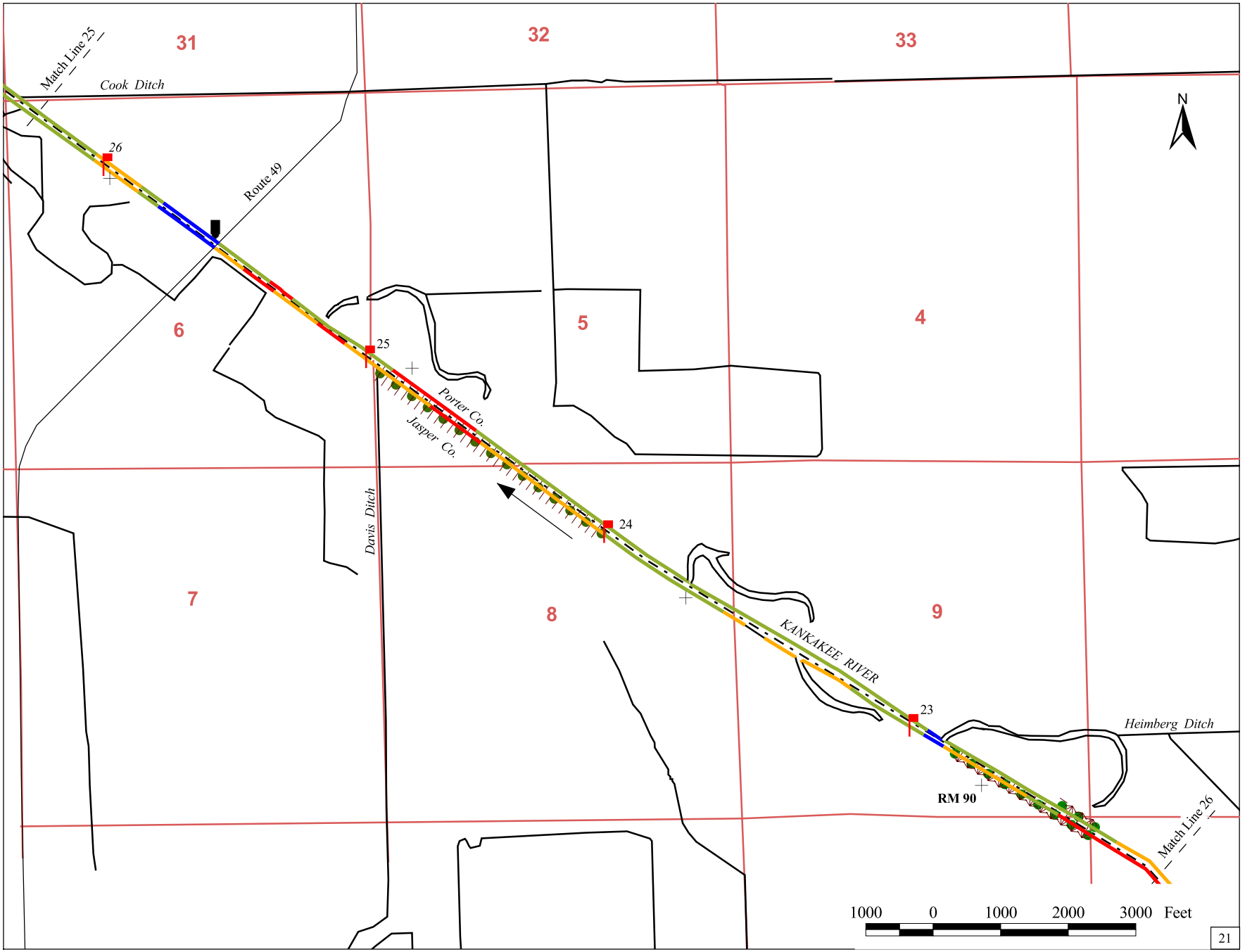

N
Match Line 21
Brown Levee Ditch
RM 74
KANKAKEE RIVER
14
13
18
17
Lake Co.
38
39
Tully Ditch
Newton Co.
Jasper Co.
34
24
19
20
Brown Ditch
Dehaan Ditch
U.S. Route 65
40
Match Line 20
Brent Ditch
Dehaan Ditch
1000 0 1000 2000 3000 Feet
17

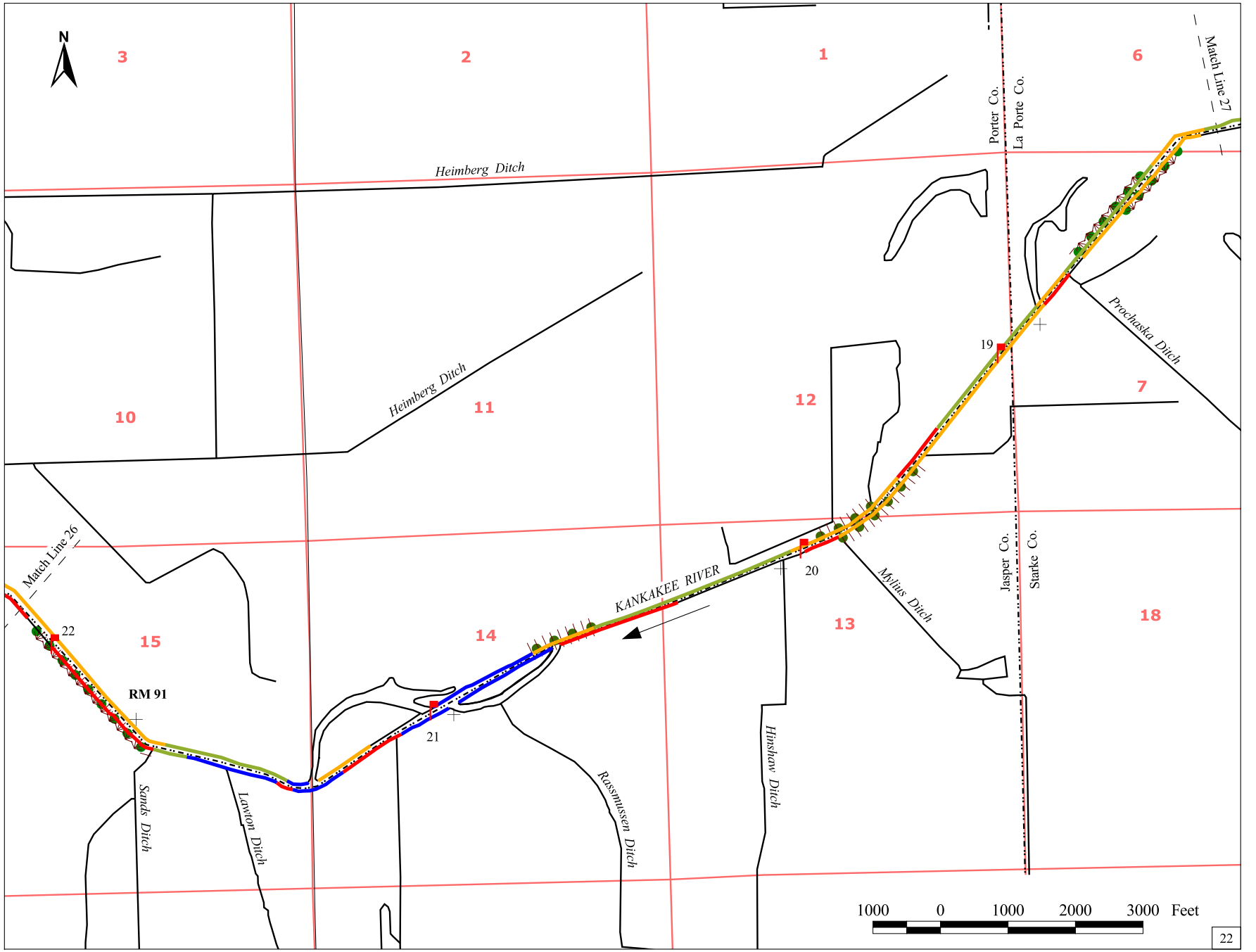

Little Ditch
Grand Ditch
Brown Levee Ditch
Lake Co.
Porter Co.
Jasper Co.
KANKAKEE RIVER
U.S. Route 231
Krucek Ditch
Hodge Ditch
Match Line 22
Match Line 21
RM 75
34
35
36
37
5
4
3
2
8
9
10
11
16
15
14
17
N
1000 0 1000 2000 3000 Feet
18

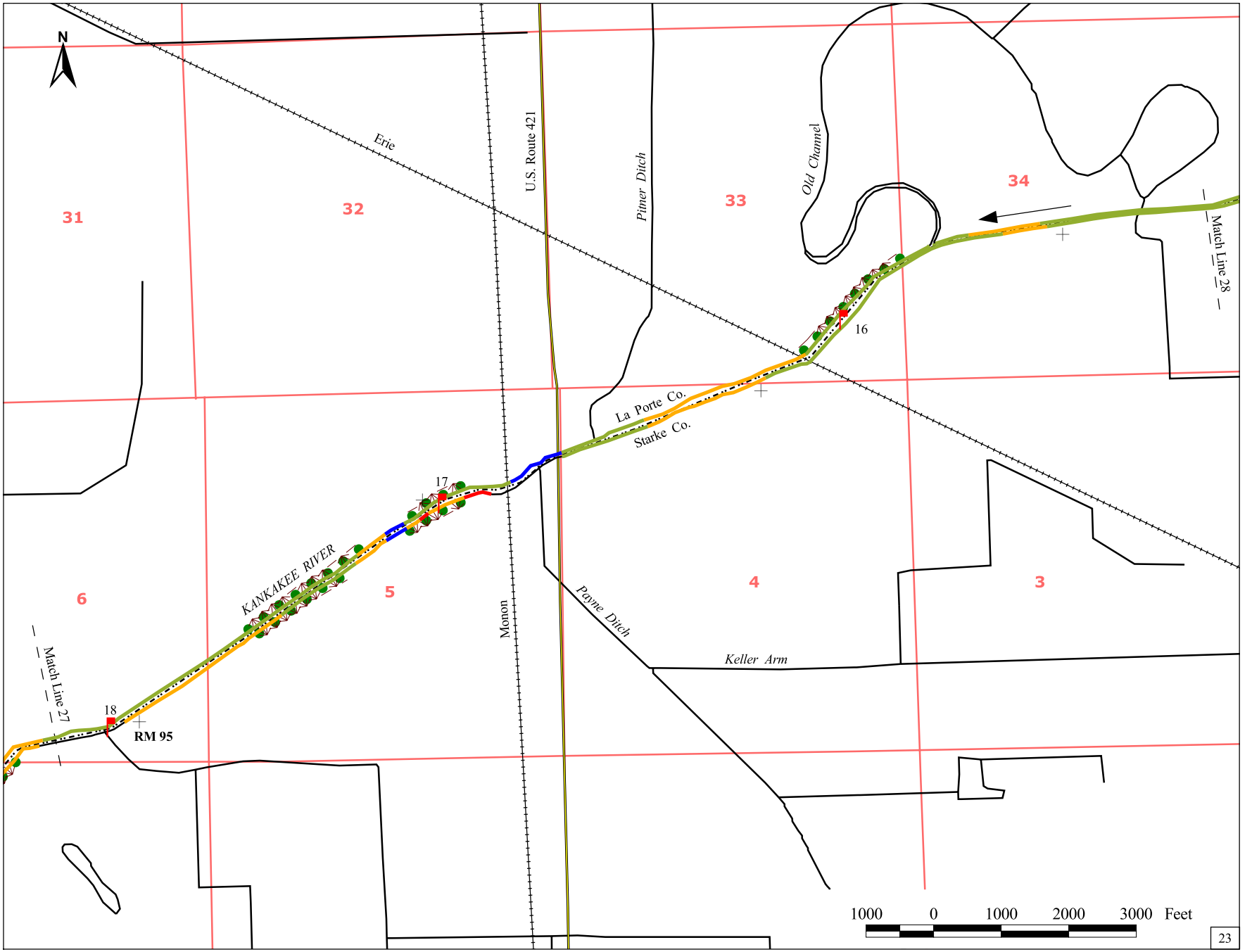

N
26
25
30
31
35
36
31
2
1
6
Cobb Creek
Breyfogel Ditch
U.S. Route 231
Porter Co.
Jasper Co
KANKAKEE RIVER
RM 80
32
33
34
31
Match Line 23
Match Line 22
Krucek Ditch
Cook Ditch
1000 0 1000 2000 3000 Feet
19

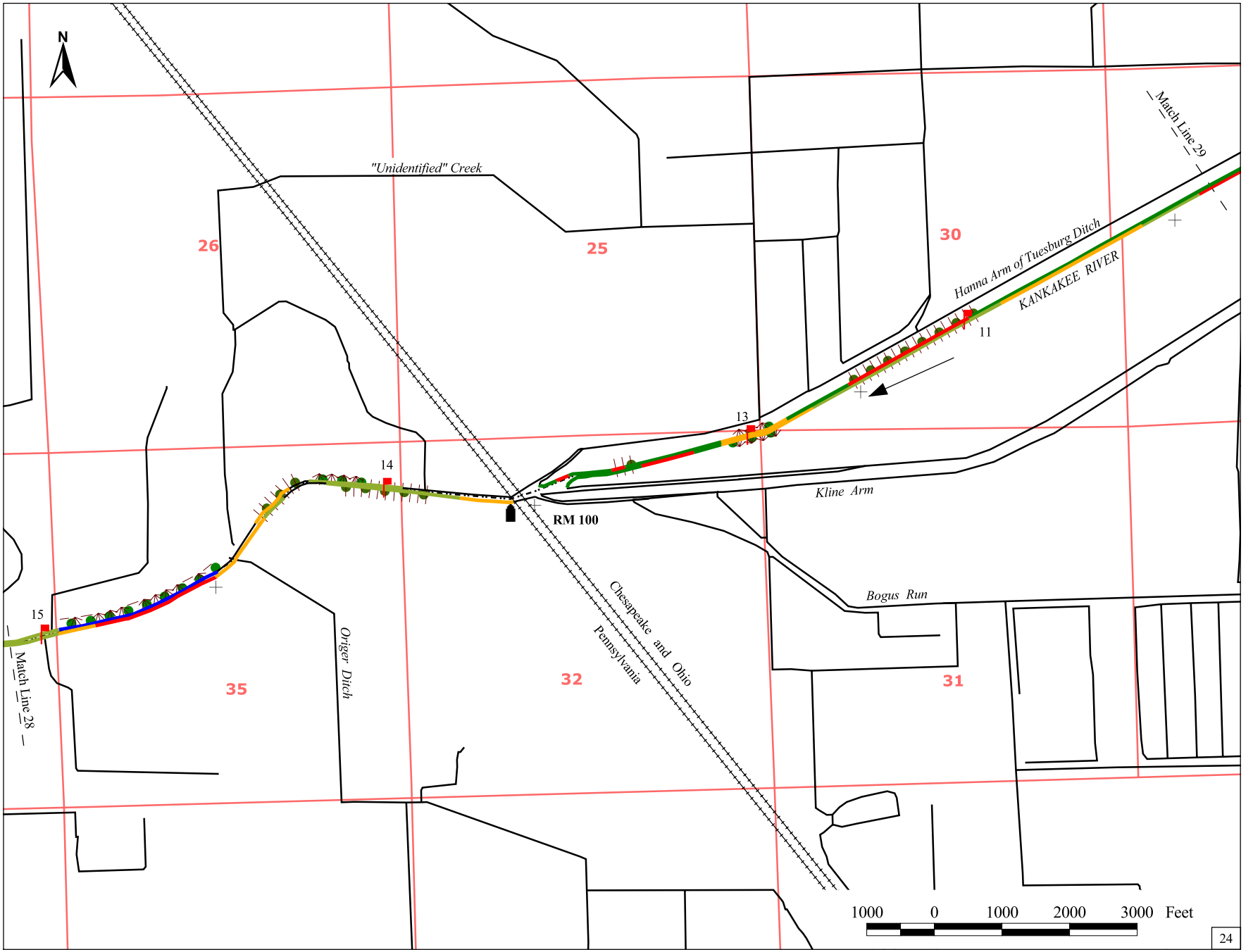

Phillips Ditch
Sandy Hook Ditch
Porter Co.
Jasper Co.
31
30
29
28
27
RM 83
KANKAKEE RIVER
Match Line 23
Match Line 24
North Cook Ditch
N
20a

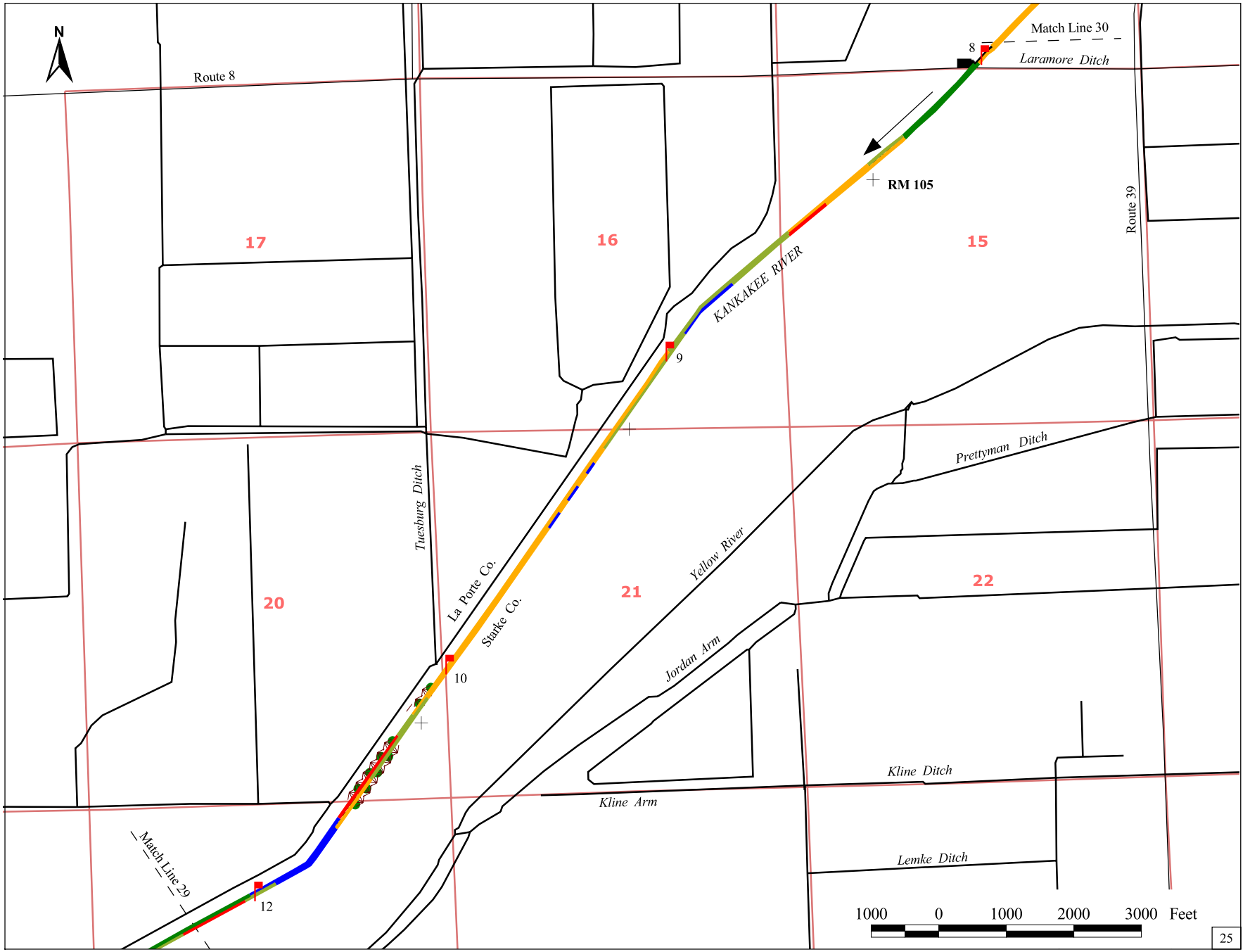

26
25
30
29
Match Line 24
28
RM 85
Township Ditch
Heinold Ditch
Porter Co
Jasper Co.
Reeves Ditch
27
KANKAKEE RIVER
31
32
Route 49
35
36
Match Line 25
Cook Ditch
1000 0 1000 2000 3000 Feet
20b

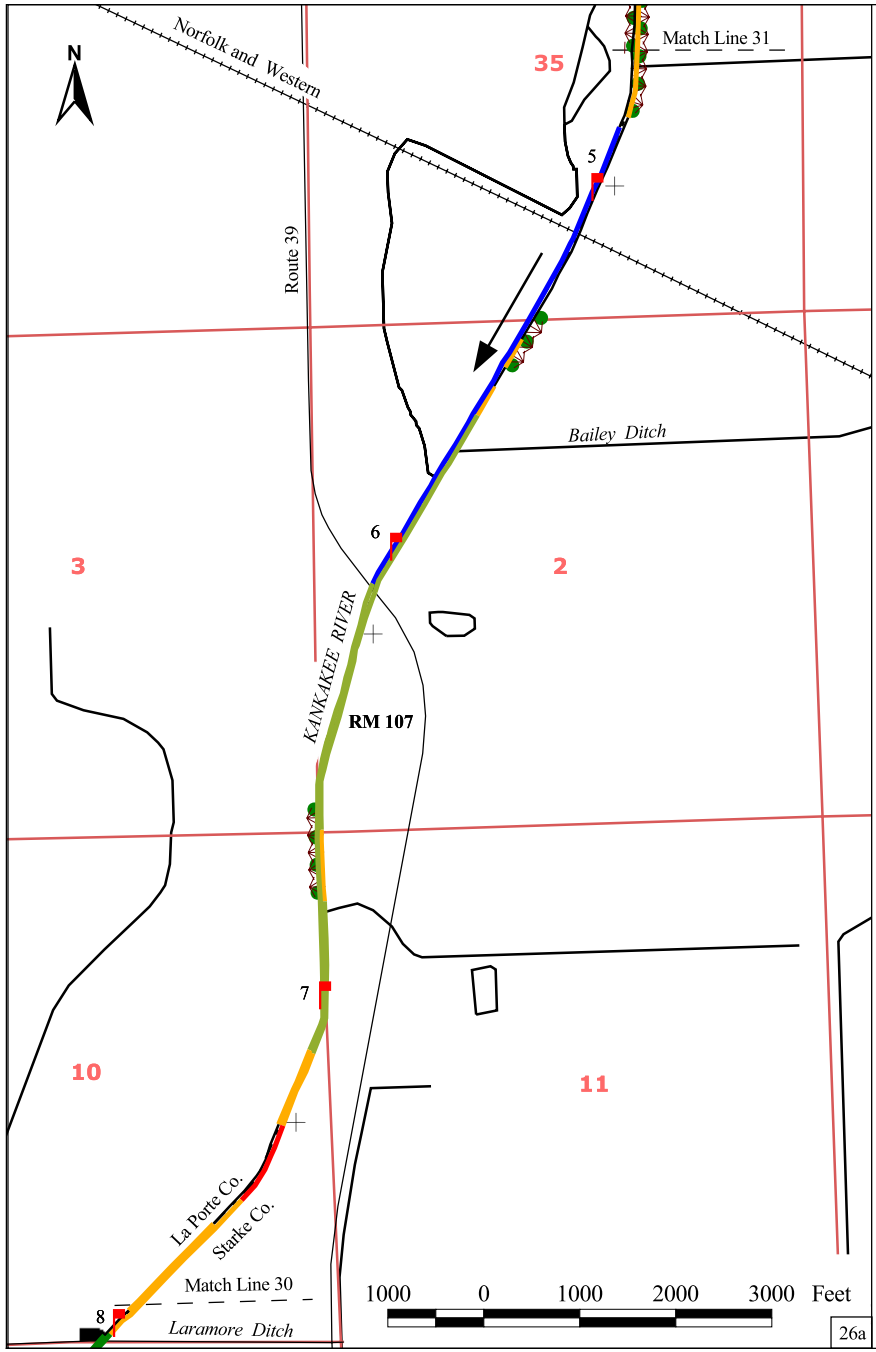

Match Line 25
Cook Ditch
31
32
33
N
26
Route 49
6
25
5
4
Porter Co.
Jasper Co.
Davis Ditch
24
7
8
9
KANKAKEE RIVER
23
Heimberg Ditch
RM 90
Match Line 26
1000 0 1000 2000 3000 Feet
21

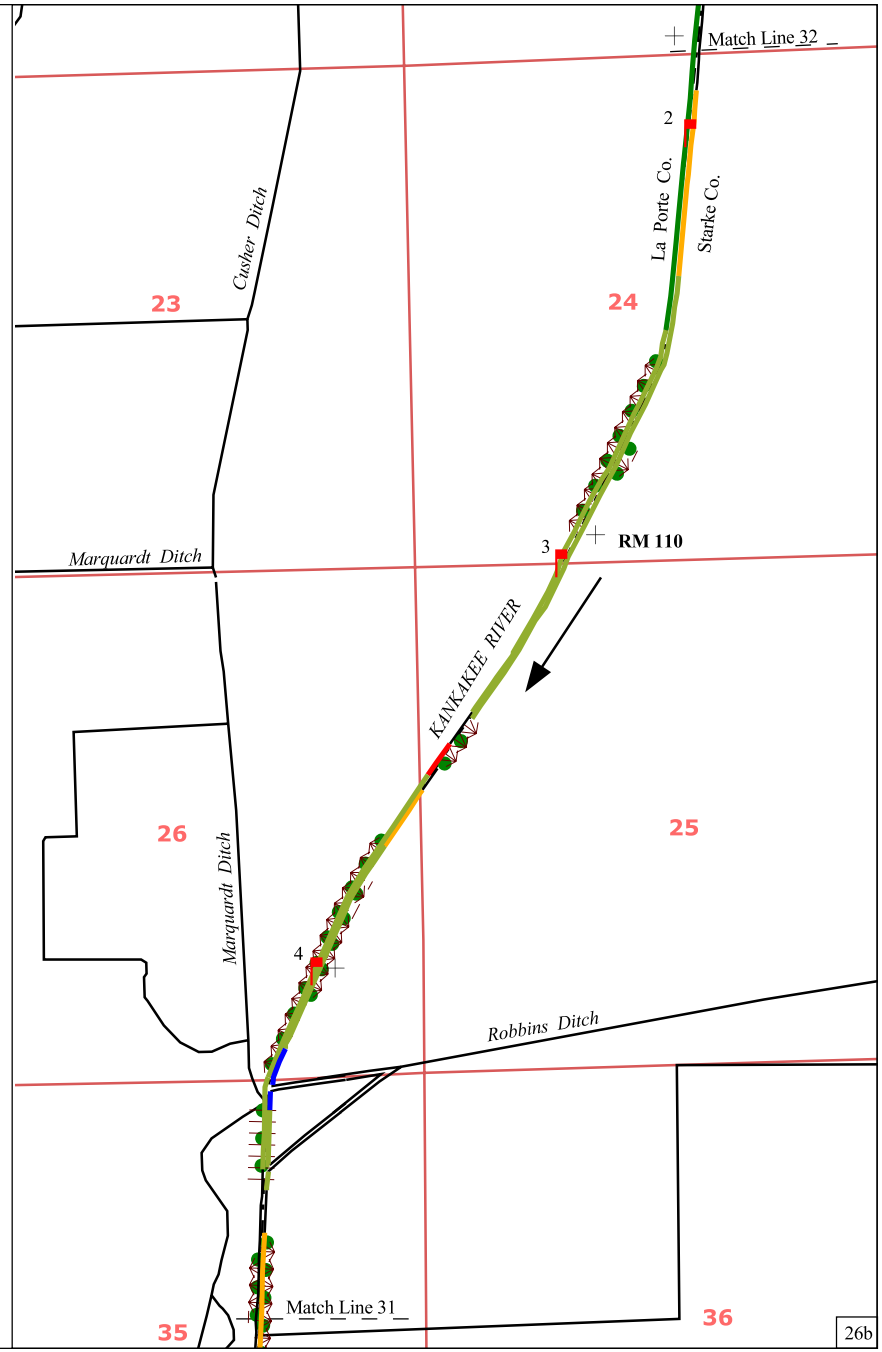

N
3
2
1
6
Heimberg Ditch
Porter Co.
La Porte Co.
Match Line 27
Prochaska Ditch
19
10
Heimberg Ditch
11
12
7
Match Line 26
22
20
KANKAKEE RIVER
Mylius Ditch
Jasper Co.
Starke Co.
15
14
13
18
RM 91
21
Hinshaw Ditch
Sands Ditch
Lawton Ditch
Rassmussen Ditch
1000 0 1000 2000 3000 Feet
22

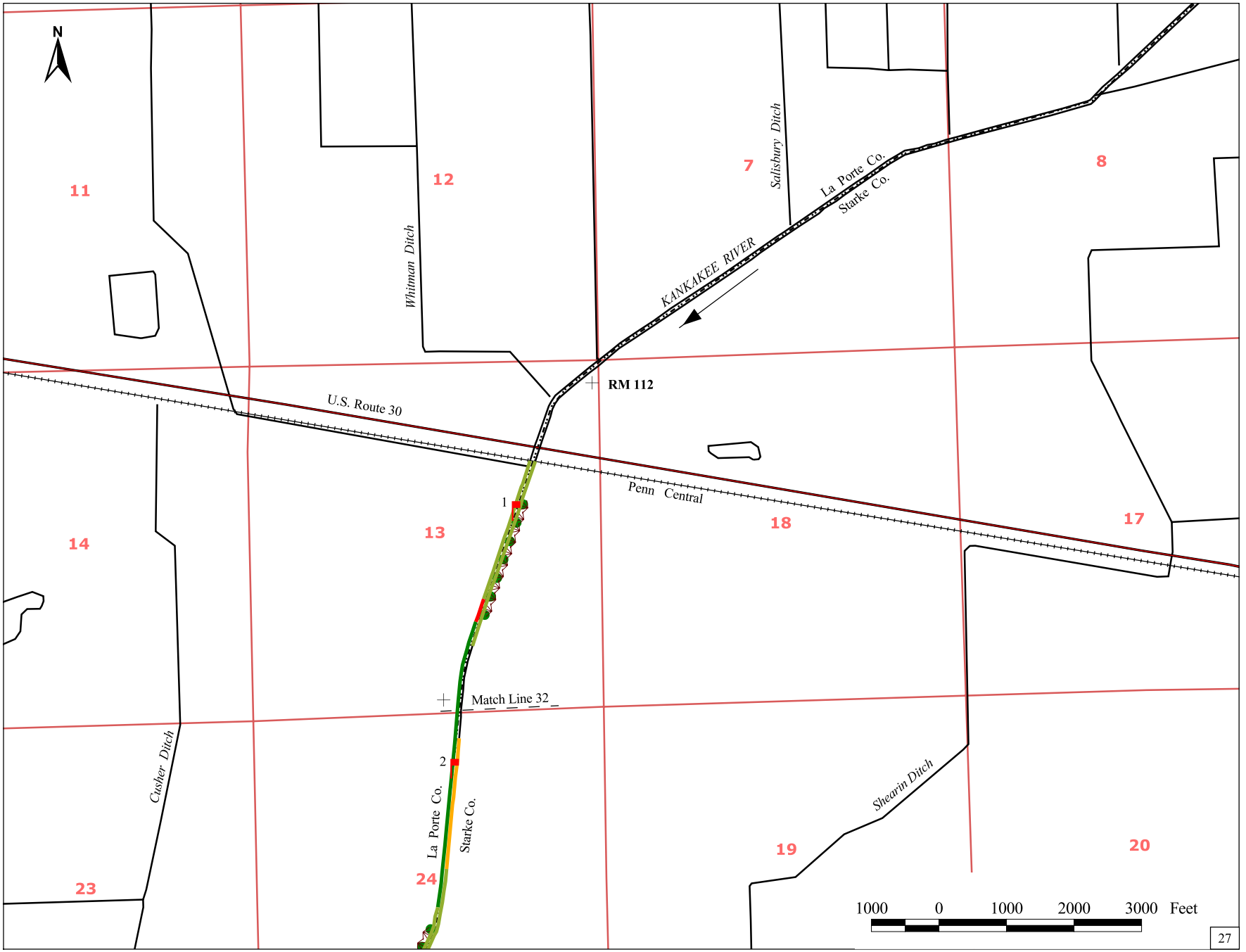

N
Erie
U.S. Route 421
Pitner Ditch
Old Channel
31
32
33
34
Match Line 28
16
La Porte Co.
Starke Co.
17
KANKAKEE RIVER
6
5
4
3
Monon
Payne Ditch
Keller Arm
Match Line 27
18
RM 95
1000 0 1000 2000 3000 Feet
23


N
"Unidentified" Creek
26
25
30
Hanna Arm of Tuesburg Ditch
KANKAKEE RIVER
11
13
14
RM 100
Kline Arm
Match Line 29
Bogus Run
Chesapeake and Ohio
Pennsylvania
15
Match Line 28
Origer Ditch
35
32
31
1000 0 1000 2000 3000 Feet
24


N
Route 8
Match Line 30
Laramore Ditch
8
RM 105
Route 39
17
16
15
KANKAKEE RIVER
9
Prettyman Ditch
Tuesburg Ditch
La Porte Co.
Starke Co.
20
21
22
Yellow River
Jordan Arm
10
Kline Ditch
Kline Arm
Match Line 29
12
Lemke Ditch
1000 0 1000 2000 3000 Feet
25


N
Norfolk and Western
Route 39
Match Line 31
35
5
Bailey Ditch
6
3
2
KANKAKEE RIVER
RM 107
7
10
11
La Porte Co.
Starke Co.
Match Line 30
8
Laramore Ditch
1000 0 1000 2000 3000 Feet
26a


Match Line 32
2
La Porte Co.
Starke Co.
Cusher Ditch
23
24
Marquardt Ditch
3
RM 110
KANKAKEE RIVER
26
25
Marquardt Ditch
4
Robbins Ditch
Match Line 31
35
36
26b


N
11
12
7
8
13
14
18
17
19
20
23
24
Whitman Ditch
Salisbury Ditch
KANKAKEE RIVER
La Porte Co.
Starke Co.
RM 112
U.S. Route 30
Penn Central
1
2
Match Line 32
Cusher Ditch
Shearin Ditch
1000 0 1000 2000 3000 Feet
27


ILLINOIS
DEPARTMENT OF
NATURAL
RESOURCES