Prepared for:
Basin Electric Power Cooperative

Final Woody Species Inventory Report for the Antelope Valley Station Raw Water Pipeline Project

ENSR Corporation
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1.0 Introduction

An inventory of woody species within the 150-foot-wide construction right-of-way (ROW) along the Antelope Valley Station (AVS) raw water pipeline route was conducted by ENSR biologists in May 2005. A woody species inventory report was completed by ENSR in June 2005 and was provided to Basin Electric Power Cooperative (BEPC) for review. The report was later sent to the North Dakota Public Service Commission (PSC) for review as supplemental information to the Route Permit Application, which was submitted to the PSC in November 2004. The report provided a summary of the species and numbers of woody plants present within the construction ROW and estimated the numbers of woody plants that would be impacted by pipeline construction. The locations of these woody plants along the pipeline route were illustrated on aerial photograph-based maps.

The purpose of this report is to provide a summary of the total numbers of species and woody plants that were removed along the proposed route and according to various landowners' properties along the proposed route. In order to provide additional mitigation for the loss of woody species, a Woody Species Replacement Plan (Plan) will be developed and submitted to the PSC for review and approval.

2.0 Methods and Summary

After pipeline construction had been completed in September 2006, BEPC personnel revisited these woody species' populations to determine the species and numbers of woody plants within the 150-foot-wide construction ROW that were not removed during pipeline construction. **Table 1** lists the species and numbers of woody plants that were observed during the woody species inventory conducted in May 2005, the estimated numbers of woody plants to be removed during pipeline construction, and the species and numbers of woody plants that were removed during pipeline construction. **Table 2** lists the species and numbers of woody plants that were removed during pipeline construction according to land ownership. **Maps 1** through **17** illustrate woody species' populations along the pipeline route and land ownership boundaries (see Appendix A).

Table 1 Woody Species Observed, Estimated to be Removed, and Removed Along the Proposed Route

Common Name	Scientific Name	Number of Individuals in 150-foot-wide ROW	Estimated Number of Individuals to be Removed During Construction	Actual Number of Individuals Removed During Construction
Trees				
Box elder	*Acer negundo*	57	57	31
Green ash	*Fraxinus pennsylvanica*	21	21	15
American elm	*Ulmus americana*	37	0	4
Siberian elm	*Ulmus sibericus*	245	58	48
Plains cottonwood	*Populus deltoides*	977	955	756
American plum	*Prunus americana*	43[1] (429 clones)	43	3
Russian olive	*Eleaganus angustifolia*	64	64	49
Hawthorn	*Crataegus rotundifolia*	5	2	1
TOTAL		**1,449**	**1,200**	**907**
Shrubs				
Western snowberry	*Symphoricarpos occidentalis*	381[1] (3,812 clones)	381	35
Chokecherry	*Prunus virginiana*	73[1] (727 clones)	73	18
Buffaloberry	*Sheperdia canadensis*	106	85	80
Bristly gooseberry	*Ribes setosa*	73	48	66
Wild rose	*Rosa arkansana*	18	10	0
Serviceberry	*Amelanchier alnifolia*	9	9	9
Skunkbush	*Rhus trilobata*	45	45	45
Sandbar willow	*Salix exigua*	137[1] (1,365 clones)	137	99
Common lilac	*Syringa vulgaris*	83	80	27
Siberian peashrub	*Caragana arborescens*	76	71	62
Cherry	*Prunus sp.*(introduced shrub)	19	19	19
Wild honeysuckle	*Lonicera dioica*	1	1	1
TOTAL		**1,021**	**888**	**461**

[1]Assumes an average of 10 clones for every plant.

Table 2 Trees and Shrubs Removed Along the Construction Right-of-way According to Landowner

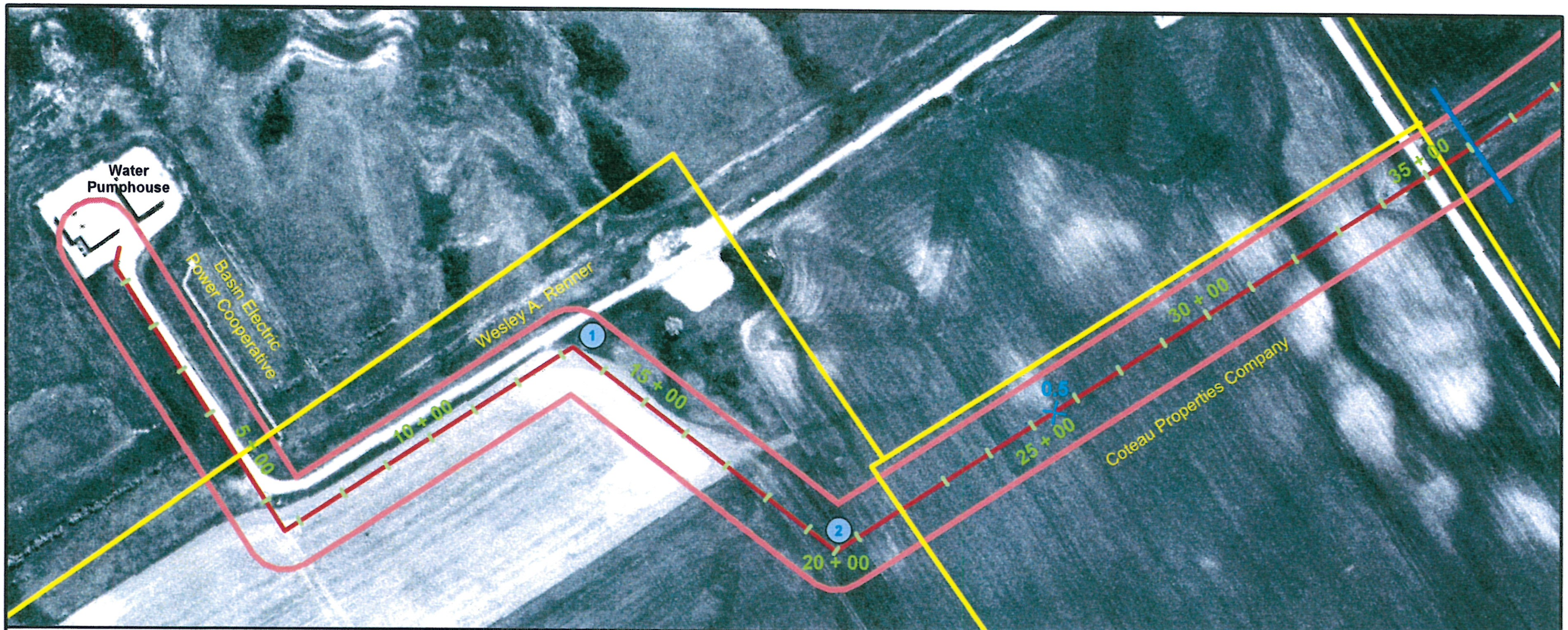
Landowner	Approximate Mileposts (MPs) of Land Tracts	Map(s) Illustrating Property and Locations of Woody Species Removed During Construction	Species and Number of Trees Removed	Species and Number of Shrubs Removed	Total Number of Woody Plants Removed
Basin Electric Power Cooperative	0.0 to 0.1	1	0	0	0
	7.9 to 8.9	14 to 17	Siberian elm – 46 Green ash - 1	Western snowberry – 3 Siberian peashrub – 3 Common lilac - 1	47 trees and 7 shrubs
Total	*1.1*	*NA*	*Siberian elm – 46* *Green ash - 1*	*Western snowberry – 3* *Siberian peashrub – 3* *Common lilac - 1*	*47 trees and 7 shrubs*
Wesley A. Renner	0.1 to 0.4	1	0	Western snowberry - 1	1 shrub
Coteau Properties Company	0.4 to 0.7	1	0	0	0
	2.4 to 2.7	5	Siberian elm – 1	Western snowberry – 8 Skunkbush – 43 Common chokecherry – 2 Bristly gooseberry – 62 Serviceberry – 9 Buffaloberry - 1	1 tree and 125 shrubs
	4.5 to 7.9	8 to 15	Box elder – 27 Green ash – 14 Plains cottonwood – 755 Siberian elm – 1 American elm - 4	Common chokecherry – 4 Western snowberry – 3 Sandbar willow - 99	801 trees and 106 shrubs
Total	*4.0*	*NA*	*Box elder – 27* *Green ash – 14* *Plains cottonwood – 755* *Siberian elm – 2* *American elm - 4*	*Western snowberry – 11* *Skunkbush – 43* *Common chokecherry – 6* *Bristly gooseberry – 62* *Serviceberry – 9* *Buffaloberry – 1* *Sandbar willow – 99*	*802 trees and 231 shrubs*
Helmuth and Lea Pfennig	0.7 to 1.7	1 to 3	0	Common chokecherry – 4 Western snowberry - 7	11 shrubs

Table 2 Trees and Shrubs Removed Along the Construction Right-of-way According to Landowner

Landowner	Approximate Mileposts (MPs) of Land Tracts	Map(s) Illustrating Property and Locations of Woody Species Removed During Construction	Species and Number of Trees Removed	Species and Number of Shrubs Removed	Total Number of Woody Plants Removed
Marlene Schriefer	1.7 to 2.1	3 and 4	Box elder -1 American plum – 1	Common chokecherry – 1 Western snowberry – 2 Buffaloberry – 6	2 trees and 9 shrubs
Tillie Sailer	2.1 to 2.4	4 and 5	Plains cottonwood - 1	Buffaloberry – 34 Western snowberry – 2 Bristly gooseberry - 4	1 tree and 40 shrubs
Lyle Eisenbeis	2.7 to 3.4	5 and 6	0	Western snowberry – 6 Skunkbush – 2 Buffaloberry - 36	44 shrubs
Raymond Eisenbeis	3.4 to 3.9	6 and 7	0	0	0
Wayne and Margo Eisenbeis	3.9 to 4.5	7 and 8	Box elder – 3 Russian olive – 49 American plum – 2 Hawthorn -1	Western snowberry – 3 Buffaloberry – 3 Common chokecherry – 7 Siberian peashrub – 59 Common lilac – 26 Nanking cherry – 19 Wild honeysuckle - 1	55 trees and 118 shrubs
TOTAL	**8.9**	**NA**	**Box elder – 31** **Green ash – 15** **American elm – 4** **Siberian elm – 48** **Plains cottonwood – 756** **American plum – 3** **Russian olive – 49** **Hawthorn - 1**	**Skunkbush – 45** **Sandbar willow – 99** **Common lilac – 27** **Siberian peashrub – 62** **Nanking cherry – 19** **Wild honeysuckle - 1** **Western snowberry – 35** **Common chokecherry – 18** **Buffaloberry – 80** **Bristly gooseberry – 66** **Serviceberry – 9**	**907 trees and 461 shrubs**

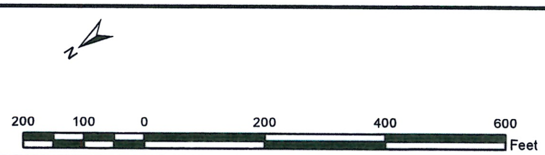
Appendix A

Maps 1-17



Vegetation Associated with Survey Points

1) Western snowberry (75 clones)
2) Western snowberry (150 clones)

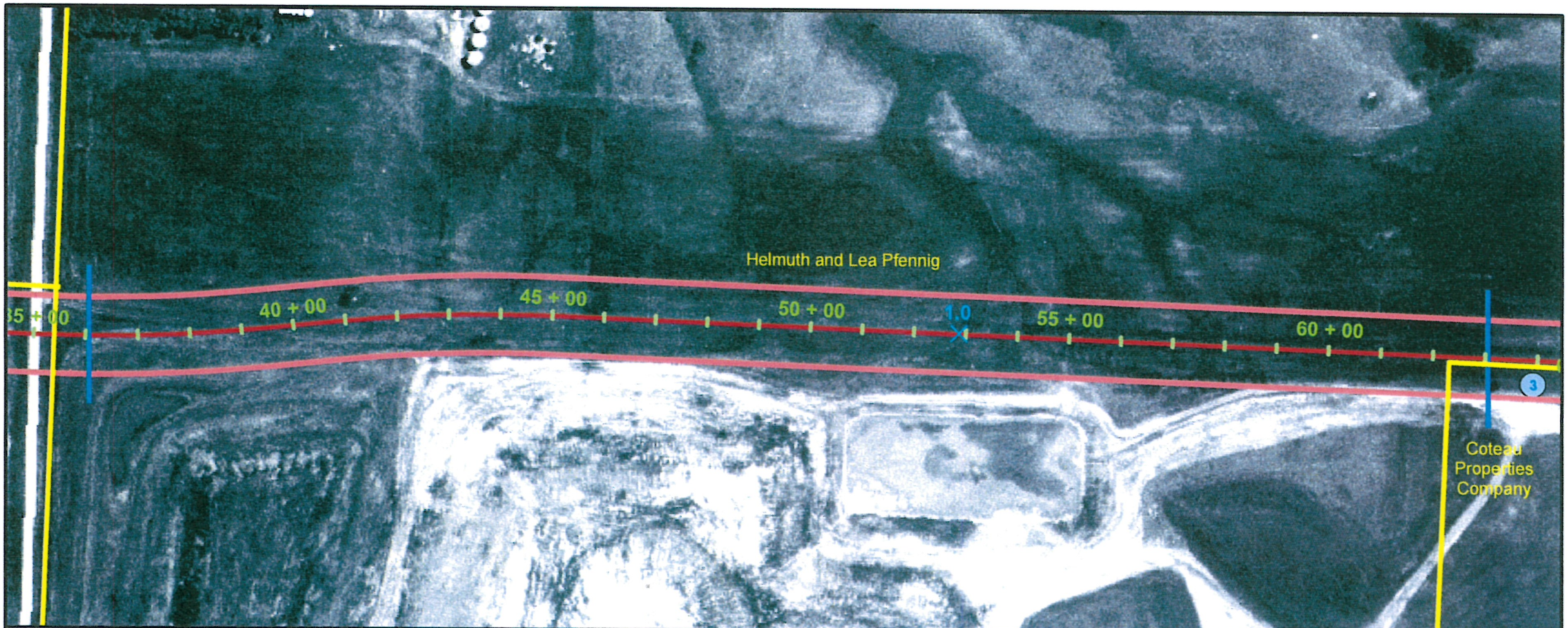


- Woodland Species Survey Point
- 150-foot-wide Construction ROW
- Pipeline Centerline with Station Numbers
- Milepost
- Property Boundary
- Matchlines

AVS RAW WATER PIPELINE PROJECT

Map 1 of 17

01/12/07



Vegetation Associated with Survey Points
(No survey points recorded)

N

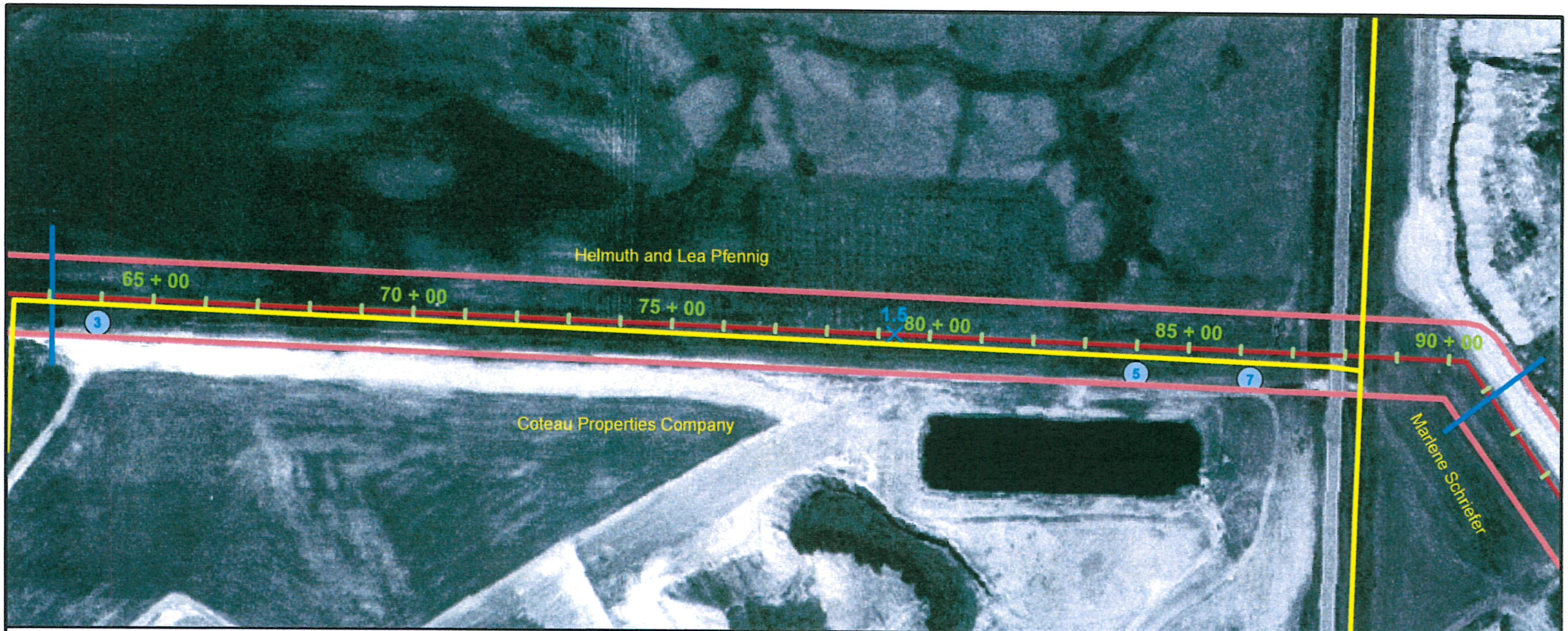
200 100 0 200 400 600
Feet

- Woodland Species Survey Point
- 150-foot-wide Construction ROW
- Pipeline Centerline with Station Numbers
- Milepost
- Property Boundary
- Matchlines

AVS RAW WATER PIPELINE PROJECT

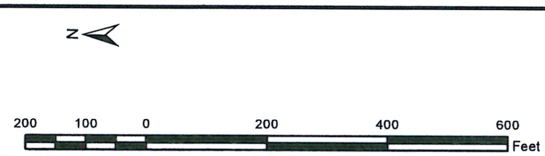
Map 2 of 17

01/12/07



Vegetation Associated with Survey Points

3) Chokecherry (71 clones)
5) Western snowberry (45 clones)
7) Western snowberry (20 clones), Chokecherry (18 clones)



- Woodland Species Survey Point
- 150-foot-wide Construction ROW
- Pipeline Centerline with Station Numbers
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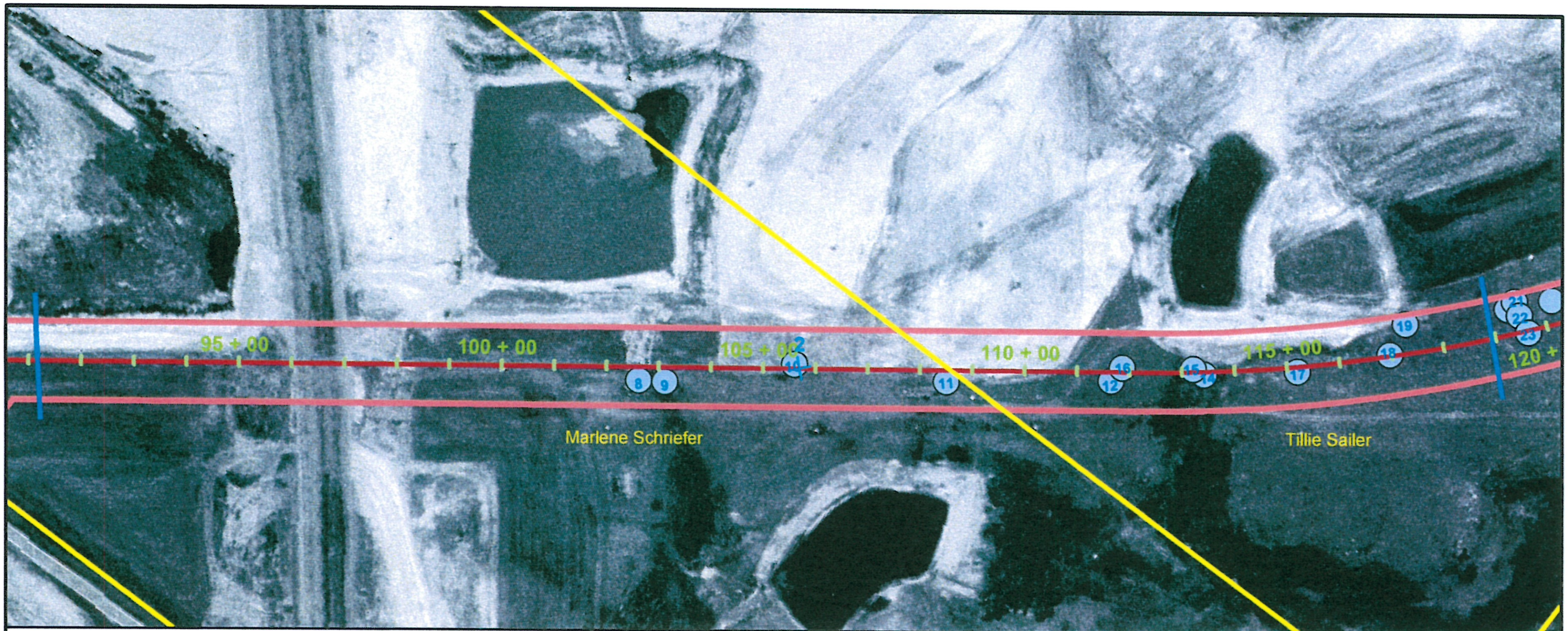
AVS RAW WATER PIPELINE PROJECT

Map 3 of 17

01/12/07



Vegetation Associated with Survey Points

8) Wild plum (1 plant)
9) Box elder (1 plant), Chokecherry (2 clones), Western snowberry (20 clones)
10) Western snowberry (100 clones)
11) Buffaloberry (9 plants), Western snowberry (120 clones)
12) Buffaloberry (26 plants), Western snowberry (25 clones)
14) Buffaloberry (7 plants), Plains cottonwood (1 plant)
15) Buffaloberry (2 plants)
16) Buffaloberry (4 plants)
17) Buffaloberry (12 plants), Gooseberry (4 plants)
18) Western snowberry (30 clones)
19) Western snowberry (20 clones)

N

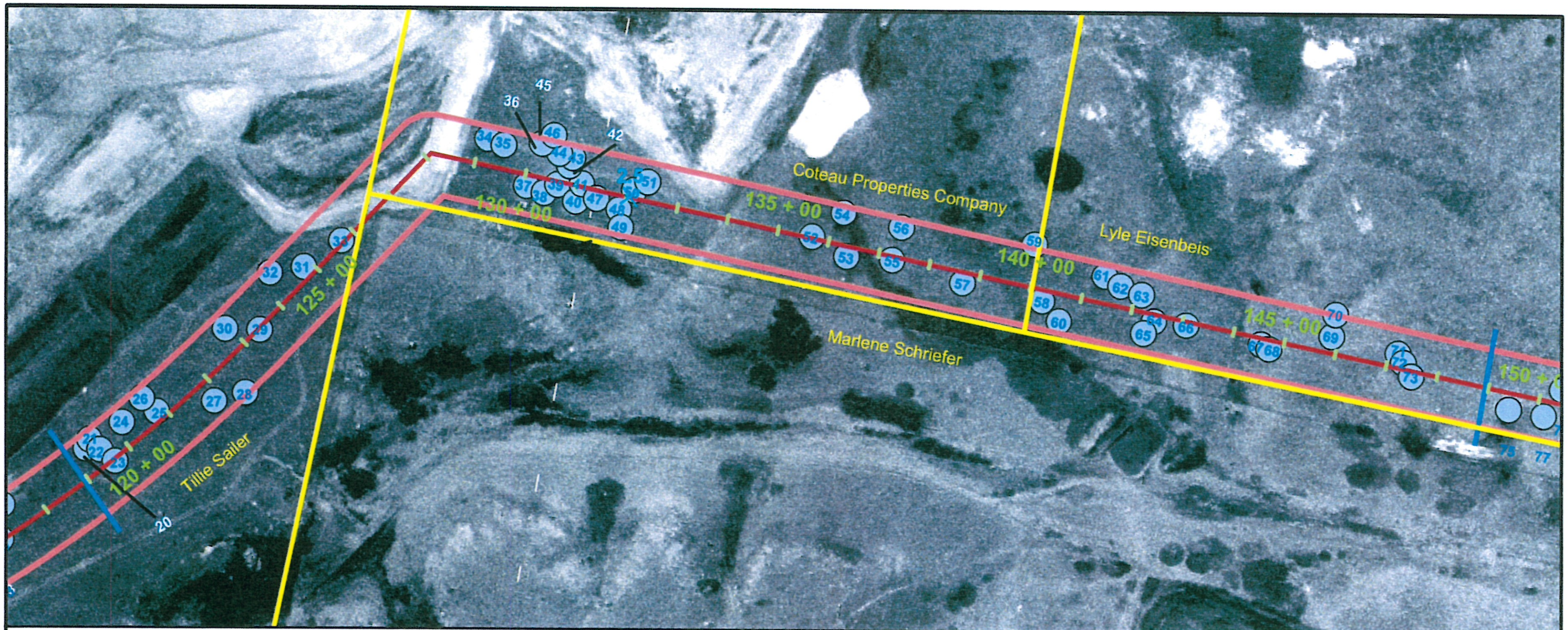
200 100 0 200 400 600 Feet

Woodland Species Survey Point
150-foot-wide Construction ROW
Pipeline Centerline with Station Numbers
Milepost
Property Boundary
Matchlines

AVS RAW WATER PIPELINE PROJECT

Map 4 of 17

01/12/07



Vegetation Associated with Survey Points

20 - 35) Western snowberry (991 clones)
36) Skunkbush (7 plants)
37) Chokecherry (17 clones), Gooseberry (14 plants), Western snowberry (70 clones)
38) Chokecherry (1 clone), Serviceberry (9 plants), Siberian Elm (1 plant)
39 - 40) Gooseberry (47 plants)
41) Buffaloberry (1 plant)
42 - 46) Skunkbush (36 plants)
47 - 48) Western snowberry (15 clones)
49) Gooseberry (1 plant)
50 - 71) Western snowberry (1,050 clones)
72) Skunkbush (1 plant)
73) Western snowberry (10 clones)

N

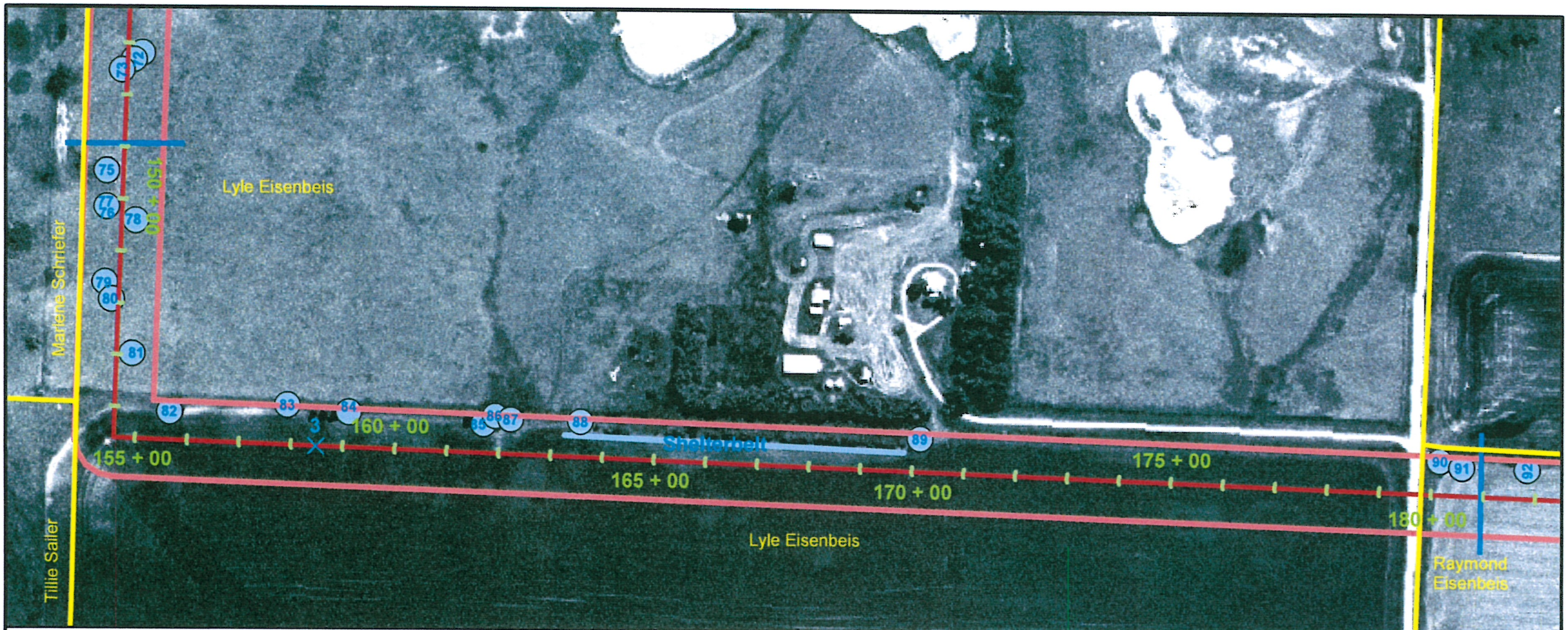
200 100 0 200 400 600 Feet

Woodland Species Survey Point
150-foot-wide Construction ROW
Pipeline Centerline with Station Numbers
Milepost
Property Boundary
Matchlines

AVS RAW WATER PIPELINE PROJECT

Map 5 of 17

01/12/07



Vegetation Associated with Survey Points

75) Buffaloberry (49 plants)
76 - 81) Western snowberry (55 clones)
82 - 87) Plains cottonwood (11 plants)
88) Shelterbelt Entrance Point
Siberian elm (145 plants), Wild plum (5 clones), Lilac (8 plants)
89) Shelterbelt Exit Point
90) Chokecherry (3 clones)
91) Siberian elm (1 plant)

N

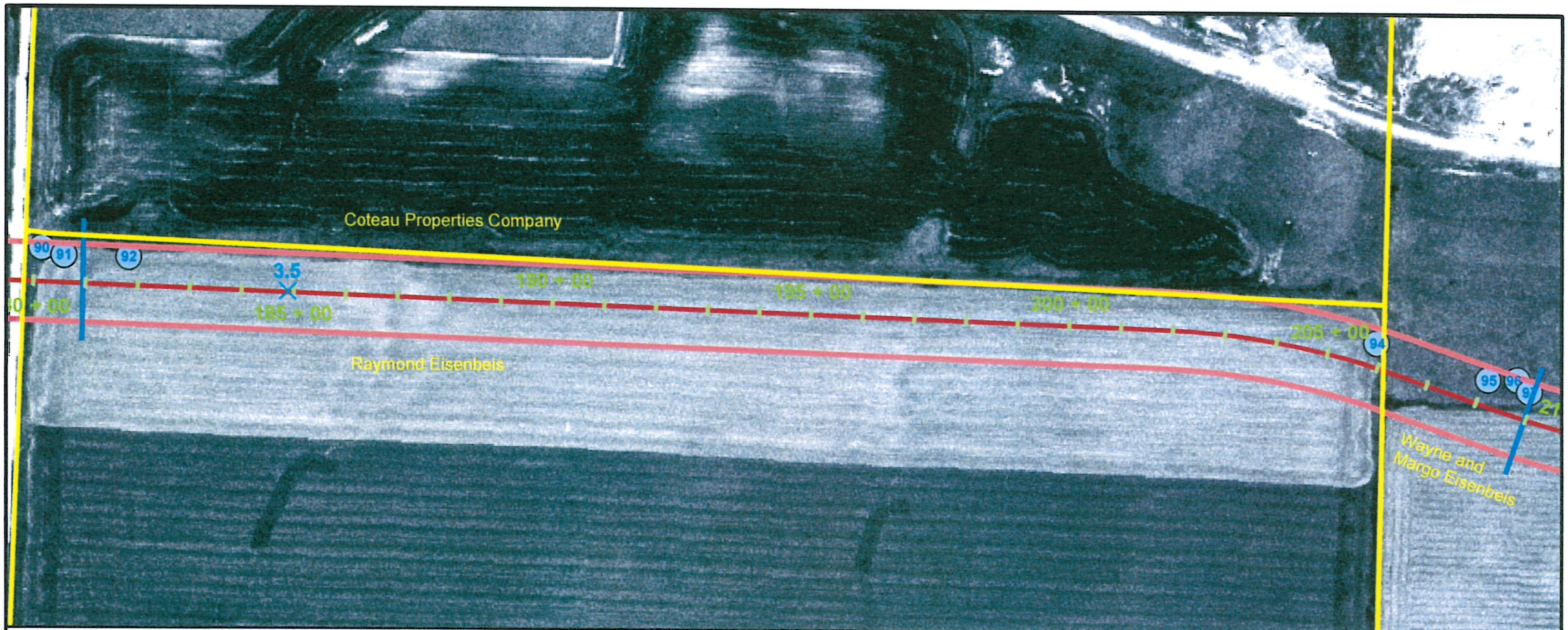
200 100 0 200 400 600 Feet

- Woodland Species Survey Point
- 150-foot-wide Construction ROW
- Pipeline Centerline with Station Numbers
- Milepost
- Property Boundary
- Matchlines

AVS RAW WATER PIPELINE PROJECT

Map 6 of 17

01/12/07



Vegetation Associated with Survey Points

92) Wild plum (1 plant)
94) Chokecherry (61 clones), Western snowberry (clones)
95 - 97) Western snowberry (80 clones)

N

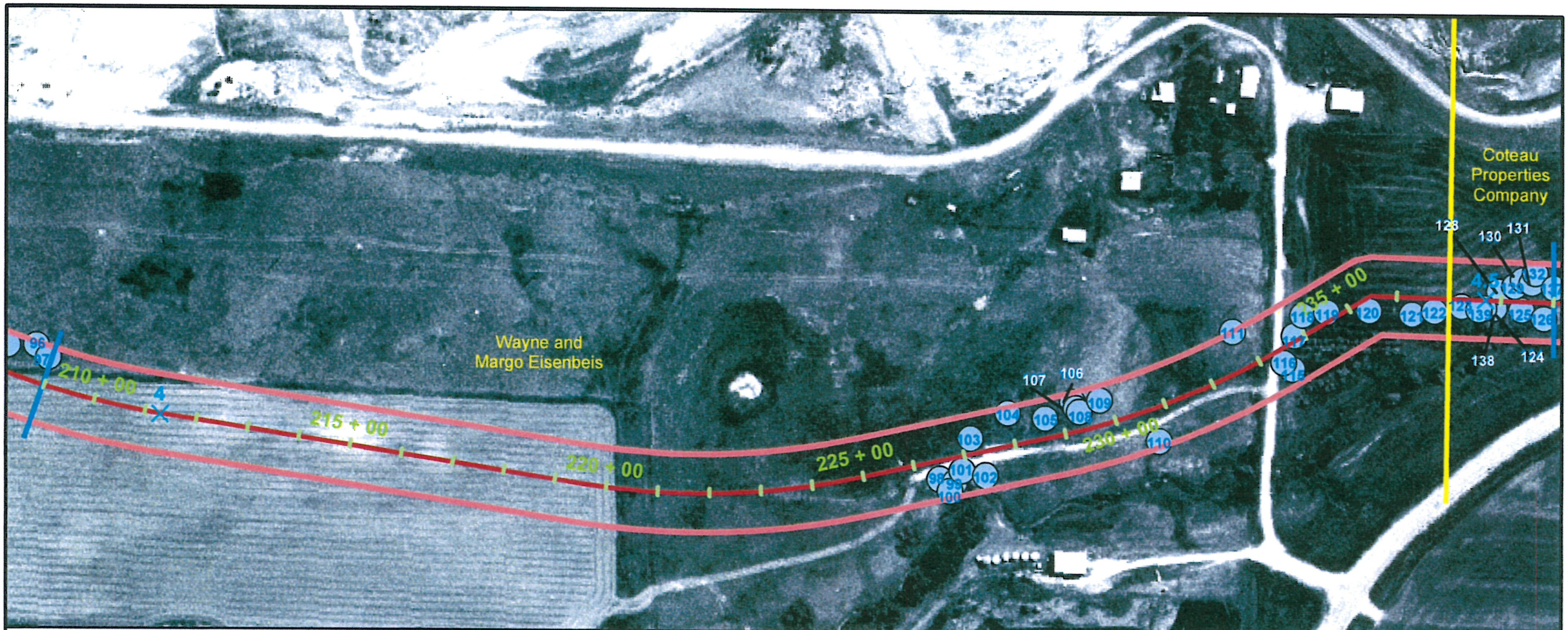
200 100 0 200 400 600 Feet

Woodland Species Survey Point
150-foot-wide Construction ROW
Pipeline Centerline with Station Numbers
Milepost
Property Boundary
Matchlines

AVS RAW WATER PIPELINE PROJECT

Map 7 of 17

01/12/07



Vegetation Associated with Survey Points

98) Buffaloberry (15 plants), Chokecherry (8 clones)
99) Buffaloberry (8 plants), Western snowberry (20 clones), Wildrose (8 plants)
100) Buffaloberry (4 plants), Wildrose (10 plants)
101 - 105) Western snowberry (203 clones)
106 - 107) Chokecherry (32 clones)
108) Siberian elm (1 plant)
109 - 110) Western snowberry (195 clones)
111) Chokecherry (6 clones)

115 - 126) Perimeter of shelterbelt and wooded area adjacent to intermittent creek
Box elder (34 plants), Siberian peashrub (71 plants), Chokecherry (424 clones), Gooseberry (7 plants), Green ash (20 plants), Lilac (68 plants), Russian olive (81 plants), Wild plum (420 clones), Hawthorn (2 plants), Nanking cherry (19 plants)
128 - 129) Chokecherry (10 clones)
130) Western snowberry (10 clones)
131) Chokecherry (30 clones)
132) Western snowberry (10 clones)
137 - 139) Western snowberry (80 clones)

N

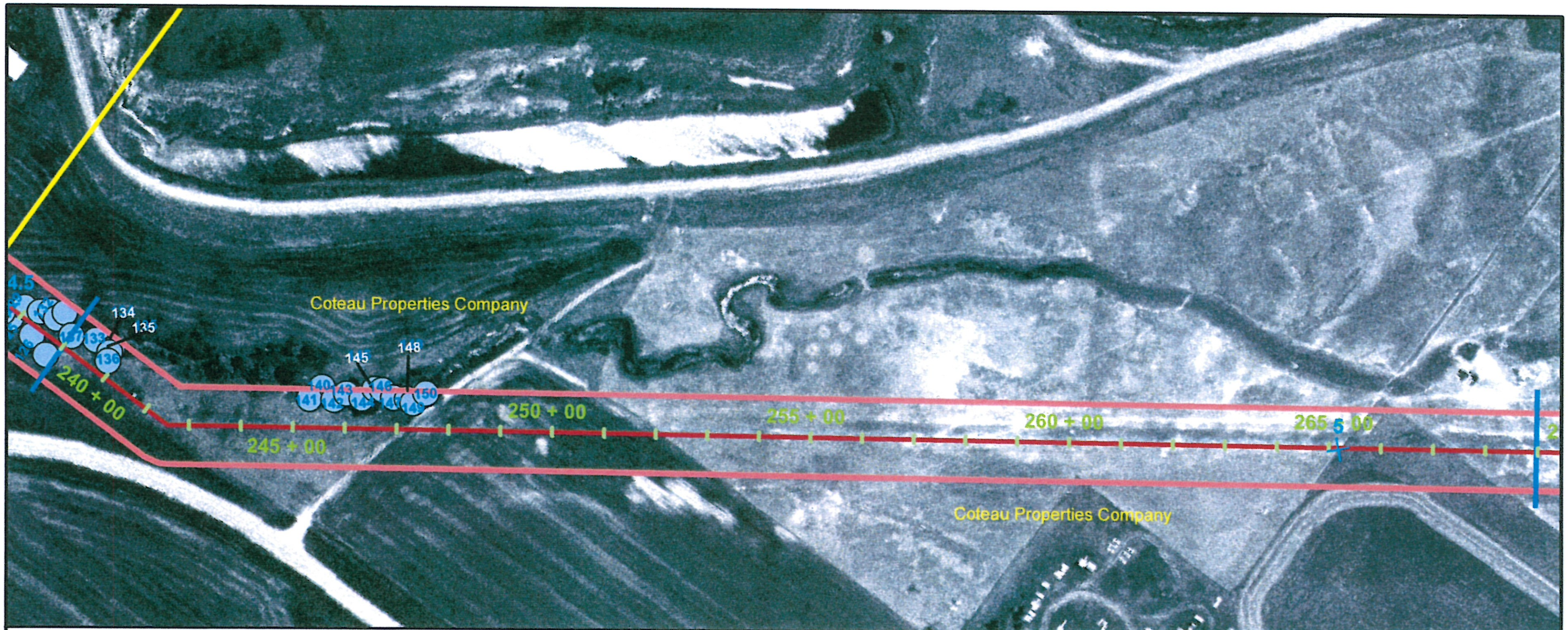
200 100 0 200 400 600 Feet

Woodland Species Survey Point
150-foot-wide Construction ROW
Pipeline Centerline with Station Numbers
Milepost
Property Boundary
Matchlines

AVS RAW WATER PIPELINE PROJECT

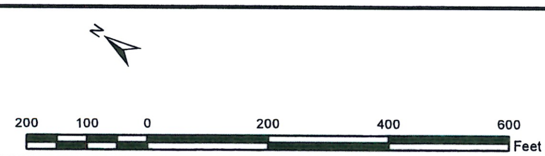
Map 8 of 17

01/12/07



Vegetation Associated with Survey Points

133) Box elder (1 plant)
134) Chokecherry (50 clones)
135 - 136) Western snowberry (30 clones)
140) American elm (2 plants), Hawthorn (1 plant)
141 - 142) American elm (16 plants)
143) Chokecherry (1 plant)
144) American elm (9 plants)
145) American elm (2 plants), Hawthorn (1 plant)
146 - 150) American elm (10 plants)

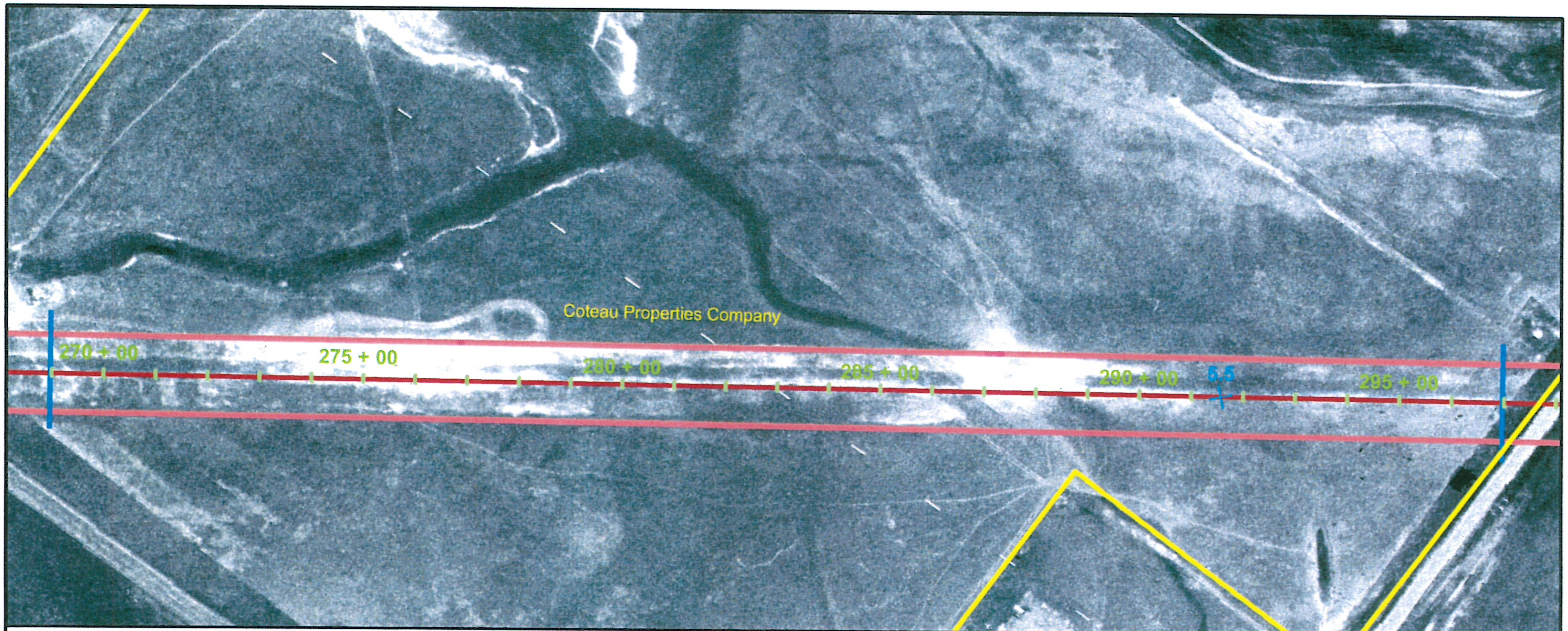


- Woodland Species Survey Point
- 150-foot-wide Construction ROW
- Pipeline Centerline with Station Numbers
- Milepost
- Property Boundary
- Matchlines

AVS RAW WATER PIPELINE PROJECT

Map 9 of 17

01/12/07



Vegetation Associated with Survey Points
(No survey points recorded)

N

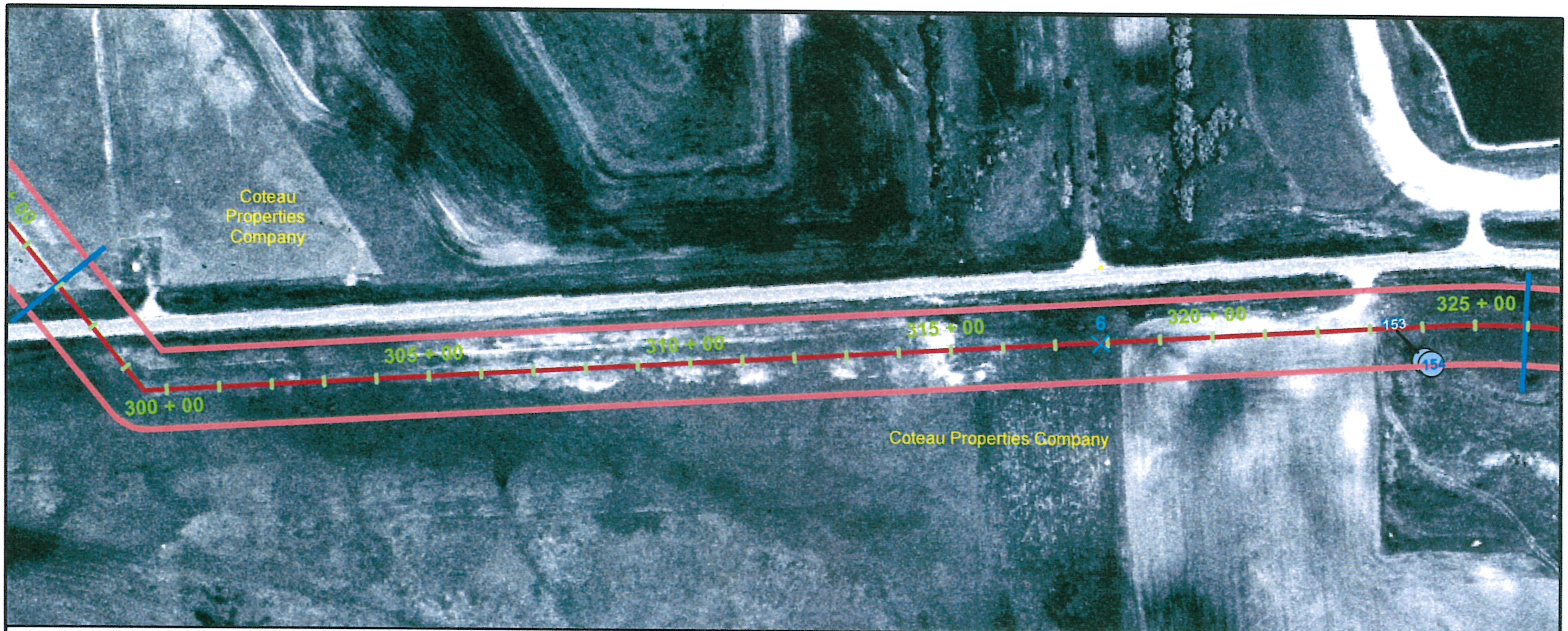
200 100 0 200 400 600 Feet

Woodland Species Survey Point
150-foot-wide Construction ROW
Pipeline Centerline with Station Numbers
Milepost
Property Boundary
Matchlines

AVS RAW WATER PIPELINE PROJECT

Map 10 of 17

01/12/07



Vegetation Associated with Survey Points

153) Western snowberry (3 clones)
154) Sandbar willow (2 clones)

N

200 100 0 200 400 600 Feet

- Woodland Species Survey Point
- 150-foot-wide Construction ROW
- Pipeline Centerline with Station Numbers
- Milepost
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- Matchlines

AVS RAW WATER PIPELINE PROJECT

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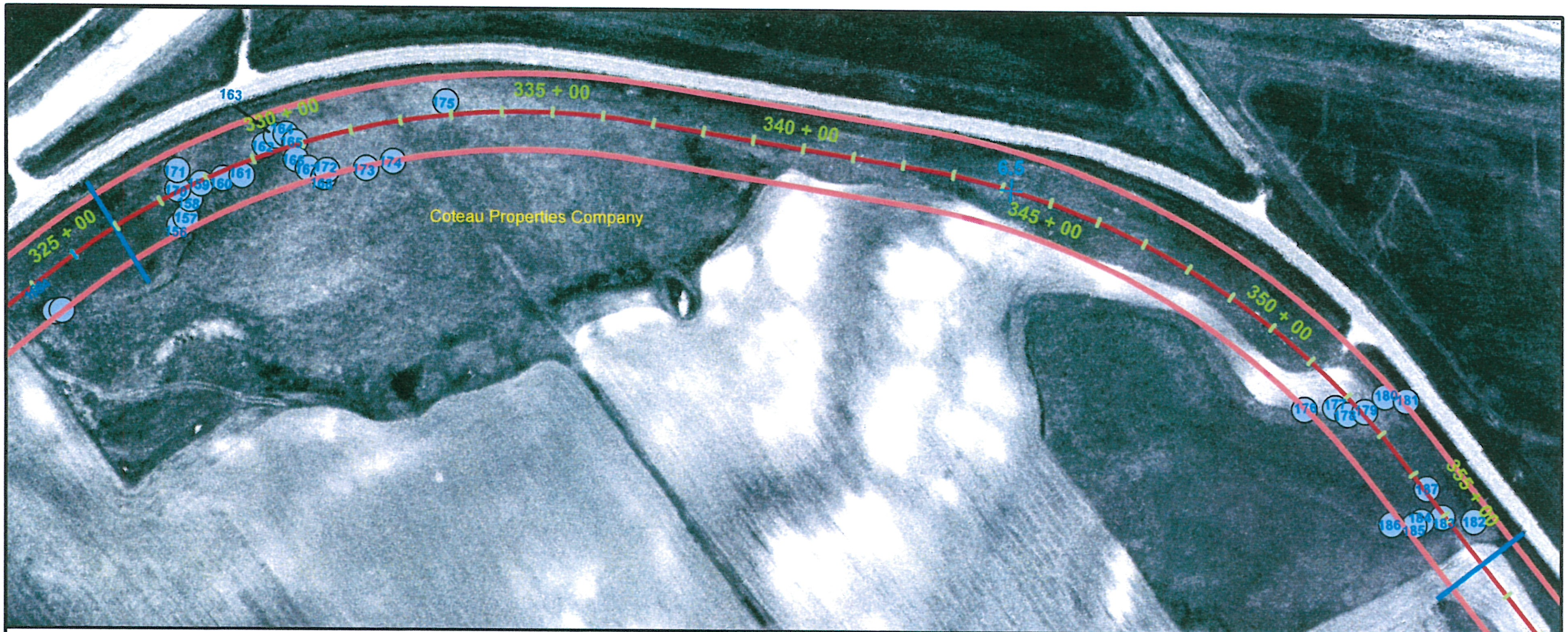
01/12/07



Vegetation Associated with Survey Points

156) Perimeter of shrub/scrub wetland (Entrance point)
Plains cottonwood (776 plants), Sandbar willow (871 clones)
168) Perimeter of shrub/scrub wetland (Exit point)
170) Sandbar willow (4 clones), Plains cottonwood (3 plants)
171) Plains cottonwood (2 plants)
172) Plains cottonwood (1 plant)
173) Sandbar willow (1 plant)
174) Plains cottonwood (2 plants)
175) Plains cottonwood (1 plant)

176 - 181) Perimeter of shrub/scrub wetland (Entrance point)
Plains cottonwood (166 plants), Sandbar willow (133 clones)
182 - 186) Perimeter of shrub/scrub wetland (Exit point)
187) Group of shrubs within shrub/scrub wetland (listed above)

N

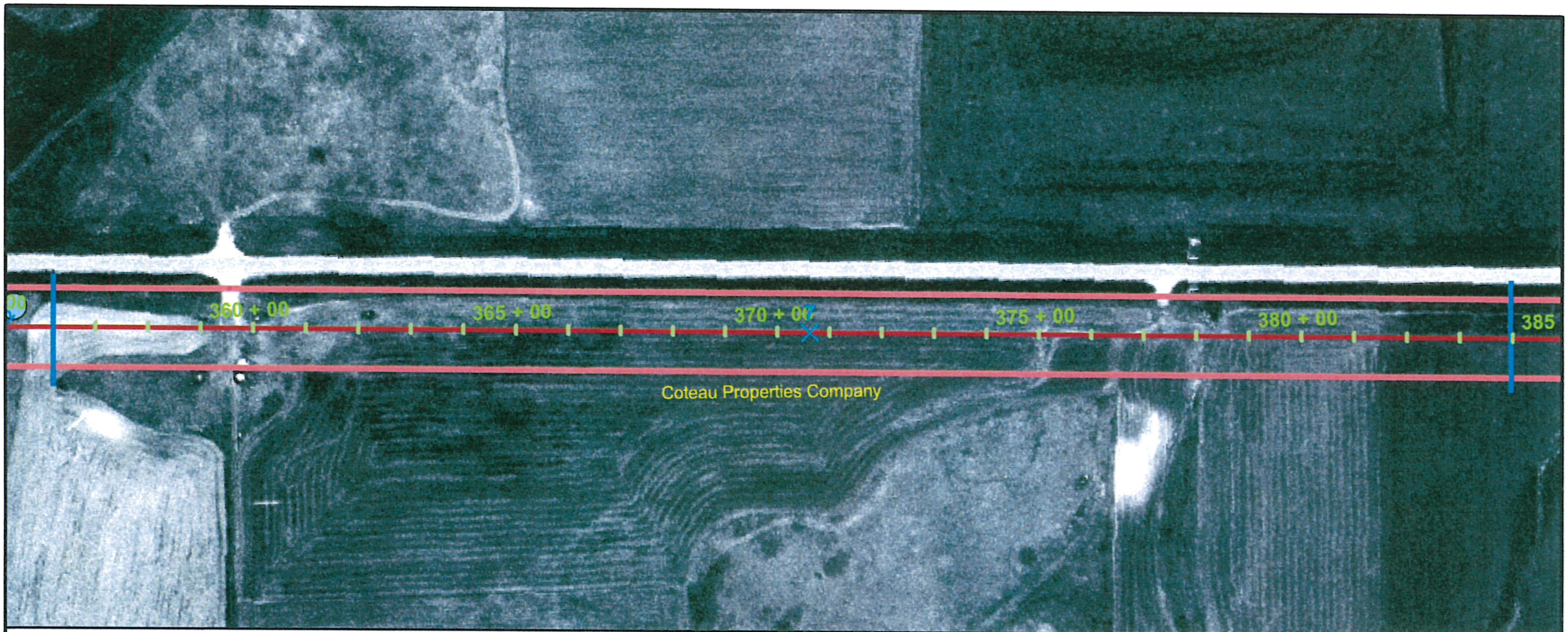
200 100 0 200 400 600
Feet

Woodland Species Survey Point
150-foot-wide Construction ROW
Pipeline Centerline with Station Numbers
Milepost
Property Boundary
Matchlines

AVS RAW WATER PIPELINE PROJECT

Map 12 of 17

01/12/07



Vegetation Associated with Survey Points
(No survey points recorded)

N

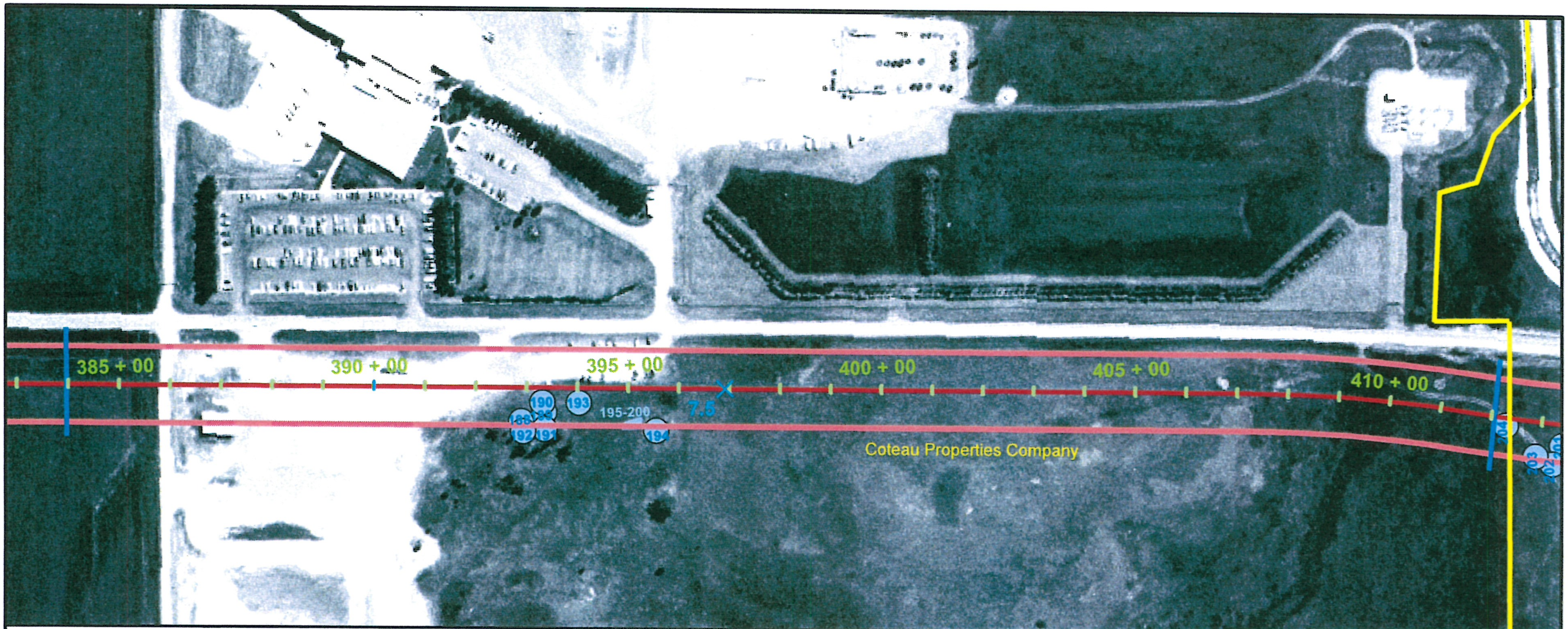
200 100 0 200 400 600 Feet

Woodland Species Survey Point
150-foot-wide Construction ROW
Pipeline Centerline with Station Numbers
Milepost
Property Boundary
Matchlines

AVS RAW WATER PIPELINE PROJECT

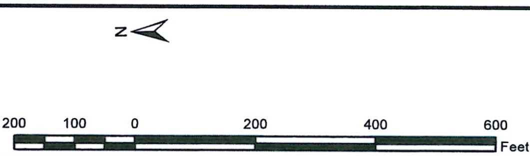
Map 13 of 17

01/12/07



Vegetation Associated with Survey Points

188 - 192) Plains cottonwood (5 plants)
193) Siberian elm (1 plant)
194) Plains cottonwood (6 plants)
195 - 200) Sandbar willow (355 clones)

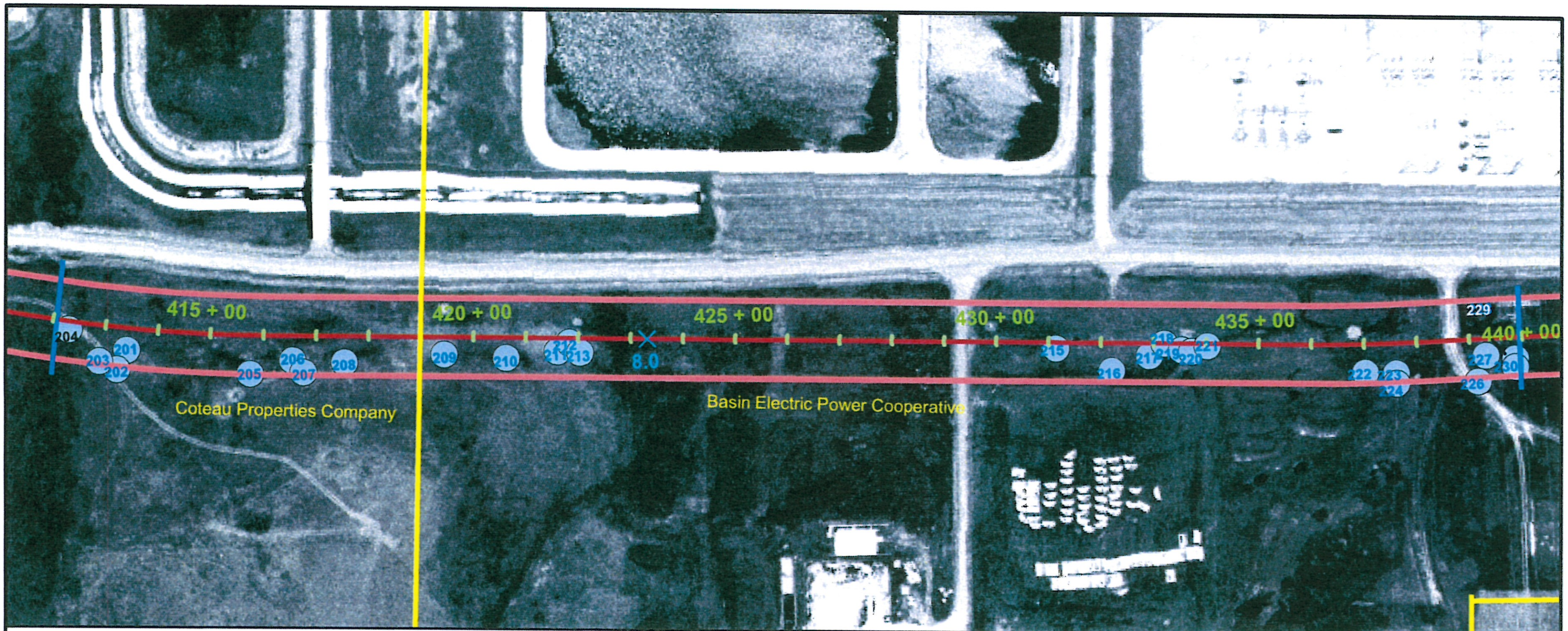


Woodland Species Survey Point
150-foot-wide Construction ROW
Pipeline Centerline with Station Numbers
Milepost
Property Boundary
Matchlines

AVS RAW WATER PIPELINE PROJECT

Map 14 of 17

01/12/07



Vegetation Associated with Survey Points

201 - 212) Western Snowberry (230 clones)
213) Siberian elm (2 plants)
215) Siberian elm (1 plant)
216) Siberian elm (1 plant)
217) Western snowberry (20 clones)
218) Siberian elm (9 plants)
219) Western snowberry (15 clones)
218) Siberian elm (9 plants)
219) Western snowberry (15 clones)
220) Green ash (1 plant)
221) Western snowberry (10 clones)
222) Siberian elm (34 plants)
223 - 224) Siberian elm (29 plants)
226) Siberian elm (2 plants)
227) Siberian elm (13 plants)
229) Siberian peashrub (1 plant)
230) Siberian peashrub (1 plant)

N

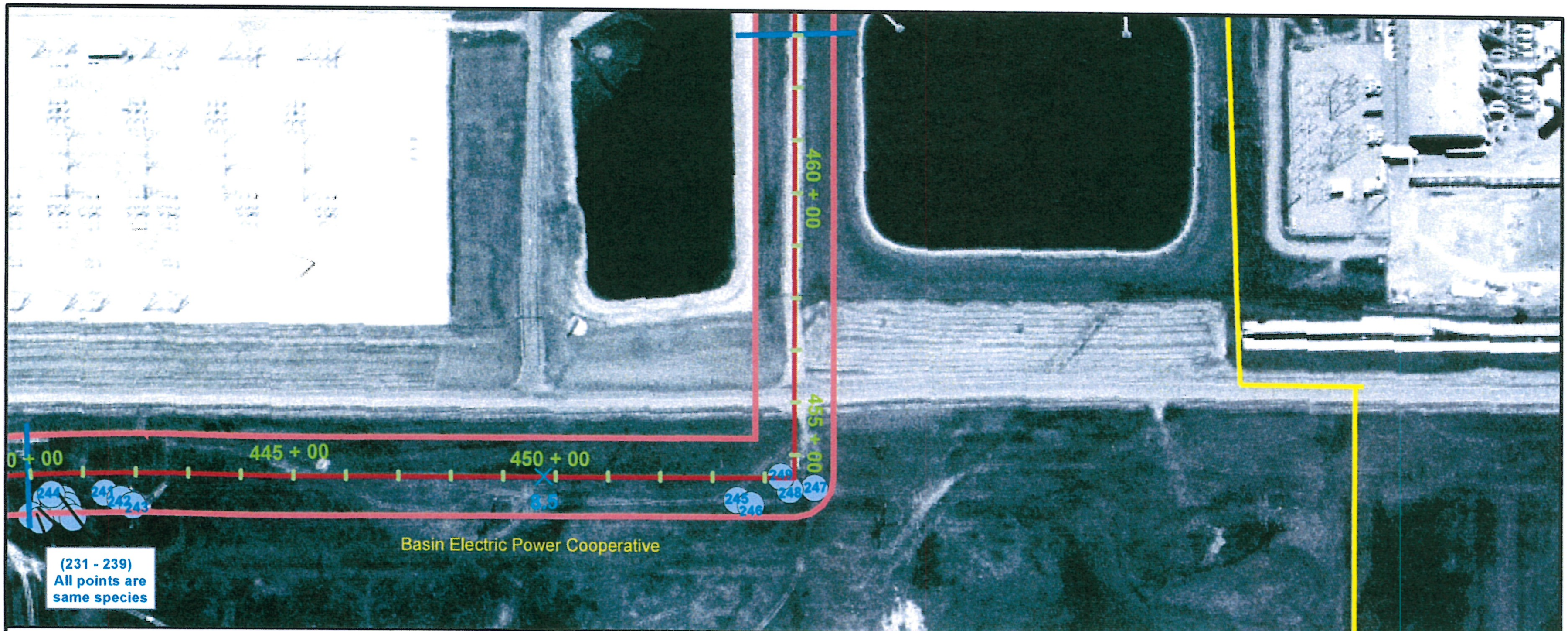
200 100 0 200 400 600
Feet

Woodland Species Survey Point
150-foot-wide Construction ROW
Pipeline Centerline with Station Numbers
Milepost
Property Boundary
Matchlines

AVS RAW WATER PIPELINE PROJECT

Map 15 of 17

01/12/07



Vegetation Associated with Survey Points

231 - 239) Perimeter of trees and shrubs
Siberian elm (5 plants), Siberian peashrub (4 plants),
Lilac (12 plants)
241) Siberian elm (1 plant)
242 - 243) Siberian peashrub (1 plant), Lilac (1 plant)
244) Chokecherry (20 clones), Lilac (2 plants)
245 - 249) Western snowberry (170 clones)

N

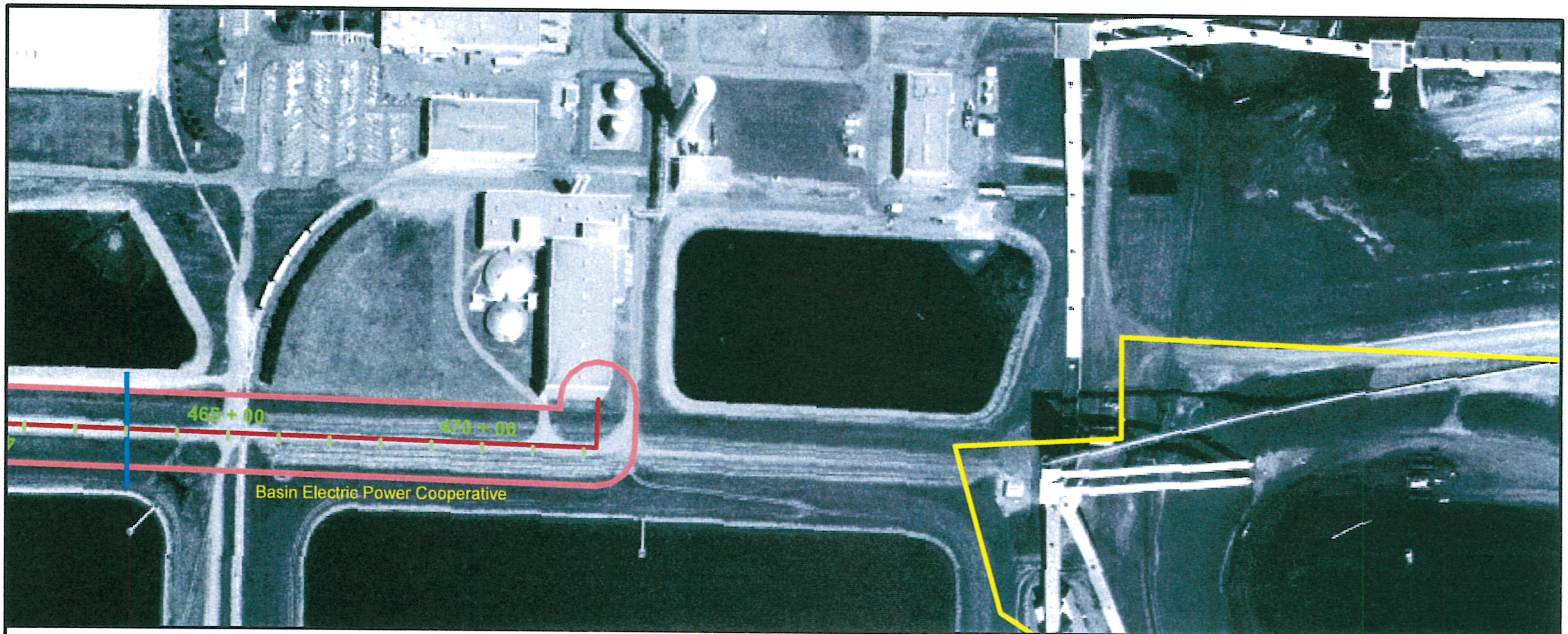
200 100 0 200 400 600 Feet

Woodland Species Survey Point
150-foot-wide Construction ROW
Pipeline Centerline with Station Numbers
Milepost
Property Boundary
Matchlines

AVS RAW WATER PIPELINE PROJECT

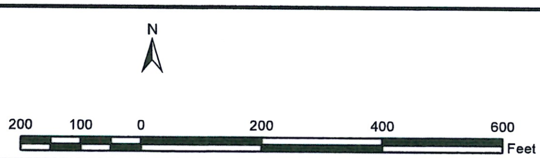
Map 16 of 17

01/12/07



Vegetation Associated with Survey Points

(No survey points recorded)



Woodland Species Survey Point

150-foot-wide Construction ROW

Pipeline Centerline with Station Numbers

Milepost

Property Boundary

Matchlines

AVS RAW WATER PIPELINE PROJECT

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01/12/07