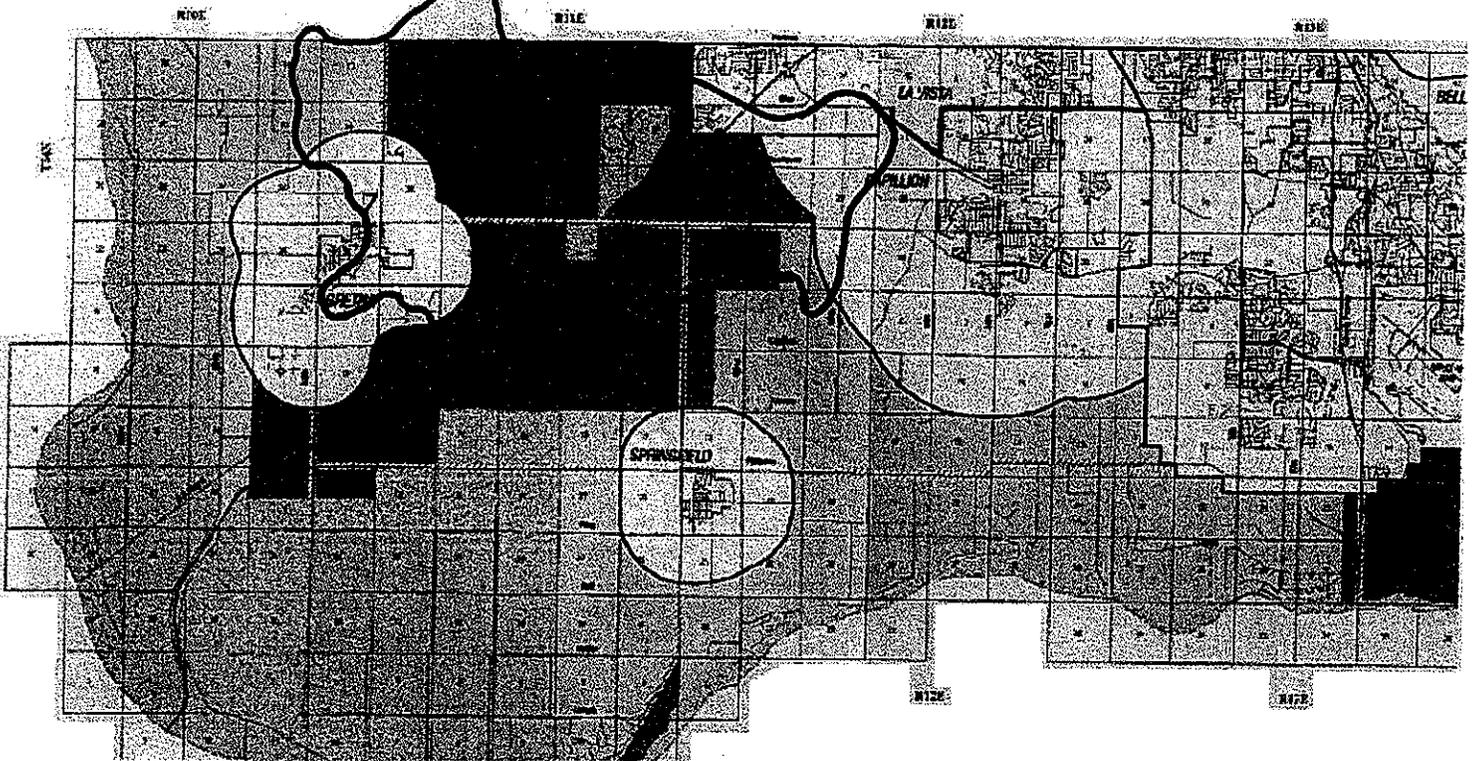


STUDY AREA



**SOUTH PAPILLION CREEK OUTFALL SEWER
2001 REPORT**

**FOR
SARPY COUNTY COMMISSIONERS**

**TIM SCHRAM, CHAIRMAN
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EXECUTIVE SUMMARY

The following is a summary of conclusions contained in this report.

1. Sarpy County's involvement in sanitary sewerage has been important in the development of the South Papillion Creek Watershed. Construction and/or acquisition of key sewers has contributed to orderly growth in a fiscally responsible manner.
2. The Wood Hollow Outfall Sewer has excess capacity when the current development patterns in the natural watershed are considered.
3. The Wood Hollow Outfall Sewer can accommodate new and existing developments in the roughly 500 acre drainage area around the Hwy. 370/I-80 interchange through use of a lift station.
4. The Wood Hollow Outfall can be improved to accommodate another 1,500 acres from the future I-80/180th Street area subject to necessary agreements with governing jurisdictions. A lift station or stations would be necessary.
5. As development continues, Sarpy County should periodically review the status of the sewer system under its control.

A more detailed discussion relating to these conclusions is contained in the text of this report.

This report is presented to the Sarpy County Board of Commissioners in response to a request from Mark Wayne, the Administrator. The purpose of the report is to provide an update summary of the present outfall sewer system and to project necessary improvements to accommodate additional growth in the South Papillion Creek Watershed. Plate 1 shows the limits of the watershed and the primary sewers which have been completed or are under construction.

Continuing commercial and industrial development in the South Papillion Creek Watershed has reached the Highway 370-I-80 interchange. Improvements to the Interstate in this area are currently proposed in anticipation of additional traffic. Highway 370 improvements are nearly complete East of I-80.

Availability of sanitary sewerage is a key requirement of new development. This need was identified in our 1993 report which ultimately led to Sarpy County constructing an outfall sewer along the South Branch of the Papillion Creek which could either serve, or be expanded to serve, the entire South Papio drainage basin, a total of some 20 square miles. Gretna has elected to cooperate with Sarpy County by connecting an outfall sewer serving their community to the Sarpy County Sewer, thus ensuring gravity sewers for all new development in the watershed. The areas authorized to connect to the Gretna sewer system are shown on Plate 3.

The Chalco Hills Recreation Area occupies the lower end of one of the main drainage areas in the watershed. The presence of Wehrspann Lake makes construction of sanitary sewers along the Lake difficult. We recommended a series of lift stations in our 1993 report. These lift stations pump to gravity sewers in the valleys on either side of Chalco Hills where gravity sewers can be built. One of the pump stations has been constructed near 168th and Highway 370 to

serve development in that area. Additional stations and/or enlargements of existing stations will be necessary as development in the South Papio Watershed continues upstream of Chalco Hills Recreational Area.

The existing Wood Hollow outfall sewer which occupies the valley South and East of Chalco Hills currently has excess capacity due to both lower density development and diversion of some sewage directly into the Sarpy Outfall Sewer. This excess capacity can be used to accommodate development of property which now drains toward the Chalco Hills Recreation area and avoid construction of an expensive and disruptive gravity sewer alongside of Wehrspann Lake.

One area of immediate interest is the Highway 370/I-80 Interchange. The existing industrial/commercial development at Highway 370 and I-80 is in SID 51, which is served by a sanitary lagoon system. Expansion of the lagoon is not considered to be a viable long-range solution. With the construction of gravity sewers in the South Papio Watershed, comprehensive wastewater treatment is available at Omaha's Papillion Creek Wastewater Treatment Plant. Treated waste from that plant is discharged directly into the Missouri River, a much better solution than a treated discharge into the creeks within Sarpy County.

Developments planned or under construction in the interchange area include Nebraska Machinery and Commerce Business Centre. We believe a sanitary sewer lift station located so as to receive gravity sewer flows from the drainage area southeast of the Chalco Hill Recreational Area, southwest of the SID 48 sanitary lagoon/pumping system and west of the Wood Hollow drainage basin is a solution for wastewater disposal for this area. The new lift station would pump sewage east along Highway 370 into the Wood Hollow drainage basin,

where it would flow into the Wood Hollow outfall sewer on the south side of Highway 370. Review of USGS topographic maps indicate that approximately 500 acres could drain by gravity to a lift station located near the Nebraska Machinery tract. Assuming upon full commercial/industrial development of this 500-acre area, the design sewer flow is 1,650,000 gallons per day, or 2.55 CFS. This area is shown on Plate 2.

The Wood Hollow outfall sewer was sized and constructed in the early to mid-1970's. The design basis for the sewer at that time was for the entire 3,706-acre drainage basin to be residential. The only portion of this basin that has developed as residential so far is Westmont, which is approximately 160 acres in size. Most of the other development has been industrial/commercial. Existing industrial/commercial developments include Prairie Corners (170± acres), Prairie Corners II (160± acres), Hilltop (160± acres), Shopco (80± acres) and Valley Ridge (80± acres). Other industrial/commercial developments in planning or construction include I-80 Industrial Park 2 (80± acres), Caterpillar Claas America (130± acres), Sarpy County Industrial Park (17± acres), Papio Valley II (50± acres), Pink Industrial Park (20± acres), Highway Crossing Industrial Park at the southwest corner of Highway 50 and 370 (80± acres), the tract at the northwest corner of Highway 50 and 370 (70± acres). At this time, approximately 938 acres of the total 3,706 acres in this drainage basin will not be connected to the Wood Hollow Outfall. Those areas include I-80 Industrial Park II, Caterpillar Claas America and Sarpy County Industrial Park which all connect directly to the Sarpy County outfall sewer. Papio Valley II, Pink Industrial Park and the remaining undeveloped land on the easterly side of Chalco-Portal Drainage Ditch are to be served by a new outfall on the east side of the ditch. Plate 4 shows these areas in more detail.

The size of the Wood Hollow outfall was based upon residential development with an assumed density of 15 persons per acre, average flow of 100 gallons per day per person, and a peaking factor of 2.75. This calculates to be about 4,125 gallons per day per acre. Current residential development sewer sizing is based on 10 persons or less per acre, 80 gallons per day per person, peaking factor related to the population to be served, and an inflow/infiltration flow of 43 gallons per day per person. This calculates to be about 2,520 gallons per day per acre for a residential area of 600 acres. Current industrial/commercial development sewer sizing is based upon 3,000 gallons per day per acre plus 300 gallons per day per acre for inflow/infiltration. This calculates to be about 3,300 gallons per day per acre. The current development patterns in the Wood Hollow basin and lower per acre design flow rates indicate that excess capacity is available in the sewer.

We have estimated excess capacity available in the Wood Hollow sewer at a point on the south side of Highway 370 to be 2.57 million gallons per day, or 3.98 CFS. This calculation is based on the assumption that 1/2 of the undeveloped area will be commercial/industrial and the other 1/2 will be residential.

Sanitary sewerage for the 500± acres around the Hwy. 370-I-80 Interchange can be pumped East to the Wood Hollow sewer by using a lift station. The lift station would pump through a force main to be discharged into the gravity sewers now under construction in the Highway Crossing Industrial Park near 150th Street. The increased flow in these sewers may require an increase in sewer size. We estimate that the increase will not be more than one pipe size, an equivalent of approximately \$4.00 per foot. Thus the oversizing required through Highway Crossing Industrial Park and its outfall connection to Wood Hollow Sewer would be \$20-25,000 for the roughly one mile involved.

The most equitable distribution of costs for the outfall sewer, pump station, and force main is to include those improvements in the Sarpy County Sewer System using the existing fee schedule. Sanitary Improvement Districts constructing improvements would be reimbursed from future fees when those Districts' expenses exceeded their normal sewer fee expense. Reimbursement for the lift station and force main would be limited to the I-80/370 Interchange Watershed (500 acres) which would ultimately contribute 500 acres x \$3,878 per acre or \$1.9 million dollars platting fee to Sarpy County in addition to the building permit fees of the same amount. The cost of the lift station and force main is estimated to be \$850,000.

Highway Crossing Industrial Park could credit its cost of oversizing and its outfall sewer expense against the County sewer fee for platting. As we have previously recommended, all properties abutting sanitary sewers should be assessed for the cost of sanitary sewers up to 8" in diameter. Where oversizing is necessary, the County should acquire title to such oversized sewers as part of the County system, after assessments for the first 8" equivalent have been levied. Subdivision agreements should prevent interdistrict connection fees. These fees tend to compound debt unnecessarily.

The South Papillion Creek Sewer System, owned and managed by Sarpy County, has up to now been successful in that the fee structure has placed all developments on equal footing regarding expense of sewer availability. At the same time, the costs of the sewers are shared by the users, rather than the County as a whole. The Wood Hollow portion of the system was acquired by the County to ensure equity and encourage orderly development. Up to now, all sewers built or acquired by Sarpy County have been gravity lines requiring minimal attention and maintenance. Construction of a lift station, as proposed, is accompanied by operational expenses, including a

recommended daily observation and electric power for operating the pumps. The County may wish to provide manpower necessary for monitoring. As an alternative, a maintenance/operation service agreement with someone such as Utilicorp could be negotiated. A source of emergency power can be obtained through agreement with Nebraska Machinery whose proximity to the site of the pump station makes prompt response possible.

The following table shows an analysis of the Wood Hollow Outfall capacity. The capacity of each section of the sewer is analyzed based on available "as-built" information. The original design capacity, the current design capacity, and the current excess capacity is shown. Excess capacity, defined as available sewage flow over and above that required for current development patterns, is shown to range from 3.15 up to more than 13 c.f.s. Plate 5 is provided to reference the manhole locations to the table.

Sarpy County - South Papillion Creek Outfall Sewer Update

Upstream MH	Downstream MH	As-Built Size, in.	As-Built slope, %	As-Built Capacity cfs		Original Design Capacity Needed cfs	Current Design Capacity Needed cfs	Current Excess Capacity cfs
38	37	21	0.42	10.27				
37	36	21	0.41	10.15				
36	35	21	0.42	10.27				
35	34	21	0.42	10.27				
34	33	21	0.46	10.72				
33	32	20	0.43	9.17	IP#1	8.25	5.19	3.98
32	31	21	0.32	8.96	IP#2	8.95	5.81	3.15
31	Prairie Corners 1	21	0.32	8.96		8.95	5.81	3.15
Prairie Corners 1	30	21	0.32	8.96	IP#3	11.05	8.08	0.88
30	29	21	1.29	18.00		11.05	8.08	9.92
29	28	24	0.55	16.47		11.05	8.08	8.39
28	27	24	0.55	16.78		11.05	8.08	8.70
27	26	24	0.55	16.78	IP#4	12.02	8.86	7.92
26	25	24	0.55	16.78		12.02	8.86	7.92
25	24	27	0.24	15.17	IP#5	14.88	9.66	5.51
24	23	27	0.24	15.17		14.88	9.66	5.51
23	22	27	0.24	15.17		14.88	9.66	5.51
22	21	27	0.24	15.17		14.88	9.66	5.51
21	20	27	0.45	20.78	IP#6	15.76	9.96	10.82
20	19	27	0.50	21.88		15.76	9.96	11.92
19	18	27	0.45	20.78		15.76	9.96	10.82
18	17	27	0.34	18.06	IP#7	16.40	9.96	8.10
17	16	27	0.34	18.06		16.40	9.96	8.10
16	15	27	0.31	17.24		16.40	9.96	7.28
15	14	27	0.34	18.06		16.40	9.96	8.10
14	13	27	0.34	18.06	IP#8	17.54	10.49	7.57
13	12	27	0.34	18.06	IP#9	17.84	10.73	7.33
12	11	27	0.34	18.06		17.84	10.73	7.33
11	10	30	0.34	23.92	IP#10	20.66	12.98	10.94
10	9	30	0.34	23.92		20.66	12.98	10.94
9	8	30	0.34	23.92		20.66	12.98	10.94
8	7	30	0.34	23.92		20.66	12.98	10.94
7	6	30	0.34	23.92		20.66	12.98	10.94
6	5	30	0.34	23.92	IP#11	21.44	10.76	13.16
5	4	30	0.34	23.92		21.44	10.76	13.16
4	3	30	0.34	23.92	IP#12	21.78	10.76	13.16
3	2	30	0.34	23.92		21.78	10.76	13.16
	2 Siphon inlet	30	0.34	23.92		21.78	10.76	13.16
Siphon inlet	Siphon outlet							
Siphon outlet	1	30	0.69	34.07	IP#13	23.65	10.76	23.31

NOTE: Current design capacity is based on 2,520 gal/acre/da for residential and 3,300 gal/cap/da for commercial/residential uses.

One section of the sewer between Manholes Prairie Corner #1 and Manhole 30 shows excess capacity of only .88 cfs. This limited excess resulted from the Prairie Corner sewer connecting one manhole upstream of the one originally intended. This capacity could be easily increased by building a short section of parallel sewer at an estimated cost of \$25-35,000.00. Additional capacity is not needed now as the current sewage flow is far less than the capacity of the sewer. The flow rates at this location should be monitored with the parallel line to be constructed when the line nears 80 to 90% of capacity.

The possibility of using the excess capacity of the Wood Hollow Outfall to serve other areas outside of the Wood Hollow watershed can also be considered. Parallel construction from Manholes 33 to 32, 32 to 31, 31 to Prairie Corners #1, Manholes 25 to 24, 24 to 23, 23 to 22, and 22 to 21 could develop excess capacity of 7.3 c.f.s. which equates to almost 1,500 acres of a mix of industrial and residential development. The length of the improved sewer would be approximately 2,500 feet. The improvement would consist of either an additional line paralleling the existing sewer, or a new replacement line, whichever is most economical. Costs for this improvement would probably not exceed \$100,000.

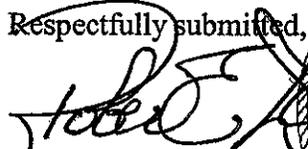
For more futuristic visions of Sarpy County, development of the area around the I-80-180th Street interchange can be considered. The interchange, if approved by the Department of Roads, will occupy a portion of the South Papio Drainage Basin (see Plate 6). Development East of this location will reach the watershed limits between the South Papio and Springfield Creek at approximately 166th Street on Capehart Road. From that point to Highway 50, drainage is southeast toward Springfield who may not have sewage treatment capability, especially for sophisticated industrial waste. The City of Omaha would probably oppose diversion of sanitary

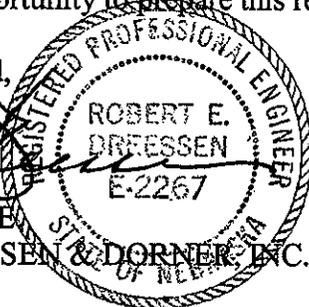
waste from the Springfield Creek drainage area into the Omaha system. Neither Sarpy County or Omaha have sized their sewer systems to accommodate flow from the Springfield Creek watershed, although it may be possible to negotiate some special agreements for specific areas. Assuming resolution of the necessary agreements, future extensions of the Wood Hollow outfall could be oversized to provide capacity for up to an additional 1,500 acres. This oversized extension is shown on Plate 6. The 1,500 acres could be both inside and outside the South Papillion Creek watershed subject to necessary agreements.

Sarpy County has experienced dynamic growth in the South Papillion Creek Watershed in the past decade. The County's decision in 1996 to provide a solution for the lack of adequate sewers has paid handsome dividends. Continuing the present administration of the County sewer system helps ensure continued growth and additional development. Periodic status reviews of the outfall system are recommended to respond to changes in development patterns.

Thank you for the opportunity to prepare this report. If you have questions, please call.

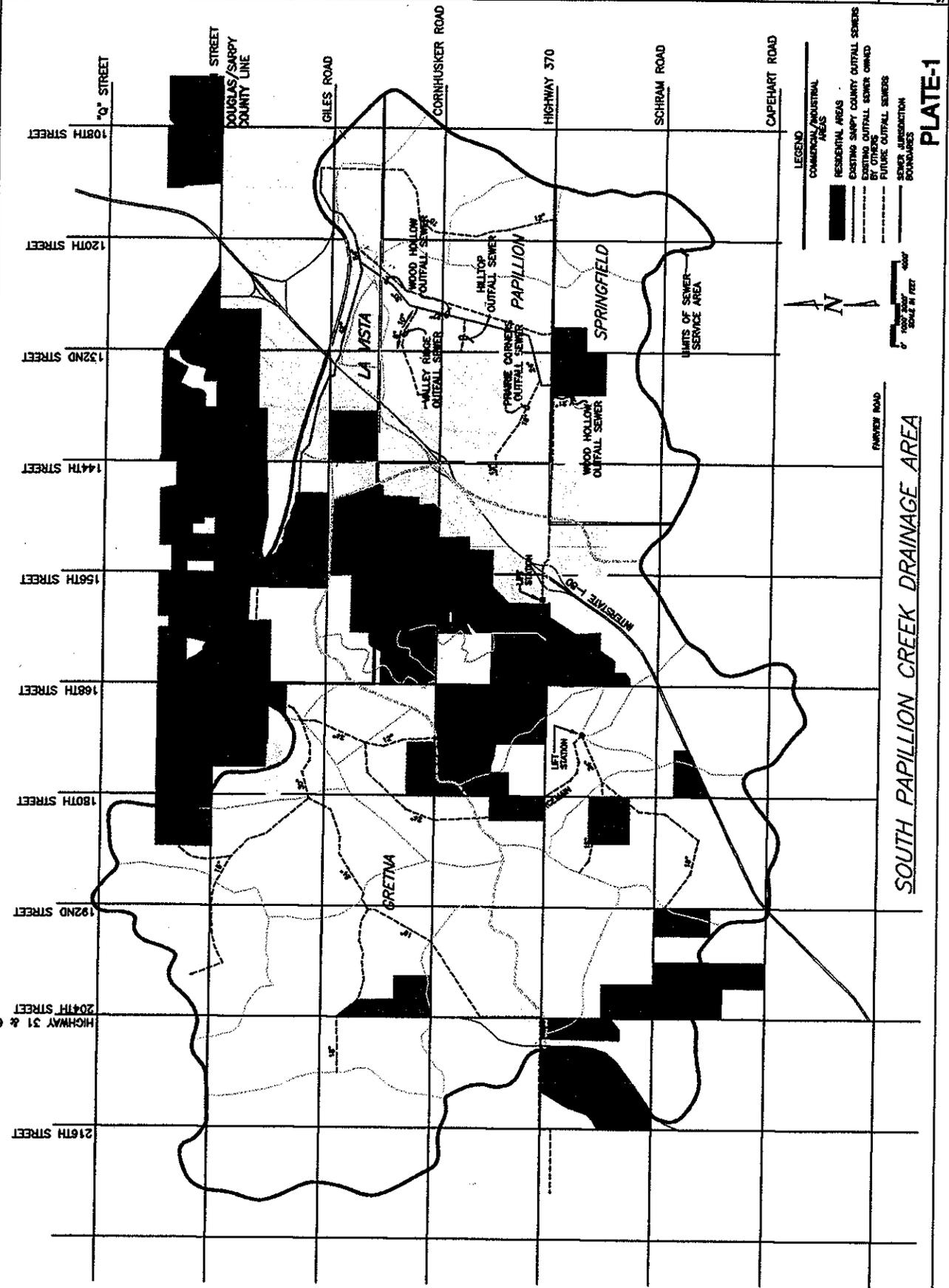
Respectfully submitted,


Robert E. Dreessen, P.E.
THOMPSON, DREESSEN & DORNER, INC.



RED:mc

TD² File No. 229-194.50



WOOD HOLLOW OUTFALL EXCESS CAPACITY REVIEW

-  EXISTING OR PLANNED COMMERCIAL / INDUSTRIAL SITES
-  WOOD HOLLOW NATURAL DRAINAGE AREA, NO LONGER TO BE SERVED BY WOOD HOLLOW OUTFALL SEWER
-  AREA OUTSIDE WOOD HOLLOW NATURAL DRAINAGE AREA THAT NEEDS SEWER SERVICE

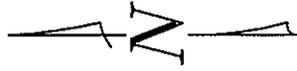
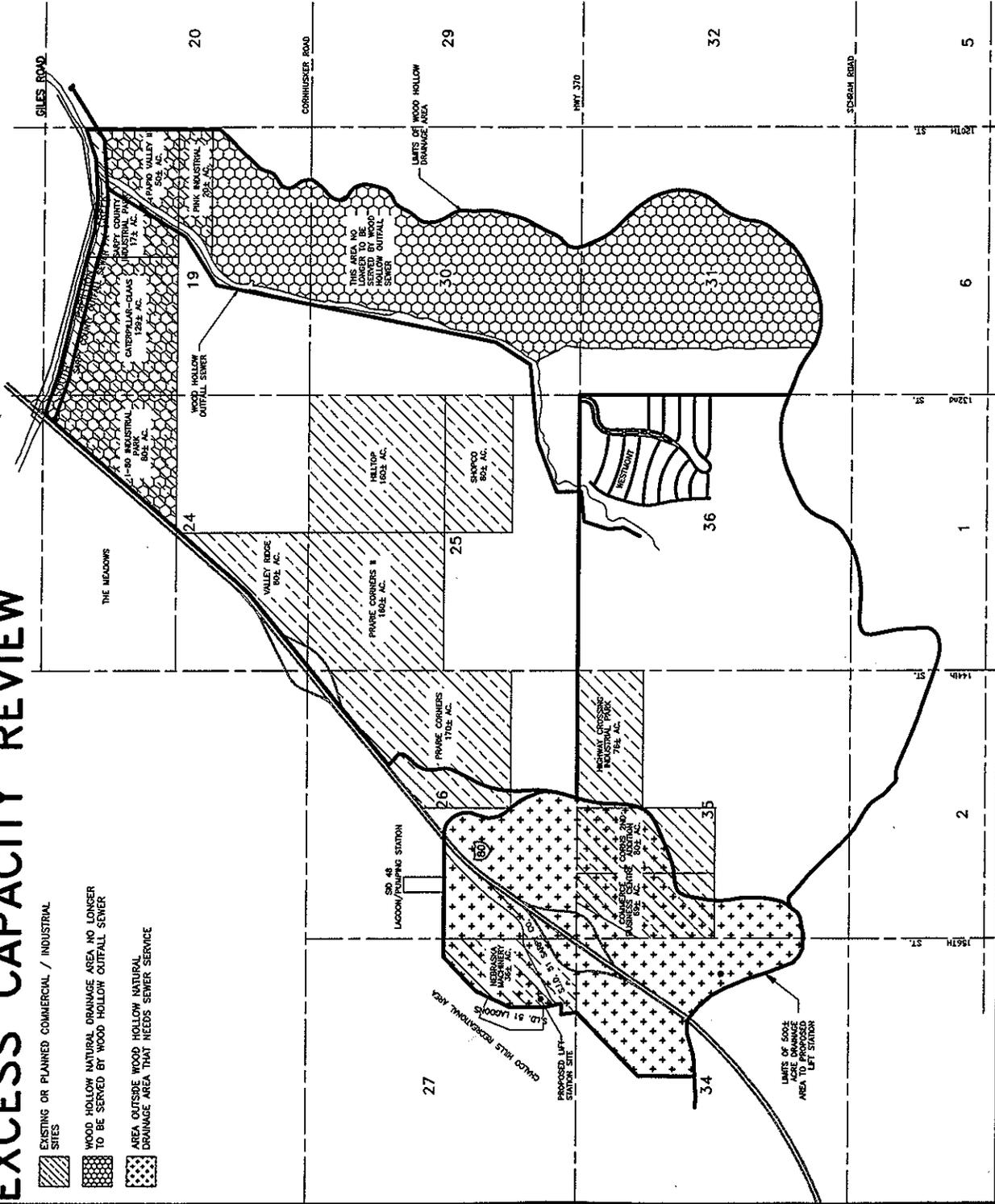
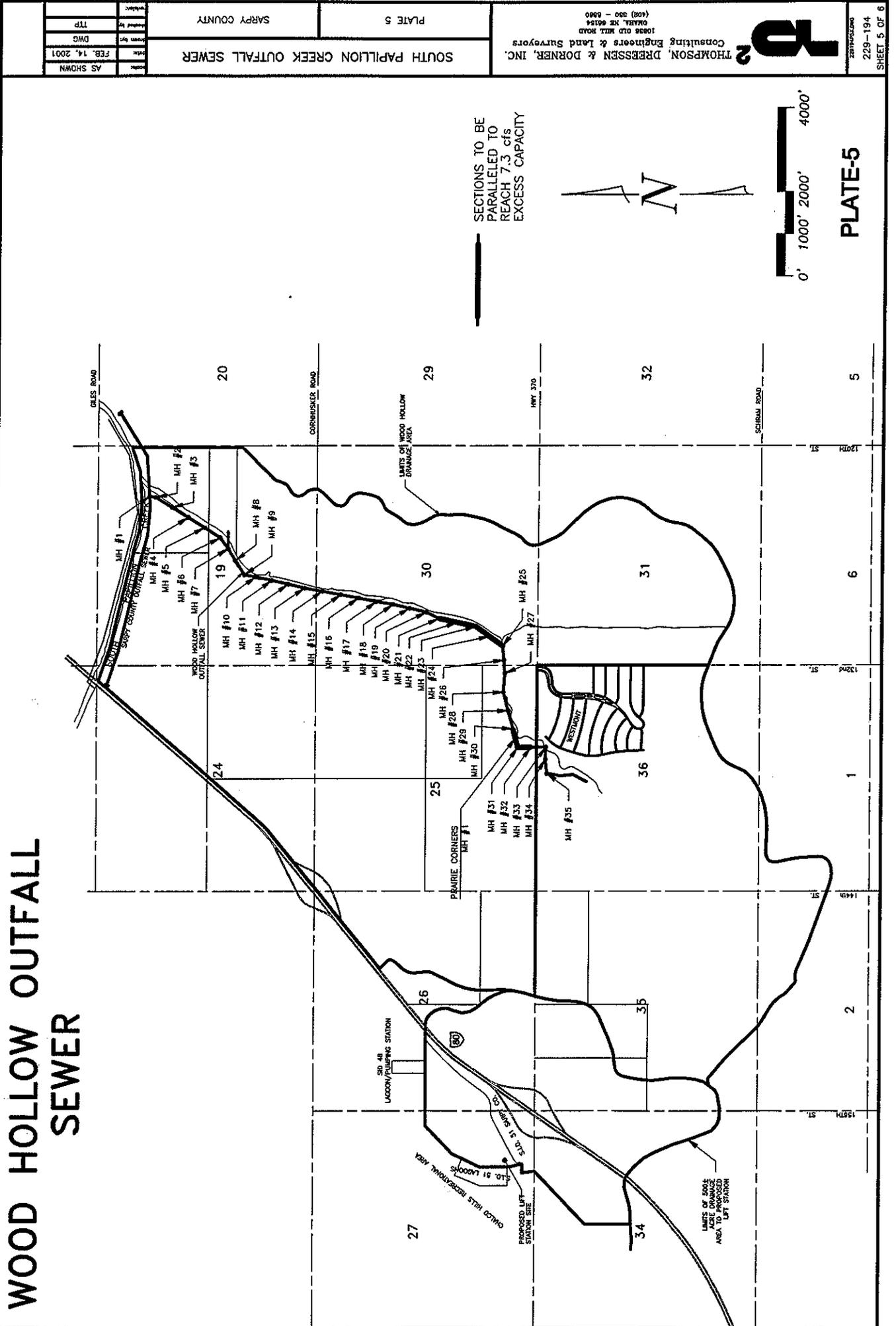


PLATE-4

AS SHOWN	DATE: FEB. 14, 2001	DWG	DESIGNED BY: TTP
SOUTH PAPILLION CREEK OUTFALL SEWER			
SARPY COUNTY			
PLATE 4			

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WOOD HOLLOW OUTFALL SEWER

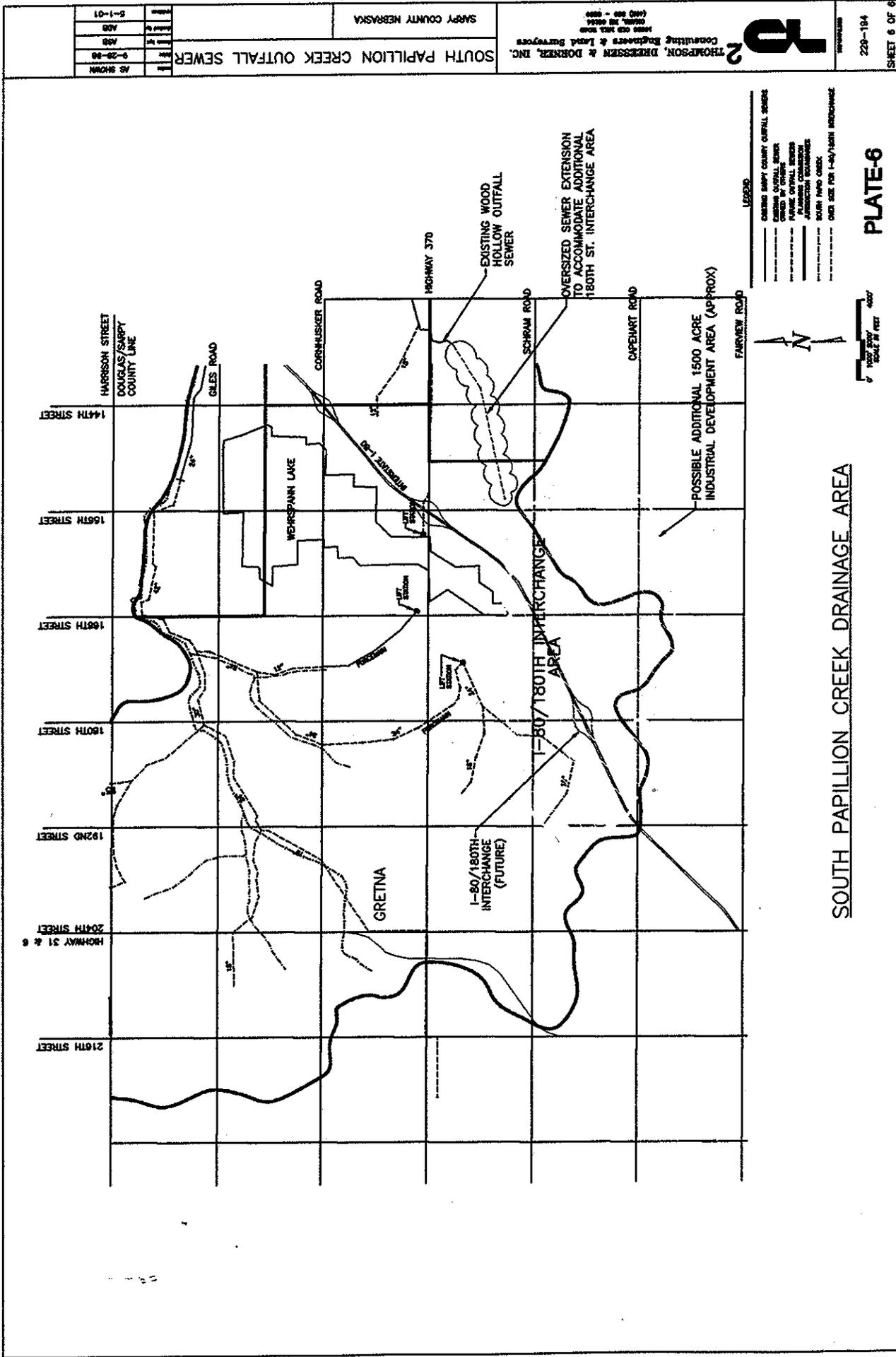


DATE	AS SHOWN
DATE	FEB. 14, 2001
BY	DWG
BY	TTP

SOUTH PAPILLION CREEK OUTFALL SEWER
 PLATE 5
 SARPY COUNTY

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ZONING CODE
 229-194
 SHEET 5 OF 6



AS SHOWN	9-29-88	ADD	5-1-91
AS SHOWN	9-29-88	ADD	5-1-91
AS SHOWN	9-29-88	ADD	5-1-91
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220-184
 SHEET 6 OF 6

SOUTH PAPILLION CREEK DRAINAGE AREA

PLATE-6