CHAPTER II
BACKGROUND INFORMATION

GEOGRAPHY

Yankton County is located along the southeastern border of South Dakota, separated from the State of Nebraska by the Missouri River. The physical area comprises 519 square miles of land or 332,032 acres. The County's population density in the year 2010 was 43.1 persons per square mile. There are 22,684 people residing within the county of which 15,427 live within the six municipalities lying completely within the County. **Figure 1** shows the location of Yankton County within the State of South Dakota along with its geographic relationship to comparable counties within the state.

In further describing the geographic site and situation of Yankton County, the following three classifications or categories provide additional detail: agricultural, climatic, and physical.

- ~~✓~~ Agriculturally, the County is situated within the cornbelt. ~~and the eastern margin of the cattle range.~~

- ✓ Climatically, Yankton County is ~~very~~ close to the boundary dividing the humid and dry regions of the continent, ~~delineated by a north-south line~~ and the warm and cool summer continental climates. ~~an east-west boundary.~~

- ✓ Physically, the County is also unique in the location and relation to the subdivision of the interior plains within North America. This boundary dividing the Great Plains from the Central Lowlands falls either within or just outside the County's boundaries.

All of the above mentioned boundaries may be related to the climatic differences of the arid western regions and more humid regions lying to the east. The location of Yankton County between these two distinct regions results in cyclical weather patterns and difficulty in supporting more intense industrial and agricultural development.

The constant fluctuation of the boundary classifications and subsequent differences are both a strength and weakness. The drought conditions associated with the arid regions of the west require a long term vision in terms of development whereas the more humid weather patterns of the east provide an opportunity of expansion and enhanced profitability. This cyclical nature forces any development or expansion plans to be well researched and structured for both long and short term returns on the initial investment.

The categories discussed in the earlier paragraphs are evident in the population distribution of the State and region. The physical location of an area is important when examining long range planning goals and objectives. The relative distances to South Dakota's larger cities are illustrated in **Figure 2**. Major metropolitan areas and travel distances are shown in **Figure 3.**

FIGURE 1

Location of Yankton County in Relationship to Comparable Counties

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FIGURE 2

Distances to South Dakota Cities

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FIGURE 3

Distances to Metropolitan Areas

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SOILS

An examination of the soils within Yankton County assists in illustrating those areas best and least suited for different uses or development. Soils can be described as belonging to a "soil association." A soil association is a unique natural landscape that has a distinct pattern of soils, relief, and drainage. Typically, a soil association consists of one or more major soils and some minor soils.

The soils map shown in **Figure 4** illustrates the soil types in the County. Each soil type has special properties. This plan will present only a brief, general discussion of applicable soils in the Yankton County area. More specific information is available in the Soil Survey of Yankton County, South Dakota, published by the U.S. Department of Agriculture, Soil Conservation Service.

The following soils are most prominent within Yankton County:

1. **Clarno-Bonilla-Tetonka:** Occupies the largest portion of the County and are primarily North and West of the City of Yankton.

2. **Egan-Ethan-Trent:** Located in the Northeast section of the County.

3. **Egan-Wentworth:** This soil is found in two distinct areas separated by the James River Basin. The smallest area is northwest of the Town of Mission Hill while the larger section commences at the mouth of the James River, east of the City of Yankton and follows the top of the Missouri River bluffs to the Bon Homme County Line.

4. **Ethan-Betts:** Located in a fairly concentrated "fingers" adjacent to Beaver Creek-Beaver (State) Lake, Clay Creek-Lake Marindahl, and Turkey Creek regions.

5. **Crofton-Boyd-Ethan:** Occupies the smallest land area and is limited to the Missouri River bluffs and ravines west of the City of Yankton.

6. **Ethan-Clarno-Davis:** Located in the James River Valley from the Hutchinson County line south to a point between the Town of Mission Hill and City of Yankton.

7. **Baltic-Roxbury-Lakeport:** Concentrated in an area bounded by the Towns of Mission Hill, Gayville, and Volin.

8. **Forney-Haynie-Sarpy:** Found in the Missouri River Valley from what is now the face of Gavins Point Dam to the Clay County line.

The soil data in **Figure 4** ~~(page 9)~~ is presented via two methods, color and abbreviations of the individual soil type. The following information ties the various abbreviations to one of the eight soil associations identified above.

Number	Series/Soils	Abbreviation(s)
1.	Clarno:	CdA, CeB, ChA, CkA
	Bonilla-Cross Plain:	BnA
	Tetonka:	Tb
2.	Egan-Ethan-Trent	EbB, EbC
3.	Egan-Wentworth:	EcA, EcB
4.	Ethan-Betts:	EmE
5.	Crofton-Boyd:	CoE
6.	Ethan:	EkD, EmE, EnC, EoD, EpD
7.	Baltic:	Ba, Bb, Bc
	Roxbury:	Rb, Rc
	Lakeport:	La
8.	Forney:	Fa
	Haynie:	Ha, Hb
	Sarpy:	SdA, SeA

Due to the vast number of soil types in the county **Table 1** illustrates the properties of the first type of soil in each association**.** Properties listed for each soil discussed are slope, corn suitability, sanitary facilities (septic tanks and absorption fields), dwellings, commercial buildings, and roads. For sanitary facilities, dwellings, commercial buildings, and roads the soil properties are listed for their suitability for each activity. The potential may be listed as slight, moderate, or severe.

Shrink/swell potential is the potential for volume change in a soil with a loss or gain in moisture. If the shrink/swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed. Severe shrink/swell means the soil properties are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance is required. Special feasibility studies may be required where the soil limitations are severe.

Some soil types should be closely studied prior to building homes and other occupied structures. An area with a high water table or poorly drained soil will not adequately support a septic tank. A high water table will allow unfiltered septic tank effluent to contaminate the local ground water. The specific soil type in the development area should be evaluated before development is allowed. Building on inappropriate soils may result in environmental damage and additional public and private expense.

FIGURE 4

Yankton County Soils

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Besides soil properties, other environmental issues such as topography and flood hazards should be considered when determining new areas for development. **Figure 5** illustrates the environmental constraints in Yankton County including wetlands, flood plains and slopes. The wetland data is based upon the United States Fish and Wildlife Service National Wetlands' Inventory.

Flood data is based upon Federal Emergency Management Agency data and includes four zones or classifications:

Zone A:	The approximate 100-year flood zone
Zone AE:	The detailed 100-year flood zone
~~**Zone ANI:**~~	~~Are area not included~~
~~**Zone X500:**~~	~~The 500-year flood zone~~
Zone X:	***No flood zone***

The majority of the flood zones within Yankton County follow the James River and Marne Creek in the City of Yankton.

Yankton County terrain includes slopes from each of the identified ranges. Slope data is based upon the vertical rise in relation to the run or horizontal distance. A 10% slope is equal to a 10 foot rise in elevation in a distance of 100 feet. **Figure 5** illustrates the various slopes within the county.

SLOPE CATEGORIES

The slope of an area or location may dictate which type of activities or development can reasonably be expected to "perform" well. Planning the Built Environment by Larz T. Anderson provides guidelines for developing upon the variety of slopes identified within **Figure 5**.

Under ½% Slope:

Almost no land uses are feasible because of the problems associated with surface drainage of rain. Some exceptions would include: rice paddies, flooded orchards, and flood control basins.

½ to 1% Slope:

Conducive to large-scale, linear industrial production uses and for recreation uses such as picnics and informal, small-group field sports. Generally not conducive for commerce, residences, roads, and airports due to drainage problems. Can be dangerous due to standing water, fog, and ice.

1 to 3% Slope:

Generally good and favorable for all types of development due to good drainage, easy slopes and easy truck and auto access. May need a 2% minimum grade in areas where ground frost is probable.

3 to 5% Slope:

Small-scale industry and commerce, trucking access becomes difficult and parking areas must be terraced. Roads, airports, and railroads must run parallel or diagonal to the contours. Suitable for playgrounds, playfields, picnic areas, informal field sports, camping, golf courses, nature trails, hiking areas, and general farming practices.

FIGURE 5

Environmental Constraints

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5 to 10% Slope:

Industry and Commerce: Intensive, small-scale industry and commerce possible with truck access becoming difficult and expensive over 7%.

Residential: Detached, single-family, townhouses, and multifamily residences are all feasible, but parking lots must be terraced, or parking garages provided.

Roads: Truck and high-speed roads must run parallel with or diagonal to the contours. Road routing is dictated by the terrain in areas over 8%, and can create access problems due to cutting and filling of the roadway.

Airports: Usually economically impractical, unless there is a long ridge top that parallels the prevailing wind direction, and can be leveled without excessive expense.

Railroads: Must run virtually parallel with the contours, but even then creates serious embankment problems and high costs.

Recreation: Suitable for golf course, picnicking, camping, and hiking. Large level fields may be expensive to construct and environmentally damaging.

Agriculture: General farming but care must be taken for erosion control.

10 to 15% Slope:

Industry: Economically impractical.

Commerce: Economically impractical, except for unusual, specialized shopping areas to serve "planned unit developments." Parking areas must be terraced or in structures.

Residential: Hillside subdivision for single-family homes which take special design if terrain is not graded to form building pads. Townhouse construction is economically impractical. Apartment construction is often feasible, especially when a "cluster design" is utilized.

Roads: Any road design takes special care in this terrain. All types of roads can be constructed, but at greater economic and ecological cost.

Railroads: Same as in category 5 to 10%, more severe problems.

Airports: Economically impractical.

Recreation: Suitable for hiking, camping, and picnicking but sports which require level playing fields are economically impractical. Golf courses are unplayable.

Agriculture: Pastures and forests are most appropriate. Cultivation should be avoided due to erosion problems.

15 to 30% Slope:

Industry: Economically impractical.

Commerce: Economically impractical.

Residential: Single-family home subdivisions are possible with special care in the design of access roads and location of septic tanks. Townhouse construction is usually economically impractical, and apartments are possible on special sites only if access roads, parking areas, water, and sewer is carefully planned (usually expensive).

Roads: Similar to the 10 to 15% slope, except problems with cutting and filling are more extreme. May be so extensive that it would be damaging to the local ecology.

Recreation: Trails and camping only. No uses which require a level playing field or concentration of people are possible.

Agriculture: Pasture, forest, and vineyards that do not involve substantial grading are suitable.

Over 30%:

Urban uses: All urban uses which require the construction of roads and the provision of utilities are both prohibitively expensive and extremely damaging to the terrain. As a general rule, land with a slope over 30% should not be disturbed. If it is determined that development is necessary, the project must be planned with extreme care.

Recreation: Trails are suitable, but too steep for camping.

Agriculture: Uncultivated pastures and forests.

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TABLE 1

Soil Properties in Yankton County

Soil Type	Slope (%)	Corn Suitability (Bu/Ac)	Soil Limitations	Dwellings (No Basements)	Dwellings (Basements)	Commercial Buildings	Roads and Streets
Clarno	0-6	73-78	Sanitary Facilities	Moderate: S/S, LS	Moderate: S/S, LS	Moderate: S/S, LS	Severe: LS
Egan	0-9	66-85	Severe: Perks Slowly	Severe: F, W	Severe: F, W	Severe: F, W	Severe: F, LS
Ethan	2-25	60	Severe: Perks Slowly	Severe: S	Severe: S	Severe: S	Severe: S, LS
Crofton	9-40	N/A	Severe: Perks Slowly	Severe: S	Severe: S	Severe: S	Severe: S, LS
Baltic	0-1	61-70	Severe: Slope	Severe: S/S, F, W	Severe: S/S, F, W	Severe: S/S, F, W	Severe: W, LS, F
Forney	0-2	73	Severe: Perks Slowly	Severe: W, LS, S/S	Severe: W, LS, S/S	Severe: W, LS, S/S	Severe: LS, S/S

Note: S/S = Shrink Swell, F = Flooding, S = Slope, LS = Low Strength, W = Wetness, N/A=Not applicable
Source: USDA-SCS Soil Survey of Yankton County South Dakota

CLIMATE

Climate conditions can affect local development in a variety of ways. The amount of insulation required for houses and buildings is affected by temperature extremes. The amount of rainfall dictates the size of drainage pipes and culverts needed to prevent flooding. Prevailing wind patterns should be taken into consideration when developing industry that may emit smoke and/or odors. **Table 2** presents the average temperature and precipitation for Yankton County.

When reviewing climatic data, historical trends need to be reviewed to offer the broadest perspective and identify the cyclical weather patterns faced by an area's population. Yankton County experiences a wide range in temperatures from summer to winter and in daily maximum and minimum temperatures during most of the year. Temperatures on some occasions rise to more than 100 degrees in summer and fall to minus 21 degrees or lower in winter.

The level of precipitation and weather patterns a region receives impacts the local economy, infrastructure development, and demographic. The growing season is best explained as a period between April and September and is further defined by the dates of "killing" freezes. This season within Yankton County is limited by the last spring freeze which generally occurs before April 25th and the first fall freeze that usually occurs after October 12th.

The importance of reviewing historical trends versus a snap shot or single year becomes evident in presenting annual growing season precipitation in Yankton County. In 2010 the County received 32.71 inches of precipitation from April through October. A historical analysis of the same months over a twenty nine year period (1971-2000) found that the County received between 18.0 and 19.0 inches.

Wind direction and intensity can vary within short distances as a result of terrain, vegetation, and buildings. Wind speed and direction can also change greatly during the day and shifts with the seasons of the year. Mean values for wind direction show the prevailing winds to be from the northwest in winter (November through April) and from the south in summer (May through October).

CHAPTER II
PLANNING CONSIDERATIONS

County Planning Challenges

The following environmental related challenges are expected??? to be encountered by Yankton County over the next 10 years:

- ✓ Development pressures in areas with environmental limitations such as steep slopes, poor drainage, and flood hazard potential;
- ✓ A continued emphasis on "water oriented" development (views or access) which could present conflicts with recreational or agricultural land uses;
- ✓ ***Development limitations due to an absence of infrastructure, primarily central sewer service within the Highway 52 corridor;***
- ✓ ***The continued sedimentation within Lewis and Clark Lake and its impact upon the local economy and water quality;***
- ✓ ***Introduction of invasive species such as Zebra Mussels and Asian or Silver Carp; and***
- ✓ ***Current agricultural practices whether livestock or crops and their potential impact upon both the built and natural environment.***

Policy Recommendations

In addressing the challenges, the Yankton County Commission should consider the following recommendations.

1) State and federal agencies should be utilized for their expertise in protecting environmental resources whenever a development proposal has the potential for conflict;
2) County environmental assets should be clearly identified and monitored to better inform the public and developers about sensitive areas;
3) ***Industry experts within the private sector and***;
4) Development should be discouraged from areas having obvious environmental limitations ***via Flood Plain and Subdivision Regulations***.

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TABLE 2
Temperatures and Precipitation

	Avg. Monthly Temp. (in degrees)										Avg. Daily Temp (In Degrees)		Total Precipitation (in inches)				
	1991		1997		2002		2010		2016		1952 - 2002		1991	1997	2002	2010	2016
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min					
January	26.5	5.7	21.5	1.6	38.2	14.9	22	4	28	13	27.9	6.4	.24	.69	.10	1.37	.01
February	46.0	21.2	33.2	14.3	44.0	15.1	25	7	38	22	33.9	12.2	.34	1.00	.64	.58	.01
March	52.6	24.3	47.8	23.5	37.3	15.0	48	29	53	30	44.1	21.8	.77	.51	1.68	1.72	.05
April	63.8	38.0	55.3	31.2	63.2	34.8	67	40	59	40	60.1	34.9	2.60	2.33	1.82	3.88	.16
May	73.7	52.0	66.7	42.7	70.3	41.2	71	46	71	49	72.2	47.0	4.15	4.32	1.84	2.7	.13
June	84.4	64.2	83.7	58.5	88.3	61.1	82	58	86	63	82.0	57.4	4..75	2.03	1.45	6.69	.03
July	88.5	63.3	87.0	64.2	93.0	66.9	87	63	85	64	87.4	62.4	3.22	2.33	1.65	10.21	.09
August	88.3	62.8	83.3	61.2	85.9	61.0	88	63	82	62	85.3	59.9	1.42	2.33	6.00	3.4	.04
September	78.6	50.9	79.2	52.7	79.3	52.9	75	50	76	55	76.2	49.6	1.54	4.16	1.51	5.83	.15
October	62.8	35.7	66.3	39.7	54.1	32.9	69	38	64	42	64.1	37.4	.87	2.72	4.14	1	0
November	36.2	17.3	42.8	22.7	N/A	N/A	48	23	53	33	45.8	23.9	2.24	.29	N/A	.45	.04
December	36.7	18.2	37.9	19.5	N/A	N/A	28	10	31	13	33.0	12.5	.27	.29	N/A	1.37	.03
Annual Average	61.5	37.8	58.7	36.0	65.4	39.6	57.5	35.92	60.5	40.5	59.3	35.4	1.87	1.72	2.08	3.26	.06

Sources: SD Climate and Weather Information Website, SDSU (http://climate.sdstate.edu/climate_site/archivedata.htm)