

FINAL ENVIRONMENTAL IMPACT STATEMENT AND FINAL SECTION 4(F) STATEMENT

SOUTH AND EAST BELTWAYS LINCOLN, NEBRASKA PROJECT NO. DPU-3300(1)

12 June 2002

Submitted Pursuant to 42 U.S.C. 4332 (2) (c) and 49 U.S.C. 303

U.S. Department of Transportation, Federal Highway Administration
Nebraska Department of Roads
Lancaster County
City of Lincoln

6/12/02
Date

For City of Lincoln

6-12-02
Date

For Lancaster County

6-12-02
Date

For Nebraska Department of Roads

6/18/02
Date of Approval

For Federal Highway Administration

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ABSTRACT: This Environmental Impact Statement (EIS) document identifies and evaluates preferred beltway alignments on the south and east fringes of the City of Lincoln. The beltways would complete a circumferential transportation system by linking with Interstate 80 (I-80) on the north and U.S. Highway 77 (US 77) on the west. The approximately 13 km (8 mi) long south beltway would connect US 77 with Nebraska Highway 2 (N-2), while the 21 km (13 mi) long east beltway would connect N-2 with I-80.

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**FINAL
ENVIRONMENTAL IMPACT STATEMENT
for
South and East Beltways
Lincoln, Nebraska**

SUMMARY

Background. The City of Lincoln, Lancaster County and the Nebraska Department of Roads, in cooperation with the Federal Highway Administration, are studying the possibility of constructing a beltway around the south and east sides of the City of Lincoln. The purpose of the project is to complete the circumferential (encircling) transportation network around Lincoln which currently exists only on the north and west sides. The project would move through traffic around Lincoln's congested urban area, and improve traffic flow on the existing urban street system.

The south beltway would provide an alternative connection between US Highway 77 (US 77) in the southwest and Nebraska Highway 2 (N-2) at the southeast edge of Lincoln. Access points are proposed at 27th, 68th and 84th Streets. The study area for the south beltway is bounded on the north by Yankee Hill Road, on the south by the half-section line 0.8 km (0.5 mi) south of Bennett Road, on the east by the half-section line 0.8 km (0.5 mi) east of 148th Street, and on the west by US 77.

The east beltway would connect N-2 at the southeast edge of Lincoln with Interstate 80 (I-80) in the northeast. Access points are proposed at Pine Lake Road, Pioneers Boulevard, US 34 (O Street), Adams Street, Fletcher Avenue and US 6 (Cornhusker Highway). The study area for the east beltway is bounded on the west by 98th Street, on the east by the half-section line 0.8 km (0.5 mi) east of 148th Street, on the north by I-80, and on the south by N-2.

The beltways could be constructed together, completing the loop around the City, or separately as stand alone projects with independent utility (*i.e.*, they would be usable and a reasonable expense even if only one is built without the other).

NEPA. This Final Environmental Impact Statement (FEIS) has been prepared to satisfy the requirements of the National Environmental Policy Act (NEPA) of 1969. All federally funded projects must comply with NEPA which requires that social, environmental and economic considerations be incorporated in project planning, and that public involvement be incorporated into the decision making process. The intent of the law is to find a balance between population needs and use of resources—with the idea that there can be a productive harmony between advancing development and preservation of our nation's resources for future generations.

Purpose and Need. Traffic data, regional growth trends and previous studies have all indicated a need for south and east beltways. Some of the highest rates of growth have been on the south and east fringes of Lincoln thereby requiring a long-range plan to develop early identification of bypass corridors and potential purchase of right-of-way. Existing high volumes of local traffic on arterials such as US 6 and N-2 is made worse by high volumes of through traffic which originates outside Lincoln and travels to destinations beyond the City. In addition, internal to external trips and external to internal trips are currently made using arterial roadways with signalized intersections and, in some areas, direct access to adjacent properties. This results in excessive delay and congestion along these roadways.

Alternatives Analysis. The document contains an evaluation of project alternatives based on the results of six years of data collection, analysis, and public and agency review. Although the document includes the step by step evaluation process, the final evaluation represents an analysis of all that is known at this time.

The study considered a wide range of alternatives, including non-beltway and no build alternatives. These alternatives were evaluated and those considered most practical and with the least environmental impact were carried forward to more detailed levels of analysis. The planning process included four levels of analysis, each representing a more comprehensive evaluation. The overall process was envisioned as a funnel, with the alternatives continually being reduced in number until the best candidates remained to be carried forward in the DEIS analysis. These were identified as the four finalist alternatives, and included one south beltway alternative (SM-4) and three east beltway alternatives: close, mid and far (EC-1, EM-1 and EF-1). The no build alternative was carried forward throughout the entire evaluation process.

Proposed Action. The proposed action was assumed to involve construction of a 4-lane roadway designed to freeway standards, similar to Interstate 80 (I-80). A freeway design would have (1) complete access control (no at-grade crossings), (2) 75 to 90 m (250 to 300 ft) wide right-of-way, and (3) design speed of 110 km/h (70 mph) and posted speed of 105 km/h (65 mph). Beltway interchanges would be spaced approximately 3.2 km (2 mi) apart along the existing grid network. Roadways which cross the beltway may or may not be improved as part of the federal project. However for cost estimating purposes of this study, it was assumed that ultimately all unpaved county roads at beltway interchanges would be upgraded to 4-lane paved roadways. County roads which cross the beltway overpasses were assumed to be upgraded to 2-lane paved roadways.

Assessment of Transportation Benefits. Comparison of the four finalist beltway alternatives indicates that all of the alternatives served the project purpose and need, and all of the alternatives are considered feasible and cost-effective solutions. The location of the east beltway in terms of the close, mid or far alignment does not seem to have a significant effect on the amount of traffic it is expected to carry or the benefits obtained. The east beltway provides relief to traffic coming into or through Lincoln from the northeast (Omaha) and the southeast (Nebraska City). This traffic will use the east beltway regardless of which alternative is selected. The major differences between the east alternatives involve the interchanges at I-80, N-2 and the south beltway. The EC-1 and EF-1 requires diagonal routing to connect to an interchange at I-80, and requires two separate interchanges for N-2 and the south beltway. EM-1 requires a single, but more complicated interchange at N-2 and the south beltway. These differences are best reflected in the construction cost estimates and right-of-way impacts; however, they have little effect on system performance.

Assessment of Environmental Impacts. This FEIS contains an assessment of environmental, social and economic impacts, and includes proposed mitigation to avoid, minimize or compensate for project impacts to the extent possible. Comparison of the project impacts indicates that all of the finalist alternatives have relatively low impact considering the length of the segments. This is due to the primarily rural setting and the great effort made to minimize impacts throughout the beltway planning process. However, all of the east routes have impacts to Section 4(f) resources. **Table S.1** is a summary of beltway benefits and impacts for the four finalist alternatives.

Table S.1

SUMMARY OF BELTWAY BENEFITS AND IMPACTS

IMPACTS	UNITS	ALTERNATIVES			
		SM-4	EC-1	EM-1	EF-1
TRANSPORTATION BENEFITS (End to End Beltway Analysis: South and East Combined)					
Total Daily Beltway Usage	Vehicle Kilometers (Miles) Traveled	–	762 800 (474,000)	721 000 (448,000)	696 800 433,000
Average Daily Time Savings	Hours	–	9,400	10,250	8,450
Average Annual Accident Savings ¹	\$	–	\$8,691,000	\$7,430,000	\$4,712,000
ECONOMIC IMPACTS					
Construction Cost (partial beltway)	\$ (1996)	\$107,000,000	\$147,000,000	\$157,000,000	\$128,000,000
Construction Cost (end-to-end beltway with SM-4)	\$ (1996)	–	\$249,000,000	\$252,000,000	\$231,000,000
Payoff Period ² (end-to-end beltway with SM-4)	Years	–	14	13	19
Cost Effectiveness	Payoff Period less than Design Life of Project	–	Yes	Yes	Yes
SOCIOECONOMIC IMPACTS					
Total Right-of-Way	ha (ac)	295 (730)	451 (1114)	389 (960)	449 (1110)
Residential Relocations	No. of houses	3	7	4	7
Business Relocations	No. of businesses	1	0	0	1
Railroad Crossings ³	No. of crossing	3	2	0	0
Airfield Impacts	Impacts	none	none	none	none
Cropland Impacts	ha (ac)	206 (508)	296 (731)	282 (698)	316 (780)
Total Farmland Impacts	ha (ac)	238 (587)	367 (906)	329 (813)	375 (926)
Prime and Unique Farmland Impacts (end-to-end beltway with SM-4)	Impact Rating Points (0-260)	–	140 (minor)	143.5 (minor)	142 (minor)
Estimate of Bisected Farms	No. of owners	16	33	29	23
LAND USE IMPACTS					
Distance from 2000 City Limit	km (mi)	0.8-2.4 (0.5-1.5)	0.8-3.2 (0.5-2.0)	2.4-4.8 (1.5-3.0)	2.4-6.4 (1.5-4.0)
Residential Impact	ha (ac)	9.5 (23.4)	12.3 (30.3)	4.0 (10.0)	7.8 (19.3)
Commercial/Industrial Impact	ha (ac)	4.2 (10.3)	1.6 (3.9)	0.6 (1.4)	1.1 (2.7)
Trail Impacts	No. of crossings ha (ac)	0 0	2 0.6 (1.5)	1 0.3 (0.8)	1 0.3 (0.7)
Modification of Proposed LPSNRD Farm Ponds	No. of ponds	0	2	1	2

IMPACTS	UNITS	ALTERNATIVES			
		SM-4	EC-1	EM-1	EF-1
ENVIRONMENTAL IMPACTS					
Air Quality	NAAQS impacts	no impact	no impact	no impact	no impact
Noise ⁴	No. of impacted receptors ⁴	4	9	5	7
Water Quality	Impacts	minor and temporary	minor and temporary	minor and temporary	minor and temporary
Major Stream Crossings	No. of crossings	2	2	1	0
Total Streams	No. of crossings	8	9	6	4
100-Year Floodplains	No. of crossings	4	4	6	5
Floodways	No. of crossings	0	2	1	0
Wetlands	ha (ac)	7.3 (18.0)	16.9 (41.8)	8.9 (21.9)	8.3 (20.4)
Prairie Grasslands	ha (ac)	0	0.4 (1.1)	1.3 (3.2)	2.7 (6.6)
Endangered & Threatened Species	Impacts	none	none	none	none
NRHP Archeological Sites Adversely Affected under Section 106	No. of sites	0	1	0	0
NRHP Standing Structures Adversely Affected under Section 106	No. of sites	1	0	1	3
Section 4(f) Impacts-Recreation	No. of resources	0	2	1	1
Section 4(f) Impacts-Historic	No. of sites	0	0	1	1
Potential Environmental Risk Sites	No. sites along route	9	4	4	4
Visual Impacts to Residences	No. w/in 0.4 km (0.25 mi)	27	58	31	41

¹ Average Annual Accident Savings is based on end-to-end beltway analyses performed with the BOS land use plan. The BOS II land use plan is expected to provide even greater accident cost savings.

² An analysis of the time savings with the BOS II model comparing the end-to-end beltway alternatives and no build alternative indicates the investment to construct the beltway would be paid off through time savings in 13 to 19 years (Section 2.4.5). The conclusions of this comparison are that all end-to-end beltway alternatives for all the east alignments are economically feasible.

³ If SM-4 and EC-1 are constructed, two crossings of the OPPD line will be required. EC-1 alone does not require any railroad crossing.

⁴ These are receptors for which noise abatement measures were not considered reasonable.

Overall differences between the east alternatives are relatively minor. EC-1 and EF-1 have greater right-of-way requirements than EM-1; and therefore, have greater land use impacts. EC-1 has slightly more impact to suburban type land uses such as residential and commercial acreage and impacts to trails due to its closer proximity to Lincoln. In contrast, EF-1, which is 4.0 km (2.5 mi) more distant from the city than EC-1, has slightly more impact to rural uses such as farmland, prairie, historic structures, and actual number of residences. EM-1 and EC-1 have slightly more impact to natural resources such as streams, floodplains and floodways, and wetlands due to their closer proximity to Stevens Creek, where as EF-1 has slightly less impact to natural resources due to its general location along the ridgeline.

There are some differentiating impacts between the routes that were carefully considered in selecting a preferred alternative.

1. For EC-1, *noise and visual impacts* to nearby residences are greater than with other alternatives because it extends across a more developed landscape closer to the city.
2. For EF-1, impacts to *historic structures* are greater due to the greater presence of resources with increasing distance from the city and urbanization.
3. The *higher costs* of EC-1 and EM-1 compared to EF-1 are due to the major bridge structure at Stevens Creek.
4. The diagonal segment at the north end of EC-1 creates a less desirable *circuitous route* (with backtracking for westbound traffic) and has greater impact to farming operations.
5. The EC-1 connection at N-2 and the south beltway requires two interchanges which creates an undesirable triangle of land and *access problems* for several residences.
6. There are *cost savings* with the SM-4/EM-1 end-to-end beltway due to the common interchange at N-2. This savings partially offset the cost of the larger bridge across Stevens Creek.

Although all of the alternatives meet the project purpose and need, there are benefits and trade-offs with any of the three east alternatives.

Project Costs. Construction costs for end-to-end beltways ranged from \$231 million with SM-4/EF-1, \$249 million with SM-4/EC-1, and \$252 million with SM-4/EM-1. Costs are within 8 percent of each other for the end-to-end beltways. This is within the 20 percent contingency contained in all cost estimates.

Areas of Controversy. Four main areas of controversy were identified during the beltways study. These were:

- a. Wilderness Park. Concerns were raised about six south beltway alternatives which crossed Wilderness Park—a public park afforded certain protection under Section 4(f) of the Department of Transportation Act. Wilderness Park is an approximately 12.9 km (8.0 mi) long park encompassing over 728 ha (1,800 ac) and located along Salt Creek. The park is a favorite among local residents. Urban expansion and

protection of the park have been critical issues affecting Wilderness Park in recent years. Based on the Level III alternatives analysis, it was shown that there were reasonable and prudent alternatives which did not require use of land from the park; therefore, all south beltway alternatives through Wilderness Park were eliminated from further consideration.

- b. Historic Resources. Concerns have been raised regarding the impact of the beltway on historic resources. As a result, the beltway study has gone to extensive effort to identify and evaluate potential effects to historic standing structures and archeological resources in the study area. In compliance with Section 106 of the Historic Preservation Act, all studies and evaluations have been prepared in consultation with the Nebraska State Historic Preservation Office. Wherever possible, site specific shifts in alignments were made to avoid impacts to historic properties. Despite this effort, historic resources would be adversely affected, amounting to one site along SM-4, one site along EC-1, two sites along EM-1 and three sites along EF-1.

In compliance with Section 4(f), impacts to historic sites were also evaluated to determine if proximity impacts were so severe that the activities, features or attributes that make the site significant, and of value to the public, would be substantially impaired. Based on this evaluation, only one site (a road sign) was determined to be impacted under Section 4(f) (with EM-1 and EF-1).

- c. Social Concerns. In June 1997, elected officials indicated that impacts to residences and developed areas were of primary importance to their constituents. This community value was defined in a vote by the Supercommons (consisting of the City Council, County Commission and City-County Planning Commission) resulting in a directive to eliminate the EC-1 alternative from further consideration. The City Council and County Board further voted in December 1998 to eliminate the EM-1 alternative based on the general impression that the EF-1 would have the least socioeconomic impact. However, in order to comply with NEPA, all reasonable alternatives were included in the preparation of the Environmental Impact Statement, including EC-1 and EM-1.
- d. Urban Sprawl. Concerns have been raised that the east beltway will encourage urban sprawl along the beltway route, where urban sprawl is considered to be any non-farm development not contiguous to the Lincoln City limits. The implication is a far location will create non-contiguous growth, and a close location will continue compact growth.

The City of Lincoln has a tradition of planning which dates back to the 1950s. One of the most long held policies has been to develop "a compact and generally contiguous urban form" around its confines with the goal to "protect existing rural areas from urban sprawl through planned development". The current *1994 Lincoln-Lancaster County Comprehensive Plan* embraces the concept of "managed contiguous growth" and the phasing of infrastructure expenditures based on this policy. However, the plan also encourages a unified planning approach between urban and rural interests and encourages "services to meet a range of urban and rural lifestyles".

Considering that there already exists a proliferation of non-farm residential acreages and acreage subdivisions in the beltway area, the development of a beltway will likely result in more pressure for urbanization in the area; however, this does not necessarily equate to urban sprawl when it follows a locally approved plan based on contiguous managed growth.

Selection of the Preferred Alternative. Following receipt and consideration of comments on the DEIS, the SM-4/EM-1 alternative was selected as the preferred alternative.

SM-4 was selected because:

1. Transportation Functions. A south beltway would aid in completing a circumferential roadway in the Lincoln area. The route is within 0.8 km (0.5 mi) of the future service limit and would reduce the amount of through traffic that otherwise would be on N-2. The route has potential as a multi-use corridor for future trails, open space, utilities and other transportation alternatives.
2. Environmental Impact. SM-4 minimizes impact on natural resources in that it has relatively little impact on wetlands, no impact on native prairie, does not cross the existing boundaries of Wilderness Park, and could be built in a manner to minimize the floodplain impact on Salt Creek. While the route does impact some homes and businesses, these impacts have been minimized to the extent possible.

EM-1 was considered the best east alternative compared to EC-1 and EF-1 because:

1. Transportation Functions. The EM-1 route would aid in completing a circumferential roadway and provide a new truck route without the less efficient "backtracking" found in the EC-1 and EF-1 options.
2. Environmental Impacts. EM-1 minimizes environmental impacts to those resources that are considered most valuable by the local community. In comparison to EC-1, the EM-1 route minimizes impacts to rural and urban neighborhoods, including noise and visual impacts to residences. It also has the least number of relocations of any of the east alternatives. While EM-1 and EF-1 are similar in environmental impact; EM-1 minimizes impacts to historic properties. At the same time, EM-1 has less impact to prairies (versus EF-1), relatively low impact to wetlands (versus EC-1), and requires 150 ac less in right-of-way than the other alternatives. While the EM-1 crossing of Stevens Creek is the longest of the three east alternatives, it could be built to minimize impacts to the floodplain. In consideration of these resources, the EM-1 route protects and preserves the environment to the greatest extent, and is considered the most compatible with the goals, objectives and values of *Lincoln/Lancaster County Comprehensive Plan*.
3. Multi-Use Corridor Potential. The EM-1 route has the greatest potential as a multi-use corridor for trails, open space, utilities and other transportation alternatives. It could be integrated well with a possible trail in Stevens Creek and then tie into possible trails along the South Beltway route to Wilderness Park trails. The potential as an open space corridor is high given that it is within 0.8 km (0.5 mi) of Stevens Creek for over a 10-km (6-mi) stretch. EM-1 also parallels an existing LES

transmission line with a 46 m (150-ft) easement which would allow some overlap of a joint utility and road corridor for over 13 km (8 mi).

4. Travel Time. EM-1 has greater travel savings than EF-1.
5. Cost. While EM-1 is more expensive than EF-1 or EC-1, EM-1 may provide future cost savings as a multi-use corridor, and it uses less land than the other two routes.

The selection of the preferred alternative was unanimously approved on 15 June 2001 by the Beltway Management Committee representing the four project sponsors—the City of Lincoln, Lancaster County, NDOR and FHWA.

Local Preference Decision. The SM-4 and EM-1 alternatives were approved by the Lincoln City Council and the Lancaster County Board of Supervisors, in separate actions, on 22 August 2001 for amendment to the *Lincoln/Lancaster Comprehensive Plan*. With the Mayor of Lincoln's signature on 30 August 2001, the alternatives were officially adopted into the plan.

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Chapter 1

PURPOSE AND NEED FOR THE PROJECT

**FINAL
ENVIRONMENTAL IMPACT STATEMENT
for
South and East Beltways
Lincoln, Nebraska**

1. PURPOSE AND NEED FOR THE PROJECT

1.1 BACKGROUND

The concept of a complete circumferential roadway system around the City of Lincoln has been discussed formally for about 40 years. The 1961 *Lincoln-Lancaster County Comprehensive Plan* identified Interstate 80 (I-80), located north of the City, as the most important link in the circumferential route, supplemented by a loop system around the urban area. The 1966 *Lincoln Metropolitan Area Transportation Study* depicted an "East Side Freeway" and a "U.S. 77 West Bypass" in the Major Street Plan. In 1971, a comprehensive study was undertaken of the east and west bypasses that identified several alternate corridors and their associated costs and impacts. The following year, the State Highway Commission designated the U.S. Highway 77 (US 77) west bypass as the top priority for funding. Since then, efforts and resources of the community, Nebraska Department of Roads (NDOR) and various political entities have been focused on completion of the US 77 west bypass, the K and L Street connection between the west bypass and downtown area, and the Nebraska Highway 2 (N-2) connection to the west bypass along Van Dorn Street. As these projects approached completion, attention became focused on the need to complete the loop road network with south and east beltways.

1.2 PROJECT PURPOSE

The purpose of the South and East Beltways Study has been to conduct a feasibility study and alternatives evaluation for preferred beltway alignments on the south and east fringes of the City of Lincoln to complete a circumferential transportation system (**Figure 1.1**). The south beltway would connect US 77 with N-2, while the east beltway would connect N-2 with I-80.

The ultimate goal of the South and East Beltways Study was to determine if south and/or east transportation corridors are needed and feasible, and if so, to identify preferred alignments to guide the preservation of right-of-way and allow for eventual construction of the beltways and related facilities.

In addition to the feasibility study, the project included concurrent traffic and economic modeling to determine project benefits and costs under future scenarios. Other considerations included evaluation of the potential for (1) coordination with existing and planned drainageways and utility corridors; (2) consolidation of railway corridors in the south beltway corridor; (3) development of a linear park and hiker/biker/equestrian trails along both the south and east corridors; and (4) preservation of a corridor for wildlife habitat and/or an ecologically sensitive wilderness park.

The study included preparation of this Environmental Impact Statement (EIS) to satisfy requirements of the National Environmental Policy Act (NEPA). All federally funded projects must comply with NEPA which requires that social, environmental and economic considerations be incorporated in project planning, and that public involvement be incorporated into the decision making process. The intent of the law is to find a balance between population needs and use of resources—with the idea that there can be a productive harmony between advancing development and preservation of our nation's resources for future generations.

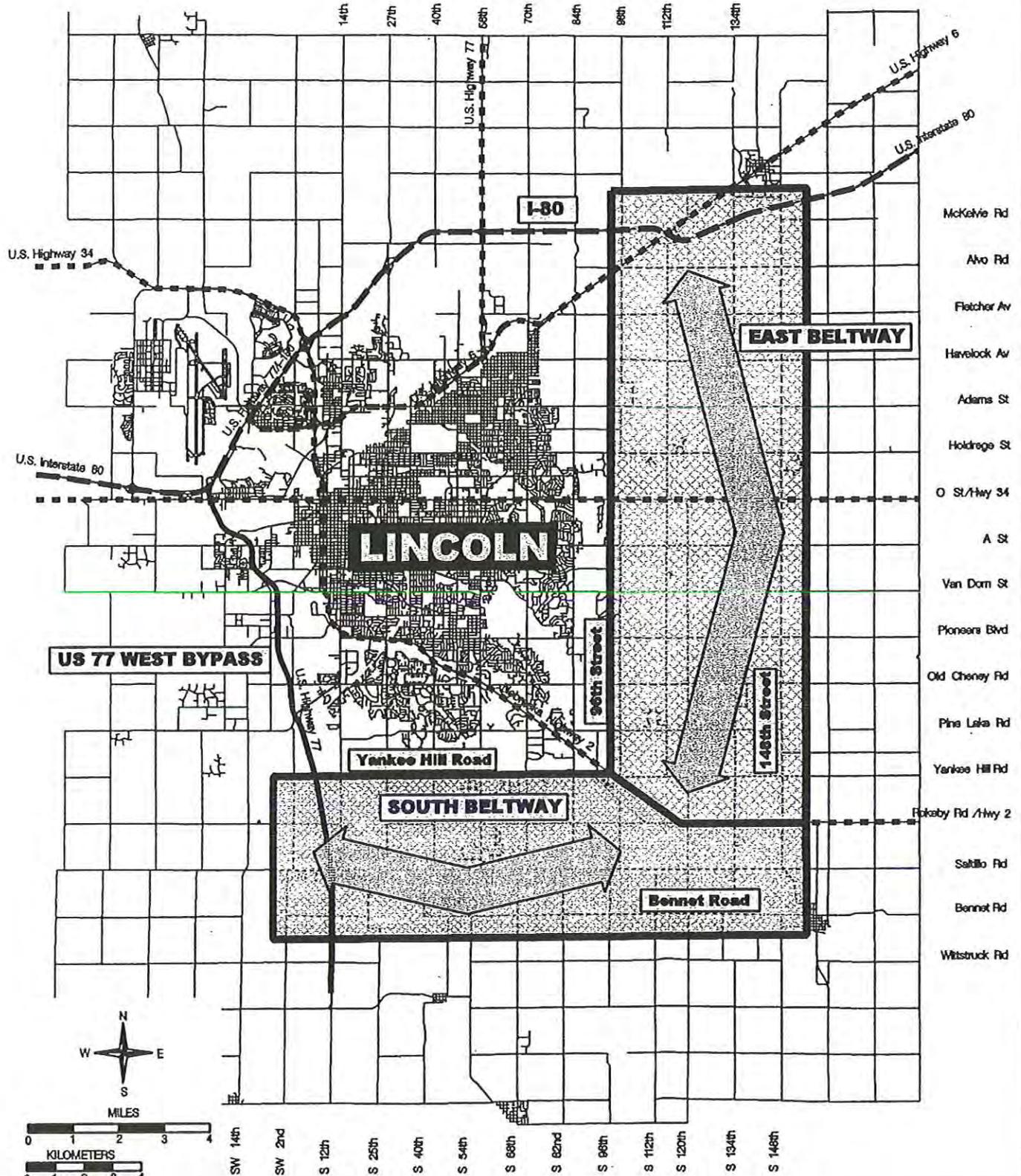
1.3 PROJECT NEED

Traffic data, regional growth trends and previous studies have all indicated a need for south and east beltways.

Regional Growth. The City of Lincoln and Lancaster County have had a long, sustained history of population expansion, with an average increase of around one percent per year over the past several decades. Much of this growth has taken place in the City of Lincoln, where population has been increasing at an annualized rate 1.37 for the past two decades, partially due to annexation (and an annualized rate of 1.63 over the past 10 years) (Lincoln/Lancaster County Planning Department, 2001). Some of the highest rates of growth have been on the south and east fringes of the City. This continued growth in both population and area necessitates planning ahead for future major transportation corridors.

Long-Range Regional Transportation Plan. The *Lincoln-Lancaster County Comprehensive Plan* serves as the Lincoln Metropolitan Planning Organization's Long-Range Regional Transportation Plan, and includes projects encompassing 20 years. The Community Congress, a citizen's advisory group involved in the update of the 1994 *Lincoln City-Lancaster County Comprehensive Plan*, clearly established the desire of the community to complete the loop around the City. One of the goals suggested by the Community Congress and adopted by City and County officials was "to provide for a long-range plan to develop early identification of bypass corridors and right-of-way retention". The south and east beltway corridor study is being conducted for this purpose. The beltway system is viewed as an essential component of the regional transportation network that would move through traffic around congested urban areas, as well as reduce delay and improve traffic flow on the existing urban street system.

In addition to accommodating through traffic, a beltway system will also facilitate trips that have an origin within the metropolitan area and a destination outside of the area, or vice versa. Currently, these trips are primarily made using arterial roadways with signalized intersections and, in some cases, direct access to adjacent properties. This results in excessive delay and increased exposure to accidents due to abrupt stopping, turning, and lane changing. While it is unlikely that internal trips (trips with an origin and destination within the metropolitan area) will use the beltway system to as great an extent as those with an external origin or destination, these trips will also benefit. A significant amount of through traffic on the current major routes (N-2, US 34 (O Street), US 6 (Cornhusker Highway) and 84th Street) will be relocated to the beltway system providing additional capacity and reduced congestion for internal trip traffic.



LEGEND

- EAST BELTWAY
- SOUTH BELTWAY
- WEST BYPASS
- I-80
- US HIGHWAYS

LINCOLN SOUTH AND EAST BELTWAYS ENVIRONMENTAL IMPACT STATEMENT

BELTWAY CONCEPT AND STUDY AREAS

Figure 1.1

The South Beltway. The south beltway would provide an alternative connection between US 77 in the southwest and N-2 at the southeast edge of Lincoln. N-2 is not only the most direct route between Kansas City (via Interstate 29) and I-80 West, but it also serves as the City's primary arterial from growth areas in the south and east of the City into downtown. A beltway could divert through traffic from the urbanized portions of N-2, and improve the flow of interstate travel around the City. It could also reduce congestion on the urban street system and improve safety by reducing the number of heavy trucks that share the roadway with passenger vehicles with local destinations.

The study area for the south beltway is bounded on the north by Yankee Hill Road, on the south by the half-section line 0.8 km (0.5 mi) south of Bennett Road, on the east by the half-section line 0.8 km (0.5 mi) east of 148th Street, and on the west by US 77 (Figure 1.1).

The East Beltway. The east beltway would connect N-2 at the southeast edge of Lincoln with I-80 in the northeast, with access points to US 34 and US 6. This corridor could serve many trips between the south and east portions of Lincoln and I-80 East, including Omaha. It would relieve traffic on the existing urban street system and serve as a truck route.

The study area for the east beltway is bounded on the west by 98th Street, on the east by the half-section line 0.8 km (0.5 mi) east of 148th Street, on the north by I-80, and on the south by N-2 (Figure 1.1).

Truck Routes. The 1993 *Lincoln Truck Route Study*, a comprehensive study of long-range and interim truck routes in the Lincoln area, strongly supports the need for south and east beltways to divert through truck traffic around the urban area. The need for these truck routes has become increasingly evident following the completion of the upgrade of N-2 between Lincoln and Nebraska City to an expressway facility. The improved roadway has resulted in increased traffic volumes on the urbanized portions of N-2.

Traffic Studies. The Lincoln-Lancaster County Planning Department maintains a travel demand forecasting model in order to model the amount of traffic that would use the beltway system if it were constructed. It can also model the effect these roadways would have on existing major streets within the metropolitan area. The most current travel demand model uses the Build Out Scenario II (BOS II) land use plan and the 1- to 25-year roadway improvements in the Comprehensive Plan as the base for evaluating potential roadway improvements. This plan includes the assumptions of a projected County population of 374,630 to occur within a 25 to 30 year planning horizon, and an accompanying expansion of the future urban service area to incorporate amendments to the 1994 Comprehensive Plan. These increases have a direct effect on the amount of traffic projected to use the beltways.

Using this model, the south beltway is expected to carry 14,000 to 19,000 vehicles per day and the east beltway is expected to carry 14,000 to 30,000 vehicles per day depending on the segment examined and its relative distance from the center of Lincoln. This shift of traffic from the arterial street system to the beltways results in a 10 to 30 percent reduction in traffic on segments of major arterials such as N-2, US 6, and 84th Street. This reduction preserves capacity and defers future widening on existing arterial streets. Since these roadways are currently situated within developed areas, widening to 6-lanes would be very expensive and have substantial negative impacts to adjacent properties.

In addition to reducing through traffic on internal urban roadways within the existing metropolitan area, a significant benefit is expected by reducing truck traffic on rural roadways on the fringe of the metropolitan area. The most reduction is expected on Saltillo Road between South 84th Street and US 77 and on North 148th Street between N-2 and Waverly. These roadways are expected to experience a 40 to 80 percent and 30 to 90 percent reduction in total traffic, respectively.

Need for Advance Planning. The need for the south and east beltways is expected to increase as the City grows, and as state highways leading to Lincoln become more congested. However, if the planning process is delayed until the need becomes urgent, acquisition of right-of-way will become increasingly costly and disruptive to the community. Completion of the South and East Beltways Study provides for early identification of potential corridors. If implemented, this will allow growth of the City to occur around these corridors, rather than forcing a transportation corridor through otherwise developed areas.

Other benefits from early identification of the corridors include more pro-active public participation and agency involvement; enhanced positive environmental impacts and reduced negative impacts; reduced impacts on developed properties; reduced costs for right-of-way acquisition and roadway construction; fewer compromises in design; accelerated relief for other area roadways; and coordination with future land uses.

Concurrence. Following the Nebraska Local Operating Procedures for Integrating NEPA/404, the Purpose and Need Statement for the beltway project EIS was reviewed by five agencies in June 1996. Concurrence was received from the US Army Corps of Engineers, US Environmental Protection Agency, US Fish and Wildlife Service, Nebraska Department of Environmental Quality and Nebraska Game and Parks Commission (**Appendix A**) indicating that the statement was satisfactory and the information provided was adequate to advance to the next stage of project development.

The same five agencies reviewed the Preliminary Draft Environmental Impact Statement (PDEIS, dated 13 November 2000) and concurred that it was satisfactory (**Appendix A**). Specific comments were received from the US Army Corps of Engineers and the US Environmental Protection Agency and have been addressed in this document (see **Section 6.15**). The PDEIS was also reviewed by the Nebraska State Historic Preservation Office which concurred with the findings of the PDEIS and the findings of the appendices as they relate to Section 106 consultation (**Appendix E**).

Chapter 2

ALTERNATIVES ANALYSIS

2. ALTERNATIVES ANALYSIS

Process Overview. A wide range of alternatives has been considered as part of the south and east beltways study. These alternatives were evaluated and those considered most practical and with the least environmental impact were carried forward to more detailed levels of analysis. The planning process included four levels of analysis, each representing a more comprehensive and rigorous evaluation. The overall process was envisioned as a funnel, with the alternatives continually being reduced in number until the best candidates remained. Specifically, the study design called for four levels of analysis or study tasks. These were:

1. Development of all reasonable alternatives,
2. Identification of five to ten candidate alternatives most worthy of further evaluation,
3. Identification of two to four finalist alternatives, and
4. Analysis and selection of a preferred alternative.

Selection of the preferred alternative was completed after receipt and consideration of comments on the Draft EIS. Discussion of the final considerations is included in this Final EIS document.

Public Input. Due to the significance of the south and east beltways study, the project sponsors decided at the onset of the project that anyone and everyone should be given ample opportunity to participate in the study planning process. Toward this end an extensive Public Participation Program was developed (see Chapter 6), including creation of three advisory committees—the Management Committee, Technical Advisory Committee and Citizen’s Advisory Committee. Development and analysis of the alternatives involved the participation of these three committees as well as public comments received at over 275 meetings (including public meetings, group meetings, and meetings with individual landowners) as well as from written comments and telephone calls. The entire process has taken more than five years to complete—with the original scope often being expanded to incorporate additional investigations requested by elected officials, reviewing agencies and the public (*Interim Report No. 1* (WSA, 1996a), *Interim Report No. 2* (WSA, 1996b) and *Interim Report No. 3* (WSA, 1999)).

In general, alternatives were developed by the consulting team and then presented to the three advisory committees. Following refinement, the options were then presented to the public. Public input was used to further refine and evaluate the alternatives considered.

Levels of Analysis. The alternatives evaluation involved four levels of analysis with each level representing a more detailed evaluation. A summary of the steps involved in the process is provided in Table 2.1.

Table 2.1

SUMMARY OF THE ALTERNATIVES ANALYSIS PROCESS

LEVEL I	
1.	Consideration of seven types of transportation alternatives, resulting in the elimination of all but the no build (planned roadway improvements), non-beltway (further improvement of existing arterials) and beltway (freeway or expressway facility) alternatives.
2.	Development of hundreds of combinations of south and east beltway corridors ("Universe of Alternatives") incorporating location suggestions from the three advisory committees and general public.
LEVEL II	
3.	Evaluation of the Universe of Alternatives using geographic strategy sets (close, mid, far) to identify the best alignments within each strategy based on certain evaluation criteria (developed by the three advisory committees and consulting team) and environmental, land use and logistical constraints. No single strategy set was considered better than another. Based on these results, further evaluation was recommended of seven 0.4 km (0.25 mi) wide corridors (four on the south, three on the east) along locations identified as south close-1 (SC-1), south close-4 (SC-4), south mid-4 (SM-4), south far-1 (SF-1), east close-1 (EC-1), east mid-1 (EM-1) and east far-1 (EF-1), as well as various diagonals to connect the south and east segments. In total, this resulted in 20 combinations of south and east beltway corridors that were carried forward.
4.	Development of three non-beltway alternatives through evaluation of various combinations of section line roads based on comparison of estimated future traffic volumes with available roadway capacity.
LEVEL III	
5.	Evaluation and screening of the 20 beltway alternatives (combinations of south and east beltway corridors) and three non-beltway alternatives, resulting in the elimination of 11 beltway alternatives and one non-beltway option based on further traffic, cost, socioeconomic and environmental considerations. This step was required to maintain the intended project design which called for the Level III analysis to be conducted on five to ten candidate alternatives.
6.	Evaluation of nine end-to-end beltway corridors and two non-beltway alternatives, resulting in the elimination of four end-to-end beltway alternatives and the remaining two non-beltway alternatives based on a preliminary cost-benefit analysis. The five remaining end-to-end alternatives were split into their four separate south and east components, and these four finalist beltway alternatives were carried forward for the Level IV analysis. These alternatives were SM-4, EC-1, EM-1 and EF-1.
LEVEL IV	
7.	Development of detailed alignments and evaluation of four finalist beltway alternatives based on updated traffic projections, measures of effectiveness, roadway capacity and level of service, right-of-way requirements, and construction costs. Level IV also included a comprehensive assessment of environmental impacts (see Chapter 3).

2.1 LEVEL I: OVERVIEW OF TRANSPORTATION ALTERNATIVES

The scope of the beltway study involved evaluation of the widest range of transportation alternatives from beltway to non-beltway options, and even to non-roadway alternatives. Some of the alternatives included costly versus inexpensive improvements, construction versus non-construction options, automobile versus transit vehicles, consolidation of transportation and utilities corridors, and incorporation of enhancement features. These alternatives were described and evaluated in detail in *Interim Report No. 1* (WSA, 1996a), *Interim Report No. 2* (WSA, 1996b) and *Interim Report No. 3* (WSA, 1999), and are listed in **Table 2.2**. Previous study reports are available at the offices of the City Public Works and Utilities Department, City-County Planning Department, Nebraska Department of Roads and Federal Highway Administration.

Table 2.2

LEVEL I TRANSPORTATION ALTERNATIVES

1	No Build Alternative (Planned Roadway Improvements)
2	Non-Beltway Alternatives (Further Improvement of Existing Arterials)
3	Beltway Alternatives (New Highway Facility)
4	Transportation Demand Management (TDM)/Transportation System Management (TSM) Improvements
5	Other Modes of Transportation
6	Joint Use Opportunities
7	Land Use Scenarios

2.1.1 No Build Alternative (Planned Road Improvements)

The no build alternative involved improving the regional street and highway system, as needed, without seeking a highway beltway. The concept involved maintaining the existing road system, but making those improvements already identified in the City and County 20-year plans such as surfacing some roads, widening some roads to four-lanes, and building some new roads. This alternative represented the lowest cost "base case" option against which other, more expensive, alternatives were compared.

2.1.2 Non-Beltway Alternative (Further Improvement of Existing Arterials)

The non-beltway alternative involved assessment of whether future travel demands and desired system performance could be satisfied by improving arterial roadways within and/or adjacent to the beltways study areas. Improvements included widening existing roads to 4 or 6 lanes, and constructing new arterial type facilities on the existing alignments. The non-beltway alternative would have signalized intersections, 60 km/h (40 mph) posted speeds, and allow some direct access to commercial property.

2.1.3 Beltway Alternative (New Highway Facility)

This alternative was the principal investment alternative evaluated in the study, and involved building a beltway on the south, east, or both south and east sides of Lincoln. The intent of the beltway was to provide a level of service (roadway operating conditions) greater than that found with a typical arterial street. The primary factors involved with level of service are the number of lanes in each direction, design speed, and type of access provided.

For this study the beltway type was considered to be a four-lane roadway designed to either freeway or expressway design standards. A freeway is a multi-lane roadway built to highway standards such as for Interstate 80. A freeway design would have (1) complete access control (no at-grade crossings), (2) 75 to 90 m (250 to 300 ft) wide right-of-way, and (3) design speed of 110 km/h (70 mph) and a posted speed limit of 105 km/h (65 mph). An expressway is a multi-lane roadway built to slightly lower design standards such as for US 77. An expressway design would have (1) grade separated interchanges at major roads (I-80, US 77, N-2, US 34) while other crossings could be at grade, (2) possible traffic signals, (3) 45 to 75 m (150 to 250 ft) wide right-of-way, and (4) locally determined speed limits.

For the beltway study evaluations, it was assumed that the concept would involve the freeway design because it is the maximum traffic carrying alternative and requires the most extensive right-of-way width. However, it was recognized that the beltway could be constructed in phases representing two-lane, or expressway facilities which could be upgraded within a right-of-way reserved to freeway standards.

Beltway interchanges would be spaced approximately 3.2 km (2 mi) apart along the existing grid network. For cost estimating purposes, it was assumed that ultimately all unpaved county roads providing access to beltway interchanges would be upgraded to four-lane paved roads, and that section line roads that cross the beltway with overpasses would be upgraded to two-lane paved roads.

2.1.4 Transportation Demand Management (TDM)/Transportation System Management (TSM) Improvements

This alternative involves attempting to influence trip making (TDM) or making inexpensive traffic engineering and traffic operational improvements (TSM) on the existing road system without making major road investments.

TDM programs include car pooling, van pooling, flex time, compressed work weeks, telecommuting, and improved transit, and are often implemented by public transportation agencies with support and incentives provided by local businesses. TDM techniques are appropriate in certain areas of the country where congestion and delay are significant, parking is limited, and businesses have a strong desire not to relocate. None of these conditions exist in Lincoln where congestion is relatively minor and confined to peak travel periods only; parking is abundant and generally free outside of the central business district; and businesses are inclined to move to suburban locations rather than have employees, clients, and customers be inconvenienced (WSA, 1996a).

The use of private automobiles in lieu of other modes of transportation is considered to be a positive benefit of living in Lincoln. As a result, local planning and zoning has reinforced this lifestyle. Even a doubling or tripling of transit usage, car pooling or adjusted work schedules will

not significantly affect traffic congestion. More specifically, it would accomplish little within the south and east beltways study area (WSA, 1996a). *Therefore, TDM techniques were not investigated in further detail as a means of eliminating or reducing the need for the beltways.*

TSM programs tend to be traffic operations oriented activities implemented by public transportation agencies, and include improved traffic signal timing, addition of auxiliary lanes at congested intersections, signing and marking improvements, parking restrictions, one-way street systems, and reversible lanes.

The City of Lincoln Public Works and Utilities Department has a program to continuously monitor its roadway network to looking for opportunities to implement TSM improvements. As TSM is already an on-going activity, it is already included in the base case conditions. Further TSM programs are not expected to be gainful, would not affect the beltway corridor areas, and are not likely to affect the need for a beltway (WSA, 1996a). *Therefore TSM techniques were not investigated further as a means of eliminating or reducing the need for the beltways.*

2.1.5 Other Modes of Transportation

This alternative involved introducing new modes or systems of transportation to Lincoln, including expanded bus transit into the beltway corridors; rail transit; park and ride lots, and services; and High Occupancy Vehicle (HOV) lanes and facilities. These systems would either take the place of a beltway, or would be complementary to the beltway.

Certain modes which do not have an impact on travel demand within the beltway corridors should be eliminated from further consideration. Other modes which may not eliminate the need for a beltway, could be pursued as a way of enhancing a beltway or improving traffic flow in other areas of the City.

Bus Transit. The City of Lincoln has an extensive network of bus routes serving the majority of the City. The local StarTran is a public service which is funded and supported in consideration of the needs of the residents and businesses of Lincoln. In FY 2000-2001, StarTran carried approximately 1.60 million passengers. Consistent with national trends, the overall use of bus transit in Lincoln declined from a high in the mid 1980's (2.05 million passengers in FY 1987-1988) to a low in the mid 1990's (1.47 million in FY 1993-1994) when fares were increased and services were substantially reduced. Since that time ridership has fluctuated between 1.6 and 1.8 million. The decline of bus service is due to many factors, including:

1. With the exception of the gasoline price hikes in 2000, gasoline prices had steadily declined relative to average income.
2. As Lincoln continues to grow, employment centers are spread throughout the community making them difficult to serve by transit.
3. City ordinances require new development to have sufficient parking to handle projected demand.
4. Current lifestyles require multiple trips to and from work including stops for purchases, day care or recreational activities. The multi-purpose work trip is not well-served by transit.
5. According to the 1990 Census, private car availability averages 2.1 cars per household in Lancaster County, and only 7.8 percent of households reported having no car available.

Bus transit is non-existent in the beltway corridors because the areas are outside of the City of Lincoln and because the low density does not support transit services. Although this may change over the next 20 years, it is unlikely that bus service will increase significantly in these outlying areas. Consequently, improved transit services within the beltway corridors is not a viable alternative to a beltway. *Therefore, the alternative was eliminated from further evaluation.*

Park and Ride Lots and Services. Park and ride lots, which provide parking facilities for car pooling or bus stops, could be located at major roadway intersections. Although they would not take the place of a beltway, they could be built in conjunction with the beltway. *Incorporation of these types of facilities will be considered during final design.*

Rail Transit. Currently, there is no rail transit in Nebraska. Chicago and St. Louis, the closest cities with rail transit facilities, both have large populations and large downtowns which are more conducive to rail transit than that in Lincoln. Even in these cases, rail transit is not utilized to the extent that significantly reduces congestion on either city's fringe freeway beltways during morning and evening rush hours.

Opportunities for rail transit within Lincoln is not considered feasible in the foreseeable future. With a projected metropolitan population of only 374,630 by the year 2025, the passenger vehicle is expected to remain the mode of choice due to travel time factors. *As a result, the development of rail transit as a means of reducing or eliminating the need for a beltway was not considered for further analysis, nor was it considered as a potential enhancement to the beltways since neither the south or east beltway leads to downtown Lincoln.*

High Occupancy Vehicle Lanes and Facilities. HOV lanes have been a popular way of developing more capacity for moving people through a corridor in many of America's larger cities. HOV lanes are generally located on the inside lane of limited access freeways where the lanes can extend for several miles without interruption due to interchanges or intersections. Their use is limited to vehicles with more than one passenger, and they generally have less congestion than other lanes. They provide an incentive for people to car pool and use public transit, thereby reducing single occupant vehicle trips, and reducing the number of cars on the highway especially in peak periods of travel.

Implementation of HOV lanes in Lincoln would be difficult because the city does not have any existing freeways or expressways that lend themselves to successful HOV design. HOV lanes on arterial streets such as O Street (US 34), Cornhusker Highway (US 6) or N-2 would not work well because of the need to travel back and forth into left and right turn lanes.

Because of the lack of appropriate locations, HOV lanes were not studied as a means to eliminate or reduce the need for beltways. In addition, they are not considered necessary as an enhancement to a beltway since HOV lanes only offer incentives in transportation systems that are over capacity where they can provide drivers with a significant savings in time.

2.1.6 Joint Use Opportunities

This alternative involved evaluation of other types of investments which may be incorporated into the beltway corridor in order to enhance (but not replace) the concept. Options considered included features that could fit into a 90 m (300 ft) right-of-way such as bicycle and pedestrian paths; linear parks; rail freight line consolidations; and utility lines.

Bicycle Facilities. The use of bicycles has been increasing in the United States over the past 20 years. In Lincoln, bicycle use is generally oriented to recreational purposes and the City has an extensive and successful system of hiker/biker trails linking residential and recreational areas. With Wilderness Park at the west end of the south beltway and the MoPac Trail bisecting the east beltway, additional trail connections could provide enhanced connectivity to the regional trail system. Therefore, it was recommended that potential beltway trail connections be evaluated as part of this study.

Although the potential exists for acquiring additional land to provide pedestrian and bicycle trails within the beltway right-of-way, other options through the city have been considered more desirable. Such options are already being considered with the ultimate effect of connecting the Wilderness Park Trail to the MoPac Trail, and the MoPac Trail to the Murdock Trail. *Therefore, incorporation of bicycle facilities are not being considered within the freeway right-of-way; however, overpasses or underpasses at trail crossings of the beltway will be provided for. These could include a Wilderness Park Trail extension, David Murdock Trail, MoPac East Trail and Stevens Creek Connector.*

Linear Parks. It was also recommended that the beltway study include evaluation of provisions for linear park sites. These areas could take advantage of unique environmental areas adjacent to the beltway corridor, provide linkages to other park and recreation areas, and/or serve as buffers to other land uses. The areas could also be developed in conjunction with mitigation requirements for the beltway, or with locally funded recreation or preservation initiatives. For example, it was thought that portions of the Stevens or Salt Creek areas prone to flooding could be purchased and developed for passive recreational use.

LPSNRD has developed a plan for addressing flood reduction in the Stevens Creek watershed which encompasses most of the east beltway study area. The LPSNRD's approved Stevens Creek Watershed Plan (which has been incorporated into the *Lincoln-Lancaster County Comprehensive Plan*) includes an open space component to acquire conservation easements over the 100-year floodplain between the MoPac East and David Murdock Trails, and ultimately to Salt Creek. The plan includes constructing a connector trail within this easement between the MoPac East and David Murdock Trails. The connector would follow the west bank of Stevens Creek from the MoPac East Trail to 112th Street. After crossing the 112th Street bridge, the connector would then follow the east bank of the creek to the David Murdock Trail and on to Salt Creek. No additional land was included in the project because of landowner opposition south of the MoPac East Trail.

The same concept could be implemented along Salt Creek with the effect of extending Wilderness Park to the south. In fact, extension of the park south to Hickman Road has been identified as a goal in the *Lincoln-Lancaster County Comprehensive Plan* and subsequent amendments to the plan. *If mitigation is required for park or recreation lands for the beltway project, incorporation of linear park land, including sufficient right-of-way for landscape treatment, will be considered at that time.*

Railroad Transportation Line Consolidation. For many years, the Railroad Transportation Safety District (RTSD) has been investigating opportunities to consolidate rail lines and relocate lines outside of central areas of the city to provide better safety for rail crossings and reduced delay for overall traffic. Due to the presence of an east-west rail line across the south side of the City just south of N-2, consideration was given to consolidating this line with the south beltway. This railroad line belongs to Omaha Public Power District and serves their Nebraska City coal-fired power plant. The line extends south from downtown and then east to Bennet with at-grade crossings near several major intersections of N-2 at South 14th, South 27th, South 40th, South 48th and South 56th Streets. A concept was considered involving combining the line with existing tracks through Wilderness Park and then constructing a new corridor east to Bennet along the south beltway.

Unfortunately, rail consolidation often only serves to relocate the problems. Train track adjacent to roadways can be a safety problem, and in at-grade situations requires minimal distance standards between the roadway and tracks to insure sufficient vehicle storage space exists. Because trains have limited ability to curve in and out between existing roadway intersections, a wider right-of-way would be required along the south beltway. In addition, local rail customers must be served (such as the Redi-Mix plant at N-2 and South 48th Street); therefore, spur lines within the existing rail corridor may need to be kept in service regardless of a consolidation. With all these problems and an estimated \$0.62 million per km (\$1 million per mi) for new track construction for an approximate distance of 16 km (10 mi), this alternative was not studied in further detail.

Utilities. Consideration of joint use opportunities with utilities focused on consolidating a future beltway with an existing utility corridor, as opposed to joint development of a new utility corridor within the beltway right-of-way. A number of utilities exist within the beltway corridors, including Lincoln Electric System (LES) overhead transmission lines, above and below ground telephone lines, underground fuel lines, and underground lines for rural water districts and cable communications. Although most of these facilities are considered as project constraints, special attention was given to the LES 345-kilovolt line generally located along North 127th Street from I-80 to US 34, south toward N-2, and then diagonally west to Saltillo Road.

Construction of a beltway along the LES easement was considered as a possible way to reduce the amount of right-of-way required for the beltway, or to minimize impacts to adjacent landowners. While a small amount of overlap (perhaps 7 to 9 m (25 to 30 ft)) of the rights-of-way may be possible in some locations, the required minimum distance between the transmission line and roadway (necessary for safety requirements and maintenance of the utility corridor) results in very little reduction in right-of-way overall.

In 1999, a newly proposed LES 345-kilovolt transmission line extension from North 127th and Adams Streets northward to Waverly was given public review by LES. After careful coordination between the beltway project team, private landowners, public interests, and other constraints, the LES engineers concluded that it would be wise to not co-locate this new transmission route with any of the alternative beltway routes, and to avoid the beltway interchange area at I-80.

2.1.7 Future Land Use Scenarios

The City of Lincoln and Lancaster County are expected to grow significantly in the next 25 to 30 years. Although some of this growth is destined for areas within the existing built-up area of Lincoln, growth will also occur in the beltway study area. The location and density of such growth will be dictated by the availability of infrastructure such as water, sewer and roads. In order to determine the impacts of growth and development on the beltway, it was necessary to evaluate future land use scenarios.

Future land use scenarios were developed by the Lancaster County/City of Lincoln Planning Department and were based on trends, City and County plans and policies, planned infrastructure expansions and capacity improvements, and community goals, objectives and desires. Future traffic was modeled for the various land use scenarios to determine impacts on the roadway system. During the Level III analysis, traffic was modeled using the Build Out Scenario (BOS) which represented a County population of 271,600 by the year 2015 as described in the approved 1994 *Lincoln-Lancaster County Comprehensive Plan* (this document is available at the offices of the City-County Planning Department). During the Level IV analysis, traffic was modeled again, using BOS II which includes subsequent land use revisions (amendments) to the Comprehensive Plan. For purposes of this study, BOS II assumed a County population of 374,630 within a 25 to 30 year period. This is in comparison to the 1999 County population of 237,657.

2.1.8 Transportation Alternatives Carried Forward

Of the seven transportation alternatives considered, four were eliminated from further consideration because they would not increase the capacity of the transportation network, or reduce or eliminate the need for a beltway. These were the TDM/TSM improvements, other modes of transportation, joint use opportunities, and land use scenarios. Although not investigated further, some aspect of these alternatives, such as park and ride lots, linear parks or natural areas, or bicycle paths might be incorporated as enhancements into a future roadway plan. The decision to focus on roadway alternatives was made during the Partnering Meeting of the project's Management Committee, Technical Advisory Committee, Citizen's Advisory Committee and consultant team in December 1995.

Three alternatives were carried forward for further analysis. These were the no build, non-beltway and beltway alternatives. The no build alternative is a required consideration under the National Environmental Policy Act (NEPA), and represents a base case comparison for all build alternatives. The non-beltway and beltway alternatives were carried forward because they are the only alternatives that would increase substantially the capacity of the transportation network.

2.2 LEVEL II: DEVELOPMENT AND PRELIMINARY SCREENING OF BELTWAY AND NON-BELTWAY ALTERNATIVES

2.2.1 Existing Constraints

One of the initial project tasks was to develop a map of environmental constraints, existing land uses and other features within the beltway study area that may affect location of a roadway. The original constraints map was developed from existing resources, databases, aerial photography, consultations and site visits as described in *Interim Report No. 1* (WSA, 1996a).

Over the five years of the study, the map has been periodically updated as new photography has become available and new information has been collected by or provided to the project team. The most recent version of the constraints map of the beltway study area (based on the most recent 1997 aerial photography) is presented in **Figure 2.1**.

Some of the more important constraints and considerations in the study area include:

1. Park and recreation areas including Wilderness Park, Jensen Park, MoPac East and David Murdock Trails, numerous golf courses
2. Rural residences, acreages and farms
3. Floodplains along Salt Creek and Stevens Creek
4. Wetlands, prairies and other natural areas
5. Historic and archeological sites
6. Communities of Roca, Bennet, Cheney, Walton, Prairie Home and Waverly
7. Infrastructure such as utility lines, electrical substations, wells, pumpstations, water towers, radio towers, railroad lines, and existing roadways

2.2.2 Development of the Universe of Beltway Alternatives

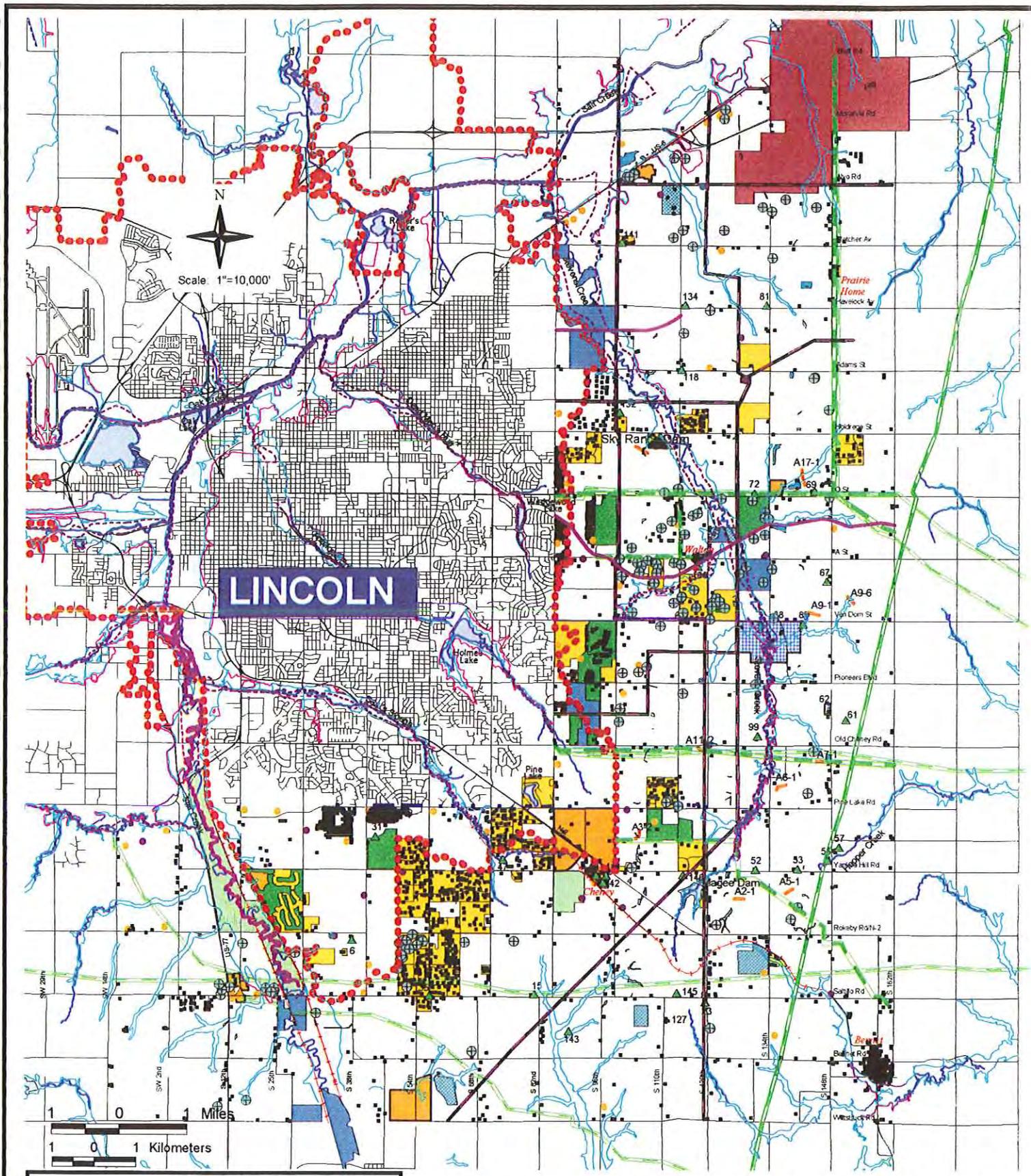
As described in **Chapter 6**, the south and east beltways study included a wide range of public involvement activities. Starting with the first Public Meeting in November 1995, the study team began requesting information on existing constraints in the study area and soliciting recommendations for possible beltway locations. In December 1995, a partnering meeting was conducted with the Management Committee, Technical Committee, Citizen's Advisory Committee and consultant team to review suggested alignments and to develop new alignments. The resulting map of Beltway alignment options was defined as the "Universe of Beltway Location Alternatives" (**Figure 2.2**).

The lines on the map indicate general corridors in which a roadway could be located, allowing some flexibility to move the roadway within the corridor to avoid environmental constraints, existing land uses and other features that may affect location of a roadway. For the purpose of this level of analysis, the corridors were considered to be at least 180 m (600 ft) wide.

2.2.3 Alignment Strategies and Strategy Sets

Once the Universe of Alternatives was developed, it became necessary to evaluate the options so that, ultimately, one preferred alternative could be selected. A method was required to eliminate some alternatives, since it was too complicated to compare the hundreds of combinations available. As a way of reducing the number of alternative alignments considered at one time, alignments were grouped in series of sets which were considered to have similar advantages and disadvantages based on a defined geographic area (Alignment Strategies). As described in *Interim Report No. 2* (WSA, 1996b), each strategy set was evaluated to determine which the best alignment in each set. At this point, no single strategy set was considered better than another. Rather it was acknowledged that there would be trade-offs between the sets that would be evaluated later in more detailed analyses.

The strategy sets were defined relative to their distance to the City of Lincoln (close, mid and far) in both the south and east study areas. With three sets in the south and three sets in the east, there could be nine possible combinations of the sets. The six strategy sets are shown in **Figure 2.3** and described more thoroughly in *Interim Report No. 2* (WSA, 1996b).



EXISTING FEATURES

Residential Structures	Streams	Overhead Power Lines
Residential/Subdivisions	100 Year Flood	Natural Gas Lines
Public Utilities	Floodway	Railroads
Public Utilities	500 Year Flood	Traffic
Commercial/Industrial	Dam Sites	Service Limits
Commercial/Industrial	Parks	Super Fund Sites
Towns	Native Prairie	NRHP Sites
Other Constraints	Lakes	NRHP Eligible
Cemeteries	Wellhead Protection	
Golf Courses	Wetlands	
Registered Wells	Surface Water Permits	

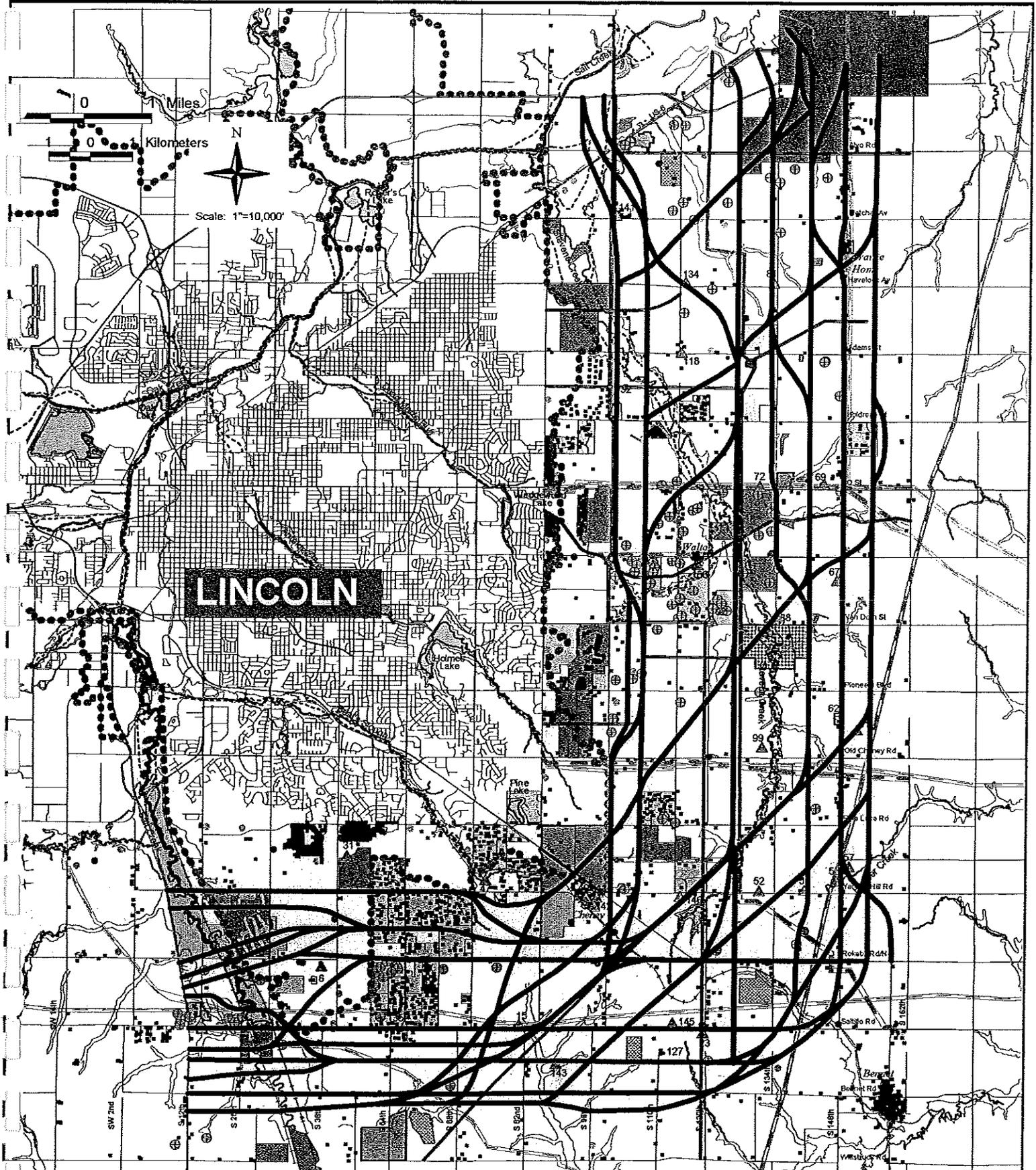
ENVIRONMENTAL IMPACT STATEMENT
LINCOLN SOUTH AND EAST BELTWAYS



Constraints Map

May 2nd, 2002

Figure 2.1



LINCOLN

EXISTING FEATURES

● Residential Structures	~ Streams	~ Overhead Power Lines
■ Residential/Subdivisions	~ 100 Year Flood	~ Natural Gas Lines
● Public Utilities	~ Flooding	~ Railroad
● Public Utilities	~ 500 Year Flood	~ Trails
● Commercial/Industrial	~ Dam Sites	● Service Limits
■ Commercial/Industrial	~ Parks	● Super Fund Sites
■ Towns	~ Native Prairie	■ NRP Sites
■ Other Constraints	~ Lakes	▲ NRP Ejects
● Cemeteries	~ Wetland Protection	
● Golf Courses	~ Wetlands	
● Registered Wells	~ Surface Water Permits	

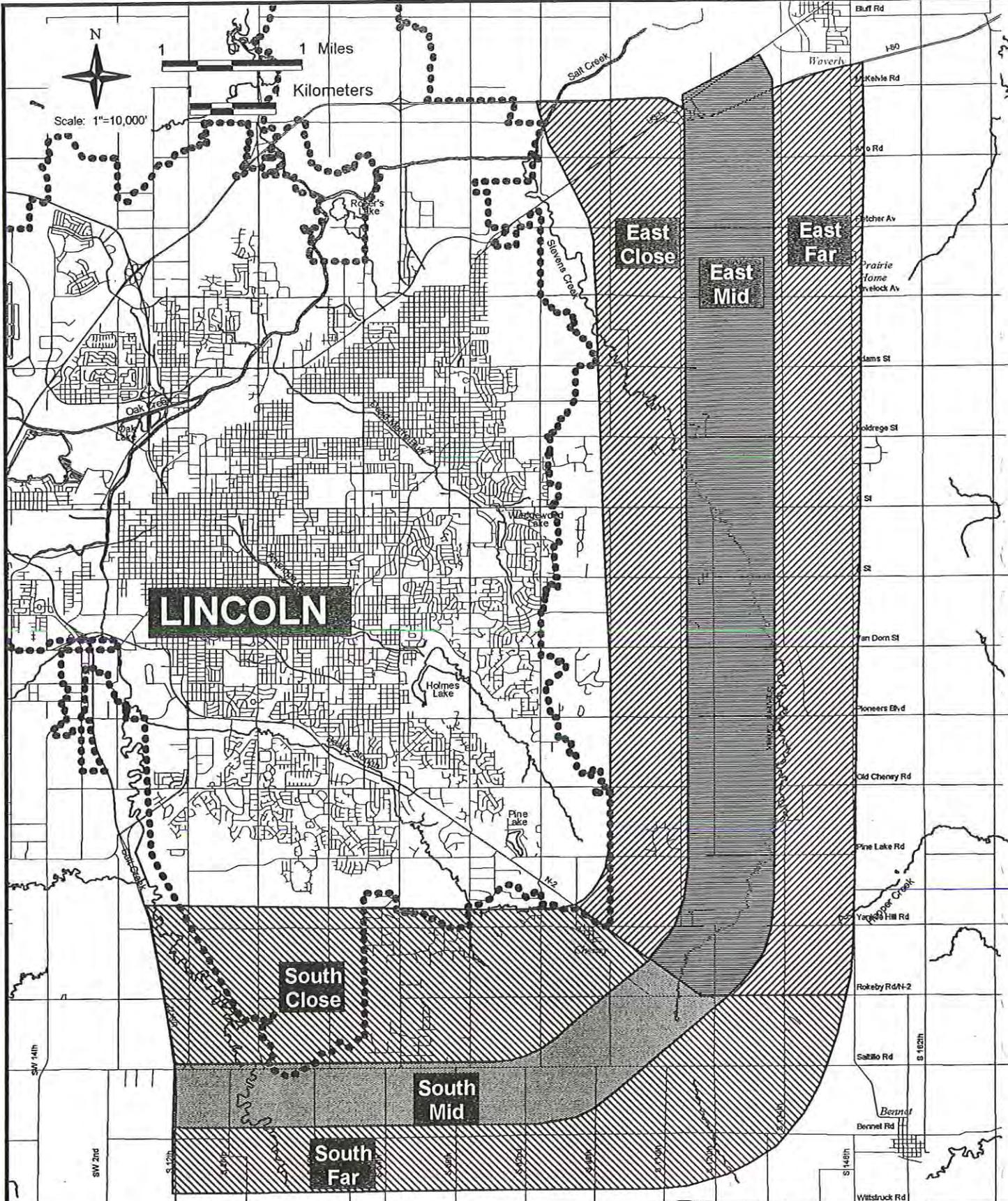


May 2nd, 2002

**LINCOLN SOUTH AND EAST BELTWAYS
ENVIRONMENTAL IMPACT STATEMENT**

**Universe Of Beltway
Location Alternatives**

Figure 2.2



LINCOLN

East Close
East Mid
East Far

South Close
South Mid
South Far

EXISTING FEATURES

- Service Limits
- Streams



LINCOLN SOUTH AND EAST BELTWAYS ENVIRONMENTAL IMPACT STATEMENT

Beltway Strategy Sets

June 9, 2000

Figure 2.3

2.2.4 General Evaluation Guidelines

To be objective and fair, all alternatives needed to be considered on an equal basis. Yet, there were too many alignment options to be able to evaluate every one in detail. To handle this situation, the study team developed general evaluation guidelines based on existing City and County policies, adopted plans, sound engineering practices, an awareness of potential environmental impacts of a roadway, and certain evaluation criteria identified at the Partnering Workshop. The guidelines are summarized in Table 2.3 and described in detail in *Interim Report No. 2* (WSA, 1996b).

2.2.5 Screening Process for the Strategy Sets and Elimination of Some Alternatives

Key Reasons for Eliminating Some Alternatives. Because many of the guidelines required detailed levels of analyses (e.g., number of houses taken, farms crossed, traffic volumes, detailed environmental consequences), they could not all be applied in screening the Universe of Alternatives/Strategy Sets. Therefore, the alternatives were compared and contrasted in terms of criteria that could be applied at this more generalized level of analysis. From this evaluation, three key reasons for eliminating some routes were identified. These were:

1. Use of section line roads for beltway purposes would be difficult due to the large number of existing rural residences in close proximity to the section line roads.
2. Diagonal alignments, especially in the east study area, would offer little advantage, but would create a number of problems involving (a) severed parcels, (b) longer bridges over county roads, and (c) angled county road intersections requiring modification and additional right-of-way to meet the design standard for 90-degree intersections.
3. Passing too close to the planned regional shopping center (at N-2 between 84th Street and 98th Street) would not be a good idea due to potential stacking of vehicles between the interchanges and the shopping area.

Although simplified, the three key reasons actually apply to many of the guideline issues (diagonal crossings of farmland, number of houses impacted, road system continuity, intersection angles, utility and railroad conflicts, compatibility with the Comprehensive Plan, crossing of creeks and drainage basins, sensitive areas, and many others). The process of eliminating some alternatives based on the three key reasons is described in greater detail in *Interim Report No. 2* (WSA, 1996b). Following this screening, 10 alternatives remained on the south and four on the east (see Exhibits 5-4 and 5-5, *Interim Report No. 2*, WSA, 1996b).

Table 2.3

**GENERAL EVALUATION GUIDELINES
 FOR SCREENING ALTERNATIVES**

PLANS, POLICIES AND GENERAL GUIDELINES:	
1.	Maintain at least one alignment option within each strategy set.
2.	Maintain the integrity of the established grid network.
3.	Maintain the integrity of the study area boundary.
4.	Recognize Comprehensive Plan goals, objectives and policies.
5.	Be aware of existing and planned utility lines in the study corridor and evaluate desirability to link the beltway to those lines.
6.	Be aware of the desires of the City of Waverly as expressed in the City's Comprehensive Plan.
TRAFFIC/ENGINEERING GUIDELINES	
7.	Avoid the creation of skewed intersections due to the angle of beltway crossing of existing roads, highways, and railroad corridors.
8.	Recognize that two trip purposes need to be served: the long distance trip (i.e., Lincoln to Omaha) and the intra-city trip (within the Lincoln Metropolitan Area).
9.	Avoid alignments that are redundant to existing State Highways.
10.	Avoid creating adverse traffic condition, misdirection of flow and circuitous routing of traffic.
11.	Be cognizant of interchange spacing needs.
ENVIRONMENTAL GUIDELINES	
12.	Avoid the use of existing section line roads.
13.	Where parklands, creeks, historic sites and other known environmental features need to be crossed, keep the length of the crossing as short as possible.
14.	Alignments that follow half-section lines are preferred.
15.	Avoid crossings of drainage basins by following ridge lines to the extent possible.
16.	Avoid fatal flaws such as historic/cultural sites, parks, etc. unless other feasible routes do not exist.
17.	Avoid diagonal crossings of farmland where possible.
18.	Existing and/or planned utility or transportation corridors should be examined as potential beltway corridors.
19.	Avoid existing residences and subdivisions where possible.
20.	Avoid platted subdivisions where possible.
21.	Avoid farm residences and farm infrastructure where possible.
22.	Recognize existing infrastructure investment in the Study Area.

Selection of the Best Alignment within Each Strategy Set. By comparing and contrasting alignments within each strategy set, several more alternatives were eliminated with the goal of having one alignment within each strategy set. Specific reasons for elimination included:

1. Minimizing the width of the Wilderness Park crossing of the SC routes
2. Minimizing wetland and creek impacts of the south routes
3. Minimizing interchange spacing problems
4. Minimizing crossing impacts at Saltillo Road for the SM and SF routes
5. Minimizing impacts to platted subdivisions, residences, farmyards and cemeteries
6. Minimizing severance of farmland
7. Avoiding routes that extend outside of the study area for the EF routes

Screening of the strategy sets resulted in the recommendation of four candidate alternatives in the south and three in the east to be carried forward to the Level III analysis (**Figure 2.4**). These were SC-1, SC-4, SM-4, SF-1, EC-1, EM-1 and EF-1. Two south close alternatives were carried forward because they were considered to have fairly different advantages and disadvantages. The Level III beltway alternatives are described in **Table 2.4**.

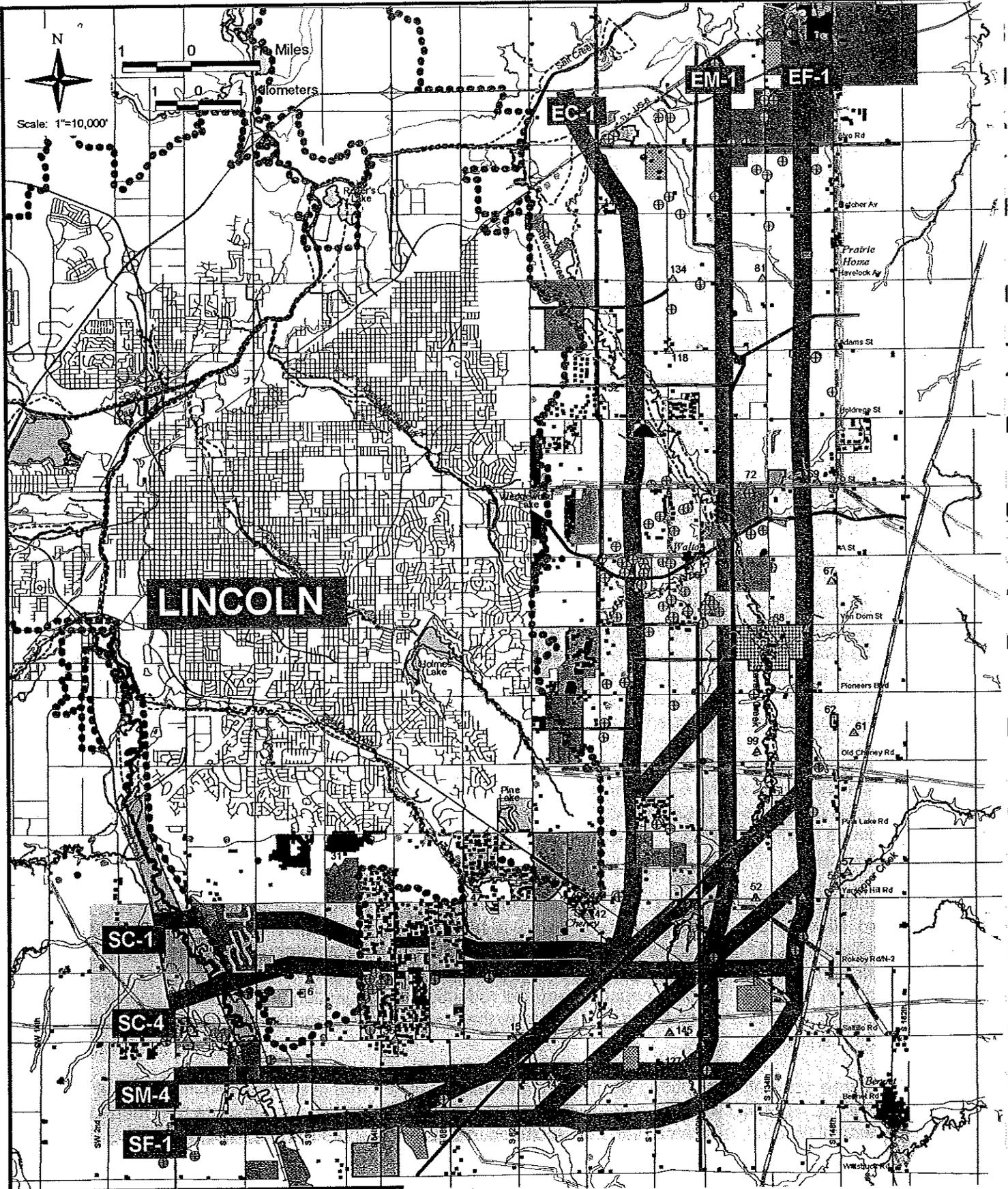
2.2.6 Development of Non-Beltway Alternatives

The non-beltway alternative involved assessment of whether future travel demands and desired system performance could be satisfied by improving arterial roadways within and/or adjacent to the beltways study areas. Improvements included widening existing roads to 4 or 6 lanes, and constructing new arterial type facilities on the existing alignments. The non-beltway alternative would have signalized intersections, 60 km/h (40 mph) posted speeds, and allow some direct access to commercial property.

Locations for non-beltway alternatives were developed by determining where potential deficiencies exist with the 20-year transportation improvement program. This was done by examining Volume to Capacity (V/C) Ratios and comparing estimated future traffic volumes to available roadway capacity. This analysis is described in detail in *Interim Report No. 3* (WSA, 1999).

Results showed that on the south additional improvements would be needed at Yankee Hill Road, Pine Lake Road, Rokeby Road or N-2 to handle projected traffic. On the east, additional improvements would be needed at 70th, 84th or 98th Street. No advantage was gained by leapfrogging an arterial (i.e. improving Rokeby and skipping Yankee Hill). The skipped roadways would still be over capacity, and the reduction in congestion along already improved roadways (i.e., N-2) would be less. Therefore, the south corridor required a non-beltway option through Wilderness Park.

The three non-beltway options were developed as test cases that could be used in the Level III analysis to establish whether a non-beltway alternative would reduce or eliminate the need for a beltway alternative. These options are included in **Table 2.4** and shown in **Figure 2.5**.



LINCOLN

EM-1 EF-1

EC-1

SC-1

SC-4

SM-4

SF-1

EXISTING FEATURES		



LINCOLN SOUTH AND EAST BELTWAYS ENVIRONMENTAL IMPACT STATEMENT

Candidate Beltway Alternative

May 2nd, 2002

Figure 2.

Table 2.4

LEVEL III ALTERNATIVES
(Candidate Beltway Alternatives and Non-Beltway Options)

ALTERNATIVE	DESCRIPTION
South Close-1 Beltway (SC-1)	This alignment is generally south of and parallel to Yankee Hill Road. It bisects the Yankee Hill subdivision along a half section line and swings south of the Town of Cheney, intersecting Highway 2 approximately 0.8 km (0.5mi) south of the Yankee Hill Road intersection with N-2. This alignment includes a crossing of Wilderness Park.
South Close-4 Beltway (SC-4)	This alignment intersects US 77 approximately 0.4 km (0.25 mi) south of Rokeby Road and angles northeast to the half section line (Rokeby Road). This alignment generally follows Rokeby Road/N-2 through the rest of the corridor. This alignment includes a crossing of Wilderness Park.
South Mid-4 Beltway (SM-4)	This alignment is located approximately 0.8 km (0.5 mi) south of Saltillo Road and generally follows the half section line before transitioning to a northeasterly direction as it approaches N-2. This alignment intersects US 77 south of Wilderness Park and does not require a park crossing.
South Far-1 Beltway (SF-1)	This alignment is located approximately 0.2 km (0.125 mi) south of Bennet Road through the entire corridor until it angles northeast to intersect N-2. This alignment also intersects US 77 south of Wilderness Park and does not require a park crossing.
East Close-1 Beltway (EC-1)	This alignment is generally located on the half section line between 98 th Street and 112 th Street and runs in a north/south direction from N-2 on the south to I-80 on the north. This alignment angles northwest at the north end and connects to I-80 and US 6 west of the Waverly Interchange.
East Mid-1 Beltway (EM-1)	This alignment is approximately located on the half section line between 120 th Street and 134 th Street and runs in a generally north/south direction from N-2 on the south to I-80 on the north. This alignment connects to I-80 and US 6 east of the Waverly Interchange. This alignment is able to utilize the existing LES transmission line corridor from Pine Lake Road to Adams Street.
East Far-1 Beltway (EF-1)	This alignment is generally located on the half section line between 134 th Street and 148 th Street and runs in a north/south direction from N-2 on the south to I-80 on the north. This alignment also connects to I-80 and US 6 east of the Waverly Interchange.
Non-Beltway Option 1	This option involves improving Yankee Hill Road on the south and 98 th Street on the east to 4-lane divided roadways, including turn lanes at all signalized intersections and a segment through Wilderness Park. In conjunction with this option, 14 th Street between Yankee Hill and Rokeby Roads would be closed (through Wilderness Park).
Non-Beltway Option 2	This option involves improving Pine Lake Road on the south and 84 th Street on the east to 6-lane divided roadways, including turn lanes at all signalized intersections and a segment through Wilderness Park. This option also includes widening N-2 to a 6-lane roadway between 14 th and 84 th Streets. In conjunction with this option, 14 th Street between Yankee Hill and Rokeby Roads would be closed (through Wilderness Park).
Non-Beltway Option 3	This option involves improving Yankee Hill Road on the south and 98 th Street on the east to 4-lane divided roadways, including turn lanes at all signalized intersections, <i>but no segment through Wilderness Park</i> . In conjunction with this option, 14 th Street would be improved to a 4-lane facility from Old Cheney Road to Saltillo Road, including the segment through Wilderness Park. In addition, Old Cheney would be improved to a 4-lane facility between 14 th Street and US 77, including the segment through Wilderness Park.

Non-Beltway Option 1. This option involves improving Yankee Hill Road on the south and 98th Street on the east to four-lane divided roadways, including turn lanes at all signalized intersections and a segment through Wilderness Park. In conjunction with this option, 14th Street between Yankee Hill Road and Rokeby would be closed (through Wilderness Park).

Non-Beltway Option 2. This option involves improving Pine Lake Road on the south and 84th Street on the east to six-lane divided roadways, including turn lanes at all signalized intersections and a segment through Wilderness Park. This option also includes widening N-2 to a six-lane roadway between 14th and 84th Streets. In conjunction with this option, 14th Street between Yankee Hill and Rokeby Roads would be closed (through Wilderness Park).

Non-Beltway Option 3. This option involves improving Yankee Hill Road on the south and 98th Street on the east to four-lane divided roadways, including turn lanes at all signalized intersections, *but no segment through Wilderness Park*. In conjunction with this option, 14th Street would be improved to a four-lane facility from Old Cheney Road to Saltillo Road, including the segment through Wilderness Park. In addition, Old Cheney would be improved to a four-lane facility between 14th Street and US 77, including the segment through Wilderness Park.

In addition to these test cases, a fourth non-beltway option, along 148th Street, was developed after the Level III analysis. This alternative is addressed in **Section 2.3.8**.

2.2.7 Candidate Alternatives Carried Forward

Preliminary screening of the strategy sets resulted in the recommendation of seven candidate Beltway alternatives to be carried forward for further evaluation in the Level III analysis. These were SC-1, SC-4, SM-4, SF-1, EC-1, EM-1 and EF-1. In total, this resulted in 20 combinations of south and east beltway corridors that were carried forward (**Figure 2.6**). Preliminary screening of non-beltway alternatives resulted in the development of three non-beltway options which were also carried forward in the Level III analysis.

2.3 LEVEL III: ANALYSIS OF THE CANDIDATE BELTWAY ALTERNATIVES AND NON-BELTWAY OPTIONS

The Level III analysis involved more detailed evaluations of the seven candidate beltway alternatives and three non-beltway options using new analyses and data. The goal of the Level III analysis was to identify two to four Finalist Alternatives for further evaluation. The steps involved in the Level III analysis are summarized in **Table 2.5**.

The various Level III steps were considered preliminary in the sense that a different set of steps, analyses and criteria were anticipated to be developed in Level IV to evaluate the remaining alternatives.

Table 2.5

SUMMARY OF LEVEL III ANALYSIS PROCESS

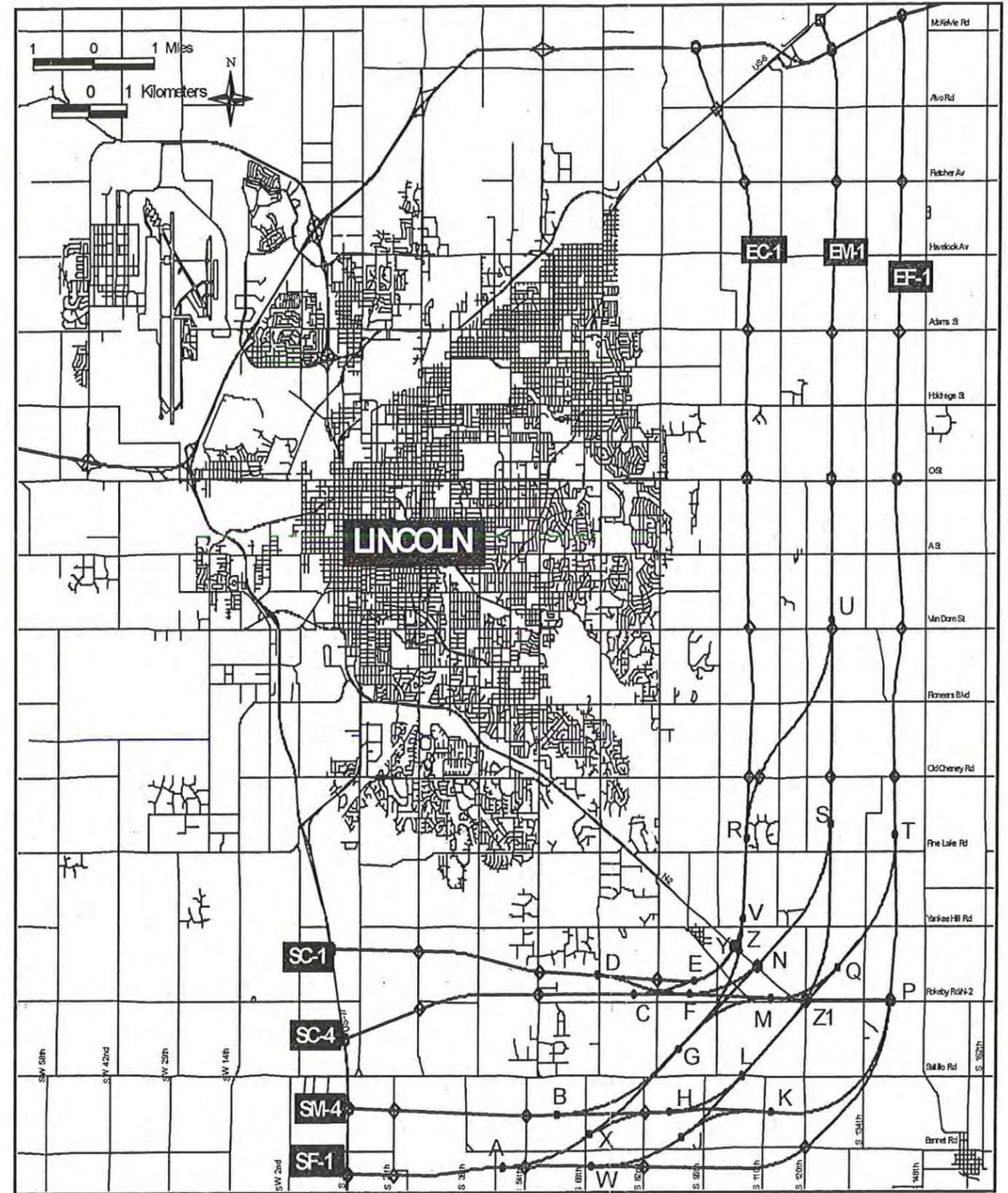
PRELIMINARY EVALUATION CRITERIA	
1.	<u>Development of 33 Criteria</u> for evaluating traffic, cost, socioeconomic, land use, and environmental impacts for the purpose of evaluating 20 end-to-end beltway alternatives and 3 non-beltway alternatives.
PRELIMINARY TRANSPORTATION ANALYSIS	
2.	<u>End to End Beltway Analysis.</u> Complete south and east beltways connecting US 77 to I-80 were analyzed to determine the affects of a complete circumferential roadway on internal traffic, as well as to determine the affect of distance from Lincoln on traffic volumes for close, mid and far beltway alignments.
3.	<u>Partial Beltway Analysis.</u> Separate south and east alignments were analyzed (for close, mid and far strategies) as stand alone improvements to determine the affect of the south and east beltways on each other, and to the determine if a beltway on the south or the east would be feasible on its own.
4.	<u>Non-Beltway Analysis.</u> Non-beltway options were analyzed to determine the impacts of each alternative on traffic within the City of Lincoln
PRELIMINARY ROUTE DEVELOPMENT	
5.	<u>Development of the 20 Beltway Alignments</u> (based on 90 m (300 ft) wide sections) which minimized impacts to socioeconomic and environmental constraints, and which could be used to estimate cost and environmental impacts.
6.	<u>Development of the 3 Non-Beltway Alignments</u> (based on 30-37 m (100-120 ft) typical sections) which could be used to estimate cost and environmental impacts.
7.	<u>Development of Preliminary Cost Estimates.</u>
PRELIMINARY ENVIRONMENTAL ANALYSIS	
8.	<u>Data Collection</u> for 31 measured parameters for socioeconomic, land use and environmental impacts based on existing resources and field checks for 20 beltway and 3 non-beltway alternatives.
9.	<u>Preliminary Categorization of Alternatives</u> into high, medium and low impact routes.
INITIAL TASK SCREENING	
10.	<u>Initial Task Screening</u> resulting in elimination of 11 end-to-end beltway alternatives which had relatively higher impacts than other alternatives including longer crossings through Wilderness Park, longer diagonal segments for the east far alternatives, or which included the south far alternatives which carried less traffic and cost more. In addition, 1 non-beltway alternative was eliminated which required 45 residential relocations. Nine end-to-end beltway and 2 non-beltway alternatives were carried forward for further analysis. This step was required to maintain the intended project design which called for the Level III analysis to be conducted on 5 to 10 candidate alternatives.
PRELIMINARY ECONOMIC ANALYSIS	
11.	<u>Economic Efficiency Evaluation</u> was conducted to determine relative benefits and costs of alternatives, including travel time savings, vehicle operating cost savings, accident reduction cost savings and total transportation efficiency benefits.
12.	<u>Economic Feasibility Evaluation</u> was conducted to determine benefit-cost ratios of alternatives.
IDENTIFICATION OF FINALIST ALTERNATIVES	
13.	<u>Consideration of 148th Street Scenarios.</u> Two additional scenarios were evaluated for a beltway and a non-beltway alternative along 148 th Street. Since these scenarios did little to relieve traffic congestion, had greater impacts to residences and historic structures, and had comparable costs, they were eliminated from further consideration.
14.	<u>Elimination of Routes through Wilderness Park.</u> The remaining 4 south close alternatives and 2 non-beltway alternatives were eliminated based on cost-benefit analysis which showed economically feasible alternatives to impacting this 4(f) resource. The 5 remaining end-to-end alternatives were split into their 4 separate south and east components, and these 4 finalist beltway corridors were carried forward for the Level IV analysis. These were SM-4, EC-1, EM-1 and EF-1.

Route 1	Route 2	Route 3	Route 4
EC1	EC1	EC1	EC1
R	R	R	R
V	V	V	V
Y	Y	Z	Z
E	E	G	G
D	C	B	X
SC1	SC4	SM4	A
			SF1

Route 5	Route 6	Route 7	Route 8	Route 9	Route 10	Route 11	Route 12	Route 13	Route 14
EM1	EM1	EM1	EM1	EM1	EM1	EM1	EM1	EM1	EM1
U	U	U	U	U	U	U	U	U	U
S	S	R	S	R	S	S	S	R	R
Z1	N	V	N	V	N	Z1	N	V	V
L	F	Y	F	Y	G	L	G	Z	Z
J	D	E	C	E	B	H	X	G	G
W	SC1	D	SC4	C	SM4	B	A	X	B
A		SC1		SC4		SM4	SF1	A	SM4
SF1								SF1	

Route 15	Route 16	Route 17	Route 18	Route 19	Route 20
EF1	EF1	EF1	EF1	EF1	EF1
T	T	T	T	T	T
Q	Q	Q	P	Q	P
Z2	Z2	Z1	K	Z1	W
M	M	L	H	L	A
F	F	H	B	J	SF1
D	C	B	SM4	W	
SC1	SC4	SM4		A	
				SF1	

***Candidate Beltway Routes
Preliminary Environmental Impact Matrix***



**LINCOLN SOUTH AND EAST BELTWAYS
ENVIRONMENTAL IMPACT STATEMENT**

Figure 2.6

2.3.1 Preliminary Evaluation Criteria

A list of evaluation criteria was developed with input from the study sponsors, the Management Committee, Technical Advisory Committee, Citizens Advisory Committee and public. After refinement by the consultant team, the evaluation criteria were presented to the three advisory committees to determine the relative importance of socioeconomic, land-use, environmental, cost and traffic impacts. At this time, the determination was made to develop an evaluation matrix based on the cost effectiveness technique where all relevant data is collected and presented without any attempt to put benefits into common units (such as cost) and without any attempt to have the data select the best alternative.

Table 2.6 is the list of the preliminary evaluation criteria along with a discussion of what the criteria involve and how they were to be measured. Most of the evaluation criteria were measurable (for example, future traffic flow and congestion). In these cases, parameters were developed to provide a measurable comparison of the relative impacts of the alternatives (for the above example, the measured parameter is average annual time saved in hours). In some cases, more than one parameter was used for assessing a particular evaluation criterion. It should be noted that there were a few criteria that the committees felt were important but a direct measurement was not readily available at that time (as noted by N/A in **Table 2.6**).

2.3.2 Preliminary Transportation Analysis

Three traffic analyses were conducted for the beltway study. First, end-to-end south and east beltways connecting from US 77 to I-80 were analyzed to determine the affects of a complete circumferential roadway on internal traffic, as well as to determine the affect of distance from Lincoln on traffic volumes for each of the beltway alignments. Second, separate south and east alignments were analyzed as stand alone improvements to determine the affect of the south and east beltways on each other, and to determine if a beltway on the south or the east would be feasible on its own. Third, non-beltway options were analyzed to determine the impacts of each alternative on traffic within the City of Lincoln and for use in comparing the benefits of a beltway versus other roadway improvements.

The Level III preliminary traffic analysis was performed using the Build Out Land Use Plan (BOS) provided by the City of Lincoln Planning Department. During the course of the beltway study, a second Build Out Land Use Plan (BOS II) was developed by the City of Lincoln. This land use plan was used for more detailed analyses in the Level IV analysis.

End-to-End Beltway Analysis. The results of the end to end beltway traffic modeling indicated that the distance of a future beltway from the existing urbanized area of Lincoln had a greater affect on traffic volumes in the south corridor than in the east corridor. The south beltway alternatives located north of Saltillo Road carry over 50 percent more traffic than the alternatives located south of Saltillo Road. This is largely due to the fact that the northern alternatives carry a significant amount of internal traffic. As a result, the close beltway alternatives provide some congestion relief on several parallel east/west streets (Pine Lake Road, Yankee Hill Road) in the urban area. However, the traffic on a south beltway increases congestion on the north/south streets (14th, 27th and 56th Streets) connecting to Lincoln's urbanized area. The south far alignment carried primarily external to external traffic between US 77 and N-2.

**TABLE 2.6
PRELIMINARY SOUTH AND EAST BELTWAY EVALUATION CRITERIA**

ID#	ISSUES	DISCUSSION	METHOD OF MEASUREMENT
T.0 TRAFFIC OPERATION FACTORS			
T.1	Traffic Flow and Congestion	Improving traffic flow and relieving congestion are objectives of any proposed transportation improvement. The extent to which this occurs can be estimated by determining relative improvements in daily vehicle hours traveled (VHT) which is an output of the transportation model.	Average annual time savings in hours from Economic Analysis using computer model.
T.2	Through Traffic Around Lincoln	This criterion relates to the need to accommodate through traffic movements around the built-up area of the City. This would in turn relieve congestion on urban streets caused by existing and/or future traffic.	Volume of External to External trips in vehicle miles traveled using beltway from computer model.
T.3	Future Traffic Demand	Sufficient infrastructure should be in place or planned to satisfy new traffic demand as a result of growth. This can be measured by determining the number and length of streets that would otherwise have an unacceptable Level of Service (LOS).	Not measured. Data not available.
T.4	Future Freight & Truck Transportation	Improving freight and truck transportation to reduce automobile and truck conflicts is a concern in the community. This criterion would provide a measure of the extent to which truck traffic can be relocated.	Not measured. No separate truck data available.
T.5	Congestion on Existing Arterials Within Developed Areas.	This criterion relates to impacts of a transportation improvement within the existing developed area of Lincoln. It is a measure of how much congestion is relieved by relocating internal traffic from the existing street system to outlying areas.	Not evaluated. Preliminary computer model results show little difference between alternatives
T.6	Effective Life of Facility	This criterion relates to the amount of time that it would take for beltway or non-beltway improvement alternatives to become obsolete due to the facility reaching its theoretical capacity.	Not measured. All beltway alternatives should have excess capacity with future model runs.
T.7	Number of Accidents	The reduction in Vehicle Miles Traveled (VMT) on the existing arterial street system should relate to a proportional reduction in traffic accidents. Accident rates for arterial streets are higher than accident rates for facilities like the beltway. Therefore, transferring traffic from the arterial streets to the beltway should result in an overall reduction in number of accidents.	Dollar value of annual accident savings from economic model.
T.8	Disruption of Existing Street Network	Lancaster County and the City of Lincoln is built upon grid type street system with major streets every mile. This criterion identifies the extent to which the existing street system is impacted.	Not measured in Task 3, but measured in Task 4. Lane miles of existing section line roads eliminated or relocated.
C.0 PROJECT COSTS			
C.1	Construction Cost	This criterion relates to only the cost of construction of the improvement in 1997 dollars and does not include cost for right-of-way	Estimated cost of Construction in 1996 dollars.
C.2	Right-of-Way Costs	Right-of-way costs are estimated by assuming generalized costs per hectare (acre) of residential property versus farm property as well as costs for homes, businesses, and miscellaneous structures.	Estimated R/W costs based on cost/structure, measured from aerial photos and G.I. Surveys.
C.3	Maintenance Costs	The cost of maintaining a new facility is an important consideration. Cost is determined by looking at historical maintenance costs involved in snow removal, pavement repair, landscaping and mowing, deicing and periodic inspection.	Cost per linear kilometer (mile) based on average maintenance costs in Nebraska for Freeway and principle arterials.
C.4	Project Funding	This criterion refers to the ability of an alternative to qualify for new sources of funds over and above existing state/local resources. Revenue could be locally generated or earmarked from future state and federal resources. Use of existing state/federal resources could upset existing priorities.	Not measured in Task 3, but may be measured in Task 4. Likelihood of obtaining new revenue. 1 = Good 5 = Poor

Table 2.6 (cont)

ID#	ISSUES	DISCUSSION	METHOD OF MEASUREMENT
S.0 SOCIO ECONOMIC			
S.1	Impacts to Residences	This parameter included structures located within the 91 m (300 ft) ROW plus additional ROW for the interchanges. It was measured from the GIS layer of structures which contained structures present on the April 1995 aerial photography along with new houses observed from driving study area in April 1996. This was updated using 1997 photography and additional drive throughs.	Number of structures within ROW (takings).
S.2	Impacts to Businesses	This parameter included commercial businesses in the study area as identified on the April 1995 blue-line aerial photography. Farm and other home businesses were not included in the sum. This includes commercial businesses within 0.4 km (0.25 mi) either side of the centerline minus the area of the ROW. Source of the information is as described for the previous parameter	Number of businesses within ROW (takings) Number of businesses within 0.4 km (0.25 mi).
S.3	Impacts to Agricultural Land	This parameter was estimated based on interpretation of the April 1995 aerial photography.	Hectares (acres) of cropland within ROW
S.4	Economic Development Opportunities	(not available at this time)	(to be determined)
S.5	Impacts to Existing School District Lines	This is the estimated ROW requirement for the entire route which corresponds approximately to the property removed from the tax rolls. The beltway study area includes portions of Districts 145 (Waverly), 153 (Cheney), 152 (Rokeby), OR-1 (Otoe), 160 (Norris) and 1 (Lincoln). This parameter was measured using School Attendance Area maps and estimates of the distribution of student populations provided by the school districts. Assuming that a beltway would divide portions of the districts, the area of the districts on the opposite side of the beltway from the school was measured and taken as a percentage of the total school attendance areas.	Hectares (acres) removed from the tax base.
S.6	Impacts to non-tillable land	This parameter was estimated based on interpretation of the April 1995 aerial photography and spot checking fields to verify the interpretation.	Hectares (acres) of pasture, hayland and CRP land within ROW.
L.0 LAND USE			
L.1	Impacts to Platted Subdivisions	Calculated from the GIS Constraints Map, this parameter was the number of platted subdivisions crossed by a beltway route. Information in the GIS included platted subdivisions on record in the County Assessors office as of April 1996. Calculated from the GIS Constraints Map, this parameter was the number of hectares (acres) taken from platted subdivisions as described above.	Number of platted subdivisions crossed Hectares (acres) of platted subdivisions within ROW
L.2	Impacts to Parks and Recreation Areas	Calculated from the GIS Constraints Map which included the City's Parks and Rec layer, this parameter was the number of hectares (acres) taken from Wilderness Park. No other parks are affected by the remaining beltway routes.	Hectares (acres) of parkland within ROW
L.3	Impacts to Golf Courses	Calculated from the GIS Constraints Map, golf course locations had been identified from maps provided by the City.	Hectares (acres) of golf courses within ROW
L.4	Compatibility with future Land Use Plan	(to be determined)	(not available at this time)
L.5	Minimize Barrier Effect	This parameter was the average distance between the beltway and the edge of the built up area as defined in the Comprehensive Plan/city limits. Average distance was determined based on measurements at Havelock, Adams, Holdrege, O, A, Van Dorn and Pioneers Streets on the east, and at Old Cheney, 70th, 56th, 40th, 27th Street on the south.	Average distance from built up area
L.6	Trail System Enhancements	Calculated from the GIS Constraints Map, these trail locations had been identified from the City's Trails layer and maps	Number of hiker/biker trail crossings

Table 2.6 (cont)

ID#	ISSUES	DISCUSSION	METHOD OF MEASUREMENT
		provided by the City Parks and Recreation Department.	
E.0 ENVIRONMENTAL			
E.1	Water Quality Impacts	Calculated from the GIS Constraints Map, these zone locations had been identified from maps provided by the Lincoln/Lancaster County Health Department.	Hectares (acres) of wellhead protection zones within ROW
E.2	Air Quality Impacts	(to be determined)	(not available at this time)
E.3	Drainage and Hydrology Impacts	Calculated from the GIS Constraints Map, streams had been identified from the City's Streams layer.	Number of stream crossings
		Calculated from the GIS Constraints Map, floodways had been identified from FEMA and FIRM maps.	Hectares (acres) of floodway within ROW
		Calculated from the GIS Constraints Map, the 100-year floodplain had been identified from FEMA and FIRM maps.	Hectares (acres) of 100-year floodplain within ROW
E.4	Noise Impacts	This parameter was measured from the GIS layer of structures which contained structures present on the April 1995 aerial photography along with new houses observed from driving study area in April 1996. It includes 0.4 km (0.25 mi) on either side of the centerline minus the beltway ROW.	Number of structures within 0.4 km (0.25 mi)
E.5	Riparian Corridors Impacts	Calculated from the GIS Constraints Map, streams had been identified from the City's Streams layer.	Number of stream crossings
		This parameter was estimated based on interpretation of the April 1995 aerial photography. Riparian areas were defined as wooded and non-wooded areas along streams and smaller drainages	Hectares (acres) of riparian corridor within ROW
E.6	Wetlands Impacts	Calculated from the GIS Constraints Map, wetlands had been identified from the City's Wetlands layer which was developed from the USFWS National Wetlands Inventory Maps.	Number of Mapped Wetlands within ROW.
E.7	Natural Habitat Impacts	This parameter was determined by assigning quality weightings of 0 to 5 to parkland, stream crossings, riparian corridor, and wetlands factors. High quality was assigned based on the extent of woodlands along the stream crossings, the width of the park crossing, and the number of wetlands	Impacts to natural habitats within ROW (0-5)
E.8	Cultural Resources Impacts	This factor applied to the three NRHP sites within the study area. Although none of the 23 routes do take NRHP property, SF1 runs along the Schrader site, and EF1 runs along the Stock Farm site. None of the routes abut the Ehler Round Barn.	Number of National Register sites within ROW
		This parameter was the number of other known cultural resources within the ROW that have not been assessed for eligibility of the NRHP, including all recorded sites listed in the Phase I Archeological/Cultural Resources Survey conducted for the project.	Number of known cultural resources within ROW
		This parameter was the number of other potential cultural resources within the ROW, including all cemeteries, NSHS owned property in the study area, and some other older structures.	Number of potential resources within ROW
		This parameter was the number of NRHP and other known cultural resources within 0.4 km (0.25 mi) of a beltway centerline, including all recorded sites listed in the Phase I Archeological/Cultural Resources Survey conducted for the project.	Number of know resources within 0.4 km (0.25 mi)
		This parameter was the number of other potential cultural resources within 0.4 km (0.25 mi) of a beltway centerline, including all cemeteries, NSHS owned property in the study area, and some other older structures.	Number of potential resources within 0.4 km (0.25 mi)

Table 2.6 (cont)

ID#	ISSUES	DISCUSSION	METHOD OF MEASUREMENT
E.9	Visual Impacts	<p>This parameter was measured from the GIS layer of structures which contained structures present on the April 1995 aerial photography along with new houses observed from driving study area in April 1996. It includes 0.4 km (0.25 mi) on either side of the centerline minus the beltway ROW.</p> <p>Calculated from the GIS Constraints Map, this parameter was the number of platted subdivisions within 0.4 km (0.25 mi) of either side of a beltway centerline. Information in the GIS included platted subdivisions on record in the County Assessors office as of April 1996.</p> <p>Calculated from the GIS Constraints Map which included the City's Parks and Rec layer, this parameter was the number of parks within 0.4 km (0.25 mi) of a beltway centerline.</p> <p>Calculated from the GIS Constraints Map, this parameter was the number of golf courses within 0.4 km (0.25 mi) of either side of a beltway centerline. Information on golf course locations was identified from maps provided by the City.</p> <p>Calculated from the GIS Constraints Map, this parameter was the number of trails within 0.4 km (0.25 mi) of either side of a beltway centerline. Information on trail locations had been identified from the City's Trails layer and maps provided by the City Parks and Recreation Department.</p>	<p>Number of structures within 0.4 km (0.25 mi)</p> <p>Number of platted subdivisions within 0.4 km (0.25 mi)</p> <p>Number of parks within 0.4 km (0.25 mi)</p> <p>Number of golf courses within 0.4 km (0.25 mi)</p> <p>Number of hiker/biker trails within 0.4 km (0.25 mi)</p>

In the east corridor, distance from Lincoln has a lesser affect on traffic volumes. The east beltway alternatives principally provide access from N-2 and I-80 to the eastern portions of Lincoln. The close alternative provides some relief to 84th Street but increases traffic on the east/west streets (Van Dorn Street, Old Cheney Road, and O Street).

Partial Beltway Analysis. Traffic volumes were generally lower for the partial beltways than for the end-to-end beltways, with the south far and south mid alignments being affected the most by the absence of an east beltway. Aside from this, the conclusions of the partial beltway analysis were similar to those for the end-to-end beltways. The close alignments had a greater affect on reducing congestion within the urbanized area and the far alignments carried primarily external traffic.

Non-Beltway Analysis. Non-beltway options 1 and 3 each provided similar benefits to the street network within the urbanized area. Non-beltway option 1 provided the greatest benefit to N-2 and 84th Street. Overall Level of Service was improved in both corridors; however, the non-beltway improvements did not result in acceptable Levels of Service on the congested roadways on the fringes of the city.

Non-beltway option 2 did not mitigate future traffic congestion as much as expected. The addition of capacity on N-2 also draws additional traffic and does not provide an acceptable Level of Service. The widening of 84th Street does not relieve congestion on 84th Street or the major north/south streets in the east corridor. In 1996 when the evaluation was conducted, this non-beltway option would have required the acquisition of approximately 45 homes and other structures. Since that time, there has been substantially more development along N-2, 84th Street and Pine Lake Road. Since option 2 had major impacts and yet did not provide significant congestion relief, it was not recommended for further analysis.

2.3.3 Preliminary Route Development

Preliminary route development of the beltway improvement alternatives established a 91 m (300 ft) wide band within each of the remaining seven beltway corridors in order to develop cost estimates and estimate environmental impacts. These bands attempted to avoid or minimize impacts to known natural and socioeconomic constraints, including natural areas, floodplains, streams, wetlands, historic sites, cemeteries, and park and recreation areas. The taking of and disruption to existing homes and farmsteads was also minimized while attempting to maintain a relatively straight alignment meeting a 110 km/h (70 mph) design speed.

The beltway alternatives were assumed to be built to freeway standards with all minor roadway intersections being grade separated and full access interchanges spaced approximately 3 km (2 mi) apart. In order for a proposed beltway to be most efficiently used, additional improvements will be required along the connecting roadways in the south and east corridors. Currently most of the roads that intersect a possible beltway are two-lane unpaved county roads. These would be upgraded to four-lane paved roads for roads that provide access to the beltway interchanges; those that cross the beltway with overpasses would be upgraded to two-lane paved roads.

Typical sections were chosen for both the beltway and non-beltway alternatives through discussions with NDOR and the City of Lincoln. The NDOR Standard Section for a Rural Expressway was used for all beltway alignments. A rural expressway typical section is shown in **Figure 2.7** and has the following features:

1. Approximately 76 to 91 m (250 to 300 ft) right-of-way; right-of-way needs vary with topography
2. Two 3.7 m (12 ft) driving lanes in each direction
3. 2.4 m (8 ft) paved outside shoulders
4. 0.9 m (3 ft) paved inside shoulders
5. 12 m (40 ft) unpaved depressed median (includes inside shoulders)
6. Drainage ditches on either side as needed

Alignments were also developed for the non-beltway alternatives for the purpose of developing cost estimates and determining possible environmental impacts. The non-beltway alignments attempted to utilize the centerline of existing section line roads with access limited as much as is reasonable in order to provide a safe and efficient roadway. Intersections along the non-beltway alternatives would be at grade with stop sign control at minor intersections and traffic signals at major intersections with minimum signal spacing of 0.4 km (0.25 mi). The non-beltway alternatives would have a design speed of 60 to 70 km/h (40 to 45 mph).

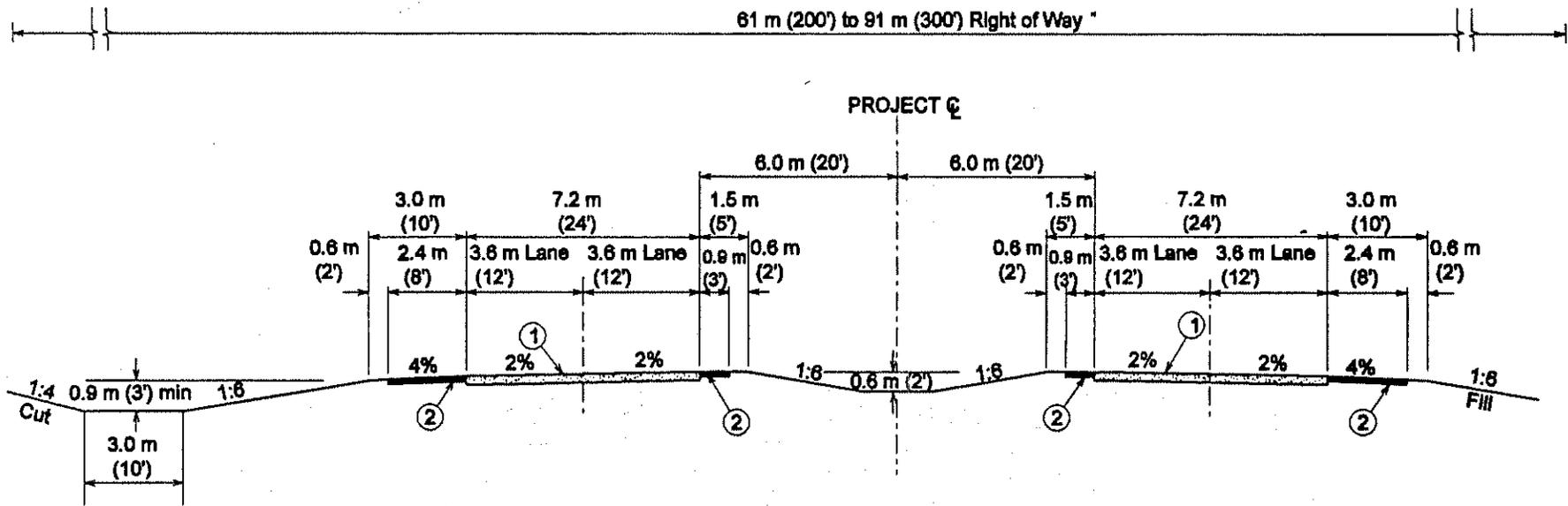
City of Lincoln fringe roadway standards were used on all four-lane non-beltway alignments. A typical fringe roadway section is shown in **Figure 2.8** and has the following features:

1. 30 m (100 ft) right-of-way, increasing to 37 m (120-ft) at major intersections to allow for auxiliary turn lanes
2. Two 3.7 m (12 ft) driving lanes in each direction with 0.3 m (1 ft) curb and gutter on the inside and outside driving lanes
3. 6 m (20 ft) landscaped raised center median
4. 1.2 m (4 ft) sidewalk separated from the driving lanes by an 2.4 m (8 ft) landscaped area

A 46 m (150 ft) right-of-way was assumed for six -lane sections.

2.3.4 Preliminary Environmental Analysis

The Level III environmental analysis involved determination of key socioeconomic, land use and environmental issues. This was accomplished through the development of the evaluation criteria (**Table 2.6**). Using the associated measured parameters, specific impacts were calculated for each of the remaining 20 beltway and 3 non-beltway routes. This information was presented and compared in a preliminary matrix of environmental impacts of the alternatives. The environmental analysis in conjunction with the previous work with traffic projections, engineering and cost estimates were used to conduct initial task screening.



* RAW width depends on terrain; wider @ Interchanges

LEGEND

- ① 250 mm (10") CONCRETE PAVEMENT
- ② 160 mm (6") ASPHALT SHOULDER



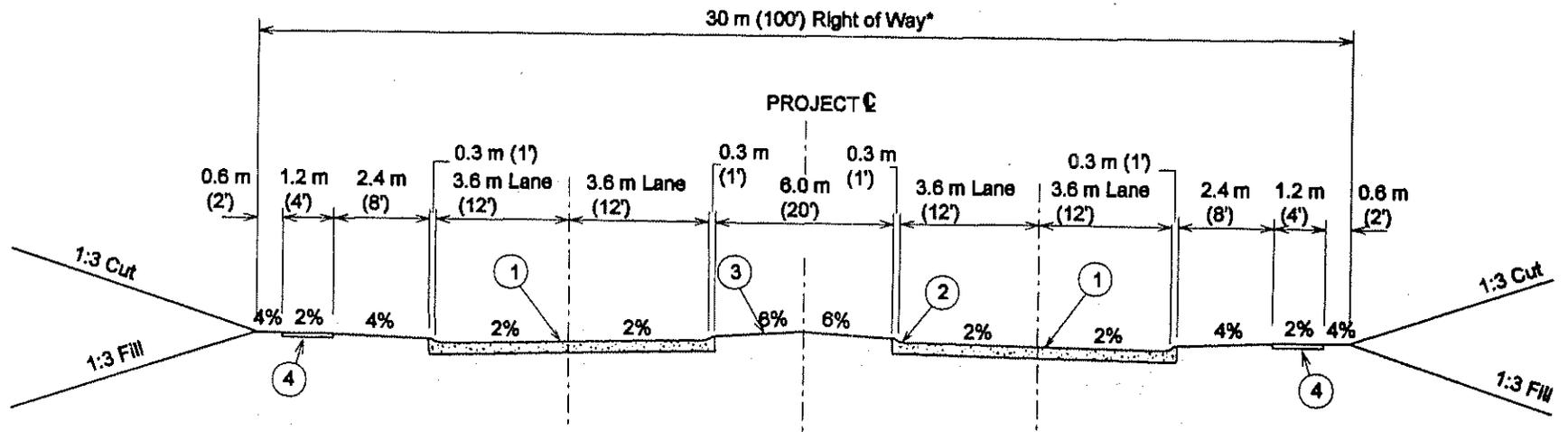
2.28

**LINCOLN SOUTH AND EAST BELTWAYS
ENVIRONMENTAL IMPACT STATEMENT**

BELTWAY TYPICAL SECTION

Figure 2.7

Figure 2.7



* RW wider @ major intersections, typically 37 m (120').

LEGEND

- ① 250 mm (10") CONCRETE PAVEMENT
- ② 150 mm (6") INTEGRAL CURB (typical)
- ③ LANDSCAPE MEDIAN
- ④ 100 mm (4") CONCRETE SIDEWALK



2.29

LINCOLN SOUTH AND EAST BELTWAYS
ENVIRONMENTAL IMPACT STATEMENT

NON-BELTWAY TYPICAL SECTION

Figure 2.8

Figure 2.8

Data Collection. Data for the Level III environmental analysis was collected from existing sources of information, including the project GIS constraints map (**Figure 2.1**) and April 1995 City aerial photography (more recent aerial photography flown in March and April 1997 was available for for the Level IV analysis). Additional field checks were made by driving through the study area at different points during the study, and most recently in June 2000. The 91 m (300 ft) wide beltway right-of-way was used to define the area of direct project impacts 37 m (120 ft) for the non-beltway. Beyond this a 0.4 km (0.25 mi) area was defined which could be affected by indirect or secondary impacts.

Of the 34 parameters, numerical data was collected for all but three--economic development opportunities, compatibility with future land use, and air quality. For economic development, it was assumed that all of the routes will provide similar opportunities. Regarding compatibility with future land use, the City of Lincoln took the position that future land use plans will be evaluated following the completion of the beltway study. Certainly, many scenarios are possible based on the City's vision for the sequence and location of future growth. Regarding air quality, differences between the routes will be extremely minor due to the similarity of the rural character of all the routes, and the magnitude of the values will have no impact on the attainment status for the City; therefore, this time consuming model was not run until the Level IV analysis. Considering that no weighting factors were applied to the evaluation criteria, it was unlikely that the addition of data for these three parameters would substantially change the findings of the environmental evaluation.

Environmental Comparison. The preliminary matrix of environmental impacts of the 20 beltway and 3 non-beltway alternatives is presented in **Table 2.7**. In all cases, higher measured values represent higher impacts. It should be noted that all values are relative, and even the highest values for a given parameter may not represent a significant impact. For example, for all the alternatives, the maximum number of commercial businesses within 0.4 km (0.25 mi) of the alignment ranges is one business. Although this may be an inconvenience to the one property owner (or it may be an improvement in access), one commercial business along a 27 to 34 km (17 to 21 mi) long alignment would not be considered a significant project impact. On the other hand, the number of structures within 0.4 km (0.25 mi) ranges from 73 with beltway Route 10 to over 492 with non-beltway option 2. This parameter gives an indication of the number of residences that could be affected by noise and visual impacts, as well as changes in access. In this case, the difference in magnitude between the high and low measured values would be considered a significant difference.

The measured parameters were preliminarily reviewed, and values in the upper half of the measured range were identified as having higher impacts. For each route, the number of parameters occurring in the upper half of the range was summed, and the distribution of the routes was plotted to find natural breaks. Routes were categorized based on the number of parameters that occurred in the upper half of the range. This method was used to categorize beltway routes as high, medium and low environmental impact, and to compare various combinations of similar routes to determine which had higher or lower environmental impact (**Table 2.8**).

**TABLE 2.7
LEVEL III PRELIMINARY ENVIRONMENTAL IMPACT MATRIX
MEASURED VALUES**

ID #	Evaluation Criteria	Measured Parameter	East Close Combinations				East Mid Combinations										East Far Combinations						Non Beltway		
			EC1 to SC1	EC1 to SC4	EC1 to SM4	EC1 to SF1	EM1 to SF1	EM1 to SC1	EM1 to SC1	EM1 to SC4	EM1 to SC4	EM1 to SM4	EM1 to SM4	EM1 to SF1	EM1 to SF1	EM1 to SM4	EF1 to SC1	EF1 to SC4	EF1 to SM4	EF1 to SM4	EF1 to SF1	EF1 to SF1	98th & Yankee Hill	84th & Pine Lake	98th & Yankee Hill
			Route 1	Route 2	Route 3	Route 4	Route 5	Route 6	Route 7	Route 8	Route 9	Route 10	Route 11	Route 12	Route 13	Route 14	Route 15	Route 16	Route 17	Route 18	Route 19	Route 20	Non-Belt Option 1	Non-Belt Option 2	Non-Belt Option 3
S.1	Impacts to Residences	Number of structures within ROW (takings)	25	22	16	16	10	16	21	15	18	7	14	7	12	12	25	24	17	20	13	16	1	45	8
S.2	Impacts to Commercial Businesses	Number of businesses within ROW (takings)	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0		9
		Number of businesses within 0.4 km (0.25 mi)	2	2	2	2	3	6	5	6	5	4	3	4	5	5	2	2	0	1	1	1	1	1	
S.3	Impacts to Agriculture	Hectares (acres) of cropland within ROW	183 (452)	197 (488)	227 (562)	226 (558)	249 (615)	250 (617)	237 (585)	263 (649)	251 (620)	286 (706)	241 (596)	284 (702)	280 (691)	281 (694)	261 (645)	274 (677)	289 (713)	303 (749)	296 (732)	325 (803)	73 (181)	0	83 (205)
S.4	Economic Development Opportunities	Economic development opportunities																							
S.5	Impacts to Existing School Districts	Hectares (acres) removed from tax base	1,170	1,159	1,197	1,208	1,315	1,229	1,208	1,229	1,186	1,251	1,297	1,251	1,251	1,229	1,315	1,294	1,315	1,402	1,337	1,423	110	127	133
		Percent of total district acres severed	4.6	5.7	4.3	4.6	6.1	7.9	8.7	8.4	8.7	6.9	7.3	7.1	7.8	5.8	7.9	9.6	9.6	9.9	9.9	8.9	8.9	2.0	0.5
S.6	Impacts to Non-Tillable Land	Hectares (acres) of pasture, hayland, and CRP land within ROW	473 (1,170)	469 (1,159)	484 (1,197)	489 (1,208)	532 (1,315)	497 (1,229)	489 (1,208)	497 (1,229)	480 (1,186)	506 (1,251)	525 (1,297)	506 (1,251)	506 (1,251)	497 (1,229)	532 (1,315)	524 (1,294)	532 (1,315)	567 (1,402)	541 (1,337)	576 (1,423)	45 (110)	51 (127)	54 (133)
L.1	Impacts to Platted Subdivisions	Number of platted subdivisions crossed	7	4	1	1	2	9	9	6	6	3	2	3	3	3	6	3	0	1	0	0	2		2
		Hectares (acres) of platted subdivisions within ROW (takings)	15 (37)	14 (35)	0	0	8 (19)	27 (67)	23 (56)	26 (65)	22 (54)	12 (31)	8 (19)	12 (31)	8 (20)	8 (20)	15 (37)	14 (35)	0	0	0	0	0	0.4 (1)	0
L.2	Impacts to Parks and Recreation Areas	Hectares (acres) of parkland within ROW (takings)	11 (27)	4 (11)	0	0	0	11 (27)	11 (27)	4 (11)	4 (11)	0	0	0	0	0	11 (27)	4 (11)	0	0	0	0	3 (8)	2 (5)	5 (13)
L.3	Impacts to Golf Courses	Hectares (acres) of golf course property within ROW (takings)	0	0	0	0	0.4 (1)	0.4 (1)	0.4 (1)	0.4 (1)	0.4 (1)	0.4 (1)	0.4 (1)	0.4 (1)	0.4 (1)	0.4 (1)	0	0	0	0	0	0	4 (11)	0	4 (11)
L.4	Compatibility with Future Land Use Plan	Compatibility with future land use																							
L.5	Minimize Barrier Effect	Average distance from built up area in km (mi)	3.7 (2.3)	4.0 (2.5)	5.1 (3.2)	5.8 (3.6)	7.1 (4.4)	5.1 (3.2)	5.1 (3.2)	5.3 (3.3)	5.3 (3.3)	6.4 (4.0)	6.4 (4.0)	7.1 (4.4)	7.1 (4.4)	6.4 (4.0)	6.1 (3.8)	6.4 (4.0)	7.6 (4.7)	7.6 (4.7)	8.0 (5.0)	8.0 (5.0)	0	0	0
L.6	Trail System Enhancements	Number of hiker/biker trail crossings	4	4	2	2	1	3	3	3	3	1	1	1	1	1	3	3	1	1	1	1	4	4 +	4
E.1	Water Quality Impacts	Hectares (acres) of wellhead protection zones within ROW	92 (227)	88 (218)	69 (170)	69 (170)	65 (161)	88 (218)	88 (218)	85 (209)	85 (209)	65 (161)	65 (161)	65 (161)	65 (161)	65 (161)	81 (200)	77 (191)	58 (143)	58 (143)	58 (143)	58 (143)	46 (113)	43 (107)	46 (113)
E.2	Air Quality Impacts (1)	Air quality																							
E.3	Drainage and Hydrology Impacts	Number of stream crossings	2	2	2	2	3	2	2	2	2	2	3	2	2	2	2	2	1	2	1	2	4	3 +	4
		Hectares (acres) of floodway within ROW	29 (71)	29 (71)	29 (71)	29 (71)	11 (27)	10 (26)	10 (26)	10 (26)	10 (26)	10 (26)	11 (27)	10 (26)	10 (26)	10 (26)	0	0	0	0	0	0	4 (10)	3 (8)	6 (15)
		Hectares (acres) of 100-year floodplain within ROW	28 (69)	19 (48)	30 (73)	18 (45)	23 (58)	31 (77)	33 (82)	23 (56)	25 (61)	33 (82)	36 (89)	22 (54)	24 (58)	35 (86)	34 (83)	25 (62)	37 (92)	38 (93)	24 (60)	28 (68)	6 (15)	8 (19)	16 (40)
E.4	Noise Impacts	Number of structures within 0.4 km (0.25 mi)	245	222	157	172	77	144	188	122	165	58	68	73	115	100	169	148	85	92	94	97	262	492 +	298
E.5	Riparian Corridors Impacts	Number of stream crossings	2	2	2	2	3	2	2	2	2	2	3	2	2	2	2	2	1	2	1	2	4	3 +	4
		Hectares (acres) of riparian corridor within ROW	29 (72)	32 (79)	24 (60)	24 (58)	18 (44)	18 (45)	27 (68)	21 (52)	31 (75)	13 (33)	22 (54)	13 (31)	22 (54)	23 (56)	30 (74)	33 (81)	34 (84)	31 (77)	30 (74)	25 (61)	10 (25)	0	13 (31)
E.6	Wetlands Impacts	Number of mapped wetlands within ROW	15	10	13	17	14	6	11	3	6	4	12	8	13	9	15	12	16	5	18	12	2	1 +	4
E.7	Natural Habitat Impacts	Impact to natural habitats within ROW (0 - 5)	5	4	3	3	3	4	4	3	4	2	3	2	3	3	5	4	3	2	3	3	3	3	3
E.8	Cultural Resources Impacts	Number of National Register sites within ROW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
		Number of known cultural resources within ROW	0	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0		0
		Number of potential resources within ROW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
		Number of known resources within 0.4 km (0.25 mi)	2	2	2	2	2	2	3	2	3	2	2	2	3	3	1	1	1	3	1	2	2		2
		Number of potential resources within 0.4 km (0.25 mi)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
E.9	Visual Impacts	Number of structures within 0.4 km (0.25 mi)	245	222	157	172	77	144	188	122	165	58	68	73	115	100	169	148	85	92	94	97	262	492 +	298
		Number of platted subdivisions within 0.4 km (0.25 mi)	8	11	6	6	1	3	5	6	8	1	1	1	3	3	2	5	0	0	0	1	4		4
		Number of parks within 0.4 km (0.25 mi)	1	1	0	0	0	1	1	1	1	0	0	0	0	0	1	1	0	0	0	0	1		1
		Number of golf courses within 0.4 km (0.25 mi)	1	1	1	1	0	0	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	1	

(1) Differences between routes will be extremely minor. Magnitude of values will have no impact on attainment area status for city.

Table 2.8

**RELATIVE ENVIRONMENTAL IMPACT
 OF BELTWAY ALTERNATIVES¹**

HIGH IMPACT			MEDIUM IMPACT			LOW IMPACT		
Route 1	(20)	EC-1 - SC-1	Route 3	(11)	EC-1 - SM-4	Route 5	(9)	EM-1 - SF-1
Route 2	(17)	EC-1 - SC-4	Route 4	(12)	EC-1 - SF-1	Route 10	(8)	EM-1 - SM-4
Route 6	(14)	EM-1 - SC-1	Route 8	(12)	EM-1 - SC-4	Route 11	(9)	EM-1 - SM-4
Route 7	(19)	EM-1 - SC-1	Route 13	(11)	EM-1 - SF-1	Route 12	(8)	EM-1 - SF-1
Route 9	(15)	EM-1 - SC-4	Route 18	(11)	EF-1 - SM-4	Route 14	(8)	EM-1 - SM-4
Route 15	(17)	EF-1 - SC-1	Route 20	(12)	EF-1 - SF-1	Route 17	(7)	EF-1 - SM-4
Route 16	(14)	EF-1 - SC-4				Route 19	(8)	EF-1 - SF-1

¹ The number of high impact parameters is shown in parentheses.

Based on the categorization of the routes, the highest impact routes are generally the south close routes (with the exception of Route 8, a variation of EM1-SC4, which was considered medium impact). These routes generally have high impact on residences, subdivisions, park land, trails and non-tillable land, but have relatively small right-of-way requirements and low impact on cropland.

Lowest impact routes were generally the east mid routes that did not involve park crossings (with the exception of Route 13, which followed the north diagonal and was considered medium impact) and the east far routes that followed the short diagonal (Routes 17 and 19). These routes typically have relatively low impact to residences, park land and a variety of parameters typical of the more developed areas of the study area. The routes have relatively large right-of-way requirements, and high impacts to cropland, floodplains, wetlands, and school districts.

2.3.5. Initial Task Screening of Alternatives

Initial task screening was required to maintain the intended project design which called for the Level III analysis to be conducted on 5 to 10 candidate alternatives. For this purpose, matrix data was used to compare and contrast beltway and non-beltway options as described above. By direction of the Management Committee (April 28, 1997), no weighting factors were applied to the data although some parameters will certainly be considered more significant than others. Information on traffic operations and project cost was used to supplement the environmental comparisons.

Similar pairs of routes were compared to identify those with lower impact. In particular, the method was used to compare (1) the two Wilderness Park crossings, (2) the two diagonal combinations for the east far alternatives, (3) the south far combinations, and (4) the non-beltway options. Based on these findings, recommendations were made to eliminate the less desirable routes.

Wilderness Park Crossings. Review of the matrix data showed that of the two south close alternatives, SC-1 (the north park crossing) has greater overall negative impact than SC-4 (the south park crossing), including:

1. More hectares (acres) taken from Wilderness Park (10.9 vs. 4.5 ha (27 vs. 11 ac) with the south crossing)
2. More hectares (acres) taken of pasture, hayland, and CRP land
3. More hectares (acres) taken from the school district tax base
4. More crossings of platted subdivisions
5. More hectares (acres) taken from platted subdivisions
6. More hectares (acres) of wellhead protection areas within the right-of-way
7. More hectares (acres) of 100-year floodplain within the right-of-way
8. More structures within the 0.4 km (0.25 mi) secondary impact area
9. More mapped wetlands within the right-of-way
10. Greater impact to natural habitats

The south park crossing has greater negative impact than the north park crossing for the following parameters:

1. Hectares (acres) taken of cropland
2. Percent of the school district attendance areas on the opposite side of the beltway from the schools
3. Distance from the built up area
4. Hectares (acres) of riparian corridor within the right-of-way
5. Number of platted subdivisions within the 0.4 km (0.25 mi) secondary impact area

In addition, Route SC-1 would cost approximately \$5.4 million more to construct due to the longer bridge over Wilderness Park. Future traffic estimates show that SC-4 would carry approximately 14 percent less traffic than SC-1. However, overall network savings would be the same. There is also little difference in traffic on parallel streets. For example, traffic on Pine Lake Road between Highway 2 and 14th Street increases only 3 to 4 percent with the SC-4 alignment as compared to the SC-1 alignment.

Considering that the two south close alternatives provide a comparable traffic solution, have fairly close costs, and have similar impacts for many measured parameters, it is recommended that routes with the north park crossings (Routes 1, 6, 7, and 15), be eliminated from further consideration because of the overall greater negative socioeconomic, land use and environmental impacts and especially because of the greater impact to Wilderness Park.

Diagonal Combinations for the East Far Alternatives. Review of the matrix data showed that of the two diagonal combinations for the east far alternatives, the far southeast corner routes (Routes 18 and 20) have greater overall negative impact than shorter diagonal routes (Routes 17 and 19), including:

1. More hectares (acres) taken of pasture, hayland, and CRP land
2. More hectares (acres) taken of cropland
3. More hectares (acres) taken from the school district tax base
4. An additional stream crossing
5. More hectares (acres) of 100-year floodplain within the right-of-way
6. More structures within the 0.4 km (0.25-mi) secondary impact area
7. More known cultural resources within the 0.4 km (0.25-mi) secondary impact area

The shorter diagonal had greater negative impact than the far southeast diagonal for the following parameters, including:

1. Hectares (acres) of riparian corridor within the right-of-way
2. More mapped wetlands within the right-of-way

Considering that the two diagonal combinations provide a comparable traffic solution and have similar impacts for many measured parameters, it is recommended that far southeast diagonal routes (Routes 18 and 20) be eliminated from further consideration because of the overall greater negative socioeconomic, land use and environmental impacts.

South Far Alternatives. Any alternatives involving the south far alignments were less desirable from a traffic and cost standpoint. Traffic projections show that the south far option would carry very little traffic and would mainly serve the US 77 South and N-2 East movements. The cost of the south far beltway is approximately \$11.8 million more than the south mid alignment primarily due to the additional length.

Considering that the south far alternatives provide less traffic benefits and had greater impacts (Routes 4, 13 and 20) or at least comparable impacts (Routes 5, 12 and 19) than the south mid alternatives for many measured parameters, it was recommended that all south far routes (Routes 4, 5, 12, 13, 19, and 20) be eliminated from further consideration. This recommendation also applies to Route 18 which is the far south east diagonal connecting the east far alignment to the south mid alignment.

Non-Beltway Option 2. The model shows that even by maximizing capacity with non-beltway option 2, congestion and reduced capacity would remain on arterial streets even with N-2, 84th Street and Pine Lake Roads widened to six lanes. In addition, non-beltway option 2 would impact significantly more residences and other structures than either of the other two non-beltway alternatives. At the time of the 1996 analysis this included taking an estimated 45 structures, with potential secondary noise, visual and access impacts to over 1,000 residences and other structures within the defined 0.4 km (0.25 mi) secondary impact area.

Because of these impacts to residences, it was recommended that non-beltway option 2 be eliminated from further consideration.

Summary of Alternatives Carried Forward. Initial task screening resulted in elimination of 11 end-to-end beltway alternatives which had relatively higher impacts than other alternatives including longer crossings through Wilderness Park, longer diagonal segments for the east far alternatives, or which included the south far alternatives which carried less traffic and cost more. In addition, one non-beltway alternative was eliminated which required 45 residential relocations. This was approved by the Management Committee on April 28, 1997. Nine end-to-end beltway and 2 non-beltway alternatives were carried forward for further analysis. These were beltway routes 2, 3, 8, 9, 10, 11, 14, 16, and 17, and non-beltway options 1 and 3.

2.3.6 Preliminary Economic Analysis

An indicator of the relative merit of a major transportation investment is the extent to which the community is or is not better off with the new roadway. It is almost without question that any well planned transportation investment will provide its users with benefits. The economic feasibility process examines these benefits and compares them with the costs of building and operating the roadway improvement. Theoretically, the value of the benefits should be greater than the cost of the improvements, but this is not always a reality. Many transportation projects are constructed without an economic analysis or determination of economic feasibility.

An economic analysis was conducted for the south and east beltways study that is consistent with the guidelines and procedures established by the Federal Highway Administration for major transportation projects. The objective of this analysis was to determine the relative economic feasibility of the various beltway and non-beltway alternatives.

2.3.6.1 Overview of the Economic Evaluation Process

The economic approach used to evaluate the investment in various beltway and non-beltway alternatives in Lincoln, while being tailored to the study, is one which has been used on other corridor studies, and one which has evolved over the years. The methodology is reasonably comprehensive and credible, and it is one that utilizes accepted economic principles. This approach includes the following steps:

1. A base case, No Build Alternative, is developed (existing roadway system plus committed improvements). The economic benefits of the various improvement alternatives are calculated by comparing the improved case with the base case. The feasibility of each alternative can then be determined.
2. A generalized estimate of the beltway and non-beltway life cycle costs is developed. Costs are tabulated in constant dollars (inflation is not factored in) by "discounting back" to the base year.
3. Use of the new or improved roadways is estimated.
4. Estimated travel efficiency economic benefits attributable to the potential roadway investments are quantified. As with costs, benefits are also tabulated in constant dollars (inflation is not factored in) by "discounting back" to the base year.
5. A comparison is made of the economic costs and economic benefits attributable to each investment alternative.
6. Conclusions are drawn with respect to the economic impact and feasibility of investing in a beltway or non-beltway alternative.

Indicators of Economic Feasibility. The comparison of costs and benefits of a Lincoln roadway investment alternative yields three indicators of "economic feasibility".

Net Present Value. All costs and benefits in future years are discounted back to the base year. When the sum of the discounted benefits is greater than the sum of the discounted costs, the "net present value" is positive and the roadway investment alternative is deemed to be "economically feasible".

Discounted Benefit/Cost Ratio. This ratio is calculated as the sum of the discounted benefits divided by the sum of the discounted costs. When the result is 1.0 or greater, the roadway is considered to be "economically feasible".

Internal Rate of Return. This calculation determines that discount rate at which the net present value is zero (the sum of the discounted benefits is equal to the sum of the discounted costs). If the rate of return is greater or equal to the discount rate, then the investment is deemed to be "economically feasible."

All of these indicators utilize the discount rate either directly to "discount" benefits and costs or indirectly as a comparison for the Internal Rate of Return. The discount rate reflects the constant value of money without the affects of inflation. A constant dollar discount rate of seven (7) percent was used in this study, as required by the US Office of Management and Budget (OMB).

Included in the above economic feasibility calculations are all quantifiable direct economic costs attributable to the roadway project (cost of planning, designing, building, maintaining and operating the roadway) and all quantifiable economic benefits relating to efficiency (operating cost savings, value of time savings, accident cost savings). Excluded from the economic cost-benefit calculations are economic development impacts on the corridor, as well as those impacts that cannot reasonably be tabulated in monetary terms (environmental or social implications, impacts on other modes of transportation, etc.). As a result, the economic feasibility calculation is important to the beltway and non-beltway investment decision, but should not be viewed as the only criterion.

2.3.6.2 Economic Efficiency Evaluation

In the assessment of economic feasibility, a life cycle approach is used. The costs of planning, designing, building, and maintaining a new freeway-type beltway or non-beltway improvement are estimated over a 33-year period. Then, the transportation efficiency gains (or loss) over that period are estimated. Efficiency benefits are finally compared with the costs to determine economic feasibility. The assumption of constructing the facility in three years and having its full use for the next 30 years is not realistic. The preferred alternative will likely be phased in over many years and may not be completed within the next 20 years. Phased or delayed construction would improve the economic feasibility of all the alternatives, therefore the results of this analysis should be considered conservative.

Assumptions used in the benefit/cost evaluation were recommended by the study consultants and approved by the Beltway Management Committee.

Economic Costs. The cost side of the benefit/cost evaluation includes two costs: (1) the cost of constructing a beltway or the costs of improving an existing roadway, and (2) the cost of operating and maintaining a new freeway-type beltway in Lincoln or the incremental cost of operating and maintaining an improved roadway for the non-beltway alternatives. These costs are summarized for the various alternatives in **Table 2.9**.

Table 2.9

ECONOMIC COSTS (\$1,000's)

ROUTE	ALTERNATIVE	CONSTRUCTION COSTS ¹	RESIDUAL VALUE	ANNUAL ² MAINTENANCE
2	EC-1 to SC-4	\$171,578	\$78,063	\$115
3	EC-1 to SM-4	154,770	73,803	117
8	EM-1 to SC-4 (west of Magee Lake)	168,593	74,675	119
9	EM-1 to SC-4 (via north diagonal)	165,362	72,485	119
10	EM-1 to SM-4 (west of Magee Lake)	155,538	71,357	123
11	EM-1 to SM-4 (east of Magee Lake)	162,941	74,160	128
14	EM-1 to SM-4 (via north diagonal)	155,738	71,362	127
16	EF-1 to SC-4	172,886	71,487	127
17	EF-1 to SM-4 (via short diagonal)	156,996	64,876	129
	Non-Beltway Option 1	86,994	19,879	100
	Non-Beltway Option 3	91,131	15,711	122

¹ 1996 Dollars.

² Highway Statistics, U.S. Department of Transportation, Federal Highway Administration, 1995

Construction Costs. These costs include right-of-way acquisition, planning, design and construction. The construction costs of the various alternatives were estimated to range from \$87 to \$173 millions. For benefit/cost purposes only, the construction costs were assumed to be spent in 3 years. **Tables 2.10-M** (metric) and **2.10-E** (English) provide a breakdown of the beltway estimated construction costs by route designation. The beltway costs include connecting link improvements. Non-beltway costs can be found on **Table 2.11**.

Residual Value. A 33-year period (30 years of operation following 3 years of construction) was used to analyze the economic feasibility of beltway and non-beltway options. However, some components of the roadway investment can be expected to last longer than 30 years. To recognize this, portions of the cost of the beltway and non-beltway elements that will last longer than 30 years following construction are added as economic benefits at the end of the last study year. After 30 years of operation the residual values for the various options range from \$15 to \$78 million based on the useful lives of the various construction cost elements exclusive of engineering, administration and contingencies costs.

Operations and Maintenance Costs were obtained from average historical costs for various types of roadway on a per route mile or lane mile basis. Incremental annual operating and maintenance costs range from \$100 to \$129 thousand.

TABLE 2.11
NON-BELTWAY PRELIMINARY COST ESTIMATES
 1996 DOLLARS

ITEM	OPTION SET #1			OPTION SET #2			OPTION SET #3		
	QUANTITY (ENGLISH)	UNIT PRICE (ENGLISH)	AMOUNT	QUANTITY (ENGLISH)	UNIT PRICE (ENGLISH)	AMOUNT	QUANTITY (ENGLISH)	UNIT PRICE (ENGLISH)	AMOUNT
WILDERNESS PARK									
GRADE SEPARATION									
structure	15 385 sq m* (165,600 sq ft)	\$970 (\$90)	\$14,904,000	18 210 sq m** (196,000 sq ft)	\$970 (\$90)	\$17,640,000	0 sq m*** (0 sq ft)	\$970 (\$90)	\$0
embankment	123 900 cu m (162,000 cu yd)	\$2.60 (\$2)	\$324,000	185 800 cu m (243,000 cu yd)	\$2.60 (\$2)	\$486,000	0 cu m (0 cu yd)	\$2.60 (\$2)	\$0
mitigation			\$1,000,000			\$1,000,000			\$0
total			\$16,228,000			\$19,126,000			\$0
RAILROAD CROSSING									
structure	2 ea	\$2,214,000	\$4,428,000	1 ea	\$3,051,000	\$3,051,000	5 ea	\$2,214,000	\$11,070,000
embankment	1 950 sq m (21,000 sq ft)	\$970 (\$90)	\$1,890,000	2 648 sq m (28,500 sq ft)	\$970 (\$90)	\$2,565,000	1 950 sq m (21,000 sq ft)	\$970 (\$90)	\$1,890,000
total each	123 900 cu m (162,000 cu yd)	\$2.60 (\$2)	\$324,000	185 800 cu m (243,000 cu yd)	\$2.60 (\$2)	\$486,000	123 900 cu m (162,000 cu yd)	\$2.60 (\$2)	\$324,000
			\$2,214,000			\$3,051,000			\$2,214,000
STREAM CROSSING									
structure	2 ea	\$756,000	\$1,512,000	4 ea	\$1,062,000	\$4,248,000	4 ea	\$756,000	\$3,024,000
embankment	780 sq m (8,400 sq ft)	\$970 (\$90)	\$756,000	1 096 sq m (11,800 sq ft)	\$970 (\$90)	\$1,062,000	780 sq m (8,400 sq ft)	\$970 (\$90)	\$756,000
total each	0 cu m (0 cu yd)	\$2.60 (\$2)	\$0	0 cu m (0 cu yd)	\$2.60 (\$2)	\$0	0 cu m (0 cu yd)	\$2.60 (\$2)	\$0
			\$756,000			\$1,062,000			\$756,000
INTERSECTIONS, AT GRADE (major)									
PAVEMENT	19 ea	\$500,000	\$9,500,000	24 ea	\$500,000	\$12,000,000	23 ea	\$500,000	\$11,500,000
CONNECTING LINK PAVEMENT	529 850 sq m (633,700 sq yd)	\$42 (\$35)	\$22,179,500	889 379 sq m (1,063,688 sq yd)	\$42 (\$35)	\$37,229,080	693 820 sq m (829,800 sq yd)	\$42 (\$35)	\$29,043,000
PAVEMENT REMOVAL	131 901 sq m (157,752 sq yd)	\$30 (\$25)	\$3,943,800	0 sq m (0 sq yd)	\$30 (\$25)	\$0	125 038 sq m (149,544 sq yd)	\$30 (\$25)	\$3,738,600
EMBANKMENT	315 200 sq m (377,000 sq yd)	\$6 (\$5)	\$1,885,000	431 860 sq m (516,500 sq yd)	\$6 (\$5)	\$2,582,500	430 190 sq m (514,500 sq yd)	\$6 (\$5)	\$2,572,500
CULVERTS (major extensions)	337 550 cu m (441,500 cu yd)	\$2.60 (\$2)	\$883,000	643 450 cu m (841,600 cu yd)	\$2.60 (\$2)	\$1,683,200	439 240 cu m (574,500 cu yd)	\$2.60 (\$2)	\$1,149,000
	3 ea	\$100,000	\$300,000	1 ea	\$100,000	\$100,000	4 ea	\$100,000	\$400,000
SUBTOTAL			\$60,859,300			\$80,019,780			\$62,497,100
HOUSES									
RIGHT-OF-WAY	1 ea	\$200,000	\$200,000	45 ea	\$200,000	\$9,000,000	8 ea	\$200,000	\$1,600,000
ENGINEERING DESIGN	45 ha (110 ac)	\$50,000 (\$20,000)	\$2,200,000	51 ha (127 ac)	\$50,000 (\$20,000)	\$2,540,000	54 ha (133 ac)	\$50,000 (\$20,000)	\$2,660,000
CONSTRUCTION ADMINISTRATION		6%	\$3,651,558		6%	\$4,801,187		6%	\$3,749,826
CONTINGENCIES		8%	\$4,868,744		8%	\$6,401,582		8%	\$4,999,768
		25%	\$15,214,825		25%	\$20,004,945		25%	\$15,624,275
TOTAL			\$86,994,427			\$122,767,494			\$91,130,969

* Includes one railroad crossing and one stream crossing.
 ** Includes two railroad crossings and one stream crossing.
 *** 14th already at grade; no separation over Wilderness Park needed.

Economic Efficiency Benefits. Benefits and costs were determined using local data where available and national statistics when necessary. The economic benefits are those derived from increased transportation efficiency. Transportation cost savings that result from improvements to a corridor are true benefits to society as a whole. When travelers experience time savings, greater safety, or reduced vehicle operating costs, their gain is not offset by losses to other people. From an economic standpoint, these cost savings are the same as a direct increase in income by making resources available for other purposes.

The transportation efficiency benefits of a roadway improvement are of three types: travel-time savings, vehicle operating cost savings, and accident reduction savings. Transportation efficiency benefits are calculated for two vehicle types: passenger vehicles (automobiles) and commercial vehicles (trucks).

To provide consistency with the results of the travel demand model (Chapter 2, *Interim Report No. 3*, WSA, 1999), the economic efficiency benefits for each alternative were estimated for the same two analysis years, 1995 and 2020. This consistency was necessary since the results of the travel demand model are used to calculate benefits. Intermediate year benefits were interpolated between the two years and benefits beyond 2020 were extrapolated.

Travel Time Savings. One objective of the Lincoln south and east beltways project is to reduce the time required to travel around Lincoln. There are three potential ways to reduce travel time: (1) Reduce mileage to reach one's destination by offering a more direct route, (2) Increase the speed at which one can travel by providing facilities with higher design standards, (3) Reduce congestion by providing additional high capacity facilities. A methodology to take into account all three elements of time-savings was developed. For each trip with the potential to improve their trip time by using a beltway or non-beltway alternative the travel time with and without the new facility was calculated and summarized. Excess travel time due to congestion was calculated for each segment using the Highway Performance Monitoring System (HPMS) model methodology (December 1987) and data developed by FHWA (Appendix D, *Interim Report No. 3*, WSA, 1999). This methodology recognizes that excess travel time due to congestion-induced speed change cycles varies according to the level of congestion (expressed in terms of volume/capacity ratios) and varies by type of vehicle (it takes longer for a truck to resume original speed).

To include time-savings in the transportation efficiency evaluation, it was necessary to place a monetary value on time saved. In reality, the value of time varies by person and situation. For the purpose of this study, values of time based on average hourly wage rates in Nebraska and average occupancy and cargo values were developed using the FHWA methodology outlined in the Highway Economic Requirements System (HERS). These values of time are:

1. \$23.4 per on-the-clock auto hour (travel while on business);
2. \$8.64 per off-the-clock auto hour (commuter and non-business travel);
3. \$25.3 per truck hour.

Vehicle Operating Cost Savings. The costs of operating motor vehicles can be a significant portion of the total cost of transportation. Vehicle operating costs include a number of components, some that are variable costs or use related costs, and others that are fixed costs (e.g. insurance and license fees). Only use related costs -- engine oil, gasoline, maintenance, and tires -- are directly affected by an improved roadway. Vehicle operating cost, like travel time, varies with the characteristics of the trip made including trip length, running speed, and speed change cycles. For each trip with the potential to use a beltway or non-beltway alternative the vehicle operating costs with and without the new facility were calculated using the results of the travel demand model. Again, the methodology and data of the HPMS model was used. With this methodology, vehicle operating costs vary with trip length, the various speeds on different portion of the trip, and the type of vehicle. Excess vehicle operating costs due to speed change cycles are also calculated by type of vehicle.

Accident Reduction Cost Savings. Improvement in roadway safety is another reason for considering roadway improvements. Because freeways and access controlled facilities are safer than roadways of a lesser standard, Lincoln beltway and non-beltway alternatives could reduce accident potential compared to the existing roadway system. National average accident rates by type of accident (fatal, injury, property damage only) and by type of roadway facility (freeway, principal arterial, etc.) were used to calculate accident potential in the Lincoln area with and without the roadway improvements considered.

To include the impact of reducing accidents in the transportation efficiency evaluation, a monetary value was associated with each type of accident. The values used for this study are based on the "The Economic Cost of Motor Vehicle Crashes (National Roadway Traffic Safety Administration (NHTSA), 1994). They are:

1. \$2,854,000 per fatality
2. \$654,000 per seriously injured person
3. \$20,600 per other injured person
3. \$1,600 per property damage only (PDO) vehicle

Total Transportation Efficiency Benefits. Total estimated transportation efficiency benefits over the 33-year analysis period, discounted at seven percent are presented in **Table 2.12**.

It is estimated that 33 years from the beginning of construction, a beltway or non-beltway alternative would save between \$56 and \$141 million to travelers in Lincoln depending on the alternative. The alternatives can be grouped in three categories based on total efficiency benefits.

1. The highest total benefits are for alternatives that combine a close beltway with another close or mid beltway.
 - Route 2: EC-1 to SC-4
 - Route 3: EC-1 to SM-4
 - Route 8: EM-1 to SC-4 (west of Magee Lake)
 - Route 9: EM-1 to SC-4 (via north diagonal)

Table 2.12

**TOTAL EFFICIENCY BENEFITS
 OVER THE 33-YEAR PERIOD¹ (\$1,000's)
 1996 Dollars**

ROUTE	ALTERNATIVE	TRAVEL TIME SAVINGS	VEHICLE OPERATING COST SAVINGS	ACCIDENT REDUCTION SAVINGS	TOTAL EFFICIENCY BENEFITS
2	EC-1 to SC-4	\$64,229	-\$3,805	\$78,386	\$138,810
3	EC-1 to SM-4	59,984	-3,938	68,605	124,651
8	EM-1 to SC-4 (west of Magee	65,714	-872	67,833	132,675
9	EM-1 to SC-4 (via north diagonal)	68,754	1,201	70,887	140,842
10	EM-1 to SM-4 (west of Magee	59,929	-826	57,342	116,445
11	EM-1 to SM-4 (east of Magee	60,042	455	56,828	117,325
14	EM-1 to SM-4 (via north diagonal)	57,726	-600	59,042	116,169
16	EF-1 to SC-4	51,340	-3,812	54,800	102,328
17	EF-1 to SM-4 (via short diagonal)	40,287	-4,094	36,981	73,174
	Non-Beltway Option 1	51,393	-922	21,935	72,406
	Non-Beltway Option 3	39,783	-1,891	17,751	55,642

¹ Discounted at 7 percent per year.

2. The next highest total benefits are for all mid alternatives that combine with another mid alternative.
 - Route 10: EM-1 to SM-4 (west of Magee Lake)
 - Route 11: EM-1 to SM-4 (east of Magee Lake)
 - Route 14: EM-1 to SM-4 (via north diagonal)

3. The lowest total benefits are for alternatives that include the east far beltway, and the non-beltway alternatives.
 - Route 16: EF-1 to SC-4
 - Route 17: EF-1 to SM-4 (via short diagonal)
 - Non-Beltway Option 1
 - Non-Beltway Option 3

2.3.6.3 Economic Feasibility

To calculate the economic feasibility of the various beltway and non-beltway alternatives in terms of transportation efficiency, all costs and benefits in constant (1996) dollars were determined for the study period, and then discounted back to the first year of construction using a discount rate of 7 percent. The benefits were then compared with the costs using the conventional feasibility indicators discussed at the beginning of this section. **Table 2.13** presents the economic feasibility indicators for the beltway and non-beltway alternatives analyzed at this stage.

Table 2.13

**ECONOMIC FEASIBILITY INDICATORS
 TRAVEL EFFICIENCY FEASIBILITY (\$1,000's)
 1996 Dollars**

ROUTE	ALTERNATIVE	NET PRESENT VALUE ¹	INTERNAL RATE OF RETURN	BENEFIT/COST RATIO ¹
2	EC-1 to SC-4	-\$19,074	6.8	0.97
3	EC-1 to SM-4	-4,523	6.8	0.96
8	EM-1 to SC-4 (west of Magee Lake)	-8,531	6.6	0.94
9	EM-1 to SC-4 (via north diagonal)	2,247	7.1	1.02
10	EM-1 to SM-4 (west of Magee Lake)	-13,706	6.3	0.89
11	EM-1 to SM-4 (east of Magee Lake)	-19,074	6.0	0.86
14	EM-1 to SM-4 (via north diagonal)	-14,200	6.2	0.89
16	EF-1 to SC-4	-43,032	4.8	0.70
17	EF-1 to SM-4 (via short diagonal)	-58,971	3.5	0.55
	Non-Beltway Option 1	-2,715	6.8	0.96
	Non-Beltway Option 3	-23,738	4.7	0.70

¹ Discounted at 7 percent per year

The previous table illustrates the relative economic feasibility of each alternative in terms of travel efficiency. When examining these results, it is important to remember that no model (travel demand model or benefit/cost model) is completely accurate. In terms of feasibility, the alternatives can be grouped in the same three categories used previously based on total benefits alone with one exception. Non-beltway option 1 shifted toward the most feasible group because it costs about half as much as the other beltway and non-beltway alternatives.

1. The most economically feasible alternatives are those that combine a close beltway with another close or mid beltway, and non-beltway option 1.
 - Route 2: EC-1 to SC-4
 - Route 3: EC-1 to SM-4
 - Route 8: EM-1 to SC-4 (west of Magee Lake)
 - Route 9: EM-1 to SC-4 (via north diagonal)
 - Non-Beltway Option 1

Note that this group includes a beltway alternative that avoids Wilderness Park entirely (Route 3).

2. The next group of alternatives is less economically feasible; however, a change in discount rate to 6 percent or some reduction in costs could make them more feasible. This group includes the all mid alternatives.

- Route 10: EM-1 to SM-4 (west of Magee Lake)
- Route 11: EM-1 to SM-4 (east of Magee Lake)
- Route 14: EM-1 to SM-4 (via north diagonal)

None of these routes impact Wilderness Park.

3. The last group of alternatives is the least economically feasible. This group includes the east far beltway alternatives, and non-beltway option 3.

- Route 16: EF-1 to SC-4
- Route 17: EF-1 to SM-4 (via short diagonal)
- Non-Beltway Option 3

Again, one of the alternatives (Route 17) avoids impacts to Wilderness Park.

It should be pointed out that this analysis was performed using the Build Out Scenario (BOS) land use plan which is based on the approved 1994 Comprehensive Plan. Since that time, the BOS II land use plan was developed to account for revisions (amendments) to the 1994 plan (see **Section 2.4.1**). The assumptions in the BOS II scenario include large increases in beltway traffic volumes which are expected to improve most of the benefit/cost ratios to greater than 1.0 (see **Section 2.4.4**).

2.3.7 Wilderness Park Considerations

Wilderness Park was initially acquired with a \$500,000 grant from the US Department of Housing and Urban Development (HUD) in the late 1960s and early 1970s for the purpose of flood control. Consultation with HUD indicated that there are no special requirements related to use of land purchased with these types of HUD grants. No Land and Water Resources Fund (LWRF) moneys were ever used for development of Wilderness Park. Therefore, the project would not need to comply with Section 6(f). However, Section 4(f) of the 1966 Transportation Act prohibits the FHWA from approving use of land from a significant publicly owned public park, recreation area, or wildlife or waterfowl refuge, or any significant historical site unless a determination is made that: (i) there is no feasible and prudent alternative to the use of the property, and (ii) the action includes all possible planning to minimize harm to the property resulting from such use.

Anticipated Park Impacts. At the beginning of the Level III analysis, two beltway (SC-1 and SC-4) and two non-beltway alternatives (options 1 and 2) required takings for new crossings through Wilderness Park (and all would require grade separations over Salt Creek and the railroad tracks). One non-beltway alternative (option 3) also required park takings for widening the existing at-grade crossing through the park.

Determination of Feasible and Prudent. To obtain 4(f) approval, supporting information must demonstrate that there are unique problems or unusual factors involved in the use of alternatives that avoid these properties or that the cost, social, economic, and environmental impacts, or community disruption resulting from such alternatives reach extraordinary magnitudes.

Since any beltway alternative through Wilderness Park would likely have greater cost, social and economic impact, and community disruption, the primary question arose as to whether traffic need would be considered as a unique problem or unusual factor. Because the project purpose and need was to solve a traffic problem, and if the park routes better served this need (or the southern routes did not serve this need), then there would be a strong case for approval of the 4(f). Therefore, it was considered premature to throw out the park routes prior to the determining feasibility in the Level III analysis.

Based on the results of the economic feasibility study, it was shown that there are feasible alternatives that avoid impacts to Wilderness Park. If there are feasible and prudent alternatives, then routes requiring park or any other 4(f) land must be eliminated.

Future Park Expansion. Extension of Wilderness Park south to Hickman Road has been identified as a goal in the 1994 Comprehensive Plan and subsequent amendments to the plan. Therefore, by the time the south beltway is built, it may cross public park land. However, if the future park lands are concurrently planned with the proposed roadway project, they would not be considered 4(f) properties in the future. Right-of-way for the beltway will be acquired prior to or separate from any acquisition for expansion of Wilderness Park.

2.3.8 Consideration of 148th Street Alignments

At the end of the Level III analysis, the study team was requested to evaluate two additional scenarios—a beltway alternative along 148th Street and a non-beltway alternative along 148th Street. (Although an alternative along 148th Street had been included previously in the universe of alternatives, it had been eliminated during the Level II analysis along with all other alignments along section line roads due to the required frontage roads and higher level of impacts to existing rural residences along these roads).

148th Street Beltway Scenario. Under this scenario, 148th Street would be improved to expressway standards (versus freeway standards for all other beltway alternatives) to allow at-grade intersections at section line roads. Diamond type interchanges would be constructed at I-80, US 34 and N-2. Since no other direct access would be allowed, frontage roads would be required to provide access to adjacent properties. If buildings are close on both sides of 148th Street, the alignment would be shifted to take all buildings on the side which would result in the least number of structures being taken.

The benefits of this scenario would be similar to those anticipated for the east far alternative in terms of projected traffic volumes and time savings. A much smaller benefit is expected in accident savings since more dangerous at-grade intersections would still be permitted. Traffic volumes would range between 8,300 vehicles per day on the south end and 11,800 on the north end. In the vicinity of East O Street, traffic volumes would likely be between 13,000 and 14,000 vehicles per day.

One measure of the impacts of improvements in the east beltway study area has been the effect on 84th Street. Improving 148th Street to expressway standards would result in a approximate 6 percent reduction in traffic volumes along 84th Street in the vicinity of East O Street. Although the reduction in traffic on 84th Street is more dramatic south of N-2, where a reduction of 25 percent is anticipated, in comparison, improving 98th Street to non-beltway standards would result in almost a 40 percent reduction in the number of lane miles along 84th Street that are in the E/F Level of Service range.

This scenario would require taking an estimated 30 houses, including 2 historic structures; five other historic structures are located within 0.4 km (0.25 mi). In comparison, the east far alternative would require 10 houses, none of which are historic. The construction cost for the 148th Street beltway scenario was an estimated 9 percent higher than the east far alternative.

148th Street Non-Beltway Scenario. Under this scenario, 148th Street would be improved to a 4-lane non-beltway section. Direct access to 148th Street would be permitted for agricultural and residential properties on either side of the roadway. Existing cross roads would remain as intersections, but no interchange would be constructed at I-80.

When 148th Street is modeled as a non-beltway, the assumption is that the capacity of the roadway is increased from 6,000 to 28,000 vehicles per day with a speed of 60 km/h (40 mph). Since this capacity is unlikely to be reached, model results would be inaccurate. Therefore, recommended assumptions for 148th Street were to use the no-build network. Under these assumptions of a paved 2-lane rural roadway, traffic levels on 148th Street would be approximately 1,500 vehicles per day near East O Street, and would taper off to about 600 vehicles per day to the north and south.

Since this scenario has no interchange at I-80 and includes no restriction of access to adjacent properties, the potential for 148th Street to relieve traffic congestion along other major arterials is even less than with the 148th Street beltway scenario.

The 148th Street non-beltway scenario would require taking an estimated 12 houses, including 2 historic structures; five other historic structures are located within 0.4 km (0.25 mi). In comparison, the east far alternative would require 10 houses, none of which are historic. The construction cost was estimated as 12 percent lower than the east far alternative.

Comparison with Other East Alternatives. Comparison of the benefits and impacts of the 148th Street alternative with other east alternatives indicates that 148th Street is not as viable an alternative as other available alternatives. Although it will operate efficiently and effectively as a 2-lane rural roadway for many years to come, improving it to 4-lanes in either the beltway or non-beltway configuration would do little to relieve traffic congestion on other major urban arterials.

Based on these considerations, the 148th Street scenarios were not carried forward for further analysis.

2.3.9 Four Finalist Alternatives Carried Forward

The Level III analysis began with four alternative alignments in the south beltway study area, three alternative alignments in the east beltway study area, and three non-beltway alternatives. Throughout the course of the Level III evaluation, these alignments were subjected to several different types of evaluation criteria.

South Beltway. Initial task screening for the Level III analysis eliminated the closest south beltway alignment (SC-1) based on the similar traffic volumes using it and the other close beltway alignment (SC-4). SC-1, while providing benefits similar to SC-4, had a greater impact on Wilderness Park and homes within the corridor.

The south far beltway alignment (SF-1) was also eliminated after the traffic analysis based on the low volume of traffic projected to use the route and the comparable negative affects on other criteria when compared to the remaining south beltway alignments (SC-4 and SM-4).

At the conclusion of the environmental and economic analyses, SC-4 was recommended for elimination based on the impacts to Wilderness Park, a 4(f) property. The 4(f) process requires that in order for park land to be taken for the purposes of a federally funded roadway, no feasible and prudent alternatives exist. In the case of SC-4, there is a reasonable and economically prudent alternative in SM-4. For this reason SC-4 was eliminated as a possible alternative. This also eliminated from further consideration any south beltway alternative which crossed through the rural acreage subdivisions along 56th Street.

As described above, three of the four remaining beltway alternatives in the south corridor have been eliminated from further consideration, leaving SM-4 as the only remaining south beltway alignment alternative.

East Beltway. The three remaining beltway alignments in the east corridor were subjected to the entire list of Level III screening criteria. The east beltway alternative traffic volumes are not substantially impacted by distance from the existing urbanized area of Lincoln, thus the benefits from each alignment are similar. The disbenefits (disadvantages or liabilities) of each of the east beltway alternatives are varied. Each alternative has impacts in the corridor, however, the type of impacts of each alignment vary greatly. As a result all three east beltway alternatives were carried forward into the final screening. This final analysis includes refining the alignments and further evaluation of impacts on social, historic, environmental and economic resources.

Non-Beltway. Non-beltway option 2 was eliminated early in the Level III analysis based on the limited traffic benefits it provided in relation to the other two non-beltway options. With only a limited increase in benefits, option 2 would have required the acquisition of approximately 45 homes, having a detrimental socio-economic impact on the area and as such was eliminated from further analysis.

Non-beltway options 1 and 3 were eliminated after the environmental and economic analyses based on the impacts each alternative has to Wilderness Park, a 4(f) property, and the availability of other reasonable alternatives.

Four Finalist Alternatives. The remaining five end-to-end alignments were split into their four separate south and east components, and these four finalist beltway alternatives along with various connectors were carried forward for the Level IV analysis. These were SM-4, EC-1, EM-1 and EF-1 (Figure 2.9).

2.4 LEVEL IV ANALYSIS OF THE FINALIST ALTERNATIVES

In the Level IV analysis, each finalist beltway alternative was refined, providing a preliminary alignment, functional interchange design and updated traffic projections. The Level IV analysis provides a more precise assessment of the impacts and benefits than previous analyses.

2.4.1 Build Out Scenario II Land Use Plan

As described previously in Section 2.1.7, land use revisions to the 1994 *Lincoln-Lancaster County Comprehensive Plan* were modeled as the Build Out Scenario II (BOS II) land use plan (see Figures 3.1 and 3.2 in Chapter 3). The BOS II plan assumes greater population growth and an expanded urban service area beyond that included in the previously approved Build Out Scenario (BOS) (which was current at the time of the Level III analysis). The planned increase in population growth and physical expansion of the City has a direct impact on the projected traffic volumes for all beltway scenarios. In addition to greater population densities within the Lincoln metropolitan area, roadways carrying traffic external to the metropolitan area are also planned to see higher growth than that anticipated in the BOS model. For the purposes of this study, it was assumed that the BOS II land use plan would build out with a 25 to 30 year period. The external growth estimates, provided by the NDOR, reflect conditions that will likely exist 30 years into the future. Thus, the BOS II land use represents a 25 to 30 year planning horizon.

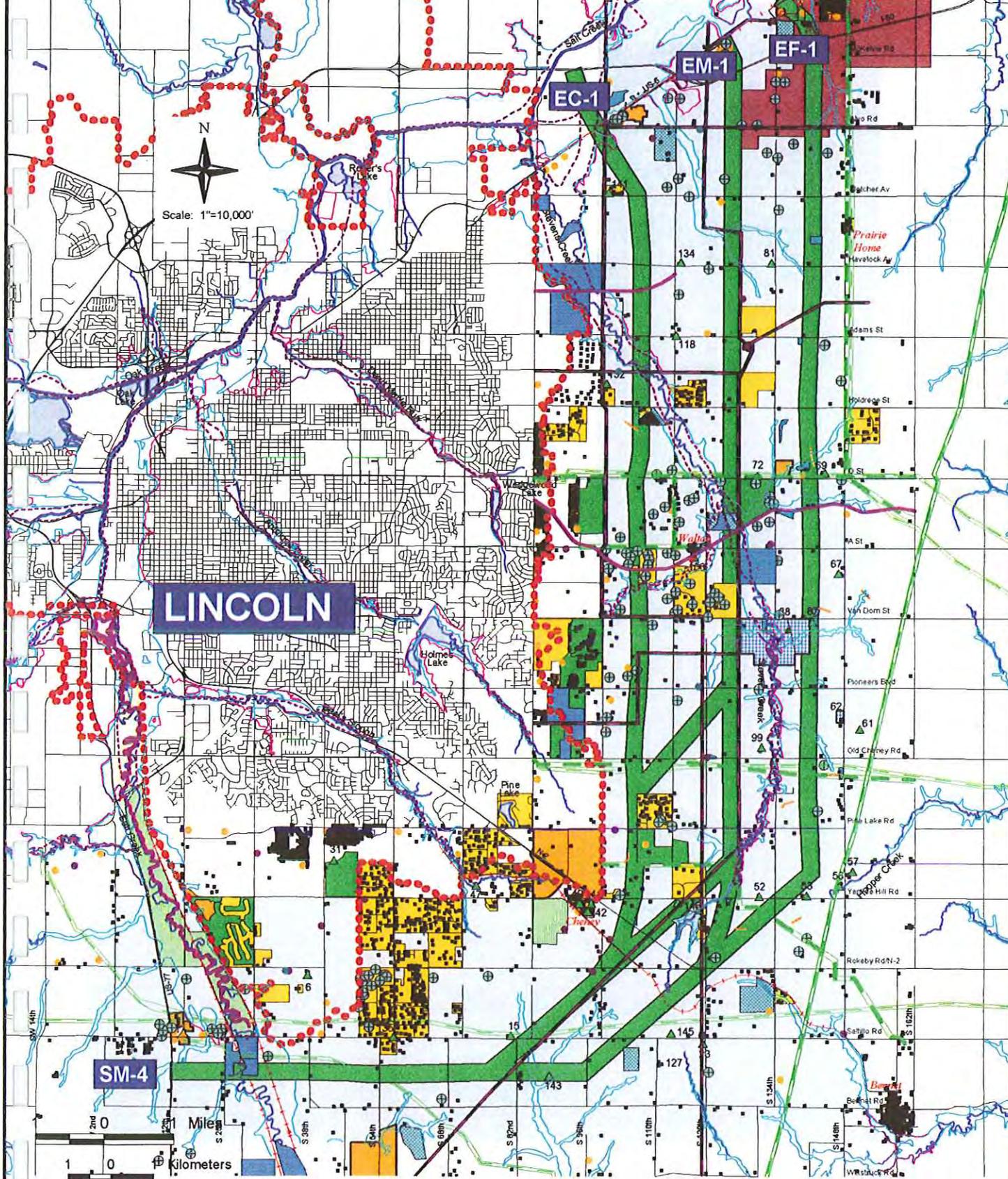
It should be noted that the current plan forecasts that about two-thirds of the south beltway study area and most portions of the east beltway study area will remain undeveloped within the 25 year time frame. There are no assumptions of expansion into the Stevens Creek basin which is currently being studied for planning purposes. However, if the result of the Stevens Creek Basin Study Initiative is to recommend of expansion of the urban service area into the watershed, traffic volumes on the beltway alternatives would be even greater.

2.4.2 Comprehensive Plan Street Network

Since initiation of the beltway study, the Lincoln-Lancaster Planning Department also updated the future roadway network to include additional street improvements. Most relevant to the beltway traffic were the improvements and recommendations found in the Southeast Fringe Roadways Study, South and East Fringe Roadways Study, East O Street Project, and Antelope Valley MIS. These improvements were included in the updated network using the most recent information available at the time. Figure 2.10 is an illustration of the improvements identified in the comprehensive plan and included in the future transportation network.

2.4.3 Traffic Projections

New traffic projections were developed for each of the beltway scenarios using the revised land use assumptions and future roadway network. Figures 2.11 to 2.13 illustrate the projected traffic volumes for each of the beltway alternatives. The total vehicle miles of travel expected for each of the end-to-end beltways is as follows:



Scale: 1"=10,000'

LINCOLN

EXISTING FEATURES

- Residential Structures
- Residential/Subdivisions
- Public Utilities
- Public Utilities
- Commercial/Industrial
- Commercial/Industrial
- Towns
- Other Constraints
- Cemeteries
- Golf Courses
- Registered Wells
- ~ Streams
- ~ 100 Year Flood
- ~ Floodway
- ~ 500 Year Flood
- ~ Dam Sites
- Parks
- Native Prairie
- Lakes
- Wetland Protection
- Wetlands
- Surface Water Permits
- ~ Overhead Power Lines
- ~ Natural Gas Lines
- ~ Railroads
- ~ Trails
- Service Limits
- Super Fund Sites
- NRHP Sites
- ▲ NRHP Eligible



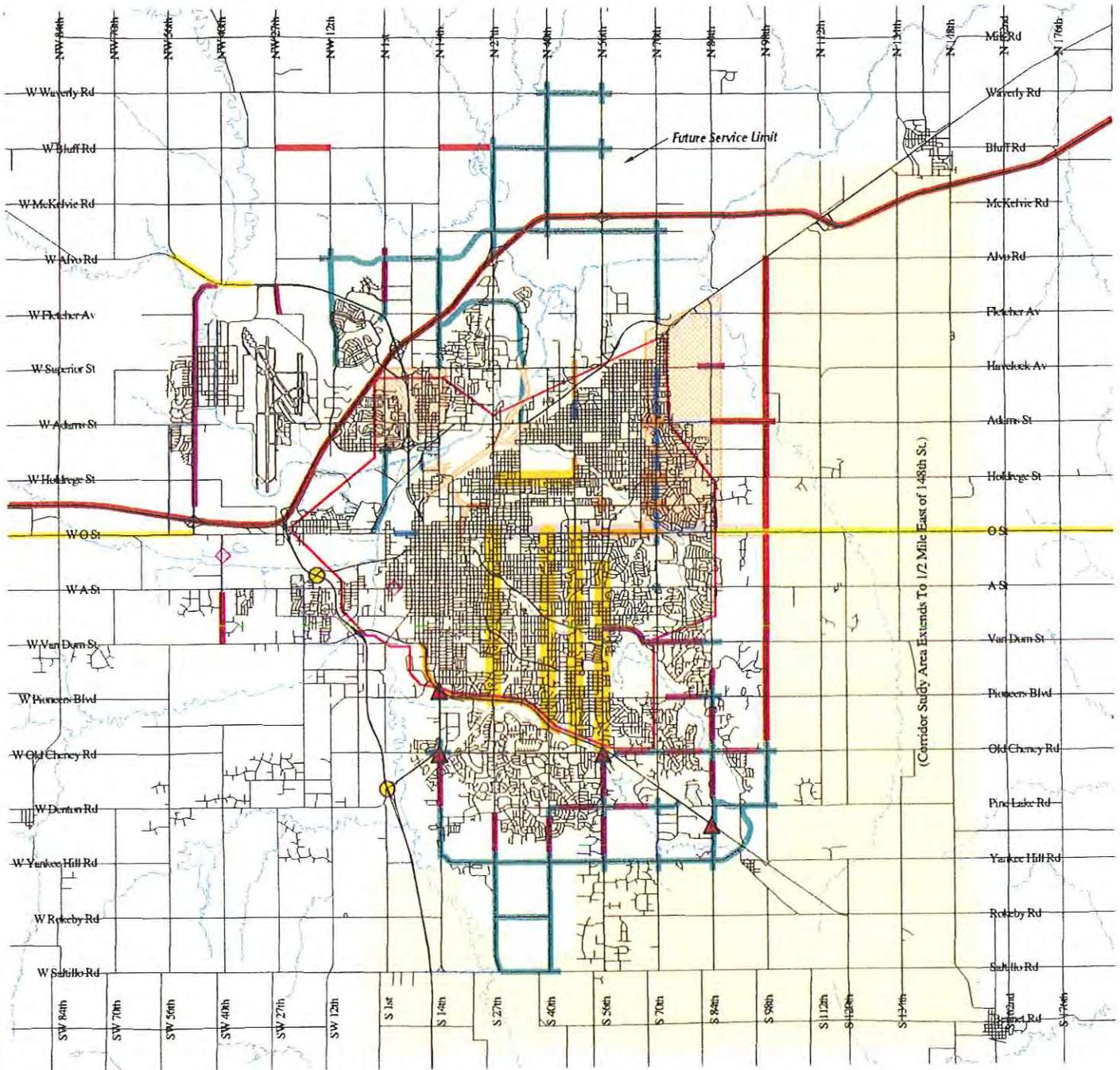
**LINCOLN SOUTH AND EAST BELTWAYS
ENVIRONMENTAL IMPACT STATEMENT**

Finalist Beltway Alternatives

May 2nd, 2002

Figure 2.9

FIGURE 2.10 IMPROVEMENTS FOR FUTURE ROAD NETWORK 1 - 25 YEAR PROGRAM



(Corridor Study Area Extends To 1/2 Mile South Of Bennet Rd.)

LEGEND

- | | | | | | | | |
|--|--|--|--|--|------------------------------------|--|---|
| | (K) Six Through Lanes, 140 ft. ROW | | Interchange | | R R Overpass | | Intersection Study |
| | (J) Four Lane Divided Highway, 200 Ft. ROW | | (C) Four Through Lanes, Painted Left Turn Lane, 80 Ft. ROW | | (B) Four Through Lanes, 80 Ft. ROW | | 6 Lane Interstate Highway |
| | (D/F) Four Through Lanes, Left Turn Lane, Raised Medians, 100 Ft. ROW | | Built Environment | | High Impact Corridor Study Areas | | South And East Beltway Corridor Study Area (Extends South to 1/2 Mi South Of Bennet Rd. and East to 1/2 Mi East of 148th St.) |
| | (E) Two Through Lanes, Painted Left Turn Lane, 100 Ft. ROW | | Antelope Valley Facility: 4 Lane Roadway, with 6 Lane Elevated Sections (See Text) | | East 'O' Street Study Area | | Capacity Enhancement Study Areas |
| | (D+) Four Through Lanes, Two Left/One Right Turn Lanes, Raised Median, 120 Ft. ROW | | Needs Analysis Study Areas | | | | |
| | (G/H) Rural Two Through Lanes, Painted Left Turn Lane, 100 Ft. Row | | | | | | |



- 763 000 vehicle kilometers (474,000 vehicle miles) for EC -1/SM-4;
- 721 000 vehicle kilometers (448,000 vehicle miles) for EM-1/SM-4; and
- 697 000 vehicle kilometers (433,000 vehicle miles) for EF-1/SM-4.

These traffic volumes are substantially higher, especially on the south beltway, than those identified during the Level III analysis. The reason for the higher volume can be attributed directly to the increased population projections and revised land use plan that shows further development in the south fringe of the metropolitan area. In addition to the change in land use, the updated travel demand model more accurately portrays the time savings of freeway facilities versus that of arterial streets.

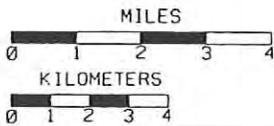
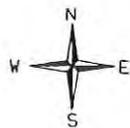
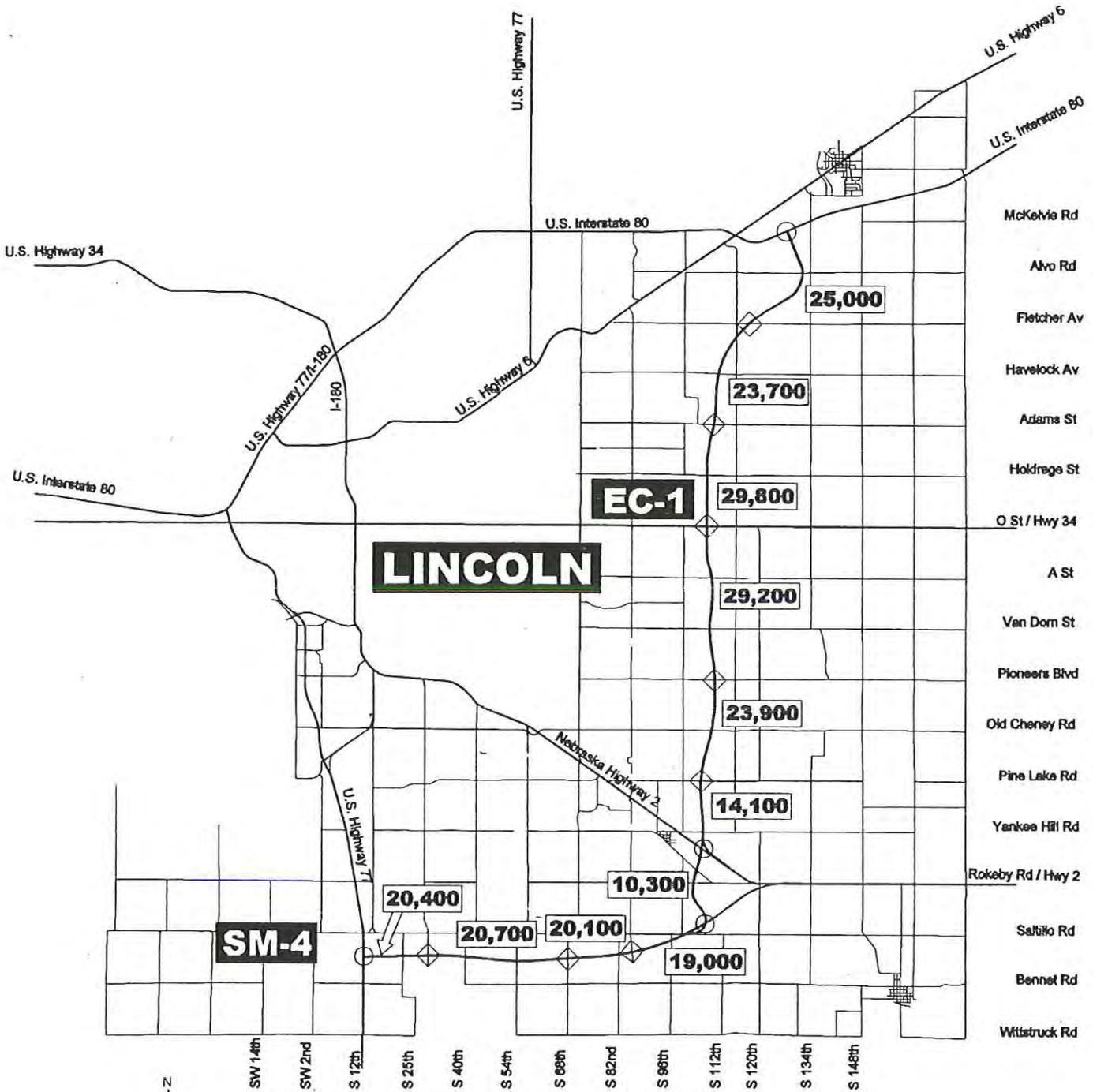
The additional traffic on the proposed beltways shows an even greater impact on the arterial street system. **Table 2.14** is a list of the effect of each beltway on key arterial streets. The streets most affected by the beltway are N-2, 84th Street, Yankee Hill Road, and US 6. These are the streets that show the greatest congestion reduction with the beltway system. **Figure 2.14** shows the impact of the beltway alternatives on four example roadway segments. Construction of the beltway would permit US 6 and N-2 to operate at an acceptable level of service as four-lane facilities through the 25 to 30 year planning horizon. Yankee Hill Road could remain a two-lane roadway with improvements for the same period. Without the beltway, these roadways would need to be constructed to six-lanes and four-lanes respectively in the future. Currently, the City's 20-Year Capitol Improvement Program shows Yankee Hill Road being widened to 4-lanes and N-2 widened to 6-lanes between 14th Street and Van Dorn Street.

2.4.4 Measures of Effectiveness

Two comparisons were made to further evaluate the remaining beltway alternatives. One compares the BOS traffic projections with BOS II. The other compares each beltway alternative with the no build alternative using the BOS II projections. Two primary measures of effectiveness were evaluated:

Vehicle Hours Traveled (VHT). This statistic provides a measure of the network wide travel time expected for each of the alternatives for a typical day in the future. By comparing the alternatives with the no build base condition, it is possible to predict the daily time savings associated with each alternative. It not only measures time savings for people who use the beltway, but also time savings for people on alternative routes that are less congested due to a shift in traffic to the beltways. The greater the time savings the more beneficial the improvement.

Vehicle Miles Traveled (VMT). VMT is a measure of the network wide total travel for a typical day in the future. While this statistic is considered positive if travel is reduced, it many times can show that travel will increase with an improvement due to the desire by some motorists to use the new facility because of faster trip times, even though the trip length may be greater.



LEGEND

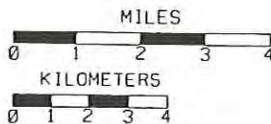
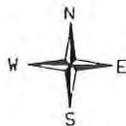
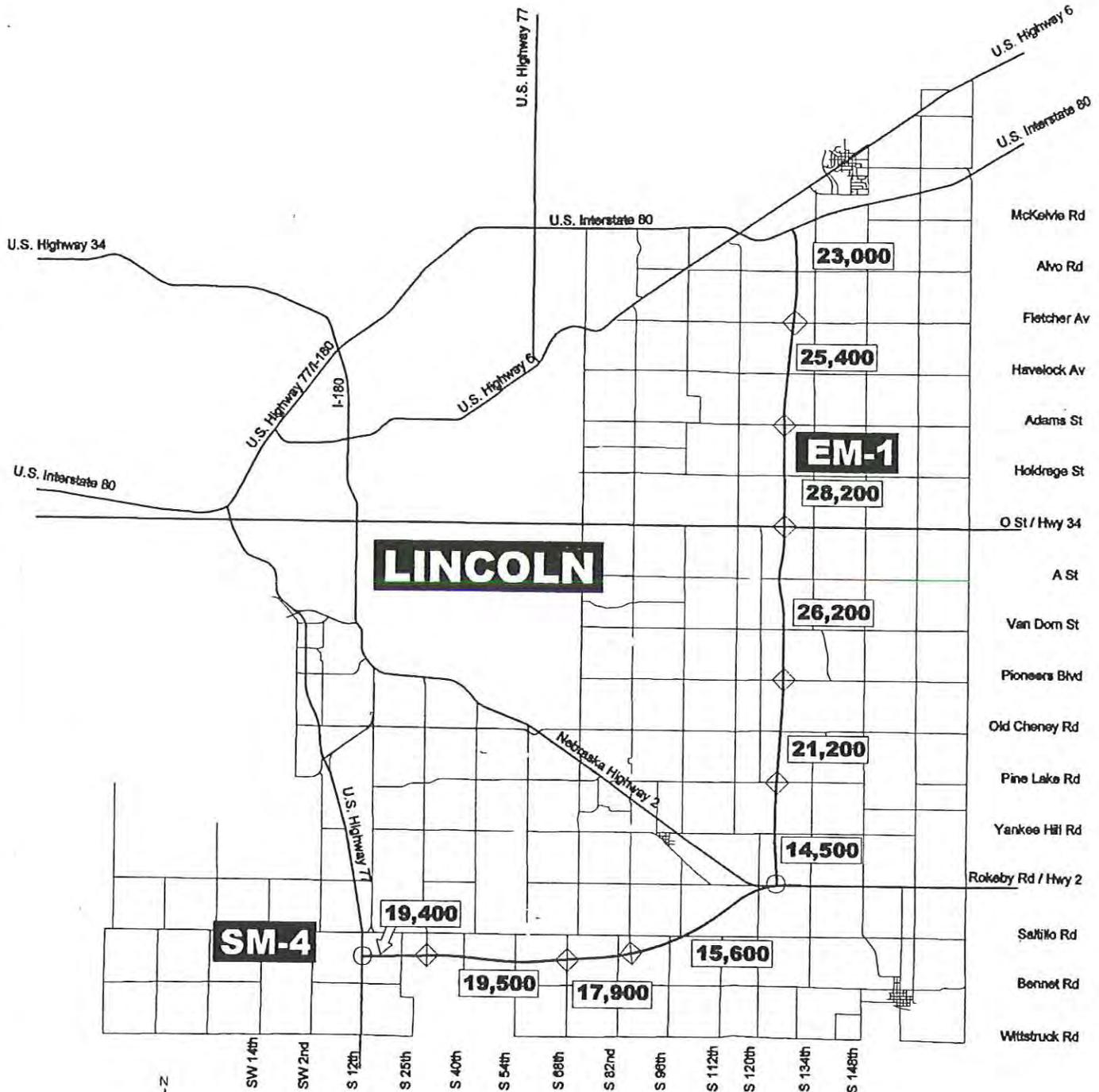
- DIRECTIONAL INTERCHANGE
- ◇ DIAMOND INTERCHANGE
- XXXXX VEHICLES PER DAY



LINCOLN SOUTH AND EAST BELTWAYS ENVIRONMENTAL IMPACT STATEMENT

EC-1 / SM-4 TRAFFIC VOLUMES

Figure 2.11



LEGEND

- DIRECTIONAL INTERCHANGE
- ◇ DIAMOND INTERCHANGE
- XXXXX VEHICLES PER DAY

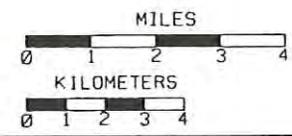
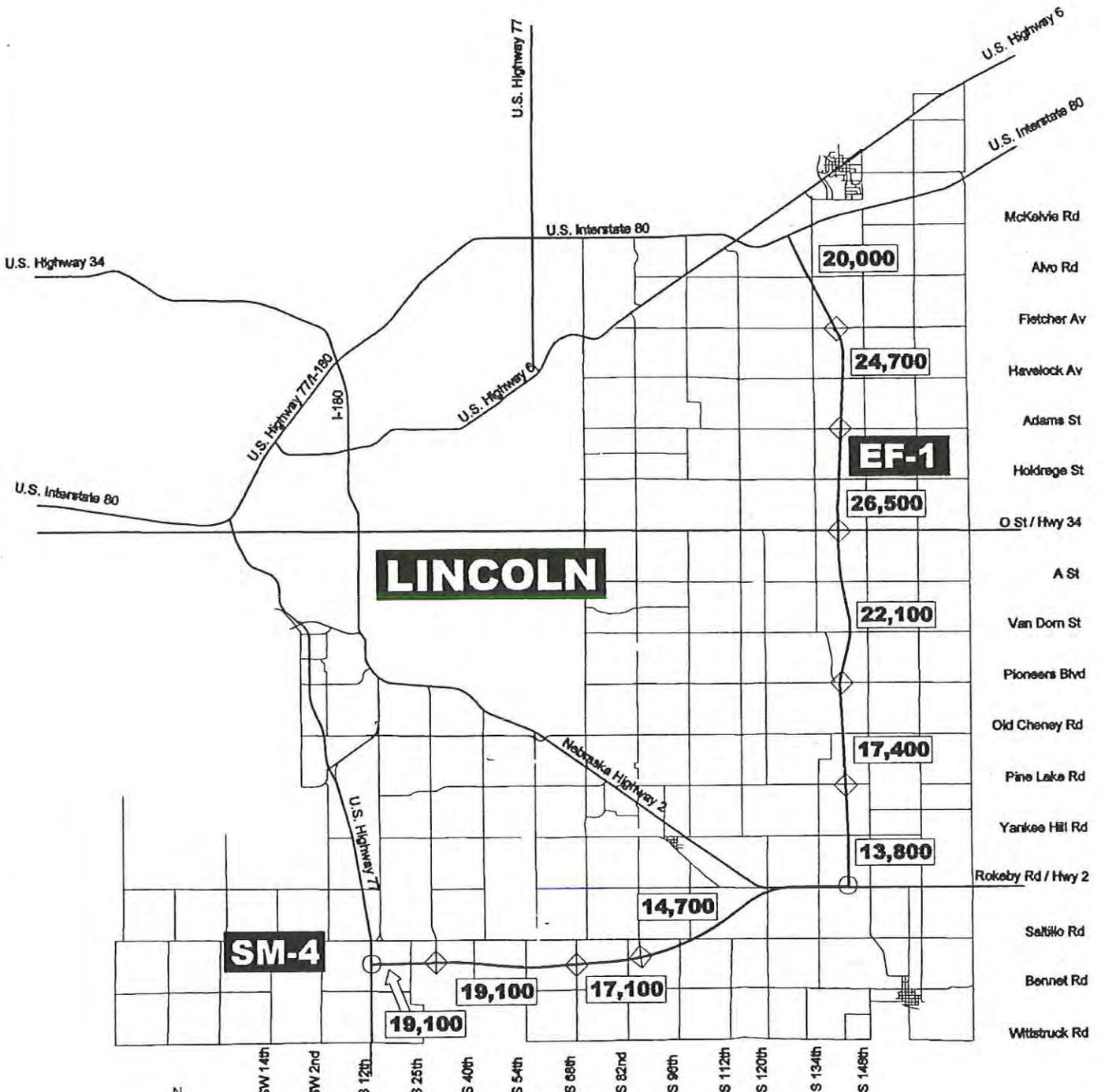


2.53

**LINCOLN SOUTH AND EAST BELTWAYS
ENVIRONMENTAL IMPACT STATEMENT**

**EM-1 / SM-4
TRAFFIC VOLUMES**

Figure 2.12



LEGEND

- DIRECTIONAL INTERCHANGE
- ◇ DIAMOND INTERCHANGE
- XXXXX VEHICLES PER DAY



2.54

**LINCOLN SOUTH AND EAST BELTWAYS
ENVIRONMENTAL IMPACT STATEMENT**

**EF-1 / SM-4
TRAFFIC VOLUMES**

Figure 2.13

**Table 2.14
EFFECT OF BELTWAY
ON KEY ARTERIAL STREETS
(With BOS II LAND USE)**

STREET SEGMENT	CLOSE			MIDDLE			FAR		
	VPD	VS. NO BUILD VPD	CHANGE %	VPD	VS. NO BUILD VPD	CHANGE %	VPD	VS. NO BUILD VPD	CHANGE %
South Beltway Between:									
Hwy 77 & 27th	20,400	N/A	N/A	19,400	N/A	N/A	19,100	N/A	N/A
27th & 56th	20,700	N/A	N/A	19,500	N/A	N/A	19,100	N/A	N/A
56th & 84th	20,100	N/A	N/A	18,000	N/A	N/A	17,100	N/A	N/A
84th & Hwy 2	19,000	N/A	N/A	15,600	N/A	N/A	14,700	N/A	N/A
East Beltway Between:									
I-80 & Fletcher	25,000	N/A	N/A	23,000	N/A	N/A	20,000	N/A	N/A
Fletcher & Adams	23,700	N/A	N/A	25,400	N/A	N/A	24,700	N/A	N/A
Adams & 'O' St.	29,800	N/A	N/A	28,300	N/A	N/A	26,500	N/A	N/A
'O' St. & Van Dorn	29,200	N/A	N/A	26,200	N/A	N/A	22,100	N/A	N/A
Van Dorn & Old Cheney	23,900	N/A	N/A	21,200	N/A	N/A	17,400	N/A	N/A
Old Cheney & Hwy 2	14,100	N/A	N/A	14,500	N/A	N/A	13,800	N/A	N/A
US 77 Between:									
Saltillo & Old Cheney	24,300	4,000	20%	24,200	3,900	19%	24,400	4,100	20%
Old Cheney & Van Dorn	29,900	3,400	13%	30,000	3,500	13%	29,700	3,200	12%
Van Dorn & I-80	35,600	3,000	9%	36,000	3,400	10%	35,000	2,400	7%
Hwy 2 Between:									
84th & 112th	16,200	-7,100	-30%	15,100	-8,200	-35%	15,700	-7,600	-33%
56th & 84th	25,100	-6,000	-19%	25,800	-5,300	-17%	25,800	-5,300	-17%
27th & 56th	31,200	-5,200	-14%	32,000	-4,400	-12%	31,800	-4,600	-13%
27th & Van Dorn	53,400	4,700	10%	53,800	5,100	-10%	55,000	6,300	13%
US 34/ 'O' Street Between:									
98th & 84th	27,600	5,800	27%	21,800	0	0%	22,200	400	2%
84th & 56th	39,200	600	2%	38,700	100	0%	39,000	400	1%
56th & 40th	40,700	0	0%	41,100	400	1%	41,000	300	1%
40th & 27th	42,200	-200	0%	42,400	0	0%	42,000	-400	-1%
27th & 10th	25,700	0	0%	25,000	-700	-3%	26,200	500	2%
US 6 Between:									
I-80 & 84th	20,900	-11,500	-35%	23,200	-9,200	-28%	25,400	-7,000	-22%
84th & 56th	22,900	-2,100	-8%	23,700	-1,300	-5%	24,300	-700	-3%
56th & 33rd	31,900	-400	-1%	32,000	-300	-1%	31,300	-1,000	-3%
33rd & 27th	32,900	-300	-1%	35,200	2,000	6%	33,000	-200	-1%
27th & 14th	32,200	-700	-2%	33,100	200	1%	32,300	-600	-2%
I-80 Between:									
Hwy 77 S & Cornhusker	51,800	-1,800	-3%	52,400	-1,200	-2%	53,000	-600	-1%
Cornhusker & I-180	43,400	-1,400	-3%	44,000	-800	-2%	44,000	-800	-2%
I-180 & 27th	48,100	-1,900	-4%	49,500	-500	-1%	49,400	-600	-1%
27th & 56th	44,200	-1,900	-4%	45,700	-400	-1%	45,300	-800	-2%
56th & Hwy 6	47,600	-3,800	-7%	46,900	-4,500	-9%	49,000	-2,400	-5%

Table 2.14 (cont'd)
EFFECT OF BELTWAY
ON KEY ARTERIAL STREETS

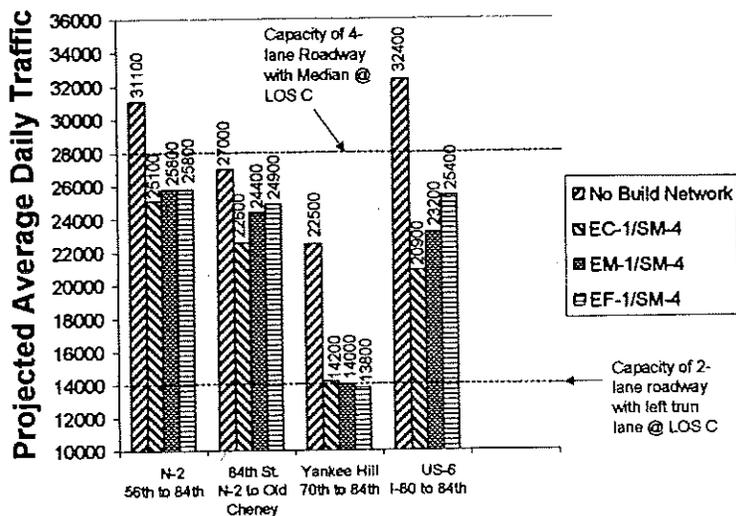
STREET SEGMENT	CLOSE				MIDDLE			FAR		
	2030 NO BUILD VPD	VPD	VS. NO BUILD VPD	CHANGE %	VPD	VS. NO BUILD VPD	CHANGE %	VPD	VS. NO BUILD VPD	CHANGE %
9th/10th Streets Between:										
'O' St. & Van Dorn	51,500	51,100	-400	-1%	50,800	-700	-1%	51,600	100	0%
27th Street Between:										
'O' St. & Normal	30,500	31,000	500	2%	31,300	800	3%	30,900	400	1%
Normal & South	25,000	25,900	900	4%	25,400	400	2%	25,100	100	0%
South & Hwy 2	19,500	19,300	-200	-1%	19,800	300	2%	18,900	-600	-3%
Hwy 2 & Old Cheney	28,100	26,700	-1,400	-5%	27,000	-1,100	-4%	26,500	-1,600	-6%
Old Cheney & Pine Lake	26,200	24,800	-1,400	-5%	25,000	-1,200	-5%	25,200	-1,000	-4%
Pine Lake & Yankee Hill	17,600	17,000	-600	-3%	17,200	-400	-2%	17,100	-500	-3%
Yankee Hill & Rokeyby	13,800	13,400	-400	-3%	13,500	-300	-2%	13,600	-200	-1%
Rokeyby & Saltillo	4,600	5,300	700	15%	5,300	700	15%	5,300	700	15%
56th Street Between:										
'O' St. & Cotner*	32,800	31,200	-1,600	-5%	32,600	-200	-1%	33,100	300	1%
Cotner & 'A' St.	20,400	19,100	-1,300	-6%	19,900	-500	-2%	20,800	400	2%
'A' St. & Normal	19,200	18,100	-1,100	-6%	18,800	-400	-2%	19,900	700	4%
Normal & Pioneer	23,000	22,000	-1,000	-4%	22,500	-500	-2%	23,600	600	3%
Pioneer & Hwy 2	27,400	26,800	-600	-2%	22,700	-4,700	-17%	23,600	-3,800	-14%
Hwy 2 & Pine Lake	28,600	27,900	-700	-2%	28,200	-400	-1%	28,200	-400	-1%
Pine Lake & Yankee Hill	10,300	10,100	-200	-2%	10,400	100	1%	10,400	100	1%
Yankee Hill & Saltillo	10,100	5,200	-4,900	-49%	5,500	-4,600	-46%	5,600	-4,500	-45%
70th Street Between:										
Hwy 6 & Adams	18,600	17,000	-1,600	-9%	17,600	-1,000	-5%	17,900	-700	-4%
Adams & 'O' St.	25,300	23,200	-2,100	-8%	23,500	-1,800	-7%	24,300	-1,000	-4%
'O' St. & Van Dorn	33,300	31,200	-2,100	-6%	31,900	-1,400	-4%	32,400	-900	-3%
Van Dorn & Hwy 2	27,900	24,600	-3,300	-12%	25,400	-2,500	-9%	26,100	-1,800	-6%
Hwy 2 & Yankee Hill	11,300	9,400	-1,900	-17%	10,100	-1,200	-11%	10,400	-900	-8%
Yankee Hill & Saltillo	4,100	2,400	-1,700	-41%	2,800	-1,300	-32%	3,100	-1,000	-24%
84th Street Between:										
Hwy 6 & Adams	22,100	17,700	-4,400	-20%	17,200	-4,900	-22%	18,200	-3,900	-18%
Adams & 'O' St.	33,100	30,700	-2,400	-7%	31,200	-1,900	-6%	31,200	-1,900	-6%
'O' St. & Van Dorn	27,900	26,600	-1,300	-5%	27,100	-800	-3%	26,900	-1,000	-4%
Van Dorn & Old Cheney	32,700	30,200	-2,500	-8%	31,200	-1,500	-5%	31,200	-1,500	-5%
Old Cheney & Hwy 2	27,000	22,600	-4,400	-16%	24,400	-2,600	-10%	24,900	-2,100	-8%
Hwy 2 & Yankee Hill	12,700	7,700	-5,000	-39%	8,100	-4,600	-36%	8,100	-4,600	-36%
Yankee Hill & Rokeyby	40	700	660	1650%	1,700	1,660	4150%	2,000	1,960	4900%
Rokeyby & Saltillo	10	600	590	5900%	1,700	1,690	16900%	1,900	1,890	18900%
148th Street Between:										
Hwy 6 & Fletcher	3,600	1,000	-2,600	-72%	700	-2,900	-81%	1,500	-2,100	-58%
Fletcher & Adams	5,700	3,100	-2,600	-46%	1,300	-4,400	-77%	430	-5,270	-92%
Adams & 'O' St.	7,000	3,700	-3,300	-47%	2,000	-5,000	-71%	1,100	-5,900	-84%
'O' St. & Pioneers	6,500	4,500	-2,000	-31%	700	-5,800	-89%	380	-6,120	-94%
Pioneers & Pine Lake	6,100	3,700	-2,400	-39%	430	-5,670	-93%	400	-5,700	-93%
Pine Lake & Hwy 2	4,800	3,500	-1,300	-27%	60	-4,740	-99%	80	-4,720	-98%

*includes one-way volumes on Cotner & 56th St.

Table 2.14 (cont'd)
EFFECT OF BELTWAY
ON KEY ARTERIAL STREETS

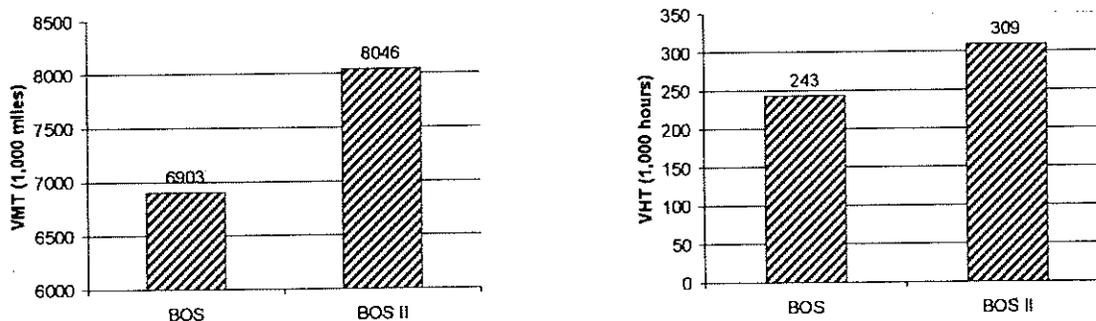
STREET SEGMENT	2030 NO BUILD VPD	CLOSE			MIDDLE			FAR		
		VPD	VS. NO BUILD VPD	CHANGE %	VPD	VS. NO BUILD VPD	CHANGE %	VPD	VS. NO BUILD VPD	CHANGE %
Fletcher Avenue Between:										
98th & Hwy 6	4,500	7,000	2,500	56%	8,700	4,200	93%	7,200	2,700	60%
Adams Street Between:										
98th & 84th	10,000	13,100	3,100	31%	11,200	1,200	12%	10,700	700	7%
84th & 56th	12,300	12,100	-200	-2%	12,100	-200	-2%	12,100	-200	-2%
Van Dorn Between:										
98th & 84th	4,900	4,300	-600	-12%	4,700	-200	-4%	4,800	-100	-2%
84th & 56th	12,900	12,700	-200	-2%	12,600	-300	-2%	12,500	-400	-3%
56th & 40th	10,800	10,500	-300	-3%	10,200	-600	-6%	11,200	400	4%
Hwy 2 & Hwy 77	23,100	21,400	-1,700	-7%	20,800	-2,300	-10%	20,300	-2,800	-12%
Old Cheney Between:										
98th & 84th	5,000	4,000	-1,000	-20%	4,400	-600	-12%	4,500	-500	-10%
84th & Hwy 2	21,300	21,700	400	2%	21,400	100	0%	21,500	200	1%
Pine Lake Rd Between:										
Hwy 2 & 70th	7,900	8,900	1,000	13%	8,400	500	6%	8,100	200	3%
70th & 56th	20,300	19,600	-700	-3%	19,200	-1,100	-5%	19,100	-1,200	-6%
56th & 27th	27,300	26,100	-1,200	-4%	26,200	-1,100	-4%	26,100	-1,200	-4%
27th & 14th	15,400	15,100	-300	-2%	15,100	-300	-2%	15,200	-200	-1%
Yankee Hill Between:										
98th & 84th	12,300	7,800	-4,500	-37%	8,100	-4,200	-34%	8,000	-4,300	-35%
84th & 70th	22,500	14,200	-8,300	-37%	14,000	-8,500	-38%	13,800	-8,700	-39%
70th & 56th	24,700	17,000	-7,700	-31%	16,900	-7,800	-32%	16,700	-8,000	-32%
56th & 27th	26,600	22,100	-4,500	-17%	22,100	-4,500	-17%	21,900	-4,700	-18%
27th & 14th	22,000	19,200	-2,800	-13%	19,500	-2,500	-11%	19,500	-2,500	-11%
Saltillo Between:										
98th & 84th	300	70	-230	-77%	130	-170	-57%	90	-210	-70%
84th & 70th	430	30	-400	-93%	50	-380	-88%	20	-410	-95%
70th & 56th	4,500	2,900	-1,600	-36%	3,100	-1,400	-31%	3,200	-1,300	-29%
56th & 27th	7,500	3,000	-4,500	-60%	3,200	-4,300	-57%	3,200	-4,300	-57%
27th & Hwy 77	7,800	4,300	-3,500	-45%	4,300	-3,500	-45%	4,200	-3,600	-46%

**Figure 2.14
EFFECT OF BELTWAY ON
EXAMPLE ROADWAY SEGMENTS**



Source: Lincoln-Lancaster County Planning Department

**Figure 2.15
COMPARISON OF BOS AND BOSII MODELS
FOR VEHICLE MILES TRAVELED AND
VEHICLE HOURS TRAVELED
(No Build Network)**



**LINCOLN SOUTH AND EAST BELTWAYS
ENVIRONMENTAL IMPACT STATEMENT**

Figure 2.14

Figure 2.15

BOS to BOS II Comparison. Figure 2.15 illustrates the comparison between the BOS and BOS II model outputs for VMT and VHT for the respective network without construction of a beltway. As expected, both statistics show an increase in the BOS II over the BOS land use and network. This is to be expected because of the greater development and higher population in the BOS II land use scenario. The increase is approximately 16 percent for VMT and 27 percent for VHT.

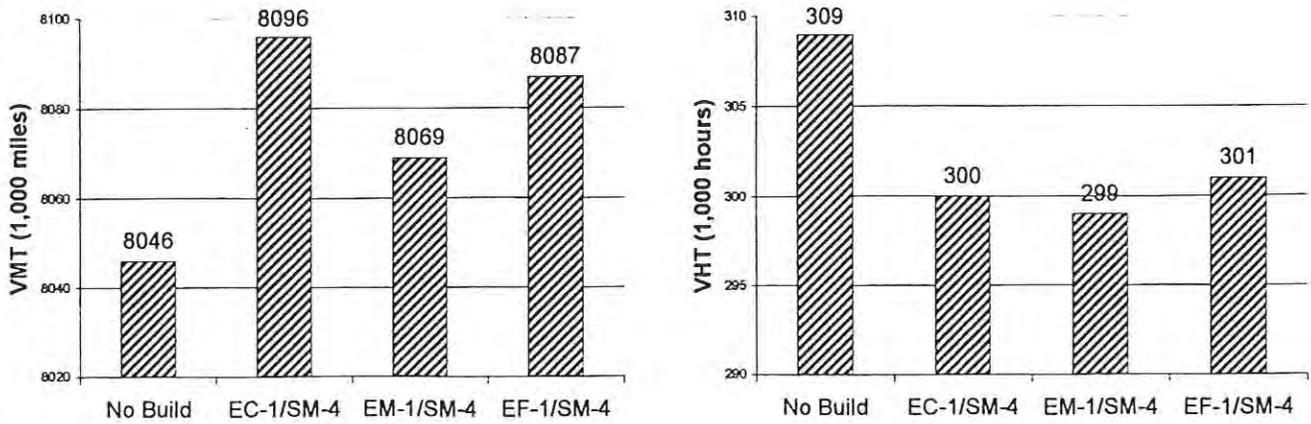
Beltway Alternative Comparison. A comparison of the beltway alternatives to the no build base condition using the BOS II land use and future network is presented in Figures 2.16 and 2.17. Figure 2.16 shows the VMT and VHT for each alternative. Figure 2.17 illustrates the difference in VHT of each alternative as compared to the no build beltway alternative. Figure 2.17 also compares the projected time savings for each alternative using the BOS and BOS II travel demand models. These statistics show that there is a considerable improvement in projected vehicle hours traveled with any of the beltway alternatives as compared to the no build alternative. The differences between the beltway alternatives are minimal. However, it is interesting that the expected time savings with EM-1 is slightly better than EC-1 with the BOS II model. The reverse relationship occurred with the BOS model.

2.4.5 Cost Effectiveness Analysis

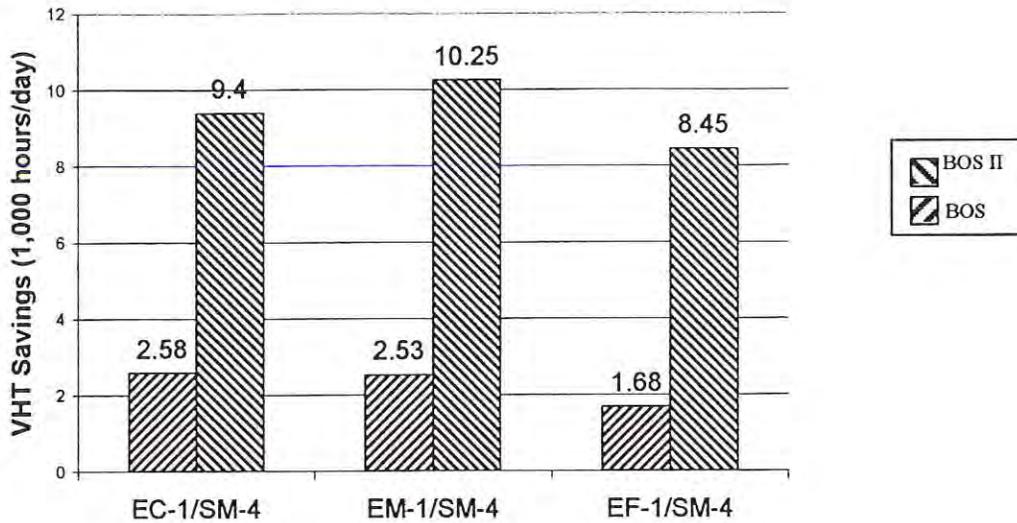
In Section 2.3.6, a detailed discussion of cost-effectiveness and economic efficiency was conducted on seven candidate beltway alternatives and two non-beltway alternatives. This analysis was done using the BOS travel demand model which, as stated earlier, showed less traffic using the beltways and a lower reduction in VHT (time savings) than the updated BOS II model. Despite the fact that traffic volumes were projected to be lower, the beltway alternative was shown to be generally cost-effective with the east-close and east-mid alternatives having a benefit-cost ratio approaching 1.0. The BOS II model show substantially better statistics in terms of time savings and therefore, it is anticipated that further economic analysis would show even more convincingly that constructing EC-1 or EM-1 is cost-effective.

An analysis of the time savings with the BOS II model comparing the end-to-end beltway alternatives and no-build alternatives indicates a relatively quick payoff of the investment. Assuming an average time value of \$14.15 per hour, construction costs and residual values identified in Section 2.3.6.2, and a 7 percent discount rate, the investment to construct the end-to-end beltway would be paid off in time savings alone in 14 years for SM-4/EC-1, 13 for SM-4/EM-1, and 19 for SM-4/EF-1. This assumes the reduction in VHT over the analysis period is consistent with estimates from the BOS II model summarized in Figure 2.17. It also assumes straight line growth in time savings from 0 hours at the beginning of Year 1 to over 43,500,000 hours per year in Year 20 after construction. This is unrealistic since a large number of motorists will begin using the beltways immediately after construction. Therefore, the actual payback period could be much sooner. Figure 2.18 compares each alternative in terms of the estimated number of years to pay off the investment. Based on payoff periods of 13 to 19 years, all three end-to-end beltway alternatives for all the east alignments are considered to have a positive benefit-cost ratio and are economically feasible; therefore, no additional benefit-cost analyses were conducted. These calculations are based on extremely conservative assumptions and include no savings benefits related to the reduction in accidents.

**Figure 2.16
COMPARISON OF BELTWAY ALTERNATIVES
FOR VEHICLE MILES TRAVELED AND
VEHICLE HOURS TRAVELED
(BOS II Model)**



**Figure 2.17
COMPARISON OF BOS¹ AND BOS II² MODELS
FOR REDUCTION IN VEHICLE HOURS TRAVELED
(TIME SAVINGS) FOR BELTWAY ALTERNATIVES
Beltway Alternatives Compared to No Build**



¹ VHT values for BOS obtained from South & East Beltways Interim Report Number 3

² VHT values for BOS II based on Level IV Analysis

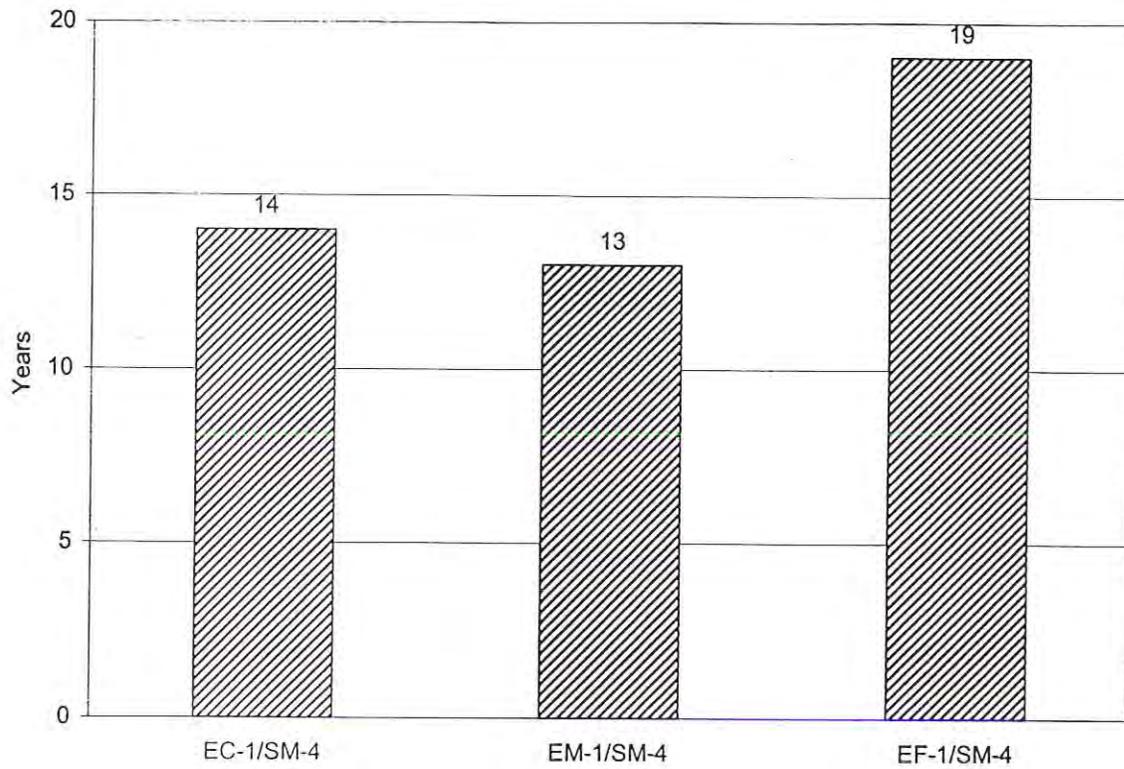


**LINCOLN SOUTH AND EAST BELTWAYS
ENVIRONMENTAL IMPACT STATEMENT**

Figure 2.16

Figure 2.17

Figure 2.18
PAY OFF PERIOD FOR END TO END BELTWAY ALTERNATIVES
BOS II TRAVEL DEMAND MODEL



LINCOLN SOUTH AND EAST BELTWAYS
ENVIRONMENTAL IMPACT STATEMENT

Figure 2.18

2.4.6 Traffic Engineering Analysis

Traffic engineering analyses are an integral part of the planning process for any transportation facility, these analyses generally include consideration of both supply and demand. The south and east beltways study included preliminary traffic analyses that evaluated key components of the proposed beltway project including basic number of lanes, connecting link improvements and interchange design.

2.4.6.1 Capacity and Level of Service

In planning studies, the demand component of the traffic analysis includes the use of traffic projections based on the adjacent roadway network and land uses in the corridor. Roadway capacity is a measure of the supply for a transportation facility and is a function of many factors, including geometric features, access control and facility type. For purposes of the beltway study, the capacity for many types of facilities was obtained from the Lincoln-Lancaster County Planning Department. These values for capacity are based on the conditions present in the Lincoln area as indicated by the transportation model for the City.

Level of Service is a qualitative measure used to characterize the operational conditions within a traffic stream and their perception by motorists (Transportation Research Board, 1998). The following descriptions of level of service characterize these conditions for freeway facilities in terms of speed, travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

LOS A describes free-flow operations. Free-flow or near free-flow speeds prevail on both freeway and arterial type roadways. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.

LOS B represents reasonably free flow. Free-flow speeds are maintained on freeways, and arterial streets maintain approximately 70 percent of free-flow speed. The ability to maneuver within the traffic stream is only slightly restricted, and the general level of physical and psychological comfort provided to drivers is still high.

LOS C provides for flow with speeds at or near the free-flow speed of the freeway. Arterial streets flow at roughly 50 percent of the free-flow speed. Freedom to maneuver within the traffic stream is noticeably restricted at LOS C, and lane changes require more care and vigilance on the part of the driver.

LOS D is the level at which freeway speeds begin to decline slightly with increasing flows. Arterial streets are now averaging 40 percent of free-flow speed. In this range, density begins to increase somewhat more quickly with increasing flow. Freedom to maneuver within the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort levels.

LOS E, at its highest capacity, represents operation at capacity. Operations at this level are volatile since there are virtually no usable gaps in the traffic stream. Speeds on arterial streets average 30 percent of free-flow speed. Maneuverability within the traffic stream is extremely limited, and the level of physical and psychological comfort afforded the driver is poor.

LOS F describes breakdowns in vehicular flow.

In general, planning studies strive to achieve LOS C for future year traffic volumes. LOS C is used to ensure efficient use of resources while providing an acceptable level of service to the traveling public for the design year. Typical values for roadway capacity by facility type for LOS C were also obtained from the Lincoln-Lancaster County Planning Department. Table 2.15 lists the maximum traffic volumes at LOS C for various types of roadways.

Table 2.15

**MAXIMUM TRAFFIC VOLUMES AT
 LEVEL OF SERVICE C
 VERSUS FACILITY TYPE**

TYPE OF STREET AND NUMBER OF THROUGH LANES (2-Way Traffic)	MAXIMUM CAPACITY (vehicles per day)
2-lane surfaced street, 7.9-9.8 m (26-32 ft) wide, without turn lanes	3,500 -6,000
2-lane surfaced street, 7.9-9.8 m (26-32 ft) wide, with turn lanes	6,000 – 14,000
4-lane surfaced street, 13.4 m (44 ft) wide, without turn lanes	16,000
4-lane surfaced street, 13.4-18 m (44-60 ft) wide, with turn lanes	20,000 – 24,000
4-lane surfaced street with medians	28,000 – 30,000
4-lane divided roadway with partial access control	32,000
4-lane divided roadway with full access control	38,000
6-lane surfaced roadway with medians	40,000

Source: Lincoln-Lancaster County Planning Department

These values were used in conjunction with the traffic projections from the BOS II model to determine the appropriate number of lanes for the beltways and connecting links. The scope of the beltway study included characterization of the proposed beltway as a freeway type facility with full access control. The capacity, as determined by the local planning agency, for a four-lane divided roadway with full access control is approximately 38,000 vehicles per day at LOS C. The projected volumes on the beltway are all under this threshold, indicating that as a freeway, the beltways will operate at an acceptable level. The volumes on the beltways range from 13,800 to 29,300 vehicles per day. The range of volumes is a reflection of the different connecting link volumes. These volumes have a much greater effect on beltway traffic than does distance from the city.

2.4.6.2 Connecting Links

The roadways leaving the edge of Lincoln on both the south and east sides that will intersect the beltway at an interchange were evaluated based on the traffic projections from the BOS II land use plan and the capacities at LOS C for roadways in the Lincoln area. The traffic projections for all connecting links except US 34 (O Street) were within the acceptable range for a two-lane roadway. The US 34 link is projected to require a four-lane facility, however, these improvements are already planned by NDOR.

2.4.6.3 Interchange Design

Preliminary interchange design was required as part of the beltway study to allow full control of access to the proposed beltways. The interchange locations were chosen based on a number of factors. Use of the beltway by heavy trucks, through traffic and connectors necessitate interchanges at I-80, US 34, US 6, US 77, and N-2. The distance between additional interchanges at section line roads was established at not less than 3.2 km (2 mi) to provide for smooth traffic flow between interchanges and minimize impact to surrounding properties. Shorter interchange spacing can result in less than desirable merge and weave characteristics and should be avoided if possible.

In addition to traffic and geometric considerations, interchange locations were also evaluated based on potential impacts to historic properties near the interchanges or along roadways that connect to the beltway interchanges. Specifically, there are no historic properties along the connector roads to the proposed interchanges at South 27th, South 68th, Pine Lake Road, Pioneers Boulevard, and Fletcher Avenue. In contrast, no interchanges are proposed along Yankee Hill Road, Old Cheney Road, Van Dorn Street, A Street and Havelock Avenue which all have historic properties along them. The only connector roads with historic properties in close proximity are South 84th (Wunibald Farmstead), O Street (Mayer Farmstead and Haeger Dairy), and Adams Street (road sign). Of these, only the Wunibald Farmstead is expected to be impacted by the beltway project.

The three basic types of interchanges that were evaluated for use on the beltway are: diamond, cloverleaf and directional. A brief description of each type of interchange and its application in the beltway study is included below:

Diamond. A diamond interchange provides ramps for entry and exit onto the freeway with the ramp terminals having either stop sign or traffic signal control at the intersection with the intersecting roadway. This type of interchange was used for all interchanges with surfaced arterial streets. Diamond interchanges are proposed at the intersection with the following connecting links on the south beltway: 27th Street, 68th Street, and 84th Street. Diamond interchanges are also proposed at the intersection with the following connecting links on the east beltway: Fletcher Road, Adams Street, US 34, Pioneers Boulevard, and Pine Lake Road. For cost estimating purposes of this study, it was assumed that ultimately all unpaved county roads which provide access to the beltway interchanges would be upgraded to 4-lane paved roadways.

Cloverleaf. A cloverleaf interchange provides a system of ramps and loops to provide entry and exit to both roadways without requiring a stop condition. This type of interchange was not deemed necessary for any beltway interchanges based on the types of intersecting facilities. No cloverleaf interchanges are proposed at this time.

Directional. Directional interchanges permit high-speed, high volume operation for movements between the intersecting facilities. This type of interchange was deemed appropriate for use at freeway intersections with the proposed beltways. Directional interchanges are proposed at four locations:

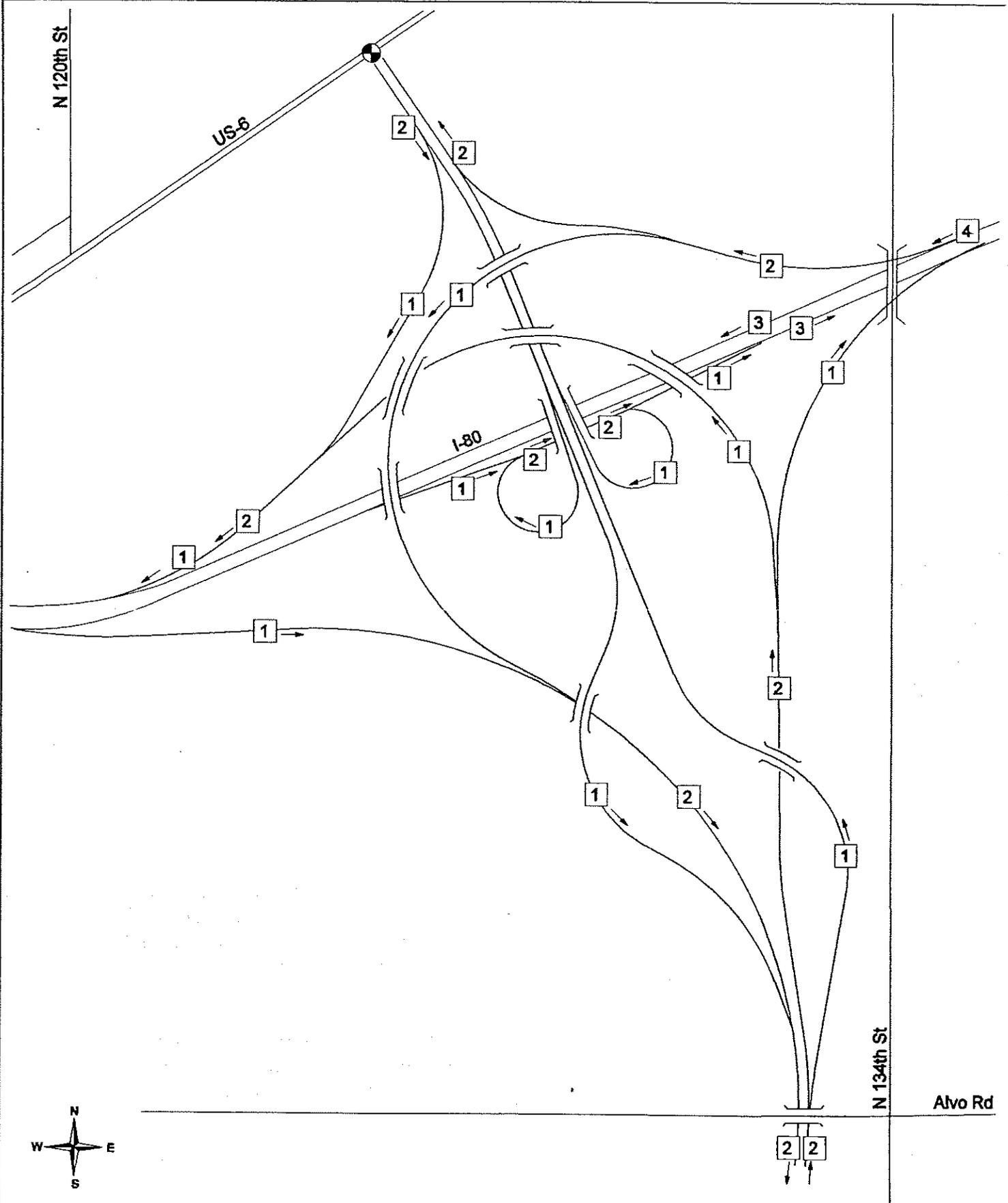
- I-80/East Beltway Interchange
- N-2/East Beltway Interchange
- East Beltway/South Beltway Interchange
- US 77/South Beltway Interchange

Figures 2.19- 2.24 illustrate the basic configuration and number of lanes required for each of the directional interchanges based on a capacity of 14,000 vehicles per day for a one-lane ramp. It should be noted that the east close and east far beltways have separate interchanges for connections with N-2 and the south beltway. In comparison, the east mid has one interchange which provides connections to N-2 and the south beltway. In addition, not all movements are accommodated in all of the beltway interchange configurations. The primary reason for omitting a movement from an interchange configurations was cost and the availability of an alternate route to accomplish the movement. The discussion below illustrates which movements are missing and the alternative routes that are available.

East Beltway/I-80. All movements are accommodated with the proposed interchange layout (**Figure 2.19**).

South Beltway/N-2. The eastbound N-2 to westbound south beltway movement is not directly accommodated in the proposed interchange layout (**Figure 2.20**). However, the driver can accomplish this movement by using southbound 84th Street to go west on the south beltway. Eastbound N-2 traffic is also restricted from accessing 120th Street in the proposed interchange configuration. This movement is accommodated by using eastbound Yankee Hill Road to access 120th Street.

East Close Beltway/N-2. The East Close Beltway/N-2 interchange (**Figure 2.21**) works in conjunction with the South Beltway/N-2 interchange (**Figure 2.20**) to provide access to all movements. The only movements not directly accommodated by these two interchanges are the eastbound N-2 to westbound south beltway and the eastbound N-2 to northbound east close beltway. However, these two movements are easily accomplished using 120th Street and Yankee Hill Road.



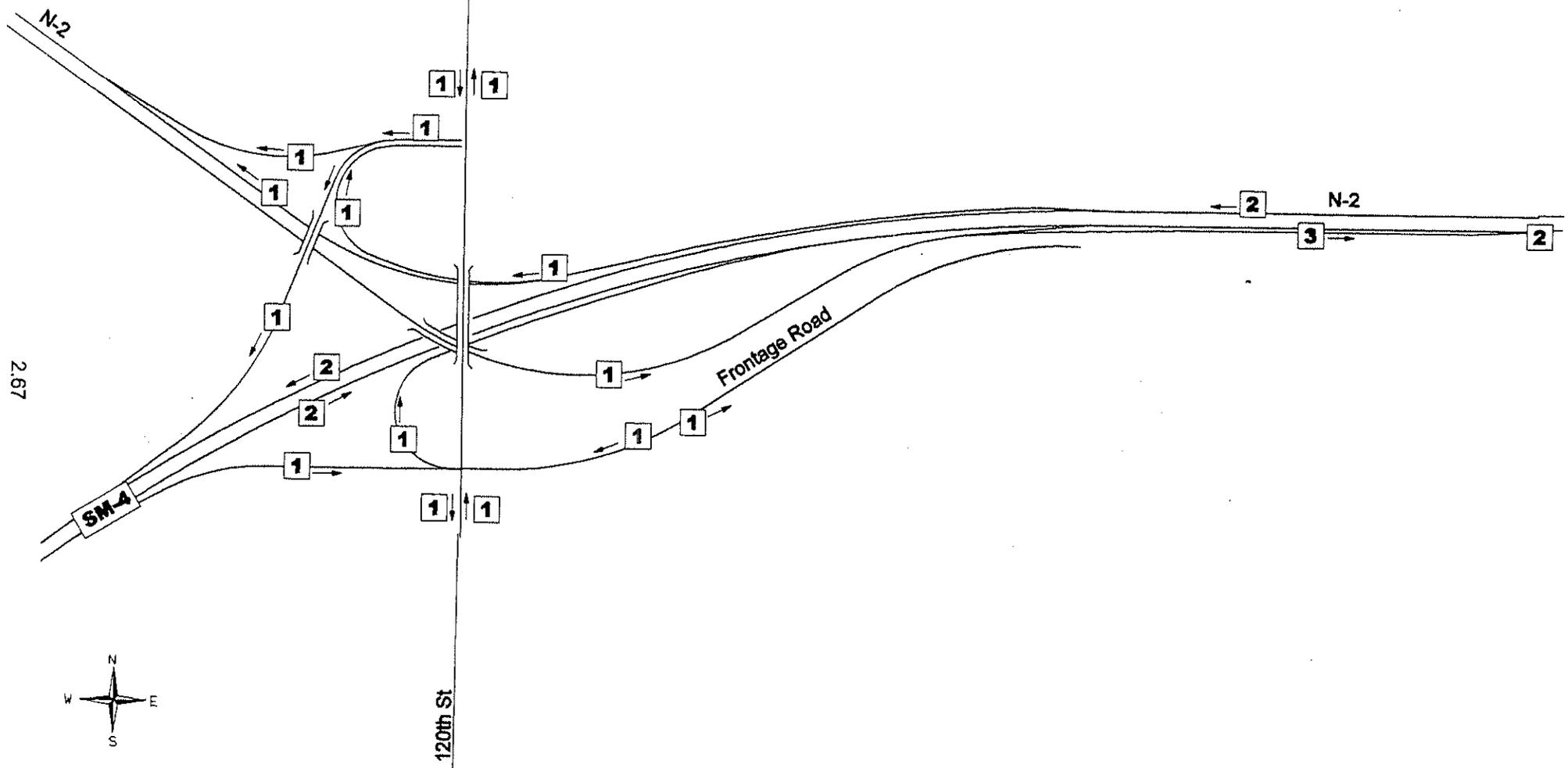
LEGEND	
1	NUMBER OF PROPOSED LANES
\rightarrow	DIRECTION OF TRAFFIC FLOW
	PROPOSED
	EXISTING
	PROPOSED TRAFFIC SIGNAL



2.66

LINCOLN SOUTH AND EAST BELTWAYS
 ENVIRONMENTAL IMPACT STATEMENT
**INTERCHANGE LANE
 CONFIGURATION
 EAST BELTWAY / I-80**

Figure 2.19



LEGEND

- 1 NUMBER OF PROPOSED LANES
- DIRECTION OF TRAFFIC FLOW
- PROPOSED
- EXISTING

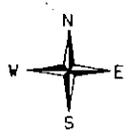
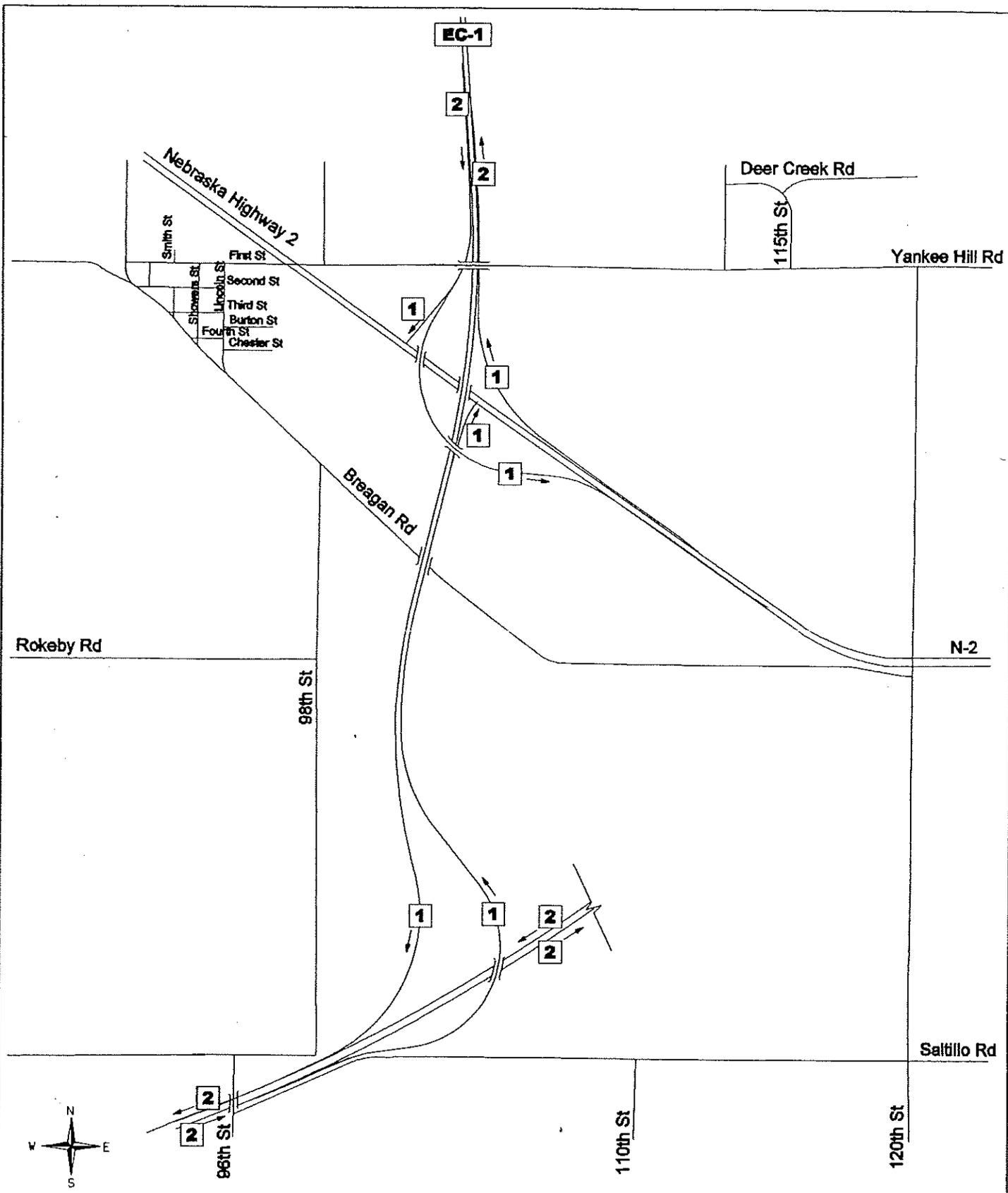


LINCOLN SOUTH AND EAST BELTWAYS
ENVIRONMENTAL IMPACT STATEMENT

**INTERCHANGE LANE
CONFIGURATION
SOUTH BELTWAY / N-2**

Figure 2.20

2.67



LEGEND	
1	NUMBER OF PROPOSED LANES
→	DIRECTION OF TRAFFIC FLOW
—	PROPOSED
—	EXISTING
⊙	PROPOSED TRAFFIC SIGNAL



2.68

LINCOLN SOUTH AND EAST BELTWAYS
 ENVIRONMENTAL IMPACT STATEMENT
**INTERCHANGE LANE
 CONFIGURATION
 EAST CLOSE BELTWAY /
 SOUTH BELTWAY / N-2** *Figure 2.21*

115th St

Yankee Hill Rd

EM-1

2

2

1

1

1

1

1

2

2

2

2

2

2

1

2

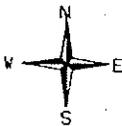
2

1

2

2

120th St



LEGEND

- 1 NUMBER OF PROPOSED LANES
- DIRECTION OF TRAFFIC FLOW
- PROPOSED
- EXISTING
- PROPOSED TRAFFIC SIGNAL



2.69

LINCOLN SOUTH AND EAST BELTWAYS

**INTERCHANGE LANE
CONFIGURATION
EAST MID BELTWAY /
SOUTH BELTWAY / N-2**

Figure 2.22

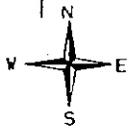
S 134th St

S 148th St

Yankee Hill R

EF-1

N-2



LEGEND

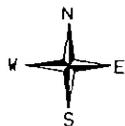
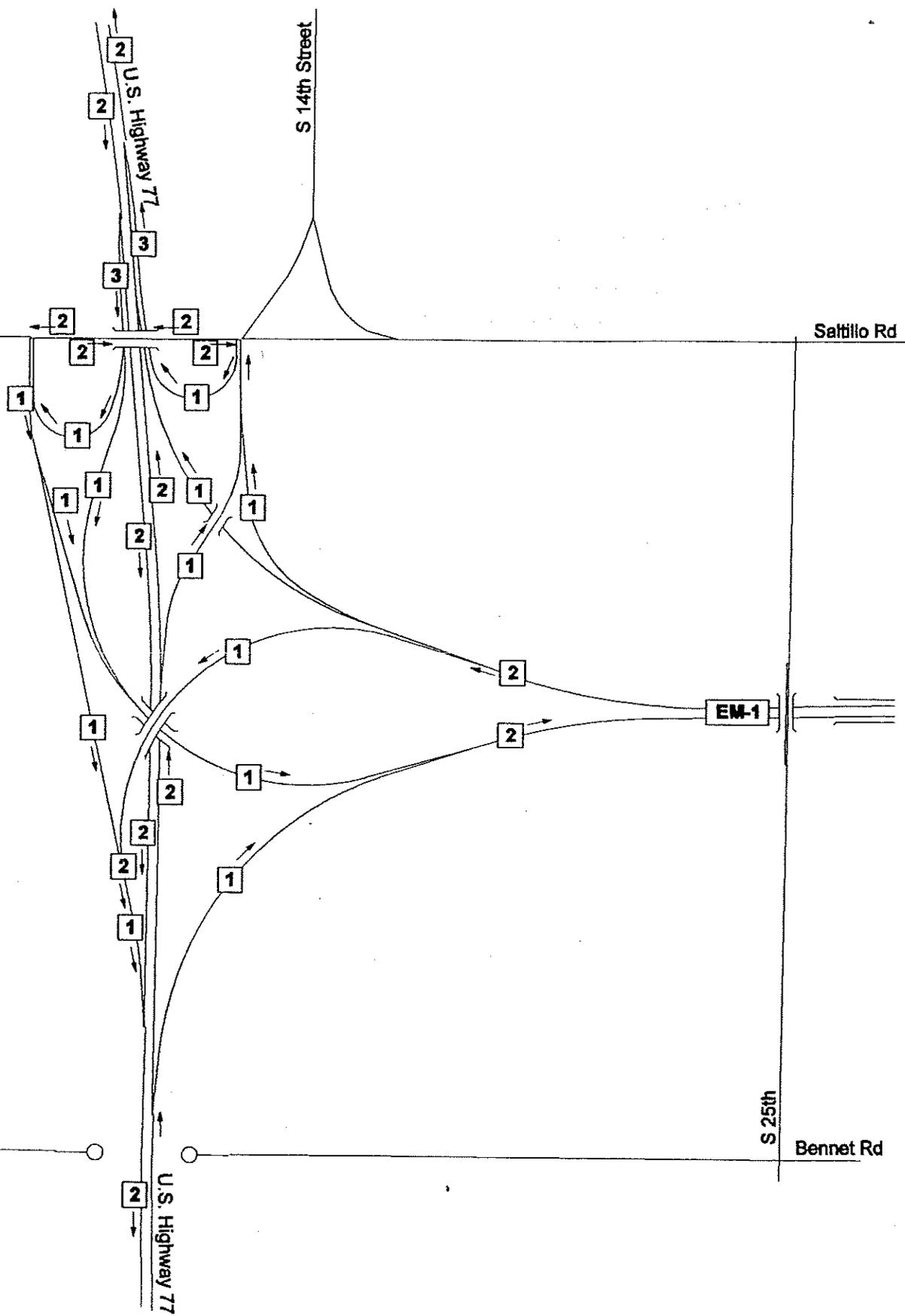
- 1 NUMBER OF PROPOSED LANES
- DIRECTION OF TRAFFIC FLOW
- PROPOSED
- EXISTING
- PROPOSED TRAFFIC SIGNAL



2.70

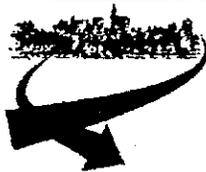
LINCOLN SOUTH AND EAST BELTWAYS
 ENVIRONMENTAL IMPACT STATEMENT
**INTERCHANGE LANE
 CONFIGURATION
 EAST FAR BELTWAY / N-2**

Figure 2.23



LEGEND

- 2 NUMBER OF PROPOSED LANES
- DIRECTION OF TRAFFIC FLOW
- PROPOSED
- - - EXISTING
- ⊙ PROPOSED TRAFFIC SIGNAL



2.71

LINCOLN SOUTH AND EAST BELTWAYS
ENVIRONMENTAL IMPACT STATEMENT

**INTERCHANGE LANE
CONFIGURATION
SOUTH BELTWAY / US-77**

Figure 2.24

East Mid Beltway/South Beltway/N-2. This interchange layout is the most complex because the intersection of the east mid beltway and the south beltway both occur near 120th Street along N-2 (**Figure 2.22**). This location does not permit access to 120th Street from the beltways or from N-2. As such, 120th Street must be accessed using other surfaced roads in the area. The southbound east mid beltway to westbound N-2 and the eastbound N-2 to northbound east mid beltway movements are not directly accommodated with the proposed interchange layout. These movements can be accomplished by using Pine Lake Road and 98th Street/Yankee Hill Road. The eastbound south beltway to westbound N-2 and the eastbound N-2 to westbound south beltway movements must use 84th Street.

East Far Beltway/N-2. All movements are accommodated with the proposed interchange layout in conjunction with the South Beltway/N-2 interchange (**Figure 2.23**).

South Beltway/US 77. All movements are accommodated with the proposed interchange layout, including providing access to Saltillo Road from US 77 and the South Beltway (**Figure 2.24**).

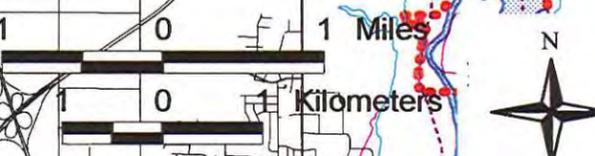
I-80 Interchange Location. The locations of the east beltway interchanges with I-80 have changed over the course of the beltway study. Earlier in the study, each of the three finalist alternatives for the east beltway had a separate interchange locations (distinct termini); whereas, there is currently only one recommended location where all of the east beltway alternatives would connect to I-80. The original EC-1 terminus was shifted east to move it away from the floodway and floodplain of the Stevens Creek overflow channel, as well as saline wetlands in the vicinity of 98th Street. The EF-1 terminus was shifted west in response to the request by the City of Waverly to keep the interchange outside of the city.

2.4.7 Engineering Analysis

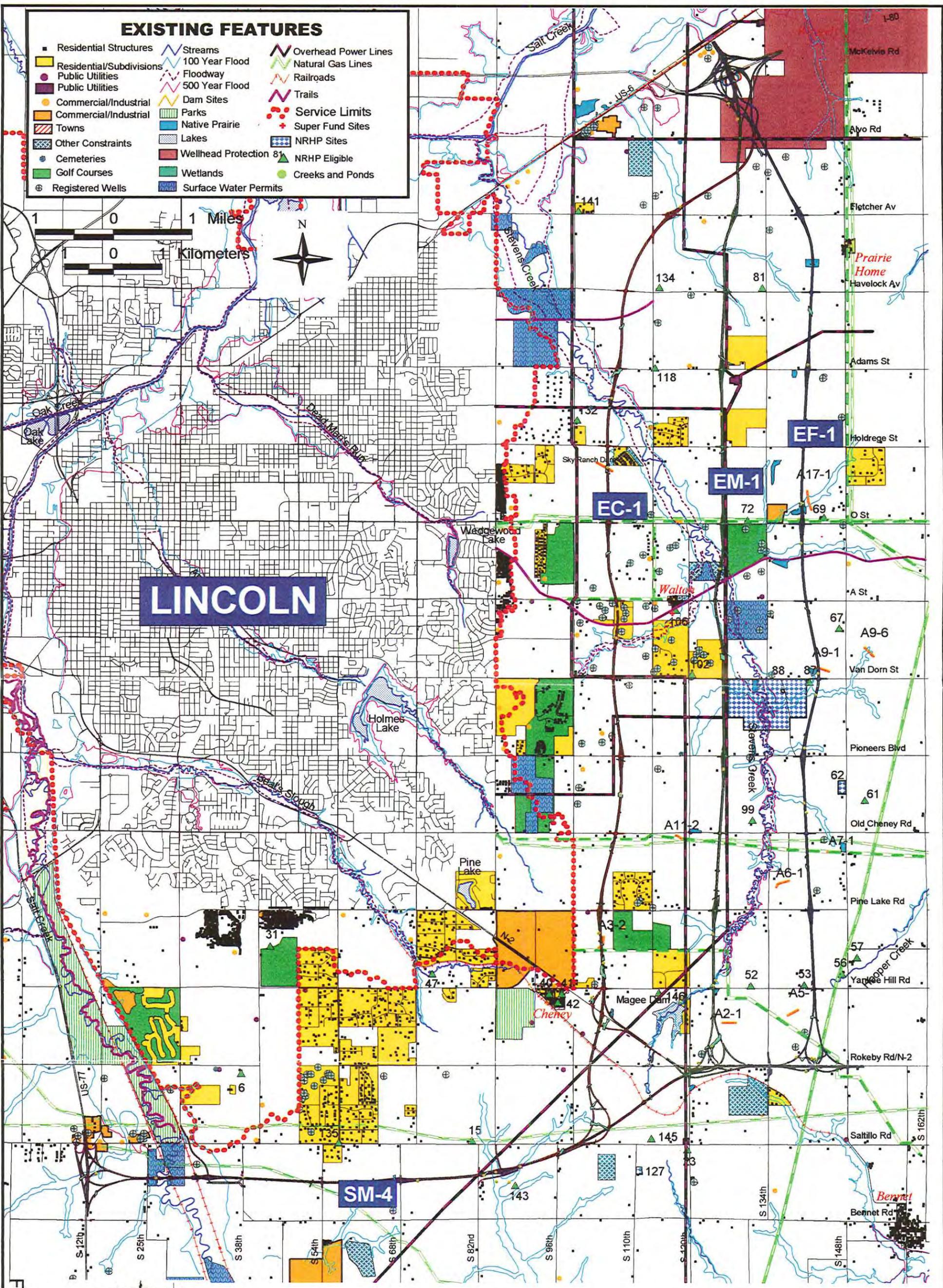
During the Level IV screening, the four finalist beltway alignments were reviewed and refined with respect to several criteria. These criteria included maintaining straight or nearly straight alignments with minimal superelevation and gentle, sweeping curves where possible. Diagonal portions of the alignments were minimized in order to reduce the impacts to adjacent properties and minimize the number and size of unusable remnants. Skew was minimized at all beltway/county road intersections in order to simplify interchange and overpass design as well as to reduce costs for bridges. Stream crossings were also evaluated to minimize bridge lengths and changes to the channel. In addition to these criteria, the refined beltway alignments considered other projects in the corridor. The refined finalist alternatives are shown in **Figure 2.25**.

EXISTING FEATURES

- | | | |
|----------------------------|--------------------------|------------------------|
| ■ Residential Structures | ▬ Streams | ▬ Overhead Power Lines |
| ■ Residential/Subdivisions | ▬ 100 Year Flood | ▬ Natural Gas Lines |
| ● Public Utilities | ▬ Floodway | ▬ Railroads |
| ● Public Utilities | ▬ 500 Year Flood | ▬ Trails |
| ● Commercial/Industrial | ▬ Dam Sites | ▬ Service Limits |
| ■ Commercial/Industrial | ▬ Parks | ● Super Fund Sites |
| ▨ Towns | ▬ Native Prairie | ▬ NRHP Sites |
| ▨ Other Constraints | ▬ Lakes | ▬ NRHP Eligible |
| ▨ Cemeteries | ▬ Wellhead Protection 81 | ● Creeks and Ponds |
| ▨ Golf Courses | ▬ Wetlands | ● Registered Wells |
| ⊕ Registered Wells | ▬ Surface Water Permits | |



LINCOLN



LINCOLN SOUTH AND EAST BELTWAYS ENVIRONMENTAL IMPACT STATEMENT

Refined Finalist Beltway Alternatives

May 2nd, 2002

Figure 2.25

Preliminary Hydrology and Hydraulics. As part of the engineering analysis for the south and east beltways project, preliminary hydrologic and hydraulic analyses were conducted. These analyses were used to determine the preliminary impacts of the beltways on the waterways within the corridor and to determine the major hydrologic issues that need to be addressed in final design of the preferred alternatives.

The preliminary discharges for the alternatives for the south and east beltways were estimated by methods outlined in the NDOR, Roadway Design Manual, Chapter 11: Drainage. The rational method was used for structures with a drainage area less than 259 ha (640 ac), and regional regression equations for Nebraska were utilized for those drainage areas greater than 259 ha (640 ac). The discharge for Salt Creek was obtained from the "Salt Creek at Wilderness Park Hydrologic Study" (June 1999) by the US Army Corps of Engineers. A 100-year storm frequency was estimated in locations of established floodplains. All other locations were estimated using a 50-year storm frequency according to NDOR Design Manual Standards for culverts on this type of facility. Additional information on hydrologic issues is provided in **Sections 3.17 and 3.18.**

Right-of-Way Requirements. Right-of-way requirements were determined for each beltway alternative assuming a 90 m (300-ft) width for the right-of-way. In addition, the number of residential and commercial acquisitions required, and the number of residences and commercial buildings within 0.4 km (0.25 mi) of the refined alignments were also determined. Additional information on right-of-way requirements is provided in **Section 3.6.**

2.4.8 Construction Cost Estimates

Construction cost estimates were prepared based on the refined finalist beltway alignments. These cost estimates are presented in **Tables 2.16 and 2.17** and summarized in **Table 2.18.** These estimates do not include mitigation costs.

Construction cost for the south beltway as a stand alone (partial beltway) project was estimated at \$107 million. Costs for the east alternatives ranged from \$128 million with EF-1, \$147 million with EC-1, and \$157 million with EM-1.

Construction costs for end-to-end beltways ranged from \$231 million with SM-4/EF-1, \$249 million with SM-4/EC-1, and \$252 million with SM-4/EM-1. Costs are within 8 percent of each other for the end-to-end beltways, and within 14 percent for the stand alone east beltway alternatives. This is within the 20 percent contingency contained in all cost estimates.

TABLE 2.17
EAST BELTWAY PRELIMINARY COST ESTIMATES
1996 DOLLARS

ITEM	CLOSE			MID			FAR		
	QUANTITY (ENGLISH)	UNIT PRICE (ENGLISH)	AMOUNT*	QUANTITY (ENGLISH)	UNIT PRICE (ENGLISH)	AMOUNT*	QUANTITY (ENGLISH)	UNIT PRICE (ENGLISH)	AMOUNT*
DIAMOND INTERCHANGE	5 ea	\$3,254,000	\$16,270,000	5 ea	\$3,254,000	\$16,270,000	5 ea	\$3,254,000	\$16,270,000
structure	1 230 sq m (13,200 sq ft)	\$970 (\$90)	\$1,188,000	1 230 sq m (13,200 sq ft)	\$970 (\$90)	\$1,188,000	1 230 sq m (13,200 sq ft)	\$970 (\$90)	\$1,188,000
embankment	474 000 cu m (620,000 cu yd)	\$2.60 (\$2)	\$1,240,000	474 000 cu m (620,000 cu yd)	\$2.60 (\$2)	\$1,240,000	474 000 cu m (620,000 cu yd)	\$2.60 (\$2)	\$1,240,000
ramps	19 700 sq m (23,600 sq yd)	\$42 (\$35)	\$826,000	19 700 sq m (23,600 sq yd)	\$42 (\$35)	\$826,000	19 700 sq m (23,600 sq yd)	\$42 (\$35)	\$826,000
total each			\$3,254,000			\$3,254,000			\$3,254,000
DIRECTIONAL INTERCHANGE									
I-80/East Beltway									
structure (8)	8 439 sq m (90,840 sq ft)	\$970 (\$90)	\$8,175,600	8 439 sq m (90,840 sq ft)	\$970 (\$90)	\$8,175,600	8 439 sq m (90,840 sq ft)	\$970 (\$90)	\$8,175,600
embankment	1 896 000 cu m (2,480,000 cu yd)	\$2.60 (\$2)	\$4,960,000	1 896 000 cu m (2,480,000 cu yd)	\$2.60 (\$2)	\$4,960,000	1 896 000 cu m (2,480,000 cu yd)	\$2.60 (\$2)	\$4,960,000
ramps	123 250 sq m (147,400 sq yd)	\$42 (\$35)	\$5,159,000	123 250 sq m (147,400 sq yd)	\$42 (\$35)	\$5,159,000	123 250 sq m (147,400 sq yd)	\$42 (\$35)	\$5,159,000
total each			\$18,294,600			\$18,294,600			\$18,294,600
East Beltway/N-2/South Beltway									
structure	5 Structures 5 254 sq m (56,550 sq ft)	\$970 (\$90)	\$5,089,500	6 Structures 9 304 sq m (100,150 sq ft)	\$970 (\$90)	\$9,013,500	3 Structures 3 382 sq m (36,400 sq ft)	\$970 (\$90)	\$3,276,000
embankment	969 460 cu m (1,268,000 cu yd)	\$2.60 (\$2)	\$2,536,000	1 422 000 cu m (1,860,000 cu yd)	\$2.60 (\$2)	\$3,720,000	597 900 cu m (782,000 cu yd)	\$2.60 (\$2)	\$1,564,000
ramps	124 200 sq m (149,100 sq yd)	\$42 (\$35)	\$5,218,500	111 960 sq m (133,900 sq yd)	\$42 (\$35)	\$4,686,500	111 120 sq m (132,900 sq yd)	\$42 (\$35)	\$4,651,500
total each			\$12,844,000			\$17,420,000			\$9,491,500
ROADWAY CROSSING	8 ea	\$1,170,000	\$9,360,000	6 ea	\$1,170,000	\$7,020,000	7 ea	\$1,170,000	\$8,190,000
structure	873 sq m (9,400 sq ft)	\$970 (\$90)	\$846,000	873 sq m (9,400 sq ft)	\$970 (\$90)	\$846,000	873 sq m (9,400 sq ft)	\$970 (\$90)	\$846,000
embankment	124 000 cu m (162,000 cu yd)	\$2.60 (\$2)	\$324,000	124 000 cu m (162,000 cu yd)	\$2.60 (\$2)	\$324,000	124 000 cu m (162,000 cu yd)	\$2.60 (\$2)	\$324,000
total each			\$1,170,000			\$1,170,000			\$1,170,000
RAILROAD CROSSING	1 ea	\$1,934,000	\$1,934,000	0 ea	\$1,934,000	\$0	0 ea	\$1,934,000	\$0
structure	1 170 sq m (12,600 sq ft)	\$970 (\$90)	\$1,134,000	1 170 sq m (12,600 sq ft)	\$970 (\$90)	\$1,134,000	1 170 sq m (12,600 sq ft)	\$970 (\$90)	\$1,134,000
embankment	300 000 cu m (400,000 cu yd)	\$2.60 (\$2)	\$800,000	300 000 cu m (400,000 cu yd)	\$2.60 (\$2)	\$800,000	300 000 cu m (400,000 cu yd)	\$2.60 (\$2)	\$800,000
total each			\$1,934,000			\$1,934,000			\$1,934,000
BIKE TRAIL CROSSING	2 ea	\$580,000	\$1,160,000	0 ea	\$580,000	\$0	1 ea	\$580,000	\$580,000
structure	370 sq m (4,000 sq ft)	\$970 (\$90)	\$360,000	370 sq m (4,000 sq ft)	\$970 (\$90)	\$360,000	370 sq m (4,000 sq ft)	\$970 (\$90)	\$360,000
embankment	84 100 cu m (110,000 cu yd)	\$2.60 (\$2)	\$220,000	84 100 cu m (110,000 cu yd)	\$2.60 (\$2)	\$220,000	84 100 cu m (110,000 cu yd)	\$2.60 (\$2)	\$220,000
total each			\$580,000			\$580,000			\$580,000
MINOR STREAM CROSSING	2 ea	\$756,000	\$1,512,000	4 ea	\$756,000	\$3,024,000	3 ea	\$756,000	\$2,268,000
structure	780 sq m (8,400 sq ft)	\$970 (\$90)	\$756,000	780 sq m (8,400 sq ft)	\$970 (\$90)	\$756,000	780 sq m (8,400 sq ft)	\$970 (\$90)	\$756,000
embankment	0 cu m (0 cu yd)	\$2.60 (\$2)	\$0	0 cu m (0 cu yd)	\$2.60 (\$2)	\$0	0 cu m (0 cu yd)	\$2.60 (\$2)	\$0
total each			\$756,000			\$756,000			\$756,000
MAJOR STREAM/RR CROSSING									
#1	1 ea	\$3,402,000	\$3,402,000	0 ea	\$0	\$0	0 ea	\$0	\$0
structure	3 512 sq m (37,800 sq ft)	\$970 (\$90)	\$3,402,000	0 sq m (0 sq ft)	\$970 (\$90)	\$0	0 sq m (0 sq ft)	\$970 (\$90)	\$0
#2-Stevens Creek	1 ea	\$8,316,000	\$8,316,000	1 ea	\$16,632,000	\$16,632,000	0 ea	\$0	\$0
structure	8 584 sq m (92,400 sq ft)	\$970 (\$90)	\$8,316,000	17 950 sq m (184,800 sq ft)	\$970 (\$90)	\$16,632,000	0 sq m (0 sq ft)	\$970 (\$90)	\$0
INTERSECTIONS, AT GRADE	1 ea	\$500,000	\$500,000	1 ea	\$500,000	\$500,000	1 ea	\$500,000	\$500,000
PAVEMENT	263 210 sq m (314,800 sq yd)	\$42 (\$35)	\$11,018,000	269 900 sq m (322,800 sq yd)	\$42 (\$35)	\$11,298,000	269 320 sq m (322,100 sq yd)	\$42 (\$35)	\$11,273,500
SHOULDERS	120 650 sq m (144,300 sq yd)	\$16 (\$13)	\$1,875,900	123 830 sq m (148,100 sq yd)	\$16 (\$13)	\$1,925,300	123 410 sq m (147,600 sq yd)	\$16 (\$13)	\$1,918,800
CONNECTING LINK PAVEMENT	106 020 sq m (126,800 sq yd)	\$30 (\$25)	\$3,170,000	231 770 sq m (277,200 sq yd)	\$30 (\$25)	\$6,930,000	305 200 sq m (365,000 sq yd)	\$30 (\$25)	\$9,125,000
EXCAVATION	1 174 400 cu m (1,536,000 cu yd)	\$2.60 (\$2)	\$3,072,000	1 601 700 cu m (2,151,000 cu yd)	\$2.60 (\$2)	\$4,302,000	1 539 800 cu m (2,014,000 cu yd)	\$2.60 (\$2)	\$4,028,000
CULVERTS (major)	5 ea	\$250,000	\$1,250,000	1 ea	\$250,000	\$250,000	1 ea	\$250,000	\$250,000
DRAINAGE STRUCTURES	18 km (11.2 mi)	\$83,890 (\$135,000)	\$1,512,000	18 km (11.4 mi)	\$83,890 (\$135,000)	\$1,539,000	18 km (11.4 mi)	\$83,890 (\$135,000)	\$1,539,000
SUBTOTAL			\$95,491,000			\$105,405,000			\$83,728,000
CONTINGENCIES		20%	\$19,098,000		20%	\$21,081,000		20%	\$16,746,000
TOTAL CONSTRUCTION COST			\$114,589,000			\$126,486,000			\$100,474,000
ENGINEERING DESIGN		6%	\$6,875,000		6%	\$7,589,000		6%	\$6,028,000
CONSTRUCTION ADMINISTRATION		8%	\$9,167,000		8%	\$10,119,000		8%	\$8,038,000
HOUSES/COMMERCIAL	6 ea	\$500,000	\$3,000,000	5 ea	\$500,000	\$2,500,000	10 ea	\$500,000	\$5,000,000
RIGHT-OF-WAY	449 ha (1,110 ac)	\$29,900 (\$12,000)	\$13,320,000	388 ha (960 ac)	\$25,000 (\$10,000)	\$9,600,000	449 ha (1,110 ac)	\$20,000 (\$8000)	\$8,880,000
TOTAL			\$146,951,000			\$156,294,000			\$128,420,000

* extended costs are based on English quantity and unit prices

Table 2.18

SUMMARY OF BELTWAY CONSTRUCTION COSTS

ALTERNATIVE	SM-4	EC-1	EM-1	EF-1
STAND-ALONE	107,000,000	147,000,000	157,000,000	128,000,000
END-TO-END (with SM-4)	--	249,000,000	252,000,000	231,000,000

It should be noted that the common interchange at N-2 results in a \$12 million cost savings with the EM-1 alternative which is not realized with the other two east alternatives. In contrast, the SM-4/EC-1 alternative requires two interchanges at N-2, one 0.8 km (0.5 mi) east of 98th Street and the other at 120th Street. The two N-2 interchanges for the SM-4/EF-1 alternative are located at 120th Street and 0.8 km (0.5 mi) east of 134th Street.

2.4.9 Environmental Analysis

The Level IV environmental analysis was defined as the preparation of the Draft Environmental Impact Statement (DEIS). Assessment of environmental impacts is addressed in **Chapter 3** of this FEIS document.

It should be noted that with additional refinements, the locations of centerlines and interchanges were modified to further minimize conflicts. Therefore, Level III and Level IV impact assessments are not directly comparable.

Chapter 3

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES OF THE FINALIST ALTERNATIVES

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES OF THE FINALIST ALTERNATIVES

3.1 INTRODUCTION

Site Location. The study area for the Lincoln South and East Beltways Study is located on the southern and eastern edges of the City of Lincoln, partially within the city limits, in Lancaster County, Nebraska. The study area for the south beltway is bounded on the north by Yankee Hill Road, on the south by the half-section line 0.8 km (0.5 mi) south of Bennett Road, on the east by the half-section line 0.8 km (0.5 mi) east of 148th Street, and on the west by US 77. The study area for the east beltway is bounded on the west by 98th Street, on the east by the half-section line 0.8 km (0.5 mi) east of 148th Street, on the north by I-80, and on the south by N-2.

Topography and Drainage. The approximately 207 km² (80 sq mi) study area is characterized by gently rolling uplands and nearly level bottomlands along Stevens Creek and Salt Creek which drain the area. More strongly sloping areas occur along the foot slopes of the stream terraces.

Vegetation. The native vegetation of Lancaster County was originally dominated by mid and tall grasses with trees growing along the narrow stream floodplains. With settlement, the prairie landscape was transformed by production agriculture which dominates the landscape today. Although woodlands still remain along the watercourses, only a few remnant prairie locations remain. Typical riparian woodland species in the study area are cottonwood, peach-leaf willow, American elm, green ash, hackberry, mulberry, honey locust, and box elder. Wetlands are generally limited to areas along the smaller stream courses.

Agriculture. Dominant crops are milo, corn, soybeans, wheat and hay crops. Historically, local farmers raised dairy and beef cattle, hogs, sheep and chickens; however, stock production has decreased significantly in the county. In 1997, the market value of agricultural products sold was \$82,386,000. Crop sales accounted for 72 percent of the market value; livestock sales accounted for 28 percent.

Demographic Characteristics. Population in Lancaster County has shown steady increases during the past several decades. From 1980 to 1990, the County as a whole grew from 192,882 to 213,641, a 10.8 percent increase during the ten-year period (Bureau of Census, 1990). The population continued steady growth through the 1990's with a 2000 population of 250,291, a 17.2 percent increase (Lincoln-Lancaster County Planning Dept, 2001). The annualized rate of population growth in the County during the 1990s was 1.60—significantly higher than the annualized rate of 1.03 during the 1980's (Lincoln-Lancaster County Planning Dept, 2001). Growth during the 1990's was attributable to both natural increase (more people born than dying) (60 percent) and positive net migration (more people moving into the area than leaving) (40 percent). The positive net migration reflected both strong domestic migration (54 percent) and international migration (45 percent) (Lincoln-Lancaster County Planning Dept, 1999).

Most of the growth in the region has occurred within the City of Lincoln which had a 2000 population of 225,581 and now accounts for 90 percent of the total population of the County.

The annualized rate of population growth for the City during the 1990s was 1.63—significantly higher than the annualized rate of 1.11 during the 1980's (Lincoln-Lancaster County Planning Department, 2001).

The farm population within the County continued a steady decline from 4,275 to 3,081 in the ten-year period from 1980 to 1990. This contrasts with the rural non-farm population which had a steady increase from 15,059 in 1980 to 17,982 in 1990 (US Bureau of Census 1992). More current data is more limited but shows that full time farms decreased 6 percent from 713 to 670 in the 5-year period from 1992 to 1997 (US Bureau of Census 1997). Similarly, the average size of farms decreased 5 percent from 123 ha (305 ac) to 117 ha (289 ac) during this period. The trend in the beltway study area toward suburban growth is consistent with trends evidenced in the comparison of the total County's farm and non-farm population. The non-farm population consists of persons living in unincorporated towns, or acreages and in other non-farm settings.

In addition, trends for the incorporated towns within the beltway study area also show increasing populations. For example, the town of Waverly increased from 511 in 1960, to 1,869 in 1990, and 2,448 in 2001. It is projected that the population of Waverly will range from 2,500 to 2,700 by 2010, a 17 to 26 percent increase from 1990.

3.2 LAND USE

3.2.1 Existing Conditions

Agricultural Uses. Current land uses in the beltway study area are primarily agricultural. The dominant crops are milo, corn, soybeans, wheat and hay crops. Historically, local farmers raised dairy and beef cattle, hogs, sheep and chickens; however, stock production has decreased significantly in the county. Like the rest of Lancaster County, the farm population in the beltway study area has decreased considerably as the urban population of the City of Lincoln has increased. Following this trend, land uses in the study area are beginning to transition from agricultural to suburban uses.

Rural Non-Farm Uses. Although most of the tillable land is in active production, review of the constraints map (see **Figure 2.1**) shows that there has been substantial development of non-farm uses in the beltway study area. Some of this development has occurred in clusters; however, the overall pattern is scattered throughout the area. The majority of the development has been for residential land use.

In particular, farm home and farmstead split-offs are common, as well as residential acreages (large lot single family homes). On the south, there are a large number of contiguous large lot subdivisions. On the east the subdivisions tend to be fewer and more scattered. Some of the subdivisions have special common use features such as an airstrip, lake, golf course, or equestrian facilities. The east tends to have some of the older subdivisions as well as non-subdivision areas of 2 ha (5 ac) lots which predate current zoning policies. These residential areas appear to have been deliberately located to provide convenient access to O Street and downtown Lincoln, or I-80 and Omaha. In comparison, the south tends to have many more newer subdivisions appealing more generally to those interested in country living, but with quick access to Lincoln on paved roads. In general, rural residences constructed in the beltway study area are custom built homes for higher income households.

There are three unincorporated towns within the study area—Cheney on the south, and Prairie Home and Walton on the east. These towns vary in size and generally reflect a rural community neighborhood of mixed use that serves the local residents. Growth of these former railroad junction towns has been relatively slow; however, the settlements closest to Lincoln, such as Cheney and Walton, are experiencing some development pressure.

Commercial uses are very limited and are generally located along State Highways or are internal to the unincorporated towns. Commercial uses are typically convenience-type services, but are beginning to include large warehouse retail sales businesses such as Rod's Outdoor Power and Apache Camper Center. Other commercial businesses in the study area include several nursery, greenhouse and tree farm operations; two kennels; a pet cemetery; and grain elevators at Cheney and Walton.

Industrial uses in the study area are few and are generally located along State Highways or arterial roads due to the need for accessibility for work force and materials and the availability of central utilities. Industrial sites include Williams Pipeline, Conoco Pipeline, Lincoln Oil Products, Bedient Organ, and Norris Public Power District at US 77 and Saltillo Road; Parker Fluid Connectors on O Street (US 34); Novartis, Pavers, Linweld, National Crane and ADM along US 6. There is one active quarry and sand pit in the project area; Schwarck Quarries, located along South 54th Street south of Saltillo Road, produces crushed rock, agricultural lime and retaining wall stone. Three private airstrips--Weaver Field, Stewart Field and Skyranche Acres (Pester Field)--are also located in the study area.

Several urban recreational elements occur in the beltway study area including two city parks. Wilderness Park, which extends 12 km (7.5 mi) from Lincoln to Saltillo Road along Salt Creek, is owned by the County and operated by the City. The park provides hiking, bicycle and equestrian trails. Jensen Park, located west of Cheney, is soon to be developed by the City of Lincoln with ballfield facilities. There are three private golf courses within the study area--Wilderness Ridge, Hidden Valley and Crooked Creek. Four other private courses about the study area (Yankee Ridge, Himark, Firethorn and Hillcrest Country Clubs). All of the golf courses have surrounding housing developments. The Izaak Walton League has a facility south of Highway 2 on South 134th Street, and the Boy Scouts of America have recently purchased a property near A Street and Stevens Creek.

Other features throughout the beltway study area are extensive electric distribution lines, radio and communication towers, rural and municipal water distribution systems, county maintenance buildings, several cemeteries, and the MoPac and Murdock hiker/biker trails. The Marion Catholic Center is located near 112th and Alvo Roads.

Local Planning Process. The City of Lincoln has a tradition of planning which dates back to the 1950s and the first Comprehensive Plan. The current *1994 Lincoln-Lancaster County Comprehensive Plan* embraces the concept of "managed contiguous growth" and the phasing of infrastructure expenditures based on this policy. The plan was adopted with the understanding that it should "provide for the overall health of the community, but only if such growth is not injurious to the overall health of the community's neighborhoods and commercial areas including Lincoln's downtown". The Plan suggests a number of "policy initiatives for the healthy growth and development of the community".

One of the most long held policies has been to develop “a compact and generally contiguous urban form” around its confines with the goal to “protect existing rural areas from urban sprawl through planned development”. However, the plan also encourages a unified planning approach between urban and rural interests and encourages “services to meet a range of urban and rural lifestyles”. An analysis of the City's growth over the last 30 years shows a gradual expansion outward from the original urban core, building on the availability of infrastructure. Much of this growth continues to occur to the south and east of Lincoln in the beltway study area. Although the City has an existing, clearly defined boundary denoting urban versus rural uses, it has begun to envelop large lot residential areas that were once remote from the City's boundaries.

Policy initiatives specific to the beltways study include “the development of a circumferential roadway network around the City of Lincoln” and providing for “a long-range plan to develop early identification of bypass corridors and right-of-way retention”.

In order to establish a rational policy of City expansion, ensure the availability and adequacy of the resources in which to construct infrastructure, the City has identified a future urban service area that has taken into account limitations poised by natural features, current city limits and prior plan designations. As such, the 1994 Comprehensive Plan included a map of future land uses in the City and County. Since that time, the maps have been revised to show amendments to the Comprehensive Plan. For the purposes of this study, the revised land use plans for the City and County were used to develop the Build Out Scenario II (BOS II) which assumed a projected population of 374,630 within a 25 to 30 year period, representing a 57 percent increase over the 1999 County population. **Figures 3.1 and 3.2** are the most recent versions of the City and County land use plans. The current plans forecast that about two-thirds of the south beltway study area and most portions of the east beltway study area will remain undeveloped within 25 years. Future land uses in the beltway study area are shown primarily as the existing agricultural and low-density residential uses—with highway commercial and industrial along State Highways.

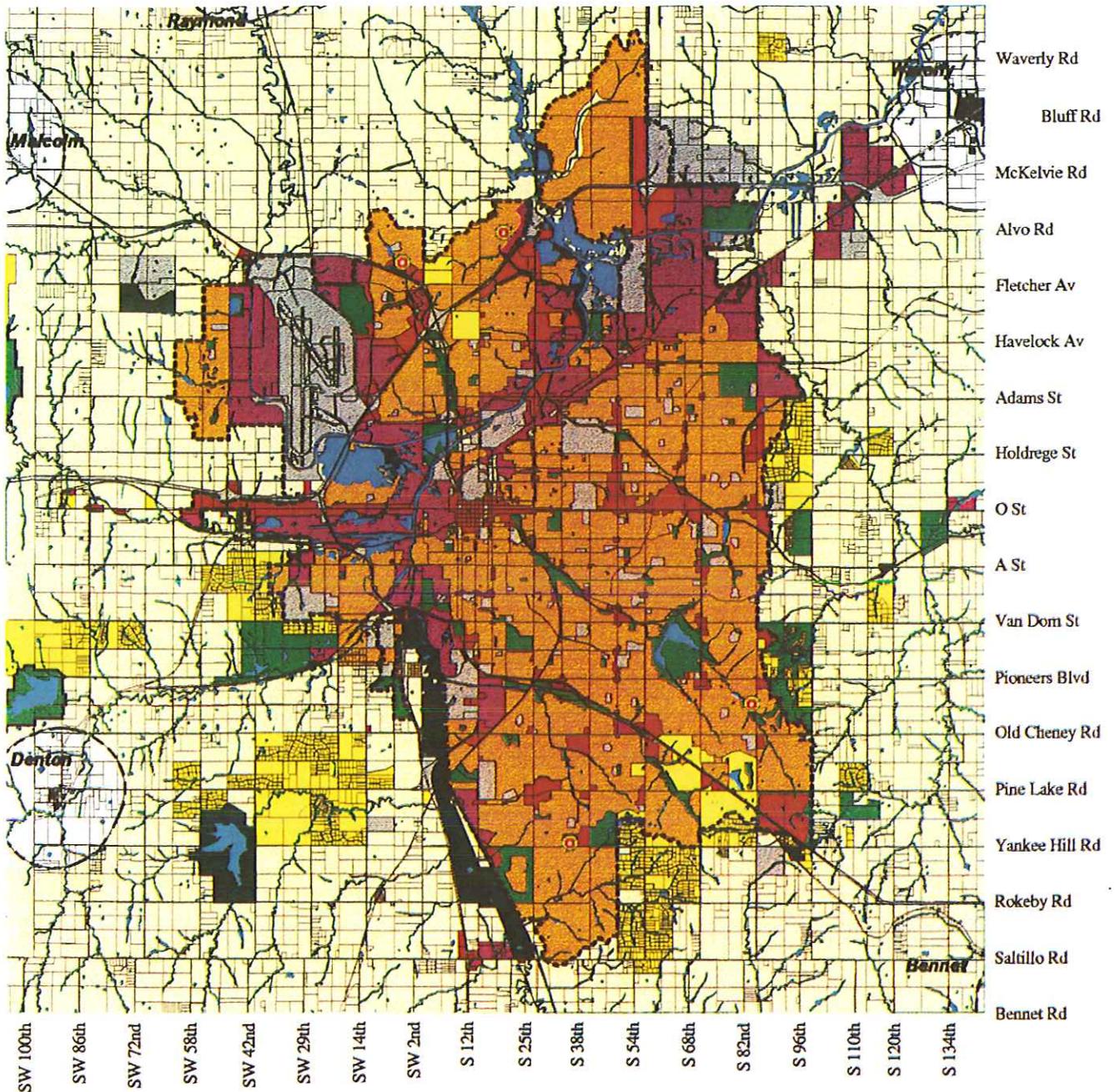
The two incorporated cities in the study area, Waverly and Bennet, have jurisdiction over unincorporated areas within 1.6 km (1 mi) of their existing city limit boundary. The Village of Bennet has designated the portion of the study area under its jurisdiction for agricultural use, consistent with the County designation. The Waverly Comprehensive Plan also designates the areas south of I-80 and 0.8 km (0.5 mi) west of 134th Street for agricultural uses. The remaining land use designation in the Waverly plan recognizes (1) expanding residential uses from Amberly Road south to I-80, and (2) new industrial and commercial uses at the proposed interchange at I-80 and a realigned 134th Street.

Zoning. Zoning in the study area is determined by four entities. The majority of the area is governed by Lancaster County, with some areas falling within the 4.8 km (3-mi) extraterritorial jurisdiction of the City of Lincoln, and the 1.6 km (1 mi) extraterritorial jurisdictions of the City of Waverly and Village of Bennet.

In general, the majority of beltway study area is zoned for Agricultural (AG) or Agricultural Residential (AGR) uses. The exceptions are commercial and industrial districts located along State Highways at US 77 and Saltillo Road, US 34 (O Street) and 134th Street, and US 6. In these areas, Highway Commercial (H3), Industrial (I-1), Industrial Park (I-2), County Industrial (I) uses have been deemed appropriate.

Figure 3.1

LINCOLN'S LAND USE PLAN

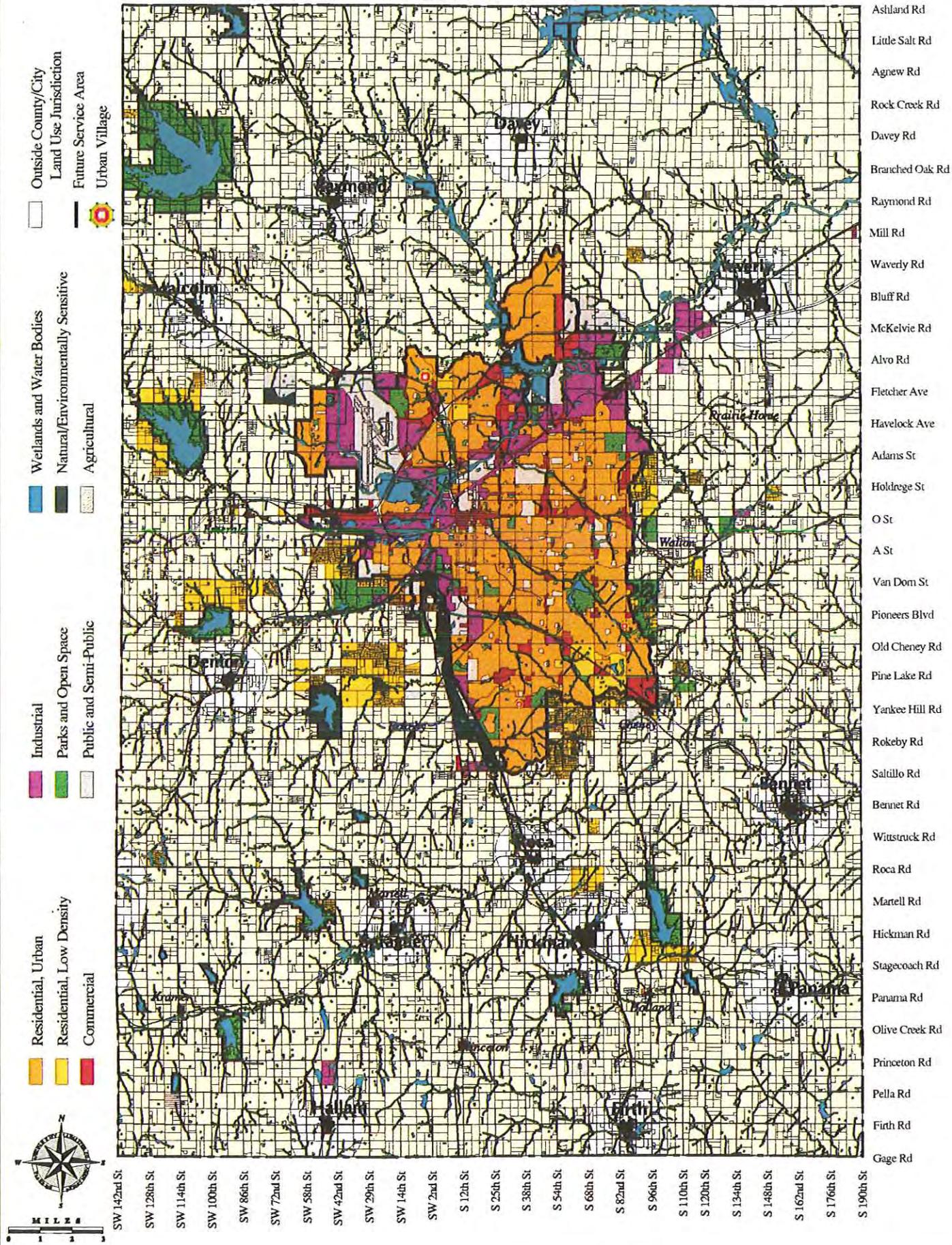


LEGEND

- | | |
|--|---|
|  Residential, Urban |  Public and Semi-Public |
|  Residential, Low Density |  Wetland and Water Bodies |
|  Commercial |  Natural / Environmentally Sensitive |
|  Industrial |  Agricultural |
|  Parks and Open Space |  Urban Village |
| ---- Future Service Limit | |



Figure 3.2 LANCASTER COUNTY'S LAND USE PLAN



These approved zoning districts, and the policies that created them, have resulted in the proliferation of rural non-farm residential development in the beltway study area. Within the County jurisdictional area, there are two residential zoning classifications. The AG classification allows for a minimum buildable lot size of 8.1 ha (20 ac); creation of such lots requires only a survey and documented conveyance (deed). In comparison, the AGR classification allows for a minimum buildable lot size of 1.2 ha (3 ac); creation of these lots requires subdivision approval (final plat) by the or County (or City if within the 4.8 km (3 mi) limit). In general, approval of the subdivisions has taken into account factors such as the location along a paved road, availability of water, appropriate soils for septic systems, and close proximity to villages.

Past Limitations. In general, the rural non-farm areas rely on individual wells or rural county water, and septic systems. The City of Lincoln's service area, which is based on a gravity flow system, has not been extended farther south than Rokeby Road, or father east over the ridge line into the Stevens Creek watershed (approximately between 84th and 98th Streets). The lack of centralized utilities in the area has been the major contributing factor in maintaining the rural character of the area.

However, the future urban service area has been extended into the south beltway study area and to the edge of the east beltway study area due to the continuing growth of Lincoln. On the south, the City has recently approved inclusion of the S-1 and S-2 Subareas (Urban Planning Zones) into the *Lincoln-Lancaster County Comprehensive Plan* bringing the future City service area up Saltillo Road (within the beltway study area). On the east, the future City service area has been extended to 98th Street (the edge of the east beltway study area) between N-2 and Old Cheney Road. In addition, the City has recently initiated the Stevens Creek Basin Planning Initiative to assess future urban and rural development in the basin relative to the overall long-term growth objectives of Lincoln and Lancaster County. The goal of the initiative is to prepare a long range conceptual plan for inclusion in the Comprehensive Plan update process. The current Stevens Creek study has expanded the area of the Urban Planning Zones (which generally covered the west bank) to include the entire basin, including the east bank.

Social Acceptability. As documented throughout the beltways study, there is a growing conflict between increasing numbers of citizens who choose to live in rural areas of the County and the prospect of a "circumferential roadway" regardless of the location. However, there appears to be substantially more objection to the three east beltway alternatives, than to the SM-4 alternative.

3.2.2 Impacts of the Four Finalist Alternatives

Direct Impacts. Construction of the beltway will require conversion of existing land uses to road right-of-way, including paved lanes and grassed shoulders and medians. Estimates of direct impacts are listed in **Table 3.1**.

Table 3.1

**ESTIMATE OF LAND USE IMPACTS
 WITHIN BELTWAY RIGHTS-OF-WAY
 Hectares (Acres)**

LAND USE	ALTERNATIVE			
	SM-4	EC-1	EM-1	EF-1
Cropland	205.5 (507.7)	295.8 (730.8)	282.6 (698.3)	315.5 (779.5)
Pasture/Hayland	26.5 (65.6)	69.4 (171.6)	46.3 (114.5)	55.9 (138.2)
Other Farm	5.5 (13.7)	1.6 (3.9)	0.1 (0.3)	3.2 (8.0)
Woodland (Upland)	1.1 (2.7)	10.4 (25.6)	3.6 (8.9)	9.4 (23.3)
Wetland	7.3 (18.0)	16.9 (41.8)	8.8 (21.8)	8.3 (20.4)
Ponds/Streams	3.5 (8.6)	2.4 (5.9)	1.8 (4.4)	3.2 (7.9)
Residential Use	9.5 (23.4)	12.3 (30.3)	4.0 (10.0)	7.8 (19.3)
Commercial Use	4.2 (10.3)	0.9 (2.2)	0.0 (0.0)	0.0 (0.0)
Industrial Use	0.0 (0.0)	0.7 (1.7)	0.6 (1.4)	1.1 (2.7)
Road	31.2 (77.1)	39.7 (98.1)	40.3 (99.6)	44.5 (110.0)
Railroad	1.2 (2.9)	0.2 (0.6)	0.0 (0.0)	0.0 (0.0)
Hiker/Biker Trails	0.0 (0.0)	0.6 (1.5)	0.3 (0.8)	0.3 (0.7)
TOTAL Right-of-Way	295.4 (730.0)	450.8 (1114.0)	388.5 (960.0)	449.2 (1110.0)

Indirect Impacts. In addition to direct impacts, concerns have been raised that the east beltway will indirectly impact land uses by encouraging urban sprawl along the beltway route, where urban sprawl is considered to be any non-farm development not contiguous to the Lincoln City limits, or any low density development (such as suburban acreages). The implication has been that a far location will create non-contiguous growth, and a close location will continue compact growth. The EC-1 alternative is within 0.8 to 3.2 km (0.5 to 2.0 mi) of the city limits; EM-1 is within 2.4 to 4.8 km (1.5 to 3 mi); and EF-1 is within 2.4 to 6.4 km (1.5 to 4 mi). The SM-4 alternative is as far distant as EF-1--between 2.4 to 5.6 km (1.5 to 3.5 mi) of the city limits.

New policies are proposed to be included in the revised Lincoln/Lancaster County Comprehensive Plan (Lincoln/Lancaster County Planning Department, September 2001). This plan includes mechanisms to protect historic and natural resources and to avoid urban sprawl. Goals of the proposed policies include:

- to prohibit new acreage development within the area of future urban growth, which includes the beltway study area (albeit within the 25-to-50 and 50-to-100+ year planning periods).

- to discourage further development within the 100-year floodplain which will help preserve the Stevens Creek bottoms and tributaries
- to encourage increased residential density (up to 5 dwelling units per acre)

Further evidence of a commitment to preservation, was Change of Zone #3209 (4/17/00) which removed over 100 ac of industrial, general commercial and local business zoning from the interchange at US 77 and Van Dorn Street to retain the use of the land as open space. This action was proposed by the Planning Department, and approved unanimously by the City Council and Mayor.

Over the next 25 years, no additional development is proposed to occur in about two-thirds of the south beltway study area and most portions of the east beltway study area. The proposed revision to the Comprehensive Plan shows some new development in the area of the SM-4 and EM-1 alignments within the next 25 years. The proposal is for 50 to 100 years or more for the City to fill most of the beltway study area. Specific to the Stevens Creek watershed, the Stevens Creek Basin Initiative proposed urbanization of northwest bank of basin within next 25 years, then the rest of the west bank within 25 to 50 years, followed by the east bank beyond 50 years.

While City/County policies are aimed at planned growth and avoiding urban sprawl, the vision of the Comprehensive Plan very clearly shows that population growth and physical expansion into the beltways study area is eventually expected as the city grows outward. Ultimately, the beltway study area could become part of the urban limit in the long-term.

Due to existing and proposed policies which determine the pattern of development, urban growth in the beltway study areas is expected to occur with or without a beltway project--so long as the City of Lincoln continues to experience the current rate of population growth.

In response to public comments, an expanded discussion on secondary and cumulative impacts has been prepared for this FEIS document in **Section 9.6**.

Air Traffic Impacts. There are three private airfields in the study area. EC-1 is approximately 0.5 km (0.33 mi) from the end of the runway at Skyranch Acres (Pester Field); and SM-4 is approximately 0.4 km (0.25 mi) from Steward Field and 1.2 km (0.75 mi) from Weaver Field. There is also an abandoned airfield east of 148th Street between Van Dorn Street and Pioneers Boulevard that has not been used in about 10 years; the airstrip is currently planted in alfalfa.

Consultation with the Federal Aviation Administration (FAA) Air Traffic and Environmental Divisions indicated that (1) there are no federal regulations applicable to private use airfields (Donna O'Neil, FAA, Kansas City, personal communication with A. Zlotsky, 28 September 2000 and 4 October 2000; and Mark Schenkelberg, FAA, Kansas City, personal communication with A. Zlotsky, 28 September 2000), and (2) none of the three airfields had published approaches therefore there are no NPIAS (National Plan of Integrated Airport System) airports in the area of potential effect for the beltways study.

In addition, consultation with the Nebraska Department of Aeronautics indicated that the most important standard when locating a new road is the 20:1 approach (Anna Lannin, personal communication with A. Zlotsky, 6 October 2000; Diane Hoffer, personal communication with A. Zlotsky, 28 September 2000). In addition, in all three locations the beltway alternatives would exceed the minimum licensing standards for a public use airport which includes a 20:1 approach from the end of the runway which would clear a 5 m (15 ft) height over the road at a distance of at least 91 m (300 ft) from the end of the runway. Further, all three airfields are already constrained by existing Holdrege Street and Saltillo Road. Beyond this, all three locations were reviewed for potential height encroachment from light standards or elevated bridges. Since lights are only proposed at interchanges, and no interchanges or elevated bridges occur along the vector from the air fields, there would be no height constraints. It is noted that the Stevens Creek Bridge would be in close proximity to Sky ranch Acres, but it would not occur along the approach to Sky ranch Acres. As such, the proposed alternatives would have no impact on air traffic or use of the three private airfields. However, the project will need to be reviewed again regarding airspace considerations during final design with possible coordination with FAA.

3.2.3 Proposed Mitigation

No mitigation for impacts to land use is proposed.

3.2.4 No Build Alternative

The no build alternative will not require conversion of existing land uses for road right-of-way, other than that required for construction of the proposed future roadway network improvements. Development pressure will continue under current growth policies as the City continues to grow. In addition, changes in farming, farm consolidation and escalating agricultural land prices will contribute to urbanization of the area.

3.3 TRANSPORTATION

3.3.1 Existing Conditions

Traffic. Traffic data, regional growth trends and previous studies have all indicated a need for south and east beltways. Some of the highest rates of growth have been on the south and east fringes of the Lincoln necessitating a long-range plan to develop early identification of bypass corridors and right-of-way retention. Existing through traffic, with external origin and destination, exacerbates high traffic volumes on arterials such as US 6 and N-2. Internal to external trips and external to internal trips are currently made using arterial roadways with signalized intersections and unlimited access to adjacent properties. This results in excessive delay and congestion along these roadways.

Safety. The existing congested conditions along many of Lincoln's arterial streets subject drivers to increased exposure to accidents due to abrupt stopping, turning and lane changing. Other safety concerns in the beltway study area are (1) the I-80 interchange at Waverly, (2) the at grade intersections of County Roads with US 77, N-2, US 34 and US 6, and (3) Saltillo Road and 148th Streets which currently serve as popular routes for through traffic, especially trucks. These locations have higher accident rates due to high speeds, less than desirable intersection configurations, and/or high traffic volumes.

3.3.2 Impacts of the Four Finalist Alternatives

Traffic. The beltway system is viewed as an essential component of the regional transportation network that would move through traffic around congested urban areas, as well as reduce delay and improve traffic flow on the existing urban street system.

In addition to accommodating through traffic, a beltway system will also facilitate trips that have an origin within the metropolitan area and a destination outside of the area, or vice versa. While it is unlikely that internal trips will use the beltway system as much as those with an external origin or destination, these trips will also benefit by reduced delay and accidents due to reduction of abrupt stopping, turning, and lane changing. A significant amount of through traffic on the current major routes (N-2, US 34, US 6 and 84th Street) will be relocated to the beltway system providing additional capacity and reduced congestion for internal trip traffic.

The south beltway is expected to carry 14,000 to 19,000 vehicles per day and the east beltway is expected to carry 14,000 to 30,000 vehicles per day depending upon the segment examined and, to a lesser degree, its relative distance from the center of Lincoln. This shift of traffic from the arterial street system to the beltways results in a 10 to 30 percent reduction in traffic on major arterials such as N-2, US 6, and 84th Street. This reduction will preserve roadway capacity for these streets. Since these roadways are currently situated within developed areas, widening to 6-lanes would be very expensive and have substantial negative impacts to adjacent properties.

In addition to reducing through traffic on internal urban roadways within the existing metropolitan area, a significant benefit is expected by reducing truck traffic on rural roadways on the fringe of the metropolitan area. The most reduction is expected on Saltillo Road between South 84th Street and US 77 and on North 148th Street between N-2 and Waverly. These roadways are expected to experience a 40 to 80 percent and 40 to 90 percent reduction in total traffic, respectively.

The location of the east beltway in terms of the close, mid or far corridors does not seem to have a significant effect on the amount of traffic it is expected to carry or the benefits obtained. The east beltway provides relief to traffic coming into or through Lincoln from the northeast (Omaha) and the southeast (Nebraska City). This traffic will use the east beltway regardless of which corridor is selected. The major differences between the east corridors involve the interchanges at I-80, N-2 and the south beltway. The close and far corridors require significant diagonal routing to connect to an interchange at I-80. The close and mid corridors require more complicated interchanges at N-2 and the south beltway than is required for the far corridor. These differences are best reflected in the construction cost estimates and right-of-way impacts; however, they have little effect on system performance.

Safety. The beltway will be designed using modern standards which incorporate safety features designed to protect the traveling public. The primary effect on safety will be positive due to the relocation of truck and other through traffic from congested urban streets and unpaved County Roads to a more appropriate high speed limited access freeway facility. Freeways have a 50 to 80 percent lower accident rate than urban arterials. Accidents throughout the Lincoln roadway network are expected to be fewer as traffic shifts from local streets and collectors to fill the excess capacity available on the arterials due to the beltways.

The beltway project will also result in the reconfiguration of the Waverly interchange which needs some modifications to accommodate current traffic volumes and heavy truck usage.

I-80, US 77 and N-2 will be provided with full directional interchanges; these are the most efficient and safest types of interchanges because they allow high speed, high volume movements between intersecting roadways. Diamond interchanges will be provided at all other arterial intersection locations.

Additional safety features include fencing of the beltway right-of-way, and lighting at freeway interchanges. These features increase the safety factor for the traveling public and adjacent landowners. Overall, the construction of the beltways is projected to save between \$37 and \$68 million per year in vehicle accidents using the BOS traffic model. These savings are expected to be even greater using the BOS II model because of the higher projected usage of the beltways.

Measures of Effectiveness. The beltway alternatives provide considerable improvement in projected vehicle hours traveled (time savings) compared to the no build alternative. The differences between the east beltway alternatives are minimal, but slightly better with EM-1 than EC-1 or EF-1 under the BOS II model. The beltways are expected to save approximately 8,500 to 10,300 hours of travel time per day for Lincoln motorists depending on which beltway corridor is selected.

Cost Effectiveness. In **Section 2.3.6**, a detailed discussion of cost effectiveness and economic efficiency was conducted on seven candidate beltway alternatives and two non-beltway alternatives. This analysis was done using the BOS travel demand model which showed less traffic using the beltways and a lower reduction in VHT (time savings) than the updated BOS II model. Despite the fact that traffic volumes were projected to be lower, the beltway alternative was shown to be generally cost effective with the east-close and east-mid alternatives having a benefit-cost ratio approaching 1.0.

An analysis of the time savings with the BOS II model comparing the end-to-end beltway alternatives and no build alternative indicated the investment to construct the beltway would be paid off through time savings alone in less than three years. Based on a payoff period of less than three years, all three end-to-end beltway alternatives are considered economically feasible for all east alignments.

3.3.3 Proposed Mitigation

Traffic. No mitigation is necessary.

Safety. No mitigation is proposed, beyond planned fencing of the freeway right-of-way, and lighting at interchanges.

3.3.4 No Build Alternative

Other than that included in the 1 and 20 Year Program of proposed future roadway network improvements, the no build alternative will do nothing to address the problem of increasing traffic on the south and east fringes of the City of Lincoln, nor will it specifically address high truck use and through traffic on Saltillo Road and 148th Streets, and other locations in the beltway study area.

3.4 FARMLAND

3.4.1 Existing Conditions

Farmland. Current land uses in the beltway study area are primarily agricultural. The dominant crops are milo, corn, soybeans, wheat and hay crops. Historically, local farmers raised dairy and beef cattle, hogs, sheep and chickens; however, stock production has decreased significantly in the county.

Prime Farmland Soils. Numerous soil types occurring in Lancaster County have been listed as prime farmland soils (NRCS, 1998). Several of these prime farmland soils are mapped as occurring within the project area. Form AD-1006 was submitted to the Natural Resources Conservation Service (NRCS) requesting determination of impacts to prime farmland soils. This form uses the NRCS Farmland Conversion Impact Rating which is based on a scale of 0 to 260.

3.4.2 Impacts of the Four Finalist Alternatives

Conversion of Farmland. Construction of the beltway will require conversion of existing farmland to road right-of-way, including paved lanes and grassed shoulders and medians. Impacts to production agricultural land, consisting of cropland, pasture/hayland, and other farm (including corrals, livestock waste lagoons, etc.) are listed in **Table 3.2**. Other on farm land uses, not typically in agricultural production, include woodlands, wetlands and ponds/streams are included in the previous **Table 3.1**. The majority of these acres occur on farms, but some occur on residential acreages. **Table 3.2** shows that the alternatives will impact less than 1 percent of the 186 425 ha (460,666 ac) of farmland in Lancaster County--whether constructed as partial or end-to-end- beltways.

Indirect Impacts to Farms. Data has not been developed to exactly determine the indirect impacts due to bisected parcels. However, general practices in right-of-way acquisition for rural properties include provision of access to the extent possible, and sale of uneconomic remainders to neighboring landowners who do have access. These practices minimize the loss of production agriculture. It also appears that the project may impact two pivots amounting to 36 ha (90 ac); however, use of the land for agriculture is not lost. Landowners will be compensated for any loss of property caused by loss of access, uneconomic remainders or diminished value as described in **Section 3.6**.

Based on the number of owners with one or more parcels crossed by the beltway, the number of bisected farms was estimated at 16 for SM-4, 33 for EC-1, 29 for EM-1, and 23 for EF-1. These numbers do not include small uneconomic remainders that would be purchased outright.

During the public comment period, concern was raised regarding the impact of artificial lighting on crops. According to David Andrews, Professor of Agronomy, University of Nebraska-Lincoln, the only impact to Nebraska crops that he is aware of is a very limited delay in soybean flowering due to the tropical origin and short photo period of the plant. In his experience, this effect was observed from street lights and did not extend beyond a 15 m (50-ft) radius from the base of the pole. This impact would be negligible with the beltway project because lighting is only proposed at the interchanges, and because the interchanges generally include at least a 9 m (30-ft) clear zone.

Table 3.2

**ESTIMATE OF FARMLAND IMPACTS
 WITHIN BELTWAY RIGHTS-OF-WAY
 Hectares (Acres)**

PRODUCTION AGRICULTURAL LAND USE	ALTERNATIVE			
	SM-4	EC-1	EM-1	EF-1
Cropland	205.5 (507.7)	295.8 (730.8)	282.6 (698.3)	315.5 (779.5)
Pasture/Hayland	26.5 (65.6)	69.4 (171.6)	46.3 (114.4)	55.9 (138.2)
Other Farm	5.5 (13.7)	1.6 (3.9)	0.1 (0.3)	3.2 (8.0)
TOTAL Farmland	237.5 (587.0)	366.8 (906.3)	329.0 (813.0)	374.6 (925.7)
Percent of Farmland in County	0.13	0.20	0.18	0.20

Prime and Unique Farmland Soils. According to the Prime Farmland Policy Act, the NRCS assigns a relative value up to 100 points and the project proponent (federal agency) assigns up to 160 points for the site assessment. Once the score is tabulated, the lead federal agency can identify the effect of the project on farmland and determine the suitability of the site for protection as farmland. Once the score is computed, the NRCS recommends that 1) alternatives with the highest combined scores be regarded as most suitable for preservation and those with lower scores as less suitable, and 2) alternatives receiving a score less than 160 need not be given further consideration for protection and no additional alternatives need to be evaluated.

Table 3.3 lists impacts to prime and unique farmland soils for each of the end-to-end beltway alternatives as determined by the NRCS (see Appendix A) using Form AD-1006. Impacts for the highest impact route represent less than 0.5 percent of the 102 340 ha (252,900 ac) of prime and unique farmland soils in Lancaster County. Because scores for all alternatives are all less than 160, no further consideration is required and the project is considered to have a minor effect on prime and unique farmland soils.

During the public comment period, concerns were raised regarding the assumptions used in the Form AD-1006. Further discussion of the evaluation is provided in Section 9.7.

3.4.3 Proposed Mitigation

In order to minimize farmland impacts, beltway right-of-way will be limited to that necessary for roadway design standards and any required mitigation. No other mitigation is required specifically for farmland impacts.

Table 3.3

**IMPACTS TO PRIME AND UNIQUE FARMLAND SOILS
 (End-to End Beltway Analysis)**

	ALTERNATIVES		
	SM-4 / EC-1	SM-4 / EM-1	SM-4 / EF-1
Impact Rating Points	140	143.5	142
Prime and Unique Farmland Impacts ha (ac)	461 (1139)	466 (1152)	494 (1221)
Percent of Prime and Unique Farmland in County	0.45	0.46	0.48

3.4.4 No Build Alternative

The no build alternative has no adverse impact on farmland or prime and unique farmland soils in the project area, other than that necessary for construction of the proposed future roadway network improvements. The current trend of the conversion of farmland to rural non-farm uses, especially residential use, would continue with or without the beltway project.

3.5 ENVIRONMENTAL JUSTICE

The Executive Order on Environmental Justice (EO 12898) was signed by President Clinton on February 11, 1994. The executive order requires that, to the extent practicable and permitted by law, neither low-income nor minority populations may receive disproportionately high or adverse impacts as a result of a proposed project. Federal agencies must take the appropriate and necessary steps to identify and address "disproportionately high and adverse" effects of federal projects on the health or environment of low-income and minority populations. Also, representatives of any low-income or minority populations in the community that may be affected by a project must be given the opportunity to be included in the impact assessment and public involvement process.

3.5.1 Existing Conditions

The beltway alternatives are located in Census Tracts 37.03, 101, 103, and 104, all in Lancaster County. The four census tracts comprise approximately 8.0 percent of the total population of the county and approximately 65 percent of the total land area of the county.

Table 3.4 summarizes selected 1990 Census Data regarding these tracts and the greater community of Lancaster County (2000 Census data was not yet available for these statistics). The median household income for each of the four census tracts is substantially higher than the median household income of Lancaster County. Also, the percentage of persons living below the poverty level in each of the four census tracts is substantially less than the percentage for Lancaster County.

Table 3.4

**INCOME AND POVERTY STATISTICS
 FOR BELTWAY CENSUS TRACTS**

1990 CENSUS STATISTIC	Lancaster County	Census Tract 37.03	Census Tract 101	Census Tract 103	Census Tract 104
Median Household Income	\$28,909	\$51,619	\$35,212	\$33,733	\$30,799
Percent below Poverty Level	10.5%	5.6%	1.6%	4.1%	5.7%

Table 3.5 shows the 2000 Census data for the number of minority residents in the beltway census tracts compared to the number of minority residents in all of Lancaster County. The percent of minority residents in each of the four census tracts is substantially less than that of Lancaster County.

Table 3.5

**MINORITY POPULATION STATISTICS
 FOR BELTWAY CENSUS TRACTS**

2000 CENSUS STATISTIC	Lancaster County		Census Tract 37.12		Census Tract 101		Census Tract 103		Census Tract 104	
	#	%	#	%	#	%	#	%	#	%
White	225,426	90.07	4,348	97.4	4,903	98.1	3,161	97.6	6,104	98.3
Black	7,052	2.82	24	0.5	11	0.2	2	0.1	13	0.2
American Indian, Eskimo, or Aleut	1,599	0.64	4	0.1	16	0.3	15	0.5	12	0.2
Asian or Pacific Islander	7,311	2.92	35	0.8	28	0.5	34	1.0	36	0.5
Other Race	4,225	1.69	14	0.3	20	0.4	17	0.5	22	0.4
Hispanic Origin (of any race)	8,437	3.37	41	0.9	55	1.1	31	1.0	52	0.8

3.5.2 Impacts of the Four Finalist Alternatives

None of the finalist alternatives will impact low-income or minority neighborhoods or populations.

3.5.3 Proposed Mitigation

No mitigation is necessary.

3.5.4 No Build Alternative

The no build alternative would also have no impact on low income or minority populations.

3.6 ACQUISITIONS AND RELOCATIONS

3.6.1 Existing Conditions

The beltway alternatives cross a predominately rural area dominated by production agricultural and agricultural residential land uses.

3.6.2 Impacts of the Four Finalist Alternatives

Acquisition of new right-of-way will be required for the beltway alternatives. Property owners of land acquired will be paid fair market value for property taken and damages accrued. If both the south and east beltways are constructed, the alternatives are expected to require the acquisition of up to ten residential properties (including some farmsteads) that will result in the displacement of the occupants from their residences. In addition, there are two business displacements--Major Oil Company along SM-4 and Stevens Creek Storage along EF-1. Some of the farmsteads may also qualify as a business displacement. Table 3.6 lists the residential properties requiring acquisition and relocation. Of these properties, at least three are known to have elderly residents; and there may be one minority resident in a rental property. With few exceptions, the parcels affected are primarily owner occupied. The elderly are sometimes more difficult to relocate therefore residential relocation will begin as soon as possible to allow sufficient time.

3.6.3 Proposed Mitigation

All right-of-way acquisition will be handled in accordance with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. In addition, relocation assistance for all eligible residential and business relocatees would be provided without discrimination, through the Nebraska Relocation Assistance Act as required by federal and state laws (Neb. Rev. Stat. Section 76-1214 *et seq.*).

A Relocation Assistance Program will be offered to all who are displaced by the project. This program is designed to provide advisory assistance to all displacees and under many circumstances, to make payments to help offset some of the expenses and costs experienced by those who are displaced.

Table 3.6
REQUIRED ACQUISITIONS AND RELOCATIONS

PARCEL ID	PROPERTY TYPE	RESIDENTIAL SQ FT ¹	NUMBER OF BEDROOMS ¹
SM-4 (3 Residences and 1 Business)			
22-32-200-012-000	1 ha (2 ac) suburban acreage	2276	3
08-01-100-002-000	1 ha (2 ac) business (Major Oil)	-	-
08-01-100-002-103	mobile home—double-wide	1518	3
08-02-400-003-000	2 ha (5 ac) farmstead split-off	3118	4
EC-1 (7 Residences)			
17-36-300-002-000	43 ha (106 ac) farm	1920	5
16-01-200-001-000	2 ha (5 ac) suburban acreage	1617	3
16-01-200-002-000	2 ha (6 ac) farmstead split-off	2690	3
16-12-300-002-000	4 ha (9 ac) farmstead split-off	1536	4
16-24-300-006-000	1 ha (3 ac) suburban acreage	1921	2
16-25-100-006-000	8 ha (19 ac) suburban acreage	1592	4
17-36-204-001-000	1 ha (3 ac) suburban acreage	3200	3
EM-1 (4 Residences)			
22-29-300-005-000	10 ha (25 ac) suburban acreage	2211	4
22-32-200-015-000	3 ha (8 ac) suburban acreage	1304	3
22-32-200-012-000	1 ha (2 ac) suburban acreage	2276	3
22-29-100-007-000	8 ha (21 ac) suburban acreage	3215	3
EF-1 (7 Residences and 1 Business)			
24-33-100-001-000	5 ha (13 ac) farmstead split-off	3298	4
22-28-300-002-000	15 ha (36 ac) suburban acreage	1400	3
22-33-100-012-000	2 ha (5 ac) farmstead split-off	1632	3
22-33-200-003-000	6 ha (14 ac) farmstead split-off	1120	3
23-21-300-006-000	17 ha (42 ac) suburban acreage plus business (Stevens Creek Storage)	1713	3
23-09-300-001-00	63 ha (155 ac) farm	1768	5
24-33-100-002-000	59 ha (147 ac) farm	672	2

¹ From the records of the Lancaster County Assessors Office

Residential Relocations. The following residential relocation payments can be made under certain conditions.

1. Moving cost payments
2. Replacement housing payments
3. Incidental expenses payments
4. Mortgage differential payments
5. Tax differential payments

No person shall be displaced from their residence unless a comparable replacement dwelling is available or provided for the displaced occupant.

Rural residential farmsteads may either be occupied by tenants; owned and occupied by non-farmers; or owned and occupied by someone in the business of farming at the location of the dwelling. When acquisition is partial, affecting only the farm home occupied by someone in the business of farming at the location of the dwelling, consideration will be given to providing replacement housing in the form of new construction on the remaining land, so as not to separate the owner of the business from his/her business operation.

For the beltway project, a worst case scenario would require relocation of ten residences at the same time if SM-4 and EF-1 were built together. In January 2001, the Lincoln Board of Realtors Multiple Listing Service listed approximately 49 rural residences ranging from 1 to 10 ha (2 to 25 acres), and \$150,000 to \$300,000 in price (Table 3.7). This number of residences on the market is considered average for Lancaster County, but could increase during spring and summer when, in general, more houses are put on the market. The available housing appears to be an adequate amount to handle relocations for the beltway; however, it may take adequate lead time to successfully relocate all occupants. In addition, if relocations exceed payment limits then last resort housing provisions will be implemented to ensure that all displaced occupants will have comparable, decent, safe and sanitary housing available to them.

Table 3.7

**ACREAGE SITES (1 to 10 HECTARES (2 TO 25 ACRES))
 FOR SALE IN LANCASTER COUNTY
 IN THE MULTIPLE LISTING SERVICE
 (as of 1/26/01)**

NUMBER OF BEDROOMS	LESS THAN \$150,000	\$150,000 - \$200,000	\$200,000 - \$250,000	GREATER THAN \$250,000
2 Bedrooms	1	2		
3 Bedrooms	4	4	3	7
4 Bedrooms	4	2	4	16
5 Bedrooms				2

Business Relocations. A displaced business would be offered a Relocation Assistance Program that meets all the criteria under federal and state laws governing displacements on publicly financed projects. This program is designed to offer advisory services and under many circumstances, to make payments to help offset some of the expenses and costs experienced by those who are displaced.

The following relocation payments can be made for businesses, provided certain conditions are met:

1. Moving cost payments,
2. Searching cost payments,
3. Actual direct loss of personal property,
4. Reestablishment expenses for small businesses, or
5. Fixed payment, based on income, in lieu of the previous payments.

Acquisition and Relocation Payment Provisions. Following an appraisal, property owners would be offered and paid no less than fair market value for their residential or commercial property. This payment would be through fee simple acquisition. In addition, the Relocation Assistance Act would provide displaced persons and businesses with various types of payments related to moving. The length of occupancy would determine eligibility for certain replacement housing benefits, but moving costs would be available to all persons regardless of length of occupancy, provided they are in occupancy as of the date of acquisition.

3.6.4 No Build Alternative

The no build alternative will require no acquisitions or relocations, other than that required for construction of the proposed future roadway network improvements.

3.7 RAILROADS, UTILITIES, AND PUBLIC SERVICES AND FACILITIES

3.7.1 Existing Conditions

Railroads. There are four railroad lines in the beltway study area providing freight and passenger service to and through the region. From west to east, the Union Pacific Railroad (UP) has a single track line which parallels Salt Creek and Wilderness Park in the south beltway study area. A portion of the line, from the half-section line south of Saltillo Road to Beatrice, has been identified for abandonment in the near future and placed in conservancy for the Rails-to-Trails program. The rest of the line to the north remains in active status. The Burlington Northern Santa Fe Railway Company (BNSF) has a double track mainline which parallels the UP on the east; this line provides freight service with up to 30 trains per day. Omaha Public Power District (OPPD) has recently purchased the BNSF line to the OPPD coal-fired electric generating plant at Nebraska City. This line roughly parallels N-2 through the south beltway study area and carries approximately 12 trains per week. BNSF also has a double track mainline which runs along the north side of US 6 in the east beltway study area; this line provides freight and passenger service with upwards of 42 trains per day.

Utilities. Numerous public and private utilities are located in the beltway study area, including:

1. Extensive electric distribution lines, substations and other facilities belonging to Lincoln Electric System, Norris Public Power District and Nebraska Public Power District.
2. Extensive telephone distribution lines belonging to Alltel.
3. Radio and communication towers belonging to several public and private entities.
4. Municipal and rural water distribution systems for the City of Lincoln, City of Waverly, Lancaster County Rural Water District No. 1, and Cass County Rural Water District No. 2. These include the City of Lincoln's Northeast Pump Station and underground reservoir, and City of Waverly's well field.
5. Underground gas and liquid fuel transmission mains belonging to Peoples Natural Gas, Enron Transportation/Northern Natural Gas and Kinder Morgan Energy Partners.
6. Underground cable lines, including Galaxy Cablevision, Level 3 Communications, MCI-Worldcom, and Sprint.
7. Lancaster County maintenance buildings.
8. Petroleum pipelines and storage tanks belonging to Williams Pipeline/Mid-America Pipe Company and Conoco Pipeline Company.

Many of the above ground features are shown on the constraints map, (see **Figures 2.1 and 2.25**). More detailed maps are provided in *Interim Report No. 1* (WSA, 1996a).

Public Services and Facilities. The beltway study area is served by the following emergency services:

1. County Sheriff
2. Rural Fire Districts
3. Rural/Metro Medical Services

3.7.2 Impacts of the Four Finalist Alternatives

Railroads. The SM-4 alternative will cross three railroad lines; including the very end of the active portion of the UP (SM-4 crosses the UP line just north of the half-section line). All of these locations will be provided with grade separations. None of the east alternatives cross railroad lines north of N-2; however, if SM-4 and EC-1 are constructed, two crossings of the OPPD line will be required. **Table 3.8** lists required railroad crossings.

Table 3.8

REQUIRED RAILROAD CROSSINGS

RAILROAD LINES	ALTERNATIVES			
	SM-4	EC-1	EM-1	EF-1
UP along Salt Creek	Yes	No	No	No
BNSF along Salt Creek	Yes	No	No	No
OPPD along N-2	Yes	Yes*	No	No
BNSF along US 6	No	No	No	No
TOTAL CROSSINGS	3	2	0	0

* If SM-4 and EC-1 are constructed, two crossings of the OPPD line will be required. EC-1 alone does not require any railroad crossings.

Utilities. Utility relocations will be determined during final design. Any approvals for relocations will be obtained at that time. Major underground pipe lines are generally buried deep enough to avoid potential impacts. EM-1 will need to be designed to avoid impacts to the nearby transmission towers.

The majority of the utilities found in the beltway study area are routinely encountered on roadway projects. Most of these utilities can be easily relocated at minimal cost once final design has identified those utilities that must be moved. There are a few major utilities in the beltway corridor that may require additional consideration during final design due to the high cost of relocation. These utilities include major gas distribution lines, water mains, major fiber optic lines, and electrical transmission lines.

Major underground utilities such as water, gas and fiber optic lines can be accommodated during final design by adjusting the vertical alignment as necessary to provide adequate cover over existing lines. Water mains generally require 1.5 m (5 ft) minimum cover. Other underground utilities may allow as little as 0.75 m (2.5 ft) of cover. Any adjustments to the vertical alignment will likely be determined based on a cost comparison of the cost of relocating the utility versus adjusting the roadway alignment.

The major electrical distribution lines in the area may require alignment shifts during final design in order to accommodate the existing steel towers. Alignment shifts would likely be determined based on a comparison of the cost to realign the roadway (including right-of-way costs) versus the cost to relocate the distribution line. General guidelines for roadway construction near electrical distribution lines include: maintain transmission towers on private property, no grade changes or disturbed soil within 9 to 15 m (30 to 50 ft).

After initiation of the beltways study, Lincoln Electric System completed a transmission line to service the City of Waverly. This line is crossed by EM-1 and then continues parallel to the beltway. During final design the beltway alignment may need to be adjusted to cross this transmission line at a right angle in order to fit the beltway in between the transmission towers which are spaced 205 to 210 m (675 to 700 ft) apart. This can be accomplished by moving the alignment to the east of the substation located south of Adams Street or by crossing the line where it turns west between Fletcher and Havelock Avenues.

Public Services and Facilities. Public services and public facilities are not expected to be negatively impacted by construction of a beltway. The primary effect on community services will be positive due to improved access for emergency vehicles.

3.7.3 Proposed Mitigation

Railroads. All of the beltway/railroad crossings will include grade separations over any active railroad lines.

Utilities. Utility relocations will be determined during final design. Any approvals for relocations will be obtained from the affected utility at that time.

Public Services and Facilities. No mitigation is proposed.

3.7.4 No Build Alternative

The no build alternative will avoid any impacts to railroads, utilities or public services and facilities, other than that required for construction of the proposed future roadway network improvements.

3.8 ECONOMIC IMPACTS

3.8.1 Existing Conditions

Lincoln and Lancaster County have experienced a growing and prosperous economy, resulting in the sustained population growth, employment and aggregate income observed over the past three decades. The City has continually expanded the area of the urban service area to meet the demands for new residential, commercial, industrial, institutional and recreational land uses.

3.8.2 Impacts of the Four Finalist Alternatives

Construction Cost. The preliminary construction cost estimates are summarized in Table 3.9. Costs are within 8 percent of each other for the end-to-end beltways, and within 19 percent for the stand alone east beltway alternatives. This is within the 20 percent contingency contained in all cost estimates. It should be noted that the common interchange at N-2 results in a \$12 million cost savings with the EM-1 alternative which is not realized with the other two east alternatives. In contrast, the SM-4/EC-1 alternative requires two interchanges at N-2, one 0.8 km (0.5 mi) east of 98th Street and the other at 120th Street. The two N-2 interchanges for the SM-4/EF-1 alternative are located at 120th Street and 0.8 km (0.5 mi) east of 134th Street.

Table 3.9

**SUMMARY OF BELTWAY
 PRELIMINARY CONSTRUCTION COST ESTIMATES**

ALTERNATIVE	COST
PARTIAL BELTWAY	
SM-4	\$107,000,000
EC-1	\$147,000,000
EM-1	\$157,000,000
EF-1	\$128,000,000
END-TO-END BELTWAY	
SM-4/EC-1	\$249,000,000
SM-4/EM-1	\$252,000,000
SM-4/EF-1	\$231,000,000

Cost Effectiveness and Economic Efficiency. Construction of the beltway involves commitment of fiscal resources, requiring a substantial expenditure of public funds. The commitment of these funds is based on the idea that residents of Lincoln and Lancaster County, as well as travelers through the region, would benefit by improving the quality of the transportation system. The economic benefits are those derived from increased transportation efficiency. Transportation cost savings that result from improvements to a corridor are true benefits to society as a whole. When travelers experience time savings, greater safety, or reduced vehicle operating costs, their gain is not offset by losses to other people. From an economic standpoint, these cost savings are the same as a direct increase in income by making resources available for other purposes. Based on the economic analyses in **Sections 2.4.4, 2.4.5 and 2.3.6**, all four of the beltway alternatives were considered to be cost-effective and to provide substantial road user benefits, including travel-time savings, vehicle operating cost savings, and accident reduction savings. These benefits are considered to outweigh the commitment of financial resources.

Property Values. Currently, the Stevens Creek Basin Initiative is proceeding on development of a land use plan for the east beltway area. It is unknown at this time whether the subarea plan will or will not include development along the east beltway alignment. (No similar effort has been initiated for the south). Although no proposed land use plan has been developed for a beltway scenario, property values in the vicinity of a freeway typically increase, especially at the interchanges. This would result in greater net gain in tax revenue over existing conditions, or with loss of tax base from acquisition of public right-of-way. If a land use plan is developed with a no growth scenario, property values would not be expected to increase as dramatically.

Tax Revenue. Based on average County tax valuations, the acquisition of private property to construct an end-to-end beltway would remove up to \$3.8 million from the County property tax base, and reduce annual property tax revenue for the County by an estimated \$100,000. This amount is far less than 1 percent of the annual property tax revenues in the County.

Acquisition Costs. Construction cost estimates for acquisition of right-of-way, residences and businesses are substantially higher than the average County tax valuations. For the purposes of this study, acquisition costs were estimated at are \$10.3 million for SM-4, \$16.3 million for EC-1, \$12.1 million for EM-1, and \$13.9 million for EF-1 (see **Tables 2.16 and 2.17**).

3.8.3 Proposed Mitigation

No mitigation is proposed.

3.8.4 No Build Alternative

The no build alternative will avoid commitment of fiscal resources for a beltway, but will require further investment for the existing arterial street system which may include widening streets. This is in addition to that required for construction of the proposed future roadway network improvements.

3.9 JOINT DEVELOPMENT

As part of the alternatives analysis, early consideration was given to joint development of the beltway with other new features that might be incorporated into the beltway right-of-way in order to enhance the concept. Options considered included features that might be compatible with a 90 m (300 ft) road right-of-way such as bicycle and pedestrian trails; linear parks; rail freight line consolidations; and utility lines.

Although some features, such as a trail or linear park, could be incorporated into the beltway project corridor with additional right-of-way, most other joint use opportunities were not considered feasible (see **Section 2.1.6**). The City of Lincoln is experiencing some problems at Wilderness Park, where environmental and trails activists are adamantly opposed to the construction of arterial connectors to US 77 through the park. No joint use opportunities are being pursued for the beltway project at this time.

3.10 RECREATION IMPACTS

3.10.1 Existing Conditions

Recreational facilities in the study area include two public parks, two private recreation areas, three private golf courses, a privately owned arboretum, and three public hiker/biker trails and two public equestrian trails. Wilderness Park, which extends 12 km (7.5 mi) from Lincoln to Saltillo Road along Salt Creek, is a County-owned, City-operated park providing separate trails for hiking, bicycle and equestrian users. Jensen Park, also owned by the City, is soon to be developed with ballfield facilities. Golf courses in the study area include Wilderness Ridge, Hidden Valley and Crooked Creek. Four other courses about the study area and include Yankee Hill, Himark, Firethorn and Hillcrest Country Clubs. The MoPac East and David Murdock Trails are located in the east beltway study area. The Izaak Walton League has a facility south of

Highway 2 on South 134th Street. The Boy Scouts of America (BSA) have recently purchased a property near A Street and Stevens Creek; the organization was fully advised of the location of the beltway alternatives prior to acquisition of the property.

It should be noted that the City of Lincoln is considering two new park areas within the beltway study area which could result in the beltway crossing future public recreation land; however, Section 4(f) only applies to existing resources. In addition, if these park lands are concurrently planned with the proposed roadway project, they would not be considered 4(f) properties in the future. The first location is the Salt Valley Heritage Greenway Corridor extending south from Wilderness Park to Hickman which would be crossed by SM-4. The second is a new park location in the vicinity of Stevens Creek which could be crossed by EM-1.

3.10.2 Impacts of the Four Finalist Alternatives

The only recreational impacts are that (1) all of the east beltway alternatives will require grade separated crossings of MoPac East hiker/ biker and equestrian trails (2) EC-1 will require a grade separated crossing of the David Murdock Trail, and (3) EM-1 will require acquisition of approximately 3.6 ha (9 ac) from the BSA property, and will have noise impacts at the BSA property and at Crooked Creek golf course. Noise at Crooked Creek and the adjacent BSA properties will not approach or exceed the 66 dB level, but will increase by 15 dBA or more near the property boundary. However, the noise study indicated that the 66 dBA contour would extend no more than 12 m (40 ft) beyond the beltway right-of-way (**Appendix C, Section 7.4**).

3.10.3 Proposed Mitigation

Mitigation for the trail impacts are discussed in detail in **Section 3.11** and **Appendix H**. Mitigation of noise impacts to the golf course are discussed in **Section 3.13** and **Appendix C**.

Early in the project planning, it was discussed that if mitigation was required for impacts to parks or other appropriate resources, then consideration should be given to acquiring project right-of-way to extend Wilderness Park south of Saltillo Road. At this point in time, no mitigation requirements of this type have been identified.

3.10.4 No Build Alternative

The no build alternative will avoid any impacts to recreation, other than that required for construction of the proposed future roadway network improvements.

3.11 PEDESTRIAN AND BICYCLE ACCOMMODATIONS

3.11.1 Existing Conditions

Existing Trails. There are three recreational trails within the beltway study area as listed in **Table 3.10**. Locations of the trails are shown in **Figures 2.1** and **2.25**. The Wilderness Park Trail has two trail heads in the study area (14th Street at Salt Creek and Saltillo Road at Salt Creek). The MoPac East Trail also has two trailheads in the study area at 98th Street and in Walton. There are no other pedestrian or bicycle accommodations in the study area, with the exception of the Walton Trail Company in Walton, a private business enterprise which primarily serves users of the MoPac East Trail. Use of the trails is limited to daylight hours.

Table 3.10

EXISTING RECREATIONAL TRAILS IN THE BELTWAY STUDY AREA

TRAIL	TYPES	SURFACE	OWNER/MANAGER	LOCATION
Wilderness Park	1. Pedestrian 2. Bicycle 3. Equestrian	Wood Chip Ground Surface Ground Surface	Lancaster County (Owner) City of Lincoln (Manager)	South Beltway
MoPac East	1. Pedestrian/Bicycle 2. Equestrian	Crushed Limestone Ground Surface	Lower Platte South Natural Resources District	East Beltway
David Murdock	1. Pedestrian/Bicycle	Crushed Limestone	City of Lincoln	East Beltway

The Wilderness Park trails occur entirely within the 12 km (7.5 mi) long park, with the exception of several at-grade crossings of paved city streets. The trails are located within a wooded setting along the banks of Salt Creek. In general, the trails are visually screened, but not audibly shielded from traffic along US 77 and the BNSF and UP railroads.

The MoPac East and David Murdock trails were developed along abandoned railroad rights-of-way. Both trails have 30 m (100 ft) rights-of-way. Roadway intersections have been variously treated with both at-grade and grade separated crossings. Both trails originate within urban portions of the city, extend east through suburban developments, and continue east into agricultural areas. Visually, these trails occur in more open settings than the Wilderness Park Trail. The MoPac Trail, which follows the old Missouri Pacific line, is owned by the City of Lincoln to 150 m (500 ft) east of 84th Street. From this point east, the MoPac East Trail is owned by LPSNRD and extends to Elmwood; future plans include extending the route to Omaha. In the east beltway area, the trail is located in the vicinity of A Street. The Murdock Trail, which follows the old Chicago-Rock Island line, is owned by the City of Lincoln and ends at 112th Street. The trail terminus has no trailhead, and all former railroad right-of-way to the east has been sold to adjacent landowners. In the east beltway area, the trail is located in the vicinity of Havelock Avenue.

Through the beltway study area, hiker/biker usage on the Wilderness Trail is considered moderate compared to very heavy use on the MoPac East and fairly light use on the Murdock Trail. Equestrian usage is considered moderate on the Wilderness Park Trail (personal communication between Amy Zlotsky and Terry Genrinch, City of Lincoln Parks and Recreation Department, 22 August 2000) and very heavy on the MoPac East Trail (personal communication between Amy Zlotsky and Glenn Johnson, LPSNRD, 27 June 2000).

Proposed Trails. There are three proposed trails within the beltway study area. The LPSNRD's approved Stevens Creek Watershed Plan includes an open space component to acquire conservation easements over the 100-year floodplain between the MoPac East and Murdock Trails. The plan (which has been incorporated into the *Lincoln-Lancaster County Comprehensive Plan*) includes constructing a proposed connector trail within this easement between the MoPac East and Murdock Trails. The Stevens Creek Connector would follow the west bank of Stevens Creek from the MoPac East Trail to 112th Street. After crossing the 112th Street bridge, the connector would then follow the east bank of the creek to the Murdock Trail

and on to Salt Creek. The study team has been in contact with LPSNRD regarding potential beltway conflicts.

The UP rail line, from the half-section line south of Saltillo Road and extending south to Beatrice, has been recently abandoned and filed upon for rail banking for the Rails-to-Trails program by the Nebraska Trails Council. Several entities have been approached for participation in construction of this project—the Homestead Trail. To date, LPSNRD, Nemaha NRD and the City of Beatrice have decided to participate; Gage County and Little Blue NRD have decided not to; and the City of Lincoln and Lancaster County have not yet decided. Even if the proposed trail project is constructed, the trail will still be considered a transportation corridor, and could be used for railroad purposes in the future. It should be noted that there would be a 0.8 km (0.5 mi) gap between the end of the Wilderness Park (and its trails) and the beginning of the proposed Homestead Trail, and that the south edge of the SM-4 right-of way is located approximately 135 m (450 ft) north of the beginning of the proposed Homestead Trail.

The UP has also filed abandonment on the section beginning 0.5 mi south of Saltillo Road and extending north along the edge of Wilderness Park, through the South Bottoms neighborhood, and into downtown Lincoln. The City has filed for rail banking and is negotiating the purchase of this segment—Jamaica North. Therefore, it is very likely that a trail would be located so as to connect Wilderness Park (and its trails) to the Homestead Trail should the Homestead Trail become a reality.

3.11.2 Impacts of the Four Finalist Alternatives

The required trail crossings and approximate right-of-way from construction of the four alternatives is summarized in Table 3.11.

Table 3.11

REQUIRED TRAIL CROSSINGS

TRAILS	ALTERNATIVES			
	SM-4	EC-1	EM-1	EF-1
Wilderness Park Trails	No	No	No	No
MoPac East Trail	No	Yes 0.3 ha (0.7 ac)	Yes 0.3 ha (0.8 ac)	Yes 0.3 ha (0.7 ac)
David Murdock Trail	No	Yes 0.3 ha (0.8 ac)	No	No
Proposed Stevens Creek Connector	No	Yes	Possible	No
Proposed Homestead Trail	No	No	No	No
Proposed Jamaica North Trail	Yes	No	No	No

Existing Trails. The south beltway, SM-4, crosses no existing trails. All east beltway alternatives cross the MoPac East Trail; but only EC-1 crosses the Murdock Trail. It should be noted that EC-1 crosses the Murdock Trail very close to the trail terminus at 112th Street.

Construction of the beltway will introduce a new roadway element into these segments of the trails, and may adversely impact the visual and audible experience of the trail users for a short distance. However, the beltway impact on trails is considered negligible considering the trails are part of an urban trail system that already crosses many roadways (approximately 1 per 1.6 km (1 mi)), and considering the length of the trails (over 14 km (9 mi) for MoPac/MoPac East; over 11 km (7 mi) for Murdock). Since the trails crossings will be mitigated for, there will be no adverse impact on existing pedestrian and bicycle accommodations.

Proposed Trails. SM-4 would cross the proposed Jamaica North Trail (or other connector trail) in the vicinity of the bridge over Salt Creek. EC-1 would cross the proposed Stevens Creek Connector. Since EM-1 crosses the MoPac East Trail very near Stevens Creek is possible that EM-1 could cross the Stevens Creek Connector as well.

3.11.3 Proposed Mitigation

Existing Trails. For the MoPac East Trail, design of the beltway/trail intersections will include (1) grade separations to safely accommodate the trail, (2) separate access through confined areas for the hiker/biker and equestrian trails (or a physical divider), and (3) underpasses for all equestrian trail crossings since horses are hesitant to use overpasses (personal communication between A. Zlotzky and Glenn Johnson, LPSNRD, 27 June 2000). The hiker/biker trail may be designed as an overpass or underpass. For the Murdock Trail, design of the beltway/trail intersection will be handled as an overpass since it is not an equestrian trail. Design of the trails will follow AASHTO and ADA trail guidelines, and will be coordinated with the trail owners, LPSNRD and the City. Specific details on the crossings will not be determined until final design.

Because the trails are publicly owned recreational facilities and rights-of-way will need to be acquired from LPSNRD and the City of Lincoln, the existing trails are considered 4(f) resources. The 4(f) resources are discussed further in the Section 4(f) Statement in (**Appendix H**).

Proposed Trails. SM-4 crosses the abandoned UP line just north of the half-section line within the Jamaica North segment for which the City has filed for rail banking. If a trail has already been built in this location, the beltway project would provide an appropriate crossing over the trail right-of-way. If the Homestead Trail is built prior to the beltway and prior to the Jamaica North Trail (or other connector), the beltway project would provide a bicycle/pedestrian trail (and appropriate trail crossing) to connect the south end of Wilderness Park with the north end of the Homestead trail. The beltway project would also be designed to accommodate the proposed Stevens Creek Connector at the EC-1 or EM-1 crossings.

Construction of the proposed trails could result in the beltway crossing future public recreation areas, however, these trails are being concurrently planned with the proposed roadway project, including discussion of appropriate crossings. Therefore, they would not be considered Section 4(f) properties in the future. (Relative to the Jamaica North Trail, stipulations of the rail banking agreement allow for any transportation use of the right-of-way. The 4(f) resources are discussed further in the Section 4(f) Statement in (**Appendix H**).

Although the potential exists for acquiring additional land to provide pedestrian and bicycle trails within the beltway right-of-way, other options through the city would be more desirable. Such options are already being considered with the ultimate effect of connecting the Wilderness Park Trail to the MoPac Trail, and the MoPac East Trail to the Murdock Trail (see above).

There are no other trail connections proposed within the beltway right-of-way at this time. If necessary, the issue of whether additional trails should occur within highway right-of-way could be reevaluated.

3.11.4 No Build Alternative

The no build alternative will have no impacts on pedestrian and bicycle accommodations that can be identified at this time. However, as County roads are hard surfaced to accommodate a growing suburban population (as part of the proposed future roadway network improvements), there will be some impact to recreational trails. An example would be the recent paving of 148th Street across the MoPac Trail.

3.12 AIR QUALITY

An air quality analysis was conducted for the beltway project. Results of the evaluation are summarized here; more detailed information is provided in the Air Quality Analysis (**Appendix B**).

3.12.1 Existing Conditions

Based on the most currently published data, the Nebraska Department of Environmental Quality (1998) reports that all of Nebraska is in attainment with the National Ambient Air Quality Standards (NAAQS) for particulate matter (PM₁₀) and carbon monoxide.

3.12.2 Impacts of the Four Finalist Alternatives

Construction Impacts. Construction impacts generated from internal combustion engines and fugitive dust generated during excavation, grading and site preparation will cause a short term impact on ambient air quality. Of these emissions, fugitive dust will be the most predominant. Dust generated from these activities is generally large particles which are redeposited in close proximity to the construction site. However, a fraction of the dust is composed of small particles referred to as PM₁₀ which can remain airborne for an indefinite period of time.

Impacts from Vehicle Emissions. A long term increase in the carbon monoxide levels proximal to the beltway alignment will be caused by the additional vehicular traffic. As such, an air quality analysis was conducted for the beltway project (**Appendix B**). Since Nebraska is in compliance with NAAQS, a regional analysis was not required; therefore, the evaluation focused on a project-level analysis. Although there are several criteria pollutants associated with mobile sources, FHWA considers carbon monoxide to be the most significant criteria pollutant of concern for a project-level analysis (FHWA, 1986); therefore, only evaluation of carbon monoxide is required for compliance purposes.

The air quality analysis for carbon monoxide was conducted based on the most conservative assumptions which assumed worst-case conditions for all variables. The highest predicted carbon monoxide levels proximal to the beltway segments with the highest traffic volumes are listed in **Table 3.12** along with the NAAQS criteria levels. NAAQS levels may be equaled, but not exceeded.

Table 3.12

**HIGHEST 1-HOUR AND 8-HOUR CARBON MONOXIDE CONCENTRATIONS
 FOR WORST-CASE LOCATIONS**

ROADWAY ANALYZED	1-HOUR CARBON MONOXIDE CONCENTRATION (ppm)	8-HOUR CARBON MONOXIDE CONCENTRATION (ppm)
SM-4 Roadway Segment (between South 27 th and 68 th Streets)	7	5
EC-1 Roadway Segment (between Adams and O Streets)	8	6
SM-4 and US 77 Interchange	6	4
EC-1 and I-80 Interchange	9	6
NAAQS Criteria	35	9

Based on the air quality analysis, the carbon monoxide contribution at these beltway locations together with the background carbon monoxide concentration is within the 1-hour and 8-hour concentration limits established in the NAAQS at all receptors. Since the worst-case roadway segments and interchanges are in compliance, it is reasonable to assume that all the beltway roadway segments and interchanges will be in compliance with the NAAQS. The increase in carbon monoxide is considered insignificant.

3.12.3 Proposed Mitigation

If objectionable dust levels occur during construction, dust will be controlled by timely applications of water and temporary seeding to the areas of construction.

No mitigation is proposed for vehicle emissions.

3.12.4 No-Build Alternative

Use of unpaved County roads will continue to generate dust over the long-term. Construction impacts associated with improvements to these section line roads and other planned roadway network improvements will generate temporary increases in dust. Increased vehicular traffic on existing roadways will increase local levels of carbon monoxide.

3.13 NOISE

A noise study was conducted for the beltway project. Results of the study are summarized here; more detailed information is provided in the Noise Study Report (**Appendix C**).

3.13.1 Existing Conditions

The Federal Highway Administration has developed noise abatement criteria based on the A-weighted, equivalent level noise descriptor ($L_{eq(h)}$). The $L_{eq(h)}$ is the equivalent steady state sound level measured in decibels (dBA), and reported over a period of one hour which contains the same acoustic energy as the time-varying traffic sound level during that same hour. **Table 3.13** lists the upper limits of the $L_{eq(h)}$ desirable noise levels that are part of the Noise Abatement Criteria (NAC) established by the FHWA. Any noise levels that approach or exceed these criteria would not be desirable and would be considered a noise impact.

Table 3.13
NOISE ABATEMENT CRITERIA
HOURLY A-WEIGHTED SOUND LEVEL

ACTIVITY CATEGORY	HOURLY NOISE LEVELS ($L_{eq(h)}$ dBA)	DESCRIPTION OF ACTIVITY CATEGORY
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, play grounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties or activities not included in Categories A or B above.
D	—	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

The majority of the beltway study area lies within rural areas, and the land use is classified as Activity Category "B" or "D". Activity "C" mostly pertains to commercial land use or business offices. Storage buildings or warehouses are not usually considered to be noise sensitive.

Ambient noise levels within the study area are primarily caused by vehicular traffic moving on the existing roadway network. Noise levels for the project area were determined by direct field measurements using a Quest 2800 sound level meter. Noise levels for locations near existing highways were determined by modeling the current traffic volume (1998 traffic data). Noise levels ranged in the mid to upper 40 $L_{eq(h)}$ dBA level adjacent to unimproved county roads and ranged in the upper 50 $L_{eq(h)}$ dBA to mid 60 $L_{eq(h)}$ dBA level near existing highways. Noise levels exceeding FHWA impact criteria currently occur at several residences located adjacent to N-2 .

3.13.2 Impacts of the Finalist Alternatives

The procedures included in the FHWA Traffic Noise Model involve an analysis of traffic noise in terms of traffic parameters (vehicle type and speed), roadway design and receptor characteristics. These parameters are input into the computer model which provides the noise level estimate. All noise levels referred to in this study are exterior noise levels. Detailed engineering regarding the exact alignment and grade of the beltway alternatives, cut and fill areas, and intersection design is beyond the scope of the current level of the beltway study. As such, the traffic engineer's best estimates of these parameters have been incorporated into the model, therefore, these results must be considered preliminary. Further analysis of the noise impacts and recommended mitigation will be completed using more detailed design information on the preferred alternatives.

In accordance with the Nebraska Department of Roads policy, a noise impact occurs and abatement measures will be considered for receptors in Activity Category B if:

1. The predicted future year noise levels approach or exceed NAC criteria (67 dBA or 72 dBA for Activity Category C). Approach is defined by the NDOR as 1 dBA less than the noise abatement criteria or;
2. The predicted future year noise level exceeds the existing noise level by 15 dBA or more.

Future Noise along Existing Roadways. Construction of the east beltway alternatives will increase traffic volume on several existing roadways that cross or parallel the beltway alignments (*Interim Report No. 3* (WSA, revised 1999)) and which are not necessarily in the beltway study area. Those roadway segments which were predicted to have an increase of 50 percent or greater traffic volume were included in the noise study.

For these locations, the 2030-Build projected traffic Leq(h) noise level at each receptor was compared to the 2020 No-Build traffic Leq(h) noise level to determine future noise impacts for receptors adjacent to the existing roadways. This analysis indicated that noise levels will generally increase, however, no noise impacts were predicted (see **Appendix C, Tables C.4 to C.11**).

Future Noise along the Beltway. The beltway noise analysis included all receptors within approximately 240 m (800 ft) of the edge of pavement (within the 300 m (1000 ft) range of accuracy of the model). The results of the noise analysis for all of the receptors analyzed are provided in **Appendix C, Tables C.12 to C.17**. **Tables C.12 to C.14** are the SM-4 alternative with the varying traffic volumes depending on connection with the three different east alternatives. Although traffic volumes are somewhat different, the noise impacts are the same at the receptor sites. **Tables C.15 to C.17** are the three east beltway alternatives.

Receptors which are predicted to have a noise impact are listed in **Table 3.14**. There are 39 impacted residential receptors, including 5 along SM-4; 13 along EC-1, 8 along EM-1; and 13 along EF-1.

Table 3.14

RECEPTORS IMPACTED BY NOISE

ALTERNATIVE	RECEPTOR MAP NUMBER	RECEPTOR TYPE	EXISTING NOISE LEVEL	2030-BUILD NOISE LEVEL	TYPE OF IMPACT	
					Approach or Exceed NAC	Increase Equal to or Greater than 15 dBA
SM-4	11	Residence	44	61	No	Yes
SM-4	25	Residence	64	67	Yes	No
SM-4	27	Residence	67	70	Yes	No
SM-4	28	Residence	66	68	Yes	No
SM-4	29	Residence	66	70	Yes	No
EC-1	10	Residence	45	62	No	Yes
EC-1	17	Residence	49	66	Yes	Yes
EC-1	19	Residence	46	66	Yes	Yes
EC-1	39	Residence	48	64	No	Yes
EC-1	40	Residence	48	65	No	Yes
EC-1	42	Residence	48	63	No	Yes
EC-1	44	Residence	63	67	Yes	No
EC-1	45	Residence	44	61	No	Yes
EC-1	46	Residence	44	62	No	Yes
EC-1	47	Residence	44	62	No	Yes
EC-1	51	Residence	44	59	No	Yes
EC-1	55	Residence	52	67	Yes	Yes
EC-1	56	Residence	52	68	Yes	Yes
EM-1	6	Residence	67	67	Yes	No
EM-1	7	Residence	66	66	Yes	No
EM-1	8	Residence	66	66	Yes	No
EM-1	17	Residence	44	64	No	Yes
EM-1	23	Golf Course	44	59	No	Yes
EM-1	25	Golf Course	44	60	No	Yes
EM-1	27	Residence	43	59	No	Yes
EM-1	31	Residence	43	58	No	Yes
EM-1	35	Residence	47	63	No	Yes

Table 3.14 (continued)

ALTERNATIVE	RECEPTOR MAP NUMBER	RECEPTOR TYPE	EXISTING NOISE LEVEL	2030-BUILD NOISE LEVEL	TYPE OF IMPACT	
					Approach or Exceed NAC	Increase Equal to or Greater than 15 dBA
EM-1	36	Residence	47	62	No	Yes
EF-1	2	Residence	69	73	Yes	No
EF-1	5	Residence	66	71	Yes	No
EF-1	6	Residence	66	69	Yes	No
EF-1	7	Residence	67	69	Yes	No
EF-1	8	Residence	62	66	Yes	No
EF-1	9	Residence	65	69	Yes	No
EF-1	10	Residence	65	69	Yes	No
EF-1	12	Residence	46	63	No	Yes
EF-1	13	Residence	46	61	No	Yes
EF-1	24	Residence	43	66	Yes	Yes
EF-1	25	Residence	43	58	No	Yes
EF-1	30	Residence	47	64	No	Yes
EF-1	31	Residence	47	66	Yes	Yes

The area adjacent to the roadway which will be within the 66 dBA contour will vary depending on traffic volume and type, and topography. This contour was estimated based on review of the predicted noise levels for the existing receptors along the alignments, and by inserting additional receptors. Along SM-4 the contour ranges from 52 to 76 m (170 to 250 ft) from the edge of pavement; along EC-1 and EM-1 the contour ranges from 46 to 58 m (150 to 190 ft); and along EF-1 the contour is approximately 46 m (150 ft) from the edge of pavement. These distances will increase near the major intersections. Based on this evaluation, the 66 dBA contour would extend no more than 30 m (100 ft) beyond the edge of the right-of-way, under the worst case scenario; and in some cases, would not extend beyond the right-of-way at all.

Noise was modeled at the three historic properties that occur within 240 m (800 ft) of the edge of pavement of the road (Table 3.15). None of these sites were predicted to have noise impacts (noise impacts generally occur within 75 m (250 ft) of the edge of pavement. None of the other historic standing structures were within 300 m (1,000 ft) of the edge of right-of-way; therefore, they were not modeled.

Table 3.15

HISTORIC SITES MODELED FOR NOISE IMPACTS

HISTORIC SITE	ALTERNATIVE	RECEPTOR NO.	1999 EXISTING NOISE LEVEL	2030 BUILD NOISE LEVEL	MODEL RESULTS
Henry Wunibald Farmyard LC00:S-143	SM-4	R-16	47 dBA	59 dBA	No Impact
Penterman Farmyard LC00:E-53	EF-1	R-3	43 dBA	55 dBA	No Impact
Theresa Retzlaff Farmyard LC00:E87	EF-1	R-21	45 dBA	55 dBA	No Impact

3.13.3 Proposed Mitigation

In accordance with the NDOR Noise Abatement Policy, noise abatement measures must be considered where predicted traffic noise levels approach or exceed the noise abatement criteria, or when the predicted traffic noise levels substantially exceed the existing noise levels (i.e. 15 $L_{eq(h)}$ dBA). Two types of noise mitigation measures were considered during this study: shifting the roadway alignment horizontally and constructing noise barriers.

Shifting the Roadway Alignment Horizontally. A shift in the horizontal alignment can sometimes be made to reduce traffic noise where receptors are typically on one side of the roadway alignment and the topography is acceptable. Shifting the roadway away from the receptor will reduce noise levels as sound intensity decreases with distance.

Constructing Noise Barriers. A noise barrier, either a wall made of concrete or wood products or an earthen berm, may be constructed to break the line-of-sight to the receptor. To be effective, a noise barrier must be continuous and have substantial length and height. In accordance with the NDOR Policy, a noise barrier must be *feasible* from an engineering standpoint and *reasonable* from a cost, effectiveness, and access standpoint to be considered.

The feasibility of implementing these types of noise abatement measures was analyzed for the impacted receptors. The conclusions of the feasibility study are summarized in **Table 3.16**. It should be noted that some locations have feasibility for alignment shifts and/or barriers.

Because noise barriers for certain locations appear to be feasible based on the current alignments, a reasonableness test was conducted for each of these locations. Reasonableness is judged on a point system (see **Appendix C**). Barriers with a total of 9 points or less are judged to be not reasonable and are excluded from further consideration. Barriers were considered reasonable at 6 locations (7 receptors). Reasonableness of barriers will be reassessed prior to construction based on costs at that time; if earthwork costs or right-of-way acquisition are too high, the noise barrier could be considered unreasonable at that time.

For locations where noise abatement is feasible and reasonable, a public information meeting will be held and benefitted property owners will be given an opportunity to vote according to NDOR Noise Policy. Noise abatement will be provided if 75 percent of the benefitted property owners are in favor of the proposed noise abatement device.

Table 3.16

NOISE ABATEMENT FEASIBILITY

Alternative	Receptor Number	Horizontal/Vertical Roadway Alignment Shift Feasible? ¹	Barrier Feasibility Determination				
			Compatible with Topography	Height ²	Other Noise Sources ³	Location	Is Barrier Feasible?
SM-4	R-11	Yes: shift 37 m (120 ft) north	Yes	No	No	OK	No
SM-4	R-25, 27, 28, 29	No	Yes	Yes	No	OK	Yes
EC-1	R-10	No	Yes	No	No	OK	No
EC-1	R-17	No	Yes	Yes	No	OK	Yes
EC-1	R-19	No	Yes	Yes	No	OK	Yes
EC-1	R-39, 40	No	Yes	No	No	OK	No
EC-1	R-42	Yes: shift 15 m (50 ft) west	Yes	No	No	OK	No
EC-1	R-44	No	Yes	No	Yes	OK	No
EC-1	R-45, 46, 47, 51	No	Yes	No	No	OK	No
EC-1	R-55	No	Yes	Yes	No	OK	Yes
EC-1	R-56	No	Yes	Yes	No	OK	Yes
EM-1	R-6, 7, 8	No	Yes	Yes	No	OK	Yes
EM-1	R-17	Yes: shift 90-105 m (300-350 ft) east	Yes	No	No	OK	No
EM-1	R-23, 25	No	Yes	Yes	No	OK	No
EM-1	R-27	No	Yes	No	No	OK	No
EM-1	R-31	No	Yes	No	No	OK	No
EM-1	R-35, 36	Yes: shift 120 m (400 ft) east	Yes	No	No	OK	No
EF-1	R-2	No	Yes	Yes	No	OK	Yes
EF-1	R-5, 6, 7, 8, 9, 10	No	Yes	Yes	No	OK	Yes
EF-1	R-12	Yes: shift 30 m (100 ft) west	Yes	Yes	No	OK	Yes
EF-1	R-13	Yes: shift 7.5-15 m (25-50 ft) west	Yes	Yes	No	OK	Yes
EF-1	R-24, 25	No	Yes	Yes	No	OK	Yes
EF-1	R-30	Yes: shift 60 m (200 ft) east	Yes	No	No	OK	No
EF-1	R-31	Yes: shift 75 m (250 ft) east	Yes	No	No	OK	No

Notes: 1 - Alignment shifted to eliminate noise impact (less than 66dBA or below significant increase of 15 dBA).
2 - Can the exposed height of a barrier be built 4.9 meters (16 feet) or less?
3 - Other noise sources include other roadways that contribute to noise.

The preliminary evaluation indicates noise abatement measures should be considered at 12 locations (14 receptors) as described in Table 3.17. All proposed barriers provide an insertion loss of a least 5 dBA below the predicted level. Roadway alignment shifts provide a reduction in the predicted traffic noise level increase to less than 15 dBA over existing; however, in most cases only a 1 to 2 dBA reduction is gained.

Table 3.17

LOCATIONS FOR CONSIDERATION OF ABATEMENT MEASURES

ALTERNATIVE	RECEPTOR	ABATEMENT CONSIDERATION(S)
SM-4	R-11	Shift horizontal roadway alignment of roadway north approximately 37 m (120 ft).
EC-1	R-17	Installation of an earthen berm ranging in height from 3.4 to 4.3 m (11 to 14 ft) and a length of 189 m (621 ft).
EC-1	R-42	Shift horizontal roadway alignment of roadway west approximately 15 m (50 ft).
EC-1	R-55	Installation of an earthen berm at a height of 3.7 m (12 ft) and a length of 132 m (434 ft).
EC-1	R-56	Installation of an earthen berm at a height of 3.7 m (12 ft) and a length of 143 m (468 ft).
EM-1	R-17	Shift horizontal alignment of roadway 90 to 105 m (300 to 350 ft) east.
EM-1	R-35, 36	Shift horizontal alignment of roadway 122 m (400 ft) east.
EF-1	R-12	Installation of an earthen berm at a height ranging from 2.4 to 3 m (8 to 10 ft) and a length of 197 m (646 ft) OR shift horizontal alignment of the roadway 30 m (100 ft) west.
EF-1	R-13	Installation of an earthen berm ranging in height from 3.4 to 4.6 m (11 to 15 ft) and a length of 197 m (646 ft) OR shift roadway alignment 7.5 to 9 m (25 to 30 ft) west.
EF-1	R-24, 25	Installation of an earthen berm ranging in height from 4 to 4.9 m (13 to 16 ft) and a length of 98.5 m (323 ft).
EF-1	R-30	Shift roadway alignment 60 m (200 ft) east.
EF-1	R-31	Shift roadway alignment 75 m (250 ft) east.

There are 25 remaining residential receptors which are impacted, but for which it appears there are no feasible or reasonable noise abatement measures available. These include 4 on SM-4; 9 on EC-1; 5 on EM-1; and 7 on EF-1. Further evaluation of noise abatement measures should be conducted during final roadway design.

In addition to traffic noise, the project area would experience temporary noise increase during construction. Construction noise levels are typically a function of the scale of the project, the phase of construction, the condition of the equipment and its operating cycles, and the number of construction equipment units operating simultaneously. Measures that may be employed to reduce objectionable construction noise include designating haul routes away from sensitive receptors, controlling noise at the source, and limiting construction activities to certain hours of the day.

3.13.4 No Build Alternative

Under the no build alternative, traffic will continue to increase in the future; thereby increasing noise levels especially as unpaved roads are paved and/or widened with the planned roadway network improvements. However, the No Build alternative would not cause any noise impacts above NAC levels other than at the receptors already exceeding criteria levels under existing traffic conditions.

3.14 LIGHTING

3.14.1 Existing Conditions

The beltway study area is in a rural setting with very little street lighting. The main exceptions are in the vicinity of the small cities, towns and villages, and at intersections along the state highways.

3.14.2 Impacts of the Four Finalist Alternatives

Lighting features will be determined during final design. Location and choice of specific lighting structures will likely be determined by surrounding land uses. It is expected that the beltway will only be lighted at the intersections and within the City limits, if it extends to the beltway at the time of construction. There are a wide variety of lighting options available to minimize light intrusion on adjacent properties.

3.14.3 Proposed Mitigation

To the extent possible, the location and choice of specific lighting structures will be designed to minimize light intrusion on adjacent properties. In addition, landscape treatments will be considered to screen lighting if sufficient right-of-way is included outside the lateral obstacle clearances.

3.14.4 No Build Alternative

The no build alternative will avoid the need for lighting structures within the beltway study area, and there will be no impact due to lighting.

3.15 WATER QUALITY

3.15.1 Existing Conditions

Groundwater. Groundwater in Lancaster County is very complex. Groundwater quantity, quality and the ability of the principal aquifer to yield water all vary markedly within the county (Lincoln-Lancaster County Ecological Advisory Committee, 1997). In the beltway area, the principal aquifer is composed of mostly fine-grained material, primarily glacial till, and well yields are generally low. Depth of the principal aquifer is generally within 30 m (100 ft), but closer to 60 m (200 ft) east of Stevens Creek. As a result, most of the beltway area is served by rural water districts. Local shallow water aquifers occur along the creek bottoms, and spring or seep areas are not uncommon.

It should be noted that the City of Lincoln obtains all of its drinking water from a recently constructed well field and treatment plant located near Ashland on the Platte River. Water is conveyed underground approximately 48 km (30 miles) from this site to the City.

The Nebraska Department of Environmental Quality in coordination with the Nebraska Health and Human Services manage the State Wellhead Protection Program. This program assists communities and other public water suppliers in establishing zones (wellhead protection areas (WHPA)) surrounding water supply wells which if contamination occurred in would impact the water quality in the well in 20 years or less. Participation in this program is voluntary and no state statutes require delineation of a WHPA. As such, there are no state statutes restricting land use in a designated WHPA. However, other state statutes do restrict certain land uses such as septic tanks, lagoons, and injection wells within 300 m (1,000 ft) of the well.

Two wellhead protection areas (WHPA) occur in the beltway study area, the City of Waverly and Firethorn Subdivision (Lincoln) WHPAs. The City of Waverly WHPA encompasses the City of Waverly and an area west-southwest of Waverly (see **Figure 2.25**). Each of the east alignments passes through the southwest portion of the Waverly WHPA. The two wells in this area are at approximately 47 m (155 ft) in depth and screened in the Dakota sandstone, with approximately 30 m (100 ft) of till and clay protecting the aquifer from any potential spills. Although the four wells which are located just south of the City are much shallower, the WHPA for these wells would not be affected by the beltway alignments. The Firethorn Subdivision WHPA encompasses an area which is bounded approximately by A Street on the north, 70th on the west, Old Cheney on the south, and South 112th on the east. The EC-1 alignment passes through the eastern portion of the Firethorn Subdivision WHPA. The two Firethorn wells are around 61 m (200 ft) in depth and screened in the Dakota sandstone, with approximately 30 m (100 ft) of till and clay protecting the aquifer from any potential spills. In Lancaster County, the overlying layers of glacial tills and clays act as an aquiclude and serves as a natural barrier for the transmission of groundwater.

Private wells in the beltway are both the deep Dakota type wells, and shallow wells in reliable alluvial sources near creeks or in coarse material filled fissures in the geologic profile. These aquifers should be fairly well protected from potential surface contamination, unless a well was improperly constructed allowing floodwaters to enter the aquifer around the well casing. Generally, there are no large contiguous aquifers in the project area, and the smaller drinking water sources are limited in extent and often well buffered from surface contamination by thick clay material. Registered groundwater wells are shown in **Figure 2.25**.

Surface Water. There are two major streams in the south and east beltways study area: Salt Creek and Stevens Creek. Both have perennial flow through the study area. In addition, there are numerous tributaries to the creeks, and to the Little Nemaha River and Wagon Train Lake. These tributaries tend to have intermittent flow. Surface water rights are shown on **Figure 2.25**.

There has been limited surface water quality monitoring conducted for the stream segments within the south and east beltways study area. What data is available supports the beneficial use classifications identified by the Nebraska Department of Environmental Quality (NDEQ) (**Table 3.18**). The beneficial use designations correlate with specific numerical criteria of the Nebraska Surface Water Quality Standards. Based on the classification, Salt Creek and Stevens Creek are designated as providing warmwater aquatic life, agricultural water supply, and aesthetic uses. The tributaries of the Little Nemaha River and Wagon Train Lake are not classified within the beltways study area.

Table 3.18

STREAM CLASSIFICATION BY BASIN AND DESIGNATED BENEFICIAL USES

STREAM SEGMENT	SEGMENT NO.	USE CLASSIFICATION								Key Species
		State Resource Water	Recreation	Aquatic Life ¹		Water Supply ³			Aesthetics	
				Coldwater	Warmwater	Public Drinking Water	Agricultural	Industrial		
Salt Creek-Hickman Branch to Beal Slough	30000				A ²		A		X	channel catfish, walleye
Stevens Creek	20200				B		A		X	

¹Warmwater Class A waters provide, or could provide, a habitat suitable for maintaining one or more key species on a year-round basis. These waters are capable of maintaining year-round populations of a variety of other warmwater fish and invertebrate organisms and plants. Warmwater Class B are waters where the variety of warmwater biota is presently limited by water volume or flow, water quality (natural or irretrievable human-induced conditions), substrate composition, or other habitat conditions. These waters are only capable of maintaining year-round populations of tolerant warmwater fish and associated vertebrate and invertebrate organisms and plants. Key species may be supported on a seasonal or intermittent basis (e.g., during high flows) but year-round populations cannot be maintained.

²Site specific water quality criteria for un-ionized ammonia are assigned.

³Agricultural Class A are waters used for general agricultural purposes (i.e., irrigation and livestock watering) without treatment; water quality criteria have been assigned for conductivity, nitrate and nitrite as nitrogen, and selenium. Agricultural Class B are waters where the natural background water quality limits its use for agricultural purposes; no water quality criteria are assigned to protect this use.

Source: Nebraska Department of Environmental Quality
 Title 117 - Nebraska Surface Water Quality Standards
 Revised Effective Date: 3 March 1996

In regard to aquatic life uses, which relate most directly to fish and wildlife impacts, Salt Creek has been designated as Class A Warmwater stream; and Stevens Creek is designated as Class B Warmwater stream. Class A "waters provide, or could provide, a habitat suitable for maintaining one or more key species on a year-round basis. These waters are capable of maintaining year-round populations of a variety of other warmwater fish and invertebrate organisms and plants" (NDEQ, 1996). In contrast, Class B "are waters where the variety of warmwater biota is presently limited by water volume or flow, water quality (natural or irretrievable human-induced conditions), substrate composition, or other habitat conditions. These waters are only capable of maintaining year-round populations of tolerant warmwater fish and associated vertebrate and invertebrate organisms and plants. Key species may be supported on a seasonal or intermittent basis (e.g., during high flows) but year-round populations cannot be maintained" (NDEQ, 1996).

Because Nebraska is an agricultural state, NDEQ considers all streams to have agricultural water supply uses-regardless of actual or potential agricultural uses. All stream segments in the state are also considered to have aesthetic uses-regardless of actual physical appearance (personal communication between A. Zlotzky and John Bender, NDEQ, 12 March 1998). None of the streams provide public drinking water uses.

Wagon Train Lake, located approximately 4.8 km (3 mi) downstream of the beltway, has been included on the List of 303(d) Impaired Waters for Nebraska, as well as the Nebraska Priority Watersheds for Nonpoint Source Surface Water Quality Actions. The lake has been recently renovated.

3.15.2 Impacts of the Four Finalist Alternatives

Groundwater. None of the four alternatives will adversely affect groundwater.

Surface Water. The primary adverse impact on surface water quality would be limited to temporary construction effects of erosion and sedimentation, particularly during construction of the bridges and culverts. Construction impacts to surface waters are considered minor and temporary, and can be minimized through the use of temporary and permanent erosion control.

In addition, surface water impacts can be expected from wash off of accumulated pollutants from the road surface after construction; however, these are considered minimal and do not require mitigation.

Construction for the new bridges and culverts requires a Section 404 permit from the U.S. Army Corps of Engineers for dredge and fill activities in waters of the United States and their adjacent wetlands. As part of this permit, the project requires Section 401 Water Quality Certification from the Nebraska Department of Environmental Quality. In addition, the project will require a National Pollution Discharge Elimination System (NPDES) permit from NDEQ which is needed for all sites greater than 2 ha (5 ac) in size. The permit will require incorporation of erosion and sedimentation control measures during construction.

3.15.3 Proposed Mitigation

Groundwater. No mitigation is required. Roadway designers will consider storm water drainage patterns in the vicinity of the WHPAs; however, there are no land use restrictions in the areas except within 90 m (300 ft) of a well.

Surface Water. Mitigation measures will be implemented for construction-related erosion and sedimentation control and include, as appropriate, dikes, dams, sediment basins, fiber mats, temporary and permanent seeding, straw mulch, plastic liners, slope drains, and other devices which would intercept and trap transported sediments during construction. All heavy equipment will be refueled and serviced away from water courses to prevent accidental contamination of surface waters with petroleum products. Only clean fill material will be used in construction in the waters and wetlands. Special consideration will be given to erosion and sedimentation control measures in the vicinity of the tributary to Wagon Train Lake.

3.15.4 No Build Alternative

Groundwater. The no build alternative will have no impact on groundwater.

Surface Water. The no build alternative will have no impact on surface water, other than temporary increases in sedimentation during construction of the proposed future roadway network improvements.

3.16 WETLANDS

3.16.1 Existing Conditions

Due to the rural setting of the project, there are numerous wetlands in the study area. However, the wetlands are fairly limited in areal extent and diversity, and tend to be dominated by monocultures of cattails or reed canarygrass. Wetlands generally occur along Stevens Creek, Salt Creek and tributary streams, as well as in isolated depressions and impoundments throughout the watersheds. The wetlands and waterways are categorized into six major groups:

1. Riverine wetlands within Salt Creek and Stevens Creek
2. Forested wetlands along tributaries
3. Scrub-Shrub wetlands along tributaries
4. Emergent wetlands along tributaries
5. Impounded wetlands along tributaries
6. Emergent, Forested and Scrub-Shrub isolated wetlands in depressions

Additional information on wetlands is provided in the Wetlands Delineation Report in **Appendix D**.

3.16.2 Impacts of the Four Finalist Alternatives

Wetlands in the study area were delineated in July and August 1999 using the 1987 Corps of Engineers (Corps) Wetland Delineation Manual. The field survey included all potential wetland areas and stream crossings that had the potential to be affected by the four finalist beltway alternatives. Depending on the configuration and selection of an alignment, some of these wetlands will not be affected. **Table 3.19** is a summary of the estimated wetlands impacts for each of the the project alternatives.

Table 3.19

ESTIMATE OF WETLAND IMPACTS

WETLAND IMPACTS	ALTERNATIVE			
	SM-4	EC-1	EM-1	EF-1
Number of Wetlands	19	33	17	22
Wetland Impacts - hectares (acres)	7.3 (18.0)	16.9 (41.8)	8.9 (21.9)	8.3 (20.4)

3.16.3 Proposed Mitigation

Mitigation has been proposed to replace all impacted wetlands, whether jurisdictional or not, at a minimum ratio of 1:1 replacement-to-loss. Wetland mitigation sites may be located along the proposed project route at feasible sites, or may be located in the City of Lincoln's Wetland Mitigation Bank, currently under development.

3.16.4 No Build Alternative

The no build alternative will impact wetlands along all proposed roadway network improvements in the Future 1 and 25 Year Program which will be implemented with or without a beltway.

3.16.5 Compliance with Executive Order 11990, Protection of Wetlands

The south and east beltways, a linear transportation project by definition, must provide expressway connectors in both east-west and north-south directions. Because of the location of Salt Creek in the south, and Stevens Creek in the east, there are no alternatives which completely avoid impacts to wetlands or waters of the United States. Although few wetlands remain in the study area and the wetlands have been avoided to the extent possible, the project will unavoidably impact some wetlands due to (1) the linear nature of the project, and (2) the project goal to follow half section lines to the extent possible to minimize impacts to agricultural production and landowners. With the proposed wetland mitigation, the project would conform to existing State (NDEQ) requirements for mitigation of wetland impacts. Since these wetlands would be mitigated in-kind at accepted replacement-to-loss ratios, there is minimal impact on the beneficial values of wetlands in the area.

3.17 WATER BODY MODIFICATION AND WILDLIFE

3.17.1 Existing Conditions

Water Bodies. The main bodies of water in the beltway study area are Salt Creek and Stevens Creek and their tributaries, along with the North Fork of the Little Nemaha River and an unnamed tributary of Wagon Train Lake. Other minor water features include scattered farm ponds.

Terrestrial Habitat. Typical mammals that utilize riparian habitat along the creeks include white-tailed deer, red fox, raccoon, muskrat, beaver, opossum, mink, cottontail rabbit, and fox squirrel. Common bird species are mallard, blue-winged teal, belted kingfisher, great blue-heron, ring-necked pheasant, bobwhite quail, blackbirds, sparrows and wrens. Typical reptiles and amphibians include snakes, turtles, salamanders, and frogs.

Aquatic Habitat. Typical fish species in Salt Creek and Stevens Creek include bullheads, carp, sunfish, shiners, and minnows. Typical fish species in most of the smaller tributaries are limited to minnows and shiners.

SM-4 Alternative. SM-4 crosses the mainstem of Salt Creek between Saltillo Road and Bennet Road near 25th Street. The floodplain is very broad at this location, nearly 1.6 km (1 mi) wide. The mainstem channel is deeply entrenched and has been subject to significant erosion. The channel overbanks are planted in commodity crops with a significant zone of riparian vegetation along each bank. SM-4 also crosses the Wagon Train tributary of Salt Creek between Saltillo Road and Bennet Road near 84th Street. The floodplain at this location is narrow and the channel is incised. The channel overbanks are planted in commodity crops with riparian vegetation along the banks. The US 77 interchange also crosses a tributary of Salt Creek. The channel overbanks are planted in commodity crops with little to no zone of riparian vegetation along the banks.

EC-1 Alternative. EC-1 crosses the mainstem of Stevens Creek, two tributaries to Stevens Creek, and an unnamed tributary to Salt Creek. The mainstem crossing of Stevens Creek occurs between Adams Street and Holdrege Street. The floodplain is broad at this location and is generally perpendicular to the proposed route. The channel overbanks are planted in commodity crops with a significant zone of riparian vegetation along each bank. The tributary floodplains crossed by EC-1 are located in the upper and middle portions of the respective drainage basins. They are broad with incised channels generally varying from 0.6 to 0.9 m (2 or 3 ft) deep and twice as wide. The channel overbanks are planted in commodity crops with a narrow zone of riparian vegetation along each bank.

EM-1 Alternative. EM-1 crosses the mainstem of Stevens Creek in two locations, two tributaries to Stevens Creek, and two unnamed tributaries to Salt Creek. The two mainstem crossings of Stevens Creek occur near Yankee Hill Road and 120th Streets, and between O and A Streets near the MoPac Trail bridge over Stevens Creek east of Walton. Near Yankee Hill Road, the channel is deep and narrow, approximately 2.4 m (8 ft) deep and wide, with near vertical slopes. Riparian vegetation occurs in a narrow strip along each bank. The floodplain is broad and parallel to the proposed route. Near Walton, the channel is deeply incised, approximately 4.9 to 5.5 m (16 to 18 ft) deep and about three times as wide with a bottom width of 3.7 to 4.3 m (12 to 14 ft). Riparian vegetation occurs along each bank varying from zero to 30 m (100 ft) wide. The flood plain is very flat and broad at this location and is crossed at approximately a 45-degree angle by the proposed route. The tributary floodplains crossed by EM-1 are located in the lower and middle reaches of the respective drainage basins. They are broad with deeply incised channels generally varying from 2.4 to 3.0 m (8 to 10 ft) deep and two to three times as wide. Some channels have developed intermediate benches. The channel overbanks are planted in commodity crops with a significant zone of riparian vegetation along each bank.

EF-1 Alternative. EF-1 crosses five tributaries to Stevens Creek and an unnamed tributary to Salt Creek; the route does not cross the Stevens Creek mainstem channel. The tributary floodplains crossed by EF-1 are located in the middle to lower reaches of the respective drainage basins. They are broad with incised channels generally varying from 1.5 to 1.8 m (5 to 6 ft) deep and two to three times as wide. The channel overbanks are planted in commodity crops with a significant zone of riparian vegetation along each bank.

3.17.2 Impacts of the Four Finalist Alternatives

The primary water body modifications will be construction of bridges and culverts at the stream crossings. In general, the structures would cause no adverse long-term modification of water bodies, and would have no adverse impacts on wildlife that utilize the waterbodies—other than a minor loss of riparian habitat where it is currently present. The primary negative impacts would be temporary disturbance of wildlife, and temporary impact to aquatic habitat from increases in turbidity and total suspended solids during bridge construction. Good construction practices should keep suspended sediments at acceptable levels. Temporary construction impacts to surface waters are considered minor and can be minimized through use of temporary and permanent erosion control. Any riprap that may be used in embankment and pier protection for the new bridges would provide a new stable substrate for periphyton and macroinvertebrate colonization, thereby increasing the availability of food for fish in the area.

A list of the structures for each beltway alternative is provided in Table 3.20. Major culverts were defined as those costing upwards of \$250,000. Additional minor bridges or major culverts may be required to accommodate the emergency spillways from the LPSNRD dam sites near the beltway alignments.

Table 3.20

WATER BODY MODIFICATIONS

WATER BODY MODIFICATION	ALTERNATIVE			
	SM-4	EC-1	EM-1	EF-1
Major Bridge Structures: > 75 m (> 250 ft)	2	2	1	0
Minor Bridge Structures: < 75 m (< 250 ft)	5	2	4	3
Major Culverts	1	5	1	1
TOTAL	8	9	6	4

3.17.3 Proposed Mitigation

Mitigation measures will be implemented for construction-related erosion and sedimentation control and include, as appropriate, dikes, dams, sediment basins, fiber mats, temporary and permanent seeding, straw mulch, plastic liners, slope drains, and other devices which would intercept and trap transported sediments during construction. In addition, the project will require a National Pollution Discharge Elimination System (NPDES) permit from NDEQ which is needed for all sites greater than 2 ha (5 ac) in size. The permit will require incorporation of erosion and sedimentation control measures during construction.

3.17.4 No Build Alternative

The no action alternative would avoid all temporary adverse impacts to waterbodies and associated wildlife from construction of bridges and culverts, other than that required for construction of the proposed future roadway network improvements.

3.18 FLOODPLAINS

3.18.1 Existing Conditions

Floodplains. Portions of the beltway alternatives are located in 100-year floodplains established by the Federal Emergency Management Agency (FEMA). The City of Lincoln and Lancaster County participate in the FEMA National Flood Insurance Program (NFIP) which regulates construction within the 100-year floodplain. A 100-year floodplain is estimated as the limits of the water surface created by a 100-year flood, or an event with a 1 percent annual chance of occurrence.

The concept of a floodway and floodway fringe is used to regulate encroachment (development) within the floodplain. A floodway consists of a channel and portion of the adjacent floodplain area required to convey the 100-year flood discharge with no more than 0.3 m (1 ft) increase in the 100-year flood elevation. Floodway fringe is defined as the area between the limits of the floodway and the 100-year floodplain. In essence, once a floodway is established for an area, theoretically the entire floodway fringe may be developed in most cases.

Some locations along the beltway alternatives are within areas where floodplain boundaries have only been estimated. In other locations regulated floodway and floodway fringe have been established. The boundaries of the 100-year floodplains and floodways are shown on **Figure 2.25**.

Through participation in the NFIP, the local floodplain ordinances require that floodplain development permits be obtained from the City/County. Any development within designated floodways must include certification from a registered professional engineer that the proposed development will result in no increase of the water surface elevation associated with the 100-year flood event. In some locations, where no floodway has been designated, development may not cause more than 0.3 m (1 ft) of rise in the 100-year flood elevation. These ordinances allow some, but only very minor encroachment.

Currently, the City and the Lower Platte South Natural Resources District (LPSNRD) are evaluating a more stringent floodplain ordinance for the City of Lincoln and its 5 km (3 mi) zoning jurisdiction to protect infrastructure and properties within the floodway fringe. Some concepts being discussed include provisions for no net loss of floodplain storage, and no net rise of base flood elevation within the floodway fringe/floodplain. These provisions might also have the potential for application within the County's jurisdiction to achieve a more uniform countywide floodplain management program.

Salt Creek Hydrologic Study. As part of the Wilderness Park Subarea Study, the US Army Corps of Engineers (Corps) was contracted by the LPSNRD to prepare the *Hydrologic Study of Salt Creek at Wilderness Park* (1999). This study evaluated various alternatives to determine their effects on the peak flows (discharges) and stages (water surface elevations) on Salt Creek through Wilderness Park. Pertinent recommendations from the study that apply to the beltway study were:

1. Channel confinement or shortening within upstream areas should be strongly discouraged.
2. Any fill within the Salt Creek floodplain should be compensated for by providing an equal amount of storage elsewhere on the site.
3. Analysis of all the alternatives involving bridge removal or additions resulting in findings that there would be no significant reduction in peak discharge, and there would be no system wide impact on flow rates.

Stevens Creek Watershed Plan. LPSNRD prepared the *Concept Comprehensive Flood Management Plan for Stevens Creek* (1997) study identifying measures that would provide at least a 40 percent reduction of flood damages in the watershed. Several components were identified that would provide a holistic approach to stormwater management in the watershed and meet the flood damage reduction goal. These include:

1. Preserving portions of the Stevens Creek mainstem and tributary 100-year floodplain as open space through acquisition and regulation,
2. Augmenting culverts at select locations to reduce flooding,
3. Erosion healing treatment in the lower channel reach using solutions such as vegetative plantings of woody and herbaceous species to stabilize the stream banks, using rip rap to construct riffle pools along the channel to dissipate energy and arrest headcutting, and installing live willow mats to stabilize the channel banks.
4. Land treatment as a conservation measure with new and retrofit pipe outlet terraces, and establishment of permanent vegetative cover on Class IV lands,
5. Watershed management using integrated watershed models, and
6. Providing detention storage for flood waters using a system of ten farm pond dams and reservoirs (see **Figure 2.25**).

The LPSNRD has obtained partial support through state funding to construct the system of farm ponds. Five of the ten sites are currently in final design stage (sites A6-1, A7-1, A9-1, A9-6 and A17-1), and land rights negotiations are underway. Construction is anticipated to begin late in 2001. The remaining five sites are currently scheduled for construction in 2002. Each of the east beltway alternatives may impact one or two of the proposed dam sites.

Pertinent recommendations in the plan include (1) land rights acquisition using conservation easements in the Stevens Creek floodway and flood fringe between the MoPac Trail and the Murdock Trail, (2) continued reliance on existing floodplain regulations for development in the rest of the delineated Stevens Creek mainstem and tributary floodplains, and (3) a public access easement for a trail along Stevens Creek from the MoPac Trail to Salt Creek. The study team has been in contact with LPSNRD and its consultant regarding potential beltway impacts.

FEMA Mitigation Grant Program. The City of Lincoln is looking into establishing conservation easements in the south beltway corridor in the vicinity of Salt Creek for the purposes of flood control. Such easements would be established so as not to preclude construction of the south beltway. The City has applied for a grant through FEMA for this purpose.

3.18.2 Impacts of the Four Finalist Alternatives

Since the beltway project will comply with all local floodplain ordinances, preliminary evaluation indicates that floodplain encroachment will not be significant and will not adversely affect the natural and beneficial floodplain values for any of the beltway alternatives. As discussed in the previous section, the Stevens Creek Watershed will be modified over the next decade as a result of the LPSNRD project. A risk analysis in accordance with 23 CFR 650, Subpart A, will be completed at final design stage, prior to construction to insure continued compliance with floodplain ordinances.

SM-4 Alternative. SM-4 crosses the floodplain and main stem of Salt Creek between Saltillo Road and Bennet Road near 25th Street, as well as a tributary of Salt Creek at the US 77 interchange. SM-4 also crosses the Wagon Train tributary of Salt Creek, and one of its tributaries, between Saltillo Road and Bennet Road near 84th Street. A floodway has not been established in any of these locations.

EC-1 Alternative. EC-1 crosses the floodplains of the main stem of Stevens Creek, two tributaries to Stevens Creek, and an unnamed tributary to Salt Creek. The mainstem crossing of Stevens Creek occurs between Adams Street and Holdrege Street where a floodplain has been delineated, base flood elevations and flood hazard factors have been determined, and a floodway has been established. A floodway has also been established in the vicinity of the tributary crossing location between A Street and Van Dorn Street. No floodways have been established for the tributary crossing location between Fletcher Avenue and Alvo Road, or the Salt Creek tributary crossing.

EC-1 will impact two of the proposed LPSNRD farm ponds. The alignment goes through the Sky Ranch Dam site (**Exhibit EC1-4**). Moving the dam upstream (to the southwest) away from the beltway would likely reduce the flood control capacity of the structure, and the beltway would obstruct the emergency spillway of the dam--requiring an additional culvert under the beltway capable of conveying the flow from the emergency spillway. It is not practical to shift the beltway alignment at this location due to its proximity to the Sky Ranch Acres subdivision. The

alignment also goes through a portion of the A3-2 dam site (**Exhibit EC1-2**). Moving this dam site upstream (to the west) away from the beltway would likely reduce the flood control capacity of the structure. This shift would also bring the permanent pool closer to 98th Street and would require that the culvert under 98th Street be evaluated and possibly replaced. In addition, the beltway could obstruct the emergency spillway of the A3-2 dam--requiring an additional culvert or bridge under the beltway capable of conveying the flow from the emergency spillway. It is not practical to shift the beltway at this location due to its proximity to a housing development at 112th and Pine Lake Road. A shift would also impact the Pine Lake Road interchange, possibly increasing the required structure lengths and therefore cost. Both dam sites are in Phase 2 of the LPSNRD project and final design has not begun.

EM-1 Alternative. EM-1 crosses the floodplain and mainstem of Stevens Creek in two locations, as well as the floodplains of two tributaries to Stevens Creek, and two unnamed tributaries to Salt Creek. The two mainstem crossings of Stevens Creek occur near Yankee Hill Road and 120th Streets, and between O and A Streets near the Walton. No floodway has been established in the vicinity of the Yankee Hill Road crossing. However, the floodway is designated in the vicinity of the crossing near Walton. In this location, the floodplain is very flat and broad and is crossed at approximately a 45-degree angle by the proposed route. The tributaries of Stevens Creek which are crossed by EM-1 are located in the lower reaches of the drainage basins; no floodways have been established in these locations between Pine Lake Road and Yankee Hill Road, and between Van Dorn and Pioneers Boulevard. No floodways have been established on the Salt Creek tributaries.

EM-1 will impact one of the proposed LPSNRD farm ponds, A2-1, in the vicinity of the emergency spillway at the west side of the dam (**Exhibit EM1-1**). The permanent pool also appears to be very close to the westbound-to-northbound ramp of the beltway/N-2 interchange. The spillway for the dam could be relocated on the east side of the dam, thus eliminating the conflict. The impacts relative to the permanent pool can not be accurately determined based on the information available at the present time and should be addressed during final design of both projects. Dam site A2-1 is in Phase 2 of the LPSNRD project and final design has not begun.

EF-1 Alternative. EF-1 crosses floodplains along five tributaries to Stevens Creek; the route does not cross the main stem of Stevens Creek. No floodways have been established in any of these locations.

EF-1 will impact two of the proposed LPSNRD farm ponds. The alignment goes through the west end of the A9-1 dam site (**Exhibit EF1-3**). It appears that the dam embankment could be tied into the roadway embankment; it is likely that this could cause the beltway embankment to have water from the permanent pool against it. This issue would need to be addressed in the final design of the beltway to provide adequate protection of the roadway embankment. EF-1 is also close to the A-17 dam site, but does not directly impact the dam (**Exhibit EF1-4**). The emergency spillway for the dam would have to be addressed during design of the beltway bridge to ensure that the spillway flows would be conveyed downstream unimpeded. Both dam sites are in Phase 1 of the LPSNRD project and final design has already begun.

3.18.3 Proposed Mitigation

Floodplain Development. The proposed project will comply with or exceed the current minimum requirements of the City/County floodplain management ordinance. There are no additional mitigation measures above what is already required by the City/County program.

Channel Realignment. According to the US Army Corps of Engineers requirements, if channel straightening is proposed for any of the crossings, it will be necessary to demonstrate that there are no other practicable alternatives.

SM-4 Alternative. It is anticipated that all major crossings in this alternative will allow channels to remain in their existing configurations.

EC-1 Alternative. The Stevens Creek tributary crossing at Adams Street may require minor channel realignment at an existing meander due to encroachment of the channel by the roadway embankment.

The Salt Creek tributary crossing north of Fletcher Avenue cuts across an existing channel meander. There are several options to accommodate the road crossing. The channel can be realigned to provide a relatively straight section of channel at the bridge location, and meanders upstream and downstream of the crossing can be reconfigured to enable the total channel length to remain the same as before the realignment. Other options would be to straighten the channel (with the effect of shortening the channel approximately 210 m (700 ft), or extending the bridge approximately 98 m (320 ft) to span the meander.

EM-1 Alternative. The Stevens Creek tributary crossing south of Pine Lake Road cuts across two existing channel meanders. Again, there are several options. The channel can be aligned to provide a relatively straight section of channel at the bridge location, and the meanders upstream and downstream can be reconfigured to enable the total channel length to remain the same as before the realignment. Other options would be to straighten the channel (with the effect of shortening the channel approximately 73 m (240 ft), or extending the bridge approximately 38 m (125 ft) to span the meanders.

The Stevens Creek tributary crossing between Van Dorn Street and Pioneers Boulevard may require minor channel realignment at two existing channel meanders due to encroachment of the channel by the roadway embankment.

It is not anticipated that other major crossings along EM-1 will require channel reconfiguration.

EF-1 Alternative. The Stevens Creek tributary crossing between Old Cheney Road and Pioneers Boulevard cuts across two existing channel meanders. The channel can be aligned to provide a relatively straight section of channel at the bridge location, and the meanders upstream and downstream can be reconfigured to enable the total channel length to remain the same as before the realignment. Other options include straightening the channel (with the effect of shortening the channel approximately 177 m (580 ft), or extending the bridge approximately 94 m (310 ft) to span the meanders.

The Stevens Creek tributary crossing south of Van Dorn Street cuts across an existing channel meander. In this location, the channel can be aligned to provide a relatively straight section at the bridge location, and the meanders upstream and downstream can be reconfigured to enable

the total channel length to remain the same as before the realignment. Other options include straightening the channel (with the effect of shortening the channel approximately 111 m (365 ft), or extending the bridge approximately 61 m (200 ft) to span the meanders.

It is not anticipated that other major crossings along EF-1 will require channel reconfiguration.

Stevens Creek Farm Ponds. All of the east beltway alternatives will require continued coordination with LPSNRD, as well as modifications to the roadway design to reduce conflicts with the proposed farm ponds. EC-1 will require (1) moving the Sky Ranch dam site upstream, (2) installing an additional culvert or bridge under the beltway capable of conveying the flow from the Sky Ranch emergency spillway, (3) moving the A3-2 dam site upstream, and (4) evaluation and possible replacement of the culvert under 98th Street near the A3-2 site. In addition, the beltway could obstruct the emergency spillway of the dam--requiring an additional culvert or bridge under the beltway capable of conveying the flow from the emergency spillway. The resulting loss of flood control capacity from moving the dams upstream has not been estimated at this time; therefore, mitigation options have not been identified. EM-1 will require (1) the A2-1 spillway to be relocated on the east side of the dam, and (2) adequate protection of the roadway embankment at the same site. EF-1 will require (1) adequate protection of the roadway embankment at the A9-1 site, and (2) accommodation of the emergency spillway flows at the A-17 site.

Stevens Creek Conservation Easements and Trail. For EC-1 and EM-1, proposed development in the Stevens Creek mainstem floodplain between the Murdock Trail and the MoPac Trail would be required to comply with the terms of the conservation easements to be acquired by LPSNRD relative to the Stevens Creek watershed plan; however, these terms will not prohibit construction of a beltway facility.

3.18.4 No Build Alternative

The no build alternative would avoid any direct alteration to the existing floodplain conditions other than that required for construction of the planned roadway network improvements. Even without a beltway project, modifications to the existing floodplains are likely to continue as agricultural land is converted to suburban and urban uses for paved County roads, housing and subdivision developments, golf courses, and commercial and industrial sites. The no build alternative would avoid any conflicts with the Stevens Creek watershed project.

3.18.5 Compliance with Executive Order 11988, Floodplain Management

To meet the project purpose, the south beltway must cross the Salt Creek floodplain because it is impossible to connect US 77 to N-2 without crossing Salt Creek within the defined 200 km² (80 mi²) study area. Based on the defined east study area, only alternatives located east of 134th Street would be able to avoid any impacts to the Stevens Creek floodplain. Of the three east beltway alternatives, only EF-1 meets this criteria.

Through the Lancaster County participation in the National Flood Insurance Program, it is a local requirement that floodplain development permits be obtained from the City/County. This requires that any developments within designated floodways must include certification from a registered professional engineer that the proposed development will result in no increase along the floodway water surface profiles. The City/County are both sponsors of the project and are aware of floodplain management requirements.

3.19 WILD AND SCENIC RIVERS

No Wild and Scenic Rivers segments have been designated by the Department of the Interior in the project area; therefore, the proposed project will have no impacts on Wild and Scenic Rivers.

3.20 COASTAL BARRIERS

The proposed project is not located along a coast and no Coastal Barrier Units have been designated by the Department of the Interior in the project area; therefore, the proposed project will have no impacts on coastal barriers.

3.21 COASTAL ZONE IMPACTS

The proposed project is not located along a coast and no Coastal Zone Management Areas have been designated by the State; therefore, the proposed project will have no impacts on coastal zones.

3.22 THREATENED AND ENDANGERED SPECIES

3.22.1 Existing Conditions

Based on letters from the Fish and Wildlife Service (FWS) and the Nebraska Game and Parks Commission (NGPC) (**Appendix A**), four federal and state endangered and threatened species had the likelihood to occur in the beltways study area. Since that time, the status of two species have changed, and NGPC has listed three other species with the likelihood of occurrence in the beltway study area. These species, and their current listing status are presented in **Table 3.21**. Based on information compiled by the Nebraska Natural Heritage Program (NNHP) and field surveys for the beltway study, none of the listed species are known to inhabit the south and east beltways study area.

3.22.2 Impacts of the Four Finalist Alternatives

Bald Eagle. The bald eagle has been sighted in various locations in Lancaster County; mostly in the vicinity of larger creeks and lakes, and thermal discharge points from local industries. It is generally considered a winter visitor and nesting is not known in the county. The wetlands, ponds and streams along the four potential alignments of the beltway are generally small and isolated in nature, and do not contain typical bald eagle habitat. No nests or individuals were observed during the field surveys for wetlands and the western prairie fringed orchid. The FWS has indicated that the bald eagle may pass through the project area, but they have not observed any potential feeding habitat that would attract them to the area.

For the above reasons, we conclude there will be no effect on this species from any of the four beltway alternatives.

Table 3.21

**LIST OF THREATENED AND ENDANGERED SPECIES
 WITH LIKELIHOOD OF OCCURRING IN THE BELTWAYS STUDY AREA**

COMMON NAME	SCIENTIFIC NAME	STATUS	
		USFWS	NGPC
Bald eagle	<i>Haliaeetus leucocephalus</i>	Threatened ¹	Threatened
Peregrine falcon	<i>Falco peregrinus</i>	(no longer listed)	(no longer listed)
American burying beetle	<i>Nicrophorus americanus</i>	Endangered	Endangered
Salt Creek tiger beetle	<i>Cicindela nevadica lincolniana</i>	(proposed Endangered)	Endangered
Western prairie fringed orchid	<i>Platanthera praeclara</i>	Threatened	Threatened
Small white lady's slipper	<i>Cypripedium candidum</i>	(not listed)	Threatened
Saltwort	<i>Salicornia rubra</i>	(not listed)	Endangered

Peregrine Falcon. Although the peregrine falcon does feed in wetlands, the wetlands, ponds and streams along the four potential alignments of the Beltway contain only marginal feeding habitat. The drainages in the study area contain only small open water areas, and have low plant diversity (being mostly dominated by reed canarygrass, peachleaf willow and cottonwoods). The surrounding hills are mostly in agricultural production (row crops). The only potential peregrine falcon nesting habitat is in downtown Lincoln at the State Capitol and other high-rise buildings.

For the above reasons, we conclude there will be no effect on this species from any of the four beltway alternatives.

American Burying Beetle. The American burying beetle is a carrion feeder that buries its prey, which it then uses below the ground surface for the feeding of its young. Habitat for the beetle has not been clearly defined. Although virgin or primary forest has been suggested as habitat, recent captures in the Midwest since 1960 have been in mixed agricultural lands. Most past records in Nebraska show that it has been collected near major watercourses such as the Platte, Elkhorn, Loup, and Dismal Rivers. Until more information on habitat is acquired, any area with enough humus and topsoil for burying carrion is considered potential beetle habitat. Past surveys have not found any beetles in the Lancaster area, therefore, a survey is not required by the FWS.

For the above reasons, we conclude there will be no effect on this species from any of the four beltway alternatives.

Salt Creek Tiger Beetle. The Salt Creek tiger beetle has one of the most restricted ranges of any insect in the United States; it is found only in the eastern Nebraska saline wetlands of Lancaster County (Spomer and Higley, 1994). Within the saline wetlands, it is restricted to the wetter unvegetated, mudflat (saltflat) sites and internal drainages. Although once found

predominately on mudflats on the terraces on Salt Creek and its tributaries, the tiger beetle is commonly found near the base of the Little Salt Creek embankment where salt crusts form from interception of the local groundwater. According to Steve Spomer (Research Associate, University of Nebraska-Lincoln), the Salt Creek tiger beetle may be found at one location in a given year, but not be present at the same location in another year. This is particularly true for mudflats, saltflats, and ephemeral pond areas where populations of the tiger beetle are considered transient. In comparison stable populations are known from locations along Little Salt Creek. Between 1990 and 1995, the number of Salt Creek tiger beetles counted in the annual surveys of the species steadily increased as new populations were found (personal communication between Amy Zlotsky and Steve Spomer, 23 August 1995 and 2 June 1998). Since 1995, population estimates based on visual counts of adults have averaged around 600 individuals per year (Spomer and Hoback, 1998). Because of its highly localized distribution, the beetle is considered vulnerable to environmental threats.

There are no areas of saline soils mapped within any of the beltway alignments, and there are no saline wetlands within any of the beltway alignments (see **Appendix D**). The closest location of saline soils and saline wetlands is approximately 2.4 km (1.5 mi) west of the proposed I-80 interchange location near Cornhusker Highway and 98th Street. These particular saline wetlands do not contain saltflat or unvegetated mudflat habitats.

For the above reasons, we conclude there will be no effect on this species from any of the four beltway alternatives.

Western Prairie Fringed Orchid. The western prairie fringed orchid grows in wet tall grass meadows and wet-mesic tall grass prairies, and has been found at a few native prairie tracts in Lancaster County. The closest known populations of the orchid are at Nine-Mile Prairie on West Fletcher Avenue 1.6 km (1 mi) west of NW 48th Street, and at two locations in southern Lancaster County, both of which are over 16 km (10 mi) away from the beltway alignments.

Because its presence in the study area was possible, a survey to look for the orchid was conducted as part of the South and East Beltways Study. The survey was conducted in 1998, 1999 and 2000 during the blooming period of the orchid which is considered to extend from the second half of June through the first half of July. The survey was conducted by biologists Dr. Joan Darling and Mr. Craig Meilke in 1999 and 2000, and Amy Zlotsky in 1998. During the survey, native grass hayfields and native prairies along the finalist alignments were investigated for the orchid. In addition, other grassland and wetland areas that might support the orchid were investigated. No orchids were found during the survey. **Table 3.22** provides a list of the surveyed sites, dates they were surveyed, grassland type (including water regime and location in the landscape), associated species, known management practices, and a subjective assessment of the quality of the site.

Based on the negative results of the survey, we conclude there will be no effect on this species from any of the four beltway alternatives.

Small White Lady's Slipper. The small white lady's slipper is a perennial orchid. In Nebraska, it is known from native sub-irrigated wet meadows which are not common in the study area. The species appears to be intolerant of cattle grazing, and susceptible to herbicides application and drift from adjacent agricultural fields (NGPC, 1999). There are only two documented localities of the species in Lancaster County, and these are over 20 years old.

Table 3.22

**GRASSLAND SITES SURVEYED FOR THE
WESTERN PRAIRIE FRINGED ORCHID**

Site Number/ Name	Survey Date(s)	Grassland Type	Soil Type	Associated Species	Management Practices/ Quality	Route	Prairie Impact ha (ac)
P-1 Berneisse	7/6/99	Bottomland brome pasture	Wymore silty clay loam	reed canarygrass, prairie cordgrass, foxtail barley, curly dock, smartweed	Grazed/ Low	SM-4	
P-2 Camelot Acres	6/13/00	Bottomland wildflower seeding on old cropland	Judson silt loam	grey-headed coneflower, black-eyed susan, purple coneflower, daisy fleabane, soybeans	Unknown/ Low	EC-1	
P-3 Hagerman	6/13/00	Bottomland brome pasture	Judson silt loam	smooth brome, prairie cordgrass, foxtail barley, path rush, American bugleweed	Heavily grazed/ Low	EC-1	
P-4 Kirchoff	7/16/99	Bottomland brome pasture	Judson silt loam	smooth brome, Kentucky bluegrass, blue vervain, foxtail barley	Heavily grazed/ Low	EC-1	
P-5 Nisley	6/13/00	Upland native prairie hay	Burchard clay loam	big bluestem, prairie cordgrass, switchgrass, plains coreopsis	Mowed/ Medium	EC-1	0.4 (1.1)
P-6 Gottula	7/15/99	Upland CRP	Judson silt loam	big bluestem, smooth brome	CRP planted in 1990/ Medium	EM-1	
P-7 Wilson	7/12/99	Upland native prairie	Burchard clay loam	big bluestem, silvery scurf pea, lead plant	Unknown/ Medium	EM-1	1.3 (3.2)
P-8 Hoffman	7/12/99	Upland CRP	Pawnee clay loam	big bluestem, prairie cordgrass, daisy fleabane, common milkweed, indian hemp dogbane, ironweed	CRP planted in 1988/ Medium	EM-1	
P-9 Reed	6/15/00 6/25/01	Upland native prairie with PEMA wetland through center	Sharpsburg silty clay loam	big bluestem, prairie cordgrass, germander, rosin weed, lead plant, white sage, silvery scurf pea, purple prairie clover	Mowed/ High	EF-1	1.5 (3.8)
P-10 Skoda	7/6/99 6/19/98	Upland brome pasture	Judson silt loam	Kentucky bluegrass, downy brome, sedges	Mowed/ Low	EF-1	
P-11 T. Retzlaff (north)	7/7/99	Upland native prairie hay	Sharpsburg silty clay loam	big bluestem, Kentucky bluegrass, western wheatgrass, purple sweet clover, prairie larkspur	Mowed/ Medium	EF-1	0.2 (0.6)
P-12 T. Retzlaff (south)	7/7/99	Historic upland native prairie, now forested	Morrill clay loam	elderberry, American elm; smooth sumac, smooth brome, nettles	None/ Low	EF-1	0.9 (2.2)
P-13 Schroeder	7/16/99	Upland CRP pasture with PEMC wetland	Sharpsburg silty clay loam	big bluestem, prairie cordgrass, foxtail barley, curly dock, smartweed	Grazed/ Medium	EC-1	

As part of the beltway survey, native grass hayfields, native prairies, and other grassland and wetland areas along the finalist alignments were investigated for the western prairie fringed orchid. No orchids of any kind were found during the survey. Based on **Table 3.22**, there are four locations of native prairie hay along the beltway alignments; all but one are upland locations. Prairie P-9 does have a drainage wetland through the field; however, the wetland portion is dominated by cattail, cordgrass and peachleaf willow (Wetland EF-3 in **Appendix D**) which are not species indicative of a diverse biological assemblage more typical of conditions for the small white lady's slipper. In addition, the approximately 4 ha (10 ac) prairie is surrounded on four sides by cropland.

For the above reasons, we conclude there will be no effect on this species from any of the four beltway alternatives.

Saltwort. The saltwort is a weedy annual species that grows in moist saline and alkaline soils throughout the midwest. Within Nebraska, it is known only from the saline wetlands in Lancaster County, and from an alkali saltflat near a pothole wetland in Phelps County. Saltwort grows in the areas of highest salt concentration within the saline wetlands, and is typically found in the saltflat areas.

There are no areas of saline soils mapped within any of the beltway alignments, and there are no saline wetlands within any of the beltway alignments (see **Appendix D**). The closest location of saline soils and saline wetlands is approximately 2.4 km (1.5 mi) west of the proposed I-80 interchange location near Cornhusker Highway and 98th Street. These particular saline wetlands do not contain saltflat or unvegetated mudflat habitats.

For the above reasons, we conclude there will be no effect on this species from any of the four beltway alternatives.

Prairies. Although prairies are not a threatened or endangered species *per se*, it was possible to calculate the project impacts on prairies as a result of the orchid survey information. Due to the extent of agricultural row crops only small remnants of these native grasslands remain in the County. Direct project impacts to prairies are a loss of 0.45 ha (1.1 ac) with EC-1; 1.3 ha (3.2 ac) with EM-1 and 2.7 ha (6.6 ac) with EF-1. It is a goal of the Lincoln/Lancaster County Comprehensive Plan to preserve prairies habitats.

In the Public Comments, concern was raised that the EF-1 route may have an additional secondary impact to the remainder of the Reed prairie.

3.22.3 Proposed Mitigation

Since construction is not expected for several years, surveys for threatened and endangered species will be updated, as appropriate. Although prairies are not regulated, impacts to these areas will be avoided or minimized to the extent possible.

3.22.4 No Build Alternative

As with the build alternatives, the no build alternative would have no effect on endangered or threatened species.

3.23 CULTURAL RESOURCES

3.23.1 Existing Conditions

As part of the south and east beltways study, several cultural resources investigations were conducted in the study area. The purpose of the investigations was to provide compliance with Section 106 of the National Historical Preservation Act which requires that historical resources (*both standing structures and archeological materials*) be considered during the planning and execution of any federally funded project. Under this legislation, historical resources are defined as those listed in or considered eligible for listing in the National Register of Historic Places (NRHP). Eligibility is based on two primary considerations (1) the degree of historic integrity, and (2) the overall significance of the resource. Integrity requires the site to retain enough of its early materials, appearance, and feeling to illustrate its history clearly. Significance requires that the resource relate to a historical context and must be based on at least one of the following four criteria: (a) association with events that have made a significant contribution to the broad patterns of our history, (b) association with the lives of persons significant in our past, (c) embodiment of the distinctive characteristics of a type, period or method of construction, or high artistic values, and (d) likelihood to yield information important to historical understanding.

Survey Investigations. Survey investigations were conducted to identify existing cultural resources. A survey of historic standing structures was conducted by On-Site Preservation and Photography (On-Site); a survey of archeological resources was conducted by the University of Nebraska Department of Anthropology (UNL). Following completion of the initial surveys, several additional surveys were requested and conducted by UNL.

Project Scope. The project scopes for the two surveys were developed in consultation with the Nebraska State Historic Preservation Office (SHPO), NDOR, FHWA and the City of Lincoln. The scope of the historical survey was to identify historic standing structures, and to evaluate those sites using the federally-established criteria to determine eligibility for the NRHP. The survey included two components: (1) a reconnaissance-level survey to identify all historic resources within the 200 km² (80 mi²) study area, and (2) an intensive-level survey of the Stevens Creek Bottoms, the area of some of Lancaster County's earliest settlements.

The scope of the archeological survey was to identify archeological sites within defined 0.4 km (0.25-mi) wide corridors, and to evaluate those sites using the federally-established criteria to determine eligibility for the NRHP. The survey included two components: (1) an intensive archeological survey of all project stream crossings from valley margin to valley margin, and (2) an intensive survey of a ten-percent sample of upland areas. Corridors covered by the surveys were SM-4, EC-1, EM-1 and EF-1, as well as several diagonal alignments connecting the south and east corridors. All aspects of the archeological survey were coordinated with the Nebraska State Historical Society Highway Archeology Program. It should be noted that although the 10-percent upland survey was completed, the bottomland survey was incomplete due to landowners who denied permission to survey. Any of the unsurveyed parcels along the final beltway route would be surveyed once they have been acquired.

Public Participation. Both investigations incorporated public participation opportunities, including running announcements on the public access channel, newspaper articles in the *Lincoln Journal Star*, *Waverly News* and *Hickman Village Voice*, and questionnaires mailed to landowners within the study area. A feature story on the archeological survey was aired on the Channel 10/11 6:00 P.M. evening news on 21 July 1998. Extensive discussions were held with landowners with a familiarity with historic standing structures in the area; and contact was made with 193 landowners during the process of obtaining permission of access for the archeological survey. In addition, representatives of various advocacy groups were contacted, including Friends in the East-Mid Beltway, Citizens for Accountable Route Selection, Preservation Association of Lincoln, Stevens Creek Preservation Association, Nebraska Indian Commission, Waverly Planning Commission, Lincoln Trails Committee, Native American Tribes, and several homeowners associations.

Survey Documents. Findings of the survey inventories and evaluation of eligibility for the National Register of Historic Places (NRHP) were presented in the following documents:

1. *Archeological/Cultural Resources Survey of Lincoln South and East Beltways Study, Lancaster County, Nebraska. Phase I Records Search.* Prepared by Department of Anthropology, University of Nebraska-Lincoln. January 1996.
2. *Lincoln South and East Beltways Historic Survey Report.* Prepared by On-Site Photography and Preservation, Lincoln, Nebraska. August 1998.
3. *(DRAFT) Archeological Inventory and Evaluation of Lincoln's South and East Beltway: Investigation Along the Southern Route SM-4, Lancaster County, Nebraska (Not For General Distribution).* Prepared by Archeological Laboratory, Department of Anthropology, University of Nebraska-Lincoln. January 1998.
4. *Archeological Inventory and Evaluation of Lincoln's South and East Beltway: Investigations Along the Eastern Alternatives EC-1, EM-1 and EF-1, Lancaster County, Nebraska (Not For General Distribution).* Prepared by Archeological Laboratory, Department of Anthropology, University of Nebraska-Lincoln. August 1998.
5. *Archeological Inventory and Evaluation of Lincoln's South and East Beltway, Lancaster County, Nebraska (For General Distribution).* Prepared by Archeological Laboratory, Department of Anthropology, University of Nebraska-Lincoln. December 1998.
6. *Evaluations of the Hulda Otto House, Guenzel Farmstead and Wunibald Farmstead for Eligibility to the National Register of Historic Places.* Prepared by Archeological Laboratory, Department of Anthropology, University of Nebraska-Lincoln. July 1999.
7. *Archeological Inventory and Testing of Lincoln's South and East Beltway: Alternatives SM-1, EC-1, EM-1 and EF-1, Lancaster County, Nebraska (Not for Public Distribution).* 2 Volumes. Prepared by Archeological Laboratory, Department of Anthropology, University of Nebraska-Lincoln. January 2000.

It should be noted that some of the archeological documents were not made available to the public because they contain information on the location of protected cultural sites. In order to provide information to the public (minus locality data), one comprehensive report (Number 5 above) was prepared for general distribution which covers information on all the archeological sites. All owners were notified of any archeological findings on their properties.

Documents prepared for general distribution are available for review at the offices of the City of Lincoln Public Works and Utilities Department, Engineering Services (531 Westgate Boulevard).

Findings of the Reconnaissance (and Supplemental) Surveys of Historic Standing Structures.

The reconnaissance survey identified 144 sites over 50 years old—the cut-off limit for historic resources according to NRHP guidelines. Of these, two sites were already listed on the NRHP (Steven Creek Stock Farm and Ehler's Round Barn). Based on a comparative analysis and evaluation of historic integrity, 28 other sites were determined to be eligible for listing. The majority of the eligible sites are farmyards and barns which individually, and as a group, contribute to the overall understanding of agricultural development in rural Lancaster County. The 30 sites included 12 farmyards, 8 individual barns, 4 residences, 1 school, 3 cast concrete road signs, and 2 grain elevators. Since that time, two additional cast concrete road signs were identified within the study area in June 2000 (**Appendix G**).

Results of the survey showed that historical resources nearer to central Lancaster County have already been affected by growth pushing eastward from the City of Lincoln. In general, the concentration of historic resources increases with distance from the City. This is attributable to the growth throughout the twentieth-century of Lincoln as a center of business, commerce and government, and the increasing impact of the city on its surroundings.

Findings of the Intensive-Level Survey of the Stevens Creek Bottoms. The intensive-level survey focused on the Stevens Creek Bottoms--a small area within the overall study area. Because Stevens Creek was known to be the location of the earliest settlement in the County, the purpose of the intensive level survey was to develop a cultural context (narrative history) with which to evaluate any cultural landscapes or the potential for any historical districts. Thirteen sites were surveyed within the defined area—generally within 0.8 km (0.5 mi) of either side of Stevens Creek. These sites included 10 farms, 1 automobile garage, and 2 relocated school buildings.

Although the survey revealed broad patterns of nineteenth century immigrant settlement and the consequent early development of agriculture in Lancaster County, only one site (Norma and Bob Lemke Residence) was considered eligible for the NRHP (other than the already listed Stevens Creek Stock Farm). No cultural landscapes were identified, and no historical districts were considered appropriate. The low-incidence of Register-eligible properties in the Stevens Creek Bottoms can be attributed to the steady adaptation of the farm to the changing demands of agriculture. As a result, the physical manifestation of early settlement has eroded with time, and few resources in the area retain the historic integrity necessary for the determination of eligibility.

Findings of the Archeological Surveys. The Archeological Survey Reports included a records and archives search. Information obtained was used to develop a narrative which covers the physiographic and environmental background of the region, general overview of Great Plains culture history, Native American cultures in Eastern Nebraska, and documented accounts of Indians in Lancaster County. The Schrader Site, located 0.8 km (0.5 mi) from the centerline of SM-4, was the only recorded archeological site within the entire beltway study area that was already listed on the NRHP.

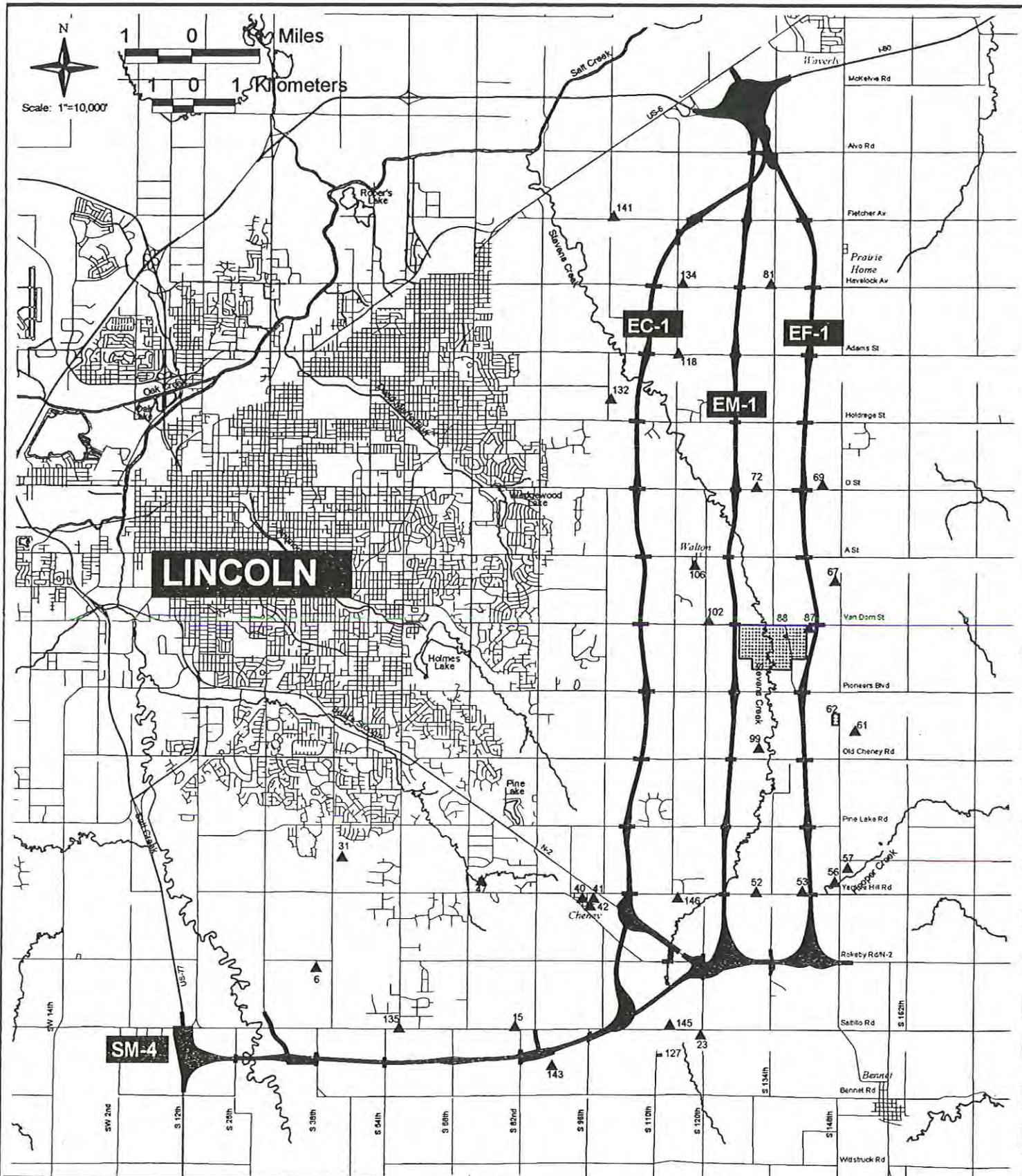
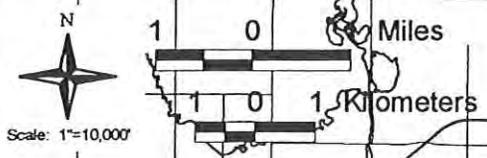
The archeological survey of the south and east beltways identified 47 previously unrecorded sites along SM-4, EC-1, EM-1 and EF-1. Of these 47 sites, 28 are indicative of Native American activities. Euroamerican activities are represented by 17 sites, and 1 site is a multicomponent site which contains both prehistoric and historic material. After further investigation, 1 site is considered non-cultural. Controlled subsurface testing was conducted on 18 sites selected in consultation with the SHPO. Upon completion of testing, two archeological sites were recommended eligible to the NRHP. Based on surface evidence, a Euroamerican wagon road was also recommended eligible to the NRHP.

The majority of the sites were located along the east beltway alignments. The relatively small number of sites in the south beltway study area was thought to be related to the lack of well-defined terraces above the floodplain along the SM-4 route. Most prehistoric sites tend to be located on terraces. Along SM-4, there are sudden slopes rising from the floodplain to the uplands. Any sites or materials that might once have been present were either washed away down the steep slopes, or remain deeply buried in the floodplain. In contrast, the relative abundance of prehistoric sites in the east beltway study area is due to the presence of terraces at the stream crossing locations. These areas were favorable environmental settings for prehistoric groups which were attracted to the reliable year-round water sources. At the time of occupation, villages or other long-term sites were close enough to streams for water to be available, but high enough in the landscape to prevent recurrent flooding.

NRHP and NRHP-Eligible Properties. Based on the recommendations of the Historic Survey Report, Archeological Evaluation, and supplemental investigations requested by the State Historic Preservation Office (SHPO), there are 36 sites in the study area which are either on or eligible for listing on the NRHP. These include 32 historic (**Figure 3.3**) and four archeological sites. The SHPO and FHWA have concurred with the recommendations of eligibility; all other historic and archeological sites were determined not eligible (**Appendix A**). The historic resources being considered as part of the Section 106 consultation with the SHPO are listed in **Table 3.23**. This table provides the site number, site name (with historic name in quotation marks), type of site, and closest beltway corridor.

In addition to historic and archeological sites, the project included a good faith effort to contact Native American groups for the purpose of identifying traditional cultural properties; none were identified.

Information from the surveys was used in developing alignments to avoid impacts to historic resources to the extent possible.



LINCOLN

SM-4

EC-1

EM-1

EF-1

EXISTING FEATURES

- ▲ NRHP Eligible Sites
- NRHP Sites
- ~ Streams



LINCOLN SOUTH AND EAST BELTWAYS ENVIRONMENTAL IMPACT STATEMENT

Sites On Or Eligible For National Register Of Historic Places

May 2nd, 2002

Figure 3.3

Table 3.23

**SITES ON OR ELIGIBLE
 FOR THE NATIONAL REGISTER OF HISTORIC PLACES
 BY NEAREST BELTWAY CORRIDOR LOCATION ¹**

SITE NUMBER	SITE NAME	CORRIDOR						
		SC-1	SC-4	SF-1	SM-4	EC-1	EM-1	EF-1
FARMYARDS								
LC00: S-15	Del O'Brien Farmyard				X			
LC00: S-143	Henry Wunibald Farmyard				X			
LC00: E-52	Steve Johnson Farmyard						X	X
LC00: E-53	Penterman Farmyard, "Penterman Farm"							X
LC00: E-56	Michael Smith Farmyard							X
LC00: E-61	Elaine and Owen Herter Farmyard							X
LC00: E-62	Joel and Kathy Sartore Farmyard, "Herter's-Hagaman Farm"							X
LC00: E-69	Arthur Monahan Farmyard, "Haeger Dairy"							X
LC00: E-72	Lyle and Maveme Mayer Farmyard						X	X
LC00: E-87	Theresa Retzlaff Farmyard, "Forest Brook Farm"							X
LC00: E-88	Stevens Creek Stock Farm, Mardale Farm						X	X
LC00: E-134	Laura Reed Farmyard, "Reed Homestead"					X	X	
BARNs								
LC00: S-6	David McEwen Gable Roof Barn		X					
LC00: S-31	Steve Speidel Gothic Arch Roof Laminated Truss Barn	X						
LC00: S-47	Margene Zachek Gable Roof Connected Barn	X						
LC00: S-127	Ehler's Round Barn				X			
LC00: E-57	Elton Haase Gable Roof Mortise and Peg Barn, "Haase Farm"							X

**Table 3.23
(continued)**

SITE NUMBER	SITE NAME	CORRIDOR						
		SC-1	SC-4	SF-1	SM-4	EC-1	EM-1	EF-1
LC00: E-67	Shirley Retzlaff Bams and Silo "Retzlaff Farm"							X
LC00: E-102	Donna Keane Gambrel Roof Barn, "Kettlehut Farm"						X	
LC00: E-132	Lynn Lenhoff Gambrel Roof Concrete Block Barn					X		
RESIDENCES								
LC00: S-23	Forest Nicely Residence, "Jensen Homeplace"				X			
LC00: E-81	Chuck Hobza Residence, "Jacoby Homestead"						X	X
LC00: E-99	Norma and Bob Lemke Residence, "Karl Lemke Farm"						X	X
LC00: E-141	William Fagen Residence, "Fagen's Acres"					X		
SCHOOL								
LC00: S-41	"Cheney School"				X	X		
GRAIN ELEVATORS								
LC00: S-40	Circle 4 Feed and Grain Elevator, Cheney				X	X		
LC00: E-106	Farmers Coop Grain Elevator, Walton					X	X	
ROAD SIGNS								
LC00: S-42	Road Sign at 1 st and 91 st , Cheney				X	X		
LC00: S-135	Road Sign on at Saltillo and 56 th				X			
LC00: S-145	Road Sign at Saltillo and approx 112th			X				
LC00: E-118	Road Sign at 112 th and Adams						X	X
LC00: E-146	Road Sign at Yankee Hill and approx 116 th						X	
ARCHEOLOGICAL SITES								
25LC1	Schrader Site—Small Late Prehistoric Village, Smokey Hill Phase			X				
25LC125	Lithic Scatter						X	
25LC129	Lithic and Ceramic Scatter						X	
25LC147	Euroamerican Trail, ca. 1860-1880					X		

¹ List includes two additional road signs identified in June 2000.

3.23.2 Impacts of the Four Finalist Alternatives

A preliminary assessment of adverse effects to NRHP sites was conducted by a team of technical persons who have been involved in the Beltway project over the course of several years (see **Appendix F**). Methodology for the assessment followed 36 CFR Part 800.5, as described in the revised guidance dated 18 May 1999. The assessment of effects included three levels of screening.

Results of Level 1 Screening. The original 34 sites were reviewed to determine which beltway corridors could potentially affect them (previous **Table 3.23**). However, only the four remaining beltway corridors were considered in the evaluation; these are SM-4, EC-1, EM-1 and EF-1. Based on this review, 3 historic sites and 1 archeological site were determined not to be affected by any of these four corridors. Eliminated from further consideration were sites LC00: S-6, LC00: S-31, LC00: S-47 and 25LC1.

Results of Level 2 Screening. The remaining 30 sites (27 historic and 3 archeological) were compared with the most recently refined corridor concept. Materials available to the reviewers included site survey data forms, descriptions, maps, and photographs of the sites. For each corridor, materials available included recent aerial photography, existing and future contour maps, revised centerline concepts and cut and fill information.

Using the list of examples of adverse effects found in 36 CFR Part 800.5 (a) (2), a matrix of potential adverse effects was determined for each site along each corridor. Among other things, the teams evaluated the physical characteristics of and type of historic property; the distance between the property and the beltway; the topography in between the property and the beltway; any existing screening; whether the beltway was in a cut or fill section; whether the property was already affected by other transportation facilities; and any changes in access.

Based on the matrix, sites were either determined to (a) not be adversely affected by the beltway project, (b) be adversely affected, or (c) possibly be adversely affected, but needed field verification.

Results of Level 3 Screening. In Fall 1999, a field investigation was conducted by the team members to survey the sites in question. The field trip included viewing sites from the corridor centerlines and viewing the centerlines from the sites. Based on the field review, the team finalized the preliminary assessment of adverse effects. Seven sites were determined to be impacted by the four routes (**Table 3.24**). Of the seven sites, the beltway would require incorporation of land from only the two archeological sites. These takings are discussed further in the Section 4(f) Statement (**Appendix H**).

Table 3.24

**SUMMARY OF NRHP SITES
ADVERSELY AFFECTED BY THE BELTWAY CORRIDORS**

SM-4	EC-1	EM-1	EF-1
LC00: S-143 Henry Wunibald Farmyard	25LC147 Euroamerican Trail	LC00: E-52 Steve Johnson Farmyard	LC00: E-53 Penterman Farmyard
		25LC129 ¹ Lithic and Ceramic Scatter	LC00: E-87 Teresa Retzlaff Farmyard
			LC00: E-88 Stevens Creek Stock Farm

¹ In December 2001, refinements to the EM-1 alignment allowed this site to be avoided.

Additional Sites. Two additional cast concrete road signs which were identified in the study area in June 2000 (**Appendix G**) have been added to **Table 3.23**. Neither of these signs will be impacted by finalist beltway alignments.

Public Coordination. The Preliminary Assessment of Adverse Effects to NRHP and NRHP-Eligible Sites was made available for review and comment by the consulting parties and general public. A total of 32 letters were received, including 20 which mentioned being members of CARS—Citizens for Accountable Route Selection.

Comments were reviewed, summarized and discussed by the teams listed above. Additional investigations were conducted, and information from the comments and investigations was incorporated into (1) the Assessment of Adverse Effects to NRHP and NRHP-Eligible Sites to be submitted to the SHPO, and (2) the Environmental Impact Statement, where appropriate.

Additional Investigations. As recommended in the consulting party/public comments, several additional investigations were conducted. These included:

1. Determination of specific boundaries for all historic properties eligible for the NRHP (see **Appendix G**).
2. Evaluation of the Stevens Creek Stock Farm 320 ha (800 ac) (see **Appendix F**).
3. Evaluation of the Sartore (Herter) Farmyard 40 ha (100 ac) (see **Appendix F**).
4. Noise evaluation of the sensitive receptors, including three residences on or eligible for the NRHP (Henry Wunibald, Penterman and Teresa Retzlaff) (see **Section 3.13** and **Appendix C**).
5. Evaluation of urban sprawl (see **Sections 3.2** and **3.31**).
6. Reevaluation/evaluation of other sites, including four that had already been evaluated, two previously not considered to have retained a sufficient degree of historic integrity to warrant inclusion in the original historic survey report, and three archeological sites (**Appendix F**).
7. Reevaluation of a historic district centered on the German/Trinity Lutheran Church (**Appendix F**).
8. Resolution of various other issues (see **Appendix F**).

Reevaluation of Effects. Based on the consulting party/public comments and additional investigations, the list of eligible sites remained unchanged from that determined by FHWA in a letter dated 7 October 1999, and for which concurrence was obtained by the SHPO in letters dated 3 June 1998, 11 June 1998, 7 December 1998, 7 September 1999 and 2 June 2000. The only exceptions were the addition of the two more recently identified road signs which are considered eligible for the NRHP.

Based on the additional investigations, sites on or eligible for the NRHP were reevaluated and the Assessment of Adverse Effects was updated with current information. However, the list of sites which were determined to be adversely affected remained unchanged from the December 1999 preliminary assessment (see **Appendix F**). In letters dated 1 February 2001 and 27 November 2000 (**Appendix E**), the SHPO concurred with the findings of the Assessment of Adverse Effects (**Appendix F**) and the Determination of Boundaries report (**Appendix G**). Since that time, public comments on the DEIS raised several other historic issues. These are addressed in **Sections 9.5 and 9.6**.

Section 4(f) Resources. All of the seven sites in **Table 3.24**, as well as the road sign at 112th and Adams, were included in the Draft Section 4(f) Statement which further addressed transportation impacts to historic resources. The Final Section 4(f) Statement is included in **Appendix H**; this version of the document evaluates only those resources along the preferred alternative. Based on the Draft 4(f) evaluation, the only historic resource which falls under Section 4(f) is the road sign. The road sign is located along the preferred alternative and may require protection during construction and nearby repositioning, if it is not moved prior to the beltway project for County road widening. Repositioning the sign is a minor impact, required for operation and safety of an existing roadway. The SHPO has concurred that the beltway project will have no adverse effect on the sign, with the condition of protection during construction and repositioning nearby (see letter dated 26 September 2000, **Appendix H-A**).

3.23.3 Proposed Mitigation

Proposed mitigation follows the guidelines of the Nebraska SHPO and is included in the Assessment of Adverse Effects (**Appendix F**). A Memorandum of Agreement was developed to implement mitigation for the two historic properties which are adversely affected by the preferred SM-4/EM-1 alternative (Henry Wunibald and Steve Johnson Farmyards), and includes a clause for donation of easements. Modification of the EM-1 alignment made it possible to avoid archeological site 25LC129. Other cultural resource management activities will include:

- Completion of an archeological survey of bottomlands where access has been previously denied.
- Use of NDOR standard provisions regarding previously unsuspected archeological remains that provide for cessation of work and notification of the SHPO
- Use of NDOR standard provisions regarding monitoring of archeological sites during construction.
- A historic marker located at Saltillo Road and South 14th Street will need to be relocated. The marker commemorates the Nebraska City to Fort Kearny Road, "The Great Central Route to the Gold Fields" which crossed near this location. There are no remnants of the trail known within or near the SM-4 right-of-way.

Additional details on mitigation are included in **Section 9.5.4**.

3.23.4 No Build Alternative

Under the no build alternative, deterioration of some historic properties will likely continue while others may be preserved and maintained. The no build alternative probably maintains the characteristics of the area that motivate certain owners to invest in maintaining historic properties. However, even with the no build scenario, development pressures will continue to accelerate in both the south and east beltways areas under current growth policies. There is reason to believe that continued changes in farming, farm consolidation, escalating agricultural land prices, and proliferation of non-farm residential acreages will contribute to urbanization. With no evidence of major public or private funding for historic preservation, the same processes that caused the decline of former historic structures will continue into the future.

Although the no build alternative may avoid the specific impacts to cultural resources of the beltway alternatives; construction of the proposed future roadway network improvements are likely to impact other cultural resources along roadways to be paved and/or widened in the 1 and 25 Year Program.

3.24 ENVIRONMENTAL RISK SITES

3.24.1 Existing Conditions

Environmental risk sites are those facilities and/or locations where hazardous substances, hazardous waste or petroleum products were or can be released into the ground water, surface soils or subsurface sediments. The beltway could impact these sites during roadway construction by direct contact with contamination present in contaminated media (surface soil, subsurface sediments, and ground water). The assessment of the impact of the beltway project on environmental risk sites considered the extent of contamination at the facility and extending from the facility.

Existing conditions have been determined by review of regulatory records through the Federal Freedom of Information Act requests to the Nebraska Department of Environmental Quality (NDEQ), the United States Environmental Protection Agency (EPA) and the Nebraska State Fire Marshal (SFM). Each agency provided a list of sites regulated by their agencies occurring in the study area. Regulatory records examined and date of the database were as follows:

1. **NPL** The National Priorities List (NPL) documents sites which have been identified for priority remedial actions under the Superfund Program by EPA. Database date: 4/14/00.
2. **CERCLIS** The Comprehensive Environmental Response, Compensation and Liability Index System (CERCLIS) is a compilation of sites in which the EPA investigated or is currently investigating for a release or threatened release of hazardous substances pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980. Database date: 4/14/00.
3. **Landfills** The Landfills list is a listing maintained by the NDEQ of closed or operating registered solid waste landfills.

- 4. RCRIS** The Resource Conservation and Recovery Act Information System (RCRIS) is a compilation by the EPA and the NDEQ of reporting facilities that generate or transport hazardous waste or facilities that treat, store or dispose (TSD) of hazardous waste. RCRIS also contains a listing of TSD facilities required to complete corrective action. Database dates: 3/29/00 and 4/17/00.
- 5. UST** The UST list is a compilation by the SFM of registered underground storage tanks (UST) and facilities that previously had tanks. Database date: 5/9/00.
- 6. LUST** The LUST list is a compilation by the NDEQ of leaking underground storage tanks (LUST) indicating the type of release from the tank and status of the site (active or closed). Database date: 4/12/00.
- 7. Surface Spills** A listing of releases to land or water of petroleum products or hazardous substances that have occurred and been reported. Database date 4/12/00.

The above regulatory lists were reviewed for environmental risk sites occurring within the study area (and up to 1.6 km (1 mi) from each alternative). In addition, other potential environmental risk sites not identified on the above regulatory lists have been identified based on current or previous land uses.

Review of potential environmental risk sites in the study area identified one NPL site, two CERCLA sites, five RCRA generators, no registered Landfills, five LUST sites, two UST facilities (sites with tanks and not appearing on the LUST list), and 17 surface spills (more than one on some properties). Several of the 32 sites identified have no potential for conflict or impact by the beltway project based on distance from features, type of site, and type of contamination; therefore, the number of potential impact sites is reduced.

The NPL site occurs north of Waverly over 2.4 km (1.5 mi) northeast of the east beltway routes, and the two CERCLA sites occur in Waverly near the NPL site and in Walton southwest of the intersection of South 120th and A Streets. None of these sites are considered potential impact sites based on the distance each is located from the alignments and the type of contamination.

Five hazardous waste generators are located in the study area; however none are located in close enough proximity to any of the alignments to warrant further consideration of impact.

Contaminant plumes resulting from leaking underground storage tanks (LUSTs) are relatively small and expected to be approximately 150 m (500 ft) long by 75 m (250 ft) wide based on the type and volume of releases noted, low permeability of soils and sediments within the study area and the resulting low ground water flow and contaminant migration velocities. No known LUST sites occur within 150 m (500 ft) of the proposed beltway alignments; therefore, no potential impact sites are identified.

The UST list was also searched for sites within approximately 150 m (500 ft) of linear features which currently have underground tanks installed, but, have not reported any releases from the tanks. Potential plumes from these sites would be of similar type and size as those noted at known LUST sites. Two UST sites are located at the intersection of US 77 and Saltillo Road.

Seventeen surface spills were identified in the study area. These spill have occurred from above ground storage tanks, pipelines, fixed facilities, and motor vehicles. In some cases, insufficient information is included in the regulatory database to determine the exact location and extent of the spill, therefore, these spills are assumed to occur in the study area. Eleven of the 17 spills are identified as potential impact sites and occur in seven locations along the beltway alignments.

Two major above ground petroleum storage facilities with petroleum pipelines are located near the intersection of US 77 and Saltillo Road. Releases from these facilities could result in more extensive surface contamination due to the volume stored, absence of spill prevention measures in the past and length of operation. Both of these sites have had releases from the tanks or other portions of the facility and are included in the surface spill list.

Another potential environmental risk site occurring in the study area is the United States Department of Agricultural (USDA) grain storage facility in Cheney. This site has not been identified by the NDEQ or EPA as a potential hazardous waste site; however, past activities at similar facilities included the use of hazardous substances (grain fumigants) which have since contaminated surface soils, subsurface sediments and ground water in the vicinity of these type of facilities. This site is located approximately 1.6 km (1 mi) west of the EC-1 alignment. Contaminated surface soils and subsurface sediments could be expected near the facility and contaminated ground water could be expected at distance from the site.

In addition, impacts from unreported releases, unregistered facilities and facilities with insufficient location information are unable to be assessed. The potential does occur that these sites may exist along the project alternatives. Due to the rural setting of the majority of the project, contaminated media may also be encountered in areas impacted by unreported releases, in particular from unregistered tanks at farm operations that do not appear on regulatory agency lists, and from undocumented rural landfills.

Prior to right-of-way acquisition, Phase I and Phase II environmental evaluations may be conducted for improved properties (with structures) to determine site-specific operational histories, historical land use, and potential waste streams during demolition.

3.24.2 Impacts of the Four Finalist Alternatives

The total number of environmental risk sites with potential to be impacted by the beltway alternatives are summarized in **Table 3.25**. Descriptions of the individual facilities are discussed under each alternative.

SM-4 Alternative. Two underground tank facilities are located at the intersection of US 77 and Saltillo Road. These are Major Oil Company (SMF #4708) and Shoemaker's Truck Stop South (SFM #11650) located on the southeast corner and the northeast corner of this intersection, respectively. Each facility appears on the UST list and not on the LUST list indicating that no release from the underground tanks has been documented to date. However, since these sites still have underground tanks installed, there is a potential that a release has occurred and not been noted. The risk of exposure to potential contamination from these sites would be higher with excavation below approximately 3 m (10 ft) below ground level. Minimal risk of exposure would be expected with shallower excavation activities.

Table 3.25

**NUMBER OF RECORDED ENVIRONMENTAL RISK SITES
 WITH POTENTIAL FOR BELTWAY IMPACTS**

ENVIRONMENTAL RISK SITES IN REGULATORY RECORDS	ALTERNATIVE			
	SM-4	EC-1	EM-1	EF-1
NPL	0	0	0	0
CERCLIS	0	0	0	0
RCRIS	0	0	0	0
UST	2	0	0	0
LUST	0	0	0	0
Surface Spills	7	4	4	4
TOTAL	9	4	4	4

Major Oil Company is the only business relocation required on any of the beltway alternatives. Regulatory records indicate that underground storage tanks are installed at the site and no release of petroleum products has been documented at this site. However, the NDEQ has documented thousands of releases from underground storage tanks in the State of Nebraska. Upon taking the business, State regulations require that the underground storage tanks be removed and a soil assessment completed to determine if a release has occurred. There is a potential that when the underground storage tanks are removed, petroleum contamination may be encountered. It would be the responsibility of the tank owner/operator to notify state and local authorities regarding the contamination. In the event that petroleum contamination is encountered during construction, removal and on-site treatment mitigation measures may need to be addressed as discussed in **Section 3.24.3**.

Seven spills have occurred at or near the intersection of US 77 and Saltillo Road. Information in the regulatory database is insufficient to determine the exact location of some of the spills. Information on these spills are summarized in **Table 3.26**. Surface and subsurface soil and ground water contamination would be expected at these sites, and could be mitigated as described in **Section 3.24.3**.

EC-1, EM-1 and EF-1 Alternatives. Four surface spills have occurred along I-80 and US 6 in the vicinity of the proposed east beltway interchange. Since all of the east beltway alternatives join I-80 at the same location, the potential impacts for each east alternative are the same. These spills are summarized in **Table 3.27**. Surface contamination would be expected and could be mitigated by removal and disposal at a licensed landfill as described in **Section 3.24.3**.

Table 3.26

**POTENTIAL SURFACE SPILL SITES
 ON SM-4**

FACILITY NAME	FACILITY ADDRESS	NDEQ FILE NO.	STATUS
Conoco, Inc.	South 14 th Street and Saltillo Road	062691-RF-1445	No Further Action (NFA)
Williams Pipeline	2000 Saltillo Road	02278-K-0216	Unknown
	11200 South 14 th Street	06139-CAB-1545	Unknown
	11200 South 14 th Street	04028-H-1245	Unknown
	2000 Saltillo Road	042792-KM-1640	NFA
	2000 Saltillo Road	06028-M-1900	Unknown
AF Agromony	Hwy 77 & Saltillo Road	051194-DT-1045	NFA

Table 3.27

**POTENTIAL SURFACE SPILL SITES
 ALONG EC-1, EM-1 AND EF-1**

FACILITY NAME	FACILITY ADDRESS	NDEQ FILE NO.	STATUS
Pavers, Inc.	12303 US 6	060797-KM-1420	Suspended
	12303 US 6	061797-KM-1420	Unknown
Interstate 80	Mile marker 410 Eastbound	060491-KM-1830	NFA
	US 6 & I-80 Interchange	082598-DB-1620	NFA

3.24.3 Proposed Mitigation

Contaminated media encountered in the project area could include contaminated soil and/or sediment and ground water. Mitigation measures include avoidance, removal of the contaminated media or on-site treatment. Selection of an appropriate mitigation strategy will depend on the type and concentration of the contaminant and the type and quantity of media contaminated. Contaminated media may be encountered in or near areas of identified releases.

Avoidance. If possible, contamination should be avoided by realignment of the beltway feature. This approach is difficult because the contamination occurs in the subsurface and the surface extent is typically uncertain. Furthermore, right-of-way acquisition may preclude realignment.

Removal. Contaminated soil and sediment may be removed and managed off-site in accordance with requirements of the State of Nebraska for special waste or hazardous waste. If contaminated soil meets the classification of a special waste then the most common management option involves disposal at a licensed Subtitle D landfill in accordance with NDEQ Title 132. If contaminated soil is classified as a hazardous waste, disposal must be at a licensed hazardous waste disposal site in accordance with NDEQ Title 128.

On-Site Treatment. Contaminated water generated from any de-watering activities may require treating prior to discharge. Cost of treatment would vary depending on the type and concentration of contaminant, receiving waterway, volume of discharge and treatment system required. Permits issued by NDEQ may be required for this option for water discharges in accordance with NDEQ Title 119 and contaminant emissions to ambient air in accordance with NDEQ Title 129.

3.24.4 No Build Alternative

The no build alternative will have no impact to existing environmental risk sites and would avoid the expenses of any mitigation measures, other than those required for construction of the proposed future roadway network improvements.

3.25 VISUAL AESTHETICS

3.25.1 Existing Conditions

Visually, the project area is characterized by rolling hills and an agricultural landscape. Narrow strips of woodlands occur along the stream courses which break up the typical scenery of large fields of row crops. Existing farm ponds dot the drainages between the hills. This rural landscape is regularly dissected by a grid of paved and unpaved section line roads spaced at 1.6 km (1 mi) intervals in both directions. Portions of the project area are characterized by suburban residential acreage residences.

3.25.2 Impacts of the Four Finalist Alternatives

The beltway will introduce a linear freeway facility into a rural landscape, including associated bridges, overpasses and interchanges. Although the size of a freeway facility is out-of-character for the beltway study area, the visual effect of an additional linear roadway is not greatly different than that of the existing grid system of section line roads except for those residences in close proximity to the beltway. For these residences, the visual isolation of the existing landscape will be replaced with a view of a 4-lane freeway facility, not unlike US 77 through the south beltway study area.

To estimate the potential visual impact of each alternative, a determination was made of the number of residences within 0.4 km (0.25 mi) of the beltway right-of-way (Table 3.28).

Table 3.28

**NUMBER OF RESIDENCES AND BUSINESSES
 WITHIN 0.4 km (0.25 MI) OF BELTWAY ALTERNATIVES**

	ALTERNATIVE			
	SM-4	EC-1	EM-1	EF-1
RESIDENCES	27	58	31	41

3.25.3 Proposed Mitigation

Public concern has been increasing for Lincoln's major transportation corridors. This was recently observed in the adoption of a new 'Boulevard' concept for future Public Way Corridors to create a positive physical image for the community along the mile-line section roadways within Lincoln's future urban area. The Boulevard concept is a 37 m (120-ft) multiple-use corridor which expands to 40 m (130 ft) at mile-line intersections and allows for landscaping, open space, pedestrians, and cyclists, while accommodating utilities and the addition of future traffic lanes. There is an opportunity to apply a similarly 'green' concept to the beltway corridor. Accommodating landscaping and open space would have a clear benefit to adjacent properties, but is likely to require the acquisition of additional right-of-way or easements and will need to be weighed against the additional loss of private property

As part of final design, consideration will be given to visual impacts on residential properties. Measures to screen the road from the residence will be evaluated including landscaping, berming and fencing which can be accomplished within the road right-of-way or on additional road right-of-way acquired for this purpose.

3.25.4 No Build Alternative

The no build alternative will have no impact on visual aesthetic, other than paving and or widening proposed future roadway network improvements in the 1 and 20 Year Program.

3.26 ENERGY

3.26.1 Methodology

The proposed project will affect energy usage by providing a new roadway for automobiles-- which consume fossil fuels as an energy source. To compare energy impacts of the alternatives an analysis was made of fossil fuel consumption. The analysis involved a comparison of the finalist alternatives and the no build alternative. Typically, both direct and indirect energy consumption would be calculated for a transportation system. The direct energy consumption includes the amount of energy consumed by vehicles operating on the roadway network, and was calculated by multiplying the total vehicle kilometers (miles) traveled within the County by the energy consumption rate per vehicle. Indirect energy requirements, which are not quantified in this analysis, include construction and maintenance of roadways, and are dependent on such factors as roadway length, pavement type, number of bridges, etc.

The direct energy analysis compares the anticipated direct energy consumption level between the finalist alternatives and the no build alternative for long-range planning conditions. The direct energy consumption figures have been calculated using speed sensitive formulae developed by FHWA (1981). The analysis also makes an allowance for anticipated improvements in vehicle fuel efficiency, and assumes that the fleet would consume 23.8 percent less fuel per kilometer traveled than vehicles operating presently.

3.26.2 Impacts of the Four Finalist Alternatives

Table 3.29 shows the anticipated annual vehicle kilometers traveled (vehicle miles traveled (VMT)), average 24-hour travel speeds, and fuel consumption for the finalist alternatives and no build alternative. Annual vehicle kilometers (miles) traveled would be minimally higher (4.5 to 5.8 percent) with the beltway alternative versus the no build alternative. At the same time, average travel speeds would be 0.6 to 0.8 km/h (0.4 to 0.5 mph) faster, or 1.4 to 1.9 percent faster. This increase in travel speeds would enable vehicles to operate in a more fuel efficient environment, with savings derived from these conditions offsetting the fuel required to support the minimal increase in the vehicle kilometers traveled (VMT). Direct energy consumption under the finalist alternatives is approximately 6,412,000 to 6,494,000 billion barrels (bbl) of oil, representing a 4.5 to 5.6 percent decrease over the no build alternative. Therefore, energy consumption with the beltway alternatives is considered a small improvement over the no build conditions.

Table 3.29

ENERGY ANALYSIS

ALTERNATIVE	ANNUAL VEHICLE TRAVELED km (mi) (millions)	AVERAGE TRAVEL SPEED km/h (mph)	TOTAL GASOLINE liters (gallons) (millions)	TOTAL DIESEL liters (gallons) (millions)	TOTAL ANNUAL BTU's (billions)	TOTAL ANNUAL BBL
SM-4 / EC-1	10.23 (6.356)	43.8 (27.2)	950 (251)	68 (18)	35,100	6,412,000
SM-4 / EM-1	10.29 (6.392)	43.6 (27.1)	958 (253)	68 (18)	35,300	6,449,000
SM-4 / EF-1	10.36 (6.437)	43.6 (27.1)	965 (255)	68 (18)	35,600	6,494,000
No Build	10.82 (6.726)	43.0 (26.7)	1007 (266)	72 (19)	37,100	6,787,000

A beltway alternative would also require a one-time non-recoverable expenditure of energy for the construction of the roadway. However, this expenditure would be compensated for over time by the ongoing annual savings in direct energy requirements. Also, none of the energy resources to be used during construction are in short supply, and no unusual demands on energy supply would result from constructing the beltway.

All of the beltway alternatives would require similar energy consumption for construction and operation of a roadway facility, in comparison to the no build alternative which requires no additional expenditure of energy, other than that required for construction of the proposed future roadway network improvements. However, post-construction operational requirements will be less with the more efficient beltway (freeway) alternatives as opposed to the no build alternative. Savings in operational energy requirements would more than offset construction energy requirements and thus, in the long-term, result in a net savings in energy usage.

3.26.3 Proposed Mitigation

No mitigation is proposed since energy consumption with the beltway alternatives is less than that with the no build alternative.

3.26.4 No Build Alternative

Regional travel increases and proposed future roadway network improvements are included in the no build alternative resulting in an overall increase in future travel speeds. Annual vehicle kilometers traveled (VMT) in the County is forecast to be approximately 10,824,000 kilometers (6,726,000 miles). Vehicles operating within the County are expected to consume approximately 6,600 bbl of oil which is more than with any of the beltway alternatives.

3.27 CONSTRUCTION IMPACTS

3.27.1 Existing Conditions

All of the beltway alternatives would be constructed along new right-of-way located within rural areas.

3.27.2 Impacts of the Four Finalist Alternatives

Primary construction impacts would include:

- Detours and access impacts to adjacent properties,
- Increased dust generation from earth moving activities,
- Increased erosion and sedimentation in waterways from earth moving activities, and
- Increased noise from construction equipment.

All of these impacts are considered temporary and mitigatable.

3.27.3 Proposed Mitigation

Provision of Access. In general, detours and access to adjacent properties will only be required when construction crosses existing streets or driveways. Because most of the project will be along new corridors, access problems should be minimal with the exceptions of the major interchanges at US 77, N-2, US 34, I-80 and US 6. For minor intersections, motorists will be rerouted to nearby parallel streets. Delay would be minimized and adequate signage provided. For the major intersections, construction phasing plans will be prepared to address traffic handling operations. Private landowners will be provided access to their property at all times.

Dust Suppression. If objectionable dust levels occur, dust can be controlled by timely applications of water and temporary seeding to the construction areas.

Erosion and Sedimentation Control. Mitigation measures for construction-related erosion and sedimentation control will include dikes, dams, sediment basins, fiber mats, temporary and permanent seeding, straw mulch, plastic liners, slope drains, and other devices which would intercept and trap transported sediments during construction.

Noise Controls. Construction noise levels are typically a function of the scale of the project, the phase of construction, the condition of the equipment and its operating cycles, and the number of construction equipment units operating simultaneously. Measures that may be employed to reduce objectionable construction noise include designating haul routes away from sensitive receptors, controlling noise at the source, and limiting construction activities to certain hours of the day.

3.27.4 No Build Alternative

The no build alternative will require similar mitigation for construction of the proposed future roadway network improvements.

3.28 PERMITS

Table 3.30 includes a list of permits that will be required for the beltway project. No other permits are known at this time. A no build scenario would likely require similar permits for construction of the proposed future roadway network improvements.

Table 3.30

LIST OF REQUIRED PERMITS

PERMIT	ISSUING AGENCY	REASON
Interchange Justification	Federal Highway Administration	Required for a new interchange on the interstate highway system
Section 404 Permit	U.S. Army Corps of Engineers	Required for dredge or fill activities in wetlands or waters of the United States.
Section 401 Water Quality Certification	Nebraska Department of Environmental Quality	Required as part of Section 404 permit process
National Pollution Discharge Elimination System (NPDES) Permit	Nebraska Department of Environmental Quality	Required for construction sites greater than 2 ha (5 ac) in size.
Flood Plain Development Permit	Lancaster County	Required for construction within 100-year floodplain.

3.29 RELATIONSHIP OF LOCAL SHORT-TERM USES VS. LONG-TERM PRODUCTIVITY

The short-term use of resources to construct the beltway are necessary for the long-term benefits related to the transportation improvements described in **Section 3.3**. These improvements are based on the adopted *Lincoln/Lancaster County Comprehensive Plan* which considers the need for present and future traffic requirements within the context of present and future land uses. Therefore, local short-term use of resources for the beltway project is consistent with the maintenance and enhancement of long-term productivity for the local area and regional transportation network.

3.30 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Construction of the beltway involves commitment of a range of natural, physical, human and fiscal resources. These include land, fossil fuels, labor and construction materials.

Land is not considered an irreversible commitment of resources. If a greater need arises for use of the land or if the improvements are no longer needed, land can be converted to another use if considered appropriate and consistent with the *Lincoln/Lancaster County Comprehensive Plan*. At present, there is no reason to believe such a conversion would ever be necessary given the amount of forethought invested in the beltway planning process.

Resources irretrievably committed to the project will consist primarily of construction materials, fuel and related labor. However, they are not in short supply and their use would not have an adverse effect on the continued availability of these resources in the future. Construction activities would also require a substantial one-time expenditure of Federal and State funds which are not retrievable.

Natural resources such as soil, water, air, vegetation and wildlife will be disrupted or utilized but not in an irreversible manner.

The commitment of these resources is based on the idea that residents of Lincoln and Lancaster County, as well as travelers through the region, would benefit by improving the quality of the transportation system. These improvements include improved traffic conditions, time of travel, and safety. These benefits outweigh the commitment of resources.

3.31 SECONDARY AND CUMULATIVE IMPACTS

In compliance with NEPA and the Council on Environmental Quality (CEQ) regulations, secondary and cumulative effects of a project should be examined as part of the Environmental Impact Statement review. CEQ defines secondary (or indirect) effects as:

“effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water on other natural systems, including ecosystems.” (40 CFR 1508.8(b))

CEQ defines cumulative impact as:

"impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time." (40 CFR 1508.7)

While the DEIS included a discussion of secondary and cumulative impacts, several concerns were raised during the public comment period requiring an expanded evaluation in the FEIS. The revised secondary and cumulative impacts evaluation is included in **Section 9.6**

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Chapter 4

COMPARISON OF ALTERNATIVES

4. COMPARISON OF THE FINALIST ALTERNATIVES AND SELECTION OF THE PREFERRED ALTERNATIVE

Comparison of the Finalist Alternatives. A comparison of project benefits and impacts is summarized in **Table 4.1**. The table includes data generated during the Level IV analysis, the most detailed evaluation of the alternatives. Comparison of the beltway alternatives indicates that all of the alternatives, except the no build alternative, are feasible solutions that will serve the project purpose and need to complete the circumferential transportation network around Lincoln, to move through traffic around Lincoln's congested urban area, and to improve traffic flow on the existing urban street system. Additionally, all of the end-to-end beltway alternatives are cost-effective based on an analysis of time savings from the BOS II model (**Section 2.4.5**).

The location of the east beltway in terms of the close, mid or far corridors does not seem to have a significant effect on the amount of traffic it is expected to carry or the benefits obtained. The east beltway provides relief to traffic coming into or through Lincoln from the northeast (Omaha) and the southeast (Nebraska City). This traffic will use the east beltway regardless of which corridor is selected. The major differences between the east corridors involve the interchanges at I-80, N-2 and the south beltway. The close and far corridors require significant diagonal routing to connect to an interchange at I-80, and both require two separate interchanges at N-2 and the south beltway. In comparison, the mid corridor requires a single but more complicated interchange at N-2 and the south beltway. These differences are best reflected in the construction cost estimates and right-of-way impacts; however, they have little effect on system performance.

Comparison of the project impacts indicates that all of the alternatives have relatively low impact considering the length of the segments. This is due to the primarily rural setting and the great effort made to minimize impacts throughout the beltway planning process. However, all of the east routes have impacts to Section 4(f) resources.

Overall differences between the east alternatives are relatively minor. EC-1 and EF-1 have greater right-of-way requirements than EM-1; and therefore, have greater land use impacts. EC-1 has slightly more impact to suburban type land uses such as residential and commercial acreage and impacts to trails due to its closer proximity to Lincoln; whereas EF-1, which is 4.0 km (2.5 mi) more distant than EC-1, has slightly more impact to rural uses such as farmland, prairie, historic structures, and actual number of residences. EM-1 and EC-1 have slightly more impact to natural resources such as streams, floodplains and floodways, and wetlands due to their closer proximity to Stevens Creek, where as EF-1 has slightly less impact to natural resources due to its general location along the ridgeline.

Although all of the alternatives meet the project purpose and need, obviously, there are benefits and trade-offs with any of the three east alternatives. A few noteworthy differences in impacts between the routes are:

Table 4.1

LEVEL IV: SUMMARY OF BELTWAY BENEFITS AND IMPACTS

IMPACTS	UNITS	ALTERNATIVES			
		SM-4	EC-1	EM-1	EF-1
TRANSPORTATION BENEFITS (End to End Beltway Analysis: South and East Combined)					
Total Daily Beltway Usage	Vehicle Kilometers (Miles) Traveled	--	762 800 (474,000)	721 000 (448,000)	696 800 433,000
Average Daily Time Savings	Hours	--	9,400	10,250	8,450
Average Annual Accident Savings ¹	\$	--	\$8,691,000	\$7,430,000	\$4,712,000
ECONOMIC IMPACTS					
Construction Cost (partial beltway)	\$ (1996)	\$107,000,000	\$147,000,000	\$157,000,000	\$128,000,000
Construction Cost (end-to-end beltway with SM-4)	\$ (1996)	--	\$249,000,000	\$252,000,000	\$231,000,000
Payoff Period ² (end-to-end beltway with SM-4)	Years	-	14	13	19
Cost Effectiveness	Payoff Period less than Design Life of Project	--	Yes	Yes	Yes
SOCIOECONOMIC IMPACTS					
Total Right-of-Way	ha (ac)	295 (730)	451 (1114)	389 (960)	449 (1110)
Residential Relocations	No. of houses	3	7	4	7
Business Relocations	No. of businesses	1	0	0	1
Railroad Crossings ³	No. of crossings	3	2	0	0
Airfield Impacts	Impacts	none	none	none	none
Cropland Impacts	ha (ac)	206 (508)	296 (731)	282 (698)	316 (780)
Total Farmland Impacts	ha (ac)	238 (587)	367 (906)	329 (813)	375 (926)
Prime and Unique Farmland Impacts (end-to-end beltway with SM-4)	Impact Rating Points (0-260)	--	140 (minor)	143.5 (minor)	142 (minor)
Estimate of Bisected Farms	No. of owners	16	33	29	23
LAND USE IMPACTS					
Distance from 2000 City Limit	km (mi)	0.8-2.4 (0.5-1.5)	0.8-3.2 (0.5-2.0)	2.4-4.8 (1.5-3.0)	2.4-6.4 (1.5-4.0)
Residential Impact	ha (ac)	9.5 (23.4)	12.3 (30.3)	4.0 (10.0)	7.8 (19.3)
Commercial/Industrial Impact	ha (ac)	4.2 (10.3)	1.6 (3.9)	0.6 (1.4)	1.1 (2.7)
Trail Impacts	No. of crossings ha (ac)	0 0	2 0.6 (1.5)	1 0.3 (0.8)	1 0.3 (0.7)
Modification of Proposed LPSNRD Farm Ponds	No. of ponds	0	2	1	2

IMPACTS	UNITS	ALTERNATIVES			
		SM-4	EC-1	EM-1	EF-1
ENVIRONMENTAL IMPACTS					
Air Quality	NAAQS impacts	no impact	no impact	no impact	no impact
Noise ⁴	No. of impacted receptors ⁴	4	9	5	7
Water Quality	Impacts	minor and temporary	minor and temporary	minor and temporary	minor and temporary
Major Stream Crossings	No. of crossings	2	2	1	0
Total Streams	No. of crossings	8	9	6	4
100-Year Floodplains	No. of crossings	4	4	6	5
Floodways	No. of crossings	0	2	1	0
Wetlands	ha (ac)	7.3 (18.0)	16.9 (41.8)	8.9 (21.9)	8.3 (20.4)
Prairie Grasslands	ha (ac)	0	0.4 (1.1)	1.3 (3.2)	2.7 (6.6)
Endangered & Threatened Species	Impacts	none	none	none	none
NRHP Archeological Sites Adversely Affected under Section 106	No. of sites	0	1	0	0
NRHP Standing Structures Adversely Affected under Section 106	No. of sites	1	0	1	3
Section 4(f) Impacts-Recreation	No. of resources	0	2	1	1
Section 4(f) Impacts-Historic	No. of sites	0	0	1	1
Potential Environmental Risk Sites	No. sites along route	9	4	4	4
Visual Impacts to Residences	No. w/in 0.4 km (0.25 mi)	27	58	31	41

¹ Average Annual Accident Savings is based on end-to-end beltway analyses performed with the BOS land use plan. The BOS II land use plan is expected to provide even greater accident cost savings.

² An analysis of the time savings with the BOS II model comparing the end-to-end beltway alternatives and no build alternative indicates the investment to construct the beltway would be paid off through time savings in 13 to 19 years (Section 2.4.5). The conclusions of this comparison are that all end-to-end beltway alternatives for all the east alignments are economically feasible.

³ If SM-4 and EC-1 are constructed, two crossings of the OPPD line will be required. EC-1 alone does not require any railroad crossing.

⁴ These are receptors for which noise abatement measures were not considered reasonable.

1. For EC-1, *noise and visual impacts* to nearby residences are greater than with other alternatives because it extends across a more developed landscape closer to the city.
2. For EF-1, impacts to *historic structures* are greater due to the greater presence of resources with increasing distance from the city and urbanization.
3. The *higher costs* of EC-1 and EM-1 compared to EF-1 are due to the major bridge structure at Stevens Creek. However, all of the costs are within 8 percent of each other for the end-to-end beltways, and within 14 percent for the stand alone east beltway alternatives. This is within the 20 percent contingency contained in all cost estimates.
4. The diagonal crossing at the north end of EC-1 creates a less desirable *circuitous route* (with backtracking for westbound traffic).
5. The EC-1 connection at N-2 and the south beltway requires two interchanges which creates an undesirable triangle of land and *access problems* for several residences.
6. There are *cost savings* with the SM-4/EM-1 end-to-end beltway due to the common interchange at N-2. This savings partially offsets the cost of a longer bridge over Stevens Creek.

Selection of the Preferred Alternative. Following receipt and consideration of comments on the Draft EIS, the SM-4/EM-1 alternative was selected as the preferred alternative.

SM-4 was selected because:

1. Transportation Functions. A south beltway would aid in completing a circumferential roadway in the Lincoln area. The route is within 0.8 km (0.5 mi) of the future service limit and would reduce the amount of through traffic that otherwise would be on N-2. The route has potential as a multi-use corridor for future trails, open space, utilities and other transportation alternatives.
2. Environmental Impact. SM-4 minimizes impact on natural resources in that it has relatively little impact on wetlands, no impact on native prairie, does not cross the existing boundaries of Wilderness Park, and could be built in a manner to minimize the floodplain impact on Salt Creek. While the route does impact some homes and businesses, these impacts have been minimized to the extent possible.

EM-1 was considered the best east alternative compared to EC-1 and EF-1 because:

1. Transportation Functions. The EM-1 route would aid in completing a circumferential roadway and provide a new truck route without the less efficient "backtracking" found in the EC-1 and EF-1 options.
2. Environmental Impacts. EM-1 minimizes environmental impacts to those resources that are considered most valuable by the local community. In comparison to EC-1, the EM-1 route minimizes impacts to rural and urban neighborhoods, including noise and visual impacts to residences. It also has the least number of relocations of any

of the east alternatives. While EM-1 and EF-1 are similar in environmental impact, EM-1 minimizes impacts to historic properties. At the same time, EM-1 has less impact to prairies (versus EF-1), relatively low impact to wetlands (versus EC-1), and requires 150 ac less in right-of-way than the other alternatives. While the EM-1 crossing of Stevens Creek is the longest of the three east alternatives, it could be built to minimize impacts to the floodplain. In consideration of these resources, the EM-1 route protects and preserves the environment to the greatest extent, and is considered the most compatible with the goals, objectives and values of *Lincoln/Lancaster County Comprehensive Plan*.

3. Multi-Use Corridor Potential. The EM-1 route has the greatest potential as a multi-use corridor for trails, open space, utilities and other transportation alternatives. It could be integrated well with a possible trail in Stevens Creek and then tie into possible trails along the South Beltway route to Wilderness Park trails. The potential as an open space corridor is high given that its is within 0.8 km (0.5 mi) of Stevens Creek for over a 10-km (6-mi) stretch. EM-1 also parallels an existing LES transmission line with a 46 m (150-ft) easement which would allow some overlap of a joint utility and road corridor for over 13 km (8 mi).
4. Travel Time. EM-1 has greater travel savings than EF-1.
5. Cost. While EM-1 is more expensive than EF-1 or EC-1, EM-1 may provide future cost savings as a multi-use corridor, and it uses less land than the other two routes.

The selection of the preferred alternative was unanimously approved on 15 June 2001 by the Beltway Management Committee representing the four project sponsors—the City of Lincoln, Lancaster County, NDOR and FHWA.

Local Preference Decision. The SM-4 and EM-1 alternatives were approved by the Lincoln City Council and the Lancaster County Board of Supervisors, in separate actions, on 22 August 2001 for amendment to the *Lincoln/Lancaster Comprehensive Plan*. With the Mayor of Lincoln's signature on 30 August 2001, the alternatives were officially adopted into the plan.

Chapter 5

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5. REFERENCES

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Chapter 6

AGENCY AND PUBLIC INVOLVEMENT

6. AGENCY AND PUBLIC INVOLVEMENT

Due to the significance of the South and East Beltways Study, the project sponsors decided at the project onset that anyone and everyone should be given ample opportunity to participate in the study planning process. Toward this end an extensive Public Participation Program (PPP) was developed with input from the consultant team, study sponsors and the general public (*Interim Report 1*, WSA, 1996). The program included the following committees and activities.

- Management Committee
- Technical Advisory Committee
- Citizens Advisory Committee
- Newsletters/Landowner Notifications
- Telephone Hotline
- Agency Scoping Meeting
- Partnering Workshop
- Public Information Meetings
- Presentations to Elected Officials
- Small Group Workshops/Meetings
- Meetings with Individual Landowners
- Media Relations
- Correspondence
- Consultant Availability
- Merge Agency Review
- Public Hearing

As the study progressed, each element of the program was implemented and additional elements were added, including the establishment of a Beltway telephone hotline as an additional public forum for comments and questions. Weekly progress meetings between the study team and sponsoring agencies were conducted during critical periods of the study.

Throughout the course of the South and East Beltways Study the level of interest and concern on the part of the public has been quite high as evidenced by the letters, phone calls and other inquiries received during the course of the study. The PPP has proven to be an effective way of informing the public and receiving information to be used for the conduct of the study. The process provided the consultant team with valuable information as they formulated recommendations.

6.1 MANAGEMENT COMMITTEE

The Management Committee gives direction to the consulting team on key matters. It is made up of representatives of the study sponsors:

- City of Lincoln
- Lancaster County
- Nebraska Department of Roads
- Federal Highway Administration

The Management Committee met 23 times during the beltway study. The Management Committee received input and advice from both the Technical Advisory Committee, made up of technical staff from several local, state and national agencies, and the Citizens Advisory Committee, made up of a diverse cross section of individuals representing the entire City of Lincoln. Occasionally, these committees met on the same day to facilitate the flow of information and coordination.

6.2 TECHNICAL ADVISORY COMMITTEE

The Technical Committee included local, state, and federal agency representatives who bring technical expertise to the study. These individuals reviewed the work of the consultants, guided the study, and advised the Management Committee. This committee met on six occasions during the beltway study. Members of this group also attended many other meetings of the beltway study. Agencies included were:

- City of Lincoln Public Works Department
- Lancaster County Engineers Office
- Lincoln-Lancaster County Planning Department
- Lincoln Chamber of Commerce
- Lower Platte South Natural Resources District
- Nebraska Department of Roads
- Nebraska Game and Parks Commission
- Nebraska Department of Environmental Quality
- Nebraska State Historical Society
- Federal Highway Administration
- Federal Transit Authority
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- U.S. Environmental Protection Agency

6.3 CITIZENS ADVISORY COMMITTEE

This committee comprised a cross-section of individuals from within and outside the study area who reflected a diverse, yet balanced, set of perspectives. The committee provided the study sponsors and consultants with a community-based "sounding board". This committee met 13 times during the beltway study.

6.4 NEWSLETTERS / LANDOWNER NOTIFICATIONS

Five Beltway Newsletters were published and distributed to all persons on the beltway mailing list throughout the course of the study. Additional written communication occurred via press releases and articles that appeared in area newspapers.

6.5 BELTWAY HOTLINE

A telephone hotline was set up and advertised for use by anyone wishing to ask questions, make comments, or request information. The hotline received over 350 calls. All questions received a call-back to try to answer their question. All requested information was provided, if available. All comments were catalogued and forwarded to appropriate study team members for use in the beltway evaluations.

6.6 AGENCY SCOPING MEETING

An interagency scoping meeting and bus tour of the study area was conducted on 11 October 1995. The purpose of the meeting was to present the project and solicit input and concerns. The meeting was attended by 36 representatives of local, state and federal agencies; railroads; utilities; and the project sponsors and consultants (WSA, Interim Report 1, 1996). A summary of the meeting is included in **Appendix A**.

6.7 PARTNERING WORKSHOP

A Partnering Workshop was conducted on 12 and 13 December 1995 for orientation of the three committees. This two-day session included discussion of the beltway study progress, decision making roles, advisory roles, approval process, and public participation objectives. Exercises were also conducted to identify constraints, potential corridors and evaluation criteria. Input on all study matters were received by the project team.

6.8 PUBLIC INFORMATION MEETINGS

Public meetings were held at key milestones in the Studies to provide a forum for the dissemination of information to all interested citizens. These meetings and other forms of public participation were instrumental in receiving input and feedback from interested parties. Meetings were held on:

- 2 November 1995
- 18 April 1996
- 19 June 1997
- 27 March 2001
- 12 February 2002

2 November 1995. This meeting was designed to introduce the public to the general purpose of the Studies and to begin receiving input on the alternatives screening process. The meeting was preceded by the first newsletter, which discussed: background information, study purposes, general options for consideration, public participation process, and the study committees. It invited the readers to subscribe to the newsletter mailing list and it gave specific information about the location, date, and time of the upcoming public meeting.

The meeting was an open house format that allowed participants to circulate between tables that had information about the Studies. Display tables included: (1) a slide show of the study area, (2) the history of defining the problems/needs, (3) the study overview (goals, processes, timelines), (4) locations of key features in the study area, (5) evaluation criteria, (6) corridor maps (aerial photographs), and (7) public involvement opportunities. Attendees were encouraged to visit with City of Lincoln and Lancaster County representatives at the display tables. There were interactive opportunities for citizens to show their preference for or in opposition to any theoretical roadway. In addition, there were presentations by the Studies Team. Approximately 700 attended the meeting.

There were several major issues and concerns expressed at the meeting. These issues and how they were addressed or considered are as follows:

1. The south study area was too narrow and should be expanded.
Following the meeting, the Comprehensive Plan was amended to expand the study area one mile further to the south (to 0.5 mile south of Bennet Road).

2. Concern was expressed that the study was not completed 30 years ago.

It was explained that a study was completed 30 years ago (1971) and that the decision was made at that time not to proceed ahead.

3. Would landowners whose property was needed for a Beltway be compensated?

The legal process for government acquisition of right-of-way was explained.

4. Will long-time farmers and landowners have priority over other land uses?

It was explained that length of time as a landowner has no bearing on the selection process.

5. Why is a park (Wilderness Park) untouchable?

It was explained that Wilderness Park was not untouchable, and several crossings and alternatives were still being considered.

A second newsletter was mailed in January 1996 to explain the continuing process. It discussed the need for Management, Technical, and Citizens Committees to evaluate alternative alignments over the next few months. It notified readers of a 24-hour Beltway Hot Line that could be accessed, and invited interested parties to mail in ideas, concerns, and opinions to the Studies Office.

A third newsletter was mailed in March 1996 to explain the Beltway Alignment Alternatives Recommended For Further Evaluation. It was reported that the Citizens Advisory Committee concurred with the consultants approach and that the Committee added new alignment options for consideration. The centerpiece of this newsletter was the four alternatives in the south area and the three alternatives in the east area that were recommended. This newsletter announced the next public meeting for 18 April 1996.

18 April 1996. This meeting was designed to review the Studies progress and the various project options. It was organized similar to the previous public meeting. Participants were encouraged to visit with City and County officials and to share ideas and opinions with the Studies Team. There were displays of the work completed to date and presentations by the Studies Team. Approximately 500 citizens attended the meeting.

There were several kinds of issues and concerns that were expressed at the meeting. These matters and how they were addressed or considered are discussed:

1. A large number of citizens expressed concern that they could be in the path of a beltway. Many said they felt "betrayed" by local government because they were allowed to build in the Studies area and should have been warned that a beltway might be built nearby. Many in attendance suggested routes that would be in locations further from their own properties. Some questioned whether a beltway was needed at all.

In response, the consultants explained the process of continuing studies. It was noted that additional details would be needed such as travel demand from traffic models, preliminary cost estimates, and the environmental impacts of each option.

2. In addition, citizens asked that there be additional time at meetings for questions and answers in a full group setting. They requested more detail and information on cause and impacts. Another request was that maps be updated because of the constant change of new homes and residential subdivisions in the Studies area. The public wanted more information on traffic studies, and they wanted more information on the decision making process and who the decision makers would be.

In response, the Studies Team and Management Committee reviewed the responses and re-evaluated the project resources.

3. The public and sponsoring agencies also stated at this point that they would prefer a more detailed study of non-beltway alternatives including the widening of some existing County roads.

At this point, the Studies Team and sponsoring agencies began a process of evaluating the project scope. During the summer and fall of 1996, these discussions concluded that 1) greater citizen participation would be required, including the resources to meet that demand, and that 2) the study details would need to be greatly expanded to meet these needs. The culmination of these efforts was an expanded scope of services and extension of the Studies timelines.

A fourth newsletter was mailed in November 1996 for the purpose of explaining the status of the Studies at that point. It noted that surveys indicated an 87 percent approval rating of the public meeting format by those who had attended the previous meeting.

19 June 1997. This meeting was designed to bring new and more extensive data to the public. The fifth beltway newsletter preceded and announced the meeting. This step was the result of eight additional months of intensive study on key aspects of the project. The Studies Team presented three non-beltway options, four beltway corridors in the south area, and three beltway corridors in the east area. The studies included information on congestion/accident reduction, construction costs, socio-economics, land use, and environmental impacts as a means of evaluating the different options. There were an estimated 400 citizens in attendance.

The Studies Team recommended that one beltway alternative in the south area (SM-4) and two alternatives in the east (EC-1 and EM-1) be considered as finalist alignments for more detailed evaluation.

1. The reaction of the public intensified at this meeting and there were a number of challenges to the recommendations. Many in attendance questioned the need for a beltway, doubted the results of the traffic projections, complained about the land needed for beltways, questioned whether there would be a fair compensation for lost property, and expressed concern about decreasing land values. Some disagreed with the recommendation to drop the easternmost alternative (EF-1)

The Studies Team responded that much more detailed work would be needed to answer all the questions, and that they would work more closely with landowners as the more detailed work began.

Subsequent to the 19 June 1997 public meeting, the City Council, County Board, and Planning Commission met in joint session to consider the recommendations. This meeting was advertised to the public, but was not for public participation in the form of questions and answers. This joint session was held on 27 June 1997, and the planning and elected officials expressed a "local preference" to eliminate the EC-1 route and add the EF-1 route back into the studies. Also, they endorsed the SM-4 route for the continuing work.

It was determined and agreed by the sponsor agencies that all four alternative beltway routes (EC-1, EM-1, EF-1, SM-4) and the no build alternative should be evaluated as part of the Draft Environmental Impact Statement (DEIS). Extensive environmental studies were conducted by the Studies Team from August 1997 until March 2001 to address the issues that were raised by the public, private landowners, and sponsor agencies.

27 March 2001. This meeting was designed to present detailed environmental and planning information to the public concerning all the remaining alternatives. The publication and distribution of the Draft Environmental Impact Statement on 1 March 2001 preceded it. Also, the sixth newsletter was prepared and mailed to interested parties prior to this meeting. The newsletter summarized the additional information that was now available, noted the availability of the DEIS, and announced the planned public meeting.

The public meeting used the same basic format of previous such meetings. Members of the Beltways Study Team, including the project sponsors, consultants, and State Historic Preservation Office staff were available to meet with the public and answer questions. There were various displays and tables at which citizens could inquire about detailed information and talk with the experts that has prepared or reviewed the work to date. Displays and information tables included: historic resources/archeology, land acquisition specialists, traffic projections, cost estimates, alternative route maps, and a project video program. There were 375 interested parties that attended the 9-hour open house.

Prior to this public meeting, the sponsor agencies agreed that no specific recommendations for or against any particular alternative would be made. It was agreed that the Public Hearing on the DEIS and local government hearings to determine the local preference should be conducted prior to making recommendations. The Studies Team held a variety of discussions with individuals and small groups during the course of this public meeting. Hand out materials and displays gave information on the dates, time, and location of the Public Hearings on the DEIS.

Observations and expressions of public attitude and opinion at this meeting included the following:

1. A recurring theme that it was "time to get on with" making a decision

The response was to inform citizens of the timetables for the DEIS Public Hearings and the local preference process.

2. There was very little concern expressed about the south beltway, while the east beltway drew most of the interest and concerns.
3. Residents along the path of alternative beltway routes expressed concern about the noise level impacts. Most felt that the noise would be excessive.

The response was to explain the noise impact study methodology and the federal guidelines.

4. In general, those near any of the alternative routes expressed concern about being too close to that route.

The response was to invite interested parties to give oral or written testimony at the DEIS Hearings.

12 February 2002. A public meeting on historic mitigation was conducted for property owners and consulting parties on 12 February 2002 (see **Section 9.5.9**). The meeting included an update on historic issues and review of the proposed mitigation plan developed for the two historic properties which are adversely affected by the preferred SM-4/EM-1 alternative. Prior to the meeting, property owners and consulting parties were mailed copies of the Draft Memorandum of Agreement and a draft version of Chapter 9 of this FEIS.

Approximately 24 people attended the meeting, including representatives of the ACHP, NTHP, SHPO and Preservation Association of Lincoln. Seven written comments were received over the 10-day comment period. Comments related to historic issues covered the following topics:

1. Two landowners on EM-1 objected to the revised boundary of the Stevens Creek Stock Farm as it included their properties. The boundary changes were made without their permission. One owner expressed concern that they would now be subject to federal permits or stipulations on receiving federal subsidies.
2. The owner of the non-historic log cabin residence (located on the additional NRHP-eligible parcel west of the Stevens Creek Stock Farm) expressed concern about noise impacts from EM-1.
3. The owner of the Henry Wunibald Farmyard expressed concern that their non-historic farmyard would be more adversely affected by noise impacts from SM-4 than the NRHP eligible property.
4. The FEIS should address the impacts on the Stevens Creek Stock Farm from additional traffic on 138th which is traveling from the EF-1 interchange on Pioneers Boulevard to Van Dorn Street.
5. Certain consulting parties felt that properties along all the routes should be studied for possible boundary changes.

6. The NTHP believes that the beltway will have the potential for cumulative and indirect effects on historic properties, and suitable mitigation strategies should be developed.
7. Certain consulting parties felt that the FEIS should contain a statement that the EF-1 alternative is eliminated from any future consideration. They did not feel that selection of EM-1 was strong enough assurance that the EF-1 route would never be reconsidered.

The MOA was finalized (**Appendix E**) based on comments from this meeting.

6.9 PRESENTATIONS AT CITY COUNCIL, COUNTY BOARD, COMMONS AND SUPERCOMMONS MEETINGS

The study team included elected officials from the community in the study process by presenting information and study findings at Supercommons Meetings. The Supercommons is made up of the Lincoln City Council, Lancaster County Board and the Lincoln/Lancaster County Planning Commission. All meetings of the Supercommons, Lincoln City Council and Lancaster County Board were advertised and open to the general public. Meetings of these bodies, where the beltway was on the agenda, were held on:

- August 1995 City Council and County Board
- 18 October 1995 Supercommons Meeting
- November 1996 City Council and County Board
- 21 February 1997 Supercommons Meeting
- 16 May 1997 Supercommons Meeting
- 16 June 1997 Pre-City Council Meeting
- 27 June 1997 Supercommons Meeting
- 15 August 1997 Supercommons Hearing
- 27 March 1998 Supercommons Meeting
- 16 October 1998 Supercommons Meeting
- 20 November 1998 Supercommons Meeting
- 15 December 1998 City Council and County Board
- 15 March 1999 City Council
- 30 March 1999 County Board
- 18 June 1999 Supercommons Meeting

6.10 GROUP BRIEFINGS WITH NEIGHBORHOODS AND OTHER SPECIAL INTEREST GROUPS

Neighborhood workshops and group briefings were also held at the request of many groups to provide the public with direct access to the consultant team in an informal setting. Several of these meetings were well attended and included extensive dialog between neighborhoods and the project management team. The larger meetings included:

- 10 December 1996 South Corridor Group (estimated 50 attending)
- 6 March 1997 South Beltway Group (estimated 25 attending)
- 12 May 1997 South Beltway Group (estimated 150 attending)
- 21 May 1997 Yankee Hill Group (estimated 60 attending)

- 10 June 1997 East Beltway Group (estimated 60 attending)
- 17 June 1997 East Beltway Group (estimated 200 attending)

Comments were summarized and forwarded to study team members for use in the beltway evaluations.

6.11 MEETINGS WITH INDIVIDUAL LANDOWNERS AND OTHER CONTACTS

During the beltway study, there were frequent informal contacts with individual landowners and other interested parties regarding beltway information. Comments were summarized and forwarded to study team members for use in the beltway evaluations.

6.12 MEDIA COVERAGE

From August 1995 through June 1999, there were 25 new articles in the *Lincoln Journal Star* regarding the beltway study progress. The *Waverly News* and *Hickman Village Voice* also provided newspaper coverage during this period. Lincoln television stations, Channels 10-11 (CBS) and Channel 8 (ABC), provided news coverage at most of the key public meetings. The study was also covered in radio interviews with local stations KFOR and KLIN.

6.13 CORRESPONDENCE

During the multi-year planning process, all comment letters received on the beltway study were considered, catalogued and forwarded to study team members for use in the beltway evaluations. Letters were sent to respond to all letters received during the study.

Comment letters received on the *Draft Assessment of Adverse Effects to NRHP and NRHP-Eligible Sites* have been addressed in the revised version of that document (**Appendix F**).

6.14 CONSULTANT AVAILABILITY

The most crucial element of the Public Participation Program was the availability of the consultants. Throughout the study, the consultant team received and responded to hundreds of calls and letters from citizens. In addition to this, the team met with many interested parties to discuss specific issues one-on-one.

During the beltway study, the consulting team attended over 275 documented meetings on the beltway project. In addition, the consultants received and answered hundreds of direct calls from interested citizens.

6.15 MERGE AGENCY REVIEW

Following the Nebraska Local Operating Procedures for Integrating NEPA/404, the Purpose and Need Statement for the beltway project EIS was reviewed by five agencies in June 1996. Concurrence was received from the US Army Corps of Engineers, US Environmental Protection Agency, US Fish and Wildlife Service, Nebraska Department of Environmental Quality and Nebraska Game and Parks Commission (**Appendix A**) indicating that the statement was satisfactory and the information provided was adequate to advance to the next stage of project development.

The same five agencies reviewed the Preliminary Draft Environmental Impact Statement (PDEIS, dated 13 November 2000) and concurred that it was satisfactory (**Appendix A**). Specific comments were received from the US Army Corps of Engineers and the US Environmental Protection Agency, and have been incorporated into this document.

US Army Corps of Engineers. A letter was received from the USACE Kearney Regulatory Office indicating that the findings of the wetland delineation were highly preliminary. The following three issues were raised.

ISSUE	RESOLUTION
1. Soils data was not provided for all locations.	Further coordination with the Corps indicated that the methodology used for the beltway wetland delineation was the same methodology used by the Corps for preliminary studies where the final design is not known (see Appendix A , email dated 19 December 2000 from Keith Tillotson to Amy Zlotsky). No resolution required.
2. Some locations were delineated from a distance as permission for access was denied.	Final wetland delineations will be conducted after right-of-way acquisition when all properties may be surveyed on-site.
3. Three of the sheets were incorrectly completed.	The three data forms with errors have been corrected.

US Environmental Protection Agency. The EPA raised four issues as described below.

ISSUE	RESOLUTION
1. Statements in the PDEIS will require endorsement by other federal and state agencies	Concurrence has been received from all five Merge agencies, including all agencies mentioned in the EPA letter. Other agencies will receive copies of the DEIS for review and comment.
2. The PDEIS implies that modeling or scientific study of TDM/TSM improvements had been performed, but no reference was given.	No additional investigations were conducted. The TDM/TSM text in the DEIS was summarized from <i>Interim Report Number 1</i> (WSA, 1996a) prepared by a firm with national expertise in transportation planning. References have been added to the text to indicate the source of the information.
3. Depending on the type of wetland impacted, mitigation ratios greater than 1:1 are sometimes preferred.	The text states that mitigation has been proposed at a minimum ratio of 1:1. This does not preclude the use of greater ratios.
4. They suggest simplifying and clarifying Table 4.1 for the Benefit Cost Ratio and Cost Effectiveness parameters.	These two parameters have been revised to aid in understanding.

Nebraska State Historic Preservation Office. In November 2000, the PDEIS was also reviewed by the Nebraska State Historic Preservation Office who concurred with the findings of the PDEIS and the findings of the appendices as they related to Section 106 consultation (Appendix E).

6.16 PUBLIC HEARING

The Public Hearing for the south and east beltways was conducted on 23 and 24 April 2001 for the purpose of receiving oral testimony on the DEIS. Morning, afternoon and evening sessions were available during the two-day hearing for the convenience of the public. Three hearing rooms were available, each with a hearing officer and court recorder, for taking oral testimony. Seating was available for those interesting in observing the testimony, including the news media. A public information room was open throughout the hearings to allow further opportunity to review the DEIS materials, including various reports and documents, exhibits of the beltway corridor locations, and handouts. Members of the Beltways Study Team, including the project sponsors, consultants, and State Historic Preservation Office staff were available to meet with the public and answer questions.

Notice for the Public Hearing was published in the *Lincoln Journal Star* on 9 and 15 April 2001, with two notices on each date. The notice was also published on 19 April 2001 in *The Voice*, a regional newspaper serving western Otoe, northern Gage and Lancaster Counties. A newspaper serving the Waverly community, *The News*, published a front page story about the hearing process in its 19 April 2001 edition. During the week of 9 April 2001, Public Hearing notices were mailed to approximately 1,100 citizens on the mailing list for the south and east beltways study area. In addition, other Lincoln news media, including KOLN/KGIN-TV, KLKN-TV, and KFOR Radio were active in covering the Public Hearings, and other beltway meetings.

The attendance at the hearings was relatively low, with 162 names on the sign-in sheets. It was estimated that an additional 100 persons may have been present who did not sign in. Oral testimony was received from 49 individuals. The original public comment period extended from 23 March until 7 May 2001. The comment period was extended until 15 June 2001 in response to a request from the National Trust for Historic Preservation.

Written comments were received from 108 persons, and an additional 23 public agencies and private organizations. The comments are summarized in **Chapter 9**. This chapter documents public and agency coordination that occurred following the circulation of the DEIS. It includes responses to comments.

Chapter 7

LIST OF PREPARERS

7. LIST OF PREPARERS

This Draft Environmental Impact Statement was prepared by a number of professionals comprising the Beltway Study Team, including:

John Cambridge, P.E.: Civil Engineer, Olsson Associates. B.S. Civil Engineering (1984), University of Nebraska–Lincoln. Study Involvement: floodplain issues.

Joan Darling, Ph.D.: Senior Scientist, Olsson Associates. Ph.D. Biology (1976), M. Phil. Biology (1971), Yale University; B.A. Biology (1969), Queens College. Study Involvement: wetlands, threatened and endangered species.

Melissa Dirr: Preservation Historian, On Site Photography and Preservation. M.A. History (1990); B.S. Historic Preservation (1992), Southeast Missouri State University. Study Involvement: historic buildings survey.

Mark Elliot: Photographer, On Site Photography and Preservation. B.A. Fine Arts/Photography (1990), State University of New York, Purchase. Study Involvement: historic buildings survey.

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Lisa Richardson, P.E.: Project Engineer, HWS Consulting Group. B.S. Civil Engineering (1995), University of Nebraska–Lincoln. Study Involvement: Project Engineer.

Stacy Stupka-Burda: Research Archeologist, University of Nebraska-Lincoln. M.A. Anthropology (1995), B.S. Anthropology (1991), University of Nebraska-Lincoln. Study Involvement: archeological survey report, other cultural resources management activities.

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Jennifer Zeigler: Environmental Engineer/Civil Engineer, Olsson Associates. B.S. Civil Engineering (1996), University of Nebraska-Lincoln; M.S. Environmental Engineering (1998), University of Wyoming. Study Involvement: environmental risk.

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This document has been reviewed for technical accuracy by the following persons:

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Mark Ottemann, P.E.: Noise/Air Studies Engineer, Nebraska Department of Roads.

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Stephen Burnham, P.E.: Planning Engineer, Federal Highway Administration.

Edward W. Kosola: Realty/Environmental Officer, Federal Highway Administration.

John Snowdon: Transportation Engineer, Federal Highway Administration.

Chapter 8

LIST OF AGENCIES, ORGANIZATIONS AND PERSONS to Whom Copies of this Statement are Sent

8. LIST OF AGENCIES, ORGANIZATIONS AND PERSONS TO WHOM COPIES OF THIS STATEMENT ARE SENT

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Chapter 9

COMMENTS AND COORDINATION

9. COMMENTS AND COORDINATION ON THE DEIS

This chapter includes documentation of public and agency coordination since the circulation of the Draft Environmental Impact Statement (DEIS). The following list provides an overview of the sections and topics included.

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9.1 SUMMARY OF COMMENTS ON DEIS: WRITTEN COMMENTS AND ORAL TESTIMONY

This summary of comments addresses (1) all written comments received by mail during the public comment period for the DEIS, (2) written comments received at the Public Meeting conducted in March 2001 and the two Public Hearings conducted in April 2001, as well as (3) comments provided through oral testimony at the two Public Meetings. The summary includes responses to the comments. To aid the reader, a listing of abbreviations used in the document has been provided. In addition, a list of notes was developed to provide standard responses on issues which were raised in a large number of the comments. Please note that "comments considered", as used in this summary, are comments that did not point out specific errors requiring additional investigation for the FEIS, but were part of the public record for review by decision makers.

ABBREVIATIONS:

106	Section 106 of the National Historic Preservation Act	N-2	Nebraska Highway 2
4(f)	Section 4(f) of the Department of Transportation Act	NDOR	Nebraska Department of Roads
ASAP	as soon as possible	NE	Nebraska
CARS	Citizens for Accountable Route Selection	NRCS	Natural Resource Conservation Service
DEIS	Draft Environmental Impact Statement	NRHP	National Register of Historic Places
EC	East Close, EC-1 alignment	ROW	right-of-way
EF	East Far, EF-1 alignment	StCk	Stevens Creek
EM	East Middle, EM-1 alignment	SHPO	State Historic Preservation Office
FEIS	Final Environmental Impact Statement	SM	South Middle, SM-4 alignment
FHWA	Federal Highway Administration	UNL	University of Nebraska-Lincoln
HWS	HWS Consulting Group, Engineering Consultant	WSA	Wilbur Smith Assoc., Engineering Consultant
LPSNRD	Lower Platte South Natural Resources District		

NOTES:

1. Use of 148th Street for non-beltway & beltway options was evaluated, and eliminated from further consideration (page 2.45). In general, it has greater social, environmental (including historic) and economic impacts due to existing structures close to the roads.
2. Section 4(f) is involved when a protected property is acquired for a transportation project. A Section 4(f) "constructive use" can occur when property is not acquired, however, its use must be substantially impaired. The Section 4(f) **constructive use evaluation** has a higher criteria level than Section 106 evaluation; therefore it is possible for a project to "adversely affect" a historic resource under 106, and yet under 4(f), it may not necessarily "substantially impair" the features or attributes that make the site significant (page H.5).
3. Fair Market Value will be paid for acquired property (page 3.17). **Acquisition** will occur after the Record of Decision, as appropriate.
4. Federal-Aid Highway Funding is to be used for the benefit of the traveling public in general, rather than for the exclusive benefit of Lincoln or any other specific community.
5. A tabulation of **bisected farm parcels** has been added to Section 3.4.2 and Table 4.1).
6. The **cost estimates** included in the DEIS were prepared using very conservative assumptions in 1996, and are still considered valid in 2001. The cost estimates have been revised in the FEIS (pages 2.73 to 2.75). A final cost estimate will be prepared during final design.
7. Roadway projects are typically designed to balance cut and fill (**earth moving**).
8. A review of **economic issues** has been included in Section 9.4.

9. An EIS must discuss all **environmental impacts**, and none are assigned greater priority than another.
10. Use of **existing roadways** for non-beltway options were evaluated and eliminated because they did not meet the project purpose and need (pages 2.15 and following). Use of existing roadways for beltway alternatives was eliminated because they would have greater social, environmental and economic impacts due to existing structures close to the roads (page 2.13).
11. **Historic issues** have been further evaluated in Section 9.5.
12. The beltway alignments were rechecked in July 2001 with only a few new **houses** identified in the vicinity of any of the routes. Based on public comments, a few additional houses were added in November 2001.
13. City Council and County Board both have **jurisdiction** on the Comprehensive Plan amendment.
14. The **No Build** option was evaluated, but did not serve project purpose and need (pages 2.3 and 3.12).
15. Although **noise** may increase at various locations, it may not necessarily exceed FHWA criteria levels; when noise levels do not exceed criterial levels, it is defined as "no impact" (page 3.32).
16. **Population growth** assumptions in the DEIS were taken from the approved Comprehensive Plan. Updated population data from the 2000 Census has been included in Section 3.1 of the FEIS.
17. The NRCS form on impacts to **prime farmland** has been reviewed in Section 9.7.
18. The **public hearing** format used for the beltway study is in common use by FHWA throughout the country, and was used successfully in Lincoln for the Antelope Valley DEIS. All comments, both written and oral testimony, have been provided to decision-makers for the project.
19. A revised discussion of **secondary and cumulative impacts** has been included in Section 9.6.
20. Extensive **Section 106** cultural resource investigations were completed prior to release of the DEIS. The cultural resource reports were made available to the consulting parties and others for review and comments prior to the DEIS. After this comment period, additional revisions were made and included in the DEIS. Because of the previous limited cultural resource information and premature directives of elected officials, FHWA required the DEIS to include evaluation of all three east routes.
21. **Section line roads** are already planned for widening and paving as the Lincoln urban area expands. They are part of the No Build Scenario, and do not solve the need for a beltway (page 3.12).
22. The **tax issue** has been expanded in the FEIS.
23. It is recognized that none of the east beltway alternatives solve city **traffic problems in Lincoln**. However, the east beltways do reduce the amount of through traffic on N-2, US 6, 84th Street, Yankee Hill Road and Pine Lake Road, thereby providing more capacity for local traffic.
24. The **traffic model** shows that there is a need for a beltway (Sections 1.2 and 2.4).
25. A revised discussion of **urban sprawl** has been included in Section 9.6.
26. Because of the previous limited cultural resource information and premature directives (**voting**) of elected officials, FHWA required the DEIS to include evaluation of all three east routes to the same level of detail.
27. Any need for **wildlife** crossings will be evaluated with appropriate resource agencies during final design.

NAME		COMMENTS	RESPONSES
INDIVIDUALS AND NEIGHBORHOOD ASSOCIATIONS--WRITTEN COMMENTS			
1	Lincoln residents	Think money should be spent on improving routes w/in city, not for diverting people around city. Think beltway shouldn't be so far east as 148 th is available.	Comments considered.
2	Lincoln resident	(Against EF) Requests preservation of Lockyer (Penterman) Farm--a historical site on EF. Farm is visited by Lincoln Public School children.	Public use of Penterman Farm has been noted. Other comments considered.
3	Landowner on EC	Favors EF (but should be even farther east) primarily due to impacts to his property. Its unfair that EC was previously eliminated and now being considered.	See Note 26 (voting). Other comments considered.
4	Landowner on SM	Says process is taking too long. Wants to see south beltway built now, not 5 or 10 years down the road.	Comments considered.
5	Landowner on EC	Says most members of Sunrise Estates Community Association favor EF.	Comments considered.
6	Lincoln resident	Says use of an existing road was not fully evaluated, discussion of urban sprawl is biased and surficial, and project is not worthwhile at projected cost.	See Note 10 (existing roadways) and Note 25 (urban sprawl). Other comments considered.
7	Landowner on EF	Favors no build, one-way pairs, or add turn lanes to 148 th .	See Note 14 (no build) and Note 1 (148 th St). Other comments considered.
8	Landowner on EF	Against EF because least benefit, most cost, and causes urban sprawl. Favors no build, one-way pairs on 112 th and 120th. SM and EM are most logical.	See Note 25 (urban sprawl), Note 14 (no build), and Note 10 (existing roadways). Other comments considered.
9	Landowner near EF	Favors EM. It allows for city growth, but not too far out that no one will use.	Comments considered.
10	Landowner on EC	Favors EF, because other routes are too close to city and development in StCk. Population growth is 1.6 not 1.18. Thinks short term solution is to pave county roads.	See Note 16 (population growth) and Note 10 (existing roadways). Will add new status of StCk. Other comments considered.
11	Landowners on EF	Against current alignment of EF due to impacts on their property. They previously relocated family homestead for widening N-2. Sent another letter that they are not happy with noise model, want someone to take actual reading at house. Want to know why City Council will decide route when they are outside of 3-mi jurisdiction.	Options will be discussed with landowners during final design. HWS has contacted these landowners. See Notes 15 (noise) and 13 (jurisdiction).
12	Lincoln resident?	Wants access provided from east beltway to N-2 heading east into Lincoln, especially for EC and EM.	Need to add explanation of interchange access in FEIS
13	Landowners along EF-1	Against EF (CARS) primarily due to impacts to their property (splits farm, noise, visual, artificial lighting on crops, future development at interchange). Want land acquisition to begin immediately after selection. Says DEIS missed Waverly Wellhead Protection Area.	See Note 3 (acquisition). ,Waverly Wellhead Protection Area has been corrected in Figure 2.25. Information on the affect of artificial lighting on crops has been added to Section 3.4. Other comments considered.

14	Lincoln resident	Against any beltway as it will cause urban sprawl. Wants moratorium on all development until there is an integrated sustainable environmental and social plan for the County. Says there are alternatives to a beltway, including mass transit.	See Note 25 (urban sprawl). Other comments considered.
15	Landowners along SM	Wants to know if there are plans to pave Saltillo and 120 th prior to beltway construction? When does acquisition process begin? Other questions related to impacts to their property.	Letter was sent to landowner with answers to requested information.
16	Lincoln resident	Favors EM or EF, because route should have least environmental impact. Thinks historic impacts not as important as other types of impacts.	See Note 9 (environmental impacts). Other comments considered.
17	Landowners on SM	Against project because traffic reduction doesn't justify expense, trucks won't come off N-2, already have west bypass for N-S traffic, etc.	See Note 24 (traffic model). Other comments considered.
18	Lincoln resident	Favors EM. Says to identify routes ASAP to avoid more buildings in the way, and build the beltways as soon as possible.	Comments considered.
19	Landowners on EC	Against EC, because too close to existing and planned development in StCk.	Comments considered.
20	Lincoln resident	Against EF. States concern about cost of project, money should be spent to benefit Lincoln, not people passing by. States EF is too far, road should be nearer for Lincoln residents to benefit. Says beltway will cause urban sprawl, especially EF. Thinks price is too high in cost and impacts.	See Note 4 (benefit to Lincoln). See Note 25 (urban sprawl). Other comments considered.
21	Lincoln resident	Supports EM and SM. Thinks growing city has created traffic burden on existing infrastructure, danger to citizens and inefficient transportation route. Thinks EM most logical since least ROW and residences, and best time savings. EM is far enough out, but close enough to be used. EF least desirable as too close to 148 th and poor connections to I-80.	Comments considered.
22	Landowner on EM	Against EM, due to impacts on her property (divides family farm). Thinks original decision to select EF are still valid.	Comments considered.
23	Landowner on EM	Favors EF. Says closer routes interfere with residential developments & future city growth, have greater impacts to farm ponds, cross proposed StCk greenspace. Says EF avoids StCk since on ridgeline, east beltway doesn't solve traffic on arterials. Says EM was located along Lincoln Electric System line to reduce impacts but Lincoln Electric System advises not to co-locate. Thinks truckers won't use east beltway and time savings between routes is inconsequential. Says elected officials already chose EF.	See Note 23 (traffic in Lincoln). Have consulted with Lincoln Electric System and developed two options for EM to parallel Lincoln Electric System line. LES is not opposed to any beltway route. See Note 26 (voting). Other comments considered.

24	Landowner on EF	Against EF. Says missing airfield on EF. Says DEIS doesn't emphasize that 148 th is a major road and it would be redundant to have beltway w/in 0.5 mi. Says 12 mi long strip of ag land betw 148 th and EF would be impacted by urban sprawl as commercial or industrial would be highest and best use. Requests special discussion of this strip which contains 7 historic sites in severe danger. Says proliferation of acreages is not true for EF area, doesn't believe results of noise on historic sites, wants calculation of severed farm parcels, disputes rating scores on NRCS form, wants economic reevaluation based on issues in report by engineers/businessmen/UNL professor.	Former airfield has been added to Figure G-1; however, airfield is not on record with NE Dept Aeronautic or Federal Aviation Administration; current owner says it has not been used in about 10 years, permits have not been renewed, and currently planted in alfalfa. See Note 25 (urban sprawl). Discussion of 12-mi strip has been added to FEIS. Acreage development is present in the vicinity of EF on 148 th between Pine Lake & Old Cheney, betw O & Holdrege, and between Fletcher and Alvo—as well as on the cross roads on Rokeby, Pine Lake, Old Cheney and Pioneers. Noise model as been double checked by NDOR. See Notes 15 (noise), 11 (historic issues), 5 (bisected farm parcels), 17 (prime farmland) and 8 (economic issues).
25	Landowner on EC	Against EC because too close to existing and proposed development in SICk.	Comment considered.
26	Landowner near EC	Against EC, no reason given.	Comment considered.
27	Landowners on EF	Against EF. They are owners of 100 ac of farmground adjacent to Sartore property to be submitted for addition to NRHP site. Concern that sprawl will change character of rural farming area. Say no one ever contacted them about beltway study or historic evaluation.	See Notes 11 (historic issues) and 25 (urban sprawl). Beltway study team has been requesting names for the mailing list since 1995. Standing structures survey contacted all owners of properties built prior to 1948 either by written communication and/or by knocking on doors. Archeological report shows that Marguerite Herter, LF Estate was contacted by letter dated 6/98, but no response was received.
28	Landowner on EF	Against EF, favors EM because EF was not recommended by consultants, EM lines up with I-80 interchange best, redundancy of EF being within 0.5 mi of a paved road. Thinks EM would have cost savings because land was devalued by power lines.	Comments considered.
29	Lincoln residents	Against EF. Concerned with process to evaluate historic properties including boundaries, assessment of adverse effects and 4(f) evaluation. Disputes sprawl discussion. Says farther out a beltway is built, the less it will be used and the more harm done to downtown. Restates points in report by engineers/businessmen/UNL professor, says benefit-cost info is misleading, but agrees EF is least cost-effective.	See Notes 11 (historic issues), 2 (4(f)), 25 (urban sprawl), and 8 (economic issues). Other comments considered.

30	Lincoln resident	Concerned about cost. Thinks money should benefit Lincoln residents not travellers bypassing city. Thinks closer beltway is better. Says beltway will cause sprawl and harm downtown. Concerned about impacts to historic sites, especially on EF, and loss of prime farmland.	See Notes 4 (benefits to Lincoln), 25 (urban sprawl), 11 (historic issues) and 17 (prime farmland). Other comments considered.
31	Landowners on SM	Wants to see SM moved slightly south to avoid homestead.	Alignment has been adjusted to avoid the homestead.
32	Landowners on SM	Wants to see SM moved slightly south to avoid homestead.	Alignment has been adjusted to avoid the homestead.
33	Atty for Landowners on SM	Wants to see SM revised to avoid taking Hornung farmstead. Says relocation costs would exceed costs of resulting uneconomic remainders.	Alignment has been adjusted to avoid the homestead.
34	Landowner on EF	Against EF, favors no build or EC. Concerned about impacts to historic farm sites, especially Lockyer (Penterman) Farm which is open to Lincoln Public School students. Also concerned about impacts to her property which is highest in County and was terraced and hand-seeded to brome by grandfather and maintained since.	See Note 11 (historic issues). Public use of Penterman Farm has been noted. Other comments considered.
35	Atty for Landowner on EM	Against EC and EM, because of proposed development in StCk and environmental impacts. EIS underestimates costs of EC and EM, and benefits of EF. Poor assumptions for population growth (Comp Plan to use 1.5%), Build Out Scenario (BOS) II doesn't include growth in StCk.	See Note 16 (population growth). Status of StCk has been updated. Other comments considered.
36	Landowner on EC	Against EC, favors EF because too close to existing and proposed development in StCk. Build Out Scenario (BOS) II does not include growth in StCk; therefore, is inaccurate. Missing homes (105 th and A) and Wenzl historic site. EC1-5 is missing relocation of Havelock due to removal of railroad overpass. All routes should have interchange, not overpass at Havelock for new event center. EC and EM were previously eliminated (unfair).	See Note 16 (population growth). Status of StCk has been updated. Landowner was contacted regarding missing homes. See Note 12 (houses). Wenzl site was checked again by SHPO, and is still not considered to be eligible for NRHP. Interchange locations are discussed further in the FEIS. See Note 27 (voting). Other comments considered.
37	Landowner near EF	Had reason to believe there are orchids on Reed prairie. Requested copy of full report on search.	Prairie was revisited on 25 June 2001 by Dr. Joan Darling and Craig Mielke. No orchids were found; however, prairie larkspur (which also has a white spike of flowers) was abundant. There is no other report other than discussion in DEIS. Letter has been sent to Johansen and Reed.

38	Landowner on EF	Against EF (CARS) and any alteration of landscape. She grew up on their humble historic family farm. EF would sacrifice their historic agricultural landscape and harm many irreplaceable historic farms. Says sprawl will follow beltway construction and make commuting to Lincoln even more difficult, take businesses from downtown, and bring residential and commercial growth into their quiet farming area, including billboards, widened paved streets, commercial lighting and noise pollution. Seven generations....	See Note 11 (historic issues). See Note 25 (urban sprawl). Other comments considered.
39	Landowners on EC	Against EC, due to impacts to their property and too close to existing and planned development in StCk, etc. Concerned about impacts to sewage treatment plant and wells at Sky ranch Acres.	Landowners were contacted about sewage treatment plant and well situation, and was determined not to be affected by the beltway. Other comments considered.
40	Landowners on EM and EF	Requests info on impacts to trees on their property.	Landowner has been contacted.
41	Landowners on EF	Against EF. Question why EF is being considered when previously eliminated. Suggest that personal interests of two elected officials will weigh the decision toward EF, and suggests that they may have insider information where the corridor may be placed. Request response to these concerns. Still have same concerns from previous letter (see below). Against EF. Integrity of Preliminary Assessment of Adverse Effects is in question because (1) list of citizens requesting consulting party status was incomplete, (2) only 5 of 7 criteria were used, other types of criteria were not used, (3) there was a recently refined corridor concept and revised centerline that they had never heard of before or been allowed to comment on, (4) ways to mitigate adverse effects were only suggested for adverse effects in EF, and (5) EF has more affected historic sites than other corridors and should never have been selected, and should be eliminated from further consideration.	(1) Everyone who asked for consulting party status was put on list. (2) The other two criteria were not used because they don't apply to the beltway project (one is for alterations to properties such as restoration, rehabilitation, repair maintenance, adding handicap access, etc. and the other is specific to Federally owned properties). (3) The refined corridor concept was developed in 1998. The only change to the alignments was the location of the I-80 interchange. (4) It is inappropriate to develop specific mitigation for historic impacts until a final route is selected. (5) See Notes 26 (voting), 9 (environmental impacts). Historic impacts are not the only protected resources that must be considered.
42	Lincoln resident	Against EF. Same letter No. 20 as above.	See No. 20 above.
43	Lincoln resident	Against EF. Thinks problems are with north/south streets such as 27 th and 48 th and EF would not help. Thinks 148 th is adequate for bypassing and needs of city. Thinks money should be spent on internal streets not new beltway which will not benefit anyone.	See Notes 10 (existing roadways), 1 (148 th St), and 4 (benefits to Lincoln). Other comments considered.
44	Landowner on SM	Gives preference for provision of access to his property.	Options will be discussed with landowners during final design.
45	Lincoln resident	Supports EF because it doesn't cross StCk and has best connection with N-2. He thinks there will be a linear park along StCk and EM would intrude by crossing twice. Thinks EC is too close	Planned development must include roadway planning to serve future needs. Other comments considered.

46	Landowner on SM	SM4-3 shows their house within ROW of Saltillo Rd. They would prefer that house be taken.	Options will be discussed with landowners during final design. It does not appear necessary to relocate this house as the ROW of Saltillo Rd is unlikely to require 300 ft in this location.
47	Landowner near EM and EF	Against EM and EF primarily due to impacts on his property, especially loss of direct access to N-2 and aesthetics. Also thinks its too far out, and 148 th is adequate for traffic. Wants to know if traffic projections for N-2 are available.	See Note 1 (148 th St). City Planning will contact Lang about traffic projections. Other comments considered.
48	Landowner on EM	Favors EF because others are too close to city and proposed development in StCk. Does not believe traffic count and time savings are correct	See Note 24 (traffic model). Other comments considered.
49	Lincoln residents	Favors EF because least impacts. Very supportive of beltway to get trucks off N-2.	Comments considered.
50	Landowner on EC	Against east beltway. Thinks DEIS lacks enough information to evaluate accuracy of traffic projections. Thinks 1996 cost data are not reliable. Thinks project is too expensive, will harm historic farms, change agricultural character.	See Notes 24 (traffic model) and 6 (cost estimates). Other comments considered.
51	Landowners on EF	Owners of historic Penterman Farm, been in family for 50 years. Think historic boundaries should include pastureland and fields. Says fields are contoured not terraced, and could be reversed. Says Exhibit G-5 is labeled incorrectly. Disputes results of noise evaluation, and says inconsistent info on distance to roadway and whether ROW is taken or not. Questions if options are really available for visual impacts. Says paving Yankee Hill will interfere with horseback riding activities which are a significant part of their life-style. Have let Lincoln Public School classes use their property for history lessons. Concerned about development in area will diminish rural setting. Thinks EF will allow encourage a skip in development.	See Note 11 (historic issues). Exhibit has been revised. See Note 15 (noise). Noise and distances were checked and are considered correct. References to distances have in clarified in text. Visual impacts are mitigated to the extent possible. See Note 21 (section line roads). Uses for horseback riding and by Lincoln Public Schools have been noted. See Note 25 (urban sprawl). Other comments considered.

52	Landowner on EF	<p>(1) Says DEIS is incomplete, inaccurate and imprecise, a wetland and a prairie are missing, and the value of tallgrass prairies are underrated and there is no discussion of secondary impacts to the remainder of the Reed prairie, (2) the benefit-cost analysis has serious inaccuracies, is misleading, and is missing information on input parameters and assumptions according to evaluation by engineers/businessmen/UNL professor, (3) disputes NRCS rating scores, thinks indirect impacts should be included for future development, uneconomic remainders and loss of irrigated acreage from pivots taken out of use, (4) says summary is imprecise, missing info, does not emphasize that EM minimizes impacts better than EC and EF, misses info on Waverly Wellhead Protection Area, does not state differences between beltway routes for potential for sprawl, and thinks Table 4.1 should be part of the summary, and (5) document is biased against the no build which should be more quantitatively evaluated, thinks it is not factual that the differences between the east routes is relatively minor.</p>	<p>(1) A wetland delineation was conducted only for areas w/in the proposed ROWs; these wetlands are mapped on the Exhibits. Therefore not all wetlands in the study area are shown in the DEIS. Landowner was contacted: "missing" wetland is not in ROW , Deitrich prairie was added to Figure 2.25; however, prairie is not within any alignment and has would have no effect on the findings. A statement was added to FEIS regarding the City's goal of preservation of prairies. As noted for the Reed letter, options will be discussed with landowners during final design. (2) See Note 8 (economic issues). (3) See Notes 17 (prime farmland) and 5 (bisected farm parcels). (4) Waverly Wellhead Protection Area has been corrected on Figure 2.25. See Note 25 (urban sprawl). (5) See Note 14 (no build). Other comments considered.</p>
53	Landowners near EF	<p>Against EF. Thinks 148th already serves that area. Beltway should be closer to city to be used by Lincoln residents.</p>	<p>See Note 1 (148th St). Other comments considered.</p>
54	Lincoln resident	<p>Against EF. Same letter as No. 20 above.</p>	<p>See No. 20 above.</p>
55	Lincoln resident	<p>Against EF. Same letter as No. 29 above.</p>	<p>See No. 29 above.</p>
56	Landowners on EF	<p>Against EF, favors closer routes or Hwy 43, primarily due to impacts to their property including lack of appropriate compensation. If N-2 interchange is at 148th there should be access east and west.</p>	<p>Hwy 43 is outside the defined study area for this project. See Note 3 (acquisition). Other comments considered.</p>

57	Landowners on EF	<p>Against EF (CARS). Say consultants originally recommended elimination of EF (and imply reasons are still valid) yet EF was selected in June 1997 without explanation. Request evaluation of economic issues from report by engineers/businessmen/UNL professor. Say east beltway will not benefit Lincoln motorists and will harm downtown. Say beltway will cause sprawl, bring noise pollution, destroy air quality, create visual intrusion and change character of land, and importance of urbanization is not worth this expense. Numbers don't justify EF. Says historic impacts are inadequately addressed; these impacts preclude construction of EF. City made premature decisions and therefore 106 process is meaningless. Cumulative impacts section doesn't address historic sites. Other impacts are not addressed (noise, lighting and visual changes). Disputes statement that most historic sites in the area are being modernized or deteriorating. Says noise barrier at T. Retzlaff would be visual problem. No info provided on loss in tax revenue and bond issues to support school districts. No info on severed farmground. Amount of fill required will catastrophically change the terrain. Says no build not addressed for the east, thinks could pave other north-south roads instead. Say they have very little local representation because no ability to vote for City Council, and 2 of 5 County Commissioners have declared conflicts.</p> <p>Previous letter questions (1) noise results for T. Retzlaff and visual impact of noise barrier, (2) discussion on secondary effects to historic properties, (3) why no mention of cumulative effects on historic sites. States (4) costs should be in 2001 not 1996 dollars, (5) should include tax loss and bond support to Norris and Waverly school districts, (6) cut and fill will have catastrophic change on terrain, (7) should be discussion of amount of land that will be inaccessible, (8) need to discuss impacts to value of existing residences, (9) negotiations with landowners must begin immediately following route selection, (10) object to Public hearing format.</p>	<p>See Notes 8 (economic issues), 23 (traffic in Lincoln), 25 (urban sprawl), 24 (traffic model), 11 (historic issues), 26 (voting), 20 (Section 106), and 19 (cumulative impacts). Since the 1997 field investigation for the historic structures, the Michael Smith barn has collapsed, Lemke residence has been partially vinyl sided, Mayer farmyard has been purchased for a nursery with alteration of buildings, storage units have been constructed next to Monahans, one road sign has been painted and relocated, and Ehler's round barn continues to deteriorate. See Note 22 (tax issue), 5 (bisected farm parcels), 7 (earth moving), 14 (no build), 10 (existing roadways). Other comments considered.</p> <p>Answers to previous letter: (1) See Notes 15 (noise) and 11 (historic issues). No noise barriers are proposed at this site (2) See Note 19 (secondary impacts) and 11 (historic issues) (3) See Note 19 (cumulative impacts) and 11 (historic issues) (4) See Note 6 (cost estimates) (5) See Note 22 (tax issue) (6) See Note 7 (earth moving) (7) See Note 5 (bisected farm parcels) (8) See Note 3 (acquisition) (9) See Note 3 (acquisition) (10) See Note 18 (public hearing)</p>
58	Landowners on EC	Against EC, favor EF primarily due to impacts to their property and too close to existing and proposed development in StCk, etc. Concern about deer strikes.	See Note 27 (wildlife). Other comments considered.
59	Lincoln resident	Against EF. Same letter as No. 20 above.	See No. 20 above.
60	Landowner on EF	Says EF will cause adverse effects on his historic property not noted in DEIS, including construction of new houses on adjacent property, increase in commercial development in the area, more traffic and widening of O St, and much more traffic noise and lights from light poles and headlights. Says negative impacts were dismissed without consultation of documentation.	See Notes 11 (historic issues) and 19 (cumulative impacts). O St is already planned for widening.
61	Lincoln resident	Supports the project, can't happen fast enough.	Comments considered.

62	Landowner on EF	Against EF (CARS). Says DEIS is sloppy. Disputes NRCS form rating scores, thinks should include indirect impacts from severed parcels, future development beyond ROW, and loss of irrigated farmground from pivot impacts. Missing 1 wetland and 1 prairie; another prairie mismarked. Disputes boundaries of T. Retzlaff. Missing 1 Waverly well. Benefit-cost calculations are unreliable and cost estimates are underestimated according to group of engineers/businessmen/UNL professor. Summary doesn't mirror rest of document. No build option was not well presented. No discussion of impact to City, implies will harm downtown and airport.	See Notes 17 (prime farmland), 5 (bisected farm parcels). Wetland is not missing, prairie location has been corrected. See Note 11 (historic issues). Waverly Wellhead Protection Area has been corrected in Figure 2.25. See Notes 8 (economic issues), 19 (cumulative impacts), discussion, and 14 (no build). Other comments considered.
63	Landowners on EF	Farmstead will be taken for EF. Have lived on farm for 50 years. DEIS is disrespectful of area farmers. Land is some of richest in US and should be protected. Short sighted to destroy prime farmland with project and urban sprawl that will follow.	See Notes 17 (prime farmland) and 25 (urban sprawl). Other comments considered.
64	Landowner on EF	Against EF primarily due to impacts to his property as beltway will alter farm setting and bring development. As owner of 2 trucking companies, he thinks east beltway will not remove traffic from N-2. As director of LPSNRD, says EF will go right over one farm pond. Says DEIS is inaccurate about bike trail along StCk as LPSNRD voted not to build it. Says landowners won't sell easements for conservation along creek, if they think there may be bike trail. Thinks it would cost less for Lincoln to widen city streets and N-2 instead of seeking roadway outside city. Thinks no build will save tax dollars and prevent development from overtaking farmland.	Consultation with LPSNRD General Manager indicated that beltway routes and LPSNRD ponds can be engineered to be compatible, or impact can be mitigated. Also, says trail is still included in the StCk Watershed Management Plan even though the NRD is not proceeding to acquire trail easements. See Notes 21 (section line roads), 10 (existing roadways) and 4 (benefits to Lincoln). Other comments considered.
65	Landowner on EC	Against EC due to impacts on his property, favors the EF because less impact to existing houses and proposed development in StCk. EIS is missing houses on maps, conflict with LPSNRD ponds not adequately addressed, impact to flooding on StCk not addressed, incorrect population growth. Can't quantify many of the impacts to nearby residents. EC exit is too close to shopping center entrance. EF was already chosen, unfair to go with something else.	See Note 12 (houses). See Peterson, Dean, above. See Notes 16 (population) and 26 (voting). Other comments considered.
66	Lincoln resident	Against beltway, specifically EF. Cost of beltway is too high. Money should not be spent on truckers bypassing City. Concern for severed farmground, change in terrain (drainage problems on farms and wetlands).	See Notes 4 (benefits to Lincoln), 5 (bisected farm parcels), 7 (earth moving). Other comments considered.
67	Lincoln resident	Against EF. Same letter as No. 20 above.	See No. 20 above.
68	Lincoln resident	Against EF. Money should be spent on those who pay taxes not on people bypassing Lincoln. Concerned about historic resources, prime farmland, severed parcels. Thinks 148 th St is adequate.	See Notes 4 (benefits to Lincoln), 11 (historic issues), 17 (prime farmland), 5 (bisected farm parcels), and 1 (148 th St). Other comments considered.

69	Landowner near SM	Says no one on Saltillo Rd west of US 77 was contacted about beltway project. There are 25-30 homes in the area. There is a historic marker for the former location of aa Pioneer trail in the southeast "turnpike corner". They will lose their restaurant, gas station, access to 77 and great view. Says don't need a long off ramp to north (ramp at I-80 and 77 is 35 mph).	Landowners may not have received direct mailings as original study area did not extend west of 77. Historic marker needs to be relocated, but no features of historic trail remains in this area. As to ramp, options will be discussed with landowners during final design.
70	Landowner on EF	Against EF because of impact to her virgin prairie which she considers a historic site. If EF is selected, requests looking at options to avoid the prairie.	Options to minimize impacts will be discussed with landowners during final design.
71	Lincoln residents	Against east beltway, especially EF. Need has not been proven. Money should be spent on improving existing roads. Thinks cost estimate should be updated. Thinks selection process is flawed, elected officials prejudiced the process, government agencies will be biased. Thinks beltways cause sprawl along road and at interchanges.	See Notes 24 (traffic model), 10 (existing roads), 6 (cost estimates), 26 (voting), 25 (urban sprawl). Other comments considered.
72	Landowners on EF	Against EF(CARS) which crosses their property, for historic reasons and impacts to their property. They are part owners of NRHP eligible barns and silo (E-67). Concerned that EF sacrifices historic agricultural landscape, harms historic farms, and endangers their historic properties. Concerned about noise, fumes, vibrations and lights from trucks. Says EF separates their barns and silo from land they were built to support, DEIS doesn't consider cumulative effects, including residential and commercial development. Says EF would promote urban sprawl, and more traffic on roads connecting to the beltway which would destroy the setting and feeling of their rural neighborhood. Says annexation by Lincoln will threaten tax base of local school district 145, cost estimates are understated, neighborhood will become cluttered with trash, billboards, signs and crime will increase.	See Notes 11 (historic issues, 19 (secondary and cumulative impacts), 25 (urban sprawl), 22 (tax issue), and 6 (cost estimates), Otherwise, Other comments considered.

73	Landowners on EF	<p>Against EF for historic reasons. Owners of StCk Stock Farm. Lists flaws in DEIS as not considering that the historic significance of the Stock Farm would be undermined by (1) construction of the beltway which will destroy the rural setting, (2) induced growth from the beltway which will harm the rural setting, (3) street widening and paving of Van Dorn, Pioneers and 138th St to connect to the beltway would have adverse impacts, (4) impacts to farmland from visual, atmospheric and audible elements. (5) States no noise evaluation was conducted for the Stock Farm.</p>	<p>(1) Assessment of adverse effects did find that EF would adversely affect setting and (2) acknowledged that the potential for development is greater if road is east of the site (page F.11). (3) See Note 21 (section line roads). Pioneers is being paved to 120th. It is less likely that 138th would be paved due to the discontinuity in the grid system (4) The EIS assumes that there is no impact to farmland from visual, atmospheric and audible elements, only people and structures are affected by these. (5) The noise model is applicable within 1,000 ft of a roadway, and EF is over 2,000 ft from any of the structures on the Stock Farm.</p>
74	Landowners on EF	<p>Against EF (CARS), for historic reasons and impacts to their property. They are part owners of NRHP eligible barns and silo (E-67). Say farm will be isolated between beltway and 148th St, noise will be deafening, divided property will make access difficult for farm equipment. Say EF will cause the loss of 10,000 ac of prime farmland to development. Say DEIS does not discuss extra energy consumed by cars making longer trips, lighting for interchanges, and higher driving speeds. Think cost estimates are understated, beltways ruin downtowns.</p>	<p>See Note 15 (noise). Noise levels will increase, but not above criteria levels as residence is about 2,000 ft from EF. See Notes 17 (prime farmland) and 25 (urban sprawl). DEIS did address longer trips and higher speeds on page 3.74. Energy used for lighting has not been addressed, and is not typically included, as it is a minor impact which is more than compensated for by the safety it provides. See note 6 (cost estimates). Other comments considered.</p>
75	Landowners on EF	<p>Against EF, historic reasons and impacts to their property. Owners of historic T. Retzlaff Farm. Think previous comments were not adequately addressed. Dispute historic boundaries, thinks should be entire 80 ac (S of Van Dorn). Says that parcel does not have terracing or man-made pond, Van Dorn has changed very little since farmhouse was built, and trees do not alter integrity of property. Say they will be submitting NRHP nomination. Say noise, lights and pollution will destroy agricultural setting. Road will cut across farm and cattle will not be able to get to pasture. No practical mitigation offered. No discussion of development that will follow EF construction.</p>	<p>See Notes 11 (historic issues) and 15 (noise). Mitigation will be developed if EF route is selected; options to minimize impacts will be discussed with landowners during final design. See Note 25 (urban sprawl).</p>

76	Landowners on EF	<p>Against EF, owners of the StCk Stock Farm. Problems with DEIS include (1) benefit-cost analysis is flawed & correction would make EF even less economically feasible, (2) historic survey & boundary issues have not been rectified, including nature of standing structures survey, boundaries for historic farms, investigation of a historic district, failure to identify negative effects of EF, and failure to identify all resources in the area, (3) DEIS disagrees with SHPO that 800 acs are eligible for inclusion with the Stock Farm on the NRHP , and an additional 320 acs are also eligible, (4) 4(f) evaluation doesn't address direct, secondary and cumulative impacts of EF on historic sites, including adverse affects from increased traffic volumes on 138th St, (5) 11 points that illustrate process failures in the beltway study and decision process including illegal votes by elected officials, improper public hearings, inadequate consultation with consulting parties, inadequate study methodology, etc, (6) urban sprawl discussion, (7) consulting party letters were not answered and issues not addressed, (8) discussion of "elimination of EF" is not addressed , (9) statement about StCk connector trail, (10) dates on figures are not correct, and they are missing information, (11) historic sites should be included in Table 2.3, the environmental screening criteria, (12) NRCS farmland conversion rating scores need to be corrected, including consideration of impacts from severed parcels, irrigation systems, and loss of access. Request that Table 4.1 not be provided to public officials or general public until corrected.</p>	<p>(1) See Note 8 (economic issues) (2) See Notes 11 (historic issues) and 20 (Section 106) (3) See Note 11 (historic issues). The SHPO concurred with the DEIS statement that an additional 560 ac are not eligible as they are not adjacent to the 240 ac which are on/eligible for NRHP. The SHPO was not previously informed that the 560 ac were not adjacent. Additional 320 are addressed in Section 9.5. (4) See Note 2 (4(f)). While future traffic will increase on 138th St, it will not create an adverse noise impact. The noise evaluation shows that Old Cheney Rd is the only connector road along EF-1 expected to have a greater than 50 percent increase in traffic volume. (5) See Notes 26 (voting) and 18 (public hearing) (6) See Note 25 (urban sprawl) (7) consulting parties did not receive response letters, however, issues were investigated and included in the revised assessment of adverse effects (8) consultant recommendation to eliminate EF has been added to FEIS (9) see Dean Peterson letter (No. 64) above (10) Figures have been corrected in FEIS (11) historic sites, and specifically StCk Stock Farm, were covered under Item 16 in Table 2.3 (see Interim Report 2) (12) See Note 17 (prime farmland). Table 4.1 was part of DEIS and should be made available to the public. Revisions to the table have been made in the FEIS, as appropriate.</p>
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77	Atty for CARS	<p>Against EF. Position of CARS is that (1) process was flawed since August 1995 regarding failure to comply with Section 106 and 4(f) process, (2) federal public hearing process was not appropriately followed due to open house style, (3) report by (engineers/businessmen/UNL professor) found erroneous assumptions and conclusions, and (4) previous findings of City's consultants as to why EF should not be selected. (5) Wants to know if correspondence from Stupka-Burda is her position or UNL's.</p>	<p>(1) See Note 20 (Section 106). The only historic resource adversely affected under 4(f) is a road sign. No land is required from any other historic resource. (2) See Note 18 (public hearing) (3) See Note 8 (economic issues) (4) The DEIS includes analysis of all 3 east routes. With more detailed evaluations, 6 of the 8 conclusions remain the same. Item 7 (wetlands) was reevaluated by area of impact (not number), and the findings are slightly different. Item 6 (school districts) were not reevaluated. (5) UNL Department of Anthropology was subcontracted by the beltway study team to conduct several of the cultural resources investigations. Stupka-Burda was one of the principal investigators at UNL.</p>
78	Landowner near EC	<p>Against EC due to impacts on her property and it is too close to existing developments, most expensive and impacts most wetlands.</p>	<p>Comments considered.</p>
79	Lincoln residents	<p>Against beltway, especially EF. Says will have negative effect on downtown and airport. Concerned about noise, air and visual impact, houses and businesses, endangered species, wetlands and StCk watershed. Money should be spent on Lincoln residents not travelers by-passing city. Concerned about historic properties, agricultural setting, loss of prime farmland, urban sprawl, harm to downtown. No info on loss of tax revenues and bond issue support for Norris and Waverly school districts, or severed parcels. Earth moving will cause catastrophic changes in terrain.</p>	<p>See Notes 4 (benefits to Lincoln), 11 (historic issues), 17 (prime farmland), 25 (urban sprawl), 22 (tax issue), 6 (bisected farm parcels), 7 (earth moving). Other comments considered.</p>
80	Landowners near EF	<p>Against EF. Owners of historic Herter-Hagaman Farm. Disputes Prelim Assessment which says EF will not have visual, audible or atmospheric impacts to their property. Disputes historic boundaries, thinks additional 100 ac should be included and will be sending in NRHP nomination. Says land was contoured not terraced, says trees don't compromise integrity. Say EF will bring sprawl and that impact has not been addressed on their property.</p>	<p>See Notes 11 (historic issues) and 25 (urban sprawl).</p>

81	Lincoln resident & member of Preservation Assoc. of Lincoln	<p>Said organization did not receive DEIS. Concern that residents of beltway corridor have no vote in Lincoln politics.</p> <p>Favors no build, because of NRHP sites in StCk area. Thinks NRHP sites should include farmland. Thinks beltway and urban sprawl will impact StCk area. Should choose east beltway with least impact on historic resources (EC). Objects to Public hearing format.</p>	<p>Called and verified that they did receive DEIS.</p> <p>See Notes 11 (historic issues), 25 (urban sprawl), 9 (environmental impacts), and 18 (public hearing). Other comments considered.</p>
82	Landowners on EC	<p>Against EC, due to impacts on their property and too close in considering the fast growth of the city. EIS overestimates traffic relief on arterials, uses incorrect population growth (1.6 not 1.18), Build Out Scenario (BOS) II underestimates traffic as no urban uses in StCk, understates future residential conflicts, ignores effect of beltway in the way of urban development. Notes that 2 LPSNRD dams will be constructed in the path of EC-1, wasting money to relocate. EC-1 previously eliminated (unfair), etc.</p>	<p>See Notes 16 (population), 23 (traffic in Lincoln), 25 (urban sprawl) and 26 (voting). Other comments considered.</p>
83	Lincoln resident	<p>Against EF as too far away. Thinks east beltway should be 1 mi west of Walton. Disputes that beltway will not bring urban sprawl. Concerned about loss of farmland.</p>	<p>See Notes 25 (urban sprawl) and 17 (prime farmland). Other comments considered.</p>
84	Neighborhood Assoc on EC	<p>Against EC because too close to existing and proposed development in StCk, not economical, not efficient. Concern about deer strikes. EC was eliminated previously (unfair).</p>	<p>See Notes, 27 (wildlife) and 26 (voting). Other comments considered.</p>
85	Lincoln resident	<p>Wanted to see traffic data for outer segments of connecting roads with east beltway interchanges; DEIS only had segments west of beltway. Wanted to know if roads with only overpasses show same trend. Concerned about increased traffic on connecting roads.</p>	<p>This request was forwarded to Planning Department.</p>
86	Landowners on EC	<p>Against EC, favors no build, due to impacts to their property and EC is too close to existing and proposed development, etc.</p>	<p>Comments considered.</p>
87	Landowners near EC and EM	<p>Against EC and EM because too close to populated areas.</p>	<p>Comments considered.</p>
88	Landowners Association in East Beltway area	<p>Against cutting through StCk basin, especially against EM. Would have devastating effect on StCk, StCk should be preserved as greenspace, prefer to see upgrade of existing roadways.</p>	<p>See Notes 10 (existing roadways) and 21 (section line roads). Other comments considered.</p>
89	Landowner near SM	<p>Says SM will cut their farm in half and concerned about access.</p>	<p>Options will be discussed with landowners during final design.</p>
90	Landowner near EF	<p>Questions need for beltway. Thinks 148th should be widened with access to I-80 south of Waverly, or widen Hwy 63 and connect to N-2.</p>	<p>See Notes 24 (traffic model) and 1 (148th St). Other comments considered.</p>

91	Landowner near EF	Against EF. Disputes need for beltway. EF is too far away, and traffic can use 148 th . Concerned about loss of farmland, and opening area up for development. Disagrees with DEIS on sprawl issue.	See Notes 24 (traffic model), 1 (148 th St) and 17 (prime farmland) and 25 (urban sprawl). Other comments considered.
92	Landowner on SM	Has access and irrigation concerns for sod farm.	Options will be discussed with landowners during final design.
93	Landowners Assoc on EM	Favor EF. Same letter points as Foy.	See Foy (No. 23) above.
94	Lincoln resident	Thinks far location will not solve traffic problems, and will diminish Lincoln by making access to Omaha easier. Thinks should use 148 th .	See Notes 24 (traffic model) and 1 (148 th St). Other comments considered.
95	Landowners on EC	Against EC, due to impacts to their property and too close to existing development, previously eliminated (unfair), etc. DEIS is out of date, missing homes and archeological findings.	See Notes 12 (houses) and 26 (voting). Location of archeological sites is considered confidential. All additional archeological sites identified by landowners were investigated. Other comments considered.
96	Landowner on EC	Against EC due to impacts to her property and too close to existing and proposed development in StCk. Missing home at 1900 105 th , missing (Wenzl) historic site, pond at 1500 105 th , underestimates no. of residences within 0.25 mi. EC and EM previously eliminated (unfair).	See Note 12 (houses) and 26 (voting). Wenzl site was checked again by SHPO, and is still not considered to be eligible for NRHP. Other comments considered.
97	Lincoln residents	Supports the project to get truckers off N-2.	Comments considered.
98	Landowner near SM	For SM. Saltillo Rd is dangerous/too busy. Thinks project should start sooner.	Comments considered.
99	Lincoln business owner	Against east beltway. Owner of downtown restaurant. Says too far out to be used, will cause sprawl, will harm downtown by encouraging relocations to the suburban edge, and by making it easier to shop, dine and fly out of Omaha.	See Note 25 (urban sprawl). Other comments considered.
100	Lincoln resident	Against EF. Same letter as No. 20 above.	See No. 20 above.
101	Landowner on EC	Against EC and too close to existing and proposed development in StCk, etc. EC was previously eliminated (unfair). Incorrect population growth. Concern about impacts to septic fields and wells. Also sent information on Teachman Cemetery and Shirley Road Ranch.	See Notes 26 (voting) and 16 (population). Options will be discussed with landowners during final design. Already have records of these historic sites and they are not affected. Other comments considered.
102	Landowner near EM	Thinks east beltway support is from city residents only, and its unfair that county residents will be most impacted. Concerned area will look like West Omaha. Doesn't think there is a traffic problem.	See Note 24 (traffic model) Other comments considered.
103	Landowner near EC	Against EC, due to impacts to her property and too close to existing development.	Comments considered.
104	Landowner near EF	Favors EC, thinks we need an east beltway.	Comments considered.

105	Lincoln resident	Against EF. Thinks its too far east of city, would not benefit city traffic, infrastructure costs to reach EF would be too costly, and not needed because 148 th St already in place.	See Notes 23 (traffic in Lincoln) and 1 (148 th St). Other comments considered.
106	Landowners on EF	Errors and omissions in DEIS, will send later, problem with PH format. Against EF primarily due to impacts to their property. Was raised on StCk Stock Farm and currently lives there (7 th generation). Says farm is privately owned but they host school children, University students and others interested in history, farming and preservation. Concerned about air, light and noise, breaking up farmground, and making difficulties for farmers. Thinks wildlife would disappear, development would be out of character with current pristine setting. Thinks EF is not most feasible. EF corridor and process have fatal flaws. Concerned about benefit-cost issues, historic survey and boundary issues, boundary of Stock Farm, 4(f) considerations, process failures, urban sprawl, public input, consultant recommendations against EF (see letter 76 above).	See Note 26 (voting). Other comments considered. See Notes 5 (bisected farm parcels), 27 (wildlife), 26 (voting), 8 (economic issues), 11 (historic issues), 2 (4(f)), 20 (Section 106), 25 urban sprawl, and 18 (public hearing).
107	Landowner on EF	Favors EF. Other routes conflict with opening up StCk watershed for development. Previously told would be EF.	See Note 26 (voting). Other comments considered.
108	Beltway Citizens Advisory Committee member	Favors SM and EM. All routes will have adverse impacts to those along it, therefore its important to choose a route that most benefits the traveling public and is most cost-effective.	Comments considered.
ORAL TESTIMONY FROM PUBLIC HEARING			
109	Lincoln resident	Feels there is a high need for the beltway. He works in Bennett. Feels that EM is the most appropriate because of existing power line, and it doesn't displace the most homes.	Comments considered.
110	Landowner on EC	Says there is increasing confusion over east bypass. East originally was not to alleviate traffic in Lincoln. Should use existing state highways instead of a whole new highway. Proposals should be farther east than are being proposed. Thinks HWS messed up traffic study done a few years ago	See Notes 23 (traffic in Lincoln), 24 (traffic model), and 10 (existing roadways). Proposals farther east do not serve project purpose and need. Other comments considered.
111	Landowner on EC	No one is going to go out of their way. If you are going to build, you should build where the edge of the city will be in 2025.	Comments considered.
112	Representative of Lincoln Chamber of Commerce	Stated the Board of Directors of the Chamber of Commerce supports the south & east beltways. Thinks the DEIS was very thorough in its study of the south alignment. Feels the study is very good for the east alignment. Urges local officials to make a decision.	Comments considered.

113	Lincoln resident	He liked the original beltway proposal at 141 st St, but does not like the 105 th St location. Believes the StCk area will be developed. Wants the beltway to be past StCk so Lincoln can develop out to the beltway. Feels the beltway would prohibit growth if it were in the StCk location (EM).	Comments considered.
114	Landowner on EF	Against current alignment of EF. Her family owns a house very close to the exit ramp of EF. House has been in the family for many years. When N-2 was widened, they had to relocate the house and fix it up do to the move. The family was not repaid for repairs of a mandatory move. They feel they, and other families, should not be burdened to move again due to this project. They did not know of the latest EF alignment until last year. If they do have to move, they have water wells on the north side of N-2 in area of the proposed interchange. They want to be rehooked up to the existing wells because they are used extensively for their cattle. Overall, they do not want to move the house again.	Options will be discussed with landowners during final design if EF is selected. Other comments considered.
115	Hearing Officer for NDOR and Lincoln resident	Asked a FHWA representative to give testimony on the format of the public hearing (then in progress) and asked how the information obtained at the hearing would be used. Said he lives close to Hwy 2 and there is heavy truck traffic and a need for a beltway. Doesn't think roads should be located by a vote. Thinks we need the beltway ASAP.	No response required. Comments considered.
116	Landowner on EC	Against EC. Does not want EC being so close to the city limits. It is not practical to build a beltway so close to Lincoln. Feels the beltway should be built past StCk. He doesn't feel any alignment will relieve traffic, or is a solution to improving city streets. Overall, he feels EF would be the best option. EM would be an option to him but not as practical as EF.	Comments considered.
117	Landowner on EC	Against EC. Supports EF. Her house is in EC alignment. She is upset her house is not on any of the maps. Thinks EC and EM disrupt the MOPAC Trail. She does support an alignment to alleviate traffic around the city.	House has been added to map. All three routes cross MOPAC Trail but will be mitigated. Other comments considered.
118	Landowner on EC and EM	Supports EF. Thinks decision-makers should stick by the vote on 6/27/97 by the Supercommons for the EF alignment. Thinks it is bad to put the EM in the StCk floodplain. EC was the worst alignment in his opinion and because of legal problems. Says data used in the EIS was outdated. There are legal problems with the EC and a bad location at the EM.	See Notes 26 (voting) 12 (houses). Data in DEIS was best available and considered relevant for a planning document. Other comments considered.

119	Lincoln resident	Supports both south & east projects, supports EM. He is banker for Union Trust, resident of southeast Lincoln. Thinks south should be separated from east beltway. Thinks they are two different situations that should be dealt with separately. Thinks EM is the best route because few residential impacts, fewest acs needed, best time savings.	Comments considered.
120	Landowner on EM	Supports EF because he thought the vote in January 99 finalized it. Does not want growth prohibited from the EC or EM. He feels development will be rapid into StCk. Supports EF as it is farthest away from development and the floodplain.	See Note 26 (voting). Other comments considered.
121	Lancaster County resident	Against EC. Landowner on 176 th . Wants to widen 148 th St to four lanes.	See Note 1 (148 th St). Other comments considered.
122	Landowner on EF	Says there is an airstrip at 148 th and Van Dorn that is not in the EIS. Questioned the method of this public hearing.	Airstrip is planted in alfalfa, has not been used in about 10 years, and permits have not been renewed (see written comment No. 24 above). See Note 18 (public hearing).
123	Landowner on near EC	Moved to 112 th because of rural environment. Was attracted by StCk Development. City of Lincoln finally seemed to have a plan and now the beltway opposes the StCk Basin (Plan). Either the beltway or StCk (Plan) need to go. EIS Summary says 7 out of 8 people say protect natural resources. EIS Summary says EC is costly. City officials were concerned about EC but it is still being studied. There is a contradiction of information. Too many studies going on at once. Should focus on 4-lane arterials, especially east-west. Beltway won't help inner city.	Project will be designed to protect natural resources to the extent possible consistent with good design practices. See Notes 26 (voting), 10 (existing roadways) and 23 (traffic in Lincoln). Other comments considered.
124	Preservation Assoc of Lincoln member	She was very disappointed in this hearing process. She wanted a real public hearing in front of elected officials. She also felt a public hearing should be in a public building, and not a church.	See Note 18 (public hearing). Other comments considered.
125	Landowner on SM	Speaking on behalf of Hornungs. He farms approx 500 acs, 450 affected by new proposal. Wants SM moved back to the south.	Options will be discussed with landowners during final design.
126	Atty for Landowner on SM	SM intersects Hornung property, might take most of their property and will relocate Hornungs. Earlier alignment did not affect Hornungs, recent SM-4 does significantly affect their property. Hornungs position should be considered throughout design. Want SM moved back south.	Options will be discussed with landowners during final design.
127	Landowner on EC	Asked which choices are more viable as far as cost? Has heard on TV that EC is better, more economical, etc. Owns real estate and has done research and found that if choosing EC the city would be out to it by the time it's built.	See Table 4.1 for differences between routes. Other comments considered.

128	Landowner on EC	If EC is chosen, their house won't be taken but frontage will. When all property is taken they will end up with only 2.5 acs from the 5 ac they bought. There will be a 12 ft berm 45 ft from their walkout basement. Property access has not been addressed. Wenzl Farm does not appear on map, they have an 1860's barn on their property. Says got tired of waiting for decision to be made and put another building up this year. Page 3 says there is low impact, but the beltway meanders and property values are low. Study contains assumptions that are incorrect. 148 th St is a corridor if that's what you want.	Options will be discussed with landowners during final design. Wenzl Farm has been rechecked by SHPO and is still not considered eligible for NRHP. See Notes 3 (acquisition) and 1 (148 th St). Other comments considered.
129	Landowner on SM	Where his house is, the ROW will be in his living room. He would like access road moved south so it will impact his property less.	Options will be discussed with landowners during final design.
130	Landowner on SM	Said access road comes up to his driveway, and the ROW would take away his front yard. He wishes the road to be moved to the west, but there is a wetland and doubts it can be moved.	Options will be discussed with landowners during final design.
131	Secretary of Landowner Association in east beltway area and Landowner on EM and EF	She encourages a proposal to upgrade existing roads.	See Notes 21 (section line roads) and 10 (existing roadways). Other comments considered.
132	Landowner on EM	Supports south beltway, against east. People don't understand why an east bypass is needed. Says beltway won't take semi traffic off 70 th and 84 th . 85% of people want to know why 148 th isn't just made a divided highway. Wants to know if using 148 th will affect funding or not, has gotten several different answers on this. Project has pitted groups or people against each other. Says you could go around Wilderness Park. You hear trucks in it anyway. EM is least likely because you have to cross StCk. Says its silly to open StCk for development and then put a bypass through it. Says to take 112 th , 148 th and 162 nd , take ROW on each road and you would be able to have a 2-lane divided highway with limited access. Thinks traffic could be handled by upgrading streets. None of this will alleviate Lincoln's traffic in town. Need to not have so many entrances and exits on O St, it slows you down too much. Doesn't like farms being divided. Thinks if land is taken, the price people are receiving for it should be adjusted in anticipation of future land prices.	See Notes 24 (traffic model) and 1 (148 th St). EC also crosses StCk. See Notes 21 (section line roads), 10 (existing roadways), 23 (traffic in Lincoln), and 3 (acquisition). Other comments considered.
133	Landowner on EF	Against EF. Owns 20 ac of land on Yankee Hill eligible for NRHP (Penterman's). He was discouraged because he thought he would be voicing his opinion to the decision-makers at this meeting.	See Note 18 (public hearing). Other comments considered.
134	Landowner on EF	Objects to public hearing format. Says the data is still not right on the revised version of the maps.	See Note 18 (public hearing). See written comment No. 62 above. Other comments considered.

135	Landowner on EC	Against EC. Says information is still not accurate on what has been built. Asks if still using old information. Says some houses and farm ponds are not shown. Asks why 148 th is not used or considered, says federal friends say it is eligible as a beltway route. Asks if there is critical engineering data that says an east beltway should be built. Doesn't think there are adequate numbers to justify it. Thinks this is a waste of taxpayer money and NDOR won't want to touch it!	See Note 12 (houses). Data in DEIS was best available and considered relevant for a planning document. See Note 1 (148 th St) and 24 (traffic model). Other comments considered.
136	Landowner on EF	Says this is not a public hearing, it is an effort by the government to avoid controversy. Says east bypass is ill conceived, City of Lincoln is trying to put traffic problems in somebody else's backyard. Says he has a trucking company and will not use the east bypass because it is several miles out of the way. Would use Hwys 2, 34 and 6, and 148 th St. Will maybe use the south bypass. By using this format for a public hearing you can't tell how much opposition or support there is for the project. Says to put this on a ballot and let the county vote on it. Says this is just like Antelope Creek which is being rammed down people's throat. Says should make State 43 the bypass since it keeps going further east.	See Notes 18 (public hearing), 24 (traffic model) and 1 (148 th St). Hwy 43 would not serve project purpose and need. Other comments considered.
137	Lancaster County resident	He is concerned about the ecology and quality of life issues the beltway would make. He does feel the EIS is extensive, and overall very good. He wishes to move forward and make a decision. He did not wish to state his preference to which alignment he supports.	Comments considered.
138	Nebraska Advisor to Nat'l Trust for Historic Pres	Says he has been involved and is a consulting party. Says the Trust has placed the east beltway corridors on the top 11 most endangered historic corridors. Says they object to the format of the meeting as people are deprived of hearing others' comments. The requirement for a public hearing has not been satisfied and they will pursue this with FHWA in DC. A proper public hearing should be held. The Trust will provide its comments directly to the FHWA.	Information on the Trust list was released after the public hearing. See Note 18 (public hearing). Other comments considered.
139	Landowner on EM	Nothing has changed with all these meetings. Says there are lots of mistakes in reference books. Says new houses and powerlines have been constructed. Thinks City of Lincoln hasn't taken into account how important farms are to Lincoln. Bus routes and safety of children should be taken into account. People living in the city should have to sacrifice more than what they are.	Data in DEIS was best available and considered relevant for a planning document. See Note 12 (houses). Safe design practices will be incorporated in final design plan. See Note 21 (section line roads). Other comments considered.
140	Lincoln resident	Opposes beltways in general. City should learn from Atlanta, Georgia which built beltways and has problems with resulting sprawl, new traffic problems and air quality. Thinks global warming will result in road construction restrictions, and Lincoln should be prepared by choosing smarter growth. Thinks money should be spent on interior streets of Lincoln. Thinks truckers will use beltways, but not the vast majority of people.	See Notes 25 (urban sprawl), 21 (section line roads), 10 (existing roadways) and 24 (traffic model). Other comments considered.

141	Landowner on EF	Objected to the format of the public hearing. Didn't think there was public interaction in this process. Says there were errors and omissions in the DEIS which she would address in written comments.	See Note 18 (public hearing). See written comment No. 76 above).
142	Bennet resident	Thinks route should be further east (suggests 148 th St) and wants the I-80 interchange to be even further east (Hwy 63). She suggests somewhere between Waverly and Exit 420 (Greenwood-Ashland).	See Note 1 (148 th St). Hwy 63 would will not serve project purpose and need. Other comments considered.
143	Lincoln resident and Preservation Assoc of Lincoln member	Says there are pristine farmlands and pastures that are eligible for historic status but are not included in beltway study. Says should consider urban sprawl. Doesn't think no build option was considered (see DEIS, p. 2.3, 3.13, and throughout Chapter 3). Encourages east beltway be built as a parkway. Says impact of noise on animals was not addressed. Thinks public hearing isn't valid as public officials are not here to listen. Thinks it's inappropriate to have the hearing at a church since there should be separation of church and state.	See Notes 11 (historic issues), 25 (urban sprawl), 14 (no build) and 18 (public hearing). Noise has been considered in accordance with federal regulations. Other comments considered.
144	Landowner on EC	Thinks there wasn't much study of property assessment in DEIS. Is worried about noise and light pollution in the country from the beltway. Feels a beltway would degrade property values. Thinks EC affects the most homes, and has bad design aspects. Says development of StCk affects traffic on the beltways; says this wasn't brought up 5-8 years ago. Wants more information on the No Build option. Is wondering if the beltway is needed at all. Thinks existing infrastructure improvements should be considered first. Thinks more information is needed on design and property evaluation.	See Notes 3 (acquisition), 14 (no build), 14 (traffic model), 21 (section line roads) and 10 (existing roadways). Other comments considered.
145	Lincoln resident	Against east beltway, but if you are going to do it look at EF. Thinks should widen 148 th , 120 th , 134 th , 112 th and 96 th to five lane roads. Says to keep beltway as far east as possible since houses will be way out east in another 15-20 years anyway.	See Notes 1 (148 th St), 21 (section line roads) and 10 (existing roadways). Other comments considered.
146	Landowner on SM	They will be 1,000 ft from the beltway. Says they were told decibels aren't high enough for the project to put in trees or anything else to screen out noise. They would like to get trees to screen out both noise and view of the beltway.	See Note 15 (noise). Mitigation is not typically provided unless there is an adverse noise impact. Landscaping options will be discussed with landowners during final design. Planting trees will not typically mitigate noise.
147	Lincoln resident	In favor. Thinks EC or EM best. Lives near 84 th St and gets a lot of traffic going to I-80 or to grain elevators. Trucks are coming off of Hwy 2 and have no motivation to slow down, someone is going to get hurt. People are already pricing acreages very high in corridor so doesn't have sympathy for those saying their acreages are losing value.	Comments considered.

148	Landowners near EC	Supports EF. Lives near Pioneers and 98 th . Doesn't think he'll be around when beltway is finally built. Says Pioneers near his house will have increased traffic. Says population of 220,000 shouldn't need an east beltway. Asks why didn't Lincoln do this earlier? Says 84 th and 70 th are not fully finished yet. When StCk opens up it will fill in quickly, therefore thinks beltway should be as far east as possible.	See Note 24 (traffic model). Other comments considered.
149	Landowner near EC	Supports EF. Thinks the 3 east routes chop up ground and don't leave enough ground to have an acreage (21 ac policy). Says only new residences on west bypass are multifamily because land can be bought cheaply; single family homes are built farther away. Says you won't be able to do anything with the land that remains because of small size parcels. Says to use 162 nd St because there are no homes bothered, minimizes damage and already has an overpass at I-80 which can be used for a cloverleaf. He drives a school bus on 148 th and sees heavy rock haulers and 12-15 semi's twice a day. Thinks should move location further east and go for it.	162 nd St does not serve project purpose and need. Other comments considered.
150	Landowner on EC	Asks two questions (1) unsure about voting on EC (2) was never notified that EC was again being considered, therefore EC residents did not give opinions. Says there are three houses on EC not on map. Does not think there is a need for east beltway.	See Note 26 (voting). This determination was made in early 1999 in a letter from FHWA to NDOR. See Note 12 (houses). Landowner was contacted regarding missing information and some houses were added to figures and exhibits. Other comments considered.
151	Landowner on EC	Strongly against EC. He believed the June 1997 vote omitted EC. Says he asked city officials before he bought his property if there was any future development in the area. He moved into his new home in 1998 and found out that EC was brought back into the proposals. He wouldn't have moved if he knew this in advance. Believes a new survey has to be taken to reflect the number of new homes in EC corridor. Thinks MoPac Trail would be ruined by a beltway. Wishes StCk watershed remain undeveloped, but admits this may not happen. He doesn't think there will be adequate relief from the beltways. Supports widening inner city streets first.	See Notes 26 (voting) and 12 (houses). MOPAC will remain with all three east routes and crossing will be provided. See Notes 24 (traffic model), 10 (existing roadways) and 21 (section line roads). Other comments considered.
152	Lincoln resident	He is in strongest support of EC because of the cost and least political resistance. Supports the beltway project overall. Owns land at 176 th and Hwy 2. Wants EF and StCk area to remain rural.	Comments considered.
153	Landowner on EF	Lives on North 148 th . Doesn't want things (proposed alignments) changed from the way they are shown on the maps. Says when the (EF) interchange in Waverly was added it turned the beltway away from him. Says 148 th Street is used as truck bypass now. Doesn't have sympathy for StCk, they have been complaining forever.	Comments considered.

154	Landowners on EC	Say EC was removed from consideration in 1998. They feel offended that it has been brought back into consideration. Are worried about the resale of their property, air quality, water quality, noise, and visual impact. Say EC would cut through his 5-acre lot, and it would become useless. They won't have access to Holdrege St from this alignment. Says beltway would affect the drainage from his property, that there is a lack of cooperation with LPSNRD on this project, and EIS is flawed. Noise, water quality, and access to Holdrege Street are their major concerns. Wants beltway moved out to the county line.	See Notes 26 (voting) and 3 (acquisition). Air, noise, visual and water quality impacts were addressed in DEIS. Consultation with LPSNRD General Manager indicated that beltway routes and LPSNRD ponds can be engineered to be compatible, or impact can be mitigated. Data in DEIS was best available and considered relevant for a planning document. Options will be discussed with landowners during final design. Beltway at county line will not serve project purpose and need. Other comments considered.
155	Landowner on EC	Feels the public or the media does not understand the noise impact of this study. Says that a noise level of about 66 dB would be a noise impact, and wonders how many people would hear the noise, no matter what the dB level is. Feels EC would have the most noise impact. Wants more study on noise for the public to understand.	See Note 15 (noise). Other comments considered.
156	Landowner on EF	Says the hearing did not represent a public hearing. She found numerous errors in the DEIS, and would address them in the future.	Comments considered.
157	Landowner on EM	Against EC and EM alignments. He is upset that the city council voted for EF two years ago, yet further environmental impact is being studied. He feels that if you can hear it or see in any way, it is a direct impact and is not in support of that. He wishes the corridor study would be widened to look at farther east alignments. He feels the vote of the city council should go the original way, and support EF.	See Notes 26 (voting) and 15 (noise). Visual impacts were been addressed in the DEIS. Other comments considered.
AGENCIES, INDUSTRIES AND OTHER ENTITIES			
158	Advisory Council on Historic Preservation Don Klima	Disagree with DEIS on urban sprawl; thinks not adequately addressed. Think cumulative impacts, including Comp Plan, are not adequately addressed for historic properties. Suggest a meeting among various consulting parties to discuss indirect effects and resolution of those effects.	ACHP advised FHWA of their interest in the project beyond their 15-day required time-frame. A public meeting was held in March 2001 and two public hearings were held in April 2001. Representatives of the study team, cultural resource consultants, SHPO, FHWA, NDOR and City were available throughout these meetings to discuss historic issues with consulting parties. See Notes 26 (urban sprawl) and 19 (cumulative impacts).
159	Cass County Rural Water District No. 2 Robert West	Easements and pipelines cross EF-1 at Holdrege, and EM-1 at Holdrege, Adams and Havelock. Concerned about City encroaching on their service area.	Locations of lines have been noted.

160	ENRON Jim Sanford	All 3 alternatives cross two lines each. Both lines would need to be replaced. Provided cost estimates for 2 types of replacement.	Locations of lines have been noted. Replacement costs have been considered in the cost estimates. Options will be discussed with ENRON during final design.
161	Environmental Law & Policy Center Ann Spillane	DEIS and 4(f) improperly fail to analyze full impacts to historic properties, ignores impacts on several sites, minimizes impacts on 5 identified sites, including secondary and cumulative impacts. Says impacts of EF trigger 4(f) to choose another feasible and prudent alternative, which has less impact to 4(f) properties.	See Notes 11 (historic issues), 19 (secondary and cumulative impacts) and 2 (4(f)).
162	Lincoln City Council Jerry Shoecraft	Against EF supports EM due to sensitive wetland areas and historic farms on EF. EM already along infrastructure and power lines which will reduce costs and would relieve inner city traffic, and get truck traffic closer to Lincoln business districts.	See Note 23 (traffic in Lincoln). Other comments considered.
163	Lincoln Electric System Dan Pudenz	No problems with SM, need to coordinate about possible joint corridor usage for their future projects. Problem with intersection of EM and their N-S line, would need to adjust in final design to minimize impacts.	Will work with LES regarding potential joint use in south beltway. Have met with LES to discuss options for EM, and information is included in Section 9.3. LES is not opposed to any route.
164	Lincoln-StarTran Larry Worth	Provided updated information on transit service in Lincoln. Requested consideration to integrate public bus transit complimentary to beltway.	FEIS has been updated to reflect this information.
165	Nat'l Trust for Historic Pres. Barbara Pahl	Request extension of comment period by 60 days.	Extension was granted for 30 days.
166	Nat'l Trust for Historic Pres. Perry Poyner	East beltway is on Trust's list of 11 Most Endangered Historic Places. Objects to Public hearing format. Will submit comments at later date.	See written comment No. 138 above. See Note 18 (public hearing).
167	Nat'l Trust for Historic Pres. Robert Niewig	Thinks there are problems not fully addressed. Urge FHWA to (1) refer disputed NRHP eligibility issues to Keeper of the NRHP with particular attention to boundaries, setting & associated acreage, (2) with the Advisory Council for Historic Preservation, convene meeting of consulting parties to discuss ways to correct DEIS esp. assessment of adverse effects, (3) require Supplemental EIS to address unresolved issues on historic resources. Problems with DEIS are that it fails to properly identifies historic properties within area of potential effect or properly establish boundaries, esp for Penterman, M. Smith, Herter-Hagaman, Retzlaff Farm, Haeger Dairy, Forest Brook Farm and StCk Stock Farm therefore assessment of adverse effect is flawed (2) fails to consider potential cumulative effects of future development on historic properties.	See Notes 11 (historic issues) and 19 (secondary and cumulative impacts). Trust letter was received after due date.
168	NE Dept of Aeronautics Diane Hoffer	Endorsed	No response required.

169	NE Dept of Natural Resources Steve McMaster	Provided maps of registered ground water wells, and surface water rights. Need to contact them if impact these. Requests minimizing floodplain impacts.	Locations of wells and water rights have been added to Figure 2.25. Floodplains were evaluated in the DEIS and will continue to be evaluated during final design.
170	Preservation Assoc. of Lincoln Peter Bleed	Comments forthcoming. Concerns re: preservation of historic landscape and structures, proper procedures in defining resources and public hearing.	See Notes 11 (historic issues) and 18 (public hearing). Other comments considered.
171	Preservation Assoc. of Lincoln Bleed, Bergt, Gutgsell, Schleicher, Scholz	Inadequate discussion of secondary and cumulative impacts, or mitigating measures. Concerned about farmland conversion impact rating, and documentation for scores. Object to Table 4.1 being used by decision makers as it has not been revised. Object to the public hearing format, that public letters and comments were not included in DEIS (expect to see them in FEIS), that elected officials voted to consider only the EF. All this taints the research and conclusions of the DEIS. DEIS lacks thorough study of no build or non-beltway alternatives due to biased views. Boundaries of historic properties need to be resurveyed as evaluation process was flawed. 4(f) evaluation is only cursory. Also, bring up evaluation by engineers/businessmen/UNL professor.	See Notes 19 (secondary and cumulative impacts) and 17 (prime farmland), NRCS scores were developed based on land uses in Table 3.1 and constraints map (see Section 9.7). Table 4.1 was part of DEIS and should be made available to the public. Revisions to the table have been made in the FEIS, as appropriate. See Note 18 (public hearing). Comment summaries are provided in FEIS in Section 9.1. Refer to pp. F.16 - F.20. See Notes 26 (voting), 14 (no build), 10 (existing roadways), 11 (historic issues) and 8 (economic issues). PAL letter was received after due date.
172	USDA-Natural Resource Conservation Service-Lincoln Steven Chick	Prime farmland issues have been addressed. Other non-specific comments.	No response required.
173	US-DOD-Offutt Air Force Base Marty Hughes	Endorsed	No response required.
174	US-DOT-Federal Aviation Administration-Kansas City Mark Schenkelberg	No environmental comment; however, project must be evaluated from an airspace standpoint	Already evaluated airspace concerns relative to preliminary design and were no exceedences (see page 3.9). Need to reevaluate final design and construction methods 30 days prior to construction.
175	US-DOT-Federal Transit Administration-Kansas City Moktee Ahmad	(1) how was StarTran involved, (2) are factors listed still valid for decline in bus use, (3) was StarTran contacted regarding future transit in beltway corridor, (4) has consideration been given to transit use of Park and Ride lots at beltway interchanges?, (5) will the two Omaha Public Power District crossings be grade-separated?, (6) any measures for mitigation of mortality from wildlife crossings?, (7) were transit providers invited to scoping?	(1) StarTran provided review comments on DEIS, (2) text has been revised per StarTran comments, (3) see StarTran comment letter No. 164 above, (4) StarTran has provided a comment letter on this issue and their comments have been incorporated in FEIS, (5) yes, (6) See Note 27 (wildlife) (7) FTA was invited to scoping and management committee meetings but never attended. StarTran is managed by the City of Lincoln Public Works Department, one of the project sponsors.

176	US-Dept of Interior Wille Taylor	Defer on 4(f) until final 4(f), and dispute statement about future parkland conflicts. Says project may adversely affect threatened and endangered species which use Platte River if borrow material comes from Platte River watershed (depletion of flows), and need to address those species in DEIS. Recommend different wetland mitigation ratio. Disagree that wetlands are protected under other regulations and want wetlands protected. Say beltway will tie into I-80 and will encourage development, and therefore will degrade saline wetlands. Request cumulative impact study for saline wetlands.	Parklands discussion has been revised in FEIS. See Note 19 (secondary and cumulative impacts to Platte River depletions and saline wetlands). FHWA supports a commitment that all wetland impacts will be avoided if possible, and will be mitigated whether jurisdictional or not.
177	US-Environmental Protection Agency-Kansas City Leo Alderman	Gave EC-2 rating for all alternatives. Thinks DEIS needs to be made clearer to relate all work and studies that have been done previously, including incorporation of public comments. Need to include info on severed parcels. Recommend different treatment of wetland mitigation, including ratio. Want to see wetland impacts for no build. Says archeological survey for bottomland was not completed.	Meeting was held with EPA to discuss misunderstandings on the document (see letter below from J. Cothorn). See Note 5 (bisected farm parcels). Archeological survey for the bottomland was completed according to all requirements of the SHPO. For a few locations where permission of access was denied, those properties will be surveyed upon acquisition (DEIS, p. 3.58).
178	US-Environmental Protection Agency-Kansas City Joe Cothorn	Documented meeting with project sponsors to discuss previous comment letter. State that they now have a clearer understanding, including level of effort for archeological survey which exceeded normal practice. Recommend FEIS convey clearer summary of supporting documents and transitions between issues analysis, impact and mitigation.	Have attempted to clarify summary in FEIS.
179	US-Housing and Urban Development-Omaha Gregory Bevirt	Returned document since has no staff to review it	No response required.
180	Voice (Newspaper) Lynda Bryant	Favors bypass on south and east, but takes no position on location of east. Thinks new bypass should follow existing roads.	Comments considered.

9.2 SUMMARY OF THE LOCAL PREFERENCE DECISION PROCESS

The local preference decision for the south and east beltways studies has been a process that was envisioned in the original contracting phases of this project. It was discussed at various stages of the project, and has been the subject of intense interest in Lincoln and Lancaster County since late 1995. On 12 and 13 December 1995, the sponsoring partners (City of Lincoln, Lancaster County, Nebraska Department of Roads, and Federal Highway Administration) held scoping meetings and discussed the role of local government in the decision regarding the need for a beltway and any location issues.

Early recognition of the role of local government in the local preference decision was embodied in the consultant's scope of services, and this role crystallized as the local planning and elected officials began to monitor the project. In November 1996, the Lincoln City Council and the Lancaster County Board asked that the project be jointly monitored by the body of local elected officials, the Lincoln/Lancaster County Commons. In June 1997, the Lincoln/Lancaster Planning Commission joined the Commons in this monitoring process.

The approved scope of services, dated 1 October 1996, specified that the studies incorporate their findings in the Lincoln/Lancaster County Comprehensive Plan as part of the Long Range Transportation Plan and Transportation Improvement Program. Thus, the intent of local government to participate in the local preference decision was established early in the studies process. From that point, there have been numerous public meetings of the elected and planning officials of Lincoln and Lancaster County to keep abreast of the studies findings.

Publication of the Draft Environmental Impact Statement (DEIS) on 1 March 2001 established the formal declaration of the purpose and need for both south and east beltway projects in Lancaster County. It documented the project alternatives, including beltways, non-beltway options, and the no-build option. These alternatives were made available for public review at an advertised Public Meeting on 27 March 2001 at the Lancaster Events Center in Lincoln. Following that meeting, the Public Hearings on the DEIS were held on 23 and 24 April 2001 at the Berean Church in Lincoln.

Following the Public Hearings on the DEIS, the studies team assembled input from the Public Meeting and Public Hearings for use in the local preference decisions. The formal process for the local preference began with a briefing by the Lincoln/Lancaster Planning Department to the Super-Commons (Lincoln City Council, Lancaster County Board, and Lincoln/Lancaster County Planning Commission) on 8 May 2001. In that meeting, it was stated that the Planning Commission would hold hearings on the project first, and would then make recommendations to the Lincoln City Council and Lancaster County Board thereafter.

The Planning Commission received briefings on the project on 14 May 2001 and 27 June 2001. A bus tour of the studies area was conducted for the Planning Commission on 29 June 2001. The Planning Commission requested additional information on the beltways prior to formal public hearings of that body. A second bus tour of the beltways was conducted on 10 July 2001.

The Planning Commission conducted a Special Public Hearing at the County/City Building on 11 July 2001 to receive public input on the need for and possible locations of project alternatives. Four project alternatives were presented, including the (1) South Mid Route (SM-4), (2) East Far Route (EF-1), (3) East Mid Route (EM-1), and (4) East Close Route (EC-1). The no-build alternative was presented as the rejection of all four routes.

The Planning Commission requested additional information prior to their second Special Public Hearing, which was held on 18 July 2001 at the County/City Building in Lincoln. Then, on 23 July 2001, the Commission held a Public Meeting, also at the County/City Building. At that meeting, the Commission voted to amend the Long Range Transportation Plan and other portions of the 1994 Lincoln/Lancaster County Comprehensive Plan by including the SM-4 and EM-1 routes as future beltways. The Planning Commission also voted to reject the other alternative routes (EF-1 and EC-1). These recommendations were then forwarded to the City Council and County Board for their consideration.

The next step in the local preference decision was a bus tour of the Beltway area for the elected officials of Lincoln and Lancaster County. This tour was conducted on 10 August 2001. Following that, the City Council and Lancaster County Board held their first Joint Public Hearing on 15 August 2001 at the County/City Building in Lincoln. A second Joint Public Hearing was held on 22 August 2001, also at the County/City Building. After the hearing was closed, each body voted separately on the Planning Commission recommendations. The County Board voted to approve the recommendations and adopt them into the Comprehensive Plan. The City Council then also voted to accept the same recommendations and amend the Comprehensive Plan accordingly.

On 30 August 2001, the Mayor of Lincoln signed the amendments to the Comprehensive Plan, adopting the SM-4 and EM-1 routes for future beltways.

Comprehensive Plan Amendments Nos. 94-62 and 94-64, were approved for the SM-4 and EM-1 routes, respectively. With the Mayor of Lincoln's signature on 30 August 2001, they were officially adopted into the Long Range Transportation Plan of the Lincoln City-Lancaster County Comprehensive Plan.

9.3 REFINEMENT OF ALTERNATIVES IN RESPONSE TO PUBLIC COMMENTS

During the review process for the DEIS, concerns were raised about certain locations along the preferred alternative—the SM-4 and EM-1 corridors. These locations were:

1. On SM-4, just west of the South 54th Street crossing, the location of the corridor would require the taking of a farmstead and relocation of the owners.
2. On EM-1, between A Street and O Street, the corridor passes in the vicinity of an archeological site and where the 100-year floodway for Stevens Creek is fairly wide. The corridor shown in the DEIS clipped the corner of the archeological site and crossed the floodway at a skew, which increased the length of the bridge structure.
3. On EM-1, between Adams Street and Fletcher Avenue, the corridor crosses Lincoln Electric System (LES) overhead power lines at a skew. This would require the relocation of several overhead electrical line towers.

To address the concerns, these corridor locations were further analyzed. More detailed topographic information was received from Lancaster County which was used to develop more accurate horizontal and vertical curves at each location. Using this information and keeping the same criteria as with the earlier design, the alignments were refined to minimize impacts in the areas of concern. A report entitled "South and East Beltways Alternative Alignment Analysis, November 2001, HWS Consulting Group Inc." provides details of the various alignments studied along with the impacts associated with each. In every case, the concerns identified by the public relating to the farmstead, archeological site, and power lines could be addressed through minor changes in the earlier alignments.

Specifically, the refined alignments (1) avoid taking the farmstead and do not require relocating the residents, (2) avoid the archeological site, and (3) avoid the need to relocate any of the LES towers. The refined alignments result in \$746,000 lower costs for SM-4 and \$4,596,000 higher costs for EM-1. The lower costs for SM-4 are mainly due to having less earthwork than anticipated with the earlier design. The higher costs for EM-1 were due to lengthening the bridge over Stevens Creek, raising the beltway over A Street, and the addition of a retaining wall. There are no additional impacts to homes or businesses as a result of these alignment changes; however, there are minor changes in environmental impacts. Tables 2.16, 2.17 and 4.1, and Exhibits SM4-2, EM1-3 and EM1-4 have been modified to reflect these changes.

9.4 BENEFIT-COST ANALYSIS: A RESPONSE TO PUBLIC COMMENTS

Opponents to the construction of the EF-1 Beltway alignment submitted an anonymously authored critique that identified a number of areas where the DEIS may have incorrectly calculated the economic costs and benefits of the various east beltway routes. While the critique suggests there were errors in the analysis, the conclusions with respect to the relative cost-effectiveness of each of the east beltway alternatives, were unchallenged. The disagreement appears to be in areas where the author may not be familiar with transportation economic analysis techniques or where a change in assumptions would not significantly affect the conclusions. The following will address the issues in the order and format they were presented in the critique.

9.4.1 First Analysis

As indicated by the author of the critique, the first benefit-cost analysis presented in Section 2.3.6 of the DEIS was a detailed evaluation of the finalist alternatives using the transportation model that was in effect during 1997 when the analysis was conducted. This model used the Build Out Scenario (BOS) land use plan and a transportation network that reflected planned improvements over a 20-year period. The criticisms of this analysis include that it underestimated maintenance costs and did not properly identify residual values.

The analysis used FHWA data on maintenance for similar facility types. No information was available from the NDOR as to maintenance costs for a freeway facility at the time the economic analysis was conducted. Since maintenance costs are very low in comparison to the cost of constructing the beltway, and the costs for all three (3) east beltway alignments would be similar, the usefulness of a more accurate maintenance cost is questionable. Even doubling the assumed annual maintenance costs of approximately \$120,000 per year would not materially affect the benefit-cost ratio or the comparison of the three (3) beltway alignments. Therefore, this is not considered to be a significant issue.

The other critique of the detailed economic analysis was a failure to treat residual value properly. The DEIS clearly states the assumptions that were used to calculate the residual value of the proposed improvement after the analysis period. This procedure has been used for a number of similar transportation studies without challenge. The author does not offer a different procedure; therefore there is nothing to compare with the procedure used in the DEIS.

9.4.2 Second Analysis

After the first economic analysis was completed, the City and County amended the BOS Land Use Plan by expanding future growth into the southern and northern fringes of the city. The new plan, called BOSII, required the City to update the Travel Demand Model to reflect the new growth areas and planned roadway improvements. The second beltway economic analysis compared the results of the earlier traffic projections with BOSII. The travel demand model using the BOSII Land Use Plan showed a significant change in the amount of travel on the beltways as compared to the BOS Land Use Plan. Traffic volumes on the beltways increased significantly, resulting in even greater time savings for motorists if the beltways were constructed.

The purpose of the second analysis was not to conduct a detailed economic analysis as was done with the earlier travel demand model. Instead, the purpose was to show, in terms of travel benefits, the relationship between the Close, Mid and Far alternatives (which were similar) and benefits from construction of a beltway (which were even greater than anticipated). The following addresses the concerns identified in the second analysis:

Wrong Construction Costs Were Used. The critique suggests that Level III analysis construction costs were used rather than Level IV in the second analysis. This was intentional because the entire discussion regarding the second analysis involved building upon the information derived from the first economic analysis that used Level III construction costs. The discussion in the second analysis was included only to verify that an additional economic analysis in Level IV was not necessary.

Travel Time Savings were Calculated Based on Lancaster County Population of 374,630. The critique suggests that the future year population should not be used without discounting the benefits derived from the beltway by 7 percent for 30 to 46 years. The analysis does not discount the benefits nor does it inflate the value of time savings for the same time period.

A more detailed and significantly more conservative approach to determining cost-effectiveness was completed in the FEIS. **Section 2.4.5** (second paragraph) examines economic benefits by discounting future year time savings and comparing them to beltway depreciation over a 25-year period. In this analysis, the payback period is 13 years after construction, which is still below the 20-year planning horizon (see **Figure 2.18**). Attached **Table 9.1** summarizes the assumptions in this analysis.

**Table 9.1
BENEFIT-COST ANALYSIS FOR SM-4/EM-1 BELTWAY
BOS II LAND USE PLAN**

YEAR	TIME SAVINGS (\$1,000's)			RESIDUAL VALUE ³ (\$1,000's)			DEPRECIATION ⁴ (\$1,000's)	BENEFIT/ COST RATIO
	FUTURE VALUE ¹	PRESENT VALUE ²	CUMULATIVE PRESENT VALUE	STRUCTURES	PAVEMENT	GRADING/RW		
2027								
2026								
2025	43511	8017	136661	58934	35524	58745	97641	1.40
2024	41336	8149	128644	60136	36749	58745	95214	1.35
2023	39160	8261	120495	61364	38016	58745	92719	1.30
2022	36985	8348	112234	62616	39327	58745	90156	1.24
2021	34809	8407	103886	63894	40683	58745	87522	1.19
2020	32633	8433	95479	65198	42086	58745	84815	1.13
2019	30458	8422	87046	66528	43537	58745	82033	1.06
2018	28282	8368	78624	67886	45039	58745	79174	0.99
2017	26107	8265	70257	69272	46592	58745	76236	0.92
2016	23931	8106	61992	70685	48198	58745	73215	0.85
2015	21756	7885	53885	72128	49860	58745	70111	0.77
2014	19580	7593	46000	73600	51580	58745	66920	0.69
2013	17405	7222	38407	75102	53358	58745	63639	0.60
2012	15229	6762	31184	76635	55198	58745	60266	0.52
2011	13053	6202	24423	78199	57102	58745	56799	0.43
2010	10878	5530	18221	79795	59071	58745	53234	0.34
2009	8702	4733	12691	81423	61108	58745	49569	0.26
2008	6527	3799	7958	83085	63215	58745	45800	0.17
2007	4351	2710	4159	84780	65395	58745	41924	0.10
2006	2176	1450	1450	86510	67650	58745	37939	0.04
2005	0	0	0	88276	69982	58745	33841	0.00
2004								
2003								
2002								
2001								
2000								

¹ Assumes \$14.15/hr value of time x 10,250 hours saved/day x 300 days/yr in Year 2025

² 7% discount rate.

³ Structure Life = 50 years, Pavement Life = 30 years, Grading and ROW Life = Infinite

⁴ Depreciation = Total Project Cost - Total Residual Value

9.4.3 Lancaster County Population Data.

The critique stated that the values in Figure 2.17 of the DEIS contradict Lancaster population data. A comparison of the projected 2020 population (BOS Land Use) and the 2025 population (BOS II Land Use) shows that the expected increases in population as compared to the expected amount of travel in the Metropolitan area are consistent. Table 9.2 indicates that the expected changes in vehicle miles traveled and vehicle hours traveled are proportional to the expected population increase.

**Table 9.2
 POPULATION AND TRAVEL CHARACTERISTICS COMPARISON**

Land Use Plan	Anticipated Population	Percent Change	Daily Vehicle Miles Traveled	Percent Change	Daily Vehicle Hours Traveled	Percent Change
BOS	315,000		6,903,000		243,000	
BOS II	374,000	+ 19 %	8,046,000	+ 17 %	309,000	+ 27 %

The projected time savings with a beltway using the BOSII Land Use Plan is 300 percent greater than time savings obtained with the BOS Land Use Plan. This does not mean total vehicle hours of travel in the metropolitan area will improve 300 percent. The estimated time savings achieved by building the beltways, using the BOSII model, is between 8,500 and 10,000 vehicle hours per day depending on which east beltway alignment is selected. This represents approximately 3 percent of the total daily vehicle hours traveled in the metropolitan area.

9.4.4 Accident Reduction Savings

The critique indicates there have been improvements in accident statistics over the past several years that were not taken into account by the Economic Analysis. While the number and severity of accidents have been improving nationwide, it is still clear that the relationship between various roadway facility types and accident rates remains constant. Freeways are safer than arterial streets in terms of the average number of accidents that occur per vehicle, per mile. Freeway traffic is not subject to the conflicting movements that arterial streets have with abrupt stops, driveways, cross streets, traffic signals, etc. The accident reduction estimates used in the DEIS reflect the fact that some traffic now using arterial streets will be using the freeway (beltways). The estimated accident savings reflect the relative differences between accident rates of the two types of facilities rather than overall accident rates for all roadway types.

9.4.5 Maintenance Costs

The critique stated that maintenance costs were less than half of the historical rates identified by NDOR. At the time the Benefit-Cost Analysis was conducted, no maintenance information for freeways was available from the NDOR. The only FHWA information available was for similar facility types. If the maintenance costs were doubled for each of the roadways, it would have no significant effect on the economic feasibility of the roadways. In addition, it would not change the relationship of each of the east beltways with respect to cost-effectiveness.

9.4.6 Construction Costs Estimates

The critique stated that construction cost estimates in Tables 2.9 and 2.10 did not agree. A review of the construction cost estimates in each table indicate that there are differences. These differences are due to the fact that **Table 2.9** does not include costs for connecting links (paving arterial roadways up to the beltway interchanges) to the beltway which were included in **Table 2.10**. The cost of connecting links represent approximately 3 percent of the overall beltway construction and would not significantly change the feasibility analysis or the comparison of one beltway alignment to another.

9.4.7 Costs of Improving Connector Roads

The critique stated that the costs of improving connector roads were not included in any of the analyses. See **Section 9.4.6** above.

9.4.8 The Most Cost-Effective Alternative

The critique indicates the most cost-effective alternative was to build the south beltway and improve existing section line roads between N-2 and I-80. While this may have been the most cost-effective alternative, it did not achieve the goals and objectives of the study. The Purpose and Need Statement in the DEIS states the beltway was to provide a "Circumferential Transportation System" around Lincoln. The likely non-beltway alternatives could not provide that function because they do not connect to I-80. They also have excessive impacts to adjacent properties. In addition, improvements to roadways such as 84th Street, 98th Street, 112th Street, and 148th Street will likely occur with or without construction of a beltway. The City of Lincoln will improve these roadways to 4-lane as development occurs in the future to maintain the existing one-mile grid pattern.

9.5 STATUS OF HISTORIC ISSUES SINCE CIRCULATION OF THE DEIS

9.5.1 Comments on Historic Issues

Comments on the DEIS, including written comments and oral testimony, were compiled and summarized. Comments regarding historic issues primarily concerned the following issues:

1. Secondary and Cumulative Impacts. The most frequent comment on historic properties was regarding secondary and cumulative impacts, and specifically, the likelihood of the beltway to cause development and urban sprawl to the point of having an adverse effect on historic structures, and specifically on the Stevens Creek Stock Farm. Comments of the National Trust for Historic Preservation, Environmental Law and Policy Center, and landowners in the beltway study area have only ever raised concerns about secondary and cumulative impacts to historic properties on the EF-1 route. While the Preservation Association of Lincoln (PAL) raised the issue for all east routes in their letter dated 15 June 2001, they changed their opinion in testimony at the City/County Public Hearing on 15 August 2001 where the president of PAL urged that the preferred alternative be the EM-1 route.
2. Boundaries of the Historic Properties. Several letters from historic preservation organizations and landowners stated that the boundaries of the historic properties were delineated too narrowly. With the exception of PAL, all comments focused on the EF-1 route only. In general, the commentators felt that most of the properties should be defined as the original parcel of land containing the historic structure, or in the case of the Stevens Creek Stock Farm, all agricultural land holdings of the property owners during the period of significance. Documentation was provided for changing the boundaries of the Theresa Retzlaff (Forest Brook) Farmyard and Sartore (Herter-Hagaman) Farmyard. Various acreage amounts or descriptive requests were made for the Stevens Creek Stock Farm, Retzlaff Farms, Penterman Farmyard, Haeger Dairy, and Michael Smith Farmyard.
3. Additional Historic Property. Two letters stated that the Wenzl Farmyard/Barn had not been considered as a historic site.
4. Assessment of Adverse Affects. Several property owners and PAL stated that the Assessment of Adverse Affects did not adequately assess all impacts to the properties, including noise, visual, lighting, traffic impacts, fuel smells, trash and crime. With the exception of PAL, all comments focused on the EF-1 route only.
5. Advisory Council on Historic Preservation (ACHP). The ACHP requested that FHWA seek a formal determination from the Keeper of the National Register for the boundaries of seven historic properties on the EF-1 route consisting of the Herter-Hagaman Farm, Forest Brook Farm, Penterman Farm, Michael Smith Farmyard, Haeger Dairy, Alan and Shirley Retzlaff Farm, and Stevens Creek Stock Farm.

9.5.2 Field Trip on Historic Issues.

A field trip was conducted on 17 October 2001 to (1) revisit the historic properties, (2) visit an additional 320 ac requested for inclusion in the Stevens Creek Stock Farm, (3) revisit the Wenzl Farm on EC-1, and (4) discuss potential mitigation strategies for historic sites with adverse affects along the SM-4 and EM-1. Participants included:

Bill Callahan	Nebraska State Historical Society, SHPO
Stacy Stupka-Burda	Nebraska State Historical Society, SHPO
Ed Kosola	Federal Highway Administration, NEPA Coordinator
Rod O'Sullivan	Federal Highway Administration,
Len Sand	Nebraska Department of Roads, Environmental Analyst Supervisor
Ed Zimmer	City-County Planning Department, Historic Planner
Scott Cockrill	City Engineering, Senior Engineering Specialist
Jim Linderholm	HWS, Principal-in-Charge
Brian Ray	HWS, Transportation Engineer
Amy Zlotsky	AZ Environmental, Environmental Scientist
Stan Parks	University of Nebraska, Research Archeologist

9.5.3 Secondary and Cumulative Impacts.

A discussion of secondary and cumulative impacts to historic properties has been added to the FEIS (see Section 9.6).

9.5.4 Boundaries of the Historic Properties.

The Herter-Hagaman Farm, Forest Brook Farm, Penterman Farm, Michael Smith Farmyard, Haeger Dairy, and Alan and Shirley Retzlaff Farm are all located on EF-1. Since this alternative is not being developed, FHWA has determined that no additional analysis of the property boundaries is necessary at this time. In addition, an important reason why the EM-1 route was selected was because it minimized impacts to these historic resources.

9.5.5 Evaluation of the Additional Acres for the Stevens Creek Stock Farm

A consulting party had previously requested that an additional 560 ac be added to the 240 ac already on or eligible for the NRHP--for a total of 800 ac--which were owned by Charles Retzlaff by 1888 (defined by NSHS letter dated 18 September 1995). With the additional information that none of the 560 ac were contiguous with the 240 ac, the SHPO stated that the 560 ac were not considered eligible. Following receipt of this second request for consideration of the 560 ac, the SHPO again stated that the 560 ac were not considered eligible because they were not contiguous to the original 240 ac.

This consulting party further requested that an additional 320 ac, not previously requested for consideration, be considered eligible for the NRHP because these were part of the Stevens Creek Stock Farm during the period of significance. Therefore, research was conducted in the Registrar of Deeds records to determine ownership history of these parcels. The information was provided to the consulting party for their review, and then was provided to the SHPO. All of the parcels were acquired by Charles Retzlaff or his son George by 1909 which predates construction of some of the historic structures. Most, but not all of the parcels are contiguous with the 240 ac which are on or eligible for the NRHP, or they are contiguous with each other.

Of the parcels in the additional 320 ac, two are in close proximity to the preferred alternative, EM-1. Assessment of adverse affects to these two properties relative to the preferred alternative were discussed during a field trip conducted on 17 October 2001.

The first parcel is west of the Stevens Creek Stock Farm (West Half of the Northeast Quarter of Section 5, Township 9 Range 8). FHWA has determined that at least a portion of the west parcel would be eligible for the NRHP because (1) it was acquired by Charles Retzlaff during the period of significance (1850 to 1924, according to NPS data base) and (2) at least the southern portion of the property retains enough integrity to contribute to the rural landscape of the Stevens Creek Stock Farm (the parcel has serious integrity problems in the northwest and west portions of the property, including a modern log cabin residence and high voltage transmission line).

The second parcel is located south of the Stevens Creek Stock Farm (Northeast Quarter of the Southeast Quarter of Section 5, Township 9 Range 8 and Northwest Quarter of the Southwest Quarter of Section 4, Township 9 Range 8). FHWA has determined that the second parcel is eligible for the NRHP because (1) it was acquired by George Retzlaff during the period of significance and (2) at least the east portion of the parcel retains enough integrity to contribute to the rural landscape of the Stevens Creek Stock Farm (there is a non-historic dam and pond on the west side of the parcel).

The SHPO has concurred with the FHWA determinations by signature dated 30 January 2002 (Appendix E).

9.5.6 Additional Historic Property.

The Wenzl Farm was revisited during the field trip, and the SHPO restated that neither the barn nor the farmstead had the significance or integrity to be eligible for the NRHP. Specifically, the barn was not individually architecturally significant, and it had been subject to many alterations, including the addition of an I-beam lean-to, replacement windows, and a newer corrugated metal roof. In addition, the setting was no longer intact with a modular home on the property.

9.5.7 Assessment of Adverse Affects.

All of the comment letters which comment on the assessment of adverse affects are in regards to properties on EF-1, and none of these properties are affected by the preferred alternative—SM-4/EM-1. A reassessment of adverse affects was conducted only for the preferred alternative. In consultation with the SHPO, FHWA determined that there were no additional adverse affects to properties on the preferred alternative. The noise evaluation was also checked, and no noise impacts were identified at the historic sites.

Further, FHWA has determined that the EM-1 alternative will have no adverse affects on the first additional Stevens Creek Stock Farm parcel because (1) EM-1 is located approximately 300 ft west of the parcel and takes no land from the parcel for either the beltway or overpass, (2) there is a high-voltage transmission line located between the parcel and EM-1, (3) the property has been subdivided with a modern log cabin and tree-lined driveway constructed on a 6-ac lot in the northwest portion of the property, and (4) the historic structures of the Stevens Creek Stock Farm are already screened from the EM-1 route by the tree line of Stevens Creek.

FHWA has also determined that the EM-1 alternative will have no adverse effects on the second additional Stevens Creek Stock Farm parcel because (1) EM-1 is located more than 0.25 mi west of the parcel and takes no land from the parcel, (2) there is a high-voltage transmission line located between the parcel and EM-1, and (3) the historic structures of the Stevens Creek Stock Farm are already screened from the EM-1 route by the tree line of Stevens Creek.

The SHPO concurred with the FHWA determinations of no effect by signature dated 30 January 2002 (**Appendix E**).

9.5.8 Advisory Council on Historic Preservation.

Since receipt of the ACHP letter, the SM-4/EM-1 route has been identified as the preferred alternative. Since all of the properties listed in the ACHP letter are on the EF-1 route and none are affected by the EM-1 route, FHWA made the decision that it was not necessary to seek a determination from the Keeper of the National Register.

An additional 320 ac were evaluated for the Stevens Creek Stock Farm to determine if the EM-1 alternative would affect any of the property. Based on this evaluation, two additional parcels (west and south of the original 240 acre site) were considered eligible for the NRHP; however, FHWA determined that EM-1 would have no adverse effect on the additional parcels, or on the original 240 ac of the historic site. The SHPO concurred with these determinations.

At a meeting conducted in February 2002 with the ACHP and the National Trust for Historic Preservation (NRHP), these agencies stated that it was reasonably foreseeable that the EM-1 beltway could potentially cause adverse secondary and cumulative effects on some historic properties, and specifically the Stevens Creek Stock Farm. They felt that a beltway would induce "development", potentially changing the timing and character of development near historic properties. It was suggested that appropriate mitigation should be offered to the owners of the historic properties. Their main recommendation for mitigation was to establish conservation easements on the historic properties.

In regards to the proposed mitigation, it was pointed out that the owners of the Stevens Creek Stock Farm, as well as the Preservation Association of Lincoln, had previously expressed written opposition to the use of conservation easements. Copies of their letters were provided to ACHP and NRHP. Upon additional discussion with FHWA, the owners of the Stevens Creek Stock Farm again stated their opposition to pursuing conservation easements with FHWA.

In regards to the beltway inducing development, it is not reasonably foreseeable to assume that the EM-1 beltway route will have potential adverse secondary and cumulative effects on the Stevens Creek Stock Farm or other historic sites. This statement is based on analysis of local conditions and the facts of the specific EM-1 route, such as (1) the City of Lincoln has a unique and long history of managed, contiguous growth, (2) the community contemplates development in the Stevens Creek basin--with or without a beltway, (3) the community's proposed plans are to develop in the Stevens Creek area, prior to the construction of the beltway, thus the beltway will not change the timing of the planned growth, (4) while interchanges may change the character of development nationwide, interchanges in the EM-1 route have been planned to avoid roads (specifically Van Dorn Street which is adjacent to the Stock Farm) which could impact historic properties, thus the beltway will not change the character of the development near historic properties, and (5) development is proposed to be restricted in the floodplain areas (greenspace) which cover much of the Stevens Creek Stock Farm and vicinity.

9.5.9 Mitigation Plan for Historic Properties along SM-4/EM-1

A mitigation plan has been developed to cover the two historic properties which are adversely affected by the preferred SM-4/EM-1 alternative. These are the Henry Wunibald Farmyard on SM-4 and the Steve Johnson Farmyard on EM-1. Modification of the EM-1 alignment made it possible to avoid archeological site 25LC129. The mitigation plan is based on observations and discussions from the field trip, recommendations by the SHPO, input from a professional landscape architect, and meetings with the property owners.

A Draft Memoranda of Agreement was developed to implement the mitigation plan. The document, along with a draft version of Chapter 9 of this FEIS, was provided to the property owners and consulting parties, including the ACHP and NTHP. A public meeting on historic mitigation was conducted for the property owners and consulting parties on 12 February 2002.

Approximately 24 people attended the meeting, including representatives of the ACHP, NTHP, SHPO and Preservation Association of Lincoln. Seven written comments were received over the 10-day comment period. Comments related to historic issues covered the following topics:

1. Two landowners on EM-1 objected to the revised boundary of the Stevens Creek Stock Farm as it included their properties. The boundary changes were made without their permission. One owner expressed concern that they would now be subject to federal permits or stipulations on receiving federal subsidies.
2. The owner of the non-historic log cabin residence (located on the additional NRHP-eligible parcel west of the Stevens Creek Stock Farm) expressed concern about noise impacts from EM-1.
3. The owner of the Henry Wunibald Farmyard expressed concern that their non-historic farmyard would be more adversely affected by noise impacts from SM-4 than the NRHP eligible property.
4. The FEIS should address the impacts on the Stevens Creek Stock Farm from additional traffic on 138th which is traveling from the EF-1 interchange on Pioneers Boulevard to Van Dorn Street.
5. Certain consulting parties felt that properties along all the routes should be studied for possible boundary changes.
6. The NTHP believes that the beltway will have the potential for cumulative and indirect effects on historic properties, and suitable mitigation strategies should be developed.
7. Certain consulting parties felt that the FEIS should contain a statement that the EF-1 alternative is eliminated from any future consideration. They did not feel that selection of EM-1 was strong enough assurance that the EF-1 route would never be reconsidered.

Based on comments, the MOA was finalized (**Appendix E**). The mitigation plan, as described in the MOA, is as follows.

Henry Wunibald Farmyard. The primary emphasis of the mitigation proposal is to screen the view of the beltway from the house and yard. Presently, the north and west sides of the property are lined with many mature deciduous trees (cottonwood, mulberry, walnut) which extend up to the house. While the existing trees screen the view from the house and yard during the growing season, the beltway would be visible during winter. The period of significance for this site is 1901-1950 which includes the period when shelterbelts and windbreaks were a part of the farm culture. Some existing trees on the property appear to be remains of old windbreaks to the north and west of the residence.

Prior to implementation of the undertaking, NDOR, in consultation with the SHPO, shall design a landscape site plan to screen the view of the beltway from the farmyard, and shall ensure that the area is landscaped in accordance with the approved plan. The plan shall consist at a minimum of a windbreak planting along the north and west sides of the farmyard in the general area of the original windbreak. This may include up to three rows: a shrub, cedar trees, and possibly a deciduous tree, such as cottonwood. Further refinement of plant types and spacings will be addressed as part of final design.

In order to implement the landscape plan, NDOR shall obtain an easement or agreement with the property owners of the Henry Wunibald Farmyard or adjacent property owners to the west.

Steve Johnson Farmyard. The primary emphasis of the mitigation proposal is to screen the view of the beltway from the house and yard. South of Yankee Hill Road, the beltway would be hidden by a hill across the road and to the east of the site. North of Yankee Hill Road, the beltway would be visible to a point about 0.25 mi north of the road; further north it is hidden by another hill. There is a small creek with trees within 100 to 300 ft of the beltway--between the beltway and the house. On the property itself, there is a line of mature cedar trees along the driveway, and a number of scattered shrubs and deciduous trees west of the tree line. These trees hide the view of the beltway from the house itself, but not from the yard west of the drive.

The period of significance for this property is 1890-1936. While windbreaks, for the most part, are outside of this historic period, it is reasonably in context with the site to add a lilac or similar large shrub hedge.

Prior to implementation of the undertaking, NDOR, in consultation with the SHPO, shall design a landscape site plan to screen the view of the beltway from the farmyard, and shall ensure that the area is landscaped in accordance with the approved plan. The plan shall consist at minimum of a screen, large shrub, or hedge planting along the west side of the farmyard, extending north from Yankee Hill Road to the north end of the corral. This is anticipated to consist of one row (hedge) of lilacs or similar large shrub. Further refinement of plant types and spacings will be addressed as part of final design.

In order to implement the landscape plan, NDOR shall obtain an easement or agreement with the property owners of the Steve Johnson Farmyard or adjacent property owners to the west.

Easements. In order to address the potential cumulative effects on historic properties in the Area of Potential Effect for the Lincoln South and East Beltways Project, the National Trust for Historic Preservation and other consulting parties agree to assist owners of such historic properties who may be interested in donating historic preservation or conservation easements. Such assistance may include conducting workshops on easements, providing information on potential easement-holding organizations in the local area, and serving as a resource for technical assistance in developing easement documents.

Archeological Site 25LC129. Based on discussions during the site visit on 17 October 2001, further engineering refinements were evaluated (see **Section 9.3**). From the reanalysis, it appears possible to completely avoid impacts to the archeological site by incorporating a retaining wall on the west side of the beltway right-of-way. No additional mitigation is proposed.

Additional Cultural Resource Management Activities. Other activities will include:

- Completion of an archeological survey of bottomlands where access has been previously denied.
- Use of NDOR standard provisions regarding previously unsuspected archeological remains that provide for cessation of work and notification of the SHPO
- Use of NDOR standard provisions regarding monitoring of archeological sites.
- A historic marker located at Saltillo Road and the abandoned South 14th Street right-of-way will need to be relocated. The marker commemorates the Nebraska City to Fort Kearny Road, "The Great Central Route to the Gold Fields" which crossed near this location. There are no remnants of the trail known within or near the SM-4 right-of-way.

9.6 SECONDARY AND CUMULATIVE IMPACTS EVALUATION

This evaluation has been prepared to address agency and public comments regarding inadequacies in the secondary and cumulative impacts sections in the DEIS for the south and east beltways project. This evaluation brings together in one location new information as well as information previously provided in several different chapters in the DEIS.

In compliance with NEPA and the Council on Environmental Quality (CEQ) regulations, secondary and cumulative effects of a project should be examined as part of the Environmental Impact Statement review. CEQ defines secondary (or indirect) effects as:

“effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water on other natural systems, including ecosystems” (40 CFR 1508.8(b)).

CEQ defines cumulative impact as:

“impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time” (40 CFR 1508.7).

Additionally, Section 106 of the National Historic Preservation Act requires that a federal agency evaluate adverse effects to historic properties, including “reasonably foreseeable effects caused by an undertaking that may occur later in time, be farther removed in distance or be cumulative” (36 CFR 800.5 (a)(1)).

9.6.1 Resources and Ecosystem Components

During the review period for the DEIS, concerns were raised regarding secondary and cumulative impacts on (1) historic resources, (2) farmland, (3) saline wetlands and other wetlands, and (4) flows in the Platte River. Due to the extensive public and agency review of the DEIS, this supplemental discussion is focused on these four resources.

Historic Resources. The most frequently raised issue during the beltway review process was the potential cumulative impact on historic resources, and specifically, the likelihood of the beltway to cause development and urban sprawl to the point of having an adverse effect on historic properties. The National Trust for Historic Preservation has stated that the beltway would create secondary and cumulative adverse effects by inducing the construction of new residential, commercial and industrial development that is inconsistent with the historic character of the landscape. The Advisory Council for Historic Preservation has stated that any increased access to rural areas has the potential to diminish the rural setting and therefore the historic resources. Comments of the National Trust for Historic Preservation, Environmental Law and Policy Center, and landowners in the beltway study area have focused concerns about secondary and cumulative impacts to historic properties on the EF-1 route. While the Preservation Association of Lincoln (PAL) raised the issue for all east routes in their letter dated

15 June 2001, they changed their opinion in testimony at the City/County Public Hearing on 15 August 2001 where the president of PAL urged that the preferred alternative be the EM-1 route. This discussion addresses all beltway routes.

Farmland. The PAL and certain landowners in the beltway study area have raised concerns about secondary and cumulative impacts to farmland relative to the assumptions used in completing the NRCS Farmland Conversion Impact Rating (USDA Form AD-1006).

Flows in the Platte River. The U.S. Fish and Wildlife Service (FWS) has determined that the beltway project may adversely affect federally listed species which utilize habitat areas along the Platte River. These species include the pallid sturgeon (*Scaphirhynchus albus*) which is known from the lower reach of the Platte River, the interior least tern (*Sterna a. athalassos*) and piping plover (*Charadrius melodus*) which nest on sand and gravel bars in the Platte River, and the western prairie fringed orchid (*Platanthera praeclara*) which occurs in subirrigated wet meadows along the Platte River. Although the beltway is located 30 mi from the Platte River, the FWS alleges that any construction project which (a) obtains borrow material from any location in the Platte watershed and (b) results in the exposure of surface or ground water in the excavated pit, will result in evaporation and will deplete instream flow contributions to the Platte River. FWS further considers any depletion of flows from the Platte River system to be significant.

Saline Wetlands and Other Wetlands. The FWS has stated that the beltway project could indirectly impact the regionally unique Saline Wetland Complex of Eastern Nebraska (SWC) and other wetland systems in the Stevens Creek drainage because the beltway will facilitate future urban development in Lincoln/Lancaster County. Additionally, FWS implies that the extent of cumulative impacts from the beltway extends to other aquatic and terrestrial resources occurring within the lower Platte River Valley because the beltway will connect to I-80, and there are plans to widen I-80 through Lincoln and on to Sarpy County, including a bridge over the Platte River at the Cass/Sarpy County line.

9.6.2 Geographic Boundaries and Time Period

Geographic Boundaries. Several geographic boundaries are appropriate for this discussion.

South and East Beltways Study Area. The south and east beltways study area boundary, as shown in **Figure 1.1 of the DEIS**, is an 80 sq mi area that has been studied intensively as part of the NEPA review process. This same area was defined as the Area of Potential Effect (APE) as part of the Section 106 consultation.

Comprehensive Plan Future Service Limit. The approved Lincoln/Lancaster County Comprehensive Plan includes a future service limit which is defined as the area to be included inside the City limits and provided with City services in the future. The most current version of the plan is shown in **Figure 3.1 of DEIS** and includes the limits from the 1994 Comprehensive Plan and subsequent amendments. The Comprehensive Plan is currently being revised and is expected to be approved in May 2002.

Saline Wetland Complex of Eastern Nebraska. This area covers portions of the Salt Creek watershed in Lancaster and Saunders Counties as described by Gersib and Steinauer (1991). These areas are influenced by saline geologic deposits and resulting saline influences on the groundwater.

Platte River Watershed. This is the land area that contributes surface water runoff to the Platte River and its tributaries. This area applies only to the discussion of cumulative impacts to flows in the Platte River.

Time Period. The approved Lincoln/Lancaster County Comprehensive Plan uses a 25-year planning period, from present to 2025. A new Comprehensive Plan is currently under review which has a 25-year period as well as 25-to-50 and greater than 50-year planning periods.

9.6.3 Data Sources

This evaluation has been conducted using readily available data, observed local trends, and discussions with knowledgeable persons. It has not included developing predictive modeling or other predictive tools which are beyond the scope of this effort. The primary sources for this evaluation have included:

- Currier, P.J., G.R. Lingle, and J.G. VanDerwalker. 1985. *Migratory Bird Habitat on the Platte and North Platte Rivers in Nebraska*. The Platte River Whooping Crane Critical Habitat Maintenance Trust, Grand Island, Nebraska.
- Gersib, R.A. and G.A. Steinauer. 1991. *A biological inventory and general assessment of eastern Nebraska saline wetlands in Lancaster and southern Saunders Counties*. Transactions of the Nebraska Academy of Sciences, Vo. XVIII:37-44.
- Lincoln - Lancaster County Planning Department. 1994. *Lincoln City-Lancaster County Comprehensive Plan*. Lincoln, Nebraska
- Lincoln/Lancaster County Planning Department. September 2001. *Blueprint: Lincoln and Lancaster County 2025 Comprehensive Plan, 3rd Edition*. Lincoln, Nebraska.
- On-Site Photography and Preservation. August 1998. *Lincoln South and East Beltways Historic Survey Report*. Lincoln, Nebraska.
- Taylor, Thomas J. and Leslie D. Krueger, eds. 1997. *(DRAFT) Mitigation Guidelines for Nebraska's Eastern Saline Wetlands*. Prepared for the Eastern Saline Wetlands Interagency Study Project. U.S. Environmental Protection Agency, Region VII, and U.S. Army Corps of Engineers, Omaha District. 46 pp.
- University of Nebraska-Lincoln, Department of Anthropology. July 1999. *Evaluations of the Hulda Otto House, Guenzel Farmstead and Wunibald Farmstead for Eligibility to the National Register of Historic Places*. Lincoln, Nebraska.
- University of Nebraska-Lincoln. 2000. *Public Policy Study for the Lower Platte River Corridor Region*. Prepared for the Lower Platte River Corridor Alliance. Lincoln, Nebraska.
- U.S. Fish and Wildlife Service. 1981. *The Platte River Ecology Study, Special Report*. Northern Prairie Wildlife Research Center, Jamestown, North Dakota.

In addition, discussions were conducted with:

- Steve Henrichsen, Lincoln-Lancaster County Planning Department,
- John Bender, Nebraska Department of Environmental Quality
- Cindy Veys and Len Sand, Nebraska Department of Roads, Environmental Unit
- Bill Callahan, Nebraska State Historical Society, State Historic Preservation Office
- Tiffany Cattau, US Army Corps of Engineers, Omaha District
- Tim Schaaf and Marvin Brown, USDA Natural Resources Conservation Service
- Wally Jobman, US Fish and Wildlife Service, Grand Island
- Mike Jess, University of Nebraska-Lincoln, Conservation and Survey Division
- Matt Joeckel, University of Nebraska-Lincoln, Conservation and Survey Division

9.6.4 Past, Present and Reasonably Forseeable Future Actions

9.6.4.1 Past and Present Actions

Table 9.3 provides a list of past and present actions in Lancaster County which have had impact on the physical, biological and human environment of the county. These actions are considered to have relevance to a cumulative impacts discussion related to historic resources, farmland and saline wetlands. Many of these actions are discussed in detail in the DEIS. The table also includes a few key actions related to the Platte River watershed and the discussion of flows in the Platte River.

Table 9.3
LIST OF PAST AND PRESENT ACTIONS

TIME	ACTIONS
PAST ACTIONS	
1850 - 1900	Europeans settle in Lancaster County (and Platte River valley).
	Native grass prairies are converted to farmground, farming includes grain, hay and livestock
	Grid system of township, range and sections is established and eventually, a system of county line roads
	Railroad reaches Lancaster County, beltway study area
	Lincoln selected as state capital and site of University of Nebraska; thereby encouraging city growth. Growth is primarily east and south, limited by Salt Creek to west and north.
	Saline wetlands in Lancaster County are drained for agriculture, landfilled for municipal waste, filled for development of the city and excavated for stormwater detention (continues into present)
1900 - 1950	Construction of large reservoir and irrigation projects in the Platte River Valley in NE and WY (which continue into the 1980s). Seasonal reduction in peak flows and average annual discharge due to diversion and storage. Reduction in width of Platte River, especially in central Nebraska, and loss of riparian habitat.
	Salt Creek is channelized through Lincoln
	Construction of VA Hospital and Shriner's Club (Hillcrest Country Club) beyond the east edge of Lincoln (1929)
	Lincoln begins piping in drinking water from wells in the Platte River Valley (1934).
	Federal soil conservation programs encourage terracing, shelterbelts, windbreaks, farm ponds, etc. (beginning in late 1930s and through present)
1950s	First Lincoln Comprehensive Plan. One of the most long held policies has been to develop "a compact and generally contiguous urban form" around the City's confines with the goal to "protect existing rural areas from urban sprawl through planned development"
1960s	Construction of I-80 north of Lincoln, and through the Platte Valley.
	Livestock production declines in Lancaster County, almost all tillable land is in agricultural production
	Lincoln population grows; rural farm population of County shrinks
	Development expands on east edge of Lincoln, including construction of St. Elizabeth Hospital, Banker's Life (Ameritas), Gateway Mall, Lincoln East High School, etc. and Pine Lake SID on southeast edge
	US 77 relocated off 14 th Street to new location west of Salt Creek (1967)
1970s	Establishment of Wilderness Park to mitigate flooding in downtown Lincoln
	Widening of N-2 through south Lincoln, including incorporation of bike and pedestrian trails, transmission lines and drainage features. Development of commercial and industrial along N-2 to 56th, including East Ridge Shopping Center, Old Cheney Center, Briarhurst Center, etc.
1980s	Construction of West Bypass: US 77 widened from Warlick to N-33 (1980); construction of US 77 from Warlick to O Street (1985-87); construction of K & L Street Extension (Capitol Parkway) and intersection with US 77 (1989)
	Pattern of large industrial facilities to locate just outside the City (in beltway study area) along State Highways or arterial roads (Williams Pipeline, Conoco Pipeline, Lincoln Oil Products, Norris Public Power District, Parker Fluid Connectors, Novartis, Linweld, National Crane and ADM). Southeast Community College constructed east of City

TIME	ACTIONS
	Other urban recreational facilities constructed just outside the City (in the beltway study area), including MoPac and Murdock hiker/biker trails, Izaak Walton League facility
	Proliferation of acreage subdivisions in the beltway study area (and other parts of the County) due to policies that allow for it, prosperity of the local economy, decreasing economic feasibility of the family farm, and availability of rural land for sale in the beltways study area. Continues into the 1990s.
1990s	Construction of Lincoln municipal wellfield on Platte River near Ashland
	Proliferation of golf courses and surrounding housing developments on east edge of Lincoln (Yankee Ridge, Himark and Firethorn Country Clubs) and within study area (Wilderness Ridge, Hidden Valley, Crooked Creek).
	Expansion of utilities through beltway study area to support growth of city and county, including extensive electric distribution lines, radio and communication towers, rural and municipal water distribution systems, county maintenance buildings. Gravity-flow waste water treatment system limits growth into Steven's Creek watershed and south of Rokeby Road
	Increased use of Saltillo Road as a truck route south of Lincoln. Paving of 148 th Street and increased use of 148 th St as a truck route east of Lincoln.
	Additional improvements to West Bypass/US 77, including interchanges at Van Dorn St (1994) and Crete corner (1998). Expansion of existing highway commercial and existing industrial development on Saltillo Road.
	Increase in suburban-type commercial uses in beltway study area (such as large warehouse retailers, nurseries, greenhouse and tree farm operations; and kennels)
	Movement of several large insurance companies and other employment centers (Ameritas, State Farm, Lincoln Benefit, Gallup) from downtown Lincoln to large campus settings on the east fringe of the City.
	Relocation of many churches to larger settings on the east fringe of Lincoln
	1994 Lincoln-Lancaster County Comprehensive Plan includes community goals for preservation of historic resources, saline wetlands, native prairies, and riparian corridors. Also includes location for regional shopping center at 98 th and N-2
2000	Extension of the future urban service area into the south beltway study area and to the edge of the east beltway study area due to the continuing growth of Lincoln.
	Stevens Creek Basin Initiative proposes goals and policies for development in Stevens Creek.

PRESENT ACTIONS	
2001	Lower Platte South Natural Resources District (LPSNRD) has obtained partial support through state funding to construct a system of 10 farm ponds as part of the Stevens Creek Watershed Plan. Five of the ten sites are currently in final design stage (sites A6-1, A7-1, A9-1, A9-6 and A17-1), and land rights negotiations are underway. Construction is anticipated to begin late in 2001. The remaining five sites are currently scheduled for construction in 2002. Each of the east beltway alternatives may impact one or two of the proposed dam sites.
	City of Lincoln and NDOR are constructing saline and freshwater wetland mitigation banks to compensate for unavoidable future impacts.
	In east beltway corridor, construction of Lancaster County Events Center, Boy Scouts of America facility, Shriner's Temple, and mixed use development at N-2 and 98 th St, and proposed construction of City of Lincoln Jensen Park
	Lincoln has received grant money through the FEMA Mitigation Grant Program for establishing conservation easements in the south beltway corridor in the vicinity of Salt Creek for the purposes of flood control. Such easements would be established so as not to preclude construction of the south beltway.

9.6.4.2 Reasonably Foreseeable Actions

Reasonably foreseeable actions must be far enough in the planning process that their implementation is likely. For this analysis, a reasonably foreseeable action is one that is funded or advanced through the majority of the planning process, whether or not it has obtained local, state or federal approval.

Urban Development. While reasonably foreseeable actions are difficult to predict, Lincoln/Lancaster County has had a strong history of planning for the future, beginning in the 1950s with the first comprehensive planning document. Over the years, the City has demonstrated that growth can follow planning initiatives. One of the most long held policies has been to develop "a compact and generally contiguous urban form" around the City's confines with the goal to "protect existing rural areas from urban sprawl through planned development". Generally, the City has controlled growth by controlling the location of new utilities, as well as through zoning ordinances. In order to establish a rational policy of City expansion, and to ensure the availability and adequacy of the resources in which to construct infrastructure, the City has identified a future urban service area that has taken into account limitations posed by natural features, current city limits and prior plan designations. This service area is defined by a map in the Comprehensive Plan along with future land uses in the City and County. The current plan was approved in 1994 and includes subsequent amendments (see **Figures 3.1 and 3.2**).

From 1970 to 2000, the City population grew 50 percent with a corresponding increase in metropolitan area of 50 percent, demonstrating the ability to control and maintain compact, contiguous growth. Current plans for the City and County assume a projected County population of 363,159 by 2025, representing a 45 percent increase over the 1999 population (Lincoln/Lancaster Planning Department). Past and future population increases are due to the availability of jobs, excellent schools and universities, and a high quality of life. This level of growth is expected with or without a beltway, and is directly related to the City of Lincoln being the center of state government, a center of commerce, industry and cultural activities, and the location of the main campus of the state university system.

The Lincoln/Lancaster County Comprehensive Plan is currently being revised and is scheduled to be approved by the City Council and County Board in May 2002. The current working document includes a number of recommendations which would affect future development in the beltway study area, and are considered reasonably foreseeable actions for the future. The current proposal (1) encourages increased urban residential density (up to 5 dwelling units per acre) to increase efficiency of growth, (2) encourages mixed-use development (urban village concept), (3) discourages development in the 100-year floodplain, (4) prohibits further acreage development within the path of future urban growth, (5) places greater emphasis on preservation of historic resources, saline wetlands, native prairies, and riparian corridors, and (6) provides 78 km² (30 sq mi) of additional area, including 60 km² (23 sq mi) of developable area within the 25-year planning period. The proposed provision for 78 km² (30 sq mi) of growth area represents a 39 percent increase in area compared to the anticipated 45 percent increase in population.

Over the next 25 years, no additional development is proposed to occur in about two-thirds of the south beltway study area and most portions of the east beltway study area. The proposed revision to the Comprehensive Plan shows some new development in the area of the SM-4 and EM-1 alignments within the next 25 years. The proposal is for 50 to 100 years or more for the City to fill most of the beltway study area. Specific to the Stevens Creek watershed, the Stevens Creek Basin Initiative proposed urbanization of northwest bank of the basin to occur within the next 25 years, with the rest of the west bank within 25 to 50 years, and the east bank beyond 50 years.

While City/County policies are aimed at planned growth and avoiding urban sprawl, the vision of the Comprehensive Plan very clearly shows that population growth and physical expansion into the beltways study area is eventually expected as the city grows outward. The beltway study area could become part of the urban limit in the long-term.

Future Roadway Projects. The NEPA evaluation for the beltway project includes the assumption that all section line roads would be paved out to the beltway interchanges. Costs for paving these connecting links as 2-lane sections are included in the beltway cost estimates. Paving of these section line roads is not a new proposal as the County has always included a provision to pave section line roads to two lanes once traffic volumes reach 500 vehicles per day, and expand to four lanes once traffic volumes reach 6,000 vehicles per day.

The NEPA evaluation for the beltway project also includes the assumption that all projects in the City/County 1 and 25 Year Program of Improvements for Future Roadway Network would be constructed—many of which involve improvements to section line roads as discussed above. These projects include:

1. 84th Street - Widen to 4 through lanes with left turns lanes, US-6 to N-2
2. Adams Street - Widen to add left-turn lanes, 70th Street to 98th Street
3. Pioneers Boulevard - Widen to 4 through lanes with left-turn lanes, 70th Street to 84th Street
4. Old Cheney Road - Widen to 4 through lanes with left-turn lanes, N-2 to 98th Street
5. Pine Lake Road - Widen to 4 through lanes with left-turn lanes, 14th Street to 98th Street
6. 14th Street - Widen to 4 through lanes with left-turn lanes, Old Cheney Road to Pine Lake Road
7. 27th Street - Widen to 4 through lanes with left-turn lanes, Pioneers Boulevard to Yankee Hill Road
8. 40th Street - Widen to 4 through lanes w/ left-turn lanes, N-2 to 0.8 km (0.5 mi) south of Pine Lake Road
9. 56th Street - Widen to 4 through lanes with left-turn lanes, Old Cheney Road to Pine Lake Road
10. 70th Street - Widen to 4 through lanes with left-turn lanes, Pioneers Boulevard to Pine Lake Road

These projects are already programmed in the FY 2003-2008 Transportation Improvement Program which will bring 4-lane sections to within 2 mi of the east beltway, and 0.5 to 3.0 mi of the south beltway within the next six years even if the beltway is not built. Extension of these arterials to connect with the beltway interchanges will be included as part of the beltway project.

Other proposed future roadway projects in Lancaster County include several NDOR projects which are designed to increase capacity on Interstate 80 and US Highways. These include:

1. Widening I-80 to 6-lanes through Lincoln and on to the Sarpy County line
2. Constructing grade separations on US 77 at Capital Parkway and Warlick Boulevard
3. Widening US 6 to 4 lanes from West O Street to Cornhusker Highway (Sun Valley Boulevard), and from Lincoln to Emerald (West O Street)
4. Widening US 34 to 6 lanes from 52nd Street to Wedgewood (East O Street), to 4 lanes from Lincoln to N-63, and to 4-lanes from Lincoln west to the Seward/Lancaster County line.

Protection of Natural Resources. Lower Platte South Natural Resources District's (LPSNRD) Stevens Creek Watershed Plan includes (1) preserving open space along portions of the 100-year floodplain of Stevens Creek and its tributaries through land rights acquisition (using conservation easements in the Stevens Creek floodway and flood fringe between the MoPac Trail and the Murdock Trail), (2) continued reliance on existing floodplain regulations for maintaining open space in the rest of the delineated Stevens Creek main stream and tributary floodplain, (3) a public access easement for a trail along Stevens Creek from the MoPac Trail to Salt Creek, (4) augmenting culverts at select locations to reduce flooding, (5) erosion healing treatment in the lower channel reach using "soft engineered" solutions, (6) land treatment as a conservation measure with new and retrofit pipe outlet terraces, and establishment of permanent vegetative cover on Class IV lands (soils with very severe limitations according to the Natural Resource Conservation Service), and (7) watershed management using integrated watershed models.

The City and LPSNRD are evaluating a more stringent floodplain ordinance for the City of Lincoln and its 5 km (3 mi) zoning jurisdiction to discourage floodplain development and to protect infrastructure and properties within the floodway fringe. Some concepts being discussed include provisions for no net loss of floodplain storage, and no net rise of base flood elevation within the floodway fringe/floodplain. These provisions might also have the potential for application within the County's jurisdiction to achieve a more uniform countywide floodplain management program.

FWS is reviewing the possibility of proposing emergency listing as federally endangered for the Salt Creek tiger beetle (*Cicindela nevadica lincolniana*) which is currently listed as a state-endangered species. This activity will likely require certain restrictions on development projects in the vicinity of saline wetlands. A task force has been asked to review the situation and make recommendations to the Mayor regarding appropriate action for the community.

9.6.5. Analysis of Historic Resources

The most frequently raised issue during the beltway review process was the potential cumulative impact on historic resources, and specifically, the likelihood of the beltway to cause development and urban sprawl to the point of having an adverse effect on historic properties. The National Trust for Historic Preservation has stated that the beltway would create secondary and cumulative adverse effects by inducing the construction of new residential, commercial and industrial development that is inconsistent with the historic character of the landscape. The Advisory Council for Historic Preservation has stated that any increased access to rural areas has the potential to diminish the rural setting and therefore the historic resources. Comments of the National Trust for Historic Preservation, Environmental Law and Policy Center, and landowners in the beltway study area have only ever raised concerns about secondary and cumulative impacts to historic properties on the EF-1 route. While the Preservation Association of Lincoln (PAL) raised the issue for all east routes in their letter dated 15 June 2001, they changed their opinion in testimony at the City/County Public Hearing on 15 August 2001 where the president of PAL urged that the preferred alternative be the EM-1 route. This discussion addresses all beltway routes.

9.6.5.1 Condition of the Environment

Land Uses. Current land uses in the beltway study area are primarily agricultural. The dominant crops are milo, corn, soybeans, wheat and hay crops. Historically, local farmers raised dairy and beef cattle, hogs, sheep and chickens; however, stock production has decreased significantly in the county in the last 30 years or more. Like the rest of Lancaster County, the farm population in the beltway study area has decreased considerably as the urban population of the City of Lincoln has increased. Following this trend, land uses in the study area are beginning to transition from agricultural to suburban uses.

Although most of the tillable land is in active production, review of the constraints map (see **Figure 2.1**) shows that there has been considerable development of non-farm uses in the beltway study area. Some of this development has occurred in clusters; however, the overall pattern is scattered throughout the area. The majority of the development has been for residential land use. It is estimated that approximately 20 percent of the land in the beltway study area is in non-farm uses.

Based on the estimate of direct impacts within the beltway rights-of-way, farmland comprises between 81 to 83 percent of the rights-of ways (see **Table 3.2**), whereas non-farm uses comprise 17 to 19 percent of the rights-of-way. Urban uses in the overall study area are higher than within the rights-of-way because of the intentional routing of the beltways to avoid impacts to residences, and are estimated at 10 percent of the 207 km² (80 sq mi) study area.

In particular, farm home and farmstead split-offs are common, as well as residential acreages (large lot single family homes). On the south, there are a large number of contiguous large lot subdivisions. On the east the subdivisions tend to be fewer and more scattered. Some of the subdivisions have special common use features such as an airstrip, lake, golf course, or equestrian facilities. The east tends to have some of the older subdivisions as well as non-subdivision areas of 2 ha (5 ac) lots which predate current zoning policies. These residential areas appear to have been deliberately located to provide convenient access to O Street and downtown Lincoln, or I-80 and Omaha. In comparison, the south tends to have many more newer subdivisions appealing more generally to those interested in country living, but with quick

access to Lincoln on paved roads. In general, rural residences constructed in the beltway study area are custom built homes for higher income households.

There are few commercial uses in the beltway study area. These are generally located along State Highways or are internal to the unincorporated towns. Commercial uses are typically convenience-type services, but are beginning to include large warehouse retail sales businesses such as those at US 77 and Saltillo Road. Other commercial businesses in the study area include several nursery, greenhouse and tree farm operations; kennels and a pet cemetery; and grain elevators at Cheney and Walton. A large mixed use/commercial center is currently under development along N-2, between 84th and 98th Streets.

Industrial uses in the study area are few and are generally located along State Highways or arterial roads due to the need for accessibility for work force and materials and the availability of central utilities. Industrial sites are located at US 77 and Saltillo Road, on O Street (US 34), and along US 6. There is one active quarry and sand pit in the project area located along South 54th Street south of Saltillo Road that produces crushed rock, agricultural lime and retaining wall stone. Three private airstrips are also located in the study area.

Several urban recreational elements occur in the beltway study area including two city parks. Wilderness Park, which extends 12 km (7.5 mi) from Lincoln to Saltillo Road along Salt Creek, is owned by the County and operated by the City. The park provides hiking, bicycle and equestrian trails. Jensen Park, located west of Cheney, is soon to be developed by the City of Lincoln with ballfield facilities. There are three private golf courses within the study area. Four other private courses abut the study area. All of the golf courses have surrounding housing developments. The Izaak Walton League has a facility south of Highway 2 on South 134th Street, and the Boy Scouts of America have recently purchased a property near A Street and Stevens Creek.

One other noteworthy trend has been the movement of several large insurance companies and other employment centers from downtown to large campus settings on the east fringe of the City. Many large churches have also relocated to larger settings along 70th and 84th Streets, and two of the City's hospitals are on 70th Street. While none of these have yet been located within the east beltway study area, they are within 0.5 mi of the study area. There is also a pattern of large industrial facilities to locate beyond the city limits, but near Interstate access.

Zoning. Zoning in the study area is determined by four entities. The majority of the area is governed by Lancaster County, with some areas falling within the 4.8 km (3-mi) extraterritorial jurisdiction of the City of Lincoln, and the 1.6 km (1 mi) extraterritorial jurisdictions of the City of Waverly and Village of Bennet. In general, the majority of beltway study area is zoned for Agricultural (AG) or Agricultural Residential (AGR) uses. The exceptions are commercial and industrial districts located along State Highways at US 77 and Saltillo Road, US 34 (O Street) and 134th Street, and US 6. In these areas, Highway Commercial (H3), Industrial (I-1), Industrial Park (I-2), County Industrial (I) uses have been deemed appropriate.

These approved zoning districts, and the policies that created them, have resulted in the proliferation of rural non-farm residential development in the beltway study area. Within the County jurisdictional area, there are two residential zoning classifications. The AG classification allows for a minimum buildable lot size of 8.1 ha (20 ac); creation of such lots requires only a survey and documented conveyance (deed). In comparison, the AGR classification allows for a minimum buildable lot size of 1.2 ha (3 ac); creation of these lots requires subdivision approval

(final plat) by the County (or City if within the 4.8 km (3 mi) limit). In general, approval of the subdivisions has taken into account factors such as the location along a paved road, availability of water, appropriate soils for septic systems, and close proximity to villages.

Past Limitations on Development. In general, the rural non-farm areas rely on individual wells or rural county water, and septic systems. The City of Lincoln's service area, which is based on a gravity flow system, has not been extended farther south than Rokeby Road, or farther east over the ridge line into the Stevens Creek watershed (approximately between 84th and 98th Streets). The lack of centralized utilities in the area has been the major contributing factor in maintaining the rural character of the area.

Although existing policies allow for continued agricultural residential growth, other types of land uses are not permitted without amendment to the Comprehensive Plan. In addition, many other types of land uses are limited without the availability of City infrastructure and services.

Condition of the Historic Resources. The reconnaissance (and supplemental) surveys for historic standing structures identified 146 sites over 50 years old within the 80 sq mi beltway study area (On Site, 1998, UNL, 1999). Of these, three are listed on the National Register of Historic Places (NRHP) and 29 others are considered eligible for listing. The 32 sites include 12 farmyards, eight individual barns, four residences, one school, five cast concrete road signs and two grain elevators. In addition, an intensive-level survey was conducted for the Stevens Creek Bottoms as this area was known to be the location of the earliest settlement in the County. The purpose of the intensive level survey was to develop a cultural context (narrative history) with which to evaluate any cultural landscapes or the potential for any historical districts. Thirteen sites were surveyed within the defined area—generally within 0.8 km (0.5 mi) of either side of Stevens Creek. These sites included 10 farms, 1 automobile garage, and 2 relocated school buildings. Although the survey revealed broad patterns of nineteenth century immigrant settlement and the consequent early development of agriculture in Lancaster County, only one site (Norma and Bob Lemke Residence) was considered eligible for the NRHP (other than the already listed Stevens Creek Stock Farm). The archeological survey (UNL, 1998) identified 48 sites along the finalist beltway alignments. Of these, one archeological site is already on the NRHP, and two additional archeological sites and a Euroamerican wagon road site are considered eligible.

The historic survey report for the beltway documents the deterioration of historic structures near Lincoln that has occurred as a result of a growing community. The survey shows that "historic resources nearer to central Lancaster County have already been affected by growth pushing eastward from the City of Lincoln". The concentration of historic resources "increases with distance from the City". This is "attributable to the growth throughout the twentieth-century of Lincoln as a center of business, commerce, and government, and the increasing impact of the city on its surroundings".

The report points out that the broad patterns of agricultural development have been eroded over the last century: "No cultural landscapes were identified, and no historic districts were considered appropriate. The low-incidence of Register-eligible properties in the Stevens Creek Bottoms can be attributed to the steady adaptation of the farm to the changing demands of agriculture. As a result, the physical manifestation of early settlement has eroded over time, and few resources in the area retain the historic integrity necessary for the determination of eligibility".

The research provides a particularly important view of the structures that make up the agricultural landscape. The authors note that agricultural structures "such as barns, granaries, and silos" are "erected as revenue producing elements of a family farm". They were "often replaced as their contribution to farm profitability declined with the introduction of newer innovations in farming and improvements in building construction". Further, the researchers point out that "preservation and maintenance is thus directly contingent upon the continued economic viability of the farm. Should viability of the farm be threatened and the land sold or leased (contributing to farm consolidation), necessary maintenance will likely cease".

In summary, there are several factors that have led to deterioration of many historic structures in the study areas, including:

1. Century-long changes in agricultural operations
2. Economic impacts on agriculture resulting in abandonment of farmsteads
3. Increasing consolidation of farm units
4. Urban pressure from a growing Lincoln community
5. Policies that allow for rural non-farm development

As a result of the cultural resources surveys, it was concluded that the rural landscape and associated built environment found in the project area has low physical integrity as an historic rural landscape. This opinion is due to the intrusion of existing large scale urban developments of various kinds in the beltway study area, and the deterioration of historic properties. The most obvious types of urban development are the acreage subdivisions. Other urban elements include extensive electric distribution lines, radio and communication towers, rural water towers, petroleum storage tanks, golf courses, municipal parks, club parks/facilities, and hiker/biker trails.

Acreage subdivisions and other urban uses (golf courses, parks, commercial) account for approximately 10 percent of the 80 sq mi study area. According to records of the Lancaster County Register of Deeds, Year 2000 land sales in the Stevens Creek watershed were as high as \$21,000 to \$65,000 per hectare (\$8,500 to \$26,000 per acre), indicating proposed uses other than agricultural production. In comparison, average prices of comparable agricultural land in more distant parts of the County ranged from \$3,700 to \$6,200 per hectare (\$1,500 to \$2,500 per acre). Although existing policies allow for agricultural residential growth (see **Section 3.2**), other types of land uses are not permitted without amendment to the Comprehensive Plan. In addition, many other types of land uses are limited without the availability of City infrastructure and services.

9.6.5.2 Assessment of Future Degradation

As assessment was made to determine potential secondary and cumulative impacts that might be caused by the beltway project, including reasonably foreseeable effects that might occur later in time, be farther removed in distance or be cumulative.

Potential for Urban Sprawl. Concerns have been raised that the east beltway will indirectly impact land uses by encouraging urban sprawl along the beltway route, where urban sprawl is considered to be any non-farm development not contiguous to the Lincoln City limits, or any low density development (such as suburban acreages). The implication has been that a far location will create non-contiguous growth, and a close location will continue compact growth. The EC-1 alternative is within 0.8 to 3.2 km (0.5 to 2.0 mi) of the city limits; EM-1 is within 2.4 to 4.8 km (1.5 to 3 mi); and EF-1 is within 2.4 to 6.4 km (1.5 to 4 mi). The SM-4 alternative is as far distant as EF-1--between 2.4 to 5.6 km (1.5 to 3.5 mi) of the city limits.

As discussed previously, the south and east beltways study area is primarily agricultural in character, but includes areas of residential acreage development. The pattern of scattered non-farm development in the beltway study area has been established.

New policies are proposed to be included in the revised Lincoln/Lancaster County Comprehensive Plan (Lincoln/Lancaster County Planning Department, September 2001) which includes a renewed emphasis on preservation of historic resources. Some of the mechanisms to protect resources and avoid urban sprawl include the goals:

- to prohibit new acreage development within the area of future urban growth, which includes the beltway study area (albeit within the 25-to-50 and 50-to-100+ year planning periods).
- to discourage further development within the 100-year floodplain which will help preserve the Stevens Creek bottoms and tributaries
- to encourage increased residential density (up to 5 dwelling units per acre)

Further evidence of a commitment to preservation, was Change of Zone #3209 (4/17/00) which removed over 100 ac of industrial, general commercial and local business zoning from the interchange at US 77 and Van Dorn Street to retain the use of the land as open space. This action was proposed by the Planning Department, and approved unanimously by the City Council and Mayor.

While city/county policies are aimed at planned growth and avoiding urban sprawl, the vision of the Comprehensive Plan very clearly shows that land development could extend into the beltway study area as the population of the City grows.

Potential for Highway Commercial/Industrial Development. While some limited highway commercial or mixed use development might be expected at the 11 proposed interchanges (along the 20 mi roadway), the likelihood of any development at the interchanges will depend on many considerations, including the proximity of existing services, the likely market for the proposed services, the availability of rural or well water, and suitability of the soils for wastewater treatment. The most likely locations for highway commercial development would be at the higher traffic volume interchanges with existing highway designations. Commercial and industrial development is already present at US 77 and US 6 (Cornhusker Highway) in the vicinity of the proposed interchanges. At the US 34 (O Street) interchange location with EM-1, large tracts of land are currently in industrial land use or uses which might be considered temporary (nursery, golf course) and could be converted to other urban uses in the future. The N-2 intersection with SM-4/EM-1 is extremely complicated and does not allow immediate access to adjacent land for typical highway commercial uses.

Development between the interchanges will also be limited by control of access along the entire beltway. Any access would need to be from parallel section line roads, few of which are currently paved through the study area. Exceptions are Saltillo Road on the south and 98th and 148th Streets on the east. In regards to the preferred alternative, Saltillo Road is within 0.5 mi of SM-4; however, it is already used as a truck route and has about 1.0 mi of existing highway commercial and industrial use at the US 77 intersection, as well as at least 1.0 mi of suburban residential acreages in the vicinity of 56th Street. Relative to EM-1, the closest paved parallel road is 1.5 mi to the east at 148th Street; however, there already are highway commercial and industrial uses at the US 6 intersection, and 2.5 mi of suburban residential acreages along it.

Many of the public comments allege that development will be fast and expansive beginning at the beltway interchanges and extending out to destroy the landscape in every direction. In particular, some commentors pointed out that the EF-1 route would create a strip of land (0.5 mi wide and 12-mi long) located between two paved roads--the beltway and 148th Street-- and that this would be a very desirable location for development. However, review of Lincoln's west bypass, US 77, indicates a much slower and limited scenario. Improvements to US 77, between I-80 and N-33 (Crete interchange) began in 1967 and were completed in 1998. The improvements included relocation of the highway from 14th Street to its current location west of Wilderness Park, widening the roadway to four lanes, and construction of grade-separated interchanges at Van Dorn Street and N-33. Since completion of the improvements, there has been construction of highway commercial uses at only one rural location, on Saltillo Road, where highway commercial and industrial uses have existed for decades. There has been no new highway commercial development at either of the new urban intersections (Capitol Parkway and Van Dorn Street) or the other rural intersections (the larger of which are Pioneers Boulevard, Old Cheney, Warlick Boulevard or N-33).

Development between the intersections has also been slow and limited on US 77. The only development along the rural portion of the highway has been the YMCA Spirit soccer/ball fields, the proposed Optimists baseball/softball complex, and a church--all in the vicinity of Pioneers Boulevard. (It is noted that churches are allowed by right in all zoning districts). The lack of development is likely related to (1) the agricultural land uses identified for the area in the Comp Plan, (2) the lack of zoning to allow any uses other than AG and AGR, (3) the lack of City water and sewer, and perhaps (4) the perceived availability of better locations for development.

Along much of its length, US 77 is no more than 0.5 to 1.0 mi from existing urban residential areas, whereas the EM-1 beltway would be even further away--2.0 to 3.0 mi from the existing City limit, and 1.0 to 3.0 mi from the anticipated 2025 limit.

Impacts along Connector Roads. To the extent possible, the location of the proposed interchanges minimizes the number of connector roads to beltway interchanges which have historic properties along them; therefore minimizing impacts to these properties. Specifically, there are no historic properties along the proposed connector roads at South 27th, South 68th, Pine Lake Road, Pioneers Boulevard, and Fletcher Avenue. In contrast, no interchanges are proposed along Yankee Hill Road, Old Cheney Road, Van Dorn Street, A Street and Havelock Avenue which all have historic properties along them. The only connector roads with historic properties in close proximity are South 84th (Wunibald Farmstead), O Street (Mayer Farmstead and Haeger Dairy), and Adams Street (road sign). Of these, only the Wunibald Farmstead is expected to be impacted by the beltway project. A discussion of these impacts has already been addressed in (see **Appendix F**). Mitigation has been proposed in **Section 9.5.9**.

Protection of Valuable Resources. A variety of federal, state and local policies and regulations already exist to protect valued resources to a certain degree (for example wetlands, floodplains and endangered species). However, most regulations still permit landowners to disturb or destroy native prairies or alter historic properties without the need for government approval or review.

Additional measures do exist for protection of resources depending on the value the community places on these resources and the commitment they are willing to invest. These measures may range from the simple commitment of existing landowners to maintain valued land uses--perhaps through deed restrictions, to the adoption of a subarea plan as part of the

Lincoln-Lancaster County Comprehensive Plan, to donation or purchase of public or private conservation easements, to purchase and public ownership of resources. However, the need for protection measures to be implemented as part of the beltway project has not yet been demonstrated. In fact, preservation through planning measures is one of the considerations assessed in the Stevens Creek Basin Planning Initiative.

9.6.5.3 Assessment of Secondary and Cumulative Impacts

Due to existing and proposed policies which determine the pattern of development, urban growth in the beltway study areas is expected to occur with or without a beltway project--so long as the City of Lincoln continues to experience the current rate of population growth.

With or without a beltway, deterioration of some historic properties could continue while others may be preserved and maintained. Following the proposed Comprehensive Plan, the rural landscape of the entire beltway study area could be converted to an urban form over the long-term--except perhaps in areas where landowners refuse to sell their farm ground. Urbanization could have an adverse effect on the integrity of the setting for the 12 historic farmstead properties for which the surrounding rural landscape contributes, to one degree or another, to the historic context. The integrity of the setting for the barns and residences has already been compromised (the boundaries of these historic properties were originally defined as only the barn or residence because the historic farmyard setting was gone). The school, grain elevators and road signs are unlikely to be affected. Of course, significance of the properties will not be affected.

Since no cultural landscapes were identified and no historic districts were considered appropriate, the setting of the 12 farmsteads has to a certain extent already been compromised. In particular, concerns have been raised by Retzlaff family members regarding impacts on the historic setting of the Stevens Creek Stock Farm. While an estimated 80 percent of the beltway study area is rural and agricultural, the rural landscape has changed significantly compared to what existed during the period of significance for the Stevens Creek Stock Farm (1850 to 1924). The period of significance for this property includes the amassing of lands and the corresponding success of a large scale cattle operation (and other stock). During this period, Charles Retzlaff acquired close to 1,000 ac of prairie grasslands which were used primarily for cattle range and pasture. In contrast, the present day landscape of the beltway study area (including that within the Stevens Creek Stock Farm boundaries) is primarily agricultural row crops. The beltway study area also includes various modern agricultural features such as terraces, grassed waterways, farm ponds and pivot irrigation--as well as urban elements described under Existing Conditions.

Any resulting environmental damage, such as impacts to the landscape surrounding historic properties or loss of prime farmland, would be caused primarily by proposed development as guided by the Lincoln\Lancaster County Comprehensive Planning process, and not by the beltway project. The beltway project does include mitigation measures for direct environmental damages to resources, but it does not compensate or mitigate for the damages caused by future housing and commercial developments. Environmental degradation caused by these developments will be addressed through local, state and federal permits and clearances, as appropriate. FHWA has no legal tools to direct the local planning process.

9.6.6. Analysis of Farmland

PAL and certain landowners in the beltway study area have raised concerns about secondary and cumulative impacts to farmland relative to the assumptions used in completing the NRCS Farmland Conversion Impact Rating (USDA Form AD-1006) (see **Appendix A, page A-33**). The form was used to assess impacts to prime farmland, including indirect impacts. While PAL has requested information on the assumptions used for eight parameters, only one of these parameters—Acres to be Converted Indirectly—relates to indirect impacts. (A discussion of the other parameters of concern to PAL is included in **Section 9.7**).

9.6.6.1 Condition of the Environment

The condition of the environment is described fully in **Section 9.6.5.1** above, and summarized here.

Current land uses in the beltway study area are primarily agricultural. The dominant crops are milo, corn, soybeans, wheat and hay crops. Historically, local farmers raised dairy and beef cattle, hogs, sheep and chickens; however, stock production has decreased significantly in the county. Like the rest of Lancaster County, the farm population in the beltway study area has decreased considerably as the urban population of the City of Lincoln has increased. Decreasing economic feasibility of farming, federal programs to encourage and subsidize removing land out of production, and high sale prices for developable land have resulted in the transition from agricultural to suburban land uses in the beltway study area.

Although most of the tillable land is in active production, review of the constraints map (see **Figure 2.1**) shows that there has been substantial development of non-farm uses in the beltway study area. Some of this development has occurred in clusters; however, the overall pattern is scattered throughout the area. The majority of the development has been for residential land use.

Based on the estimate of direct impacts within the beltway rights-of-way, farmland comprises between 81 to 83 percent of the rights-of ways (see **Table 3.2**), whereas non-farm uses comprise 17 to 19 percent of the rights-of-way. Urban uses in the overall study area are higher (around 10 percent) than within the rights-of-way because of the intentional routing of the beltways to cross farmland to avoid impacts to residences.

9.6.6.2 Assessment of Future Degradation

PAL states that the assumption of no indirect impacts is erroneous because farmlands would be indirectly converted due to increased accessibility to the new highway. They also imply that additional acres could be indirectly converted due to partial acquisitions resulting in uneconomic remainders, and due to restriction of access.

One comment letter from a landowner on EF-1 proposes indirect impacts amounting to 58 ha (144 ac) on SM-4 and 78 ha (192 ac) on EF-1 that would be lost to development at the interchanges (6 ac at each of 14 interchanges); and 27 ha (66 ac) on SM-4 and 64 ha (158 ac) on EF-1 that will be left without access—amounting to 227 ha (560 ac). The landowner also mentions 36 ha (90 ac) on EF-1 that would lose pivot irrigation.

It is emphasized that it is the Comprehensive Plan that determines the location of future development and not the location of a beltway. City/County policies are intentionally aimed at planned growth and avoiding urban sprawl, and the proposed vision of the Comprehensive Plan very clearly shows that the beltway study area could ultimately become part of the urban limit as the city grows in the future (see **Section 9.6.4.2** above). Therefore it is the planned growth of the City of Lincoln, rather than the beltway, that would result in the majority of farmland conversion. As such the assumption was made that no acres would be converted indirectly.

At the time of the DEIS, there was no data available to determine the indirect impacts due to uneconomic remainders. However, general practices in right-of-way acquisition for rural properties include provision of access to the extent possible, and sale of uneconomic remainders to neighboring landowners who do have access. These practices minimize the loss of production agriculture. While the project may impact two pivots amounting to 36 ha (90 ac); use of the land for agriculture is not lost. Lastly, landowners will be compensated for any loss of property caused by loss of access, or uneconomic remainders.

9.6.6.3 Assessment of Secondary and Cumulative Impacts.

Due to existing and proposed policies which determine the pattern of development, urban growth in the beltway study areas is expected to occur with or without a beltway project--so long as the City of Lincoln continues to experience population growth. Following the proposed Comprehensive Plan, the rural landscape of the beltway area would be converted to an urban form in the long-term--except perhaps in areas where landowners refuse to sell their farm ground.

While prime farmland is a valuable resource, it has not sustained significant degradation that warrants no further adverse impacts to occur--particularly in Nebraska. Review of the USDA database (www.nhq.nrcs.usda.gov/land/tables), shows that Nebraska ranked 30th in the states for number of acres of prime farmland converted per year between 1992 and 1997. The number of acres of prime farmland converted (1 942 ha (4,800 ac per year)), amounted to less than 1 percent of the loss for the nation during this period. Further, the amount of all land developed in Nebraska during this period amounted to less than 0.5 percent of all the land developed in the nation during this time period.

According to the NRCS, the acres of prime farmland that would be lost directly with construction of any of the end-to-end beltway alternatives amounts to less than 0.5 percent of the 102 345 ha (252,900 ac) of prime farmland soils in Lancaster County. The conversion of prime farmland soils for the beltway project is considered a greater public need than the preservation of 466 ha (1,152 ac) of prime farmland soils along the SM-4/EM-1 route.

9.6.7. Analysis of Flows in the Platte River

The FWS has determined that the beltway project *may* adversely affect four federally listed species which utilize habitat areas along the Platte River (letter dated 3 May 2001). These species are the pallid sturgeon which is known from the lower reach of the Platte River, the interior least tern and piping plover which nest on sand and gravel bars in the Platte River, and the western prairie fringed orchid which occurs in subirrigated wet meadows along the Platte River—as well as wet and wet-mesic tallgrass prairies in various locations in Nebraska. Although the beltway is located 48 km (30 mi) from the Platte River, the FWS alleges that any construction project which (a) obtains borrow material from any location in the Platte watershed and (b) results in the exposure of surface or ground water in the excavated pit, will result in evaporation and will deplete instream flow contributions to the Platte River. The FWS letter further states that they consider any depletion of flows from the Platte River system to be significant.

According to FWS, their agency currently defines two types of depletions in the lower Platte River. Major depletions are defined as projects which result in greater than 3 ha-m (25 ac-ft) of water loss between February and July—which FWS considers the critical period for the pallid sturgeon. Mitigation requirements for major depletions involve acquisition of water rights and transfer of those water rights to FWS. Minor depletions are defined as up to 3 ha-m (25 ac-ft) of water loss, and requires a mitigation fee of \$300 per ha-m (\$37 per ac-ft) of water loss. These fees go to the National Fish and Wildlife Foundation Fund, and are used to purchase water rights, create new habitat or maintain existing habitat (personal communication between Amy Zlotzky and Wally Jobman).

9.6.7.1 Condition of the Environment

It has been well documented that construction of large reservoir and irrigation projects in the Platte River valley in Nebraska, Wyoming and Colorado have reduced seasonal peak flows and average annual discharge due to diversion and storage. This has resulted in the reduction in the width of Platte River, especially in central Nebraska, and loss of riparian habitat. In particular, open sandy river channels have become vegetated with trees and shrubs, and adjacent grasslands have been lost to agricultural production. These ecological changes have benefitted certain fish and wildlife species at the expense of others. Specifically, these changes have had impacts on the populations of migratory birds which travel through the Central Flyway, which covers only a narrow stretch of the Platte River in central Nebraska.

Since the late 1990's much effort has been expended on securing increased flows for habitat maintenance in the central Platte River, as well as habitat restoration and preservation to protect threatened and endangered species. The central Platte is considered habitat for the whooping crane, piping plover, interior least tern and pallid sturgeon—including critical habitat for the whooping crane from Lexington to Shelton. As a result, new water uses along the Platte River above Columbus are severely limited in order to protect these species. In addition, NGPC has acquired water rights for instream flows for habitat all the way to the mouth of the Platte River with the result of no remaining water rights in the lower Platte River (personal communication between Amy Zlotzky and Mike Jess, University of Nebraska, Conservation and Survey Division). The lower Platte is considered habitat for the piping plover, interior least tern, pallid sturgeon and western prairie fringed orchid. Critical habitat has been proposed for the piping plover from downstream of Cozad to the Missouri River.

Although the impacts of reservoir and irrigation projects in the upper Platte River watershed dwarf the impacts of other water users, several large water-dependent projects have been approved or are nearing approval in the lower Platte River. These include the City of Lincoln wellfield at Ashland, and the Omaha Municipal Utilities Districts Platte West wellfield near Venice. While not trying to dismiss the impact of such municipal water projects, these projects have received the approval of FWS (albeit with mitigation requirements, including those described above). There have also been several Natural Resource District reservoir projects and sand and gravel operations approved in the lower Platte. While the FWS depletion concern has not stopped permits, it has created a mechanism for acquiring funds to restore and preserve habitat.

9.6.7.2 Assessment of Degradation

The south and east beltway is not expected to impact depletion of flows on the Platte River because:

1. The south and east beltway is a relatively long project requiring considerable grading of the existing soil. While all construction projects strive to balance cut and fill requirements on-site, this is generally very achievable for a roadway project as long as the South and East Beltways (approximately 20 mi long). Balancing cut and fill within the project right-of-way is far more economical than bringing in fill material, or disposing of material to an off-site location.
2. If any additional borrow material might be required, it would preferably be taken from upland sources due to better compactability and ease of handling.
3. If, for some unknown reason, some borrow material would be required from sources within the Platte River drainage basin, the amount would be so small that it would result in less than 3 ha-m (25 ac-ft) of lake evaporation between February and July, even if it came from a newly exposed source. If mined deeper or from an existing pit, the amount could be further reduced. Such a small impact would be considered a minor depletion, and mitigation would be calculated at the time of construction using the formula in use at that time.

9.6.7.3 Assessment of Secondary and Cumulative Impacts

Use of borrow material from a source that may expose groundwater for construction of the south and east beltway project is projected to result in evaporation of less than 3 ha-m (25 ac-ft) of water between February and July. FWS considers this a minor depletion which can be mitigated by payment to the National Fish and Wildlife Foundation fund for use in habitat mitigation.

The south and east beltway project will have no other secondary or cumulative effects on federally listed species.

9.6.8. Analysis of Saline Wetlands and Other Wetlands

The FWS has stated that the beltway project could indirectly impact the regionally unique Saline Wetland Complex of Eastern Nebraska (SWC) and other wetland systems in the Stevens Creek drainage because the beltway will facilitate future urban development in Lincoln/Lancaster County. Additionally, FWS implies that the extent of cumulative impacts from the beltway extends to other aquatic and terrestrial resources occurring within the lower Platte River Valley because the beltway will connect to I-80, and plans are underway to widen I-80 through Lincoln and on to Sarpy County, including a bridge over the Platte River at the Cass/Sarpy County line.

9.6.8.1 Condition of the Environment

Although saline wetlands occur throughout the west and midwest on soils high in chlorides, sulfates or carbonates, relatively few exist within Nebraska. The eastern Nebraska saline wetlands only occur near Lincoln on the historic terraces of Salt Creek and its tributaries. The characteristic saltflats in these wetlands support two species which received State Endangered status from the Nebraska Game and Parks Commission in 2000--saltwort (*Salicornia rubra*) and the endemic Salt Creek tiger beetle (*Cicindela nevadica lincolniana*). Although thought to once cover more than 6 500 ha (16,000 ac) in and around Lincoln, the saline wetlands are now estimated at approximately 490 ha (1,200 ac) (Gersib and Steinauer, 1991).

Historically, losses were related to the physical development of the City of Lincoln which originally was settled because of the abundant salt deposits. Over time, the wetlands have been drained for agriculture, filled for development of the city, and excavated for stormwater detention and landfills. In 1917, the U.S. Army Corps of Engineers began channelization of Salt Creek through the city to reduce flooding. The channelization projects ultimately caused significant downcutting of the Salt Creek channel--which in turn resulted in drawdown of the local groundwater table beneath the saline wetlands. In addition, the highly dispersive clay soils have created severe headcutting into the wetlands causing flow-through conditions and direct drainage of what was previously a closed basin system. The rarity of the eastern Nebraska saline wetlands was first recognized in the late 1980's and early 1990's following work conducted by Gersib and Steinauer (1991) and the publication of *Last of the Least in Nebraskaland* (Farrar and Gersib, 1991).

9.6.8.2 Assessment of Degradation

There are many policies and regulations in place to limit impacts to wetlands, and specifically saline wetlands. Dredge and fill activities in all wetlands and waters of the United States have been regulated since 1977 through the U.S. Army Corps of Engineers Section 404 permit program. While the jurisdiction of the 404 permit program has been reduced recently to exclude isolated wetlands, the authority remains in place for any federally funded project--such as the south and east beltways. FHWA has stated that the beltway project will include mitigation for all wetland impacts, at a minimum of a 1:1 replacement-to-loss ratio, whether the wetlands are considered jurisdictional under the 404 permit program or not.

Saline wetlands also remain jurisdictional under the 404 permit program because they occur on the first terraces of Salt Creek and its tributaries--thereby having a direct connection (or at least historic adjacency) to the waters of the United States. According to the Omaha District Corps of Engineers, they have not yet lost jurisdiction over any saline wetlands permit actions (personal communication between Amy Zlotsky and Tiffany Cattau, USACE).

In addition, the Nebraska Department of Environmental Quality (NDEQ) has authority under Title 117 of the Nebraska Administrative Code, Nebraska Surface Water Quality Standards to regulate impacts to waters of the State, including wetlands (as defined in the 1987 Corps of Engineers *Wetland Delineation Manual*). Under the anti-degradation clause, no one may adversely affect the existing uses of wetlands. In general, mitigation of wetland impacts has been required in Nebraska since the mid 1980s at a minimum 1.5:1 replacement-to-loss ratio as required by the Section 401 Water Quality Certification program administered by the NDEQ. By agreement between the agencies, this ratio has been a minimum of a 1:1 ratio for NDOR projects. For saline wetlands, NDEQ follows the saline wetland guidelines described below. While NDEQ has no permit program in place, project proponents are advised to coordinate with NDEQ to obtain a letter of opinion that a project will not cause degradation.

In the mid 1990's several policies were implemented to limit further impact on saline wetlands. In 1994, the Lincoln/Lancaster County Comprehensive Plan included a community goal to encourage preservation of saline wetlands. In 1997, Eastern Saline Wetlands Interagency Study Team established draft guidelines for mitigation of saline wetland impacts based on a weighted area score methodology which generally requires greater replacement-to-loss ratios than what was previously required, and creates incentives for restoring higher quality habitats (which support rare species) and restoring in advance of need through the use of wetland banks. In 2000, saline wetlands were removed from the Nationwide permit program, thus requiring a more extensive review process for obtaining an Individual Permit. That same year, saltwort and the Salt Creek tiger beetle, two saline wetland species, received State Endangered status. The new Lincoln/Lancaster County Comprehensive Plan, currently in preparation, includes renewed emphasis on preservation of saline wetlands (as well as other wetlands, riparian corridors, and floodplains). The City of Lincoln is currently constructing a 76 ha (189-ac) saline and freshwater wetland mitigation complex in advance of future mitigation needs.

In 1990, the first saline wetland restoration was completed at Arbor Lake as mitigation for a roadway project. The success of this restoration resulted in the implementation of many other saline wetland restorations in Lancaster and adjacent Saunders Counties--for both mitigation and non-mitigation purposes.

Table 9.4 is a list of saline wetland impacts and restoration activities since 1989--about the time when the rarity of the resource was first recognized. The table shows that over the past 12 years there has been a net increase of approximately 144 ha (356 ac) of saline wetlands amounting to nearly a 6:1 replacement-to-loss ratio. The net increase is due to (1) the implementation of policies and regulations designed to limit further impacts to saline wetlands, (2) the saline wetland mitigation guidelines generally result in higher replacement-to-loss ratios, (3) the establishment of saline wetland mitigation banks in advance of impacts, and (4) the construction of several large saline wetland restorations for environmental enhancements (non-mitigation).

Further, an estimated 850 ha (2,100 ac) of the Saline Wetland Complex has been preserved through acquisition and management by various public agencies and private conservation groups, including the Nebraska Game and Parks Commission, Lower Platte South Natural Resources District, City of Lincoln, The Nature Conservancy and others (see **Table 9.4**).

**Table 9.4
SALINE WETLAND IMPACTS AND RESTORATION ACTIVITIES
(since 1989)**

MITIGATION PROJECTS

PROJECT PROPONENT/ PROJECT LOCATION	YEAR	SALINE WETLAND IMPACTS	RESTORED ACRES	PRESERVED SWC ACRES
BNSF Hobson Yard Expansion and other projects included in wetland bank permit	1995- 1997	20.51 ac saline to-date (10/01) (permit allows up to 25 ac saline Cat I, 20.94 ac Cat II)	to be debited from BNSF wetland bank using weighted score methodology	-
BNSF Hobson Yard Wetland Mitigation Bank	1997	N/A	228 ac at 2 off site locations, including 51 ac restored Cat I wetlands, plus preservation of additional 88 ac saline & FW wetlands, and 89 ac upland buffer.	228
Campbell's Northwoods Development and Warner Tract Wetland Mitigation Site	1998 ?	FW impact at east Lincoln site	2.71 ac restored saline wetland off-site, owned and managed by LPSNRD	-
Capitol Soccer Association Ethel Abbot Soccer Complex at North 70 St	1993	0.88 ac Cat III	1.32 Cat III, on-site	-
City of Lincoln K & L St Extension	1990	16.58 ac saline	58 ac saline wetland complex, off- site at Arbor Lake WMA, managed by NGPC	58
City of Lincoln Wetland Mitigation Bank at 98 th & Cornhusker	2001	de minimis FW impacts only	189-ac complex, including restoration of 61 ac Cat I wetlands, 49 ac FW wetlands, 12 ac saline prairie, 14 ac upland buffer, & enhancement of 24 ac wetlands and 6 ac of upland islands, to be managed by LPSNRD	189
Concrete Industries Wash Operations at North 70 th Street	1993	2.48 ac saline	4.96 ac saline wetland, on-site	12
Dennis R. Schworer Building Co North 33 rd & Superior	1998	0.40 ac Cat III 0.59 ac Cat IV	2.09 ac Cat III, on-site	-

PROJECT PROPONENT/ PROJECT LOCATION	YEAR	SALINE WETLAND IMPACTS	RESTORED ACRES	PRESERVED SWC ACRES
Dial Realty North 27 th Street Development	1999 ?	1.16 ac Cat I 0.87 Cat III	6.45 ac Cat I, on-site, and transfer of approx 12 ac conservation easement to LPSNRD	-
ISCO, Inc. Grading Project	1993	1.10 ac Cat III	1.65 ac Cat III, on-site	-
Lancaster County North 27 th St Grading, Arbor Rd North	1992	1 ac	1:1, off-site at NDOR Ceresco South site	-
Nebraska Department of Roads 27 th St Interchange	1994	part of 16.7 ac (with next)	1:1, off-site at NDOR Ceresco South site	-
Nebraska Department of Roads Improvements to US 77 Lincoln to Ceresco	1994- 1996	remainder of 16.7 ac (with above)	1:1, on-site at NDOR Ceresco South site	-
Nebraska Department of Roads Saline Wetland Mitigation Site	1994	N/A	17.7 ac Cat I, at NDOR Ceresco South site near Jack Sinn WMA	40?
Noddle Development Co & GenEx Hendricks Property Mitigation Site for Kmart & General Excavating Impact Sites	1993	2.46 ac (Kmart North) 4.2 ac (GenEx)	8 ac restored saline wetlands, off site, now owned by Sue Kuch	-
North 33 rd St Landowners/City of Lincoln North 33 rd St Extension	1999	0.07 ac Cat II 0.15 ac Cat III	0.66 ac, on-site, mitigated by Superior Pointe Partners, to be managed by LPSNRD	-
Rogge North 70 th St Development	1997 ?	1.03 ac Cat III	3.09 ac Cat III, on-site	-
Superior Pointe Partners North 33 rd St Development	1999 ?	0.04 ac Cat III	1 ac Cat III, on-site, to be managed by LPSNRD	-
Whitehead Oil Company North 27 th Street Development	1996	2.2 ac Cat II	99 ac Cat I complex, including 36.6 ac restored saline wetland and enhancement of remaining wetlands, on-site, now owned by LPSNRD	99
Subtotal—Saline Mitigation Projects		approx. 72.42 ac impacted	approx. 258.32 ac restored (3.6:1 replacement-to-loss)	

**Table 9.4 (continued)
WETLAND RESTORATION PROJECTS**

NOT FOR MITIGATION

PROJECT PROPONENT PROJECT NAME/LOCATION	YEAR	IMPACTED WETLANDS	WETLAND RESTORATION	PRESERVED SWC ACRES
Vicky and Kim Wheeler Private Wetland Restoration, North 14 th & Mill Road	1993	0	5 ac including salt marsh, saltflats	-
George Hendricks (now Sue Kuch) Private Wetland Restoration North 27 th Street and Arbor Road	early 1990s	0	approx. 5 ac	-
George Hendricks (now Sue Kuch) Private Wetland Restoration North 27 th Street and Arbor Road	mid 1990s	0	approx. 8 ac	-
LPSNRD Lincoln Saline Wetlands Nature Center Capitol Beach Lake	1996?	0	130 ac site including restoration of 1 ac saltflat, 4 ac FW wetlands, large prairie area, & preservation of existing saline and FW wetlands	130
Nebraska Game and Parks Commission & LPSNRD Jack Sinn WMA/Rock Creek Saline Wetland Restorations	1989 - 2001	0	120 ac restored saline wetlands w/ 265 ac wetlands & 1007 ac upland in preservation, 165 ac funded but not yet restored (then 430 ac wetlands, and 842 ac upland).	1,272
Pfizer Saline Wetland Restoration Trail Cornhusker & North 1st	1998	0.49 ac Cat I	25 ac Cat I site, including restoration of salt marsh, saltflats, saltgrass meadow and saline prairie	25
The Nature Conservancy Noble Tract Restoration, Little Salt Creek & Mill Rd	2002 ?	0	Have heard from TNC that wetlands restoration is planned on this approx. 60 ac tract	60?
Subtotal-Saline Restoration Projects		approx 0.49 ac impacted	approx 171 ac restored to-date	
TOTAL- All Saline Mitigation and Restoration Projects		approx 72.91 ac impacted	approx 429.32 restored (5.9:1 replacement-to-loss)	2,113 ac

In addition, many of the restoration projects have been designed to maximize the restoration of the higher quality plant associations, especially the saltflat habitats which support the rare species. One impetus is the agencies' use of the weighted score methodology which gives greater mitigation "credit" to those areas. For restorations which have not involved mitigation, there has been an intrinsic interest in trying to restore the full complement of saline habitats, especially the rare ones. Some of the success stories, which illustrate the state of the restoration effort in the SWC, have included a net increase in 11 ha (27 ac) of saltflat (saltwort and seablite) communities as part of the BNSF wetland bank restorations on Little Salt and Rock Creeks, and the reintroduction of saltwort (by seeding) at the Pfizer site on Oak Creek. The fact that the BNSF saline wetland bank was fully certified in five years following construction shows that restoration of these areas has been proven possible.

While it is likely that there could be some future saline wetland permits in Lancaster County, particularly for linear projects such as roads and utilities, these impacts are generally expected to be minor and related to expansion of existing facilities. In addition, the City is constructing a saline and freshwater wetland mitigation bank in advance of future impacts.

9.6.8.3 Assessment of Secondary and Cumulative Impacts

The beltway project should not facilitate urban growth in the areas of the Saline Wetlands Complex and thereby indirectly result in the loss of saline wetlands because:

1. There are City and County policies and programs which dictate the direction of urban growth and specifically discourage development in saline wetlands (as well as in the Stevens Creek floodplain and floodplains in general).
2. There are Federal and State regulations which regulate saline wetland impacts through permit programs, and require net gains in saline wetlands. There is already a demonstrated trend of a net gain in saline wetland acres due to many successful restorations.
3. FWS is reviewing the possibility of proposing emergency listing of the Salt Creek tiger beetle as a federally endangered species. This activity will likely require certain restrictions on development projects in the vicinity of saline wetlands. A task force has been asked to review the situation and make recommendations to the Mayor regarding appropriate action for the community.
4. Despite the lack of a beltway, Lincoln grew 50 percent in population and 50 percent in area between 1970 and 2000. The City is expected to grow by approximately 47 percent by 2025 with or without a beltway. Population increases are due to the availability of jobs, excellent schools and universities, and a high quality of life—not a remote beltway facility.
5. The proposed beltway location is fairly remote from the urban portion of the City, and there are essentially no saline wetlands between the beltway and the existing City limits. The only exception is an area of saline wetlands located within the 100-year floodplain between I-80 and Cornhusker Highway (about 2.4 km (1.5 mi) from the I-80 interchange at the north end of the beltway). The majority of the saline wetlands are 6.4 km (4 mi) or more away, west of the Stevens Creek basin.

6. While some limited highway commercial or mixed use development might be expected early on at the 11 proposed new interchanges (along the 32 km (20 mi) roadway), the Comprehensive Plan shows no development in the area of the SM-4 and EM-1 alignments within the next 25 years. Between 25 and 50 years, it is expected that growth of the City could reach some portions of the beltway study area. But it could take 50 to 100 years or more for the City to fill most of the beltway study area.

For these reasons, the beltway is not considered to have any direct, secondary or cumulative adverse impacts on saline wetlands or other wetlands.

9.7. RESPONSE TO COMMENTS ON NRCS FORM AD-1006

The Preservation Association of Lincoln raised concerns about the assumptions used in completing the Natural Resource Conservation Service (NRCS) Farmland Conversion Impact Rating (USDA Form AD-1006) (see **Appendix A, page A-33**). This form was used to assess impacts to farmland. The following discussion explains (a) requests by the Preservation Association of Lincoln, (b) the assumptions used in completing the AD-1006 as included in the DEIS, and (c) alternative calculations, if appropriate.

Acres to be Converted Indirectly

- (a) PAL states that the assumption of no indirect impacts is erroneous because farmlands would be indirectly converted due to increased accessibility to the new highway. They also imply that additional acres could be indirectly converted due to partial acquisitions resulting in uneconomic remainders, and due to restriction of access.

One comment letter from a landowner on EF-1 proposes indirect impacts amounting to 58 ha (144 ac) on SM-4 and 78 ha (192 ac) on EF-1 that would be lost to development at the interchanges (6 ac at each of 14 interchanges); and 27 ha (66 ac) on SM-4 and 64 ha (158 ac) on EF-1 that will be left without access—amounting to 227 ha (560 ac). The landowner also mentions 36 ha (90 ac) on EF-1 that would lose pivot irrigation.

- (b) It is emphasized that it is the Comprehensive Plan that determines the location of future development and not the location of a beltway. City/County policies are intentionally aimed at planned growth and avoiding urban sprawl. The proposed vision of the Comprehensive Plan very clearly shows that the beltway study area could ultimately become part of the urban limit as the city grows (see **Section 9.6.4.2**). Therefore it is the planned growth of the City of Lincoln that would result in the majority of farmland conversion, and not the beltway. As such the assumption was made that no acres would be converted indirectly.

At the time of the DEIS, there was no data available to determine the indirect impacts due to uneconomic remainders. However, general practices in right-of-way acquisition for rural properties include provision of access to the extent possible, and sale of uneconomic remainders to neighboring landowners who do have access. These practices minimize the loss of production agriculture. While the project may impact two pivots amounting to 36 ha (90 ac); use of the land for agriculture is not lost.

It is also interesting to note that if the assumption was made that the beltway would indirectly convert additional acres of farmland (Part III, B.), the additional acres would have no effect on the value of Part V unless the composition of the soil types, as a group, was more productive than that already included in Part IV, A. In fact, adding acres could possibly reduce the value of 71 assigned to the SM-4/EF-1 alternative. This is because the Part V value is determined as a weighted average of rankings of soil types based on the productivity of the soils—which for the beltway study area appears to be around 70.

- (c) No changes in calculations.

Criterion 1: Area (within 1-mi which is) in Non Urban Use.

- (a) PAL requests documentation to support a score of 14 for all three routes. They imply that 90 percent of the land within 1 mi of the project is in non-urban use, and therefore the score should be 15 points as stated in the guidelines.
- (b) For the DEIS, this value was estimated by taking the sum of the non-urban land uses (cropland, pasture/hayland, other farm, woodland, wetland and ponds/streams) within the beltway rights-of-way (see **Table 3.1**), and dividing by the total right-of-way. The percent non-urban was approximately 87 percent for all three end-to-end routes; which equates approximately to a score of 14. If anything, this method overestimates the amount of non-urban land within one mile of the beltway because the beltways were routed to avoid urban elements such as residences and businesses.
- (c) No change in calculations.

Criterion 2: Perimeter in Non-Urban Use.

- (a) PAL requests documentation to support the scores of 9, 9 and 8.5 for the close, mid and far routes, respectively.
- (b) For the DEIS, this value was estimated by taking the percent of non-urban land uses within the beltway rights-of-way (see (b) above), and multiplying this times 10, the maximum number of points for this criteria. This results in an actual value of 8.7 for each of the routes; therefore, each of the routes should have had the same assigned score of either 8.5 or 9. This appears to be an error.
- (c) Change score to 8.5 for all three routes.

Criterion 3: Percent of Site Being Farmed (within the last 5 to 10 years) .

- (a) PAL requests documentation to support the scores of 16, 16.5 and 16.5 for the close, mid and far routes, respectively.
- (b) For the DEIS, this value was estimated by taking the total farmland (see **Table 3.2**) as a percentage of the total right-of way for each of the three end-to-end routes (81, 83 and 82 percent), and multiplied times 20--the maximum number of points for this criterion. With rounding to the nearest 0.5, this resulted in the assigned values of 16, 16.5 and 16.5, for the close, mid and far, respectively.
- (c) No changes in calculations.

Criterion 4: Protection Provided by State and Local Government.

- (a) PAL states that all of the routes should be scored 20--the maximum number of points for this category because agricultural uses are protected by the Comprehensive Plan.

- (b) For the DEIS, it was assumed that only minor protection measures in the beltway study area were in place through USDA agricultural programs, conservation easements, floodplain ordinances, etc.
- (c) We agree that a better assumption is that the Lincoln/Lancaster Comprehensive Plan and local zoning affords the maximum protection. However, we would reduce the number of points to reflect the fact that the percent farmland is 81, 83 and 82 percent for the close, mid and far routes, respectively, due the presence of other uses in the area including agricultural residential (AGR) and highway commercial and industrial (H3, I-3, I-2, and I). Change assigned values to 16, 16.5 and 16.5, respectively.

Criterion 7: Size of Present Farm Unit Compared to Average.

- (a) PAL requests data supporting the scores of 5 for each route.
- (b) For the DEIS, the assumption was made that roughly 20 percent of the land uses in the rights-of-way were other than cropland or pasture/hayland. Using a weighted average, the highest possible score for this criterion would be 8 (out of a maximum of 10 points) if all the farm units were at least as large as the county average of 289 ac (Census of Agriculture, 1997). An assumption was made that farm units were smaller on average was due to the observed trends of farms being divided and sold for acreage subdivisions and farmstead split-offs. It was subjectively assumed that overall the average size of farms was 15 percent smaller than average, and the criterion was assigned 5 points (one point reduction for each 5 percent below average).
- (c) No change in calculations.

Criterion 10: On-Farm Investments.

- (a) PAL requests data supporting the scores of 12 for each of the three corridors.
- (b) The guidance says to use judgement in assigning points, and that 10-18 points should be assigned if the site is part of an average farming operation for the area. An assumption was already made that farm units were smaller on average was due to the observed trends of farms being divided and sold for acreage subdivisions and farmstead split-offs. For the DEIS, the routes were subjectively assigned 12 points each because there were no extraordinary farming investments noted in the area. While field terraces and drainage features are common, irrigation systems are unusual in the study area. Many of the barns and storage buildings are neither substantial nor well-maintained as documented in the historic survey report. There are no orchards or vineyards.
- (c) No change in calculations.

Criterion 12: Compatibility with Existing Agricultural Use.

- (a) PAL requests rationale or data supporting the score of 4 for each of the three corridors.

- (b) For the DEIS, a score of 4 was subjectively assigned in recognition that there is likely to be some farmland conversion at some of the beltway interchanges prior to growth of the city into this area (which is not expected for 50 to 100+ years). In the near term, most of the land adjacent to the beltway will not be adversely affected to the point of eliminating agricultural uses. For comparison, US 77 and I-80 through Lancaster County are compatible with existing agricultural uses, and they have not contributed to wholesale conversion of surrounding farmland to nonagricultural uses (see **Section 9.6.5.2** above). While some loss of agricultural lands to development has occurred, it has been related to planned development outlined in the Comprehensive Plan—such as that along the North 27th Street corridor, and at major interchanges (Cornhusker Highway on I-80, West O Street on US 77).
- (c) Change scores to 3, 4 and 5 for close, mid and far to reflect eventual timing of growth.

Recalculation of AD-1006. The suggested changes described above would result in scores of 151.5, 156.5 and 157.5 for SM-4/EC-1, SM-4/EM-1 and SM-4/EF-1, respectively. The revised scores would not change the findings in the DEIS which states that “because all scores are less than 160, no further consideration is required and the project is considered to have a minor effect on prime and unique farmland soils”.

Additionally, the purpose of completing the AD-1006 is to distinguish between alternatives as to which locations might be more or less suitable for preservation—relative to prime farmland resources. The results of the evaluation show that there is very little difference between the three alternatives.

If the score were to exceed 160, then it is recommended that other alternatives be developed. It is unlikely that other alternatives within the 80 sq mi study area would have significantly - different scores for either Part V or Part IV because of (1) the uniformity of soils types in the landscape (Sharpsburg-Pawnee-Burchard Association on the east and Wymore-Pawnee on the south), (2) similar types of farming operations, and (3) similar patterns of non-farm land uses. As such, other alternatives within the study area would have similar ratings.

Chapter 10

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Chapter 11

GLOSSARY AND LIST OF ABBREVIATIONS

11. GLOSSARY OF ABBREVIATIONS AND ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
AG	agricultural zoning
AGR	agricultural-residential zoning
bbf	billion barrels of oil
BNSF	Burlington Northern - Santa Fe Railway Company
BOS	Build Out Land Use Plan (Scenario I)
BOS II	Build Out Land Use Plan (Scenario II)
BTU	British Thermal Unit
CERCLIS	Comprehensive Environmental Response, Compensation, and Liabilities Index System
dBA	noise level in decibels weighted with A-frequency response
EIS	Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FWS	Fish and Wildlife Service
GIS	geographic information system
HOV	high occupancy vehicle
HUD	U.S. Department of Housing and Urban Development
I-80	U.S. Interstate 80
LES	Lincoln Electric System
LOS	level of service
LPSNRD	Lower Platte South Natural Resources District
LUST	leaking underground storage tank
LWCF	Land and Water Conservation Fund
N-2	Nebraska Highway 2
NAAQS	National Ambient Air Quality Standards
NAC	noise abatement criteria
NDEQ	Nebraska Department of Environmental Quality
NDOR	Nebraska Department of Roads
NEPA	National Environmental Policy Act
NeSHPO	Nebraska State Historic Preservation Office
NFA	no further action
NFIP	National Flood Insurance Program
NGPC	Nebraska Game and Parks Commission
NNHP	Nebraska National Heritage Program
NPL	National Priorities List
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OPPD	Omaha Public Power District
PM ₁₀	particulate matter
PPP	public participation program
RCRIS	Resource Conservation and Recovery Information System
ROW	right of way
RTSD	Rail Transportation Safety District

SFM	Nebraska State Fire Marshall
SHPO	State Historic Preservation Office
TDM	transportation demand management
TSD	treat, store, or dispose
TSM	transportation system management
UP	Union Pacific Railroad
US 77	U.S. Highway 77
US 6	U.S. Highway 6, Cornhusker Highway
US 34	U.S. Highway 34, O Street
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
V/C	volume to capacity ratios
VHT	vehicle hours traveled
VMT	vehicle miles traveled
WHPA	Wellhead Protection Area
WHPP	Wellhead Protection Program

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