Johnson Street/ Sandy Ridge Road

Feasibility Study

Prepared for:
City of High Point, North Carolina

Kimley-Horn
and Associates, Inc.

October 2002

FEASIBILITY STUDY

Johnson Street / Sandy Ridge Road

Guilford County

Division 7

Prepared by
Kimley-Horn and Associates, Inc.
for the City of High Point

October 2002

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NOTICE

This document supercedes a previous submittal dated February 2002.

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Guilford County

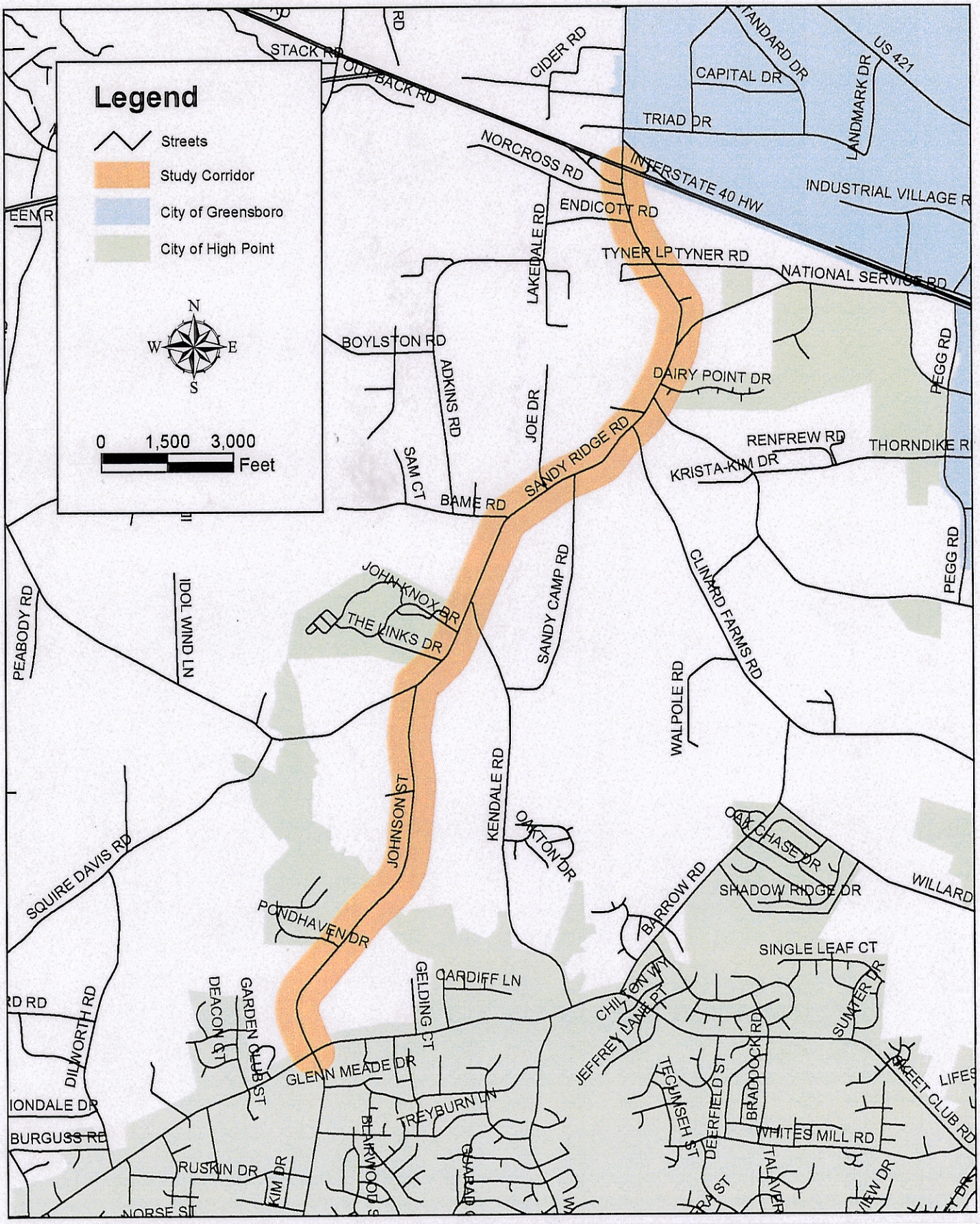
Johnson Street / Sandy Ridge Road

I. General Description

This feasibility study describes proposed improvements to the Johnson Street / Sandy Ridge Road corridor in Guilford County, north of High Point. The project study limits (see Figure 1) begin at Skeet Club Road and extend to Interstate 40, a distance of approximately 4.4 miles. Based on the findings of this study, the City of High Point recommends that the project be included in the State Transportation Improvement Program (TIP), and requests funding for additional planning studies, engineering design, right-of-way acquisition, and construction.

It is anticipated that approximately five (5) residences will be relocated due to this project. A preliminary estimate of cost was prepared by Kimley-Horn and Associates, Inc. This estimate includes $20,289,515 for construction and $4,940,300 for right-of-way (ROW) for a total cost of $25,229,815.

Construction	$ 20,289,515
Right-of-way	$ 4,940,300
Total Cost	**$ 25,229,815**



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JOHNSON STREET/SANDY RIDGE ROAD
FEASIBILITY STUDY

STUDY AREA

FIGURE 1

II. Study Methodology

The methodology used to conduct this study included the following steps:

- Project definition, purpose, and need
- Field reconnaissance, data collection, and observations
- Environmental screening
- Access management evaluation
- Existing condition intersection analyses
- Design year traffic projections
- Design year "no build" analyses
- Development and analysis treatment alternatives
- Functional plans and opinions of probable cost
- Project documentation

Traffic Analysis

Traffic operations are an important element in assessing the feasibility of improvements for the Johnson Street / Sandy Ridge Road corridor. Critical intersections within the study area were analyzed to determine the probable traffic impacts associated with design year volumes, the baseline cross-section, and other identified improvements. These analyses assume implementation by 2025.

The Transportation Research Board's ***Highway Capacity Manual***[1] (HCM) defines intersection capacity as the flow rate of traffic through an intersection during a specified period. This flow rate is influenced by many factors, such as roadway geometry, signal configuration and timing, prevailing traffic conditions, and weather. While capacity is a significant consideration and should not be overlooked, the evaluation of intersection operations is more appropriately based on Level-of-Service (LOS), which is a qualitative indicator of traffic operations. For signalized and unsignalized intersections, level-of-service is a measurement of delay time. The HCM defines six grades with LOS A representing the best operating condition and LOS F the worst. The level-of-service criteria for signalized and unsignalized intersections are given in Table 1 below.

Traffic counts provided by the City of High Point (City), the City of Greensboro (GDOT), and the North Carolina Department of Transportation (NCDOT) were used to conduct the analyses. Other data, obtained from either the City, GDOT, NCDOT, or from field reconnaissance, included intersection geometry, signal timing and phasing, and other traffic control measures.

Synchro 5.0 and *HCS2000* (software based on the principles defined in the HCM) were used to evaluate and determine the average delay and level-of-service at each intersection. Summary reports from the analyses are provided in the Appendix.

[1] ***Highway Capacity Manual***, National Research Council, Transportation Research Board, Washington, DC, 2000.

Table 1 Highway Capacity Manual Level of Service Definitions			
Signalized [2]		**Unsignalized** [3]	
Level of Service	Control Delay per Vehicle (s/veh)	Level of Service	Average Control Delay (s/veh)
A	≤ 10	A	0 - 10
B	> 10 - 20	B	> 10 - 15
C	> 30 - 35	C	> 15 - 25
D	> 35 - 55	D	> 25 - 35
E	> 55 - 80	E	> 35 - 50
F	> 80	F	> 50

Functional Criteria

The feasibility of any proposed enhancements hinges on the ability to satisfy certain design criteria. Such criteria focus on assumed travel speeds, vertical and horizontal alignment, sight distances, right-of-way, cross-section, drainage, and other features critical to providing a facility that is both safe and functional.

Basic design criteria have been established for various conditions, roadway types, and geometries. Many elements are accepted by federal, state, and local officials as minimum standards for design, the application of which generally cannot be altered without compromising the design. Others have a certain degree of flexibility and therefore can vary from alternative to alternative.

At the City's direction, the design criteria used for this evaluation are based on ***A Policy on Geometric Design of Highways and Streets***[4] and the North Carolina Department of Transportation's Roadway Design Manual.

[2] HCM2000 Table 16-2
[3] HCM2000 Table 17-2
[4] ***A Policy on Geometric Design of Highways and Streets***, AASHTO, Fourth Edition, 2001.

III. Project Purpose and Need

The City of High Point has identified the need to upgrade the Johnson Street / Sandy Ridge Road corridor. Three identified components of the City's purpose and need for the project are:

1. to relieve congestion on NC 68 (running parallel to the corridor, about 1.5 miles to the east);
2. to provide an alternative route to and from I-40 and Piedmont Triad International Airport; and
3. to address anticipated growth along the corridor and in northwest High Point.

The identified study area for the project encompasses Johnson Street and Sandy Ridge Road, north of High Point, between Skeet Club Road and Interstate 40, a distance of approximately 4.4 miles (as shown on Figure 1). Based on the findings and recommendations documented in the ***Johnson Street / Sandy Ridge Road Area Plan*** in 1999, the City has determined that a four-lane divided treatment, with a landscaped median, is the most viable cross-section for the project.

Johnson Street within the City of High Point was recently widened to a five-lane cross-section to Skeet Club Road. North of Skeet Club, it is a two-lane secondary route (SR 1818) carrying an estimated 3,100 vehicles per day (vpd) near the Sandy Ridge Road intersection (1999 NCDOT counts). Johnson Street intersects Sandy Ridge Road approximately one mile north of Deep River. Recent development along Johnson Street includes Johnson Street Sports Complex and the Meadow Creek residential subdivision.

Sandy Ridge Road is also a two-lane secondary route (SR 1850). Traffic volumes as high as 11,000 vpd were recorded by NCDOT in 1999 near I-40, but are considerably lower further to the south. Prominent features along Sandy Ridge Road include two cemeteries adjacent to the existing roadway and access to Sandy Ridge (River Run) golf course, Colfax / Guilford County Fire Station #26, and the Farmer's Market.

The Sandy Ridge Road interchange with I-40 (at the northern end of the proposed project) is currently being modified in conjunction with widening on I-40.

With approximately 20 existing intersections and numerous driveways providing access to the corridor from numerous private properties, the strategic placement of median breaks is critical to the functionality of the facility. Significant intersections along the corridor include:

Skeet Club Road
Meadow Creek Drive
Cedar Spring Drive
Kendale Road
Bame Road
Joe Drive
Sandy Camp Road
Clinard Farms Road
Rose Haven Drive
Gallimore Dairy Road
National Service Road
Partridge Road
Tyner Road
Tyner Loop
Endicott Road
Norcross Road
I-40 Eastbound Ramps

The posted speed limit varies from 45 miles per hour (mph) to 55 mph through the corridor.

- **Crash Summary**

The crash history of the corridor was reviewed. Using the latest available data provided by the North Carolina Department of Transportation, 49 crashes occurred during the three-year period from June 1, 1998 to May 31, 2001 (reports are attached). A review of this data did not conclusively reveal a pattern of incidents occurring at isolated locations that might be either the result of existing deficiencies or correctable by means of enhanced traffic control measures and/or devices.

As shown in the summaries provided in Tables 2 and 3, 26 of the 49 crashes recorded along the Johnson Street/Sandy Ridge Road corridor occurred at the studied intersections. Of the remaining 23 crashes, seven occurred at the intersection of Norcross Road and Sandy Ridge Road located just south of the intersection of Sandy Ridge Road and the I-40 eastbound ramp.

None of the reported incidents involved fatalities, 19 produced injuries, and 30 resulted in property damage only (PDO). Nine of the crashes occurred at night and seven were on wet pavement. None recorded during this period involved the use of drugs or alcohol.

Table 2
Crash History Summary

Intersection	Crashes		
	Fatal	Injury	PDO
Sandy Ridge Rd & I-40 EB Ramps	0	7	5
Sandy Ridge Rd & National Service Rd	0	2	3
Sandy Ridge Rd & Gallimore Dairy Rd	0	0	0
Sandy Ridge Rd & Clinard Farms Rd	0	1	2
Johnson St & Sandy Ridge Rd	0	0	0
Johnson St & Skeet Club Rd	0	2	4
Total	**0**	**12**	**14**

Table 3 Crash History by Type	
Crash Type	**Crashes**
Sandy Ridge Rd & I-40 EB Ramps	
Overturn / Rollover	2
Fixed Object	1
Rear End	1
Left-turn, Same Roadway	2
Left-turn, Different Roadways	3
Sideswipe, Same Direction	2
Angle	1
Sandy Ridge Rd & National Service Rd	
Ran off Road, Right	1
Hit Animal	1
Rear End	2
Left-turn, Same Roadway	1
Sandy Ridge Rd & Clinard Farms Rd	
Left-turn, Same Roadway	1
Left-turn, Different Roadways	1
Angle	1
Johnson St & Skeet Club Rd	
Ran off Road, Left	1
Rear End	1
Left-turn, Different Roadways	2
Sideswipe, Opposite Direction	1
Angle	1

Existing Conditions Analysis

A thorough evaluation of traffic operations is essential to the determination of needs for the project corridor. To accomplish this, the following six (6) critical intersections were subjected to existing and design year capacity and level-of-service analyses:

1. Skeet Club Road (signalized)
2. Sandy Ridge Road/Johnson Street (proposed Piedmont Parkway Extension)
3. Clinard Farms Road
4. Gallimore Dairy Road
5. National Service Road
6. I-40 Eastbound Ramps (signalized)

The signalized intersections of Sandy Ridge Road with the Interstate 40 (I-40) eastbound ramp and Johnson Street with Skeet Club Road were analyzed using *Synchro 5.0*, while the unsignalized intersections of Sandy Ridge Road with National Service Road, Gallimore Dairy Road, Clinard Farms Road, and Johnson Street were analyzed using *HCS2000*. The existing laneage is shown in Figure 2.

On an average weekday, peak travel periods typically occur between 7:00 AM and 9:00 AM, and between 4:00 PM and 6:00 PM. Roadways are therefore more congested during these hours than during non-peak times. Existing conditions analyses of the subject intersections were conducted using current intersection geometries, control measures, and the peak hour volumes collected by the City of High Point and others between 1998 and 2001. These volumes, as depicted in Figure 3, were adjusted for inclusion in the network analysis. Using the methodology described earlier, the operational characteristics of each intersection within the study area were evaluated. Table 4 below summarizes the findings for existing conditions.

Table 4
Existing (2001) Traffic Conditions Summary

Intersection	AM Peak Hour			PM Peak Hour		
	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c
Sandy Ridge Rd & I-40 EB Ramp	D	42.3	0.72	B	14.5	0.54
Sandy Ridge Rd & National Service Rd	A	4.2	-	A	7.0	-
Sandy Ridge Rd & Gallimore Dairy Rd	A	4.4	-	C	18.3	-
Sandy Ridge Rd & Clinard Farms Rd	A	6.3	-	B	11.4	-
Johnson St & Sandy Ridge Rd	C	15.7	-	A	4.1	-
Johnson St & Skeet Club Rd	A	7.8	0.33	A	9.8	0.50

These analyses for existing conditions indicate that levels-of-service (LOS) along the Johnson Street/Sandy Ridge Road corridor are within acceptable limits for the AM and PM peak hours of operation.

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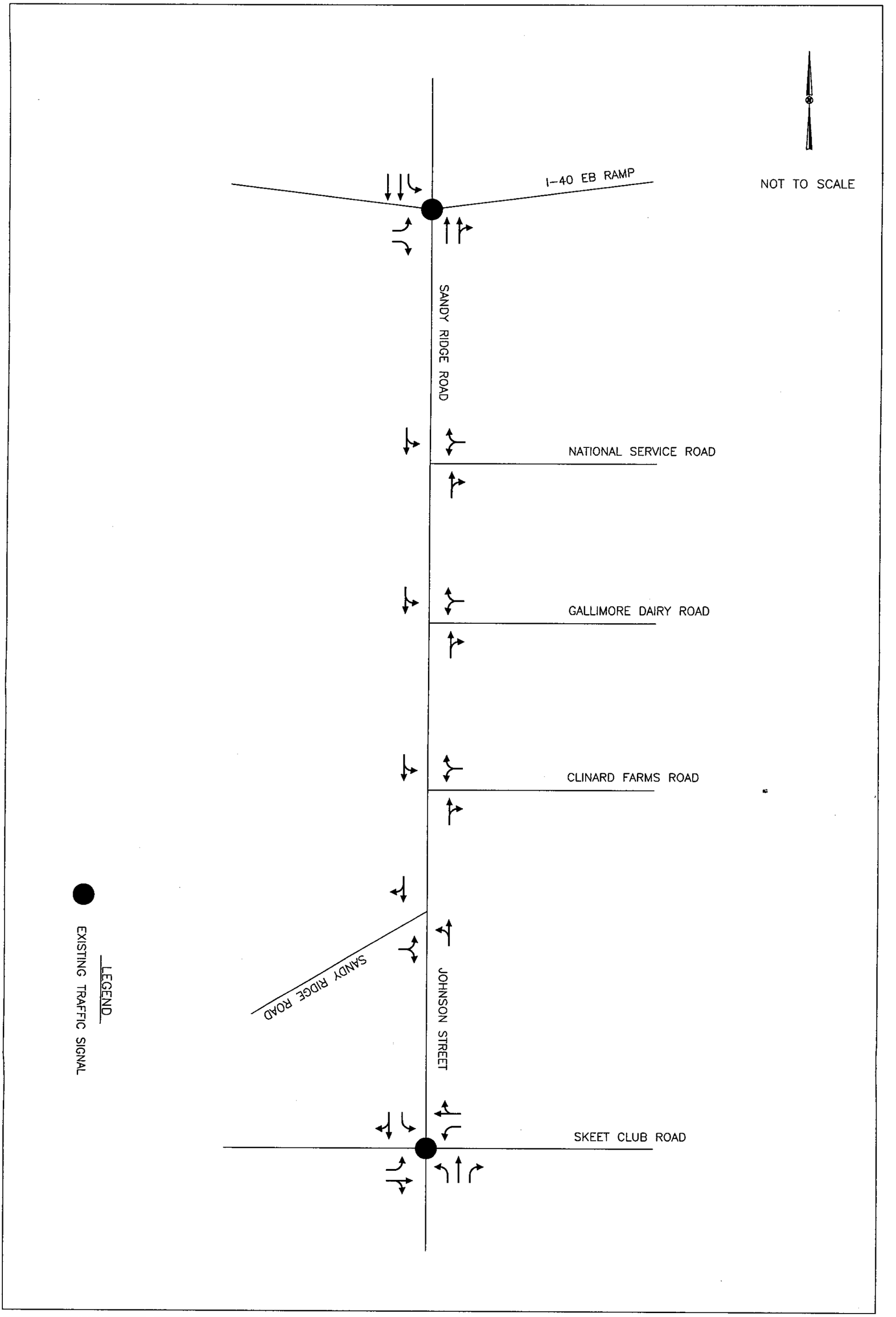

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JOHNSON STREET/SANDY RIDGE ROAD
FEASIBILITY STUDY

EXISTING LANEAGE

FIGURE
2

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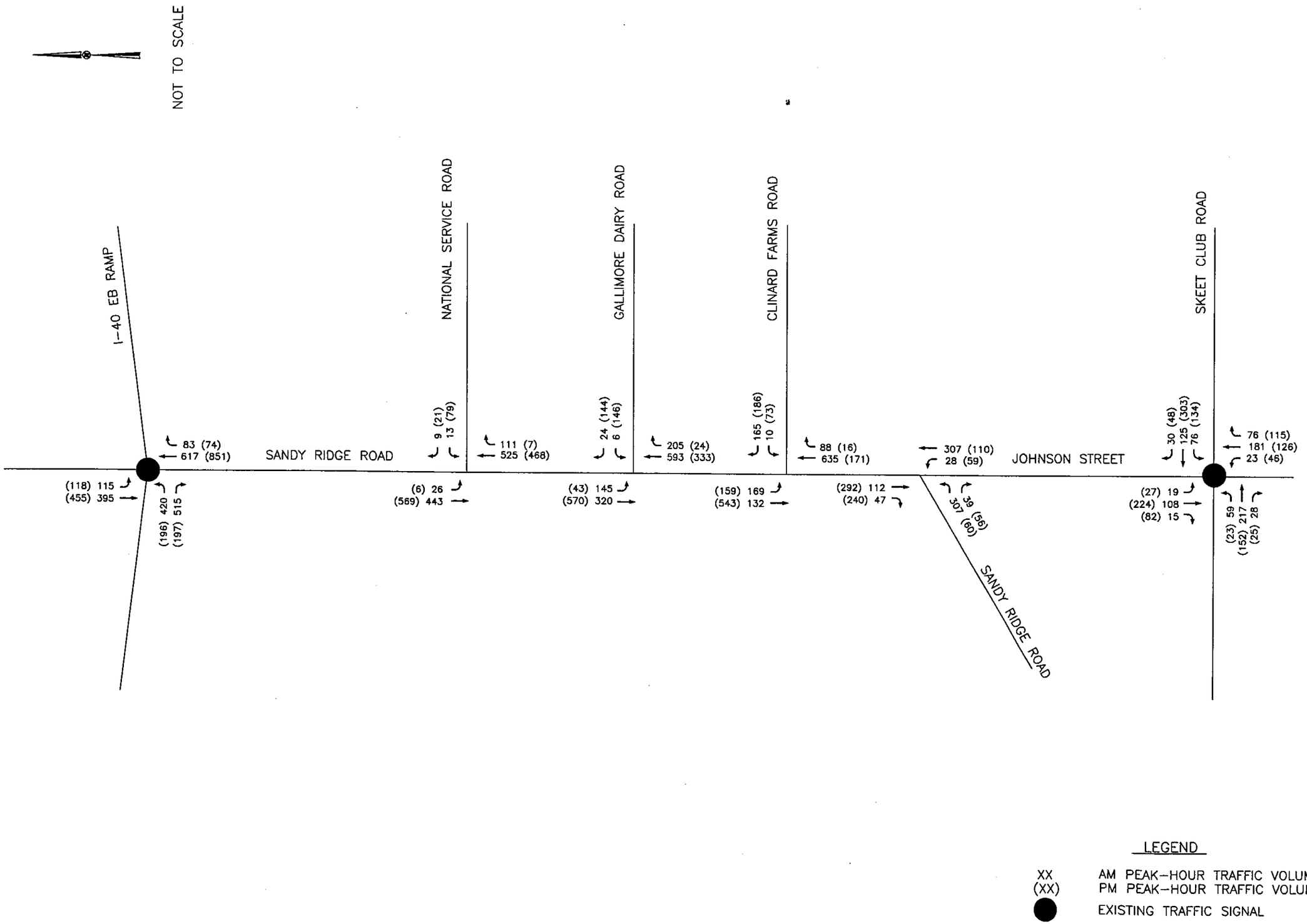

FIGURE 3

EXISTING TRAFFIC VOLUMES

JOHNSON STREET/SANDY RIDGE ROAD FEASIBILITY STUDY

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Design Year Projections and "No Build" Conditions Analysis

To effectively evaluate the impacts of the identified alternatives, traffic volumes must be estimated and reassigned appropriately to reflect design year (2025) conditions. Based on analysis of historical traffic data and discussions with the City and NCDOT's Statewide Planning Branch, a growth rate of five (5) percent per year was used to forecast 2025 design year traffic volumes, as seen in Figure 4. This rate is consistent with growth patterns experienced in the Triad region in recent years and is appropriate for several reasons. First, historical data compiled by the City of High Point suggests that growth near the northern end of the corridor has exceeded this rate in the short term. Second, the development of industrial and commercial properties in the Triad region between High Point, Greensboro, and Winston-Salem, which generally surrounds the I-40 corridor, is a continuing trend. Lastly, the development of a regional air cargo hub by FedEx at the Piedmont Triad International Airport could (and is expected to) provide the impetus for additional growth opportunities in or adjacent to the study area. When compounded over an extended period of time, this growth rate presents a conservative estimate of future year conditions without unnecessarily over-designing the project.

To establish a baseline for design year comparison, each of the subject intersections was evaluated for a "no build" scenario, which assumes that roadway and traffic control conditions will remain unchanged from the current configurations (with the exception of scheduled improvements to Skeet Club Road). The results of this evaluation, as expected, indicate that intersection operations will deteriorate dramatically to unacceptable LOS. For all locations and time periods, the estimated delay time per vehicle pushes LOS to either "E" or "F", and volumes exceed capacities. These results are shown in Table 5.

Table 5
2025 Traffic Conditions Summary No Build

Intersection	AM Peak Hour			PM Peak Hour		
	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c
Sandy Ridge Rd & I-40 EB Ramp	F	556.0	2.41	F	462.3	1.85
Sandy Ridge Rd & National Service Rd	D	32.9	-	F	94.6	-
Sandy Ridge Rd & Gallimore Dairy Rd	F	382.4	-	F	236.8	-
Sandy Ridge Rd & Clinard Farms Rd	F	396.6	-	F	234.5	-
Johnson St & Sandy Ridge Rd	F	415.1	-	F	150.0	-
Johnson St & Skeet Club Rd.	D	46.9	1.08	F	130.4	1.63

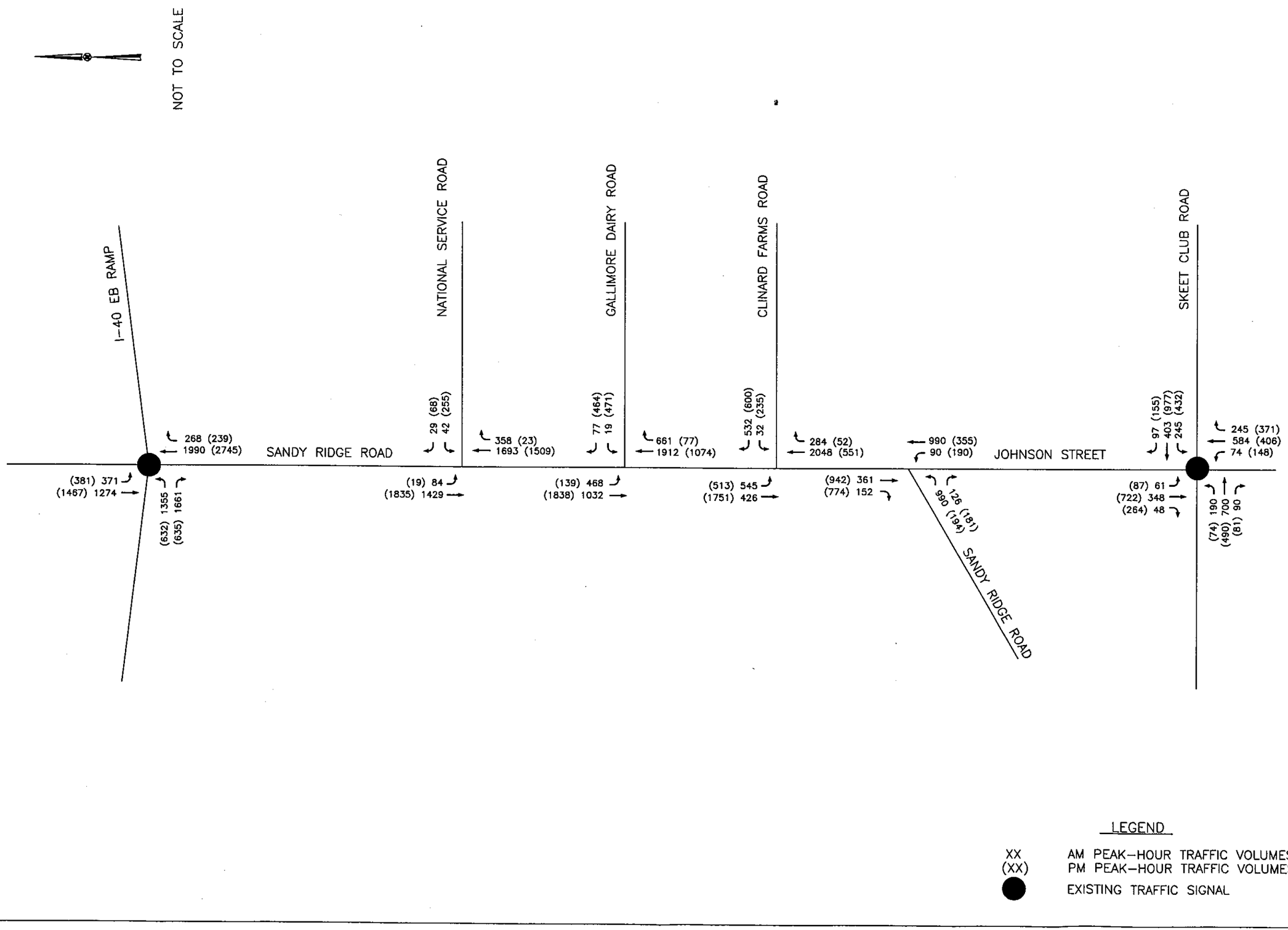

FIGURE 4

2025 PROJECTED TRAFFIC VOLUMES

JOHNSON STREET/SANDY RIDGE ROAD FEASIBILITY STUDY

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IV. Environmental Screening

The following is a preliminary review of environmental issues that have a potential impact to the project. The information obtained for the environmental screening is from readily available database information only. No survey work other then a field inspection was prepared for this study. The environmental screening is not a substitute for the project planning/environmental documentation process. The purpose of the screening is to identify potential environmental issues early in the process. For this study, these issues were identified within the corridor along the existing alignment of Johnson Street and Sandy Ridge Road between Skeet Club Road and Interstate 40. Figure 5 shows the water-related environmental features, and Figure 6 shows the locations of other potential environmental issues.

Stream Classification

The proposed project corridor is located in the Cape Fear River Basin. The project corridor crosses the West Fork of Deep River. The West Fork of Deep River is classified as a Water Supply IV Watershed (WS-IV). Some portions of the study area are designated as protected areas of the watershed, while the section immediately surrounding the river is defined as a critical area. The regulations concerning this watershed area are provided in the Water Supply Watershed Protection Rules, sections 15A NCAC 2B .0248 through .0251, defined by the North Carolina Department of Environment and Natural Resources (NCDENR), Division of Water Quality (DWQ).

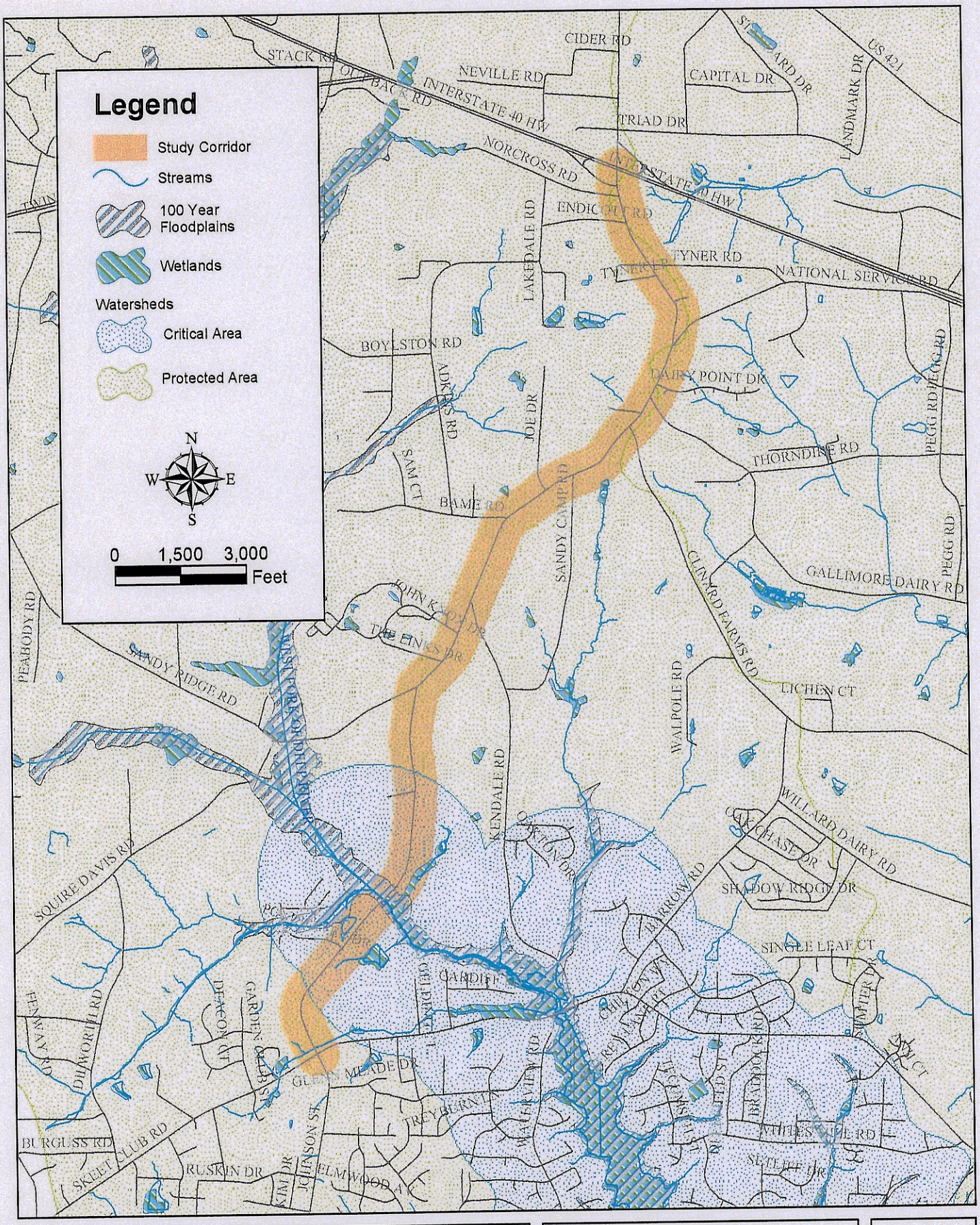
There is an existing two-lane bridge over the West Fork of Deep River at the crossing of Johnson Street. The river will be surveyed and have the appropriate coordination with NCDENR and the U.S. Army Corps of Engineers (USACE) during any environmental document study.

Floodplains

Guilford County is a regular participant in the National Flood Insurance Program. Digital Federal Emergency Management Agency (FEMA) floodplain maps provided by the City of High Point were reviewed to determine whether the proposed project corridor would cross the 100-year floodplain. The 100-year floodplain is located along the West Fork of Deep River, and the width of the floodplain at the Johnson Street crossing of the West Fork is approximately 500 feet. No base flood elevations were provided. When constructing this project, local and state regulations regarding the 100-year floodplain will be followed.

Wetlands

National Wetland Inventory (NWI) maps for the Guilford and Kernersville quads (USGS) were reviewed to determine whether the proposed project corridor impacts any wetlands. The only wetlands crossed by the proposed project corridor are those associated with the West Fork of Deep River. During the preparation of any environmental documentation, it is recommended that these wetlands be surveyed and delineated. Proper permitting from the U.S. Army Corps of Engineers will be obtained before construction of the project, and appropriate mitigation measures will be taken.



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JOHNSON STREET/SANDY RIDGE ROAD
FEASIBILITY STUDY

WATER FEATURES

FIGURE 5

Historic Properties and Archaeological Sites

As part of the environmental screening process, the North Carolina State Historic Preservation Office (SHPO) was contacted to determine if any historic resources on the National Register of Historic Places or state lists exist within the proposed project corridor. No historic properties were found on the National Register or any North Carolina surveys.

For the purpose of this screening, a field inspection was conducted to identify properties within the study corridor that had the potential to be older then 50 years. Based on the field review several old barns were identified in the vicinity of the project. The locations of these buildings are shown in Figure 6.

Two cemeteries were identified adjacent to Sandy Ridge Road. These are located on the west side of Sandy Ridge Road at Tyner Loop, and on the east side of Sandy Ridge Road just south of Sandy Camp Road. Three churches are also located along the project corridor. These are: Zion Hill United Methodist Church, north of Tyner Loop on the west side of Sandy Ridge Road; Smith Grove Baptist Church, south of Tyner Loop on the west side of Sandy Ridge Road; and Sandy Ridge United Methodist Church, north of Joe Drive on the west side of Sandy Ridge Road. The locations of the cemeteries and churches are also shown in Figure 6.

Threatened and Endangered Species

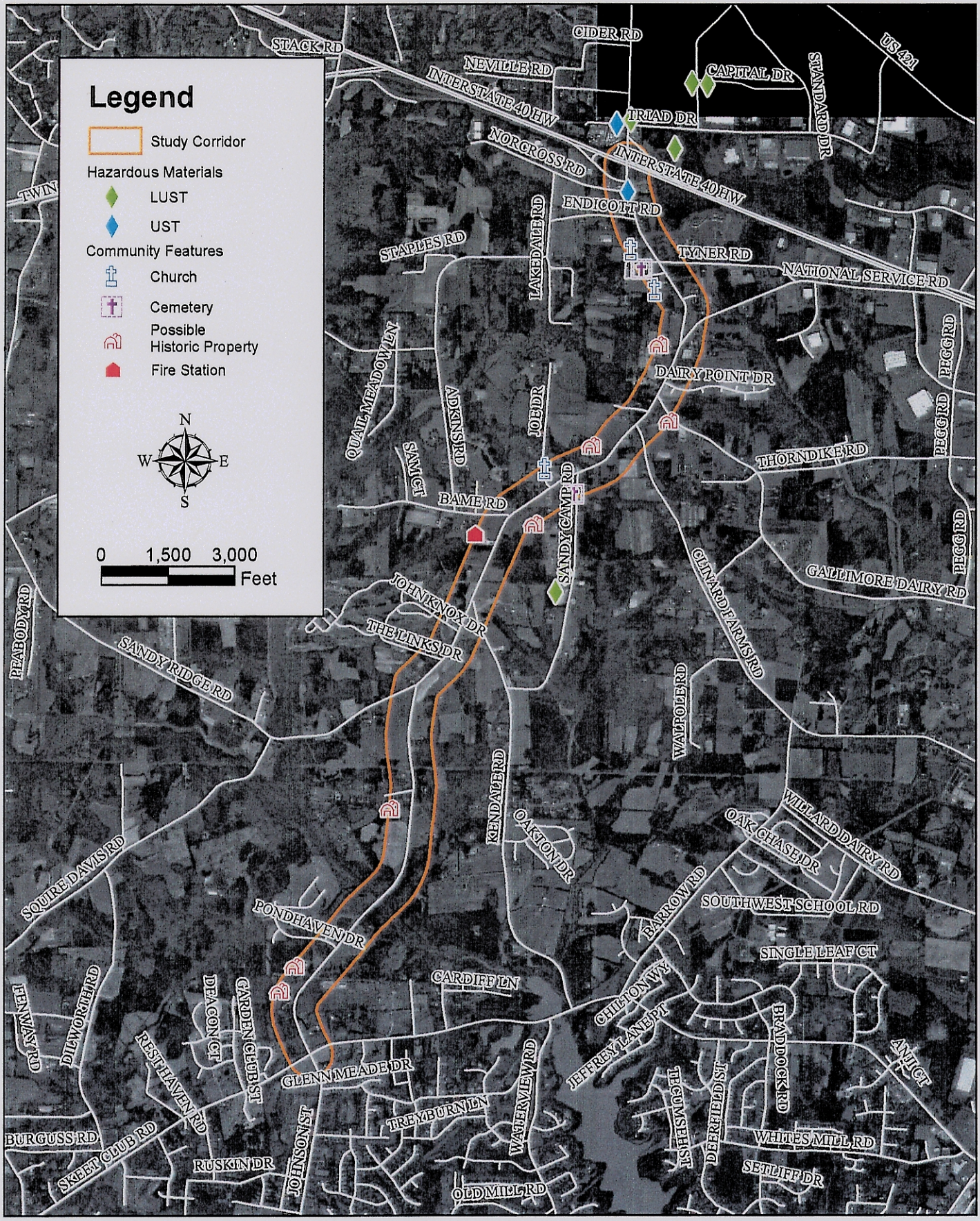
The North Carolina Natural Heritage Program was contacted to determine the presence of any threatened and endangered species within the proposed project corridor. One rare animal species was found in the vicinity of the proposed project. This is the Greensboro Burrowing Crayfish *(Cambarus Catagius)*, which has a state status of Significantly Rare. The species is not listed on Federal Threatened and Endangered Species lists[5].

A survey for this species may need to be completed during preparation of any environmental documentation, and if the species is found to be present, additional investigations may be warranted.

Hazardous Materials

Because of the liability associated with purchasing properties containing hazardous materials, State and Federal hazardous materials databases were reviewed using information provided by Environmental Data Resources, Inc. Five sites near the proposed corridor were determined to contain potential hazardous materials. Two sites contained registered underground storage tanks, and four sites have reported incidents of leaking underground storage tanks. Figure 6 shows the location of sites of potential concern, and Table 6 provides information regarding each site. Before purchasing right-of-way property for the proposed project corridor, a Phase I environmental audit will be conducted to determine potential hazardous materials impacts.

[5] North Carolina Natural Heritage Program, 2001.



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JOHNSON STREET/SANDY RIDGE ROAD FEASIBILITY STUDY

ENVIRONMENTAL FEATURES

FIGURE 6

Table 6 Potential Hazardous Materials Impacts			
	Facility Name	**Facility Address**	**Type of Potential Impact**
1	Coca-Cola Capital Drive	8200 Capital Drive, Greensboro	LUST[a]
2	Sunox, Inc.	8625 Triad Drive, Colfax	LUST, UST[b]
3	Neighbors Store #9	8400 Norcross Road, Colfax	UST
4	Northern Hydraulics	I-40 / Sandy Ridge Road, Greensboro	LUST
5	NCDOT – High Point	4715 Sandy Camp Road, High Point	LUST
Total			2 USTs 4 LUSTs

[a]LUST = Leaking Underground Storage Tank – Facility has reported leaking underground storage tank incident(s).
[b]UST = Underground Storage Tank – Facility manages registered underground storage tanks.

Source: Environmental Data Resources, Inc., 2001.

V. Description of Alternatives

Functional Plan Preparation

The preparation of functional plans is a major step toward protecting a future roadway corridor from proposed development activities. Using available mapping received from the City of High Point and other resources, alternative alignments were prepared, evaluated, and offered for consideration.

The City of High Point, through the ***Johnson Street / Sandy Ridge Road Area Plan***, determined that a typical four-lane divided "parkway" cross-section would be the most appropriate treatment for roadway enhancements. The facility would include sidewalk on both sides of the corridor, as well as a wider outside travel lane to accommodate cyclists.

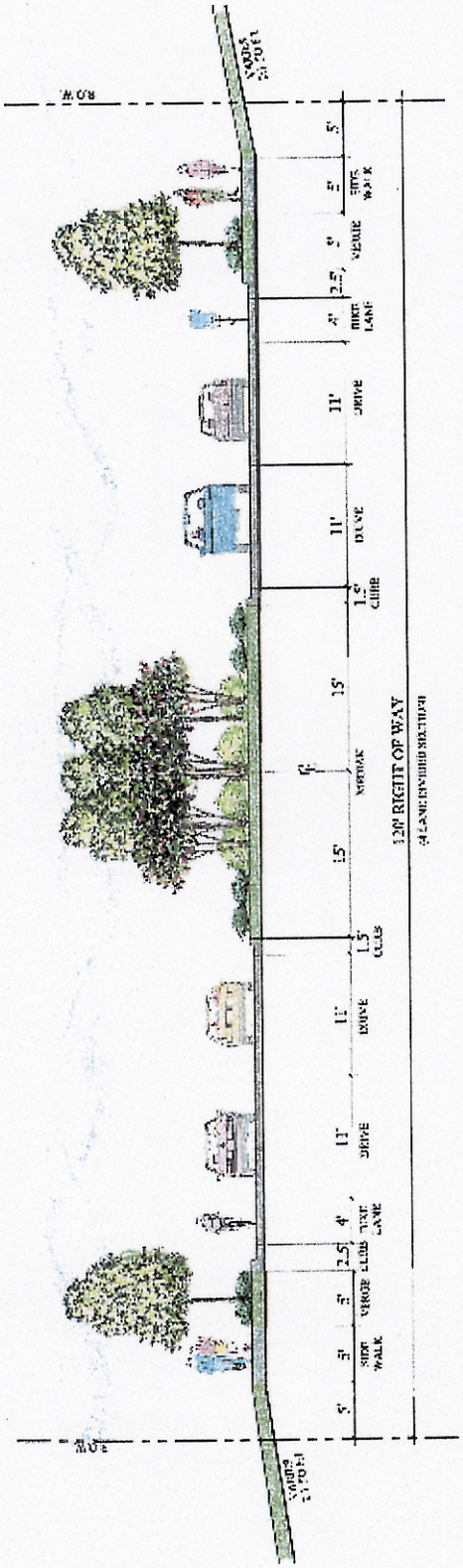
Discussions with High Point Department of Transportation staff determined that wherever possible, the basic centerline alignment should generally follow the existing Johnson Street / Sandy Ridge Road route. Deviations from the corridor were to be made only as necessary to meet specific design criteria, to reduce the impacts on abutting properties, or to avoid constraining features that would be impractical or costly to relocate (such as an electric power transmission line). The design criteria for the project are depicted in Table 7.

Functional plans for the corridor also took into consideration the proposed extension of Piedmont Parkway from Clinard Farms Road westward across Johnson Street to Sandy Ridge Road. Although a schedule for this extension has not been established, it is assumed that Piedmont Parkway will be in place by the design year of 2025.

Plans were prepared on a scale of 1" = 100' as overlays on existing aerial photography of the corridor, and depict the proposed centerline, horizontal curvature, locations of median breaks, and existing and proposed rights-of-way. Profiles of the vertical alignment were prepared using available topographic mapping for the area. Current standards used by the North Carolina Department of Transportation for roadway design were applied throughout.

Table 7 Roadway Design Criteria	
Design Element	**Recommended Standards**
Functional Classification	Urban Arterial
Design Speed	50 mph
Typical Section	
Lane Width	12 feet inside lane 14 feet outside lane
Berm Width	11 feet
Median Width	30 feet
Roadway Curb	2'-6" C&G
Median Curb	1'-6" C&G
Right-of-Way Width	120 feet
Horizontal Alignment	
Maximum Degree of Curve	6 degrees 45 minutes
Minimum Radius	849 feet
Superelevation Rate	e max = 0.06 ft/ft
Cross Slope	e = 0.0208 ft/ft
Vertical Alignment	
Maximum Grade	8%
Stopping Sight Distance	2001 AASHTO Standards
Length of Vertical Curve	2001 AASHTO Standards
Hydraulics	
Design Discharge	50 year frequency cross pipes and culverts 10 year frequency for storm drains 10 year frequency for ditches 4 inches per hour for inlet capacities and gutter spread
Hydrology	City of High Point Standard and NCDOT Guidelines for Drainage Studies and Hydraulic Design in conjunction with "USGS Water Resources Investigations Report 87-4096"
Hydraulics	City of High Point Standard and NCDOT Guidelines for Drainage Studies and Hydraulic Design in conjunction with FHWA's Publication Circular Nos. 5, 11, 12, 15, 19.
Sources: ***A Policy on Geometric Design of Highways and Streets***, AASHTO, 2001 and North Carolina Department of Transportation Roadway Design Manual.	

In addition to engineering drawings, an artistic rendering of the proposed cross-section was also prepared (Figure 7). This rendering depicts the four-lane parkway concept within the proposed 120-foot right-of-way. The functional designs are provided as an attachment to this report.



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JOHNSON STREET/SANDY RIDGE ROAD
FEASIBILITY STUDY

PROPOSED CROSS-SECTION

FIGURE 7

Alternative 1

In the development of functional plans, Kimley-Horn and Associates was able to manipulate the assumed four-lane divided cross-section within the proposed 120-foot right-of-way to meet the defined criteria for design speed and horizontal and vertical limitations. As necessary, the alignment shifts off the current centerline to either meet the design criteria, or more frequently, to reduce impacts to abutting properties or to avoid a significant physical constraint. This resulting corridor alignment is identified as Alternative 1, and is shown schematically on Figure 8.

Alternative 2

The northern third of the Johnson Street / Sandy Ridge Road corridor accommodates a significant number of single-family residences, three churches, two cemeteries, and several commercial and/or industrial properties. Furthermore, the existing alignment of the roadway is such that providing a functional plan for improvements that satisfies the design criteria would have significant impacts on these properties and require several substantial acquisitions.

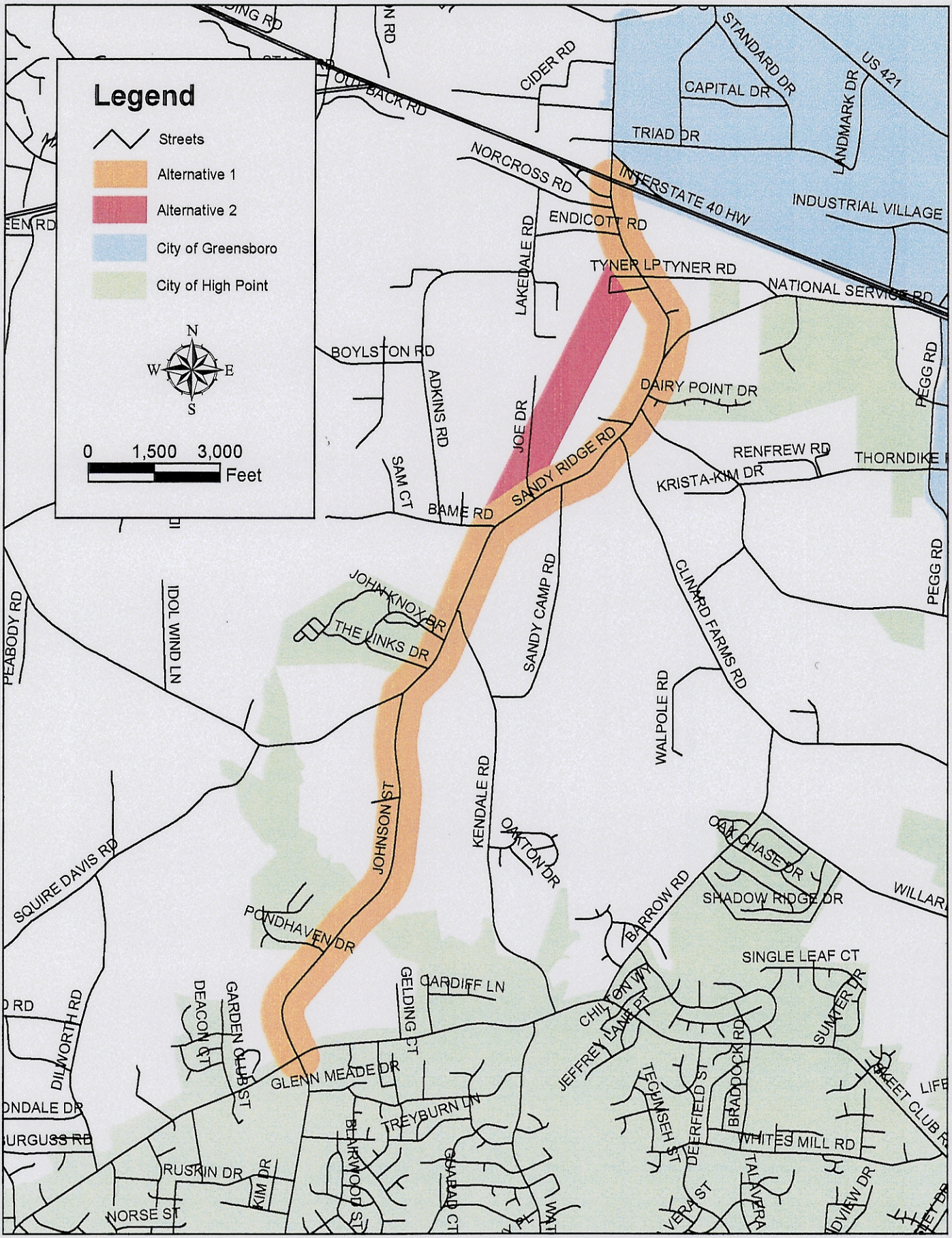
To address these impacts, a second "new location" alignment was prepared and evaluated. By taking the corridor cross-country to the west of the existing corridor, from south of Clinard Farms Road to Endicott Road, the impacts to several homes and the church properties along the primary corridor could conceivably be reduced. This option, labeled Alternative 2 on Figure 8, does not present any additional known environmental impacts, but requires the acquisition of a significant amount of right-of-way, and necessitates the lengthy extension of several intersecting routes from their existing terminal points along the existing corridor. In addition, the extension of Tyner Road proposed with this alternative would present greater impacts to a church and cemetery on the west side of Sandy Ridge Road.

Other Options for Consideration

As discussed earlier in this report, controlling access to a roadway facility preserves capacity and enhances safety. With these objectives in mind, the desirable cross-section for the corridor would provide a median element that would substantially limit the number and location of vehicular turning movements.

Properties on the northern end of the corridor, near the I-40 interchange, are distinctly commercial in nature. Several are developed and operating, while other tracts are currently being marketed for their commercial appeal. It is essential to maintain an adequate level of accessibility to such properties without compromising the integrity of the proposed roadway enhancements.

An option (which does not affect the general alignment of the corridor or the two primary alternatives) was developed for the realignment of Endicott Road, and the construction of a parallel service road from Endicott Road to Norcross Road.



Kimley-Horn and Associates, Inc.

JOHNSON STREET/SANDY RIDGE ROAD
FEASIBILITY STUDY

ALTERNATIVE CORRIDORS

FIGURE 8

Traffic Analysis

Three design year traffic scenarios were evaluated. These scenarios are independent of the alignment alternative chosen, but present various options for signalization and additional laneage at key intersections.

Design Year 2025 with Four-Lane Divided Parkway

As shown earlier on Figure 4, traffic volumes are expected to grow by 322 percent from the present to the projected 2025 design year. Given this rate of growth, substantial improvements will be necessary along the Johnson Street/Sandy Ridge Road corridor. The first scenario evaluated, shown in Figure 9, incorporates the addition of an additional through lane in each direction on Johnson Street / Sandy Ridge Road, as well as single left turn lanes at each of the intersections analyzed (median breaks are proposed at each). The results are shown in Table 8; in summary, the addition of through lanes and left turn lanes provides some relief for vehicle delay, but operational conditions remain below acceptable levels-of-service.

Table 8
2025 Traffic Conditions Summary With Improvements

Intersection	AM Peak Hour			PM Peak Hour		
	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c
Sandy Ridge Rd & I-40 EB Ramp	F	556.0	2.41	F	462.3	1.85
Sandy Ridge Rd & National Service Rd	D	33.2	-	F	94.6	-
Sandy Ridge Rd & Gallimore Dairy Rd	F	382.4	-	F	236.9	-
Sandy Ridge Rd & Clinard Farms Rd	F	396.6	-	F	234.6	-
Johnson St & Sandy Ridge Rd	F	415.1	-	F	150.1	-
Johnson St & Skeet Club Rd.	C	21.6	0.73	E	78.7	1.39

FIGURE 9

2025 FOUR-LANE DIVIDED PARKWAY LANEAGE

JOHNSON STREET/SANDY RIDGE ROAD FEASIBILITY STUDY

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Design Year with Additional Improvements - I

Given the overall volumes projected for the design year, which applies not only to through traffic on Johnson Street / Sandy Ridge Road but also to turning movements to and from the intersecting routes, signalization will likely be necessary at all of the analyzed intersections. If implemented, it is reasonable to assume that most of these signals will operate in a coordinated system (at least those from Clinard Farms north to I-40), and therefore the corridor has been modeled for such conditions. In addition, to achieve more acceptable operational levels-of-service, right turn lanes from the main corridor and multiple lanes exiting the side routes may also be required and have been incorporated into this scenario. Also included is the proposed extension of Piedmont Parkway to Johnson Street at Sandy Ridge Road. Volume adjustments that reflect this addition are shown on Figure 10. The laneage for the scenario is depicted on Figure 11. Table 9 summarizes the evaluation results.

Table 9
2025 Traffic Conditions Summary w/ Additional Improvements and Signalization - I

Intersection	AM Peak Hour			PM Peak Hour		
	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c
Sandy Ridge Rd & I-40 EB Ramp	F	433.4	2.26	F	253.5	1.69
Sandy Ridge Rd & National Service Rd	A	5.5	0.77	B	15.5	0.76
Sandy Ridge Rd & Gallimore Dairy Rd	C	27.9	1.02	C	30.3	0.90
Sandy Ridge Rd & Clinard Farms Rd	C	21.7	0.84	B	15.2	0.79
Johnson St & Sandy Ridge Rd	D	44.8	0.92	C	29.0	0.63
Johnson St & Skeet Club Rd.	C	22.4	0.65	C	31.5	0.84

These results clearly show that the addition of laneage and signalized intersection operations reduces the average delay, thereby providing better levels-of-service. Even so, conditions at the I-40 ramps intersection remain at LOS "F" during both peak evaluations. A review of each location analyzed for this scenario reveals that for the most part, through lane operations are either at or above acceptable thresholds. However, individual movements at some intersections experience longer, more significant delays that should be addressed.

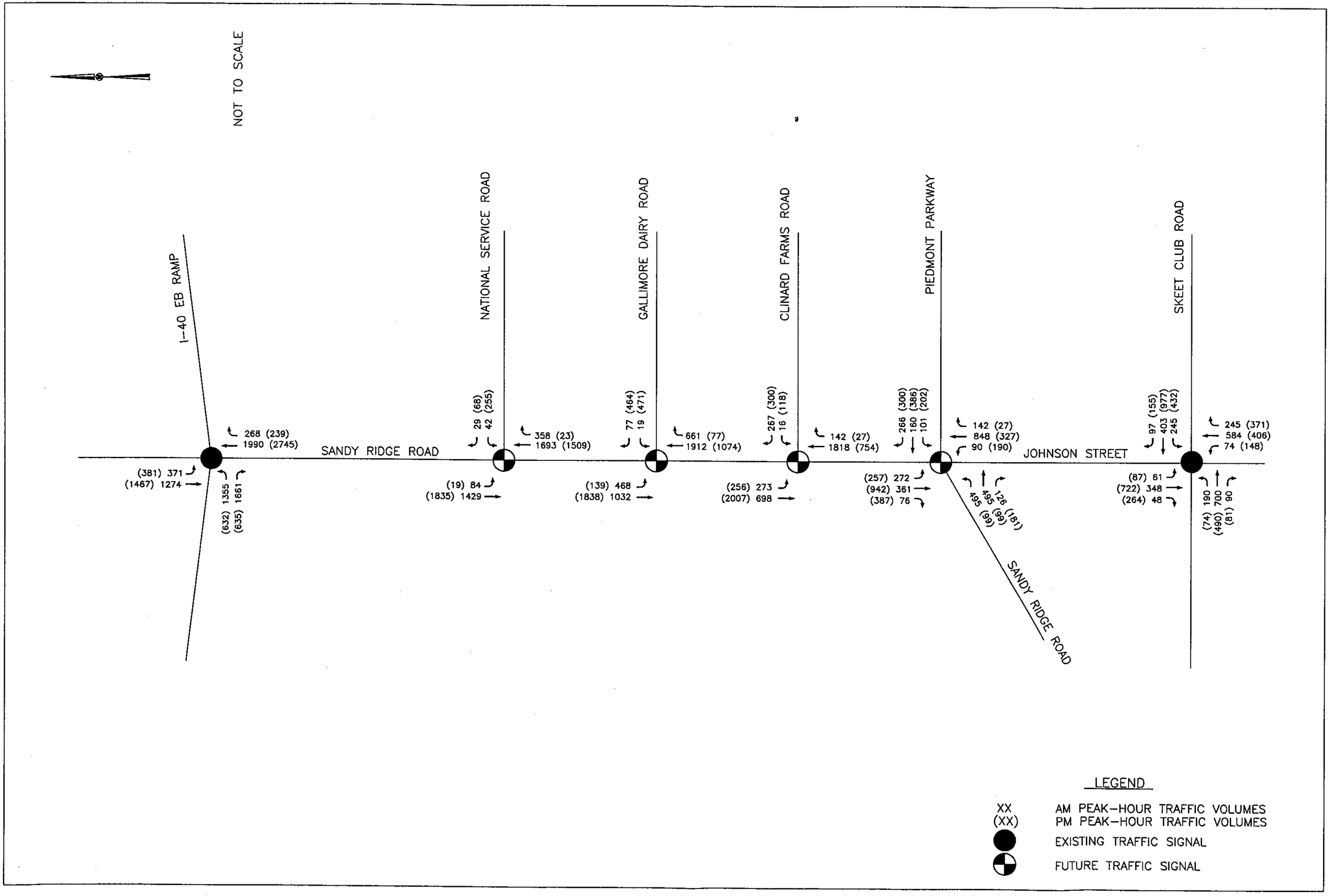

FIGURE 10

2025 PROJECTED TRAFFIC VOLUMES WITH PIEDMONT PARKWAY

JOHNSON STREET/SANDY RIDGE ROAD FEASIBILITY STUDY

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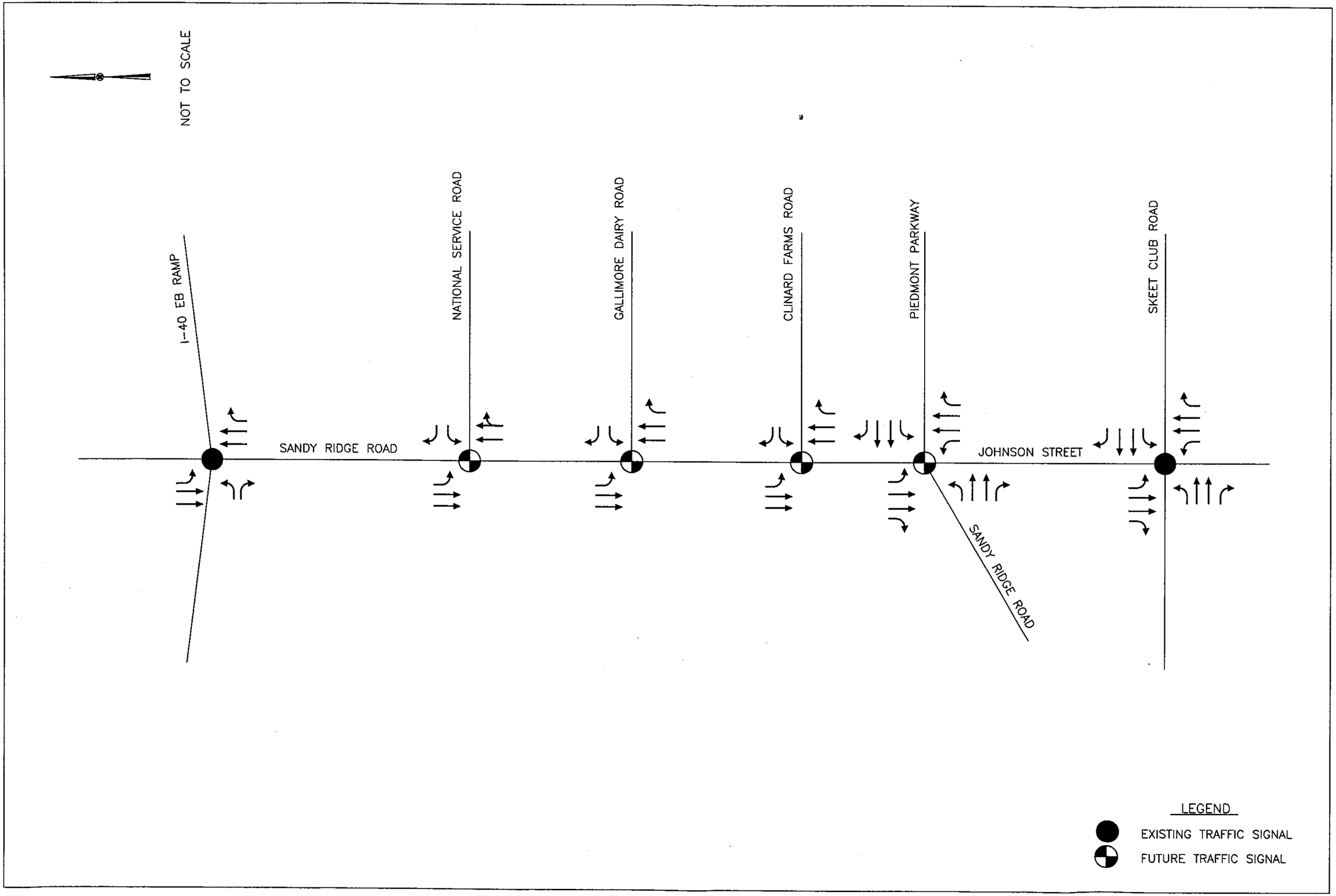

FIGURE 11

2025 WITH ADDITIONAL IMPROVEMENTS I LANEAGE

JOHNSON STREET/SANDY RIDGE ROAD FEASIBILITY STUDY

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Design Year with Additional Improvements - II

To enhance levels-of-service and provide appropriate configurations for each intersection, another scenario was evaluated with laneages shown in Figure 12. This scenario incorporates the following additions:

- a third through lane northbound and southbound at the I-40 ramps;
- dual left and right turn lanes on the eastbound I-40 exit ramp;
- a northbound right turn lane on Sandy Ridge Road at National Service Road;
- a second southbound left turn lane on Sandy Ridge Road at Gallimore Dairy Road;
- a second westbound left turn lane on Gallimore Dairy Road;
- a second southbound left turn lane on Sandy Ridge Road at the proposed Piedmont Parkway Extension;
- a second eastbound left turn lane on Sandy Ridge Road (opposite the proposed Piedmont Parkway Extension); and
- a second westbound left turn lane on Skeet Club Road at Johnson Street.

Again applying the assumption of coordinated signal operations, the results of this analysis indicates that LOS "C" or better can be provided during the peak hours at all intersections except I-40, which continues to function at LOS "F". Table 10 summarizes the evaluation results.

Table 10
2025 Traffic Conditions Summary w/ Additional Improvements and Signalization - II

Intersection	AM Peak Hour			PM Peak Hour		
	LOS	Delay (sec)	v/c	LOS	Delay (sec)	v/c
Sandy Ridge Rd & I-40 EB Ramp	F	155.8	1.40	F	81.2	1.14
Sandy Ridge Rd & National Service Rd	A	3.6	0.64	B	15.7	0.76
Sandy Ridge Rd & Gallimore Dairy Rd	B	13.8	0.82	C	22.5	0.75
Sandy Ridge Rd & Clinard Farms Rd	C	21.8	0.85	B	16.2	0.78
Johnson St & Sandy Ridge Rd	C	25.0	0.71	C	27.0	0.72
Johnson St & Skeet Club Rd.	C	21.3	0.54	C	28.0	0.79

With the exception of the northernmost link intersecting with I-40, these analyses confirm that acceptable design year operational conditions can be successfully achieved with the four-lane parkway-style cross-section if certain provisions are made at the primary intersections to accommodate heavy turning movements both to and from the Johnson / Sandy Ridge corridor.

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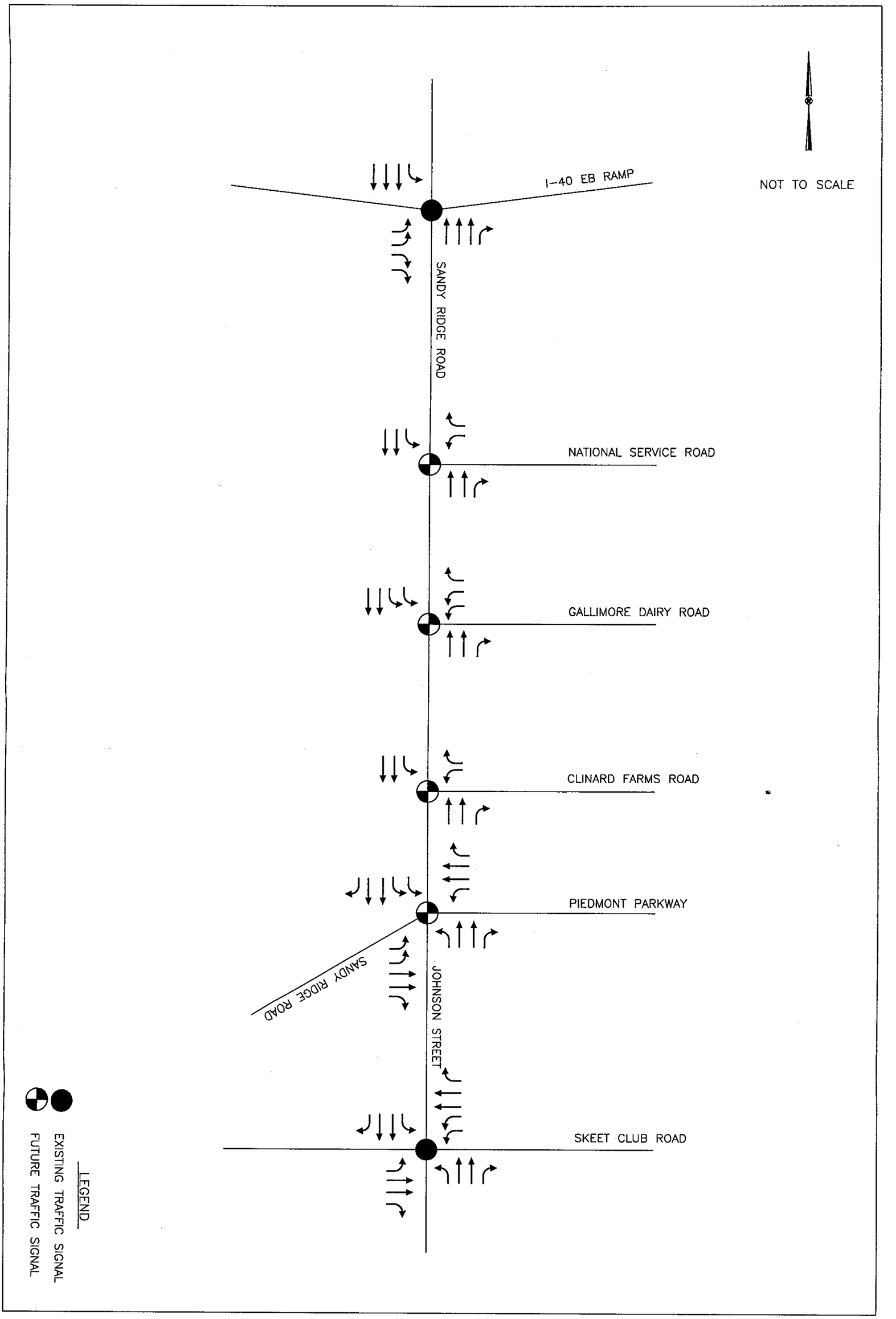

Kimley-Horn and Associates, Inc.	JOHNSON STREET/SANDY RIDGE ROAD FEASIBILITY STUDY	2025 WITH ADDITIONAL IMPROVEMENTS II LANEAGE	FIGURE 12

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Improvements to provide an additional through lane on Sandy Ridge Road at I-40 would entail the widening of the bridge over the interstate, which falls outside the boundaries of this study. Furthermore, as traffic volumes continue to escalate, the interchange itself may require more significant geometric changes.

VI. Access Management

Access management is a key to maintaining a roadway's operational efficiency, and refers to controlling ingress and egress to adjacent properties by managing the spacing, design, and type of access allowed on the roadway. Access restrictions generally enhance safety and increase a roadway's traffic-carrying capacity. Roads with few restrictions on access tend to develop with many commercial driveways, which limit capacity and operating speed, and creates many conflict points, which result in high crash experience.

In general, effective access management is based on the classification of the roadway in the thoroughfare hierarchy. Roads may be designed to move traffic, to provide access to adjacent properties, or usually, to perform a combination of those functions. Two examples illustrating the two ends of a spectrum are a freeway, which has no access to adjacent properties and is designed to serve through traffic, and a local street, which has few restrictions on access and is designed to serve adjacent properties with very little, if any, through traffic. Major thoroughfares such as Johnson Street and Sandy Ridge Road permit some access to properties, but are designed primarily to serve traffic. Therefore, it is appropriate that these roads have fairly strict access controls in order to better perform their primary function.

City of High Point Access Policy

The City of High Point's driveway ordinance was revised in 1990, for the purpose of improving the safety and efficiency of City streets. The objectives of the ordinance include:

1. Provide maximum safety and protection to the public through the regulation of vehicles entering and exiting public streets
2. Provide a uniform ordinance for the design, location, operation, and construction of driveways throughout the City
3. Provide owners of abutting property with the maximum service feasible, consistent with safe and efficient use of the City streets

In order to satisfy the above objectives, the ordinance lists the following specific goals:

1. Prohibit driveways within a certain distance of intersecting streets unless alternate access is not available
2. Minimize the number of driveways along major thoroughfares
3. Increase the distance between adjacent driveways along major thoroughfares

All driveways on City streets require a permit. A site plan is required with the permit application for any driveways other than for single family detached residences. NCDOT also has review authority for state system streets, other than for single family residential driveways.

Much of the ordinance relates to application procedures and design of driveways. The provisions relating to this planning study include the following:

- Turn lanes, when required, shall have a minimum length of 100 feet and minimum taper of 150 feet. The width of turn lanes shall be 12 feet.

- Only one driveway is allowed for a parcel with less than 350 feet of frontage. More than two driveways are allowed only if the frontage is at least 1000 feet and a traffic impact analysis justifies an additional driveway.

- No driveways are allowed within 250 feet of any intersection, unless lot dimensions preclude that.

- Driveways must be at least 100 feet apart

- No additional driveways are allowed along major thoroughfares due to subdivision of property.

Summary of Recommendations from the Local Area Plan

The ***Johnson Street/Sandy Ridge Road Area Plan***[6], adopted by the High Point City Council in April 2000, recommends even stricter access controls. The following are included in the recommendations for this corridor:

- Median openings a minimum of 1,000 feet apart, with 1,500 foot spacing desirable.

- Access to all parcels fronting on thoroughfares should be alternative streets (non-thoroughfares).

- No driveway (except for single-family residential) within 500 feet of median opening or within 200 feet of an intersecting street without a median opening.

- Minimum of 400 feet between non-residential driveways.

Existing Conditions

The area along Johnson Street and Sandy Ridge Road is primarily rural to suburban, with almost all of the adjacent land use either single-family residential or rural/agricultural, with the exception of a few churches, the sports complex, and the Colfax Fire Station. Land use near the I-40 interchange becomes more intense, with access to industrial development via National Service Road and Tyner Road. North of Tyner Road, driveways serve a Cheerwine distribution center and the Triad Farmers Market. A gasoline station/convenience store and a vacant industrial building are located adjacent to the I-40 ramps. The gas station has access via Norcross Road, which is located 220 feet from the ramp. The driveway to the vacant industrial building is located 200 feet from the ramp (measurements are approximate, centerline to centerline).

Thoroughfare Plan

Existing roads designated as thoroughfares include Johnson Street, Sandy Ridge Road, Clinard Farms Road, and Gallimore Dairy Road. Planned thoroughfares include an extension of Piedmont Parkway to Clinard Farms Road and Sandy Ridge Road at Johnson Street, and an extension of Bame Road to Thorndike Road. With the completion of the Sandy Ridge Road Extension, existing Clinard Farms Road east of

[6] City of High Point, 2000.

Sandy Ridge Road may lose its status as a thoroughfare. Kendale Road and Tyner Road are classified as collector streets. Proposed collectors using existing roads include Barne Road west of Sandy Ridge Road, National Service Road, and Norcross Road. One collector is proposed on new alignment: an extension of Gallimore Dairy Road to the west to tie to Boylston Road.

Access Management Recommendations

With the existing and planned thoroughfare and collector system, most of the parcels likely to be developed for non-residential uses would have access on intersecting streets. At the intersection of two thoroughfares, full access should be granted on the intersecting thoroughfare rather than on Johnson/Sandy Ridge. An exception would be made only if a study shows that the impact of that access would be greater than access on Johnson/Sandy Ridge. The median and driveway spacing policy recommended in the ***Johnson Street/Sandy Ridge Road Area Plan*** should be maintained unless it can be shown that this poses an unreasonable hardship on a property owner. Consolidation of parcels and access points is encouraged. The approval of future commercial subdivisions may be required to demonstrate conformity to this plan, through restrictive covenants or other conditions on deeds of subdivided parcels. Also, the corridor should be added to the list of major thoroughfares identified in the City's driveway ordinance to ensure future compliance and to preserve the functional capacity of the roadway.

Based on existing conditions and planned thoroughfares and collector streets, median openings are recommended at the following intersections:

- Skeet Club Road
- Pond Haven Drive
- Cedar Springs Drive
- Sports Complex main entrance
- Sandy Ridge Road
- One entrance to the retirement community
- Kendale Road
- Barne Road
- Joe Road
- Clinard Farms Road (temporary, until the completion of the proposed Piedmont Parkway Extension)
- Gallimore Dairy Road
- National Service Road
- Tyner Road
- Farmer's Market entrance
- Endicott Road

With the exception of the temporary opening at Clinard Farms Road, the Farmer's Market entrance, and Endicott Road, all of these openings meet the minimum spacing criteria of 1,000 feet. The former is recommended because of the road's classification as a major thoroughfare. As noted above, this median opening will be closed when the new alignment of Clinard Farms Road is constructed.

A "mountable median" design is recommended at the Colfax Fire Station to maintain adequate ingress and egress for emergency service vehicles. It will be designated for

official use only and will be reconstructed if the fire station closes or relocates. An alternative would be to provide the fire station with access to Bame Road.

The 2,000 feet of Sandy Ridge Road between Tyner Road and the southern (eastbound) I-40 ramps needs special study. The existing spacing between Norcross Road and the I-40 eastbound ramps, only about 200 feet between centerlines, is not acceptable for median opening spacing and is not even desirable in terms of distance from the ramps. A similar situation exists for the commercial driveway on the east side of Sandy Ridge Road almost across from Norcross Road. The driveways to the Farmers Market and to the Cheerwine facility, while 1,300 feet from the ramps, are only 700 feet from Tyner Road. They also are slightly offset; a realignment of the Cheerwine drive to line up with the Farmers Market drive is recommended.

Several parcels on the east side of Sandy Ridge Road north of the Farmers Market are for sale, and appear to be assembled for a future commercial site. Access to the future development will be reviewed carefully by the City and will conform to City and NCDOT guidelines.

The following alternatives have been identified for the portion of Sandy Ridge Road north of Tyner Road:

1. Widen Sandy Ridge Road to five lanes with a center two-way left-turn lane
2. Designate one location for a median opening and provide alternative access to existing properties
3. Use conventional median openings closer than specified by the area plan
4. Use restricted movements (e.g., right turn only out, left-or right turn in) at major streets or driveways.

The alternatives are discussed and compared below:

1. Widen Sandy Ridge Road to a five-lane facility with a center two-way left-turn lane. This option is the simplest and has the least adverse impact on adjacent properties. It offers some safety benefits by providing a separate left-turn lane, but it does not correct existing access deficiencies, and would allow and encourage additional commercial driveways on Sandy Ridge Road. With this alternative, the accident problems in this section of the road are likely to continue.

2. Designate one location for a median opening and provide alternative access to existing properties. This option is best in terms of restricting left-turn access, but is not practical in terms of providing access to properties. A median opening at the Farmers Market/Cheerwine driveways, the most likely location for a single median opening, would eliminate left-turn access to existing commercial properties on Norcross Road, a designated collector street, as well as properties served by Endicott Road.

3. Use conventional median openings closer than specified by the area plan. This option would result in median openings at Tyner Road, Farmers Market / Cheerwine, and a realignment of Endicott Road or Norcross Road, with a short five-lane section between Norcross Road and the eastbound I-40 ramps. It

would be preferable to the five-lane section in terms of access control, but the undesirable access spacing near the ramps would remain.

4. Use restricted movements at major streets or driveways. This option would eliminate left turns out, the movement with the greatest number of conflicts, at certain locations. This option would preserve most ingress options but would limit egress and/or require U-turns at some locations. It would probably require the use of concrete medians rather than planted medians due to closely spaced access points. Use of this option would still adversely impact some property owners, but could be seen as a compromise between access on one hand and safety and capacity on the other.

The final decision on the typical section and access management is likely to be based on economic and property considerations as well as on traffic and access management. The recommendation presented herein, based on balancing the various considerations, is to have a full access location at the Farmers Market/relocated Cheerwine driveway location with partial access locations (left turn in, no left turn out) spaced no closer than 400 feet apart. The relocation of either Endicott Road or Norcross Road to a location along the corridor that maximizes median break spacing is desirable. With restricted access movements, sufficient left-turn storage will be provided to allow for U-turn movements.

VII. Opinion of Probable Cost

A planning level opinion of probable cost was prepared for each alternative, based on tax data acquired from the City of High Point and current construction pricing experience in accordance with NCDOT estimating procedures. The opinion of probable costs includes project design, right-of-way and easements, roadway, sidewalk, and intersection construction, bridges, culverts and other significant hydraulic features, traffic signals, signing, and pavement markings.

Table 11 provides the opinion of probable cost for Alternative 1 and Table 12 provides the opinion of probable cost for Alternative 2. The probable cost for the Endicott Road/Norcross Road realignment is included in each estimate.

Table 11

Opinion of Probable Cost (Alternative 1)

Length of project:	4.45	mi (4 lane divided)	
	0.67	mi (side roads)	
Total length	5.12		

LINE ITEM	DESCRIPTION	QUANTITY	UNIT	PRICE	AMOUNT
1	Clearing and Grubbing	26.50	AC	$ 14,000.00	$ 371,000.00
2	Unclassified	95,969	CY	$ 6.00	$ 575,900.00
3	Borrow Excavation	145,526	CY	$ 8.00	$ 1,164,300.00
4	Pavement Removal	25,462	SY	$ 3.00	$ 76,400.00
5	Drainage, 4 lane divided (See #1 below)	1	LS	$ 1,001,250.00	$ 1,001,300.00
6	Drainage, 2 lane side roads (See #2 below)	1	LS	$ 154,470.00	$ 154,500.00
7	Overlay	36,533	SY	$ 6.00	$ 219,200.00
8	New Pavement	131,652	SY	$ 25.00	$ 3,291,300.00
9	Subgrade Stabilization	131,652	SY	$ 5.00	$ 658,300.00
10	Fine Grading	131,652	SY	$ 1.50	$ 197,500.00
11	2 - 6" Curb and Gutter	46,800	LF	$ 12.00	$ 561,600.00
12	1 - 6" Curb and Gutter	46,800	LF	$ 10.00	$ 468,000.00
13	5' Sidewalk	26,107	SY	$ 20.00	$ 522,200.00
14	Erosion Control (See #3 below)	1	LS	$ 376,860.00	$ 376,900.00
15	Thermo and Markers (See #4 below)	1	LS	$ 109,596.00	$ 109,600.00
16	Traffic Control	1	LS	$ 335,000.00	$ 335,000.00
17	Traffic Signal	6	EA	$ 60,000.00	$ 360,000.00
18	Bridge	1	EA	$ 894,000.00	$ 894,000.00
19	Right of Way	1,646,762	SF	$ 3.00	$ 4,940,300.00
				Sub Total	$ 16,277,300.00
20	Miscellaneous and Mobilization (1-15)	55%			$ 8,952,515.00
					$ 25,229,815.00

#1 - $225,000 /mile
#2 - $150,000 /mile
#3 - $6,000 /AC (54.8 AC)
#4 - $20,000/mile

*Estimate does not include utility relocation.

Table 12
Opinion of Probable Cost (Alternative 2)

Length of project:	4.26	mi (4 lane divided)
	1.13	mi (side roads)
Total length	5.39	

LINE ITEM	DESCRIPTION	QUANTITY	UNIT	PRICE	AMOUNT
1	Clearing and Grubbing	25.50	AC	$ 14,000.00	$ 357,000.00
2	Unclassified	201,119	CY	$ 6.00	$ 1,206,800.00
3	Borrow Excavation	239,269	CY	$ 8.00	$ 1,914,200.00
4	Pavement Removal	14,109	SY	$ 3.00	$ 42,400.00
5	Drainage, 4 lane divided (See #1 below)	1	LS	$ 958,500.00	$ 958,500.00
6	Drainage, 2 lane side roads (See #2 below)	1	LS	$ 223,470.00	$ 223,500.00
7	Overlay	28,886	SY	$ 6.00	$ 173,400.00
8	New Pavement	137,202	SY	$ 25.00	$ 3,430,100.00
9	Subgrade Stabilization	137,202	SY	$ 5.00	$ 686,100.00
10	Fine Grading	137,202	SY	$ 1.50	$ 205,900.00
11	2 - 6" Curb and Gutter	45,000	LF	$ 12.00	$ 540,000.00
12	1 - 6" Curb and Gutter	45,000	LF	$ 10.00	$ 450,000.00
13	5" Sidewalk	24,992	SY	$ 20.00	$ 499,900.00
14	Erosion Control (See #3 below)	1	LS	$ 400,860.00	$ 400,900.00
15	Thermo and Markers (See #4 below)	1	LS	$ 114,996.00	$ 115,000.00
16	Traffic Control	1	LS	$ 185,000.00	$ 185,000.00
17	Traffic Signal	6	EA	$ 60,000.00	$ 360,000.00
18	Bridge	1	EA	$ 894,000.00	$ 894,000.00
19	Right of Way	1,989,011	SF	$ 3.00	$ 5,967,100.00
				Sub Total	$ 18,609,800.00
20	Miscellaneous and Mobilization (1-15)	55%			$ 10,235,390.00
					$ 28,845,190.00

#1 - $225,000 /mile
#2 - $150,000 /mile
#3 - $6,000 /AC (64.0 AC)
#4 - $20,000/mile
*Estimate does not include utility relocation.

VIII. Recommendations and Additional Comments

The results of this study indicate that roadway improvements along the Johnson Street / Sandy Ridge Road corridor north of High Point are feasible with manageable impacts to surrounding properties.

Based on the information available to conduct an environmental screening of the study area, such impacts within the corridor are minimal.

Functionally, a four-lane parkway type facility can be accommodated within the proposed 120-foot right-of-way. This cross-section, with the implementation of consistent access management principles and with certain intersection-specific adjustments, will generally provide for acceptable peak hour levels-of-service through the corridor.

The five (5) percent annual growth rate used to evaluate the traffic impacts on the corridor presents a conservative estimate of design year conditions, although several factors suggest that the area may experience a more aggressive growth pattern. These factors include:

- data indicating that recent trends near the northern end of the corridor have exceeded this rate in the short term;
- the continuing development of industrial and commercial properties in the Triad region between High Point, Greensboro, and Winston-Salem; and
- the development of a regional air cargo hub by FedEx at the Piedmont Triad International Airport.

Further evaluation, including area and regional travel demand modeling and forecasting, should be considered prior to finalizing the design concepts presented in this report.