FRA-270-30.00
INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Prepared by

ms consultants, inc.
6500 Busch Boulevard
Columbus, Ohio

January 29, 1993

inter-office communicatior

to: G. L. Butzer, Deputy Director, Planning & Design date: February 11, 1993

from: J.A. Gregory, Planning and Design Engineer

subject: Collector, Distributor, Morse, Stelzer (CDMS)
Interchange Justification Study

Enclosed are three copies of the Interchange Justification Study to modify IR 270 in Franklin County by adding a new interchange and associated collector/distributor lanes. Although we have not yet completed our review due to staffing restraints and other priorities, i.e. Legislators Day, etc. we believe it can be formally submitted to the FHWA for approval. Copies of the January 29, 1992 transmittal letter are also included.

Additionally, copies are also being concurrently distributed to the following for information/review as follows:

City of Gahanna
% W. Murphy
Director of Public Service

City of Columbus (2 copies)
% G.H. Mack
Director of Public Service
% R.C. Smith
City Engineer

Franklin County
% John Circle
County Engineer

MORPC
% M. Ismail
Director of Transportation

D.K. Huhman (2 copies)
% Bureau of Location and Design

R.A. Allen
% Bureau of Environmental Services

T.M. Singleton
% Bureau of Planning

C.S. Creager
% Bureau of Design Services

T.C. Lunt
% Bureau of Programming

R.M. Blair
Chief Executive Assistant to the Director

The initial public meeting has tentatively been established for March 10, 1993 and our Newsletter will announce the completion of this study, overall time schedules, etc.

Please formally submit this study to the Federal Highway Administration - Ohio Division for their concurrence.

JAG:nh

Attachment

c: J.A. Gregory
M.C. Flynn
C. Seidle (City of Columbus)
T.J. Stitt
R.L. Arledge
J.E. Brenneman
B.D. Hanhilammi
J.E. McQuirt
R.L. Richards
R.F. Howard
G.D. Proctor
W.C. Habig (MORPC)
R. Lawler (MORPC)
D. Philips (Franklin County)
R.H. Lyndes
D.A. Mengerink
R.M. Gabriel
A.J. DiLoreto
J.T. Grow
E. Blais (FHWA)
J. Steele (FHWA)
Project File (FRA-270-30.00 PID 11715)
Project File (FRA-Stelzer Road PID 11401)
Project File (FRA/LIC-161-16.75/0.00 PID 9098)

→ Project File

ms consultants, inc.
engineers, architects, planners

Formerly:
Mosure & Syrakis Co.
Mosure & Associates, Inc.

6500 Busch Boulevard
Suite 233
Columbus, Ohio 43229-1738
614-848-6726 (848-MSCO)
FAX: 614-848-6311

Offices in
Akron
Canton
Columbus
Youngstown, OH
Beaver Falls
Pittsburgh, PA

January 29, 1993

Mr. Michael C. Flynn, PE
Deputy Director
ODOT District 6
400 East William Street
Delaware, OH 43015

Attention: Mr. James A. Gregory, PE

Re: FRA-270-30.00
PID 11715
Collector, Distributor, Morse, Stelzer
INTERCHANGE JUSTIFICATION STUDY

Gentlemen:

This letter serves to transmit eighteen copies each of the referenced Interchange Justification Study and its Appendices which are bound as a separate documents. The Interchange Justification Study has been revised to reflect appropriate agency comments received during our meeting in your offices on December 15, 1992, and as subsequently forwarded to us with your letter dated December 22, 1992. The project schedule has been expanded and reflects comments of your December letter and also Mr. Lyndes' letter dated January 13, 1993. Letters of support and commitment for the FRA-270-30.00 improvement package have been obtained from the Ohio Department of Transportation, the Mid-Ohio Regional Planning Commission, the City of Columbus and the Franklin County Engineer; these letters are presented as Chapter IV of the Interchange Justification Study. We recognize the difficulties of time schedule compression implied in your various comments; as partners for the accelerated delivery of the FRA-270-30.00 improvements, we stand ready to work with the public agencies and private entities in the mutual effort required for success.

As per your letter of December 22, we understand that ODOT will prepare the formal request to the FHWA Ohio Division for approval of the FRA-270-30.00 improvement package. We also understand that ODOT will distribute the Interchange Justification Study and its Appendices to the various local agencies associated with the improvement package.

As you are aware, considerable effort has been expended by the project partners during the past two weeks to develop a final cost estimate, cost-sharing strategy, source of funding and statement of responsibility for each functional component (environmental, engineering design, right-of-way, construction) of each of the eleven projects identified in the Interchange Justification Study. This work continues to move forward although final closure has not yet been reached. When all elements of responsibility and cost have been resolved, an expanded version of Table 5 will be prepared by our firm to document the agreement and will be forwarded to ODOT District 6 for distribution as a supplement to the Interchange Justification Study. In the interim we will appreciate your expedited distribution and review of the document forwarded herewith.

If **ms consultants** can be of further assistance with regard to the Interchange Justification Study and its distribution, please contact me. We appreciate the spirit of cooperation exhibited to date by many of the agencies; we look forward to continued positive interaction as these important projects move forward to design and construction.

Very truly yours,

James A. Bixby

James A. Bixby, PE
Vice President

Enclosures

JAB/lb

cc: A. W. Penzek (w/enc)
G. B. Comfort (w/enc)
10-009.310 file

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

LIST OF FIGURES

LIST OF FIGURES
(continued)

LIST OF FIGURES
(continued)

LIST OF TABLES

- CHAPTER I -

INTRODUCTION

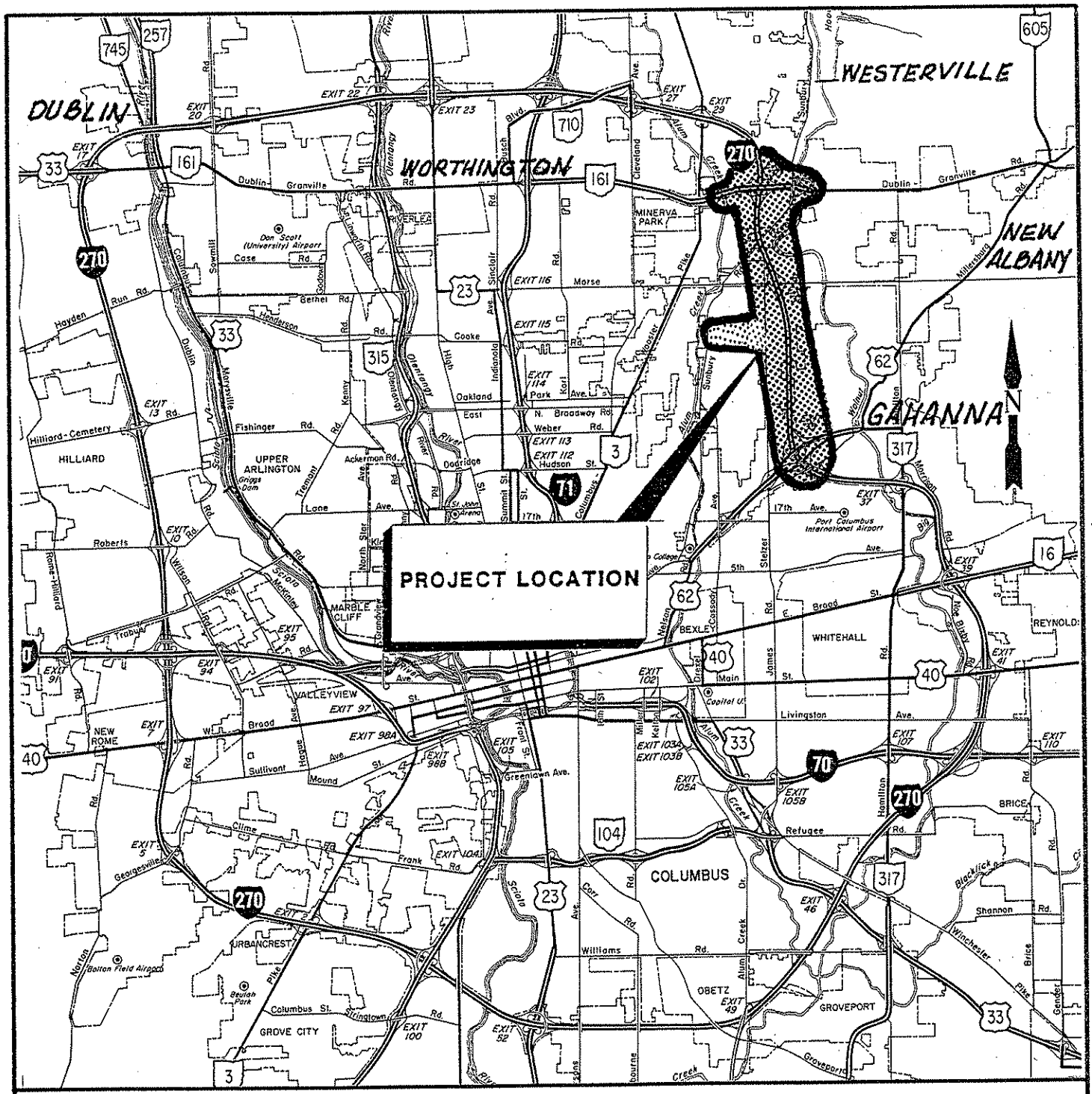
INTRODUCTION

Purpose and Scope

The northeastern portion of the City of Columbus and the County of Franklin is undergoing extensive development and growth. This growth is the result of several factors. The Columbus Metropolitan area has continued to grow in both population and employment. In the last decade Columbus was the only major metropolitan area in Ohio growing in population. The population increased nearly 10% from 1980 to 1990 while employment in the last five years grew nearly 15%. The northeastern sector is one of the last segments of undeveloped land along the northern crescent of I-270 extending from Dublin to Gahanna (see **Figure 1**). In addition, the scheduled completion of I-670 linking the Columbus Central Business District (CBD) to the northeast sector will greatly lessen travel time to the CBD and is expected to generate office and warehousing facilities and employment opportunities along the I-670 corridor. Lastly, the established presence of The Limited, a retail clothing corporation, in the southeast quadrant of I-270 & Morse Road and its requirements for nearby warehousing, office and retail service facilities will generate growth in the northeast sector. These factors have led numerous developers to plan and begin construction of office buildings, distribution centers, retail goods and services facilities, and residential housing.

The purpose of this study is to identify transportation network improvements which will be capable of accommodating projected traffic levels on the northeast (I-270) outerbelt and adjacent arterial facilities. Increased background travel demand plus traffic generated by expanding development in the northeast sector of Columbus and Franklin County has drawn concern as to the ability of the existing transportation network to handle such volume increases in an adequate manner.

This report will present the findings of the Interchange Justification Study and present a course of action to improve the roadway network. The study examined the existing interstate and arterial network and evaluated this network based on the expected background traffic growth and planned development in the northeast sector. Numerous roadway improvement alternatives ranging in scale from minor arterial improvements to



FRA–270–30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 1

PROJECT LOCATION MAP

Prepared by

ms consultants, inc.

Columbus, Ohio

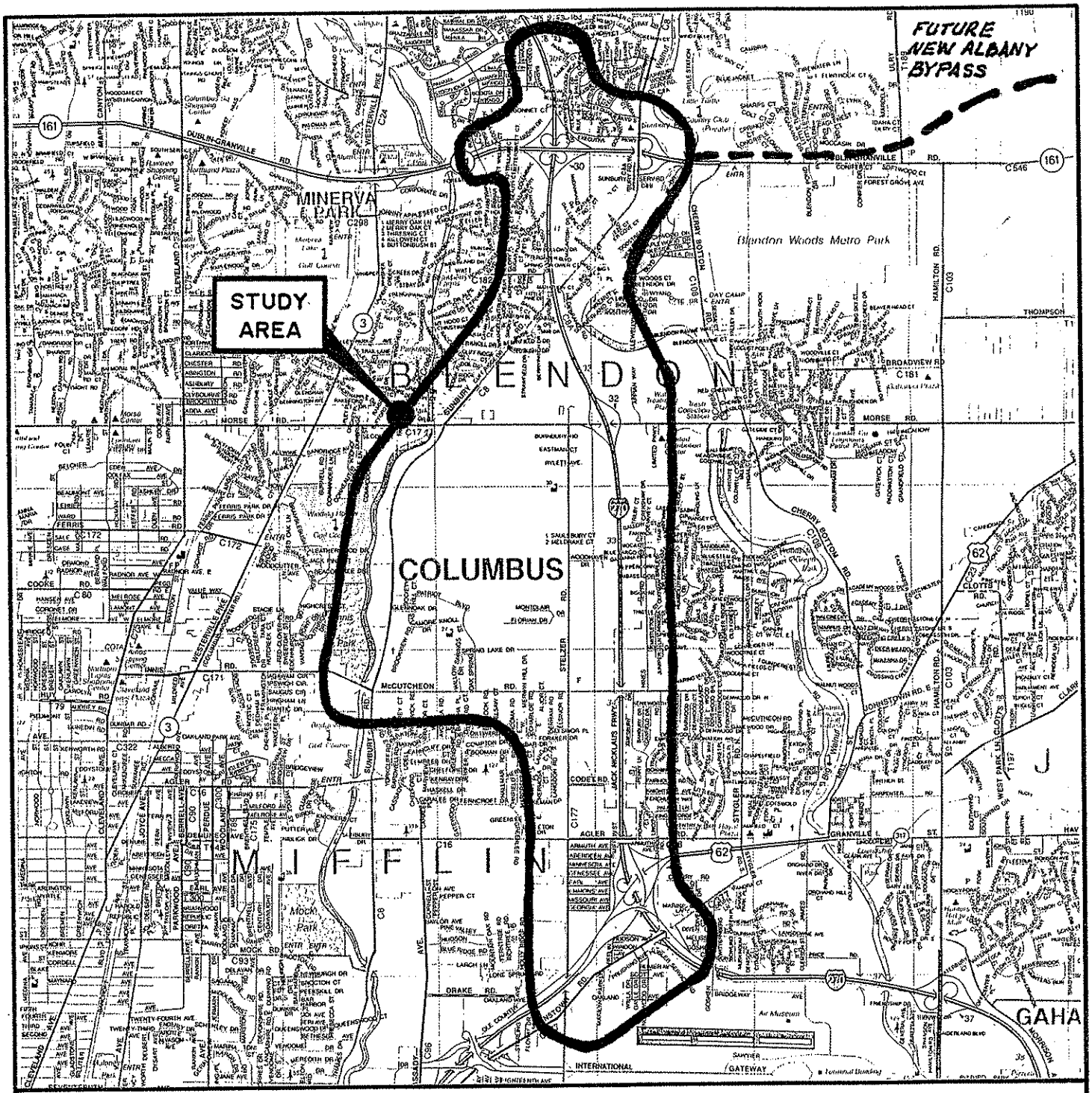
the alternative proposed for advancement were considered and evaluated. Each alternative was evaluated for its ability to provide an adequate level of service, to function within the regional transportation system, to meet accepted design criteria and to be environmentally and economically feasible.

Study Area

The study area, as illustrated in **Figure 2**, is located in the cities of Columbus and Gahanna and unincorporated areas of Mifflin and Blendon Townships in Franklin County. The roadways studied include I-270 from south of I-670/US 62 to north of SR 161 including the I-670/US 62, Morse Road and SR 161 interchanges. Morse Road from west of Sunbury Road to east of I-270 was included as well as Stelzer Road from I-670/US 62 northward to Morse Road. The study area also includes SR 161 from west of I-270 through the Sunbury interchange to the New Albany Bypass project which is currently being designed.

The study area within the I-270 beltway is composed primarily of established residential neighborhoods and undeveloped land. Beyond the beltway lie the growing areas of Gahanna and New Albany. Gahanna is composed primarily of newer residential neighborhoods expanding from I-270 to the north and east, south of the planned residential developments in New Albany. Commercial establishments supported by these residential areas are located along Cleveland Avenue, SR 3 and Morse Road, all located west of the study area. US 62 through Gahanna has numerous commercial establishments geared towards that City's needs. A commercial center is located adjacent to Sunbury Road just north of SR 161. Some commercial establishments are located in the I-270 & Morse Road interchange area. These are primarily highway-oriented uses. The corporate offices and distribution facilities for The Limited are located in the southeast quadrant of I-270 & Morse Road.

Much of the study area consists of vacant land which has been rezoned for its development use. The Limited is planning a mixed use development in excess of 784 acres at the southwest corner of I-270 and Morse Road. Corporate office buildings, commercial service and retail facilities and distribution facilities are planned. Ross Park,



FRA–270–30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 2

STUDY AREA MAP

Prepared by

ms consultants, inc.

Columbus, Ohio

an office and research complex has recently opened and is located between I-270 and Stelzer Roads, north of McCutcheon. The I-670 corridor developments are intended as a mixture of office, light manufacturing, distribution and hotel facilities.

Data Sources

ms consultants collected all available traffic, roadway, and development information to compile a data base. Manual turning movement and machine traffic counts performed by the Ohio Department of Transportation (ODOT), the Franklin County Engineer's Office, and the City of Columbus were used to generate the existing traffic volumes. A roadway and signal inventory was performed by **ms consultants** personnel.

ms consultants worked with ODOT and the Mid-Ohio Regional Planning Commission (MORPC) to update the ODOT traffic model in the northeast portion of the City. Meetings were held with MORPC, the Cities of Columbus and Gahanna and the developers in this area to produce an updated computer model that accounted for the planned development and the roadway system envisioned. The Limited, Ross Park and the I-670 corridor development organizations provided development information while Bohm-NBBJ, project coordinators for The Limited, provided site plans and additional development information.

- CHAPTER II -

EXISTING CONDITIONS

EXISTING CONDITIONS

Physical/Operational Characteristics of the Roadway Network

Field inventories performed by **ms consultants**, plus the existing traffic counts, provided the data for an analysis of the existing physical and operational characteristics of the roadway network within the study area. Serving the existing and developing land uses is an integrated road network which facilitates vehicular travel between points of trip origin and destination (see Figure 2). The freeway system includes I-270 and I-670; it connects major areas of traffic generation and provides access to the regional highway system. The regional highway system includes Agler, Innis/McCutcheon, Morse, SR 161, Sunbury, Cassady, Stelzer and Stygler; it distributes traffic to smaller geographical areas with some access to abutting properties. Collectors and local streets deliver traffic to the arterial system and provide direct access to abutting properties.

Principal access to the study area and to the regional highway system is now being provided via interchanges between I-670 & Cassady/Airport, I-270 & I-670/US 62, I-270 & Morse Road, and I-270 & SR 161. In light of the planned northeast sector development, however, these access points have limitations in effectively serving the regional arterial network system while still maintaining an acceptable level of service on the interstate.

The I-670 & Cassady/Airport Interchange is a fully directional, multi-ramp interchange which primarily serves Cassady Avenue and the Port Columbus International Airport. This interchange was intended, in part, to replace the I-670/US 62 & Stelzer Road Interchange. While the interchange provides direct access from I-670 to the airport, its circuitous route from I-270 to Stelzer Road diminishes its ability to provide effective access to Stelzer Road and developments located along Stelzer. The I-270 & I-670/US 62 interchange is primarily an interchange between freeways and provides limited local access. US 62 to the east feeds directly into the downtown business district of Gahanna and serves as the southerly access to the major residential subdivisions in Gahanna. The I-270 and Morse Road diamond-configured interchange provides interstate access to three regional routes, Morse Road, Stelzer Road, and Stygler Road. The I-270 & SR 161

cloverleaf interchange primarily serves SR 161, eastern Westerville, and the developing area of New Albany.

The following table (**Table 1**) identifies the principal streets within the Study Area, the primary orientation, number of lanes, the speed limit and the functional classification (as classified by the Mid-Ohio Regional Planning Commission and approved by both ODOT and FHWA).

TABLE 1

LOCAL ROADWAY NETWORK

ROAD	ORIENTATION	LANES	SPEED LIMIT	FUNCTIONAL CLASSIFICATION
I-270	circumferential	6	55 mph	Interstate
I-670/US 62	east-west	6	55 mph	Interstate
Agler	east-west	2	35 mph	Minor arterial
Innis/McCutcheon	east-west	2	35 mph	Collector
Morse	east-west	4/5	45 mph	Principal arterial
SR 161	east-west	4	55 mph	Freeway
Sunbury	north-south	2	45 mph	Minor arterial
Cassady	north-south	2	35/45 mph	Collector
Stelzer	north-south	2	45 mph	Minor arterial
Stygler	north-south	2	35 mph	Collector

Traffic signals are located along Morse Road (within the study area) at Sunbury, Stelzer, at the I-270 ramp terminals and Appian Way. The City of Columbus maintains a signal system along Morse Road from Stelzer Road to the east, terminating at Stygler Road. Stelzer Road has signals (within the Study Area) at its intersections with Johnstown, Agler, McCutcheon, Ross Park, Loop Road A, and Morse. The intersection of SR 161 & Strawberry Farms/Buenos Aires, just west of I-270, is signalized, as is Sunbury Road at the westbound SR 161 ramp terminal.

1991 Traffic

The 1991 ADT was developed from the vehicular counts performed by ODOT, Franklin County, and the City of Columbus. Counts had been performed at various times from 1985 to 1990. Each intersection turning movement was expanded to 24 hours, seasonally adjusted to represent an ADT and brought forward to 1991 using an average growth factor for the area. Manual smoothing was done to provide internal consistency. The 1991 ADT traffic volumes are shown in **Figure 3**. The ADT on I-270 is 89,220 and 93,660 vehicles per day north and south of Morse Road, respectively. These volumes are based on a 1989 ODOT count which showed a southbound directional ADT of 42,470 vehicles per day south of Morse Road. This implies a 1989 ADT on that link of 84,940. Due to the ongoing construction of I-670, current ADT volumes on I-670 are not available. The ADT on Morse between Stelzer and I-270 is 26,920 vehicles per day.

The 1991 AM and PM Peak Hour turning movement schematics (shown in the appendix as Figures A-1 and A-2) were developed by multiplying each turning movement in the smooth 1991 ADT by the appropriate peak hour percentage of the daily turning movement in the unsmoothed count. The AM peak occurred between 7-8:00 AM and the PM peak occurred between 5-6:00 PM. The PM peak hour volumes on the major arterial network are generally 8-1/2% - 9% of the ADT, although on I-270 the peak hour volumes are approximately 10% of the ADT. The traffic volumes have increased steadily since the mid-1970's reflecting the population growth trend in the Columbus area.

Current Levels of Service

The existing levels-of-service (LOS) were calculated using the Highway Capacity Software (HCS) based on the 1985 Highway Capacity Manual. The existing LOS for the I-270 freeway segments and ramp diverges and merges to and from Morse Road for the AM and PM peak hour are as shown in **Table 2**.

FRA–270–30.00

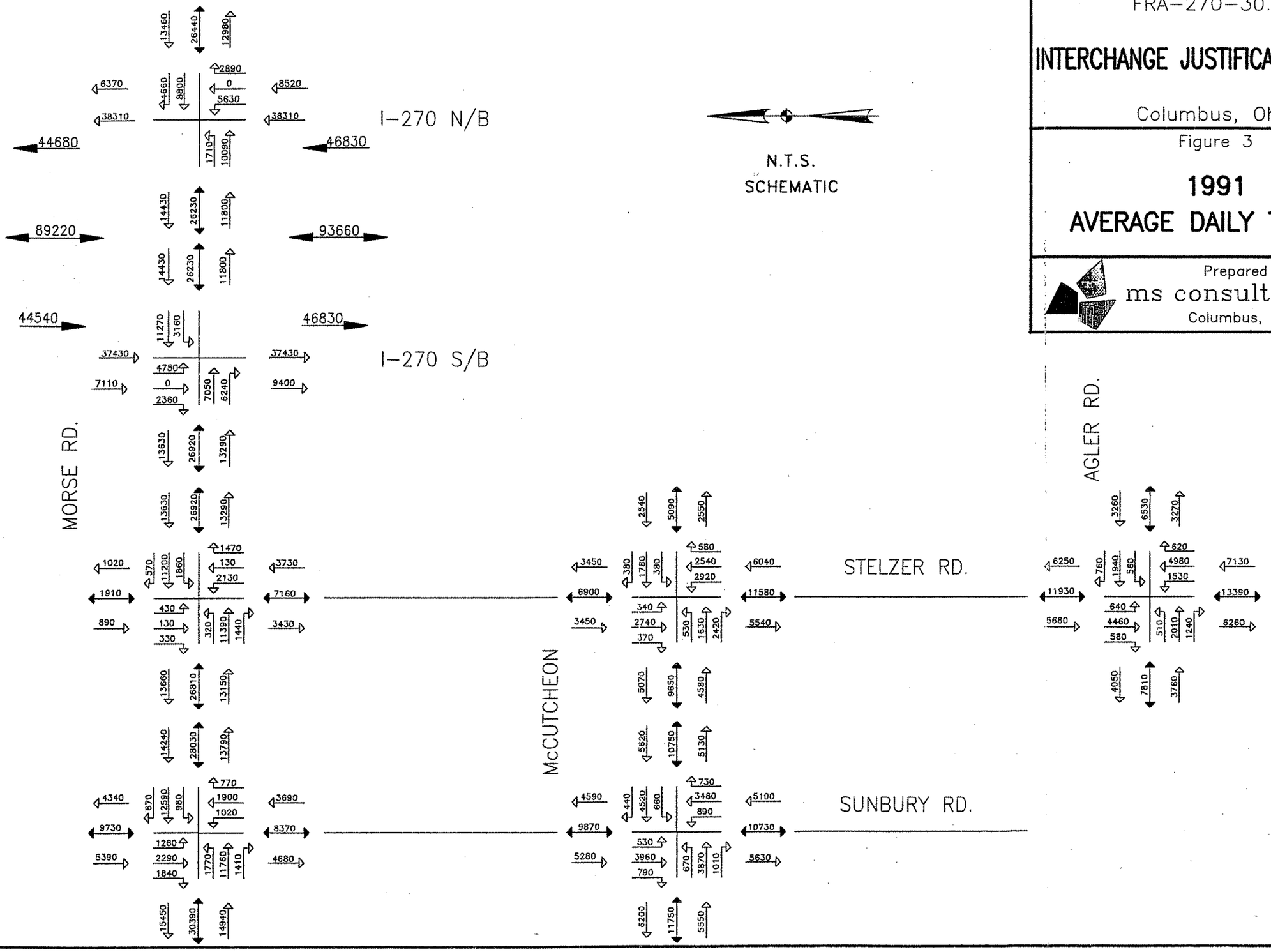
INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 3

1991
AVERAGE DAILY TRAFFIC

Prepared by
ms consultants, inc.
Columbus, Ohio



N.T.S.
SCHEMATIC

TABLE 2. 1991 LEVELS OF SERVICE - INTERSTATE SYSTEM

LOCATION	AM PEAK HOUR	PM PEAK HOUR
I-270 SOUTH OF MORSE ROAD		
Northbound Mainline	D	E
Southbound Mainline	D	E
I-270 NORTH OF MORSE ROAD		
Northbound Mainline	D	E
Southbound Mainline	D	E
I-270 N/B OFF-RAMP to MORSE ROAD	D	E
I-270 N/B ON-RAMP from MORSE ROAD	D	D
I-270 S/B OFF-RAMP to MORSE ROAD	C	D
I-270 S/B ON-RAMP from MORSE ROAD	D	E

Both the AM and PM peak highway hours at the signalized intersections along Morse Road, from Sunbury to the I-270 Ramps, and along Stelzer, from Agler to Morse, were analyzed. Based on the existing geometrics and timing, the following levels of service are being obtained, as shown in **Table 3**.

TABLE 3. 1991 LEVELS OF SERVICE - ARTERIAL SYSTEM

INTERSECTION	AM PEAK HOUR	PM PEAK HOUR
Morse & Sunbury	C	D
Morse & Stelzer	B	[1]
Morse & S/B I-270 Ramp	C	D
Morse & N/B I-270 Ramp	B	C
Stelzer & McCutcheon	B	D
Stelzer & Agler	C	C

[1] The W/B left turn has a Volume to Capacity (V/C) ratio = 2.28. The delay and subsequent LOS for the movement and intersection is meaningless for V/C ratios greater than 1.2.

It should be noted that these analyses are based on existing average peak hour volumes. Design year analyses are based on design hour volumes which are intended to represent the 30th highest hour of the year. The 1991 capacity analyses can be found in Appendix B.

The previous analyses demonstrate that the existing levels of service on the interstate system for the PM peak hour are mostly LOS E. The signalized intersections are operating at a LOS D or better. The operation of the Morse & Stelzer intersection could be improved by adding a third phase (a leading westbound through and protected left) to the cycle.

- CHAPTER III -

FUTURE CONDITIONS

FUTURE CONDITIONS

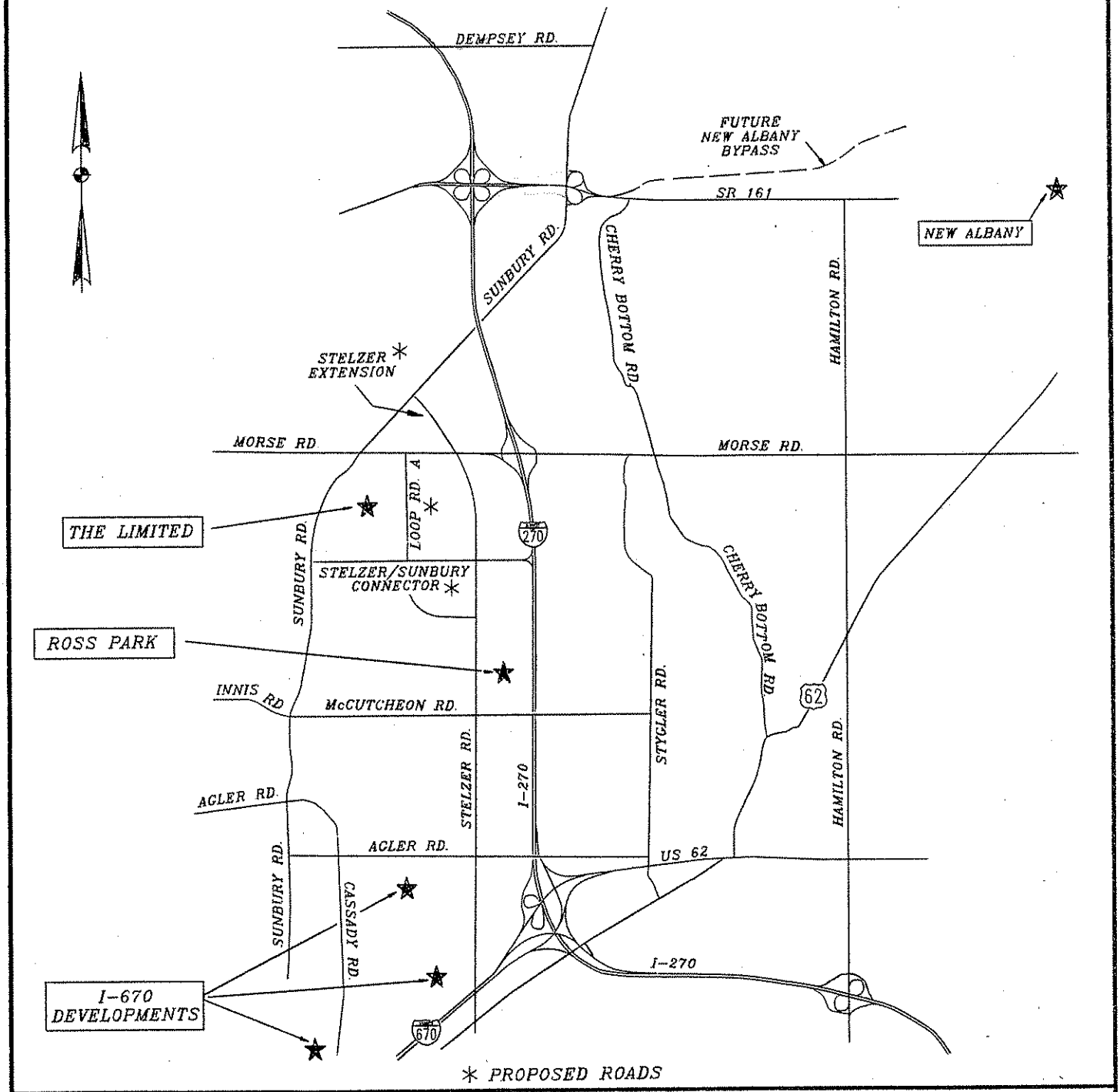
Future Land Uses and Development Schedule

The extensive development planned for the northeast sector of the City of Columbus and Franklin County is expected to have a tremendous impact on the existing road network. The Limited's complex is anticipated to be the largest of the office-related developments but the combined impact of the I-670 corridor developments and the residential developments in New Albany and Gahanna is anticipated to be considerable as well.

The I-670 developments (see **Figure 4**), located primarily in the block bounded by I-670, Cassady, Agler, and Stelzer, are to consist of office, distribution, light manufacturing and service facilities. Collector roads within this block will link the existing and planned developments primarily to Stelzer Road.

A 750,000-square-foot Victoria's Secret office/distribution center recently opened as part of the Limited's campus. Eighty-two thousand (82,000) square feet of corporate offices, a 1 million-square-foot mall and 140,000 square feet of retail/service facilities are planned in the early years of the development. A twenty-year full-build schedule is planned at which time a total of 1,570,806 square feet of corporate offices, 5,362,002 square feet of office or office/distribution facilities, 1,400,000 square feet of retail/service facilities plus the mall are anticipated. A network of collector roads within this development area will focus traffic onto Loop Road A, the Stelzer/Sunbury connector, Morse Road, and Stelzer Road. Loop Road A is to traverse from Stelzer to Morse intersecting Morse between Sunbury and Stelzer and intersecting Stelzer between McCutcheon and Morse just north of Montclair. The Stelzer/Sunbury connector will bisect The Limited's development from west to east.

Ross Park, an 860,000-square-foot office and research complex has recently opened Phase I. This campus, located between I-270 and Stelzer near McCutcheon, has a five-year build schedule with completion set for 1995. Ross Park (Phase I) has access to Stelzer across from Montclair via an on-site circulator road.



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 4

NORTHEAST COLUMBUS AND FRANKLIN COUNTY DEVELOPMENTS

Prepared by

ms consultants, inc.

Columbus, Ohio

51215BAS #9 2/30/92

Some of the planned 3500 residential units located east of I-270 between Morse and SR 161 in New Albany are under construction. Residential units continue to be built east of Hines and north of McCutcheon in the City of Gahanna.

Thoroughfare Plans

The Cities of Columbus and Gahanna have proposed several roadway improvements to strengthen the regional roadway network. An extension of Stelzer Road northward from Morse Road to Sunbury Road (see Figure 4) appears on the 1981 Columbus Thoroughfare Plan. This extension will create a continuous 15-mile James/Stelzer/Sunbury corridor from south of I-70 northward into Delaware County. Stelzer Road from I-670 to Morse is a two-lane facility (four lanes south of I-670); however, the Thoroughfare Plan designates the entire James/Stelzer/Sunbury corridor as a four-lane facility. A new interchange to connect I-270 to the regional highway network appears on Gahanna's 1988 Thoroughfare Plan. This proposed I-270 interchange is shown at a location north of McCutcheon Road. The City of Columbus Plan shows SR 161 as an expressway bypass around New Albany. This by-pass is currently under design with construction expected to begin in 1993. These plans point to local acknowledgement that the construction of missing links and local widening improvements to the regional arterial system are needed so that this network is an integral part of the entire highway network.

Public Need for Additional Transportation Facilities

The preceding discussions have described an area under development located within an expanding metropolitan area. Having long been annexed to the City and now properly zoned for its intended use, this area is ready to flourish. The area's quality and potential for creating jobs, however, may be impeded by inadequate access from the freeway system to the regional arterial network. Failure to construct a balanced transportation system will result in critical traffic overloads and performance failures in key components of the system.

The existing neighborhoods and planned developments are each serviced by a system of local and collector streets within their respective developments. These collectors are in turn serviced by a network of regional routes that connect these smaller geographical neighborhoods and developments. Improvements and additional links to this regional system as noted in the Thoroughfare Plans will form a framework that will require additional interstate access and capacity increasing improvements if this regional system is to perform its proper function within a balanced highway system.

Design Traffic

The development of the Design Year traffic began with an update of the MORPC/ODOT computer model and the testing of several roadway network scenarios for the anticipated development. **ms consultants** worked with MORPC to update the trip table, traffic zones and roadway network in the entire northeast portion of Columbus and Franklin County. Several meetings were held with MORPC, the cities of Columbus and Gahanna, and developers including The Limited to produce an updated trip table. The resulting trip table and networks were run by ODOT on their mainframe computer and supplied to **ms consultants** for analysis.

The 2015 design year traffic is shown in **Figures 5A and 5B**. The AM and PM design hour traffic is shown in Appendix A, Figures A - 3A and 3B and A - 4A and 4B. The ADT traffic was reviewed and certified by the Ohio Department of Transportation, Bureau of Technical Services on August 12, 1992. The AM and PM design hour traffic was calculated using the ODOT approved design hour K-factor as a percent of the ADT of 8.5% and the directional distribution (D-factor) of 55%.

REVISED 10/29/92

N.T.S.
SCHEMATIC

FRA–270–30.00

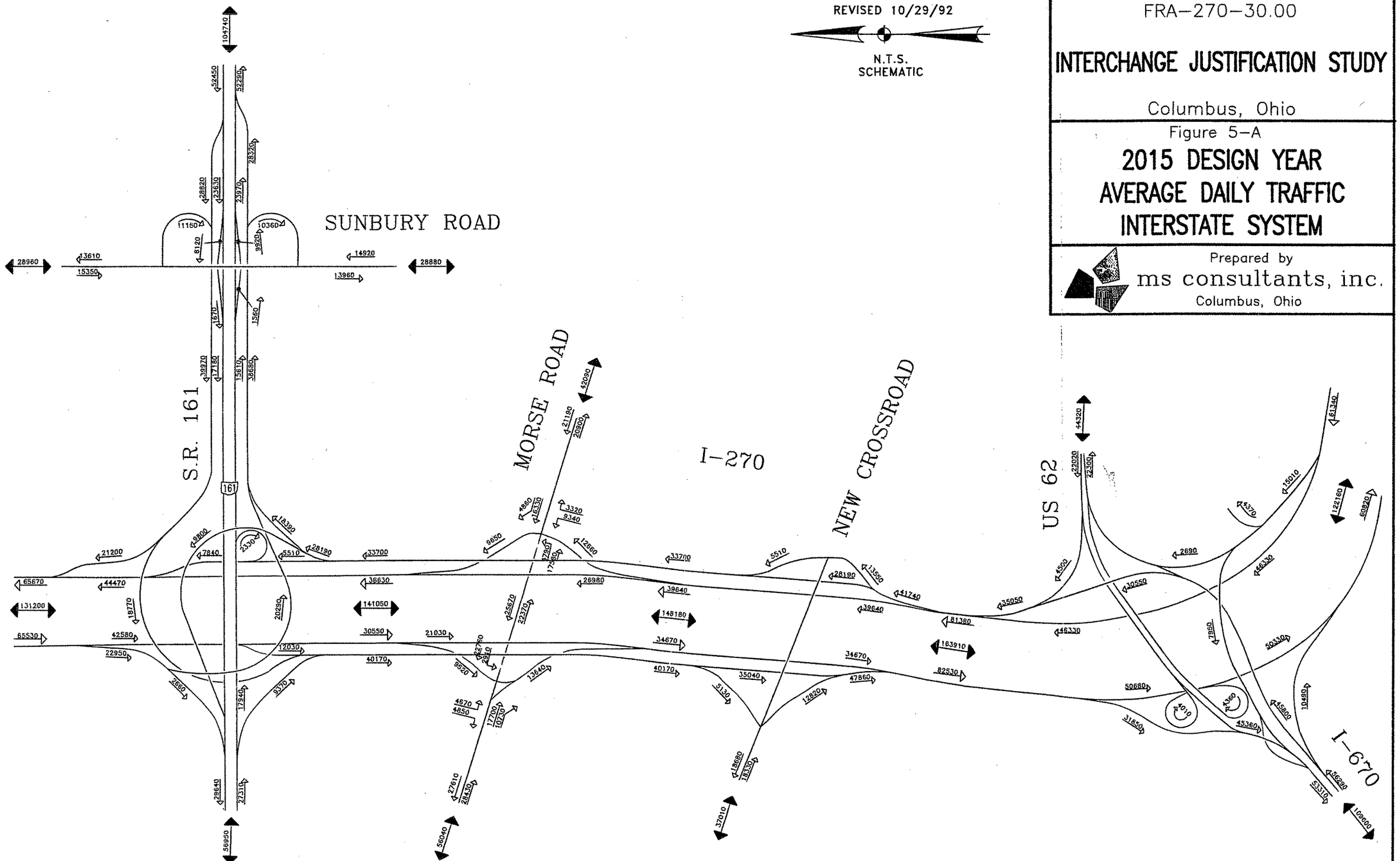
INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

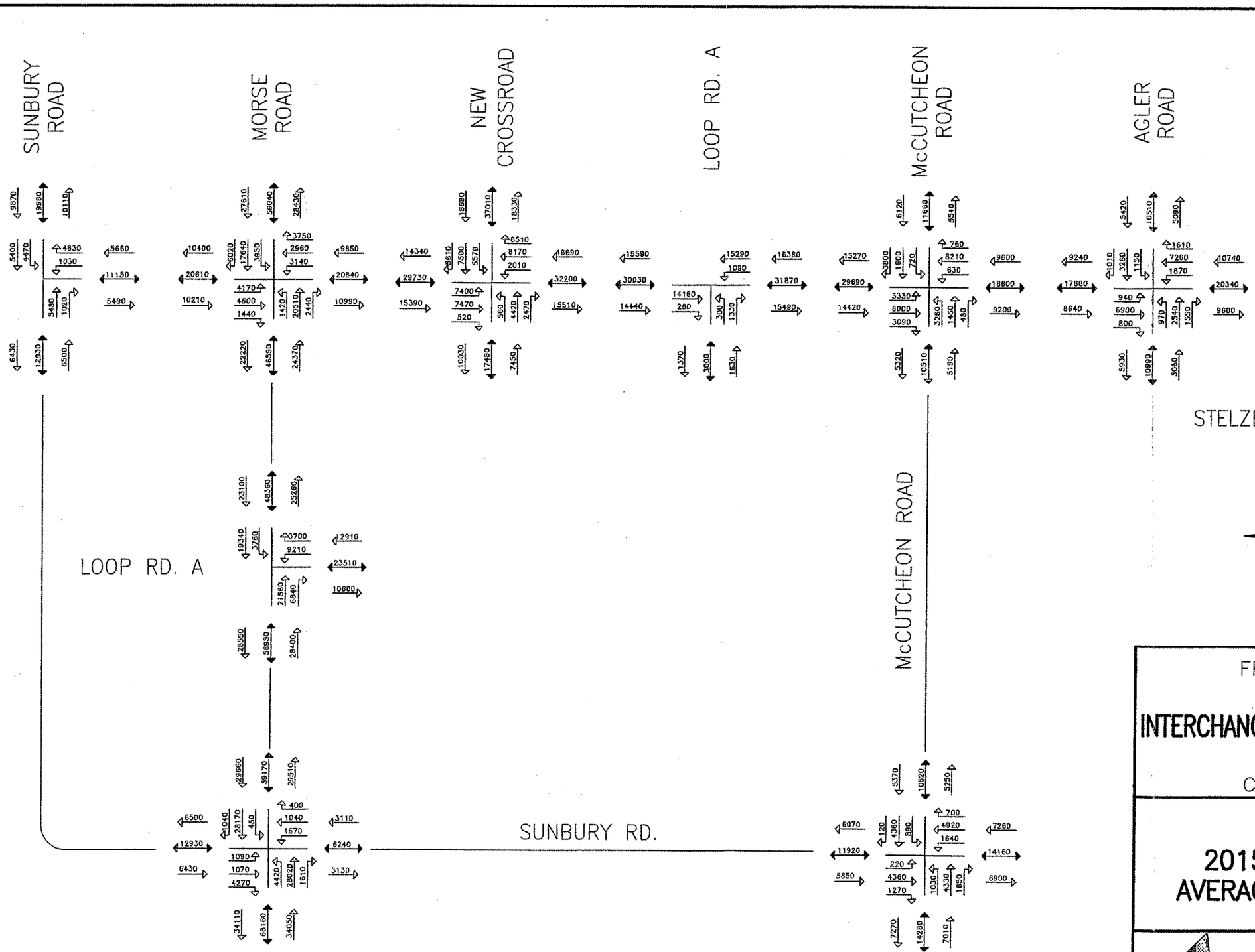
Figure 5–A

2015 DESIGN YEAR AVERAGE DAILY TRAFFIC INTERSTATE SYSTEM

Prepared by
ms consultants, inc.
Columbus, Ohio



10009ARM #8 10/29/92



N.T.S.
SCHEMATIC

FRA–270–30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 5B

2015 DESIGN YEAR AVERAGE DAILY TRAFFIC

Prepared by
ms consultants, inc.
Columbus, Ohio

REVISED 8/10/92

10009VDR #8 10/13/92

- CHAPTER IV -

ANALYSIS OF PRELIMINARY ALTERNATIVES

ANALYSIS OF PRELIMINARY ALTERNATIVES

Interchange Evaluation Process

The Interchange Justification Study process began with the realization that the transportation network in the northeast sector of Columbus was inadequate to handle the projected design year traffic volumes. Initially five network alternatives were advanced as preliminary solutions to alleviate the traffic growth that was anticipated. These five were an Existing Plus Committed alternative (a baseline or "No Build" alternative), an Arterial Upgrade alternative, a Morse Road Interchange Upgrade, a McCutcheon Road Interchange and a Stelzer Road Interchange. Each of these networks was run using as an input, the updated land uses to produce year 2013 traffic.

Recent design work on the SR 161 New Albany By-Pass and the associated design year traffic forecasts were found to affect the design of the SR 161 interchanges at I-270 and Sunbury Road at the northern tip of the study area. Consequently, the scope of the Justification Study was expanded to incorporate the New Albany by-pass work into the I-270 study and develop a concept that would improve future operations on I-270 through the SR 161 interchange possibly including the SR 161 & Sunbury interchange.

Design year traffic was re-evaluated and projected to the year 2015. Manual adjustments were made to incorporate multiple interchange connections as opposed to autonomous interchanges. Concepts for the reconfiguration of the I-270 & SR 161 interchange and SR 161 & Sunbury Road interchanges were advanced. Two significant alternatives resulted, the Morse/Stelzer Interchange and the New Crossroad/SR 161 Access Plan. This chapter will review the seven significant preliminary alternatives evaluated as part of the Interchange Justification Study.

Existing Plus Committed

The Existing Plus Committed alternative, as the name implies, only included the existing street system plus those projects committed to construction. Several projects were assumed to be committed and were input into the model run for 2013 traffic. It was assumed that the intersection of Stelzer Road and Morse Road would be relocated

approximately 800 feet west of its present location (see Figure 4). An extension of Stelzer would then be made northward intersecting Sunbury Road between Morse and I-270. This link appears in the 1981 Columbus Thoroughfare Plan. A new roadway, Loop Road A, was also input. Other noteworthy projects were the I-670 link to downtown and the SR 161 By-pass around New Albany. The design year ADT on I-270 would be approximately 132,000 vehicles per day with no improvements planned for I-270. The ADT on Morse Road, generally a 5-lane facility, would be approximately 58,000 vehicles per day. These future volumes are too large to be adequately serviced by their respective existing facilities; therefore, this alternative was discarded.

Arterial Upgrades

The Upgraded Arterial network assumed the Existing Plus Committed network conditions plus the widening of Morse Road (from four lanes to six), Sunbury Road north of Morse (from two lanes to four), and Stelzer Road (from two lanes to four). This alternative assumed no improvements to the interstate system. The design year ADT on the Morse Road interchange ramps ranges from approximately 15,000 - 17,000 vehicles per day. These volumes are at the capacity of single-lane ramp merge/diverge checkpoints, which implies that widening of the ramps and mainline improvements would be necessary in order to maintain any acceptable level of operation to and from the freeway.

Morse Road Interchange Upgrade

The Morse Road Interchange Upgrade assumed all aspects of the Upgraded Arterial network plus the widening of the I-270 diamond interchange ramps at Morse Road. This alternative resulted in failed levels of service on the interstate mainline and poor or failed levels of service on the Morse Road ramps and signalized ramp terminals.

TRANSYT 7-F signal system optimization program was used to analyze the Morse Road northbound and southbound ramp terminals. The output revealed that the back of queue on the off-ramps would be of sufficient length to disrupt interstate operations due to diverging vehicles needing to decelerate while still traveling in the interstate lanes.

For these reasons, it was determined that additional freeway access beyond an upgrade to the Morse Road Interchange would be required.

McCutcheon Road Interchange

The McCutcheon Road Interchange assumed a diamond interchange at McCutcheon Road located approximately 6300 feet north of the I-670/US 62 interchange and 8900 feet south of the Morse Road Interchange. Due to the close proximity between I-670/US 62 and McCutcheon Road, a weave section of approximately 2900 feet exists on I-270 between these adjacent interchanges. The weave volumes in this section exceed by 30% the maximum weaving capacity criteria of a Type B weave section as set forth in the 1985 HCM. The extremely high weaving volumes from/to I-670 to/from I-270, coupled with the fairly high volumes wishing to access McCutcheon Road, cannot be accommodated in any reasonable manner with an interchange at McCutcheon Road.

Stelzer Road Interchange

The Stelzer Road Interchange alternative assumed an interchange with I-270 and Stelzer Road intersecting I-270 approximately 9600 feet north of I-670/US 62 and approximately 5600 feet south of Morse Road. An interchange here is shown on the 1988 Gahanna Thoroughfare Plan. This interchange would provide freeway access to a major regional corridor, the 15-mile James/Stelzer/Sunbury route.

The traffic volumes associated with this alternative provided the most balance between the interstate and arterial systems which in turn would promote a balanced transportation network. However, ODOT and Ohio FHWA were concerned that an additional autonomous interchange could result in decreased levels of service for interstate travelers. **ms consultants** then developed the Morse/Stelzer Interchange alternative.

Morse/Stelzer Interchange

This concept uses a series of braided on-/off-ramps and a New Crossroad over I-270 to provide access to both the crossroad (located approximately 3000 feet south of

Morse Road) and to Morse Road. The braided nature of the ramps prohibits using the interstate to travel between the crossroad and Morse Road thus avoiding a weave situation between interchanges. No additional access points on the interstate system were required by this alternative.

The existing three lanes per direction would continue to be provided for through interstate traffic while two lanes (one for Morse, one for the crossroad) would exit/enter the interstate system at a single point and would be provided to the outside of the existing lanes. This concept results in five lanes per direction on I-270 between I-670/US 62 and the southern edge of the modified interchange. North of the interchange the five lanes would taper to four lanes just south of the overpass at Sunbury Road. As part of this concept, a new east-west road, the Stelzer/Sunbury Connector (see Figure 4) was proposed to provide access from the crossroad to both Stelzer and Sunbury Roads, both minor arterials.

This alternative does not address improvements to the I-270 & SR 161 Interchange in conjunction with the New Albany By-Pass work; therefore, **ms consultants** analyzed a multi-interchange, collector/distributor-type facility to include interchanges with the New Crossroad, Morse Road, SR 161 and Sunbury Road.

New Crossroad/SR 161 Access Plan

The New Crossroad/SR 161 Access Plan alternative uses a collector/distributor (C/D) facility constructed to the outside of the existing mainline lanes. This C/D system provides access to and links the New Crossroad and SR 161 interchanges. The Morse Road Interchange continues to function as it exists today with direct access to I-270. The SR 161 & Sunbury Road interchange, due to its close proximity to I-270, is linked to I-270 and SR 161 via a C/D system.

This alternative has met conceptual approval and will be advanced as a feasible alternative in this Interchange Justification Study.

- CHAPTER V -

FEASIBLE ALTERNATIVE ANALYSIS

FEASIBLE ALTERNATIVE ANALYSIS

Conceptual Geometrics

The New Crossroad/SR 161 Access Plan is shown conceptually in **Figure 6.** A system of collector/distributor (C/D) roads is to be constructed to the outside of the existing mainline lanes. This C/D system will link the New Crossroad, the SR 161 interchange and the SR 161 & Sunbury Road interchange. The Morse Road interchange will continue to have direct access to I-270. The existing three lanes per direction on I-270 will continue to be provided for through interstate traffic while three additional lanes will be constructed to the outside to make up the C/D system. The existing 60-foot-wide median, except southbound near I-670 will remain as originally constructed.

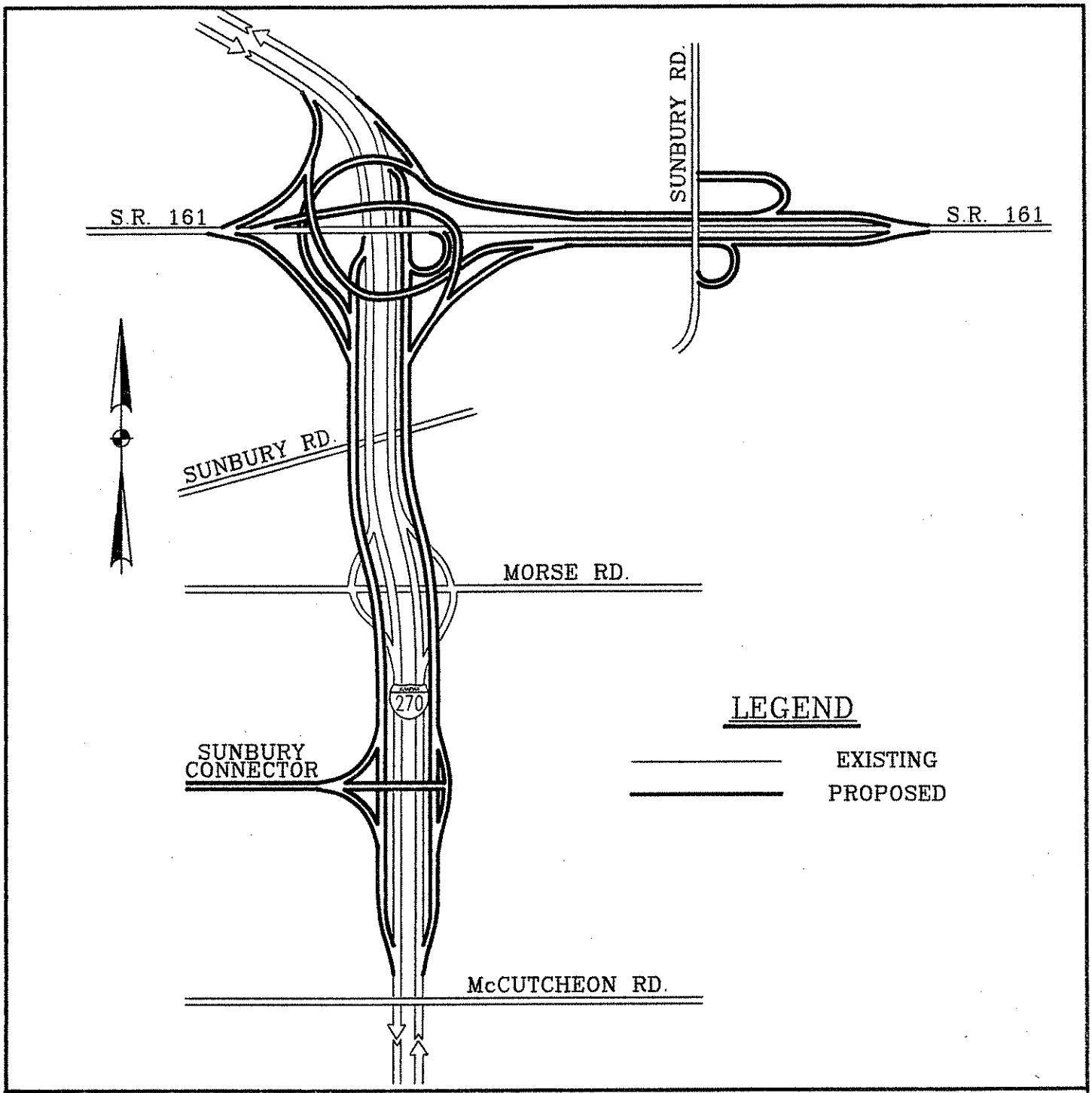
A New Crossroad located approximately 3,350 feet south of Morse Road will provide interstate access to the James/Stelzer/Sunbury corridor. Extending beyond Stelzer (shown in Figure 4) will be the Stelzer/Sunbury connector which will feed the Sunbury corridor.

The I-270 & SR 161 and the SR 161 & Sunbury Road interchanges will be reconfigured in order to separate the major conflicting traffic flows. Ramps to/from I-270 will be introduced east of Sunbury but will also have access to Sunbury via loop ramps. Traffic to/from SR 161 will access Sunbury via a compressed diamond interchange located between the loop ramps. This configuration avoids an undesirable weave situation between SR 161 traffic and I-270 traffic.

These conceptual geometrics outlined the general network facility to be provided on the I-270 northeast outerbelt. Although Figure 6 is shown to resemble the preliminary geometrics discussed later in this chapter, numerous modifications to the conceptual plan were identified and studied prior to establishing the preliminary geometrics. These conceptual geometrics served as a guide to establish preliminary geometrics, levels of service, and sub-alternatives within the framework of this conceptual plan.

Conformance with Regional Transportation Plans

The access configuration incorporates and promotes many of the regional



FRA–270–30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 6

CONCEPTUAL GEOMETRICS

Prepared by

ms consultants, inc.

Columbus, Ohio

51215RIS #8 11/2/92

transportation plans that were previously approved. The Gahanna Thoroughfare Plan proposed a new interchange located on I-270 north of McCutcheon Road. The New Crossroad fulfills this portion of their plan. The Columbus Thoroughfare Plan calls for an extension of Stelzer Road to Sunbury Road and the widening of Stelzer south of Morse Road. Both of these projects will be completed as part of the interchange construction project.

The construction of the New Albany By-pass will complete a link that has been under consideration for many years. The work proposed in this justification study will incorporate the SR 161 & Sunbury interchange and tie the New Albany By-pass with Sunbury Road and I-270. The geometrics of this plan for I-270 north of SR 161 are to meet with the planned construction project for the I-270 north outerbelt. This will result in the entire northern crescent of I-270 being upgraded and improved.

The existing 60-foot median will remain for potential high-occupancy vehicle use or transit alternatives. This is one such Transportation System Management (TSM) strategy being considered. This project will be incorporated in Columbus' regional traffic surveillance and management plan. The Limited generates or controls a large number of the employment centers in this area; therefore, multiple shifts, flex hours and car/van pooling opportunities either have been or can be incorporated in the regional transportation plans. Transit measures will be developed during the detailed design phase and in cooperation with the local transit and transportation agencies. Appropriate provisions for bicycle and pedestrian travel will also be made in the detailed design phase of the work.

Design Criteria

The general design criteria used to evaluate the sub-alternate design, as well as prepare preliminary geometric plans, was taken from applicable sections of the ODOT Location and Design (L&D) Manual. No design exceptions were assumed or otherwise incorporated.

The I-270 mainline, C/D, and ramps were considered as Class II urban freeway facilities. A sixty (60) mph design speed was provided for I-270 mainline and C/D travel

lanes. The SR 161 mainline and C/D facilities were considered as urban arterial expressway-type facilities. A sixty (60) mph design speed was also used for these facilities. Morse Road and Sunbury Road were considered as urban arterial streets with a 45 mph design speed.

The I-270/SR 161 mainline and C/D lanes, shoulder widths, slopes, etc., are depicted in the typical sections which are further described in Chapter VI. Generally, 12-foot-wide lanes with 10-foot paved shoulders were provided on these facilities. The single-lane ramps are sixteen (16) feet wide and are generally bounded by 4-foot paved left shoulders and 6-foot paved right shoulders. Dual ramps are 24 feet wide with the same shoulder widths provided on single-ramp lanes. Ramp design speeds used for alternate geometric plans were selected according to the criteria set forth on Page 4-6 of the ODOT Location & Design Manual. That criteria requires design speeds according to ramp type classification: directional ramps with high to middle design speed ranges (generally fifty (50) mph was used); diamond ramps with high approach design speeds and low terminal design speeds (fifty (50) mph and thirty (30) mph, respectively, were typically used); loop ramps with middle terminal area design speeds and lower middle area design speeds (forty (40) mph and thirty (30) mph, respectively, were used).

Vertical design requirements were applied to feasible sub-alternative designs. A maximum vertical grade of 3% (4% downgrade) was used on mainline and C/D facilities. In fact, flatter profile grades were used due to existing mainline I-270 and SR 161 profile grades which rarely approach three percent (3%).

Generally, most ramps were designed to be no greater in percent grade than existing I-270 facilities in the vicinity (2.84%). Some ramps on sub-alternates, and selected preliminary geometric plans approach the L&D nominal maximum grades. However, the designs were within recommended guidelines for urban-type facilities having limited available lateral room for roadway expansion (4% maximum).

Vertical profiles for ramps on the preferred alternates are shown in Figures F-1A through F-4A for I-270 & SR 161, SR 161 & Sunbury Road, and the new interchange included in Appendix F. Vertical profiles for the proposed C/D lanes over existing ramps at Morse Road are also shown.

Entrance and exit terminals for single-lane, collector-distributor, and multi-lane roadways were designed according to guidelines in Section 404, 405, and 406 of the ODOT Location & Design Manual.

The resulting ramp terminal lengths were used: single ramp lane lengths typically ranged from 700 feet on deceleration exit ramps to 1,500' feet on acceleration ramp tapers. Multi-lane exit ramp lanes were typically 2,500' feet from the physical separations; multi-lane entrance ramps measure 5,000' feet from the physical separation (gore).

The 26-foot minimum separation distance between the existing I-270 mainline and the proposed 3-lane collector-distributor is indicated on the typical sections. This distance accommodates two (2) ten-foot-wide shoulders plus 6 feet for placement of a concrete barrier (and its required offset to obstruction). This minimum distance was also used on the separation between C/D and existing mainlines of SR 161.

Bridge widths and vertical clearances provided on reconstructed and new bridges were provided as required in Section 304 of the Location and Design Manual. A nominal vertical clearance of 16 feet, 6 inches was provided for vertical clearances for bridges over roadways.

The clear roadway width provided on mainline bridges will include the width of traffic lanes, paved shoulders, plus two feet per side for offset to obstruction (bridge railing). Likewise, the clear roadway width provided by ramp bridges includes the ramp lane(s) widths, paved left and right shoulders, plus two feet per side for offset to obstruction.

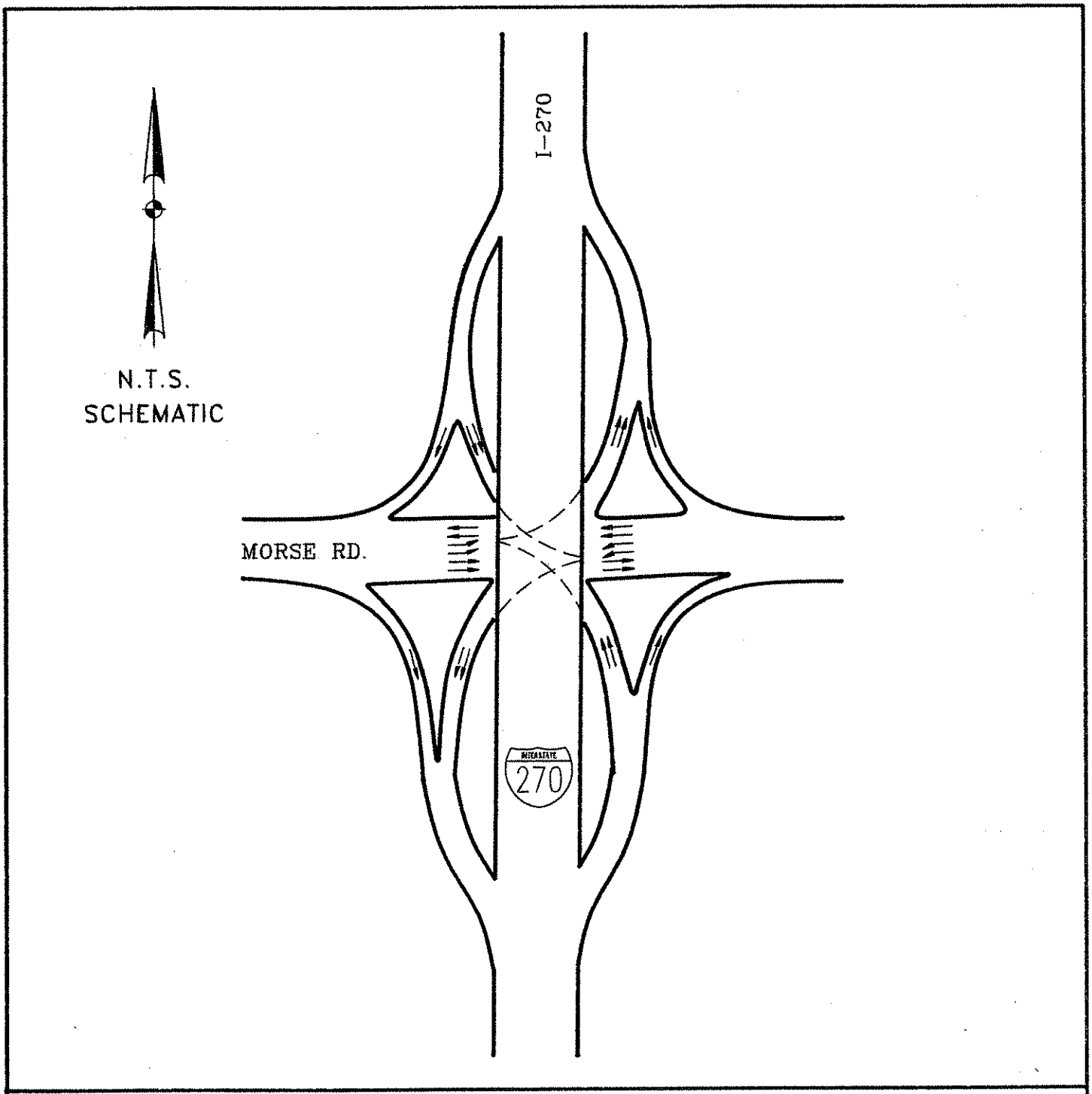
Analysis of Sub-Alternatives

The identification of the conceptual geometrics and the establishment of the appropriate design criteria enabled **ms consultants** to work towards a preliminary geometric plan which is supported by the appropriate calculations of the Level of Service (LOS). These processes were interactive in nature and resulted in numerous sub-alternatives, some of which were studied in more detail than others, but all of which conformed to the conceptual geometric plan shown in Figure 6. The preliminary geometric plan and sub-alternatives were developed in a cooperative effort between the

Ohio Division FHWA, ODOT and **ms consultants**. This section will discuss the sub-alternatives reviewed and the reasons why they were or were not selected for the alternative proposed for advancement.

Two alternatives for interchanges at the collector/distributor and the New Crossroad were examined. A conventional-type diamond interchange with extensions to the east and west of the I-270 C/D system was evaluated and found to be unacceptable. A large existing residential neighborhood is located to the east between I-270 and Stygler Road north of McCutcheon Road. A conventional diamond-type interchange with access to the east would adversely affect many of the homes, neighborhoods, and local streets in the area. Many single-family residences would have to be acquired resulting in bisected neighborhoods and disruption to the adjoining existing land uses. The compressed "tee" interchange requires additional land west of the I-270 C/D system but results in a better land and highway facility use with less disruption to existing residences and land uses.

At Morse Road three alternatives were investigated. A single point diamond (or urban interchange) was considered (see **Figure 7A**), however, recent literature and the design year traffic volumes suggest that a conventional diamond interchange would be more efficient, accommodate greater variability of traffic patterns and cost less to construct. Also a single-point diamond interchange would require extraordinarily long-spanned bridges over Morse Road to provide adequate room for the four rampways and widened Morse Road approaches. Both bridge and I-270 mainline approach costs would be very high for this sub-alternate. A compressed diamond (see **Figure 7B**) was considered in order to avoid bridging the C/D roads over the on- and off-ramps and over Morse Road. This plan requires relocating the existing ramp terminal intersections closer to I-270. This alternative was not selected because the two ramp terminal intersections would be closely spaced thus reducing potential queue storage distance on the internal links on Morse Road. In addition, this alternative required the C/D road to balloon out around the intersections resulting in an undesirable reverse curve and less than desirable horizontal alignment. The alternative that was selected maintained the existing ramp terminal intersection locations (see **Figure 7C**). Although the C/D road must bridge both



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 7A

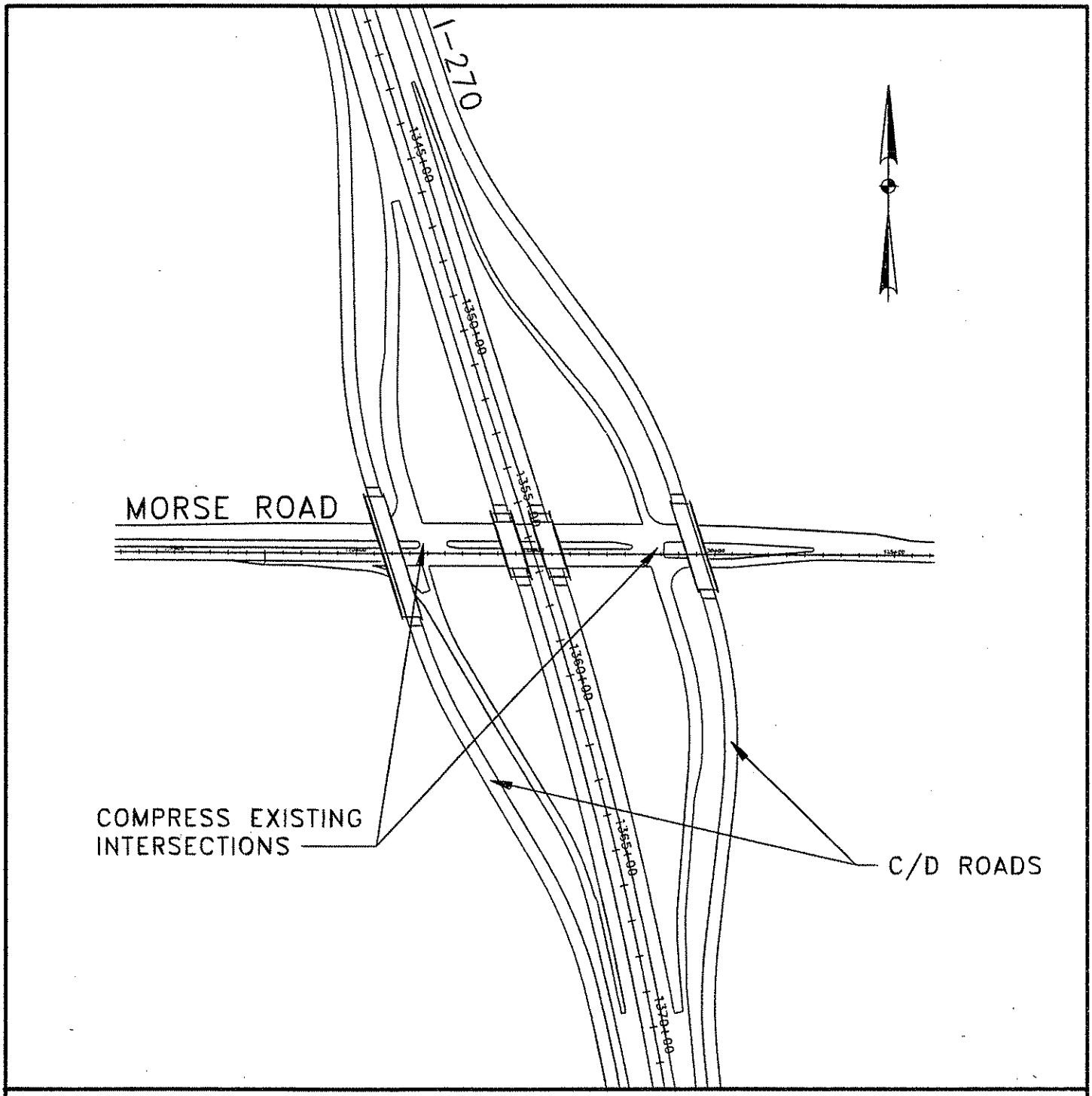
I-270 & MORSE ROAD
SINGLE POINT DIAMOND ALTERNATIVE

Prepared by

ms consultants, inc.

Columbus, Ohio

51215SPD #8 11/2/92



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

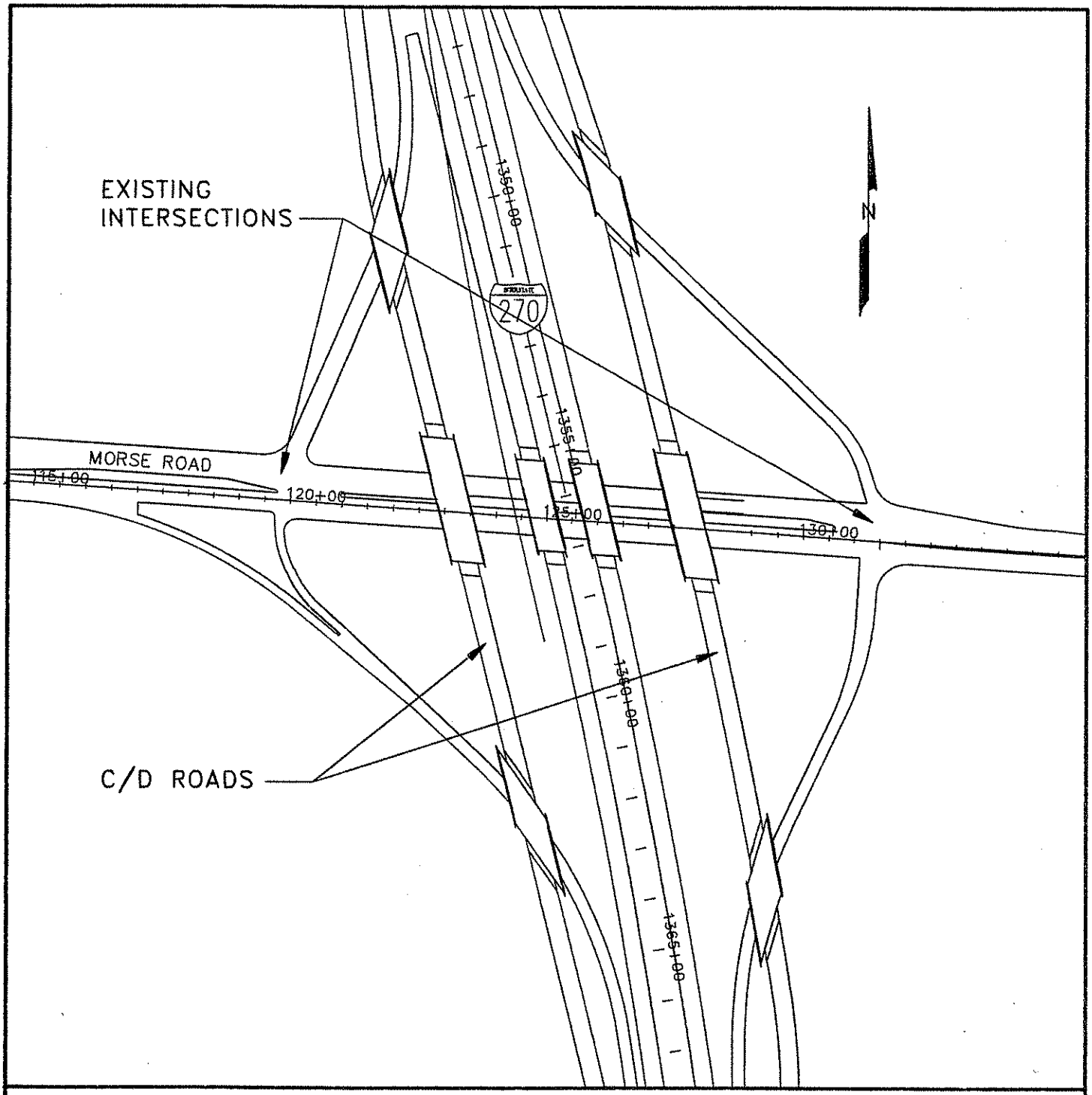
Figure 7B

I-270 & MORSE ROAD COMPRESSED DIAMOND ALTERNATIVE

Prepared by

ms consultants, inc.

Columbus, Ohio



FRA–270–30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 7C

I–270 & MORSE ROAD EXISTING DIAMOND ALTERNATIVE

Prepared by

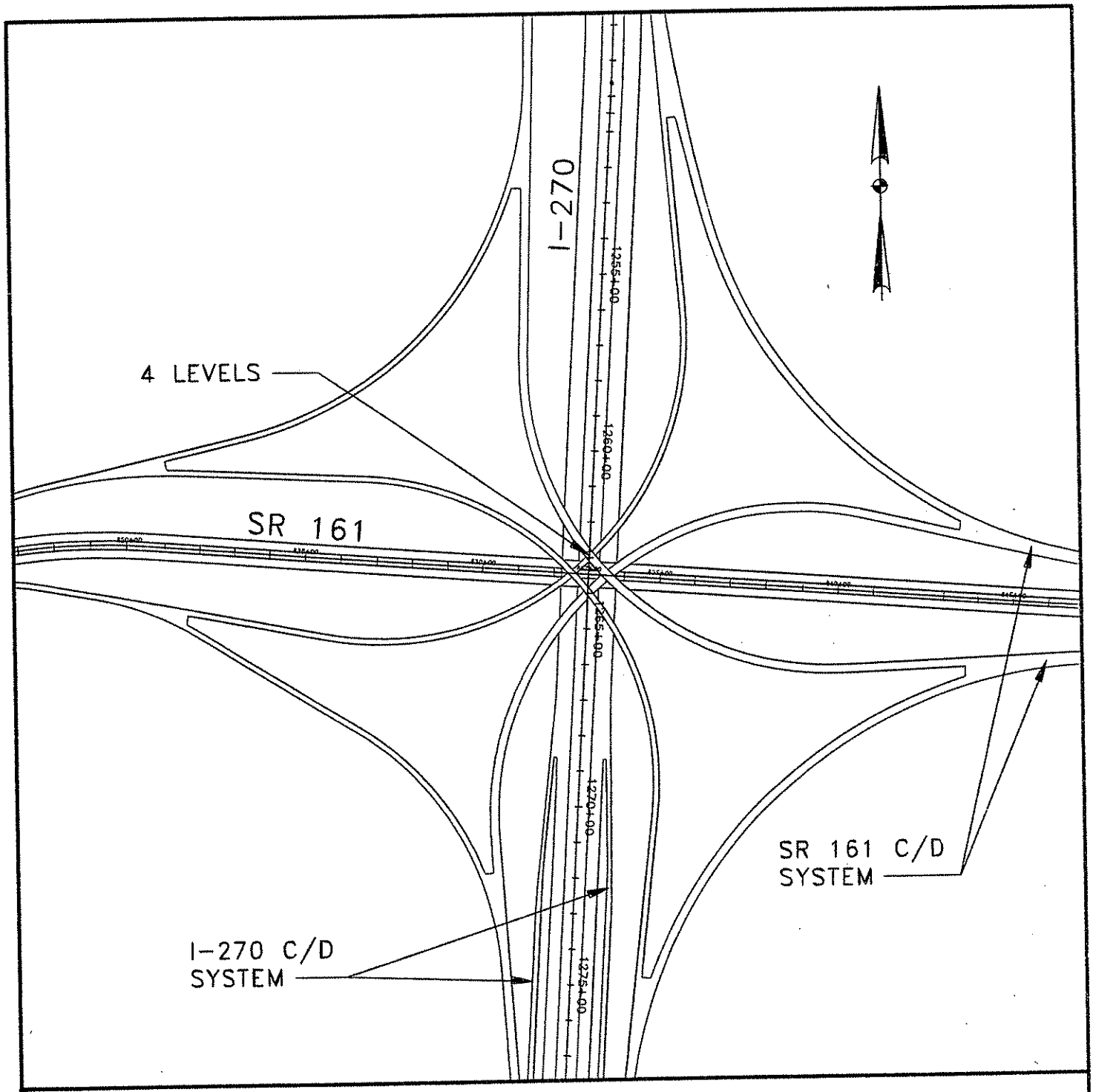
ms consultants, inc.

Columbus, Ohio

the on- and off-ramps in both directions, a smoother alignment results. It is also anticipated that this alternative can be constructed with less impact to the existing ramp operation than either of the other two sub-alternatives. Two-lane ramps will be required at the on- and off-ramps to Morse Road.

Three alternatives were examined in detail for the I-270 & SR 161 interchange. Due to the close distance (approximately 3100 feet) between this interchange and the SR 161 & Sunbury Road interchange, all alternatives studied incorporated the Sunbury Road interchange. The first alternative studied was a four-level interchange as shown in **Figure 8A**. This configuration allows for free flow directional ramps for all movements. A secondary C/D system would be provided along SR 161 to the east from I-270 for the Sunbury Road interchange. This configuration, however, does not allow access from points on SR 161 west of I-270 to Sunbury Road. The four-level structure at I-270 & SR 161 would reach significant heights and would be out of scale with the surrounding topography. The four-level structure would require ramp grades very near (and quite likely exceeding) normal design limits, due to the greater structural depth (approximately 10 feet) inherent to such long spanned structures. The additional right-of-way needed for this configuration was at a minimum. However, significant construction delays would be inevitable since most of the existing interchange would be disabled or detoured during construction.

A second alternative was developed that incorporated two loop ramps (see **Figure 8B**) for the two lower volume movements and directional ramps for all other movements. These loop ramps would access the northbound I-270 C/D system. The loop ramps would occupy the same area as existing northbound I-270 loop ramps; however, they would be modified by adjusting the ramp curvature in the I-270 deceleration and acceleration areas. The resultant change would lead to lower operating speeds in the weaving area. The weave situation between the loop ramps on the C/D system resulted in a LOS E at that location. This LOS E was undesirable. Direct access to/from points on SR 161 west of I-270 to/from Sunbury Road were provided via slip ramps off the main directional ramps to the C/D system. This did create a weave situation on the SR 161 C/D system; however, the condition was acceptable due to the lesser significance of SR



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

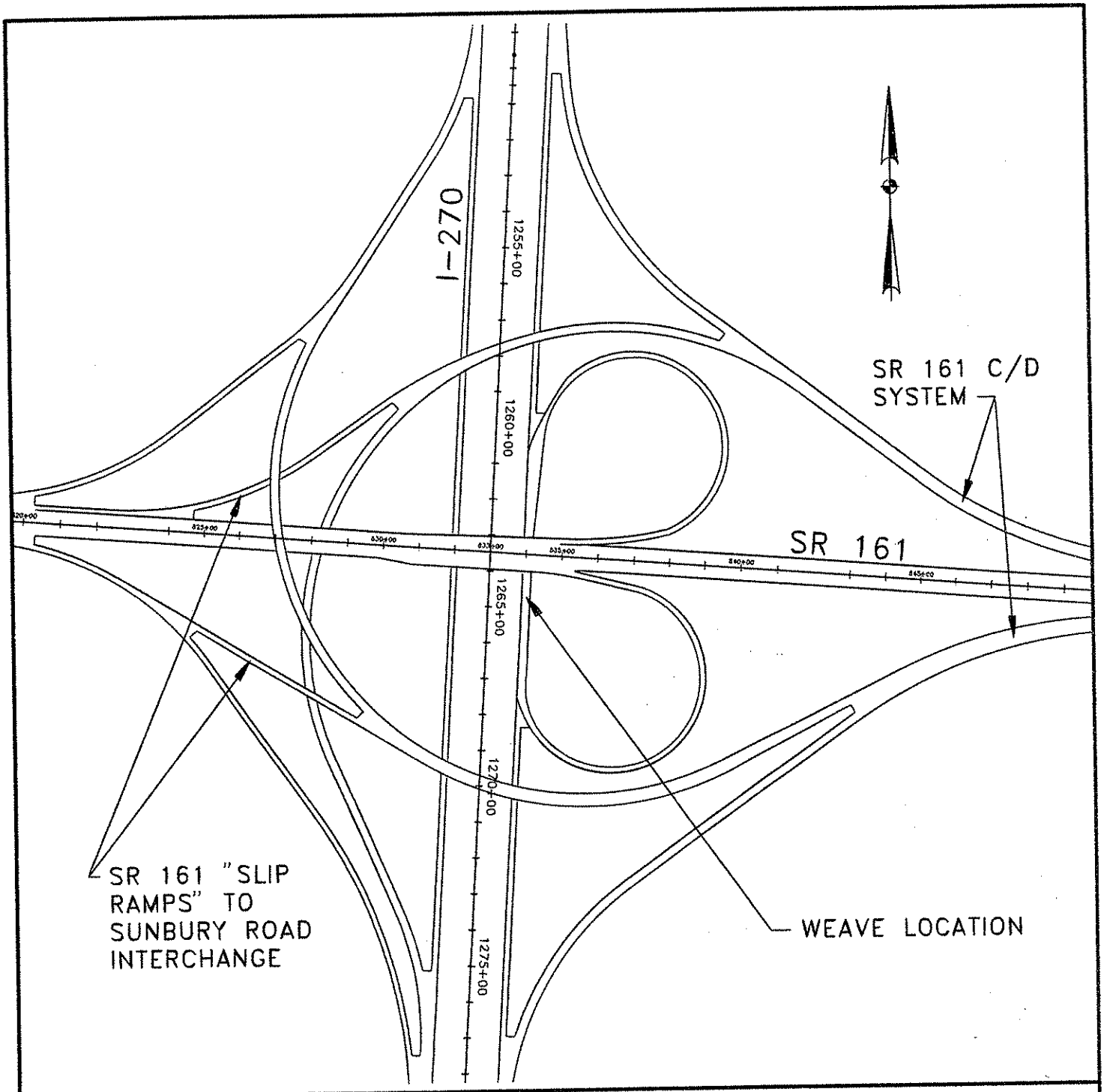
Figure 8A

I-270 & SR 161 4-LEVEL INTERCHANGE ALTERNATIVE

Prepared by

ms consultants, inc.

Columbus, Ohio



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 8B

I-270 & SR 161 2-LOOP INTERCHANGE ALTERNATIVE

Prepared by

ms consultants, inc.

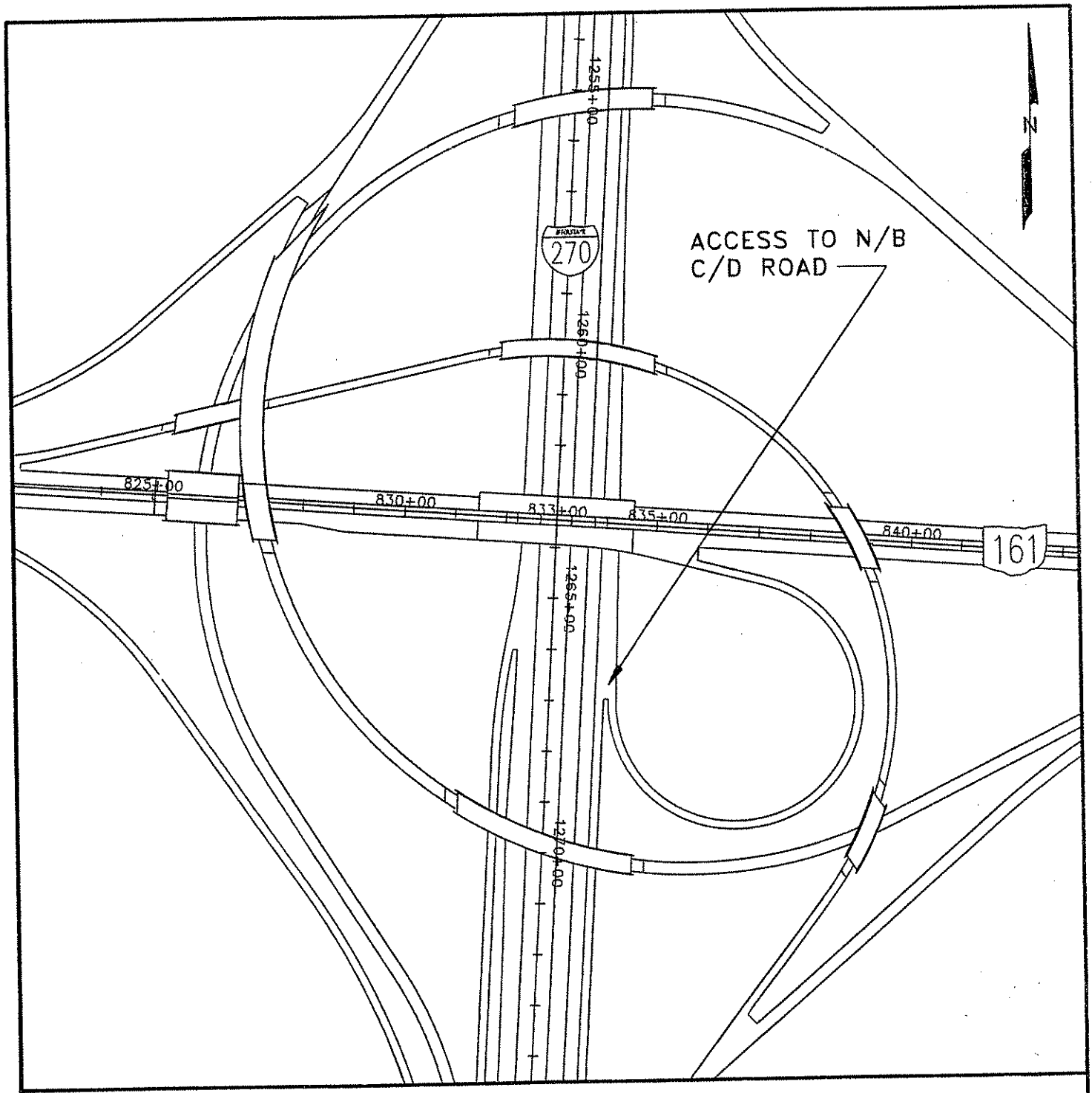
Columbus, Ohio

161 and the lower weave volumes that occurred. This alternative, however, was eventually rejected due to the LOS E weave on the I-270 C/D system between the loop ramps.

The last alternative examined included only one loop ramp for the lowest volume interchange movement (see **Figure 8C**). This loop ramp is located in the southeast quadrant of the interchange. Access to the northbound C/D road is provided, however, no weave situation exists. The second loop ramp becomes a directional ramp as are all the other ramps. Initially, traffic from points on SR 161 west of I-270 to Sunbury Road was handled via slip ramps as in the previous alternative. The geometrics of this alternative, however, resulted in a reduced weave distance (approximately 70 percent of the length of the previous alternative) for the westbound SR 161 C/D road. This resulted in an LOS F weave at this location. Although the weave volumes were identical, the shorter weaving distance increases the intensity of the lane changing movements. While the one loop alternative for the I-270 and SR 161 interchange was promising, alternatives for the SR 161 & Sunbury Road interchange were now examined to address this interchange and attempt to alleviate the LOS F weave between the two interchanges.

The three alternatives for I-270 & SR 161 had generally incorporated the existing two quadrant cloverleaf at SR 161 & Sunbury Road. A modification to this interchange was needed in order to mesh the I-270 & SR 161 interchange to the west and the planned SR 161 & Little Turtle interchange located approximately 5200 feet to the east.

The first of two alternatives resulted in a compressed diamond interchange from SR 161 to Sunbury Road as shown in **Figure 9A**. This eliminated the need for the slip ramps at the I-270 & SR 161 interchange and eliminated the SR 161 to Sunbury weave on the SR 161 C/D system. The two loop ramps to Sunbury are maintained for access to/from I-270. The SR 161 C/D system is now in effect, an extension of the I-270 ramps. East of Sunbury a weave section develops due to the use of auxiliary lanes on SR 161 between the Sunbury and Little Turtle interchanges. In the eastbound direction a LOS E weave results from the analysis. In the westbound direction a LOS D/E weave analysis results from the geometric configuration.



FRA–270–30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

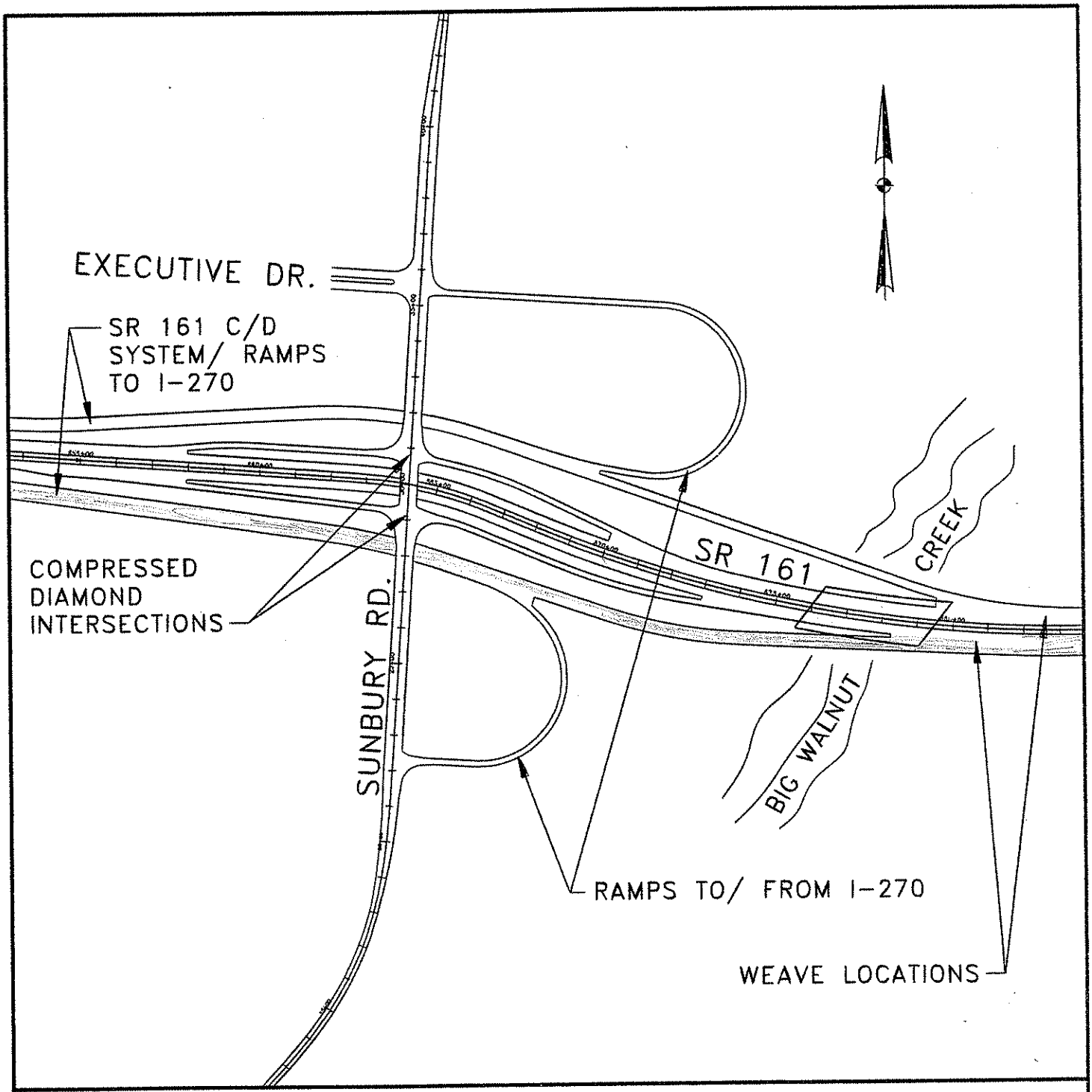
Figure 8C

I–270 & SR 161 1–LOOP INTERCHANGE ALTERNATIVE

Prepared by

ms consultants, inc.

Columbus, Ohio



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 9A

SR 161 & SUNBURY ROAD COMPRESSED DIAMOND ALTERNATIVE

Prepared by

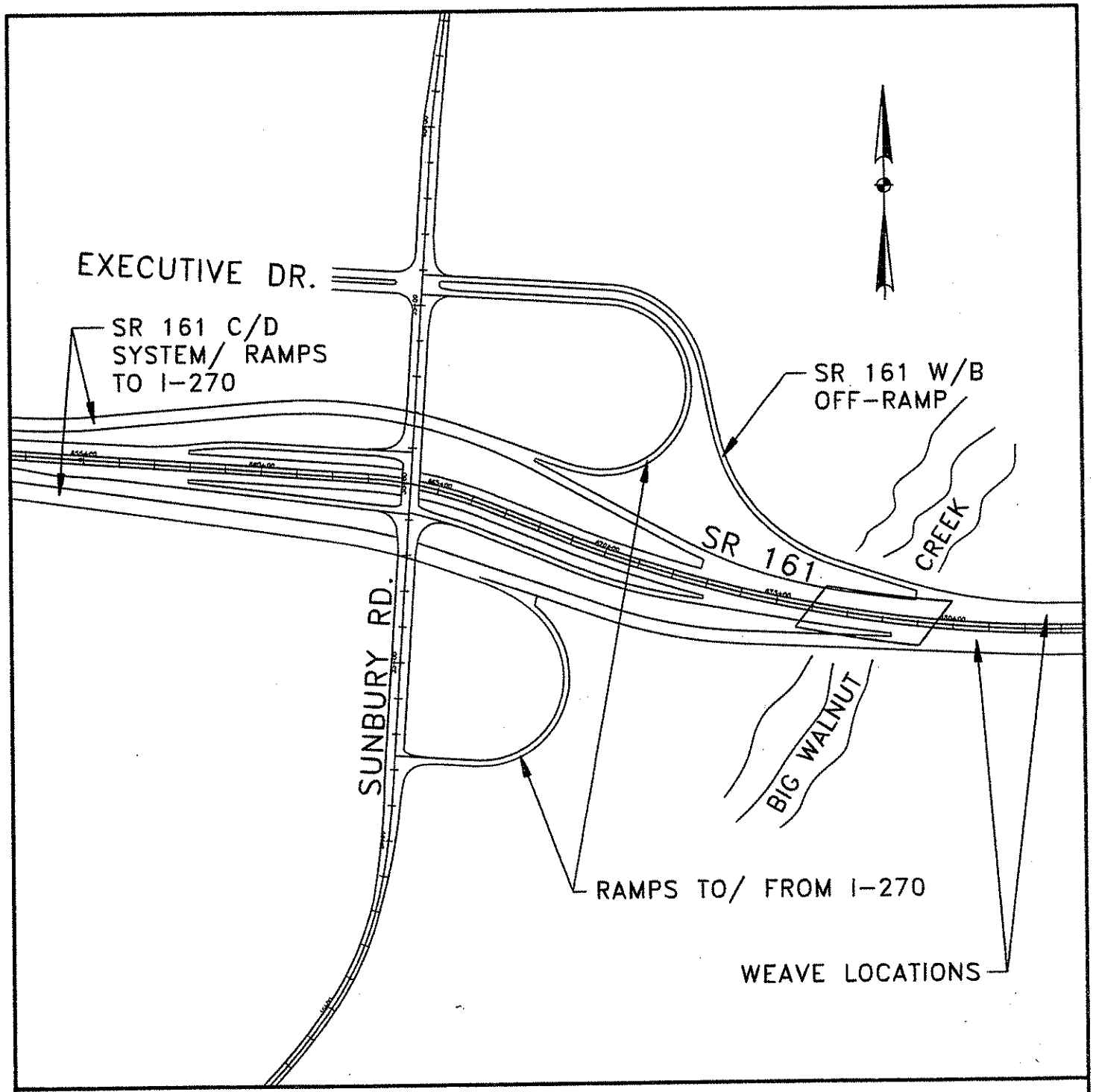
ms consultants, inc.

Columbus, Ohio

This alternative also results in four closely spaced intersections on Sunbury Road. The two intersections that make up the compressed diamond would operate simultaneously as one intersection in a coordinated system along Sunbury. A TRANSYT 7F signal system optimization program was used to evaluate the performance of a proposed signal system which consisted of the four intersections on Sunbury. The average delay for the system was approximately 30 and 35 seconds per vehicle in the AM and PM design hours, respectively. This compares favorably with the average delay at other signalized intersections analyzed in the study area.

A second alternative for the SR 161 & Sunbury Road interchange was also proposed and is shown in **Figure 9B**. In this alternative the westbound SR 161 diagonal off-ramp to Sunbury is swung around the loop ramp similar to the existing configuration. This alternative is referred to as a partial compressed diamond. This alternative was developed for two reasons. First, the westbound diagonal off-ramp shown in Figure 9A is on a four percent upgrade (the maximum allowable). Second, the close spacing of the two intersections formed by the diamond interchange with SR 161, although shown by computer analysis to provide acceptable delays, were of concern to **ms consultants** as to the efficient operation of the system.

The partial compressed diamond alternative combines the westbound ramps north of SR 161 into one intersection on Sunbury across from Executive Drive and effectively eliminates one of the closely spaced intersections at the compressed diamond. The TRANSYT-7F computer analysis showed average delays of approximately 21 seconds per vehicle in the peak hours. This alternative also simplifies traffic signing for westbound SR 161 east of Sunbury. The westbound exit to Sunbury diverges first as Sunbury Road is the first destination. The I-270 ramp diverges second with I-270 being the second destination. This signing sequence would tend to meet driver expectation better than the compressed diamond alternative in which I-270, the second destination, would be signed first. The partial compressed diamond, however, results in further encroachment into possibly sensitive areas near Big Walnut Creek. After studying these alternatives in detail, it was concluded that the compressed diamond alternative had more merit than the partial



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 9B

SR 161 & SUNBURY ROAD
PARTIAL COMPRESSED DIAMOND ALTERNATIVE

Prepared by

ms consultants, inc.

Columbus, Ohio

compressed diamond. **ms consultants** therefore proceeded with the preliminary design of the compressed diamond at SR 161 & Sunbury.

- CHAPTER VI -

ALTERNATIVE PROPOSED FOR ADVANCEMENT

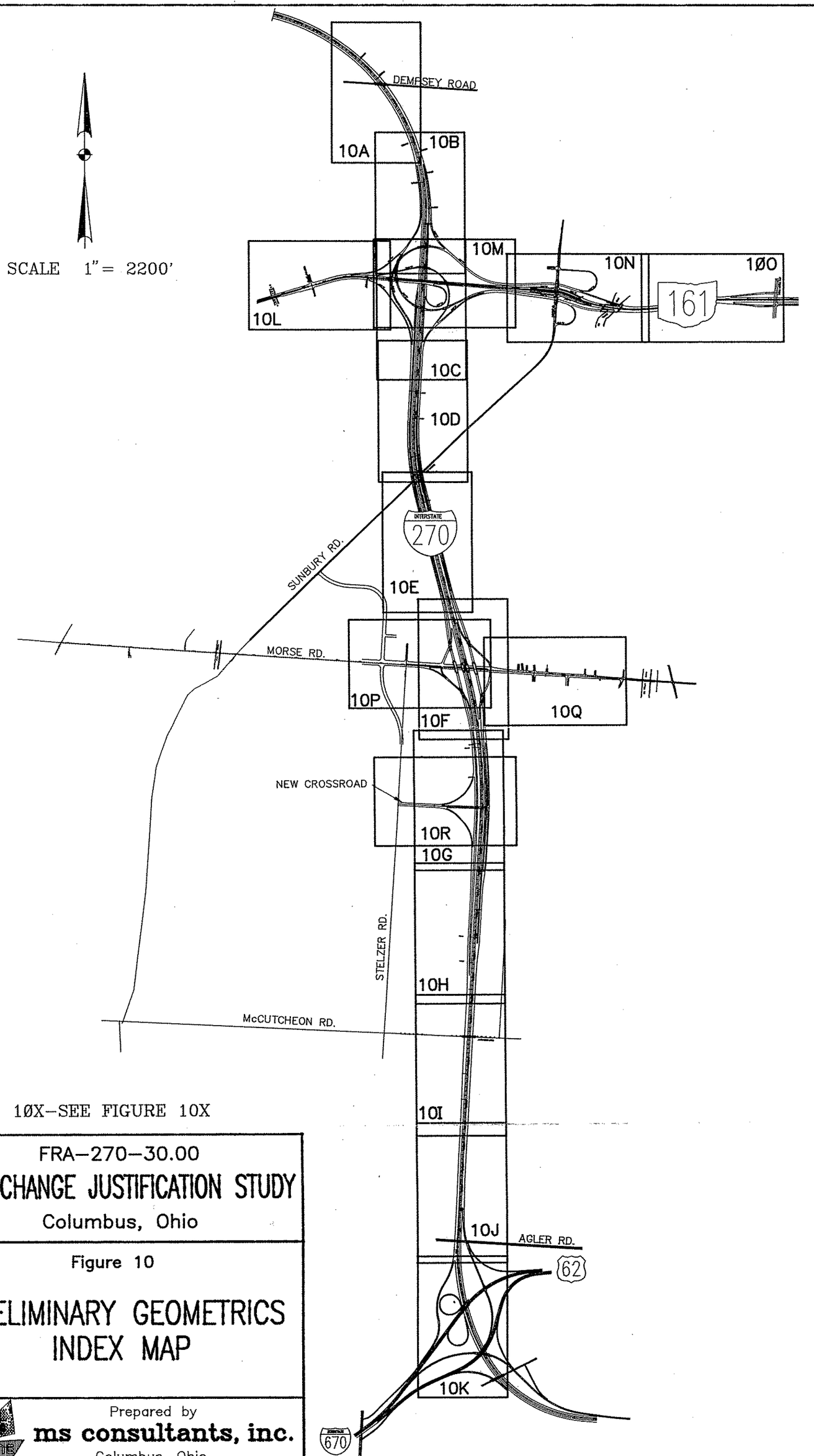
ALTERNATIVE PROPOSED FOR ADVANCEMENT

Preliminary Geometrics and Levels of Service

The analysis of sub-alternatives within the framework of the conceptual geometrics resulted in a preliminary geometrics proposal (**Figures 10 - 10R**) and corresponding levels of service (**Figures 11A - 11B**). The figures depict existing (to remain) and proposed edges of pavement with the number of traffic lanes provided on all major intersections, interchanges and lane add/drop locations, and proposed right-of-way limits.

Southbound four lanes are provided from SR 3 towards SR 161. Two lanes exit to east and west SR 161 and three mainline lanes continue (see Figure 10B). The C/D system forms just south of SR 161 where one lane exits to the right (see Figure 10C). This lane provides the exit to the New Crossroad and to westbound I-670. I-670 traffic will be directed to the southbound C/D road to improve the lane changing situation on I-270 between the crossroad and I-670 near the south end of the project. The one-lane exit to the C/D is joined by two lanes from westbound SR 161 to form a three-lane southbound C/D. One lane from eastbound SR 161 merges into the three and continues southbound over Morse Road and the on-/-off ramps at Morse (see Figure 10F). At the New Crossroad one lane exits and three lanes continue southbound. These are joined by the entrance ramp from the New Crossroad. This entrance ramp will be extended 1,000 feet beyond that which is normally required by design standards in order to allow an additional longitudinal distance for ramp vehicles to merge into the traffic stream. The C/D system will merge back with the mainline near McCutcheon Road (see Figures 10G - 10I). Here six lanes are provided for 2000 feet at which point the sixth lane merges in at the right. South of Agler two lanes diverge to westbound I-670 while four mainline lanes continue south. The four lanes taper back to the existing three lanes through the I-670 interchange (see Figures 10J - 10K).

The existing I-270 & I-670/US 62 interchange requires no modifications. The levels of service are acceptable or no worse than what would be expected with no I-270 improvements. The only changes that occur are in relationship to the I-270 modifications.



FRA–270–30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 10

PRELIMINARY GEOMETRICS INDEX MAP

Prepared by

ms consultants, inc.

Columbus, Ohio

10009IDX #9 11/5/92

LEGEND

- L/A-R/W — EXISTING RIGHT-OF-WAY
- R/W — PROPOSED RIGHT OF WAY
- ℄ — EXISTING PROPERTY LINE
- PROPOSED TRAVEL LANE
- EXISTING TRAVEL LANE

GLENGARY HEIGHTS SUBDIVISION

THE HIDEAWAY TOWNHOMES

HAMSTEAD SUBDIVISION NO. 1

DEMPSEY ROAD

R/W

L/A

INTERSTATE 270

1230+00

1225+00

1220+00

1215+00

1210+00

1205+00

1200+00

K.V.JR. & A.J. NOBLE

CITY OF WESTERVILLE

SPRINGBOROUGH SUBDIVISION

HAMSTEAD SUBDIVISION NO. 2

GRAHAM J. KATHRINE M. COLLINS

K.W. & H.L. EVANS

J.W. & V.R. SWEENEY

GLENGARY HEIGHTS SUBDIVISION

GRAPHIC SCALE

0 100 200 300 500

(IN FEET)

FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

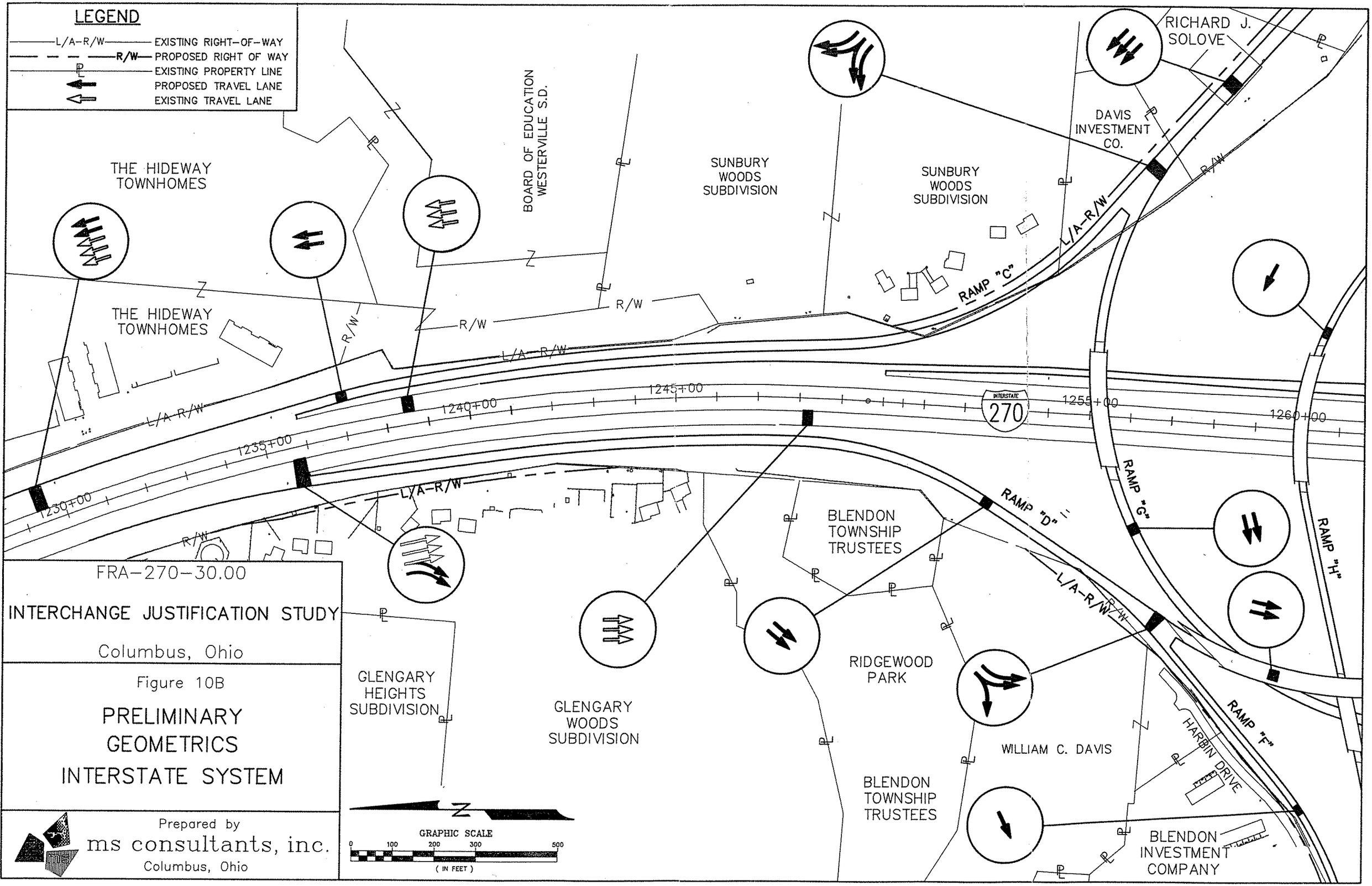
Figure 10A

PRELIMINARY GEOMETRICS INTERSTATE SYSTEM

Prepared by

ms consultants, inc.

Columbus, Ohio



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 10B

PRELIMINARY GEOMETRICS INTERSTATE SYSTEM

Prepared by
ms consultants, inc.
Columbus, Ohio

LEGEND

- L/A-R/W — EXISTING RIGHT-OF-WAY
- R/W — PROPOSED RIGHT OF WAY
- ℄ — EXISTING PROPERTY LINE
- PROPOSED TRAVEL LANE
- EXISTING TRAVEL LANE

RICHARD J. SOLOVE

DAVIS INVESTMENT CO.

RAMP "C"

RAMP "B"

RAMP "A"

RAMP "H"

RAMP "D"

RAMP "G"

RAMP "E"

RAMP "F"

L/A-R/W

R/W

840+00

835+00

830+00

825+00

161

ALLSTATE INSURANCE COMPANY

CHESTER LEE

PERRY SYCAMORE LIMITED PARTNERSHIP

FEP CAPITAL REALTY

WILLIAM C. DAVIS

BLENDON INVESTMENT CO.

1255+00 1260+00 1265+00 1270+00 1275+00 1280+00 1285+00

INTERSTATE 270

GRAPHIC SCALE

0 100 200 300 500

(IN FEET)

FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

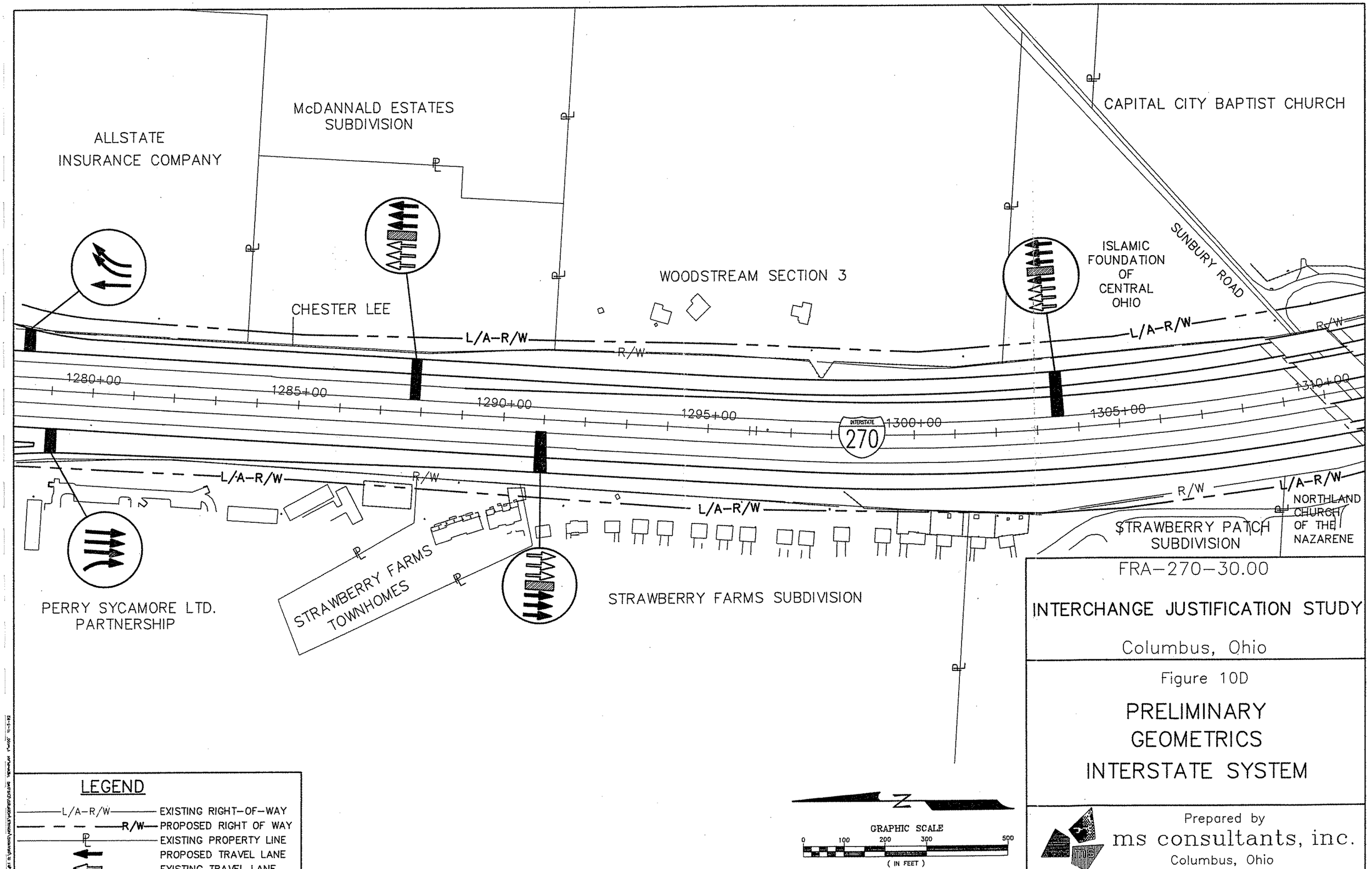
Figure 10C

PRELIMINARY GEOMETRICS INTERSTATE SYSTEM

Prepared by

ms consultants, inc.

Columbus, Ohio



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 10D

PRELIMINARY GEOMETRICS INTERSTATE SYSTEM

Prepared by
ms consultants, inc.
Columbus, Ohio

LEGEND

- L/A-R/W — EXISTING RIGHT-OF-WAY
- R/W — PROPOSED RIGHT OF WAY
- ℄ — EXISTING PROPERTY LINE
- PROPOSED TRAVEL LANE
- EXISTING TRAVEL LANE

CAPITAL CITY BAPTIST CHURCH

THE VENICE CLUB

GEORGE WUKELIC

CITY OF COLUMBUS
CHERRY BOTTOM PARK

HIGHPOINT FARMS INC.

EUROPEAN VILLAGE
ASSOCIATION LTD.

INTERSTATE 270

DON F.
MARSH

COLUMBUS & SOUTHERN
OHIO ELECTRIC CO.

COLUMBUS & SOUTHERN
OHIO ELECTRIC CO.

GUIDO
CUSID

GEORGE WUKELIC

SUNBURY LAKES
SUBDIVISION

SUNBURY ROAD

NORTHLAND CHURCH
OF THE NAZARENE

ROBERT & JARALYN WHALEY

STRAWBERRY FIELDS
SUBDIVISION

LIMREA
PROPERTIES

L/A-R/W
R/W
1310+00
1315+00
1320+00
1325+00
1330+00
1335+00
1340+00

GRAPHIC SCALE
0 100 200 300 500
(IN FEET)

FRA-270-30.00

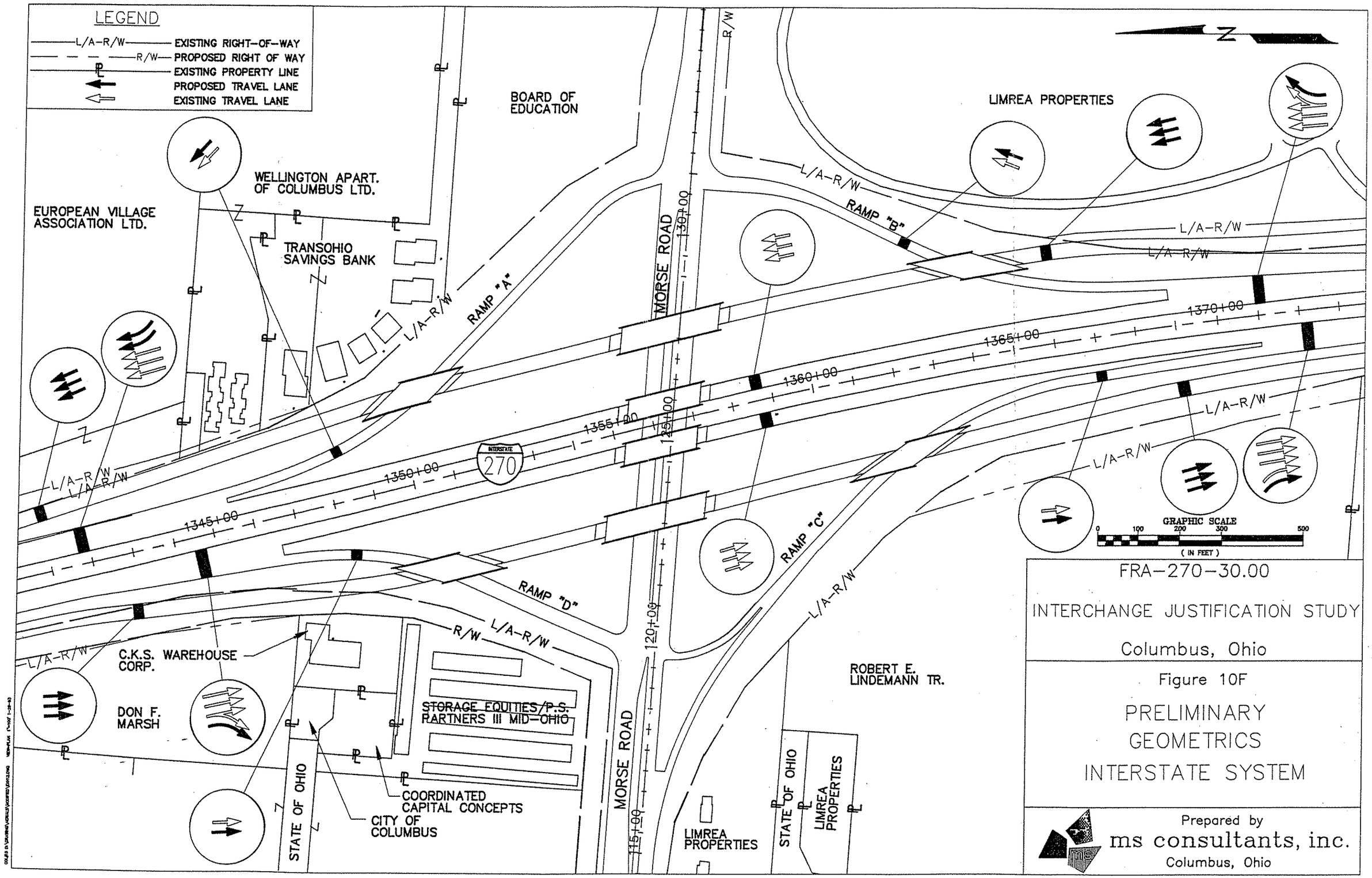
INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 10E

PRELIMINARY GEOMETRICS INTERSTATE SYSTEM

Prepared by
ms consultants, inc.
Columbus, Ohio



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

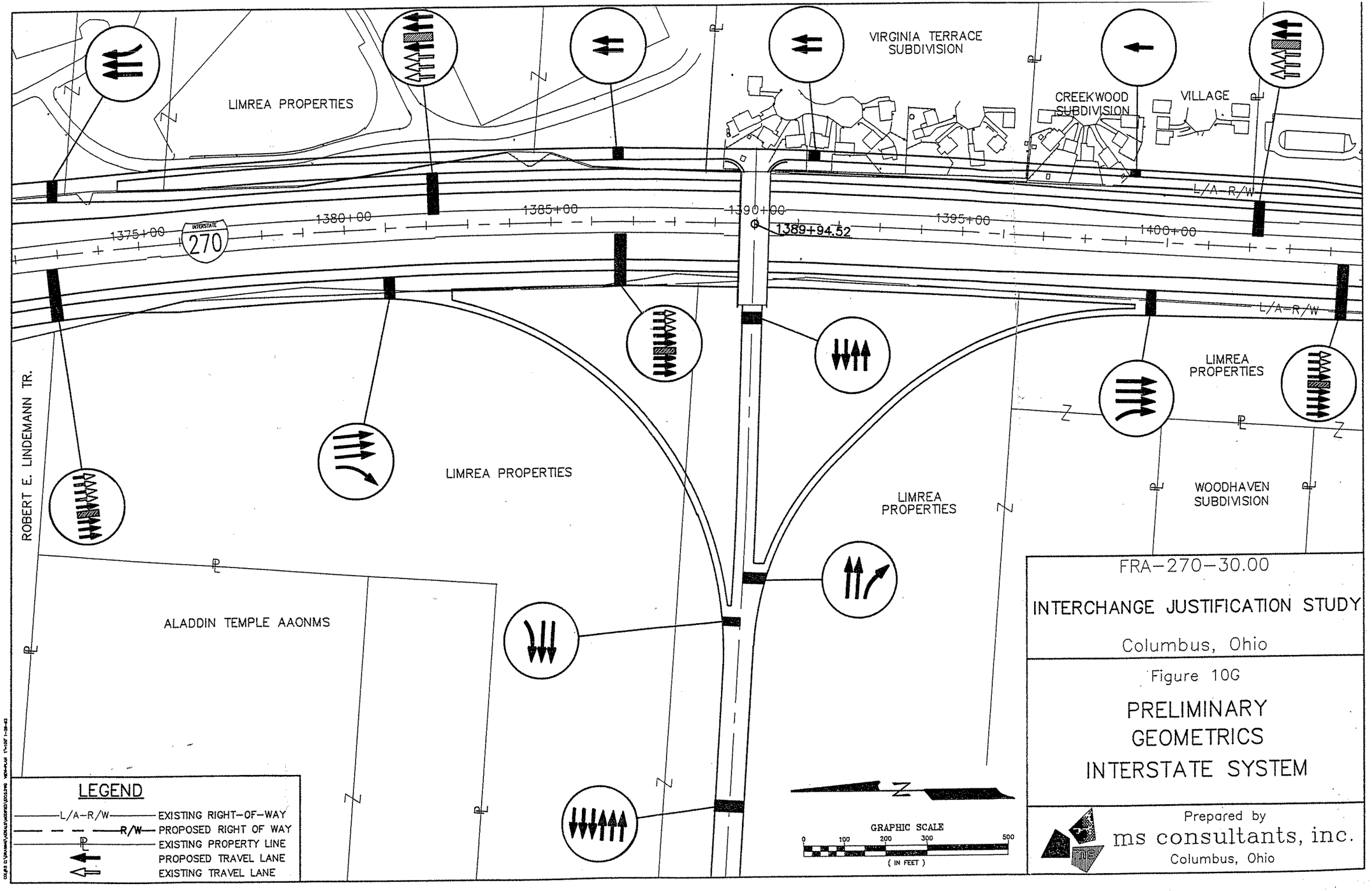
Figure 10F

PRELIMINARY GEOMETRICS INTERSTATE SYSTEM

Prepared by

ms consultants, inc.

Columbus, Ohio



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

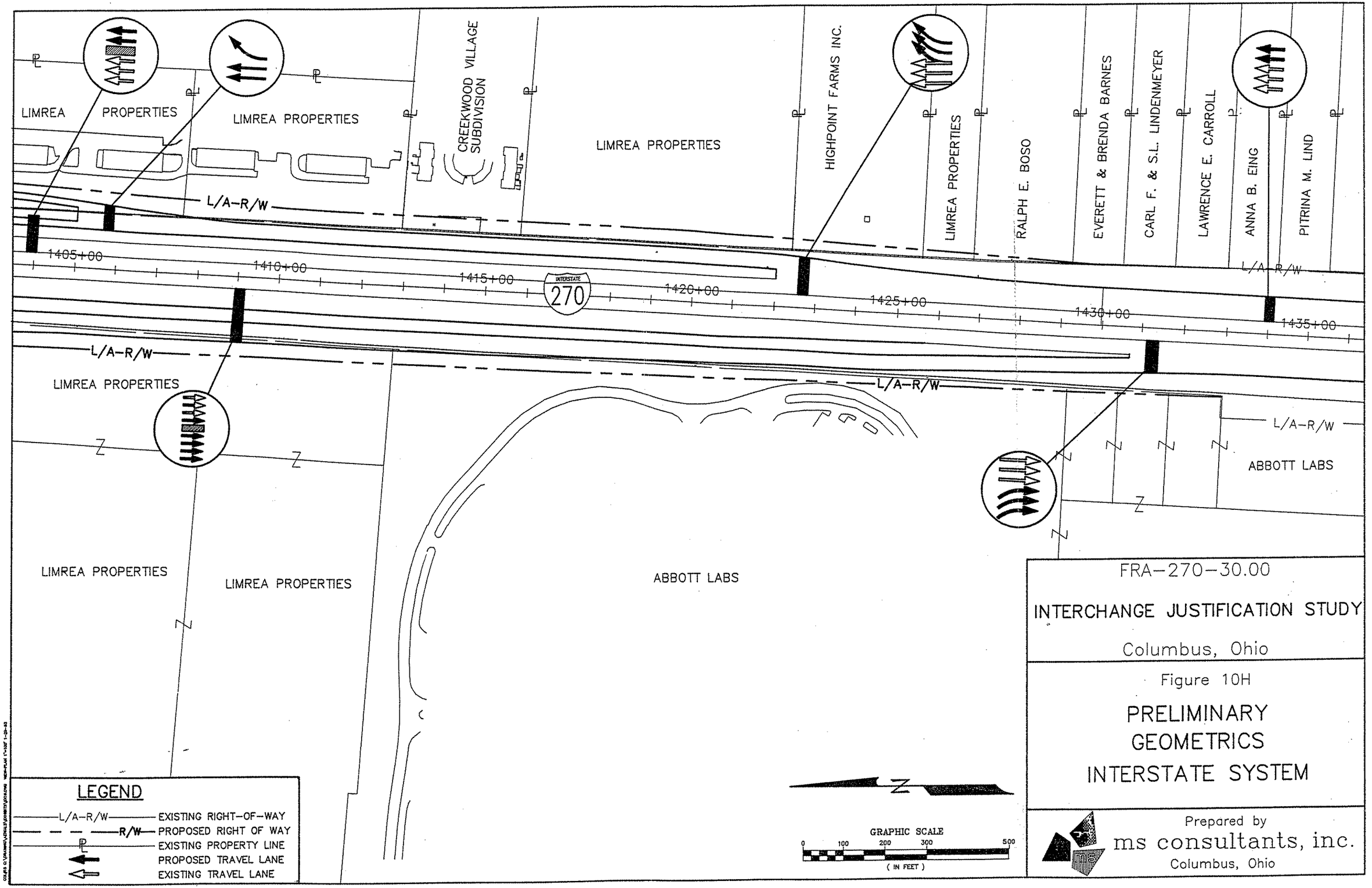
Figure 10G

PRELIMINARY GEOMETRICS INTERSTATE SYSTEM

Prepared by

ms consultants, inc.

Columbus, Ohio



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

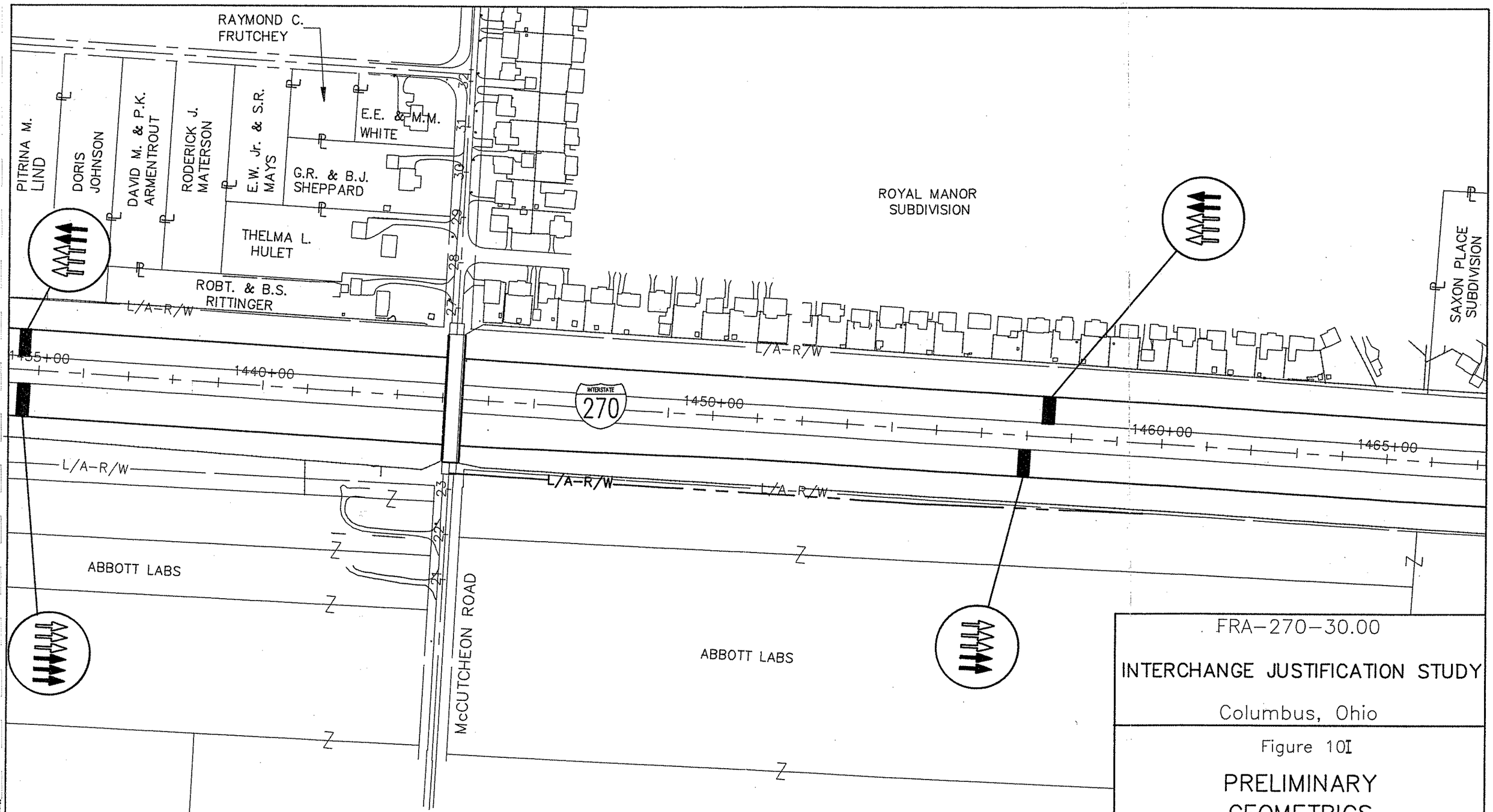
Figure 10H

PRELIMINARY GEOMETRICS INTERSTATE SYSTEM

Prepared by

ms consultants, inc.

Columbus, Ohio



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 10I

PRELIMINARY GEOMETRICS INTERSTATE SYSTEM

Prepared by
ms consultants, inc.
Columbus, Ohio

LEGEND

- L/A-R/W — EXISTING RIGHT-OF-WAY
- R/W — PROPOSED RIGHT OF WAY
- ℄ — EXISTING PROPERTY LINE
- ⇦ — PROPOSED TRAVEL LANE
- ⇦ — EXISTING TRAVEL LANE

ROYAL MANOR SUBDIVISION

L. SCHWAB

ARTHUR RUCK

WARD SUBDIVISION

EDWARD GUZIK

THURMAN BULEN

LEONARD PARK EXTENSION

SAXON PLACE SUBDIVISION

HOWARD PARSLEY

GAHANNA COMMONS LIMITED PARTNERSHIP

SAM & M.T. ISHIDA

AGLER ROAD

L/A-R/W

1470+00

1475+00

1480+00

INTERSTATE 270

1485+00

1490+00

1495+00

ABBOTT LABS

ABBOTT LABS

ABBOTT LABS

JACK & ALICE MYERS

MICHAEL & KATHY MYERS

WILLIAM & MARTHA TIEBOUT

RUSSELL & ALICE PATTON

AGLER ROAD

LEONARD PARK EXTENSION

GRAPHIC SCALE

0 100 200 300 500

(IN FEET)

FRA-270-30.00

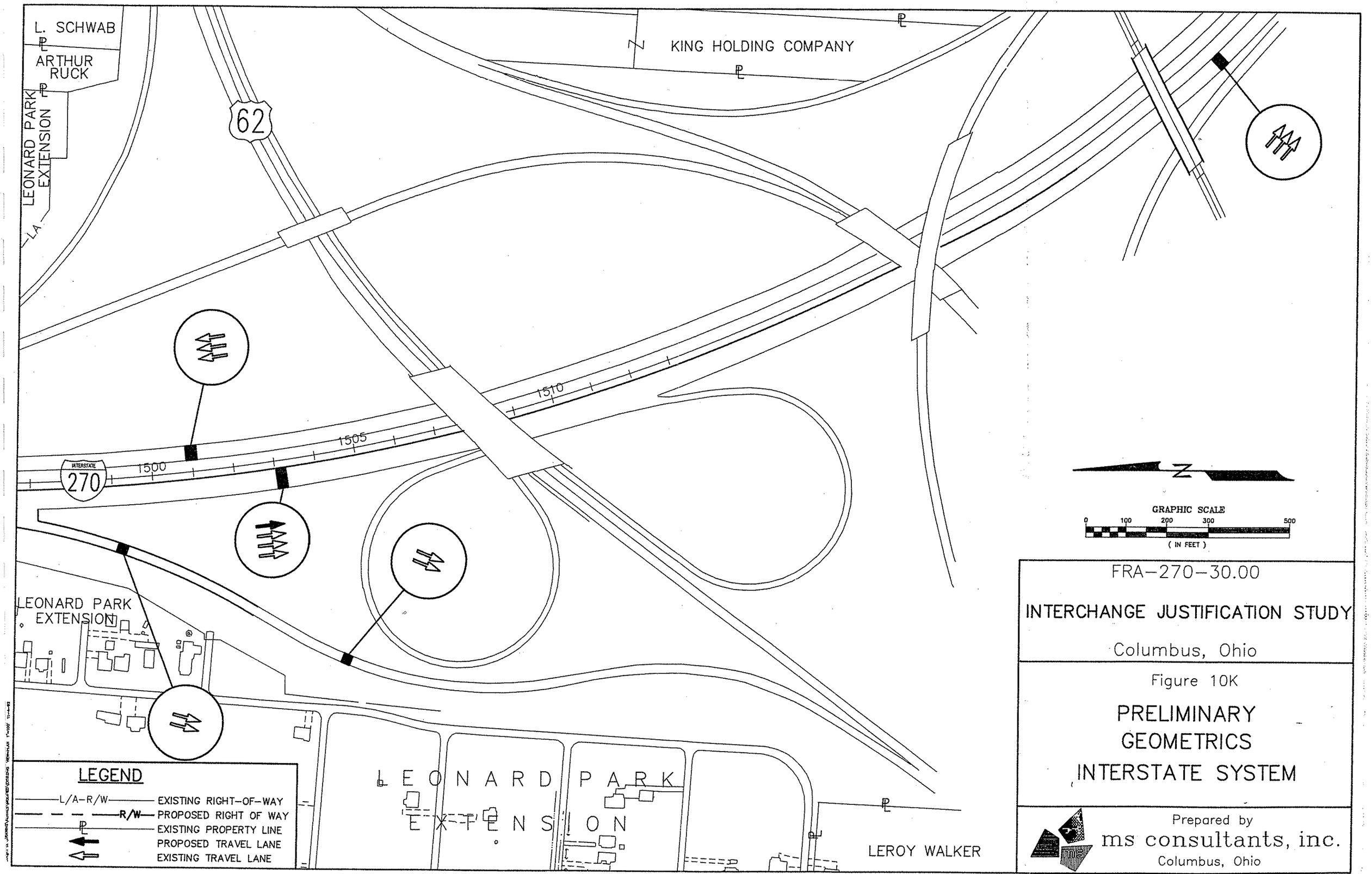
INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 10J

PRELIMINARY GEOMETRICS INTERSTATE SYSTEM

Prepared by
ms consultants, inc.
Columbus, Ohio



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 10K

PRELIMINARY GEOMETRICS INTERSTATE SYSTEM

Prepared by
ms consultants, inc.
Columbus, Ohio

LEGEND

- L/A-R/W — EXISTING RIGHT-OF-WAY
- R/W — PROPOSED RIGHT OF WAY
- ℄ — EXISTING PROPERTY LINE
- PROPOSED TRAVEL LANE
- EXISTING TRAVEL LANE

BLENDON TWP. TRS.

BLENDON TWP. TRS.

WILLIAM C. DAVIS

H.C. HUBER PLACE SUBDIVISION

H.C. HUBER PLACE SUBDIVISION

ETHAL J. COLASANTE

GARY & SHARON WYNER

BLENDON INVESTMENT COMPANY

OHIO UTILITIES CO.

BUENOS AIRES BLVD.

R/W

RAMP "F"

RAMP "H"

OHIO COUNCIL CHRISTIAN UNION

815+00

820+00

825+00

810+00

H.C. HUBER PLACE

805+00

RAMP "E"

N

ALUM CREEK

R/W

800+00

161

R/W

FOREST EDGE ASSEMBLY OF GOD

R/W

R/W

R/W

FOREST EDGE SUBDIVISION

STRAWBERRY FARMS BLVD.

HARVEST GROVE OF COLUMBUS

ASHTON WOODS LTD. PARTNERSHIP

CHARLES K. ROSS

BELL PROPERTIES INC.

GRAPHIC SCALE

0 100 200 300 500

(IN FEET)

FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

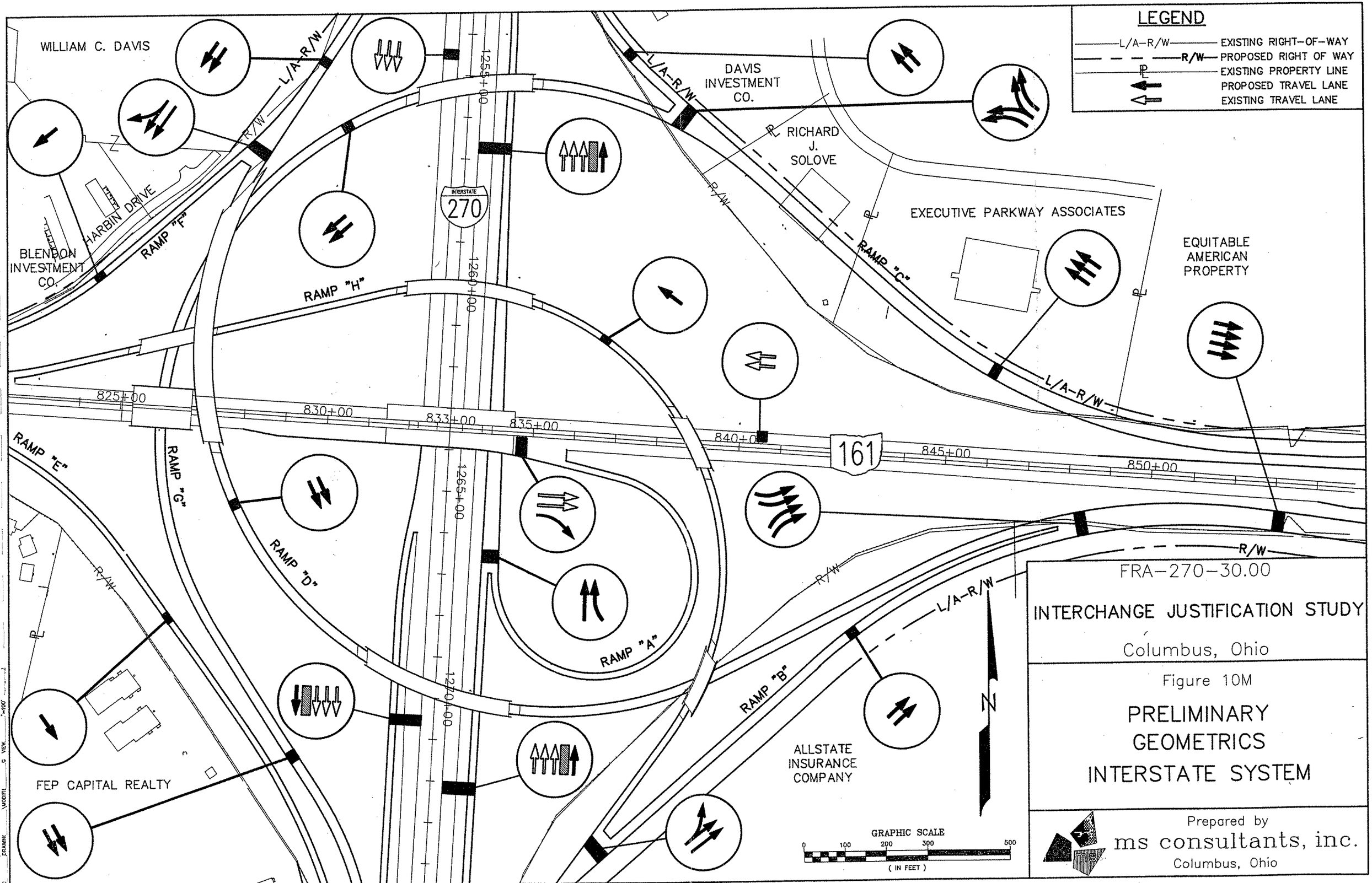
Figure 10L

PRELIMINARY GEOMETRICS S.R. 161

Prepared by

ms consultants, inc.

Columbus, Ohio



FRA-270-30.00

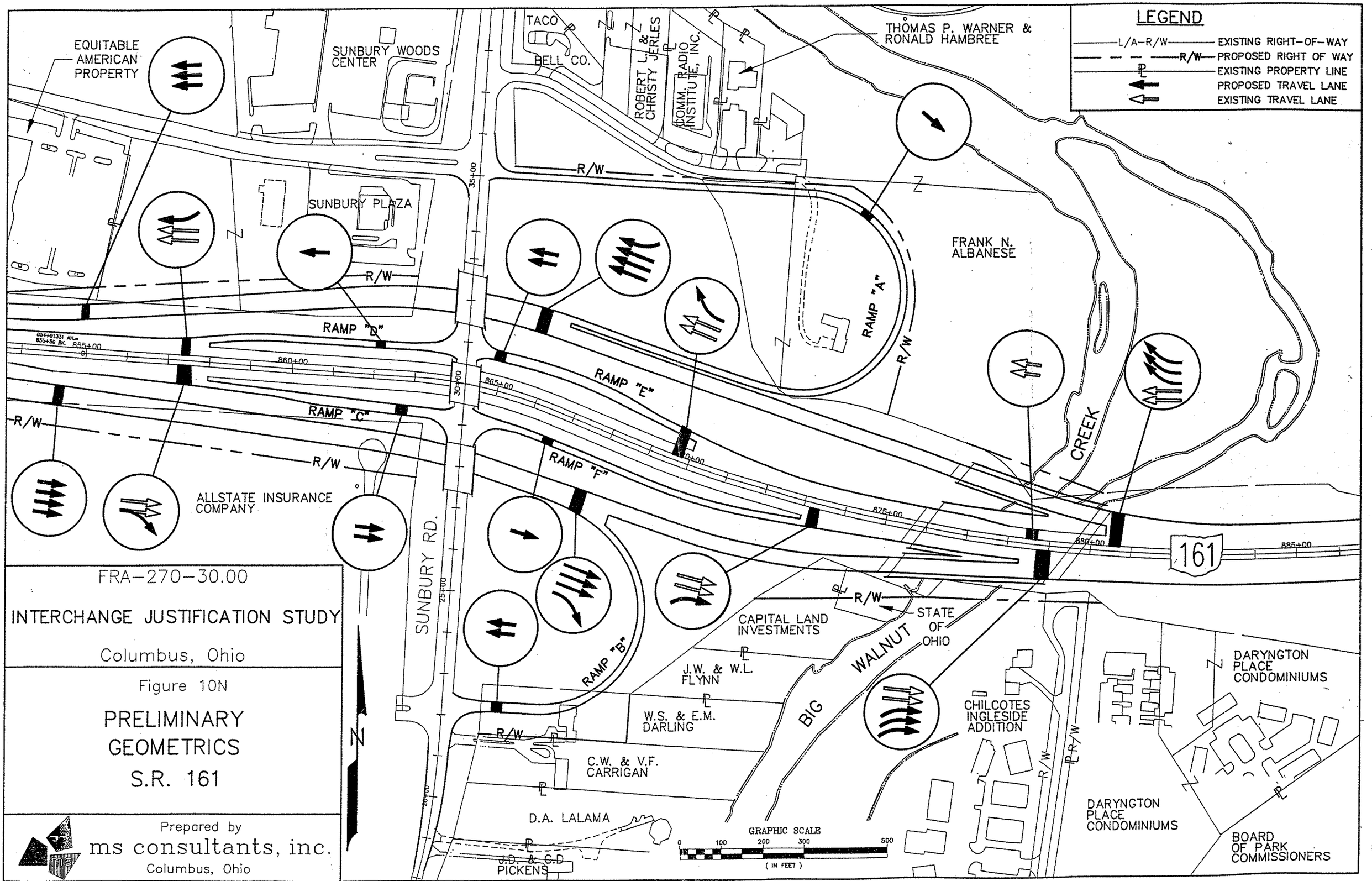
INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 10M

PRELIMINARY GEOMETRICS INTERSTATE SYSTEM

Prepared by
ms consultants, inc.
Columbus, Ohio



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

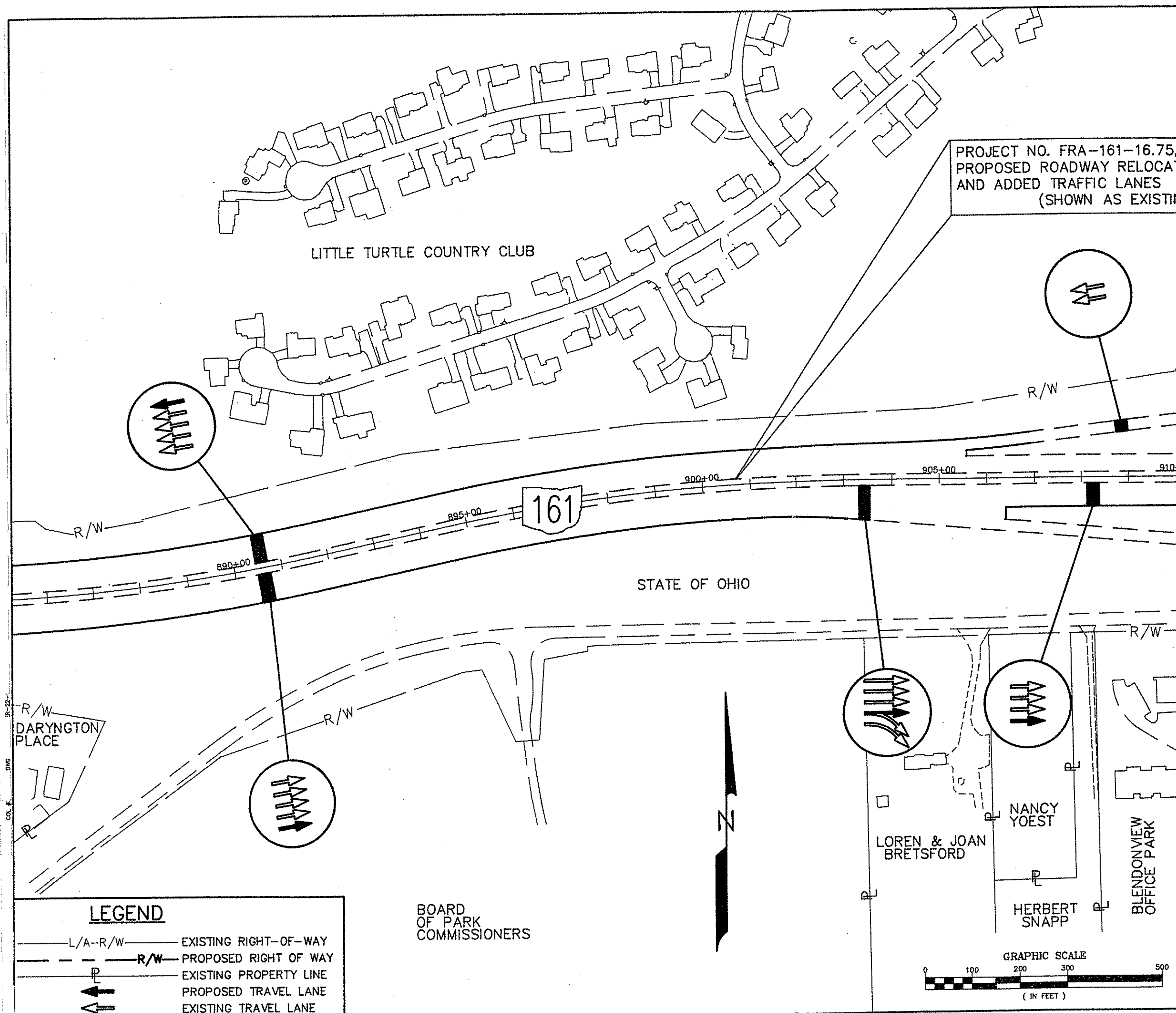
Figure 10N

PRELIMINARY GEOMETRICS S.R. 161

Prepared by

ms consultants, inc.

Columbus, Ohio


PROJECT NO. FRA-161-16.75, LIC-161-0.00
PROPOSED ROADWAY RELOCATION
AND ADDED TRAFFIC LANES
(SHOWN AS EXISTING)
LITTLE TURTLE COUNTRY CLUB
LITTLE TURTLE WAY
R/W
890+00
895+00
900+00
905+00
910+00
915+00
161
STATE OF OHIO
DARYNGTON PLACE
BOARD OF PARK COMMISSIONERS
LOREN & JOAN BRETSFORD
NANCY YOEST
HERBERT SNAPP
BLENDONVIEW OFFICE PARK
N
GRAPHIC SCALE
0
100
200
300
500
(IN FEET)
LEGEND
L/A-R/W EXISTING RIGHT-OF-WAY
R/W PROPOSED RIGHT OF WAY
EXISTING PROPERTY LINE
PROPOSED TRAVEL LANE
EXISTING TRAVEL LANE

FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

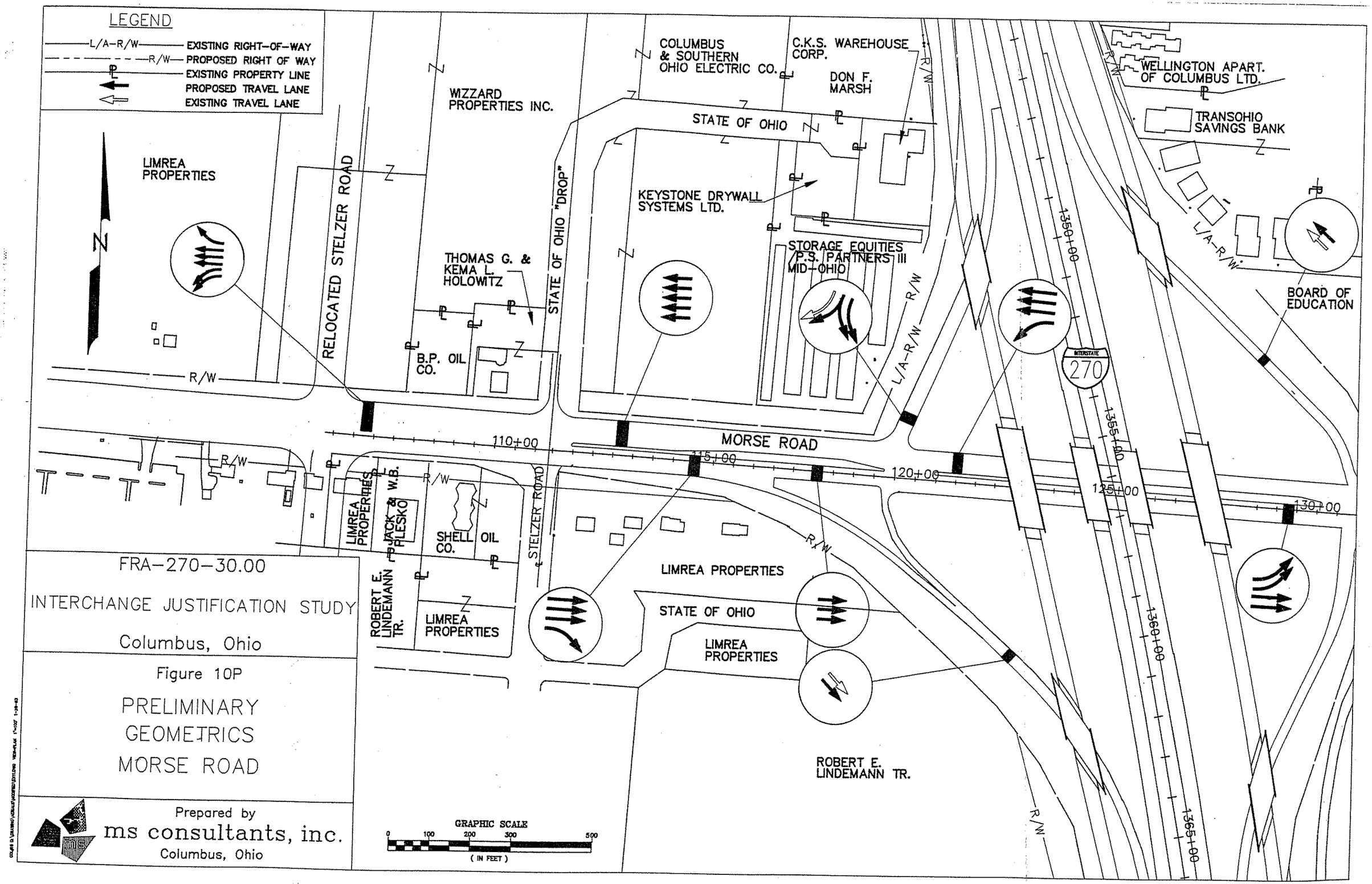
Columbus, Ohio

Figure 100

PRELIMINARY GEOMETRICS

S.R. 161

Prepared by
ms consultants, inc.
Columbus, Ohio



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

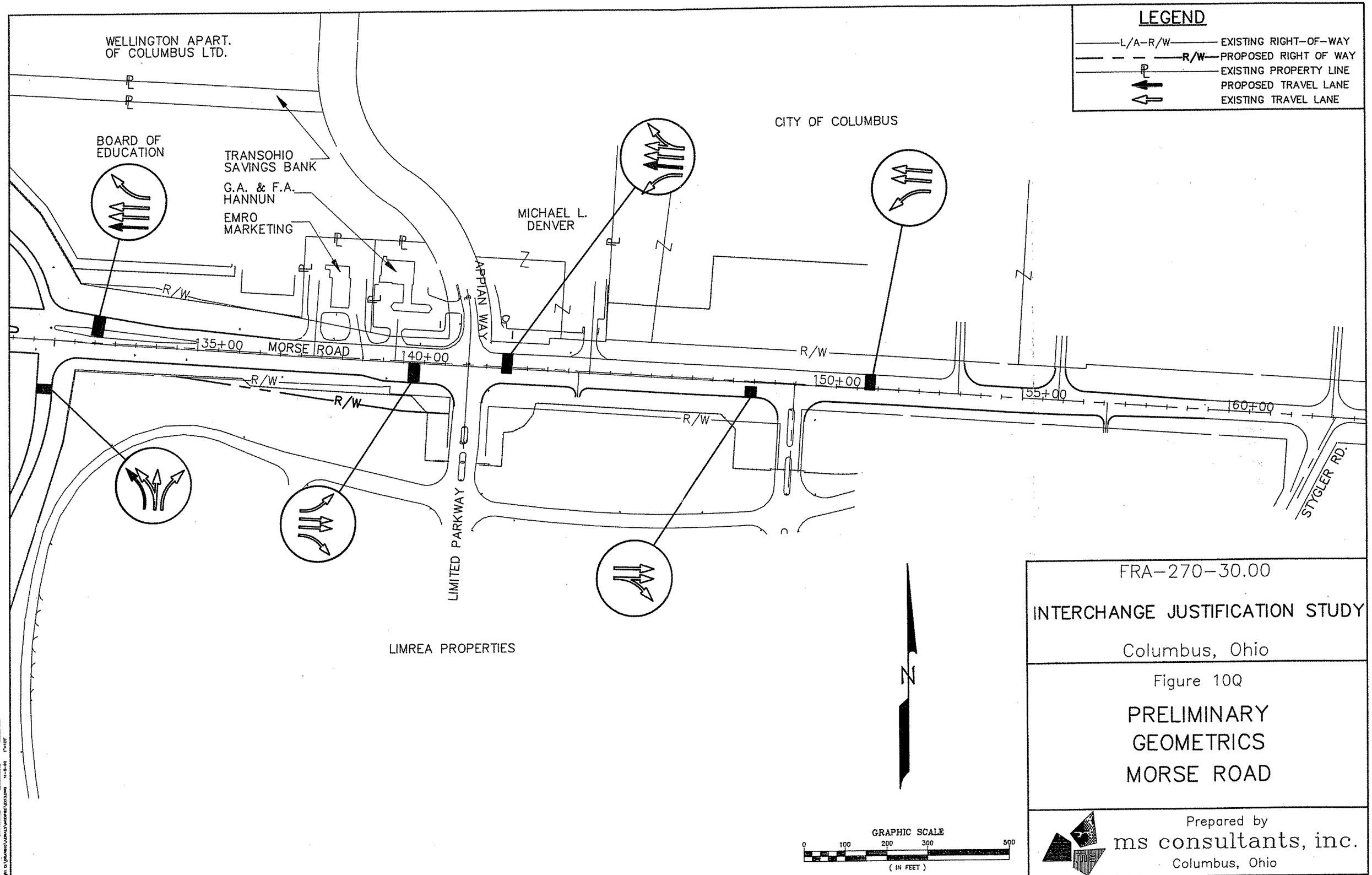
Figure 10P

PRELIMINARY GEOMETRICS MORSE ROAD

Prepared by

ms consultants, inc.

Columbus, Ohio



FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 10Q

PRELIMINARY GEOMETRICS MORSE ROAD

Prepared by

ms consultants, inc.

Columbus, Ohio

ALADDIN TEMPLE AAONMS

CITY OF COLUMBUS

BOARD OF EDUCATION

LIMREA PROPERTIES

L/A-R/W

R/W

INTERSTATE 270

1380+00

1385+00

1390+00

1395+00

LIMREA PROPERTIES

LIMREA PROPERTIES

LIMREA PROPERTIES

VIRGINIA TERRACE SUBDIVISION

AMBASSADOR COMMONS

STATE OF OHIO

CREEKWOOD VILLAGE SUBDIVISION

N

GRAPHIC SCALE

0 100 200 300 500

(IN FEET)

FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 10R

PRELIMINARY GEOMETRICS NEW INTERCHANGE

LEGEND

- L/A-R/W — EXISTING RIGHT-OF-WAY
- R/W — PROPOSED RIGHT OF WAY
- EXISTING PROPERTY LINE
- PROPOSED TRAVEL LANE
- EXISTING TRAVEL LANE

Prepared by
ms consultants, inc.
Columbus, Ohio

FRA–270–30.00

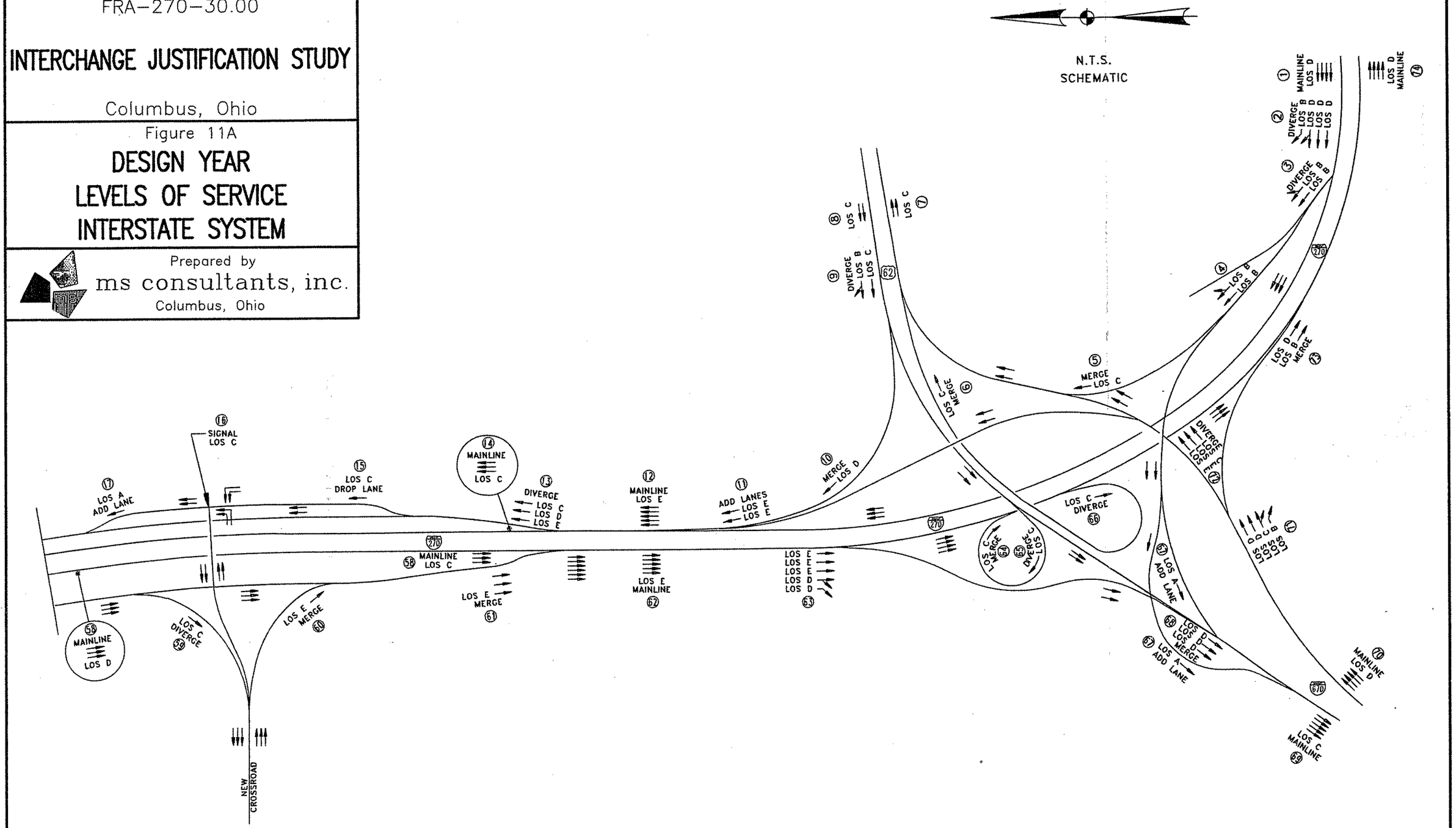
INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

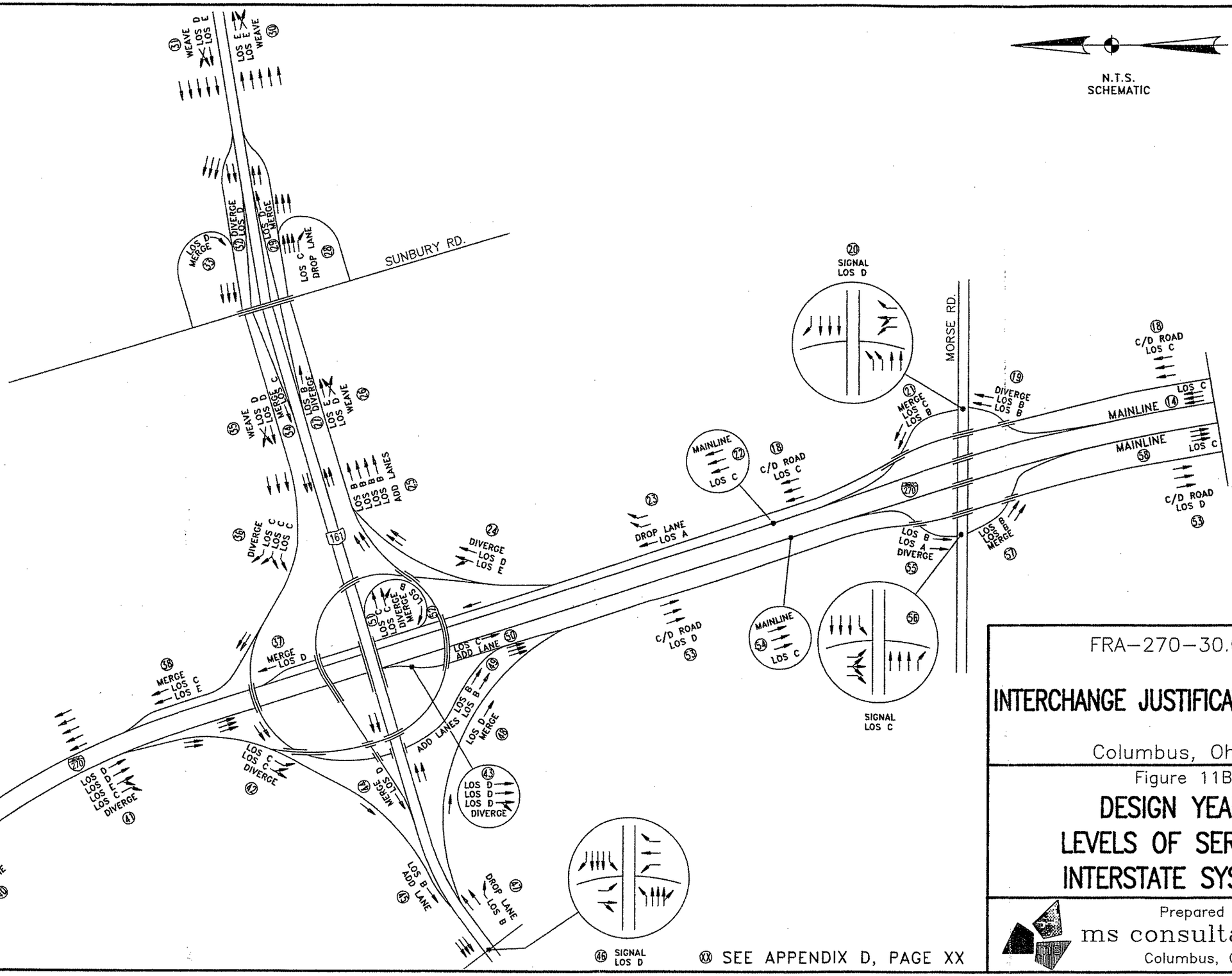
Figure 11A

DESIGN YEAR LEVELS OF SERVICE INTERSTATE SYSTEM

Prepared by
ms consultants, inc.
Columbus, Ohio



⊗ SEE APPENDIX D, PAGE XX



FRA–270–30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 11B

DESIGN YEAR LEVELS OF SERVICE INTERSTATE SYSTEM

Prepared by
ms consultants, inc.
Columbus, Ohio

REVISED 12/21/92

10009RC2 #8 12/21/92

Northbound, the three existing I-270 interstate lanes are joined by two existing I-670/US 62 on-ramp lanes near Agler Road (see Figure 10J). These five lanes will combine (not merge as now exists) and continue northbound toward the McCutcheon Road bridge over I-270. North of McCutcheon the five lanes split three to the mainline and three to the C/D system (Figure 10H). The three mainline lanes continue northward beyond SR 161. The C/D lanes, which provide access to the New Crossroad and to SR 161, form to the outside of the mainline. One lane drops to the right to interchange at the New Crossroad. The on-ramp from the New Crossroad is added back onto the C/D system and three lanes continue northbound and bridge over Morse Road and the on-/off-ramps at Morse (see Figure 10F). South of SR 161 two C/D lanes exit to east and west SR 161 while the third C/D lane picks up traffic from the eastbound SR 161 loop ramp and merges back onto I-270 and the C/D system ends. Further north the two lanes from westbound SR 161 enter the mainline. The resultant five lanes are reduced to four lanes to meet the proposed I-270 north outerbelt project which is to begin/end at SR 3.

The three-lane C/D system will generally be constructed at the same grade as existing I-270 travel lanes. To reduce cost and to minimize right-of-way and environmental impacts, a guardrail or barrier grading system with 2:1 side slopes will be used on the outside shoulders. The maximum horizontal curvature occurs at the Morse Road Interchange, Figure 10F (4°-8′ D_c). Vertical profile grades for the new C/D lanes are shown at the Morse Road Interchange in Appendix F, Figure F-2A. The maximum grade 2.88% occurs on the northbound C/D. Approximately 135,000 square feet of retaining wall systems are estimated for the C/D travel lanes at the Morse Road Interchange in the northeast, northwest, and southeast quadrants.

Extensive reconstruction of the I-270 & SR 161 interchange and along SR 161 will complete the project. Ramps and ramp bridges at the interchange of I-270 & SR 161 are shown on Figure 10M. The maximum ramp grade occurs on Ramp H (3.29%). Directional Ramp H, a single-lane ramp, has a maximum horizontal curve of 8°-18′ D_c. Profile grades for the proposed new ramps are shown in Appendix F, Figures F-1A and F-1B. Approximately 110,000 square feet of retaining wall systems are estimated for the I-270 & SR 161 interchange. These walls are proposed along Ramps F, G, C, and A.

The ramps from/to I-270 to/from the east on SR 161 are introduced to SR 161 east of Sunbury Road. I-270 has access to Sunbury Road via loop ramps. A compressed diamond interchange provides access to/from SR 161 from/to Sunbury Road. Ramps and bridges at the interchange of SR 161 and Sunbury Road are shown in Figure 10N. The maximum ramp grade occurs on Ramp E (3.9%) upgrade. The maximum horizontal curvature occurs on Ramp A (24°-$45'D_c$). Profile grades for the proposed ramps are shown in Appendix F, Figure F-3A & F-3B. Approximately 90,000 square feet of retaining walls are estimated for the SR 161 & Sunbury Road interchange. These will be located along Ramps C, D, E, and F.

East of Sunbury the three-lane eastbound ramp from I-270 merges with the existing two eastbound SR 161 lanes. The New Albany By-Pass project proposed a two-lane off-ramp to Little Turtle with three lanes continuing on SR 161. In order to provide lane continuity, this project will provide a fourth eastbound SR 161 lane beyond the gore but merge this lane back to three approximately 2000 feet east of the gore (see Figure 10-O).

In the westbound direction, two lanes from Little Turtle will join the three SR 161 eastbound lanes to form a five-lane section. A major junction, three lanes to I-270 and two lanes to westbound SR 161 will follow. The westbound off-ramp to Sunbury Road diverges shortly thereafter.

Additional through lanes will be required at the intersection of SR 161 & Strawberry Farms/Buenos Aires located west of I-270 (see Figure 10L). Currently two through lanes per direction are provided on SR 161. Three lanes per direction are needed to handle the design year traffic volumes at this intersection. These through lanes will be provided at the intersection but then will be tapered back to the existing configuration west of the intersection. Between I-270 and Strawberry Farms/Buenos Aires three lanes are shown on westbound SR 161. These are formed by the existing two-lane section plus the addition of the southbound I-270 ramp lane. Further east of this juncture the northbound I-270 ramp lane was merged into the westbound SR 161 lanes. It was suggested that the northbound to westbound ramp lane be treated as an add lane and the southbound to westbound ramp lane should become an exclusive right turn lane at the intersection. As shown, the southbound I-270 ramp lane traffic must traverse two lanes in order to turn

left at Strawberry Farms/Buenos Aires. If the northbound I-270 lane was added, not merged, the southbound ramp traffic would have to laterally traverse three lanes within an 800-foot longitudinal distance. It was suggested that since the northbound to westbound ramp lane carries more traffic, it logically should be treated as an add lane and the southbound ramp lane be merged. However, the northbound ramp lane, as a merge, results in a LOS D. As an add lane, a LOS C would be attainable. This is not a significant improvement given the concerns of driver expectation, multiple-lane changing, and forcing ramp traffic into an exclusive right turn lane. This issue remains open to further discussion before the detailed design process begins.

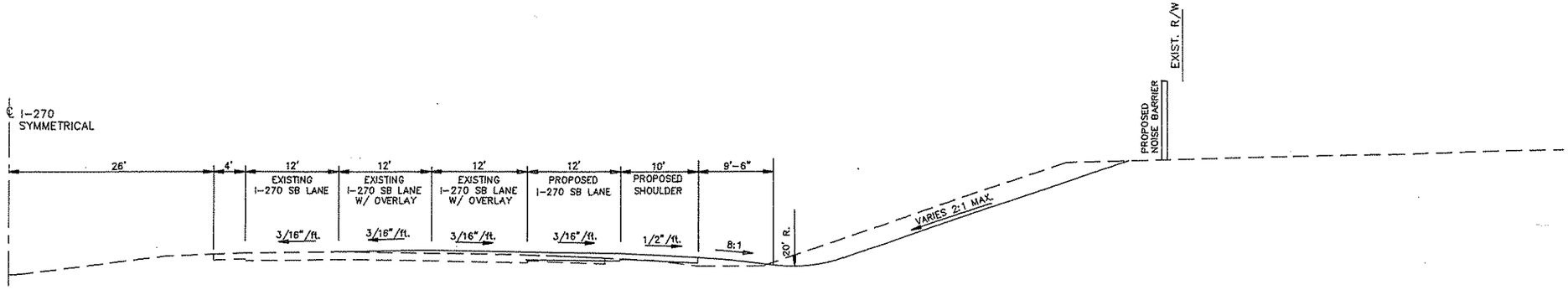
Ramps and ramp structures at the new crossroad connecting the C/D lanes with the proposed development center are shown in Figures 10G. The maximum ramp grade occurrs on Ramp A (2.73%). Profile grades for the proposed ramps are shown in Appendix F, Figure F-3A. Directional Ramps A and B have maximum horizontal curves of 6°-45′ D_c. Approximately 80,000 square feet of retaining wall systems are estimated for the ramp structure located on the east side of the new interchange.

The levels of service (LOS) for the proposed geometrics are shown in Figures 11A and 11B. The LOS analyses can be found in Appendix D according to the numbered location shown in Figures 11A and 11B. **Figures 12A, 12B, and 12C** indicate preliminary typical cross sections for the mainline I-270, C/D and SR 161 roadways.

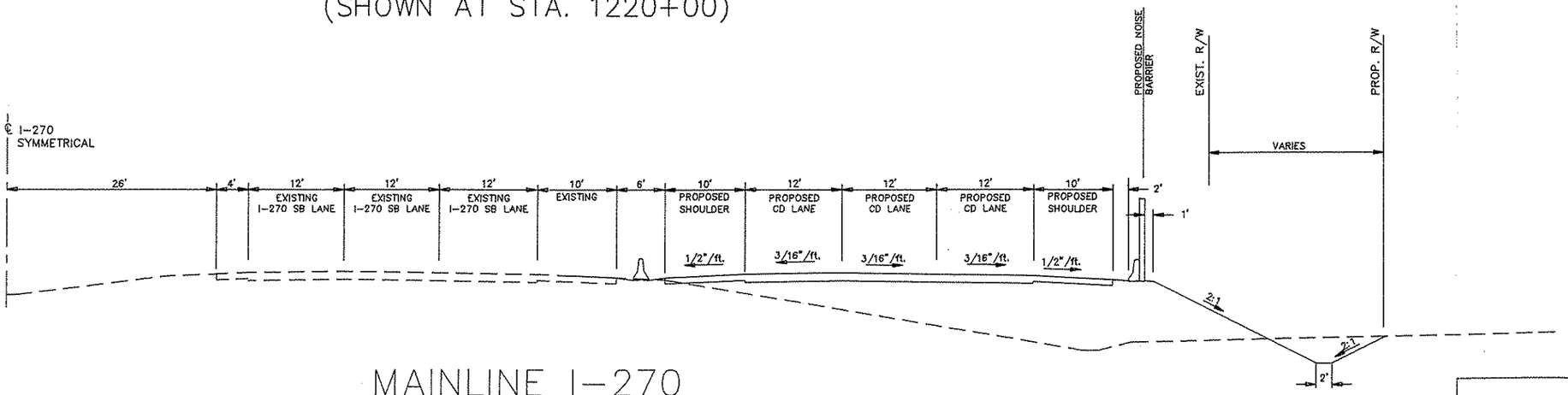
Typical sections depicting I-270 in locations where travel lanes are immediately adjacent to existing travel lanes indicate safety grading along the side slopes. The safety grading is shown within the clear zone. Beyond the area of the clear zone 2:1 slopes are typically provided to minimize right-of-way and environmental impacts.

As previously stated, barrier grading is used along the outside shoulder of the new C/D travel lanes. Where warranted, noise barriers will be provided and generally located at the shoulder break in elevated fill sections, and at the limited access right-of-way line in level and cut sections.

TYPICAL SECTIONS



MAINLINE I-270
FOUR LANE SECTION
(SHOWN AT STA. 1220+00)



MAINLINE I-270
NORMAL CD SECTION
(SHOWN AT STA. 1290+00)

GRAPHIC SCALE
8 0 8 16 32
(IN FEET)

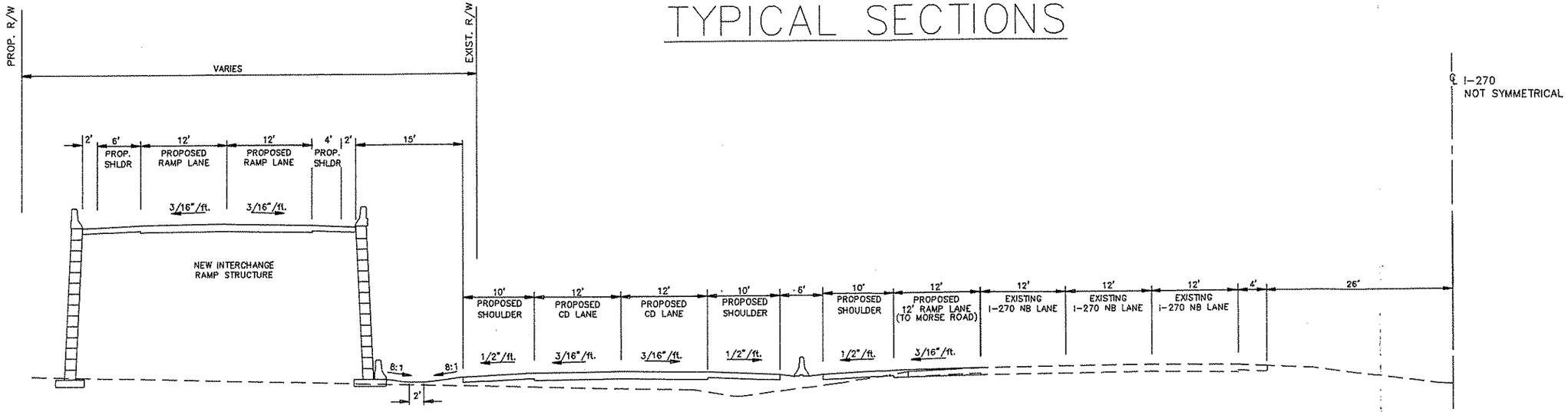
FRA-270-30.00
INTERCHANGE JUSTIFICATION STUDY
Columbus, Ohio

Figure 12A

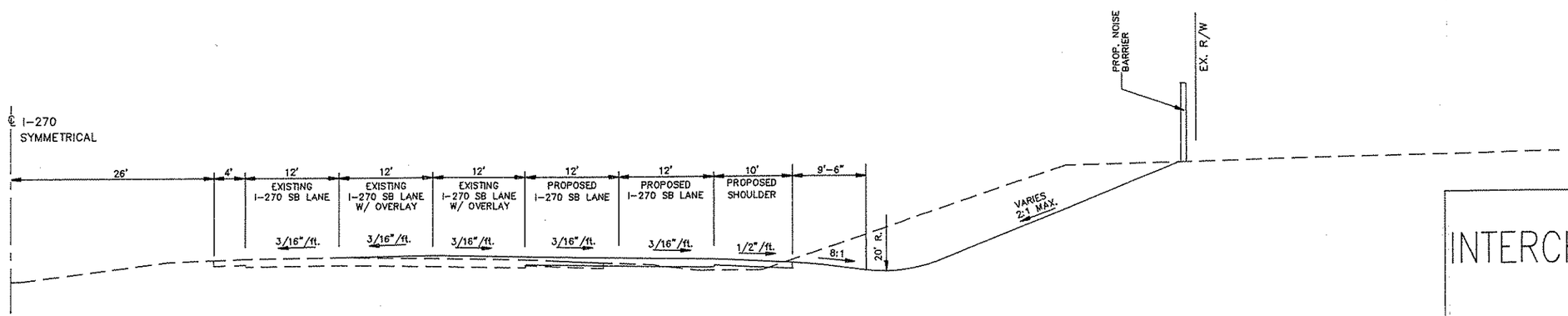
TYPICAL SECTIONS INTERSTATE SYSTEM

Prepared by
ms consultants, inc.
Columbus, Ohio

TYPICAL SECTIONS



MAINLINE I-270
RAMPS TO NEW INTERCHANGE & MORSE ROAD
(SHOWN AT STA. 1388+00)



MAINLINE I-270
FIVE LANE SECTION
(SHOWN AT STA. 1460+00)

GRAPHIC SCALE

8 0 8 16 32

(IN FEET)

FRA-270-30.00

INTERCHANGE JUSTIFICATION STUDY

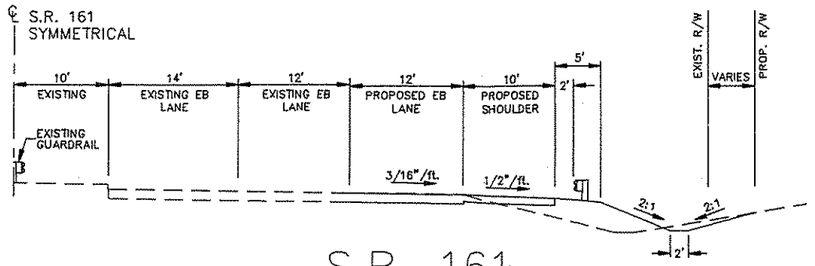
Columbus, Ohio

Figure 12B

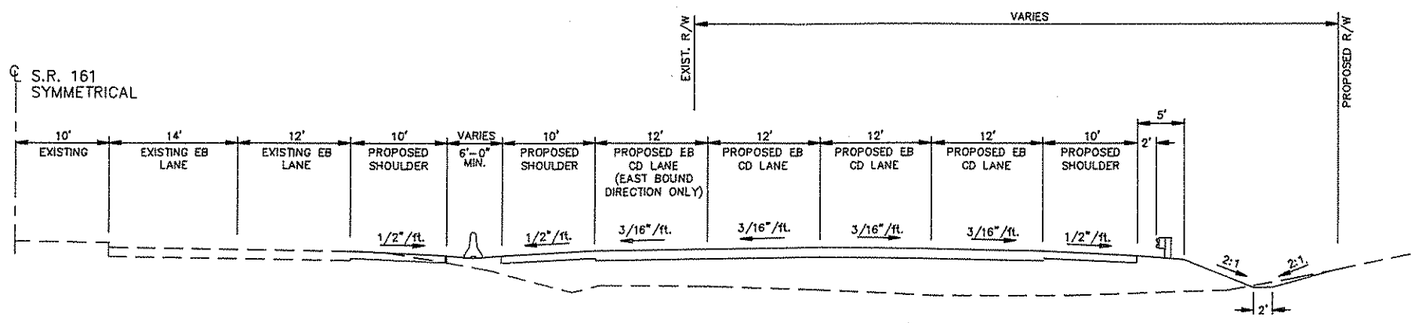
TYPICAL SECTION INTERSTATE SYSTEM

Prepared by
ms consultants, inc.
Columbus, Ohio

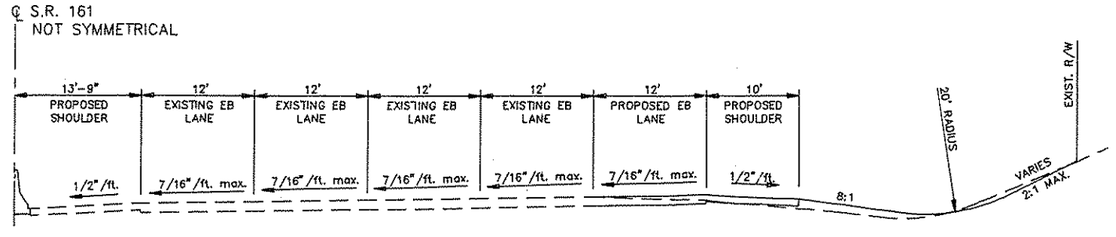
TYPICAL SECTIONS



S.R. 161
WIDENED SECTION
(SHOWN AT STA. 803+00)



S.R. 161
CD SECTION
(SHOWN AT STA. 852+00)



S.R. 161
FIVE LANE SECTION–EASTBOUND
(SHOWN AT STA. 889+00)

GRAPHIC SCALE

8 0 8 16 32

(IN FEET)

FRA–270–30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 12C

TYPICAL SECTIONS S.R. 161

Prepared by
ms consultants, inc.
Columbus, Ohio

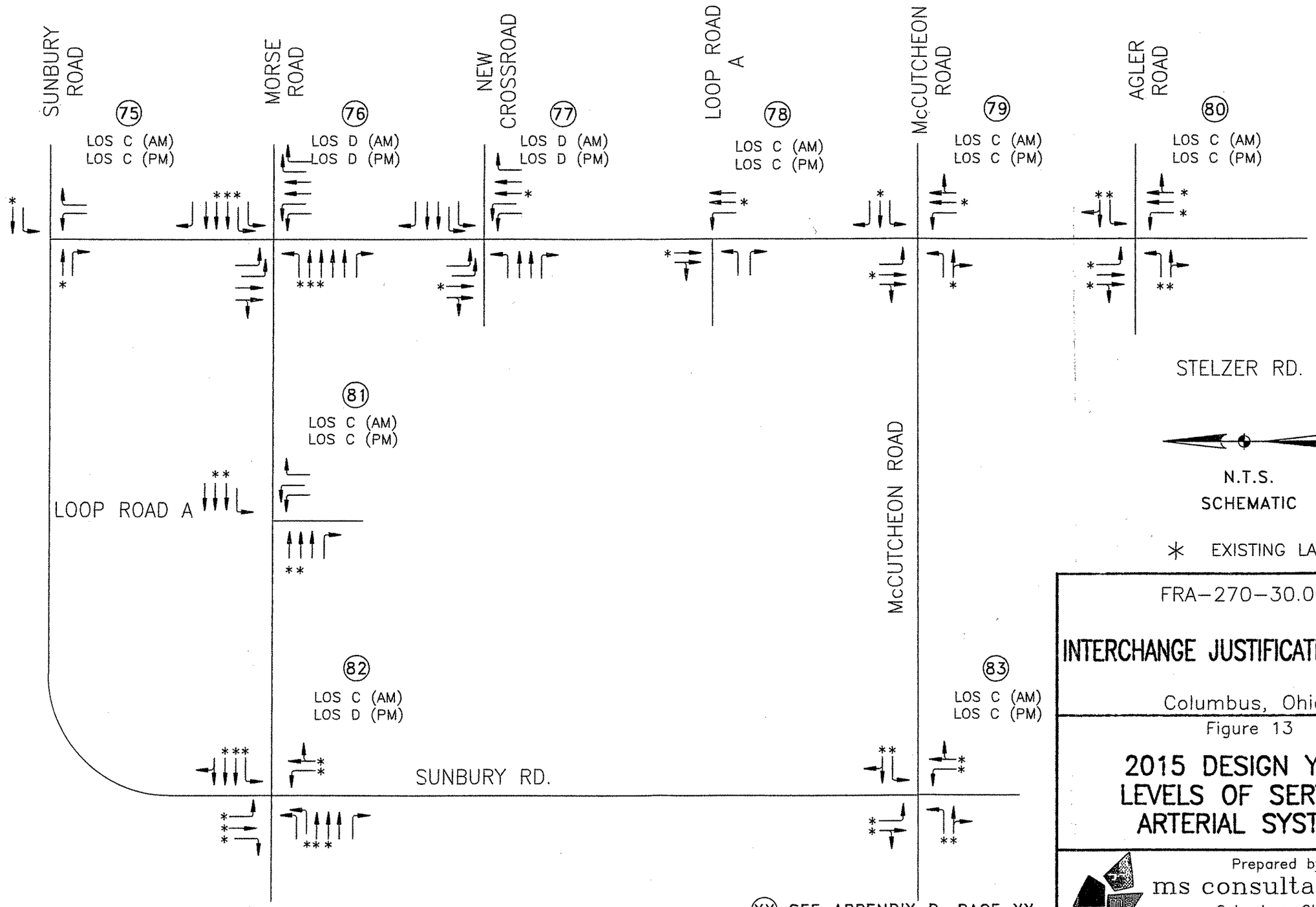
The typical sections indicate minimum requirements. It is likely that during the design phase drainage, utility, and geotechnical data will alter the constructed width of new roadway facilities. This could result in slightly different typical cross sections for construction plans.

The proposed geometrics and design year LOS for the arterial system are shown in **Figure 13**. The major intersections and the number of lanes required and the corresponding levels of service are shown. Additional intersections along the network corridors may be constructed depending on various land use and development scenarios. For the purposes of this report, however, Figure 13 depicts the general lane power requirements needed to provide LOS D or better on the arterial network.

Stelzer Road will need two through lanes per direction while Morse Road will require three lanes per direction in the design year. Sunbury Road south of Stelzer Road, and McCutcheon Road, will only require intersection improvements. Stelzer Road from McCutcheon to Sunbury and Morse Road from Sunbury beyond Stelzer are under design. The southern portion of Loop Road A is complete with access provided at its signalized intersection with Stelzer. Sunbury Road north of the Stelzer extension may require capacity increasing improvements as travel demand increases.

Construction Project Identification, Staging, and Scheduling

The proposed interstate improvements discussed in the preceding section, because of the magnitude of the work proposed, will entail numerous projects constructed over several years. Individual projects have been identified and are shown in **Figure 14**. These projects were segregated based on logical work limits, maintenance of traffic issues, corridor traffic management, scale of work, right-of-way acquisition, estimated completion time, and other considerations. Projects 10 and 11 are composed of multiple stages which were segregated based primarily on maintenance of traffic issues



N.T.S.
SCHEMATIC

* EXISTING LANE

(XX) SEE APPENDIX D, PAGE XX

FRA–270–30.00

INTERCHANGE JUSTIFICATION STUDY

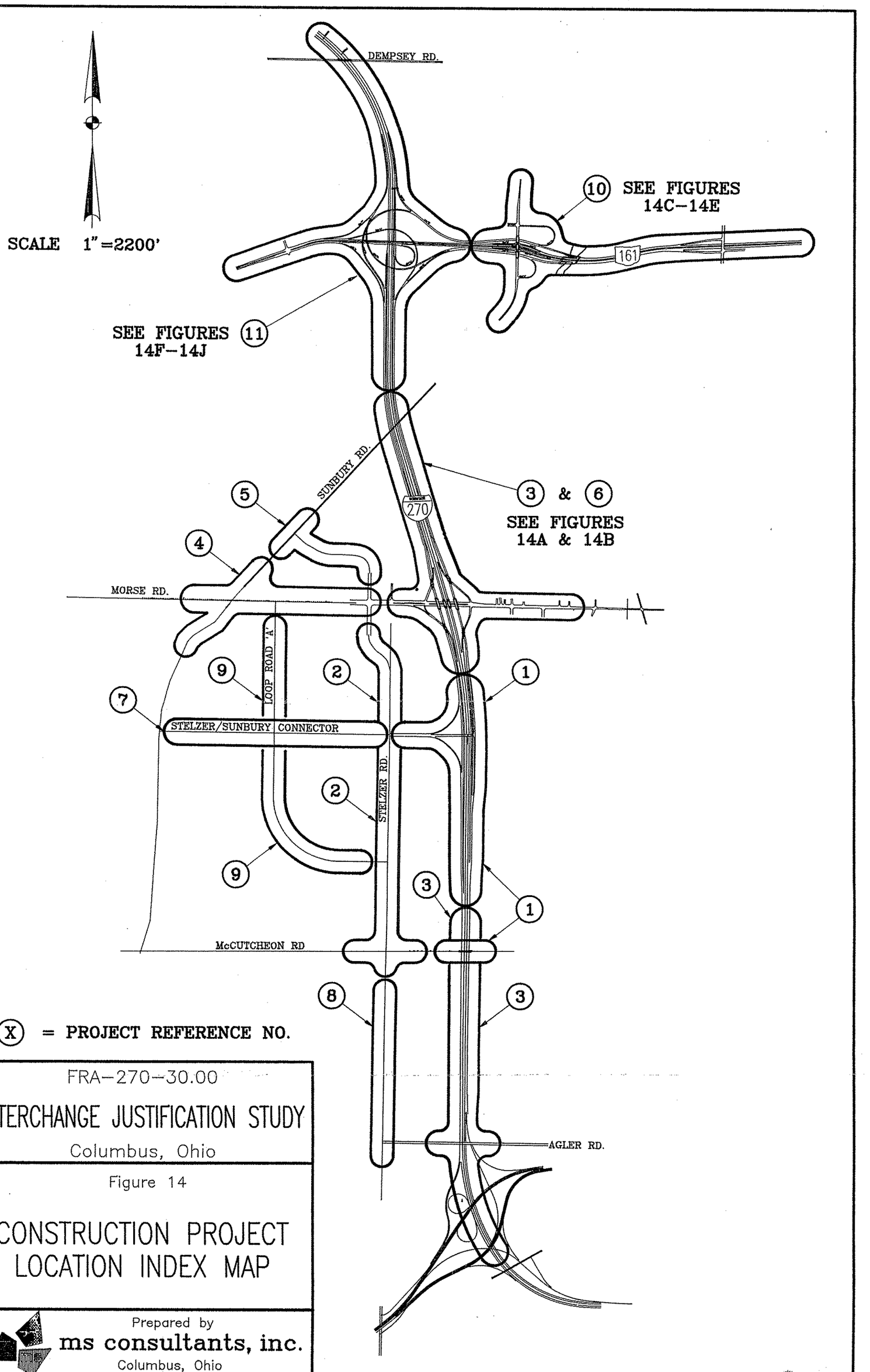
Columbus, Ohio

Figure 13

2015 DESIGN YEAR LEVELS OF SERVICE ARTERIAL SYSTEM

Prepared by
ms consultants, inc.
Columbus, Ohio

10009SC1 #8 10/20/92



(X) = PROJECT REFERENCE NO.

FRA–270–30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 14

CONSTRUCTION PROJECT LOCATION INDEX MAP

Prepared by
ms consultants, inc.
Columbus, Ohio

10009\SEQU1 #9 11/3/92

in order to minimize detours and ramp closures. The following is a description of each project.

PROJECT 1 Construction of New Crossroad and modification of McCutcheon Road Bridge:

- Construct northbound and southbound I-270 collector/distributor (C/D) roads (Sta. 1375+00 to 1428+00)
- Construct New Crossroad including bridge over I-270 and C/D roads, all ramps, and roadway to Stelzer Road
- Close McCutcheon Road bridge over I-270 and lengthen/widen structure. Detour McCutcheon Road traffic to Agler Road.

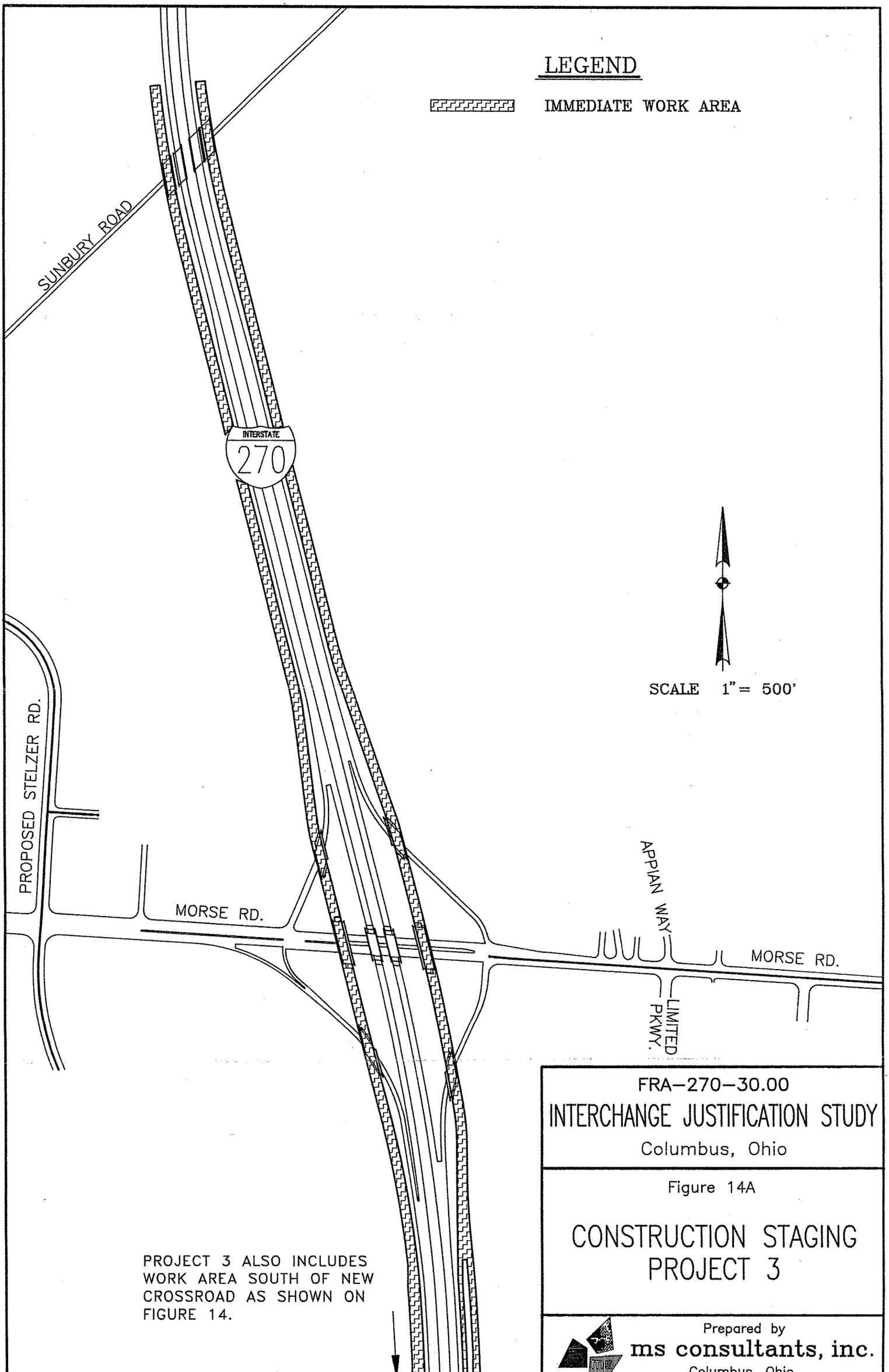
The reconstruction of the McCutcheon Road bridge in Project 1 will permit the detouring of Agler Road traffic to McCutcheon while the Agler Road bridge is modified during Project 3. Project 1 will not be opened to the public until Project 7 is complete.

PROJECT 2 Widen Stelzer Road from McCutcheon (including intersection improvements) to Morse Road (including relocation of Stelzer Road at Morse Road)

PROJECT 3 - (see **Figure 14A**) Construct the following:

- Construct northbound and southbound I-270 C/D roads from just north of Sunbury Road to south of Morse Road (Sta. 1307+00 to Sta. 1375+00) including two new structures for C/D roads over Sunbury Road and six new structures for C/D roads over Morse Road and Morse Road ramps.
- Construct remaining northbound and southbound C/D roads and I-270 mainline widening south from Sta. 1428+00 to I-670/US 62 interchange.
- Modify/lengthen Agler Road bridge with Agler Road traffic detoured to McCutcheon Road.

The construction of the New Crossroad and associated C/D roads will enable this interchange to serve traffic when the Morse Road interchange is closed for



FRA–270–30.00

INTERCHANGE JUSTIFICATION STUDY

Columbus, Ohio

Figure 14A

CONSTRUCTION STAGING PROJECT 3

Prepared by
ms consultants, inc.
Columbus, Ohio

10009\14–A #9 11/3/92