I-270 & MORSE ROAD
INTERCHANGE MODIFICATION
CONCEPT STUDY

FRA-270-32.27
City of Columbus, Ohio

April 24, 1992

Prepared by

ms consultants, inc.
Columbus, Ohio

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INTRODUCTION

Purpose and Scope

The purpose of this concept study is to present an expanded and enhanced interchange modification concept to improve traffic operations at the existing I-270 and Morse Road Interchange. This proposal will expand the current interchange facility now provided at I-270 and Morse Road by providing direct vehicular access to both Morse Road and Stelzer Road. The existing interchange will be enhanced through the use of braided on/off ramps so that no additional access points to the Interstate facility will be required.

This concept study has been prepared in an overview manner to examine the feasibility of an expanded and enhanced interchange alternative. It is not intended to be a formal interchange modification request. A forthcoming document will, in more detail and supported by the appropriate analyses, expand upon this concept and be submitted for formal approval by the review agencies.

Project Location

This project is located in the northeastern portion of the City of Columbus and Franklin County, Ohio, as shown in **Figure 1**. Portions of the overall project involve the Cities of Columbus and Gahanna, and unincorporated areas of Mifflin Township and Blendon Township.

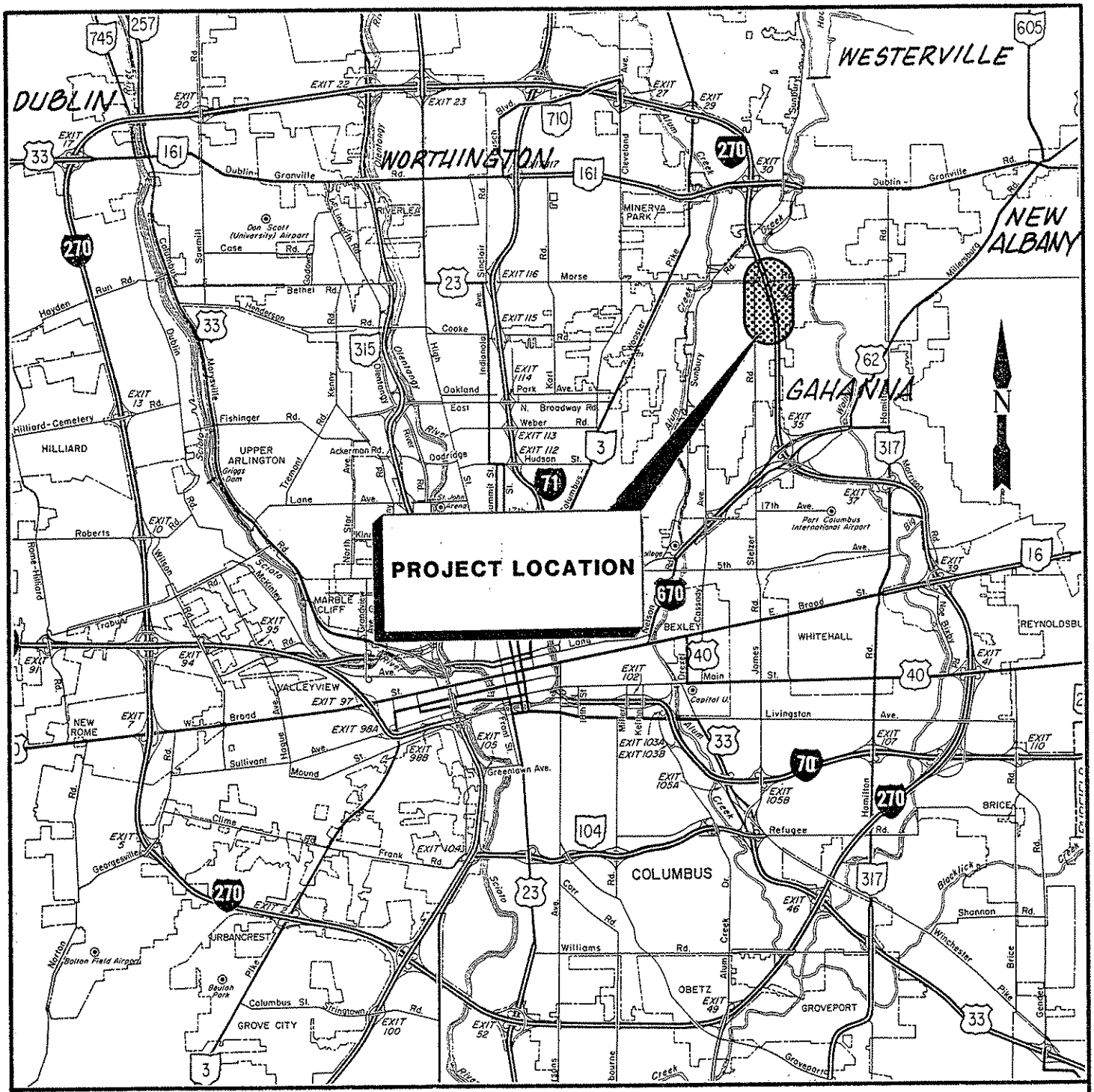

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Figure 1

PROJECT LOCATION MAP

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EXISTING AND ANTICIPATED CONDITIONS

Existing Conditions

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 1.

TABLE 1

1991 LEVELS OF SERVICE

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

Anticipated Conditions

Numerous developments are planned for the expanding northeast sector of the Columbus metropolitan area. Among these are The Limited, a retail clothing corporation,

which is planning a mixed use development in excess of 784 acres at the southwest corner of I-270 and Morse Road. Ross Park, an office/research complex located on Stelzer Road north of McCutcheon is nearing completion. Numerous developments have located along the I-670 corridor just south of the project location. Residential areas are also underway in the northeast sector of Franklin County in the communities of New Albany and Gahanna. (see Figure 1).

Design Year (2015) Average Daily Traffic (ADT) for I-270 and its interchanges with I-670/US 62, Morse Road and SR 161 is shown in **Figure 2.** This traffic has been certified by the Ohio Department of Transportation, Bureau of Technical Services. The magnitude of traffic resulting from background traffic growth plus that generated by the expanding developments has drawn concern as to the ability of the existing transportation network to handle such volume in an adequate manner. Through the combined efforts of the Ohio Division of FHWA, State and local officials, The Limited, and **ms consultants, inc.**, an expanded and enhanced transportation network has been proposed.

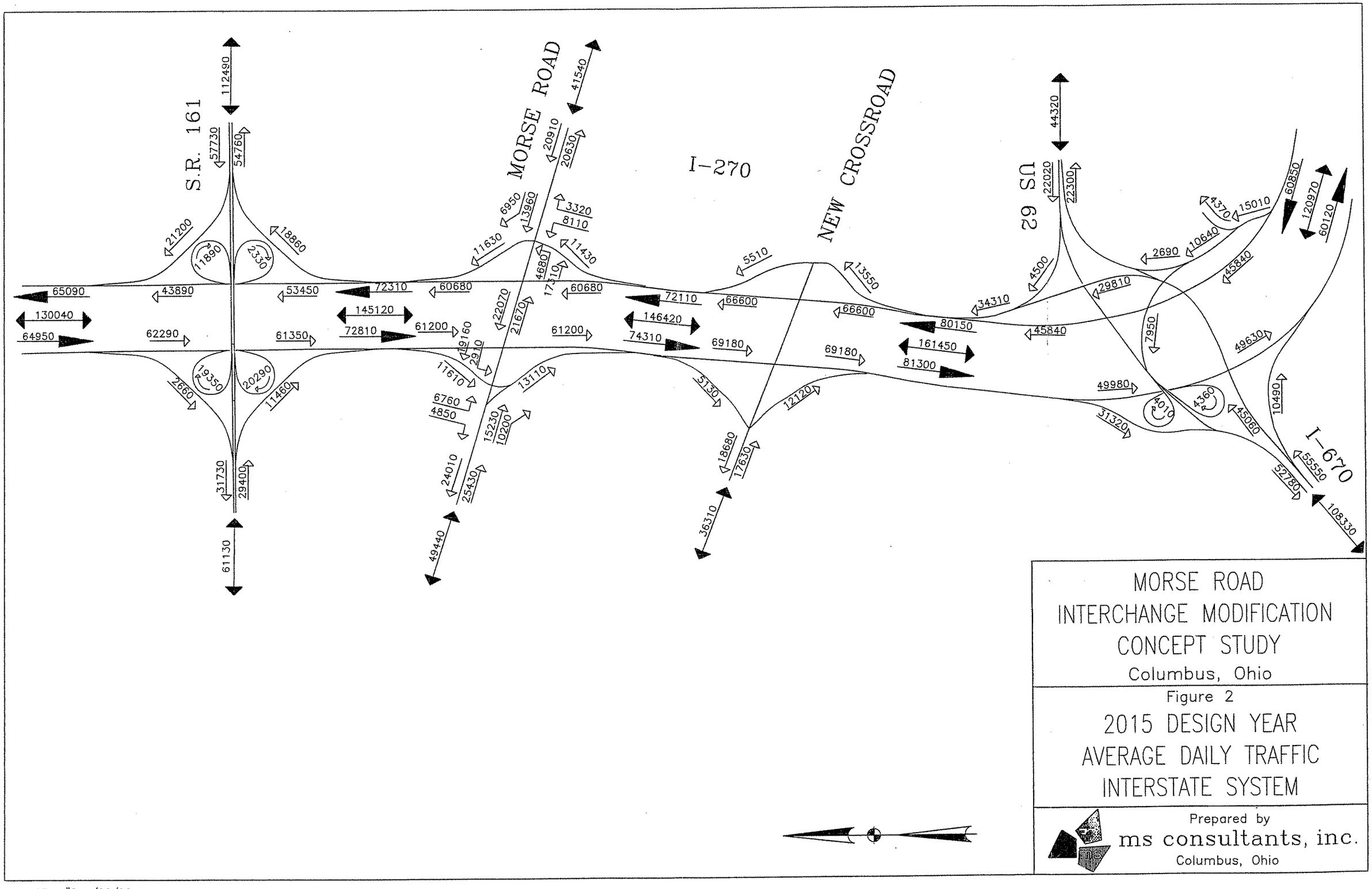

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Figure 2
2015 DESIGN YEAR
AVERAGE DAILY TRAFFIC
INTERSTATE SYSTEM

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PROPOSED CONCEPT

Conceptual Geometrics

A proposal for a new I-270 interchange with Stelzer Road was previously advanced as having considerable merit to meet not only the existing and future traffic needs but also to relieve the existing Morse Road interchange. The general consensus of the ODOT and FHWA reviewers was that additional access points on I-270 were undesirable and could result in decreased levels of service for Interstate travelers. Working closely with ODOT and Ohio FHWA officials, **ms consultants** then developed the Morse Road Interchange modification which is shown conceptually in **Figure 3**.

The Morse Road Interchange modification concept uses a series of braided on/off ramps and a new crossroad over I-270 to improve an existing interchange to a major east-west facility, Morse Road, coupled with the creation of more direct access to a major north-south facility, Stelzer Road. No additional access points on the Interstate System are required by this interchange concept. Three lanes per direction will continue to be provided for through Interstate traffic while two lanes (one for Morse, one for Stelzer) will exit/enter the Interstate System. This concept will result 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 will taper to four lanes just south of the overpass at Sunbury Road. The four lanes are expected to continue beyond SR 161 to meet with a planned construction project for the I-270 North Outerbelt. Details of the conceptual geometrics and the resultant traffic operations will be presented later in this chapter.

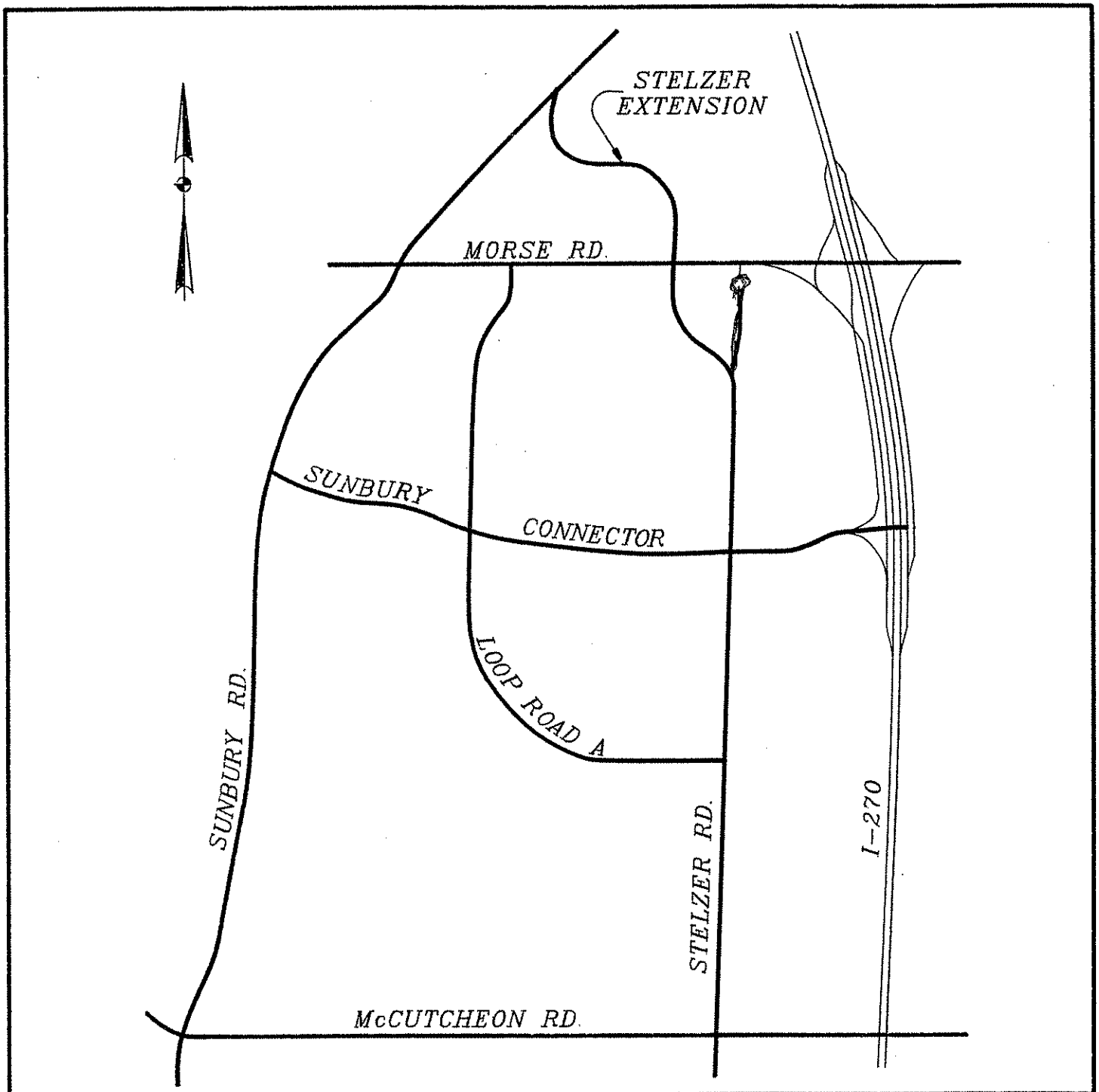

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Figure 3

CONCEPTUAL ROAD NETWORK

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Improvements to the local street network and development area were examined in conjunction with the interchange modification. As shown in Figure 3, the proposed road network will facilitate vehicular access to several principal roadways. Stelzer Road, a two lane facility, is currently under design to be improved to four through lanes between McCutcheon Road and Morse Road. Stelzer Road currently forms a "tee" intersection functionally at Morse Road immediately west of I-270. This intersection will be relocated westward to provide better operations on Morse Road, and Stelzer Road will then be extended northward to Sunbury Road, as shown on the 1981 Columbus Thoroughfare Plan. This new connection will create a 15 mile James/Stelzer/Sunbury corridor which will connect I-70 with Delaware County. 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. An east-west road which bi-sects a principal development area will connect Sunbury Road and Loop Road A to the new crossroad over I-270.

Levels of Service

Of utmost concern to all the parties involved with this project is the Level of Service (LOS) that will be provided to the motorist. This modified interchange proposal has therefore been compared to a No Build alternative and to a Morse Road Ramp Upgrade alternative in order to assess whether this new concept will result in the degradation of the LOS of the Interstate System. The No Build alternative consists of the existing three Interstate lanes per direction and the single lane ramps at the diamond configured Morse

Road interchange. The Morse Road Ramp Upgrade consists of dual on and off ramps at the interchange plus one additional through lane per direction (for a total of four through lanes per direction) on I-270.

The Design Hour traffic Volumes (DHV) are based on the certified ADT volumes and approved DHV factors for the three alternatives and are shown in **Figure 3-A**, a 24 x 36 fold-out drawing included at the end of this report. Also shown in Figure 3-A are the corresponding levels of service for the three alternatives.

As expected, the No Build alternative will result in failed levels of service for the Interstate mainline, ramp junctions and interchange intersections. Clearly, this is not an acceptable alternative for the Design Year conditions.

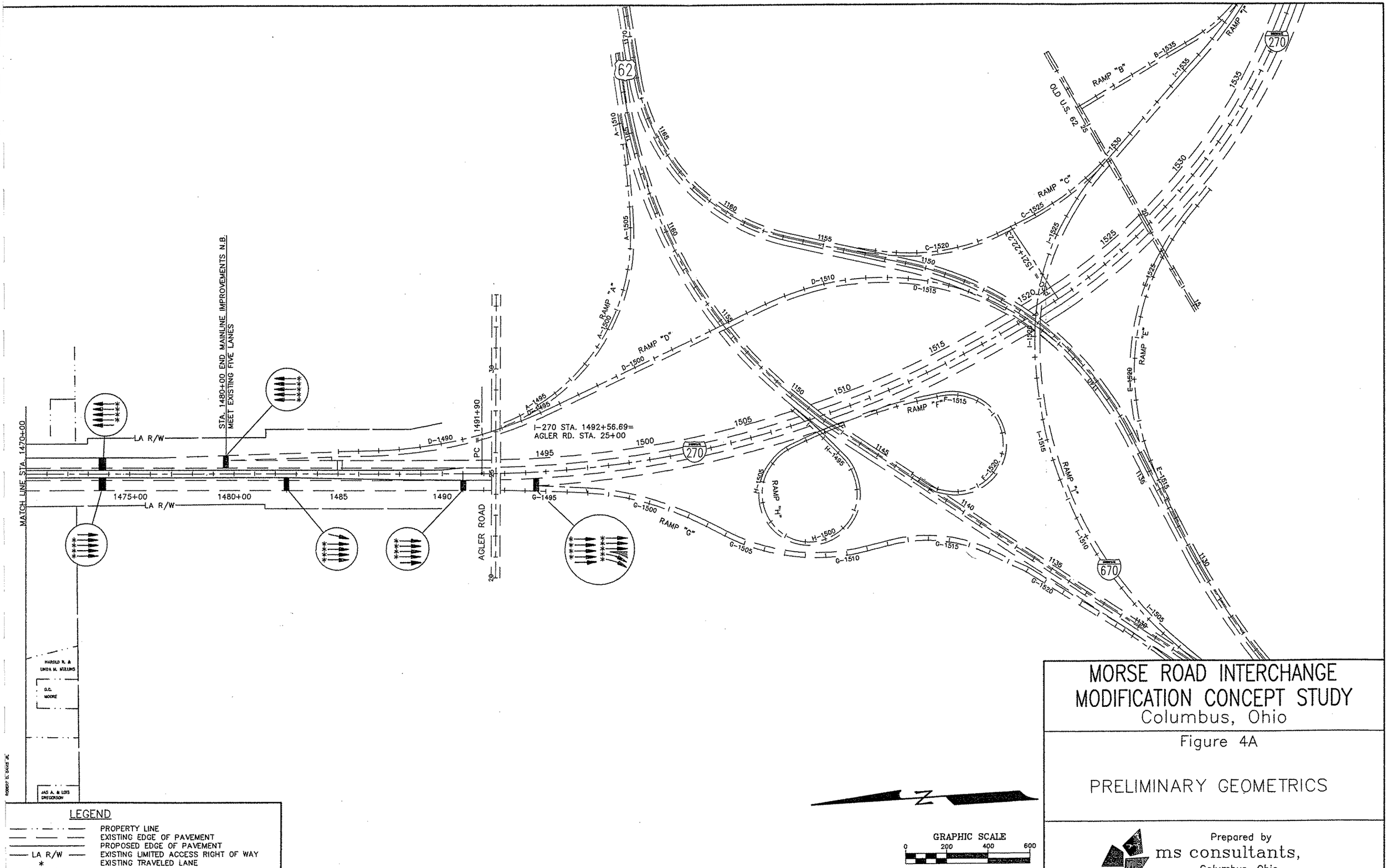
The Morse Road Ramp Upgrade alternative results in failed levels of service for the I-270 segment between I-670/US 62 and Morse Road. The signalized intersections of Morse Road and the I-270 ramp terminals are also calculated at failing levels of service. This situation could result in off-ramp traffic queueing onto the mainline and further impeding Interstate traffic flow.

The proposed Morse Road Interchange modification concept provides a level of service no worse than, and in many cases better than, the No Build or Morse Road Ramp Upgrade. Signalized I-270 Ramp terminals at Morse Road experience substantial benefits and provide operations in the LOS C and LOS D range instead of LOS F. Furthermore, Interstate traffic not exiting the freeway at the modified Morse Road interchange, is allowed to continue on the Interstate facility unimpeded and without on/off ramp traffic friction.

Preliminary Geometrics

Preliminary geometrics for the proposed Morse Road Interchange modification concept are shown in **Figures 4A-4D**. Figure 4C, which shows the section of I-270 and the braided ramps, is also included as a 24 x 36 fold-out drawing at the end of this report. These figures show the concept as it develops on I-270 from the I-670/US 62 interchange to the Sunbury Road overpass. The three existing I-270 northbound Interstate lanes are joined by two existing I-670/US 62 on-ramp lanes near Agler Road. These five lanes will combine and continue northbound with a transition toward the median as they approach the McCutcheon Road bridge over I-270. Currently, only three I-270 lanes continue under McCutcheon. North of McCutcheon the two outermost lanes will exit to the modified interchange while three mainline lanes are carried beyond the interchange. This is similar to a collector/distributor road exit situation. North of Morse Road the three mainline lanes are joined by two on-ramp lanes. The outermost ramp lane is merged into the inside ramp lane and four through lanes are carried northbound beyond Sunbury Road.

Southbound four lanes are carried over Sunbury Road and a fifth lane is added to the outside of this group. The two outer lanes exit to the modified interchange and three lanes continue beyond the interchange. Once again, these three mainline lanes are joined by the two ramp lanes north of McCutcheon and are carried southward. Three I-270 lanes currently exist at this point although a fourth lane is added south of McCutcheon. South of Agler the five lanes will split into two existing ramp lanes to westbound I-670/US 62 and three existing southbound I-270 lanes.



MORSE ROAD INTERCHANGE MODIFICATION CONCEPT STUDY

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Figure 4A

PRELIMINARY GEOMETRICS

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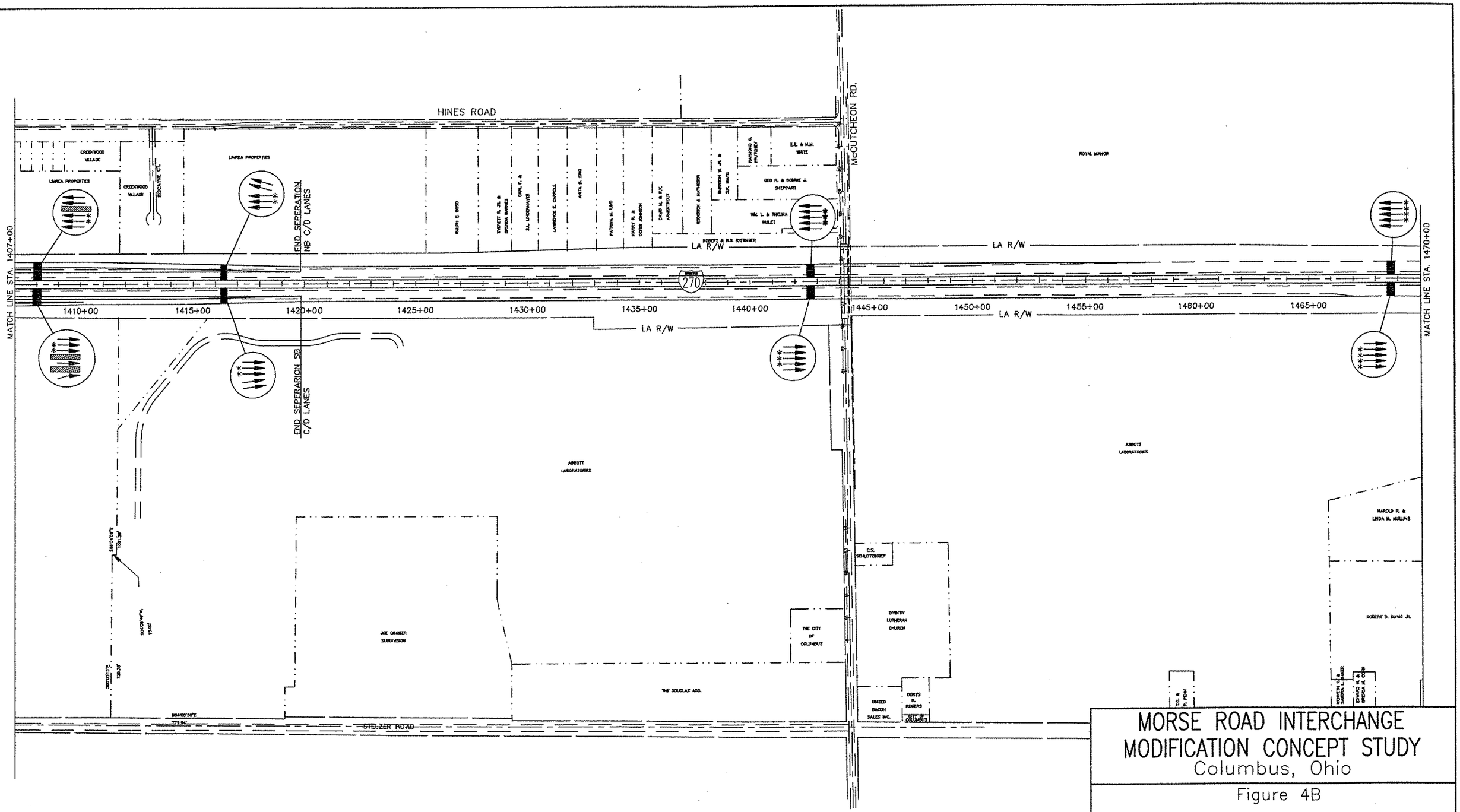

LEGEND

- PROPERTY LINE
- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- LA R/W — EXISTING LIMITED ACCESS RIGHT OF WAY
- * EXISTING TRAVELED LANE
- PROPOSED BARRIER

GRAPHIC SCALE
0 200 400 600

MORSE ROAD INTERCHANGE MODIFICATION CONCEPT STUDY
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Figure 4B

PRELIMINARY GEOMETRICS

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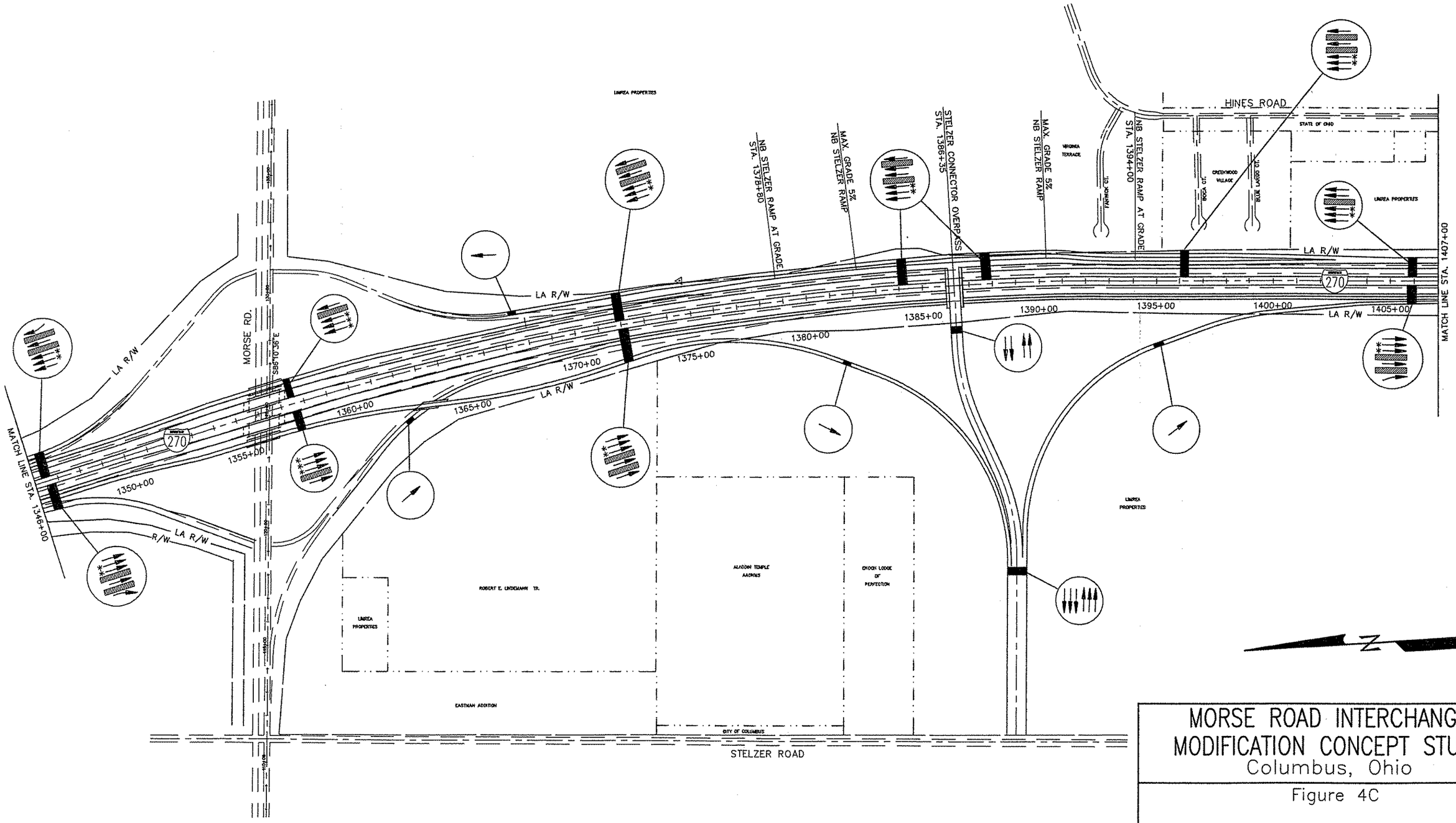

LEGEND

- PROPERTY LINE
- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- LA R/W — EXISTING LIMITED ACCESS RIGHT OF WAY
- * EXISTING TRAVELED LANE
- PROPOSED BARRIER

GRAPHIC SCALE
0 200 400 600

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Figure 4C

PRELIMINARY GEOMETRICS

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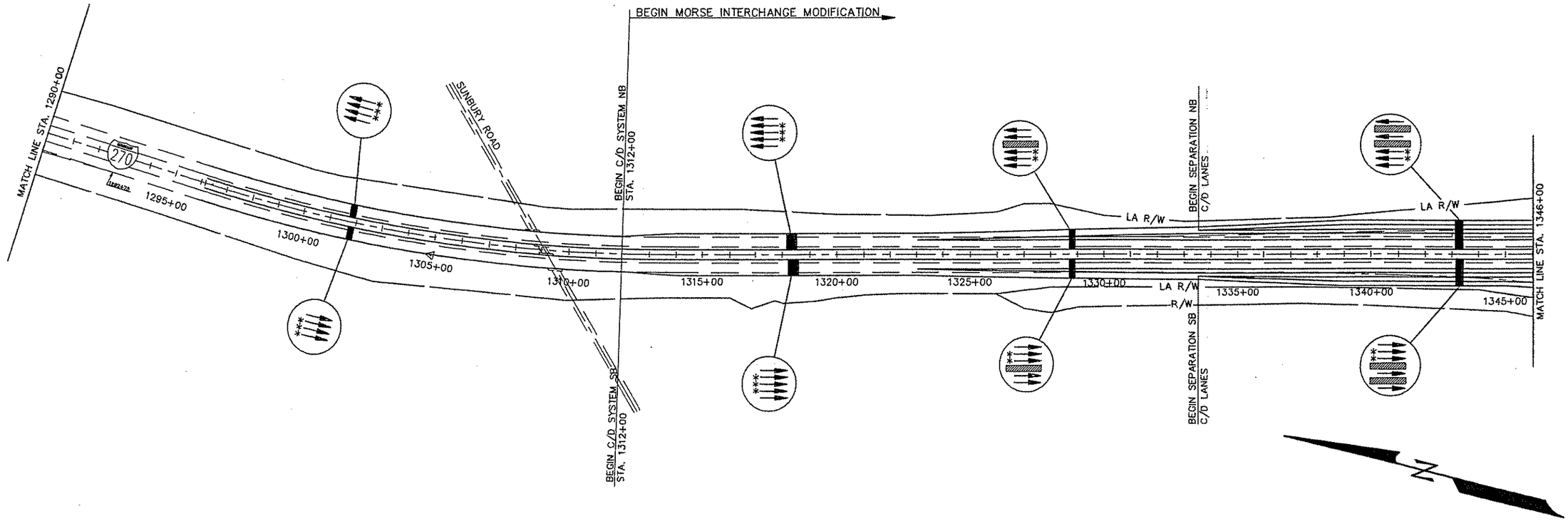

LEGEND

- PROPERTY LINE
- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- LA R/W — EXISTING LIMITED ACCESS RIGHT OF WAY
- * EXISTING TRAVELED LANE
- PROPOSED BARRIER

GRAPHIC SCALE
0 200 400 600

MORSE ROAD INTERCHANGE MODIFICATION CONCEPT STUDY
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Figure 4D

PRELIMINARY GEOMETRICS

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Typical sections for the Interstate are shown in **Figure 5**. An additional lane is proposed to be added in the median in each direction beginning south of McCutcheon. The braided ramp section will be separated from the through lanes using concrete barrier. The ramps to/from either Morse or Stelzer will also be physically separated which will prevent weaving movements within the braided ramp section.

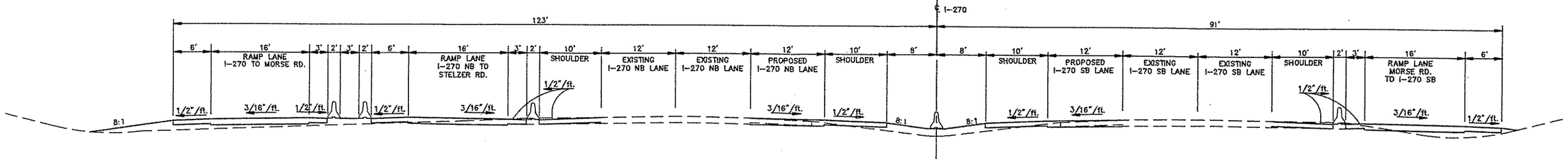
The connection to Stelzer Road includes a new Crossroad over I-270 at a point south of Morse. Although currently shown approximately 3000 feet south of Morse, this may not be the final I-270 centerline station of the Crossroad. Further study and the consideration of other factors such as vertical design, existing right-of-way, possible acquisition of residential properties, and environmental concerns may all influence the location of the final Crossroad centerline. Regardless of the Crossroad centerline station along I-270, a connection to Stelzer and beyond to Sunbury Road will be made.

Operational Benefits

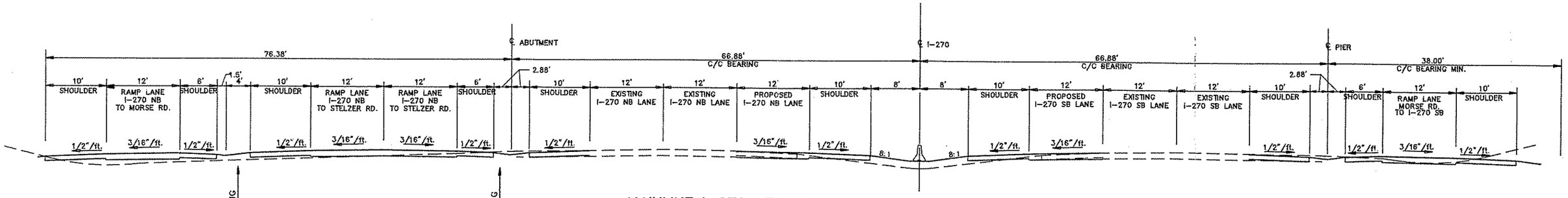
It is expected that the Morse Road Interchange modification concept will improve the Design Year levels of service over what might be expected with the No Build or Morse Road Ramp Upgrade alternatives. This concept should also improve the traffic operations along I-270, at the ramp terminals and on the local network streets.

I-270 operations should be improved through the use of a collector/distributor (C/D) type system which will separate Interstate traffic from the friction of exiting and entering ramp traffic. This should help to preserve the service integrity of the Interstate System. Ramp traffic to either Stelzer or Morse Road will have direct access to its

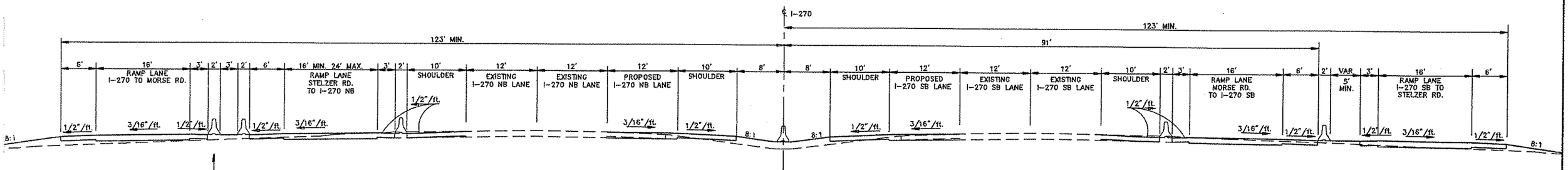
TYPICAL SECTIONS



MAINLINE I-270
STA. 1394+00



MAINLINE I-270 AT STELZER CONNECTOR
STA. 1386+35



MAINLINE I-270
STA. 1378+70

GRAPHIC SCALE
0 8 16 24

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Figure 5

MAINLINE I-270
TYPICAL SECTIONS

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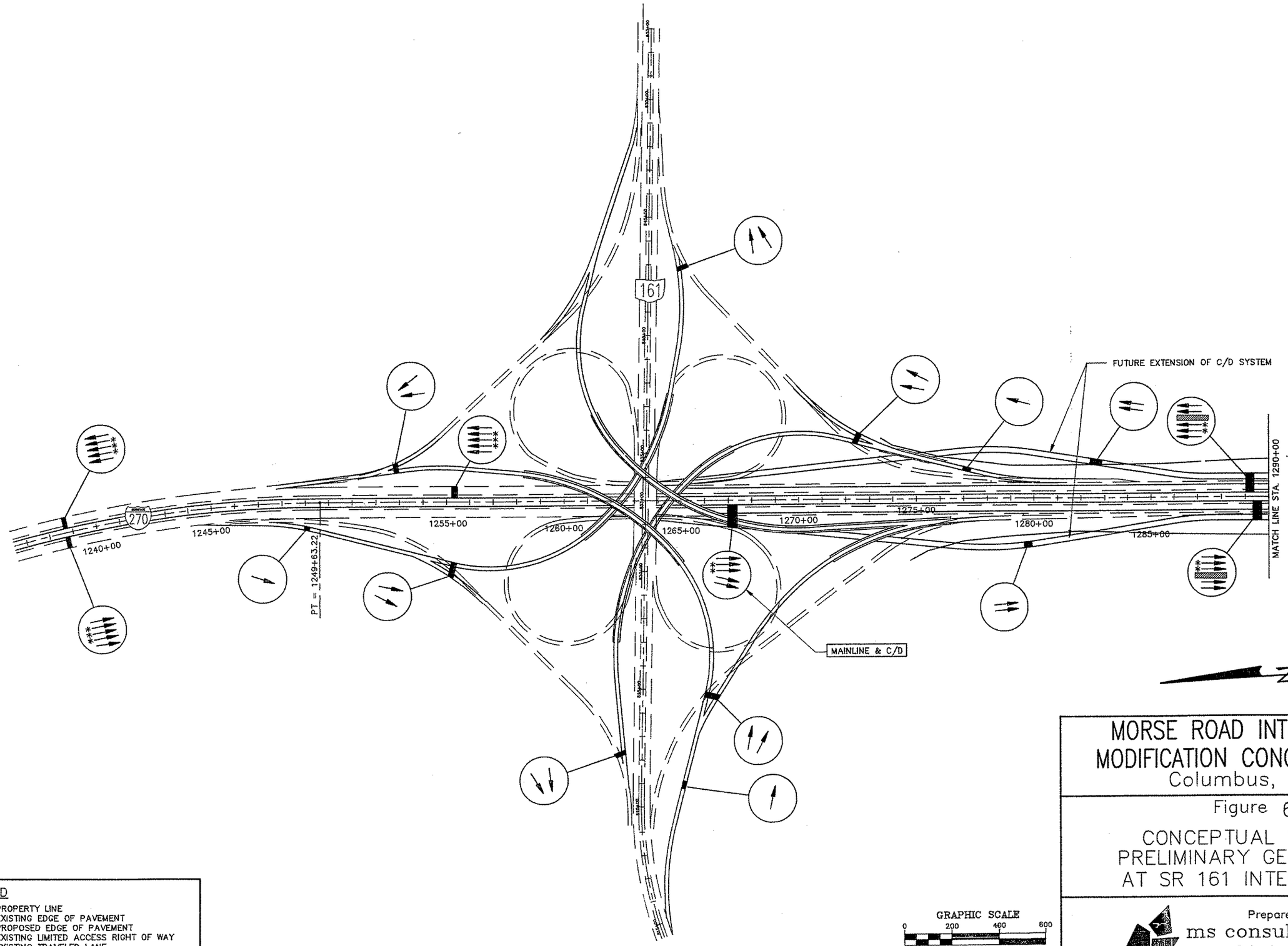
destination because of the braided nature of the ramps. Unlike the traditional C/D system, no internal weaving or merging/diverging traffic will take place due to the physical separation of the ramps. This condition applies to the on-ramp traffic as well, and will prevent the use of the Interstate for short, interchange to interchange trips. A signalized intersection at the eastern most point of the crossover will control the traffic to/from Stelzer Road. The existing signals on Morse Road at the ramp terminals are expected to be upgraded and remain.

All traffic is expected to benefit from the improvements designed to incorporate the Crossroad facility into the local street network. North-South traffic will benefit from the improvements to, and the extension of, Stelzer Road. Loop Road A will help to circulate traffic around the key intersections of Stelzer & the Crossroad and Stelzer & Morse. The Crossroad extension to Sunbury will help to deliver traffic directly to that facility. The entire concept is designed to provide a balanced transportation network.

Concern has been raised regarding the possibility of intensive lane changing occurring on I-270 between the Morse Road modified interchange and the SR 161 interchange. There is a possibility for conflicts involving traffic entering I-270 from Morse/ Stelzer and traffic exiting I-270 to SR 161 and vice-versa. An examination of the Design Year traffic volumes shown in Figure 2 suggests that the existing I-270 cloverleaf interchange at SR 161 will be inadequate for the future traffic volumes. Ultimately a fully directional interchange may be needed. As shown in **Figure 6**, these major crossover movements can be separated to avoid this intensive lane changing situation in conjunction with the reconstruction of the SR 161 interchange. This is shown conceptually to indicate



LEGEND

- PROPERTY LINE
- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- LA R/W — EXISTING LIMITED ACCESS RIGHT OF WAY
- * EXISTING TRAVELED LANE
- PROPOSED BARRIER

GRAPHIC SCALE
0 200 400 600

MORSE ROAD INTERCHANGE MODIFICATION CONCEPT STUDY
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Figure 6

CONCEPTUAL FUTURE
PRELIMINARY GEOMETRICS
AT SR 161 INTERCHANGE

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a manner in which these crossover movements may be separated in a future project to avoid ramp traffic friction and interchange to interchange trips.

Environmental Overview

A basic inventory of relevant environmental issues has been made as the Morse Road Interchange Modification concept was developed. General observations at this time are that ecological resources do not appear to be significantly impacted. Social and economic impacts appear to be minimal. Potential noise impacts have not been quantified but given the current and future traffic volumes the noise environment is expected to be affected. Inclusion of noise barriers along adjoining residential areas is expected to mitigate any adverse noise effects.

CONCLUSIONS

A need for additional and improved transportation facilities has been identified for the northeast sector of the Columbus metropolitan area. Based on the current traffic volumes and levels of service, the Interstate and local roadway network will not be adequate to handle the Design Year traffic produced by background traffic growth and the numerous developments in the area. A modification concept for the existing Morse Road Interchange is expected to result in improved levels of service over that which might be expected for a No Build scenario or a Morse Road Ramp Upgrade alternative. A series of braided ramps to both Morse and Stelzer Roads plus improvements to the local street network will provide improved traffic operations for the entire area. The preliminary geometrics shown in Figures 4A-4D outline the Interstate proposal for a C/D road concept while Figure 3 shows the local street network and how the proposed Crossroad will interface and provide balance to the entire roadway network. Additional lanes on the Interstate will be required as part of this proposal. Preservation of the service level on the Interstate System is achieved by separating merging/diverging traffic from the through traffic. The modification of the I-270 interchange at Morse Road permits continued traffic growth to be accommodated on both the Interstate and the arterial/collector system without unacceptable erosion of safety and service. Favorable consideration of this concept proposal is thus requested.