ORIGINAL TO GENERAL FILES

D.O.T. 66

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE P. I. No. 611270, Cherokee County
NH-IM-575-1(33)
I-575 Interchange at SR 20

OFFICE Preconstruction

DATE May 11, 2005

FROM Margaret B. Pirkle, P.E., Assistant Director of Preconstruction

TO SEE DISTRIBUTION

SUBJECT PROJECT CONCEPT REPORT APPROVAL

Attached for your files is the approval for subject project.

MBP/cj

Attachment

DISTRIBUTION:

David Mulling
Harvey Keepler
Ken Thompson
Jamie Simpson
Michael Henry
Keith Golden
Joe Palladi (file copy)
Paul Liles
Babs Abubakari
Brent Story
Kent Sager
BOARD MEMBER
FHWA

D.O.T. 66

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE P.I. No. 611270, Cherokee County
NH-IM-575-1(33)
I-575 Interchange at SR 20

OFFICE Preconstruction

DATE April 18, 2005

FROM Margaret B. Pirkle, P.E., Assistant Director of Preconstruction

TO David E. Studstill, Jr., P.E., Chief Engineer

SUBJECT PROJECT CONCEPT REPORT

This project is the reconstruction and rehabilitation of the SR 20 interchange over I-575. The project will begin at a point south of the SR 20 interchange and continue north 0.50 mile to a point north of the SR 20/I-575 interchange. The existing interchange is currently operating at an unacceptable level of service "F" and will continue to worsen as Cherokee County continues residential and commercial developments. Accident analysis for 1995 to 1997 data years indicates the interchange experiences accidents at a rate exceeding the statewide average for similar classified facilities. I-575 consists of four lanes, two in each direction, separated by a 64' grassed median and a posted speed limit of 65 MPH. The base year traffic volumes for I-575 at SR 20 are 35,000 VPD (2000) with future design volumes expected to be 55,000 VPD in 2020.

The proposed construction will add an exit ramp from I-575 northbound to SR 20 and add a southbound entrance ramp from SR 20 to I-575 southbound. All the existing ramps will be retained. The existing loop ramp on the east side of the interchange will be reconfigured to allow traffic from I-575 northbound to continue on SR 20 westbound. The existing loop ramp on the west side of the interchange will be reconfigured to allow SR 20 westbound traffic to I-575 southbound traffic. The existing bridges on SR 20 will be retained and no changes are proposed for the existing I-575 roadway. Traffic will be maintained via staged construction.

Environmental concerns include requiring a COE 404 permit; a Categorical Exclusion be prepared; a public information open house will be held; time saving procedures are appropriate.

The estimated costs for this project are:

	PROPOSED	APPROVED	FUNDING	PROG DATE
Construction (includes E&C and inflation)	$ 937,000	$ 936,000	Q05	2005
Right-of-Way	$1,914,000	$1,914,000		
Utilities*	LGPA	LGPA		

P.I. No. 611270, Cherokee
April 18, 2005

*City of Canton signed LGPA on 11-2-00 for utilities/Recission letter sent 2-28-05.

I recommend this project concept be approved.

MBP:JDQ/cj

Attachment

CONCUR _____
Buddy Gratton, P.E., Director of Preconstruction

APPROVE _____
For: Robert M. Callan, Administrator, FHWA

APPROVE _____
David E. Studstill, Jr., P.E., Chief Engineer

SCORING RESULTS AS PER MOG 2440-2

Project Number:	County:	PI No.:
NH-IM-575-1(33)	Cherokee	611270

Report Date:	Concept By:
March 7, 2003	DOT Office: Road Design
☒ Concept Stage	Consultant: N/A

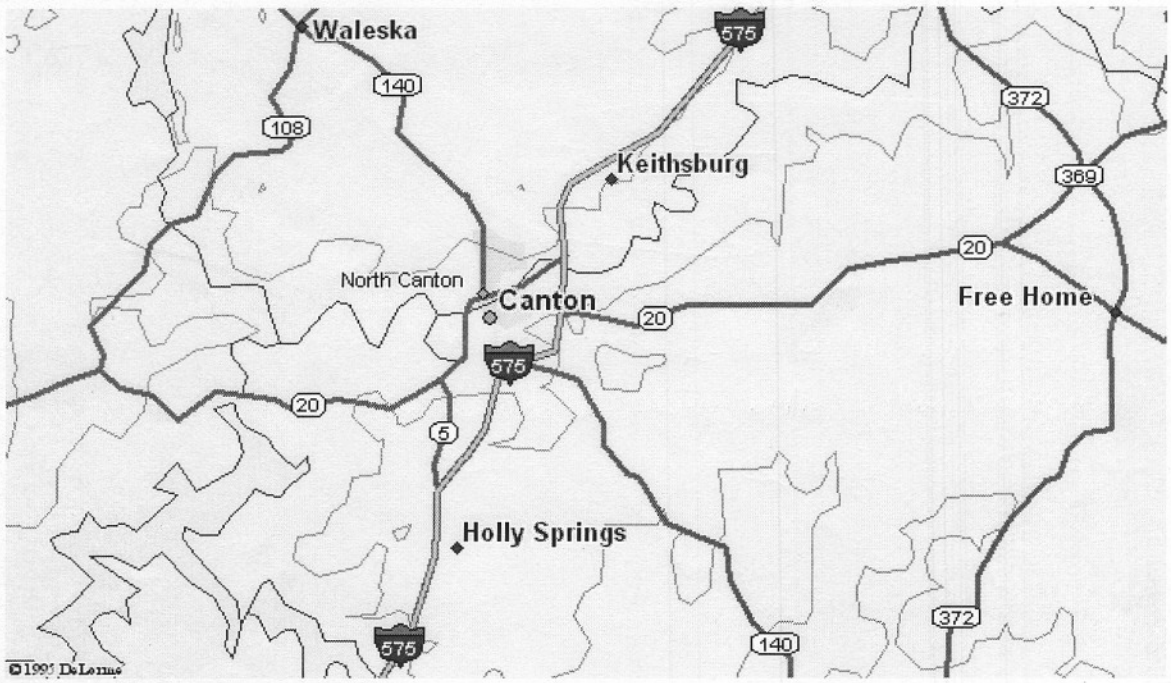
Project Type: Choose One From Each Column			
	☐ Major	☐ Urban	☐ ATMS
	☒ Minor	☒ Rural	☐ Bridge Replacement
			☐ Building
			☐ Interchange Reconstruction
			☐ Intersection Improvement
			☒ Interstate
			☐ New Location
			☐ Widening & Reconstruction
			☐ Miscellaneous

FOCUS AREAS	SCORE	RESULTS
Presentation	90	Quantities for Earthwork along with unit costs should be included for informational purposes.
Judgement	100	
Environmental	100	
Right of Way	100	
Utility	100	
Constructability	100	
Schedule	100	

DEPARTMENT OF TRANSPORTATION
STATE OR GEORGIA
Office of Road and Airport Design

Project Number: NH-IM-575-1 (33)
County: Cherokee
P.I. Number: 611270

Federal Route Number: I-575
State Route Number: 5



Recommendation for approval:

DATE 3-7-03 _____ Project Manager

DATE 3/9/03 _____ Office Head/District Engineer

The concept as presented herein and submitted for approval is consistent with that which is included in the Regional Transportation Improvement Program (RTP) and/or the State Transportation Improvement Program (STIP).

DATE _____ State Transportation Planning Administrator

DATE _____ State Financial Management Administrator

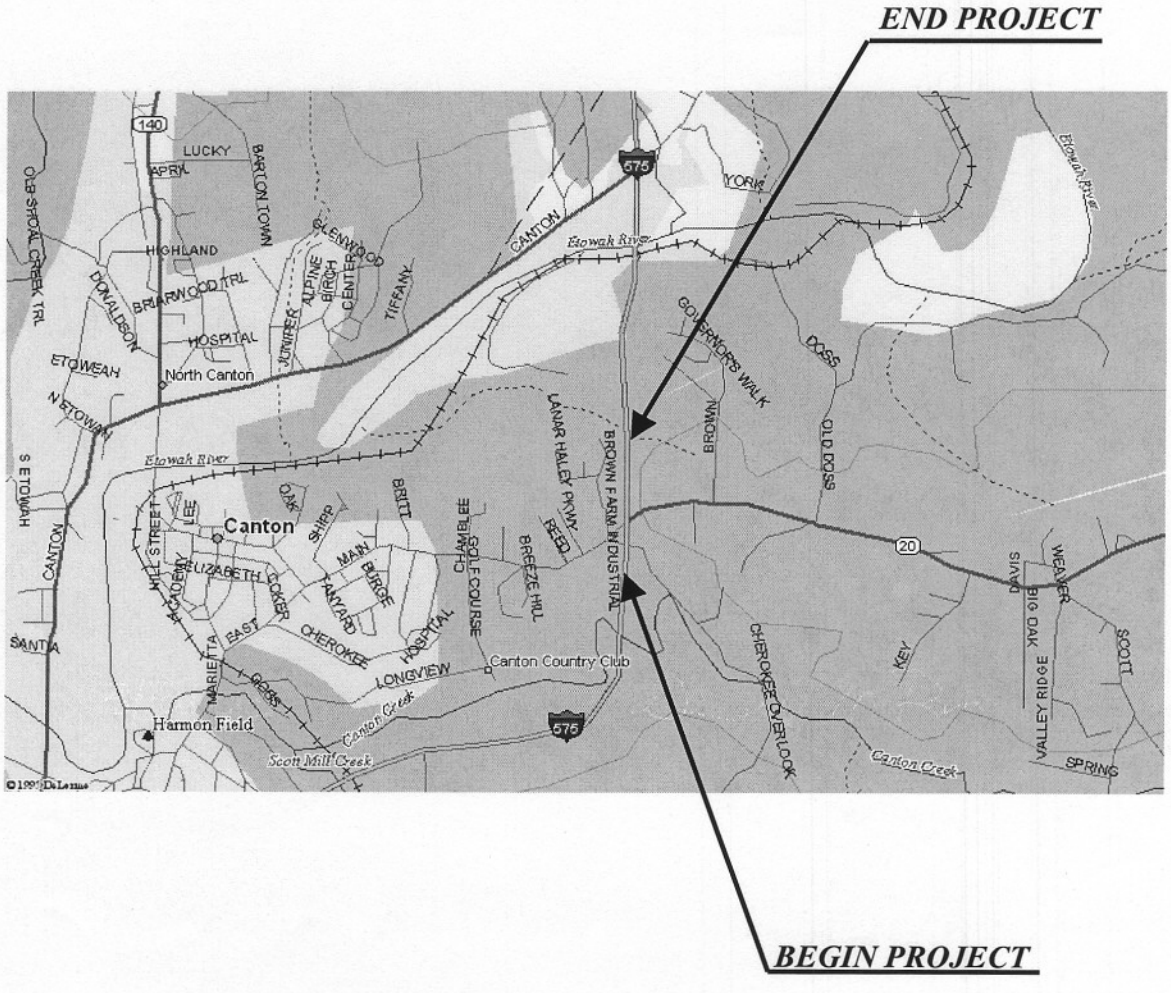
DATE _____ State Environment/Location Engineer

DATE _____ State Traffic Safety & Design Engineer

DATE _____ District Engineer

DATE _____ Project Review Engineer

PROJECT MAP - Project No. NH-IM-575-1 (33) CHEROKEE COUNTY



Need and Purpose:

Background

The Atlanta Regional Commission (ARC) adopted the 2025 Transportation Plan for the 13-county Atlanta Metropolitan area in April 2000. The Plan addresses travel needs through the year 2025. The Regional Transportation Plan is the direct result of a comprehensive, cooperative, and continuous planning process conducted by ARC, local governments and the Georgia Department of Transportation in cooperation with the Federal Highway and Federal Transit Administrations. The RTP recommends the I-575 Interchange Reconstruction at S.R. 20.

Design

Project NH-IM-575-1 (33) will reconstruct the I-575 Interchange at S.R. 20. This project will retain all of the existing ramps at the I–575 / SR 20 interchange and will add new ramps from S.R. 20 eastbound to I-575 southbound and from I-575 northbound to S.R. 20 eastbound. The existing loop ramp on the east side of the interchange will be reconfigured to allow traffic from I-575 northbound to continue on S.R. 20 westbound. The new ramp on the east side of the interchange will allow I-575 northbound traffic to continue east on S.R. 20. The existing ramp from I-575 southbound will be reconfigured for dual left turns to S.R. 20 eastbound and a right turn lane to S.R. 20 westbound. The new ramp on the west side of the interchange will be added to provide traffic from S.R. 20 eastbound to I-575 southbound. The existing loop ramp on the west side of the interchange will be reconfigured to allow SR 20 westbound traffic to I-575 southbound traffic. No ramp improvements will be made for traffic traveling S.R. 20 eastbound to I-575 northbound. The length of the project is 0.28 miles.

Travel Demand and Operational Characteristics

Existing 1999 traffic volumes of I-575 at S.R. 20 were 37,069 average daily traffic (ADT) with future design traffic volumes expected to be 52,250 ADT in 2027. Traffic volumes will increase due to planned residential and commercial growth. The interchange improvements will promote a continuous efficient movement of the existing and future traffic. The level-of-service (LOS) on existing I-575 at S.R. 20 ramps is currently at LOS F, which is unacceptable. With improvements, the ramps will operate at a LOS B in year 2027.

Safety

The following table compares the corridor's accident rate to the statewide average for a similar classified facility. The 1995, 1996 and 1997 accident rates along I-575 at S.R. 20 were above the statewide average for a road of this type (rural interstate major arterial).
I-575, Cherokee County – Rural Interstate Major Arterial, TC 245 (Milepost 12.74 to 13.12)

	1995	**1996**	**1997**
Total Accidents	14	14	19
Accidents Per 100 MVMT	**189**	**178**	**235**
Statewide Accidents Per 100 MVMT	47	50	49
Accident Ratio	**4.02**	**3.56**	**4.79**

The above accident analysis indicates the I-575 interchange at S.R. 20, on average, experiences accidents at a rate exceeding the statewide average for similar classified facilities. A majority of the accidents were "angle intersecting". The construction of the new ramps will increase capacity and provide a continuous movement of the traffic between I-575 and S.R. 20, thereby increasing safety for the drivers.

Community Issues

Cherokee County is part of the Atlanta metropolitan area and is a rapidly growing residential area. The anticipated annual population growth rate from 1990-2000 for this county is 56.5%. The percentage of persons working in Cherokee County is 69.4%. Current and proposed developments along the I-575 and S.R. 20 are expected to continue.

Need and Purpose

The proposed project will increase the capacity of the existing interchange, thereby promoting a continuous and efficient movement of traffic on I-575 and S.R. 20. The existing interchange I-575 with S.R. 20 is currently operating at an unacceptable level of service F and will continue to worsen as Cherokee County continues to develop. Without improvements, the existing interchange will continue to experience accident rates in excess of the statewide average. The purpose of the project is to provide an improved interchange that will adequately serve current and future travel demand and provide the driver with a safer environment.

Description of the proposed project: This project proposes to add an exit ramp from I-575 northbound to S.R. 20 and add a southbound entrance ramp from S.R. 20 to I-575 southbound. The project will begin at a point south of the S.R. 20 interchange and continue north for approximately 0.50 mile to a point just north of S.R. 20/I-575 Interchange. The proposed project includes the reconfiguration of all existing ramps.

Is the project located in a Non-attainment area? __X__ Yes ____ No

PDP Classification:

Full Oversight (X), Exempt (), State Funded ( ), or Other ( )

Functional Classification: Interstate Principal Arterial

U.S. Route Number(s): N/A **State Route Number(s):** 5 & 20

Traffic (AADT):

Current Year: (2000) 35,000 Design Year: (2020) 55,000

Existing design features:

- Typical Section: Four 12' wide lanes(Two each direction) separated by a 64' grassed median with 14' shoulders(10' paved/4'grassed).
- Ramp Typical Section: 16' wide lane with 10' shoulders(6' paved/4'grassed)
- Posted speed: 65 mph Maximum degree of curvature: 1°30'
- Maximum grade: 2.80 % on mainline
- Width of right of way: 400 feet
- Major structures: SR 20 over I-575
- Major interchanges or intersections along the project: I-575 @ S.R. 20
- Existing length of roadway: 0.50 mile

Proposed Design Features:

- Proposed typical section: 4 - 12' lanes(2 each direction) separated by a 64' depressed grass median with 14' shoulders(10' paved/4'grass).
- Ramp Typical Section: 16' wide lane with 10' shoulders(6' paved/4'grassed)
- Proposed Design Speed Mainline: 65 mph
- Proposed Maximum grade Mainline: 2.90 % Maximum grade allowable: 4.0 %
- Proposed Maximum grade Side Street: N/A Maximum grade allowable: N/A
- Proposed Maximum grade driveway: N/A
- Proposed Maximum degree of curve: 1°30' Maximum degree allowable: 3° 45'
- Right of way
    - Width : 500'
    - Easements: Temporary ( ), Permanent ( ), Utility ( ), Other ( )
    - Type of access control: Full ( ), Partial ( ), By Permit( ), Other (X)
    - Number of parcels: 0 Number of displacements:
        - Business: 0
        - Residences: 0
        - Mobile Homes: 0
        - Other: 0

- Structures: None
- Major intersections:
  I-575 @ S.R. 20
- Traffic control during construction: Two way traffic will be maintained by utilizing stage construction on this project.
- Design Exceptions to controlling criteria anticipated:

	Undetermined	Yes	No
HORIZONTAL ALIGHMENT:	( )	( )	(X)
ROADWAY WIDTH:	( )	( )	(X)
SHOULDER WIDTH:	( )	( )	(X)
VERTICAL GRADES:	( )	( )	(X)
CROSSING SLOPES:	( )	( )	(X)
STOPPING SIGHT DISTANCE:	( )	( )	(X)
SUPERELEVATION RATES:	( )	( )	(X)
HORIZONTAL CLEARNACE:	( )	( )	(X)
SPEED DESIGN:	( )	( )	(X)
VERTICAL CLEARANCE:	( )	( )	(X)
BRIDGE WIDTH:	( )	( )	(X)
BRIDGE STRUCTURAL CAPACITY	( )	( )	(X)

- Design Variances: None
- Environmental concerns: Permits required include Section 404, U.S. Army Corps of Engineers Nationwide Permit.
- Level of environmental analysis:
    - Are Time Savings Procedures appropriate? Yes () No (x)
    - Categorical exclusions (X)
    - Environmental Assessment/Finding of No Significant Impact (FONSI) ( ), or
    - Environmental Impact Statement (EIS) ( )
- Utility involvement: Not known

Project responsibilities:

- Design
- Right of Way Acquisition
- Relocation of Utilities
- Letting to contract
- Supervision of construction
- Providing material pits
- Providing detours

Coordination:

- Initial Concept Meeting date and brief summary. N/A
- Concept meeting date and brief summary. Oct.11, 2001
- I.M.R. To be done
- P.A.R. meetings, dates and results. No meeting held
- FEMA, USCG and/or TVA. No coordination
- Public involvement. N/A
- Local government comments. Pending
- Other projects in the area: None

Scheduling - Responsible Parties' Estimate:

- Time to complete the environmental process: 8 Months
- Time to complete preliminary construction plans: 2 Months
- Time to complete right of way plans: 6 months
- Time to complete the Section 404 Permit: 8 Months
- Time to complete final construction plans: 2 Months
- Time to complete to purchase right of way: N/A
- List other major items that will affect the project schedule: N/A

Other Alternates Considered: No build

Comments: None

Attachments:

1. Cost Estimates:
    a. Construction including E & C
    b. Right of way, and
    c. Utilities

2. Sketch location map,
3. Typical sections,
4. Planning Schematic,
5. Accident summaries,
6. Minutes of Concept Meeting,

Project Number: NH-IM-575-1 (33)
P.I. Number: 611270
County: Cherokee

SUMMARY OF PROJECT COST

DATE: January 8, 2002 ESTIMATED LETTING DATE: November, 2005

PREPARED BY: Jason L. McCook PROJECT LENGTH (MILES): 0.50

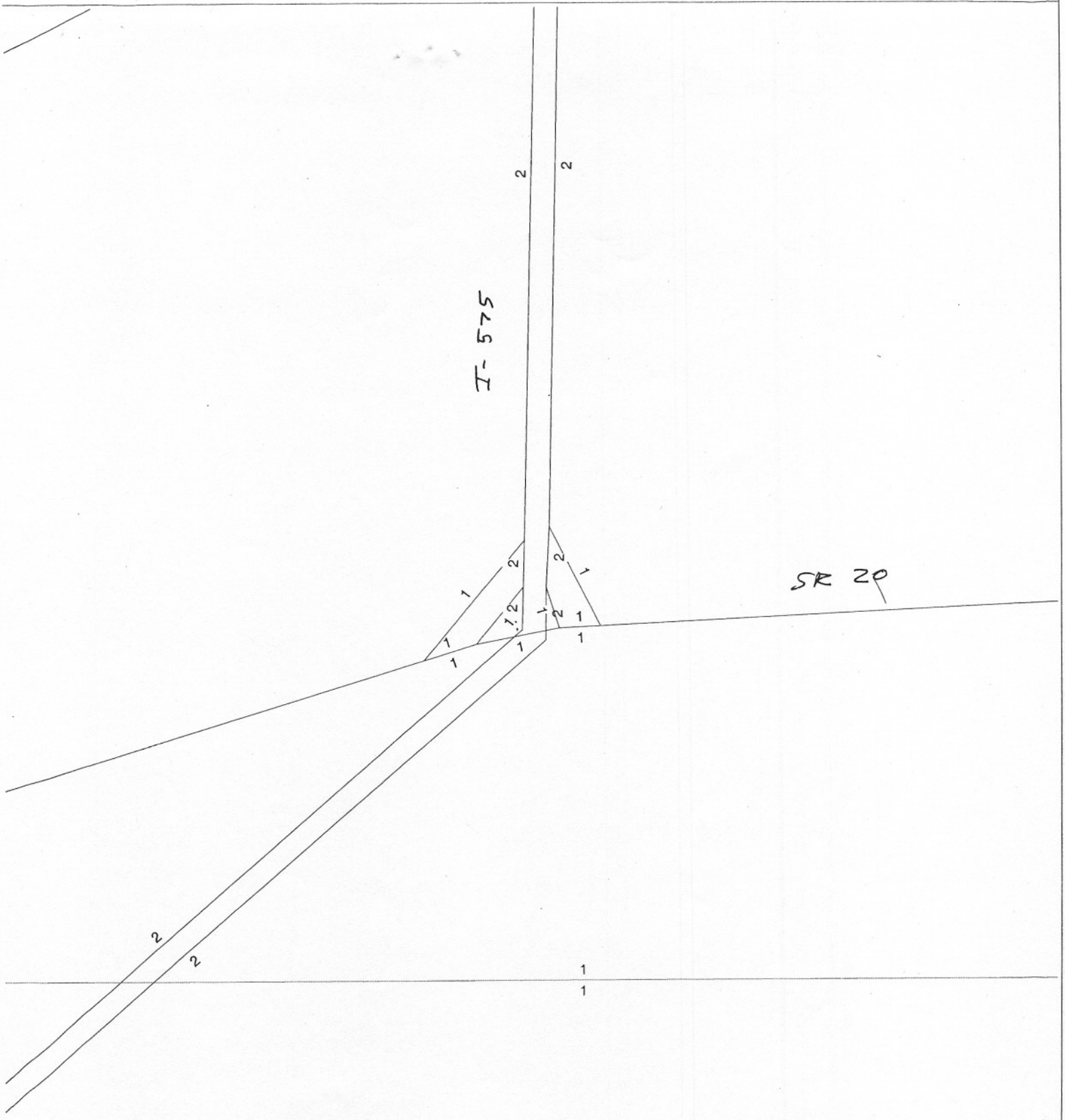
( )PROGRAMMING PROCESS (X)CONCEPT DEVELOPMENT ( )DURING PROJECT DEV.

PROJECT COST	
A. RIGHT-OF-WAY:	
1. PROPERTY (LAND & EASEMENT)	$ 1,200,000
2. DISPLACEMENTS; RES:0, BUS;0, M.H.:0	$
3. OTHER COST (ADM./COST, INFLATION)	$ 714,000
SUBTOTAL:A	$ 1,914,000
B. REIMBURSABLE UTILITIES:	
1. RAILROAD	
2. TRANSMISSION LINES	$ 42,000.00
3. SERVICES	$
SUBTOTAL:B	$ 42,000.00
C. CONSTRUCTION:	
1. MAJOR STRUCTURES	
a. RETAINING WALLS	$
b. BRIDGES	$ 0.00
c. DETOURS BRIDGES	$ 0.00
d. BOX CULVERTS – Dbl. 5' x 5' Box Culvert	$ 78,000.00
SUBTOTAL:C-1	$ 78,000.00
2. GRADING AND DRAINAGE:	
a. EARTHWORK (95,200 Cu. Yds. @ 2.10/Cu. Yd.)	$ 200,000

b. DRAINAGE:		
1) Cross Drain Pipe (exclude box culverts)		$ 20,000
2) Curb and Gutter		$
3) Longitudinal System(include catch basins)		$ 10,000
SUBTOTAL:C-2		$ 95,000
3. BASE AND PAVING:		
a. AGGREGATE BASE 5100 tons / 14.00 per ton		$ 75,000.00
b. ASPHALT PAVING: Surface	$	
Binder	$	
Base	$	
SUBTOTAL:C-3.b		$
c. CONCRETE PAVING 5450 sq. yds. @ $53/sq. yd.		$288,850.00
d. OTHER		
SUBTOTAL:C-3		$363,850.00
4. LUMP ITEMS:		
a. TRAFFIC CONTROL		$ 45,000
b. CLEARING AND GRUBBING		$ 40,000
c. LANDSCAPING		$
d. EROSION CONTROL		$ 35,000
e. DETOURS		$
SUBTOTAL:C-4		$ 120,000
5. MISCELLANEOUS:		
a. LIGHTING		$
b. SIGNING - STRIPING – SIGNAL		$ 20,000
c. GUARDRAIL		$ 35,000
d. SIDEWALK - MEDIAN BARRIER		
SUBTOTAL:C-5		$ 55,000
6. SPECIAL FEATURES_____ SUBTOTAL:C-6		

ESTIMATE SUMMARY		
A. RIGHT-OF-WAY	**$ 1,914,000**	
B. REIMBURSABLE UTILITIES	**$ 42,000**	
C. CONSTRUCTION		
1. MAJOR STRUCTURES	$ 78,000	
2. GRADING AND DRAINAGE	$ 95,000	
3. BASE AND PAVING	$ 363,850	
4. LUMP ITEMS	$ 120,000	
5. MISCELLANEOUS	$ 55,000	
6. SPECIAL FEATURES	$	
SUBTOTAL CONSTRUCTION COST	$ 711,850	
E. & C. (10%)	$ 71,185	
INFLATION (5% PER YEAR)	$ 153,408	
NUMBER OF YEARS 4		
TOTAL CONSTRUCTION COST	**$ 936,443**	
GRAND TOTAL PROJECT COST	**$2,892,443**	

I-575 @ SR 20 2000



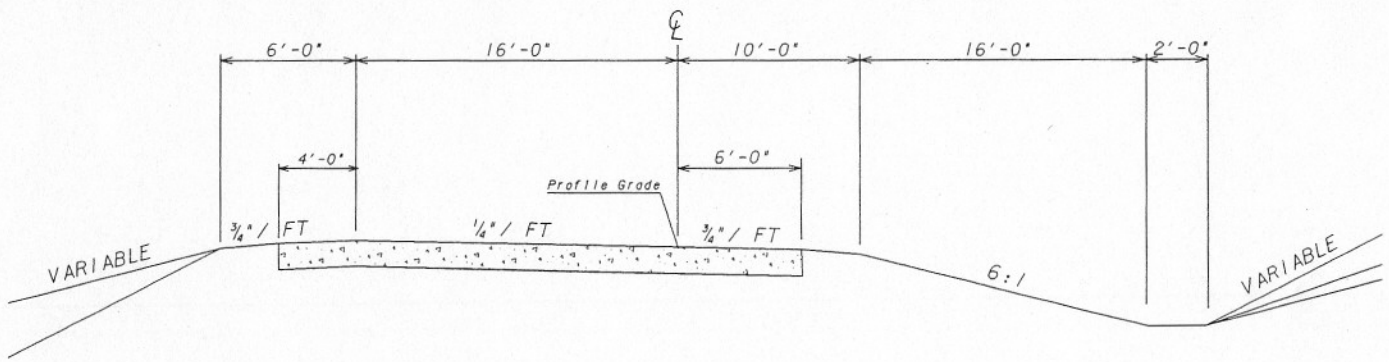
Cherokee County #611270 January 2000

Viper Software by The Urban Analysis Group
Licensed to Georgia Department of Transportation

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH-IM-575-1(33)		

TYPICAL SECTION

RAMPS



TANGENT SECTION

NH-IM-575-1(33)
RAMP
TYPICAL SECTION

SHOWDATETIME******
DGN*SPECIFICATION************************

Accident Data
For
NH-IM-575-1(33) Cherokee Co.
P.I. No. 611270

Year	Number of Accidents *	Number of Injuries	Number of Fatalities
1995	14	7	0
1996	14	6	1
1997	19	12	0

* Approximately 30 % of the accidents occur when SR 20 EB traffic turns left to enter the I-575 SB entrance ramp.

Concept Team Meeting Minutes
NH-IM-575-1 (31)&(32)&(33)
Cherokee County

The meeting came to attention at approximately 1:30 p.m. on October 11, 2001 in the Road Design conference room. The following persons were in attendance for this meeting:

1. Honorable William G. Hasty, Sr., Member State Transportation Board
2. Joe Leoni - GDOT
3. Jason McCook - GDOT
4. Andy Casey – GDOT
5. Dee Corson – GDOT
6. Royce Turner – GDOT
7. Scott Kordys – GDOT
8. David Mulling – GDOT
9. Brook Martin – GDOT

The meeting started with detailed descriptions of all three projects by Jason McCook.

Mr. Hasty commented on the need of the projects.

The floor was then open for comments:

David Mulling from GDOT Engineering Services commented on the need for lump sum items in the cost estimate to be more detailed. He also stated the need for R/W and Utilities cost estimates to be included into the project cost estimates. He also ask if the pavement section on the ramps would be concrete or asphalt.

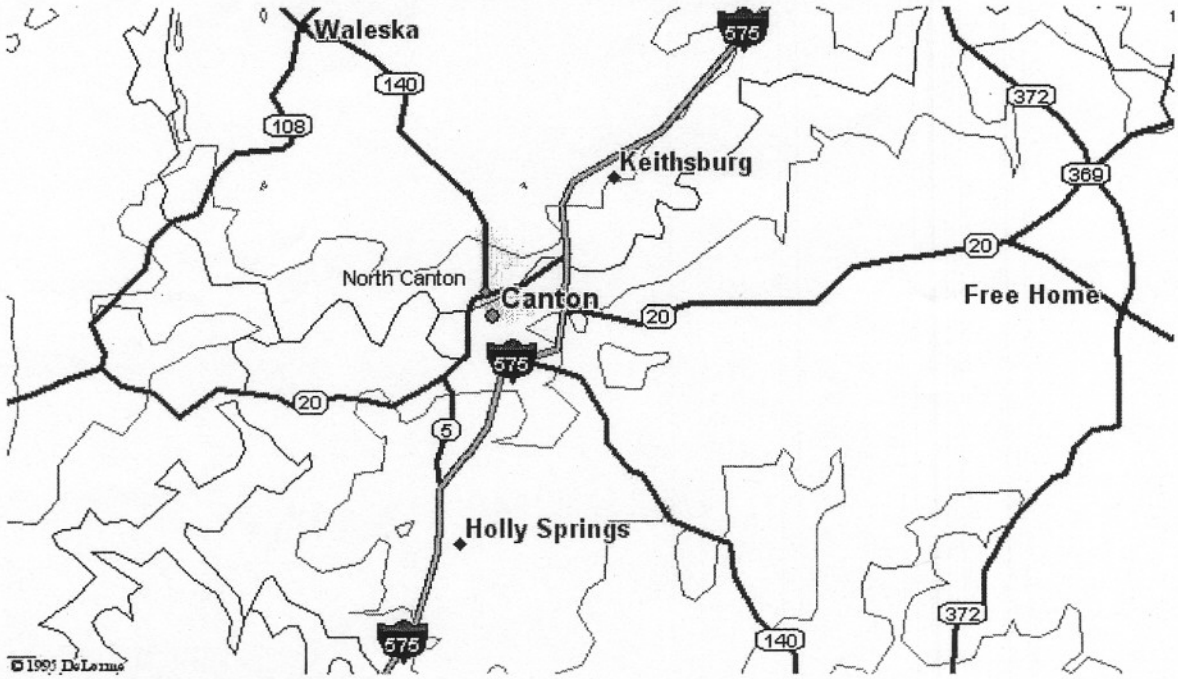
Dee Corson from GDOT District 6 Traffic Operations commented on the need for lighting at the interchanges.

The meeting adjourned at 2:15 p.m.

DEPARTMENT OF TRANSPORTATION
STATE OR GEORGIA
Office of Road and Airport Design

Project Number: NH-IM-575-1 (33)
County: Cherokee
P.I. Number: 611270

Federal Route Number: I-575
State Route Number: 5



Recommendation for approval:

DATE _____ _____
Project Manager

DATE _____ _____
Office Head/District Engineer

The concept as presented herein and submitted for approval is consistent with that which is included in the Regional Transportation Improvement Program (RTP) and/or the State Transportation Improvement Program (STIP).

DATE _____ _____
State Transportation Planning Administrator

DATE _____ _____
State Financial Management Administrator

DATE _____ _____
State Environment/Location Engineer

DATE _____ _____
State Traffic Safety & Design Engineer

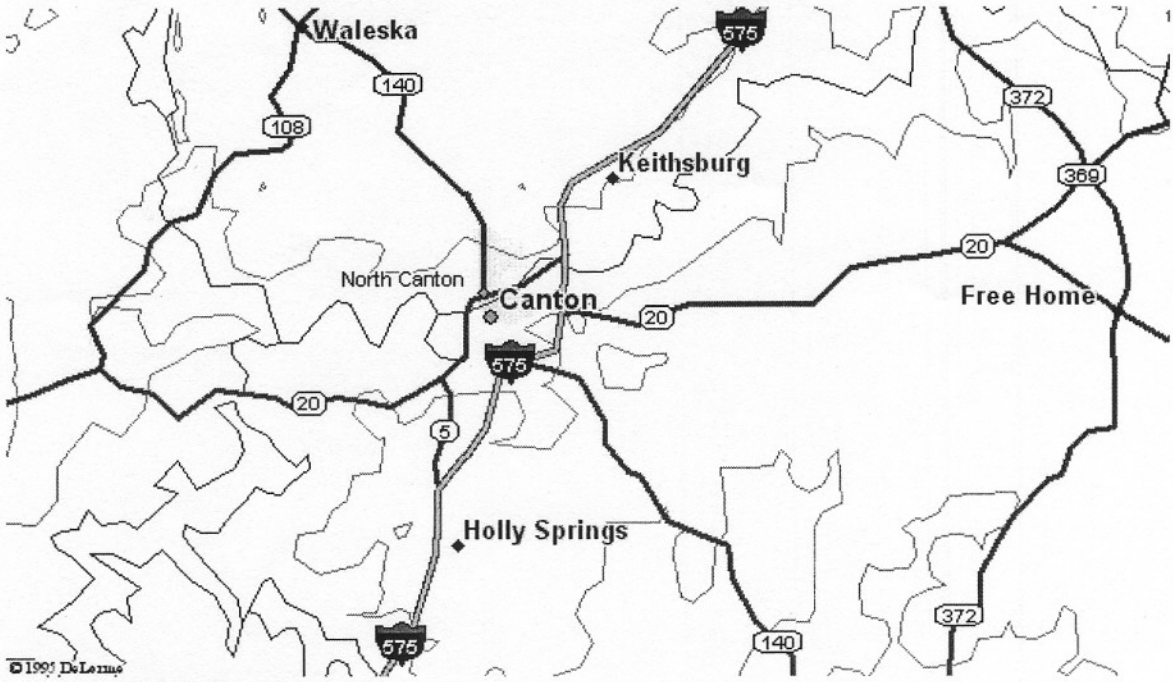
DATE _____ _____
District Engineer

DATE 3/25/03 David J Mudley RLW
Project Review Engineer

DEPARTMENT OF TRANSPORTATION
STATE OR GEORGIA
Office of Road and Airport Design

Project Number: NH-IM-575-1 (33)
County: Cherokee
P.I. Number: 611270

Federal Route Number: I-575
State Route Number: 5



Recommendation for approval:

DATE _____ _____
Project Manager

DATE _____ _____
Office Head/District Engineer

The concept as presented herein and submitted for approval is consistent with that which is included in the Regional Transportation Improvement Program (RTP) and/or the State Transportation Improvement Program (STIP).

DATE _____ _____
State Transportation Planning Administrator

DATE _____ _____
State Financial Management Administrator

DATE _____ _____
State Environment/Location Engineer

DATE _____ _____
State Traffic Safety & Design Engineer

DATE 3/12/03 _____
District Engineer

DATE _____ _____
Project Review Engineer

Department of Transportation
State of Georgia

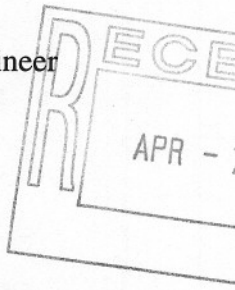
INTERDEPARTMENTAL CORRESPONDENCE

File: NH-IM-575-1(33), Cherokee County
P.I. No. 611270

Office: Traffic Safety & D
Atlanta, Georgia
Date: April 11, 2003

From: PMA/sz Phillip M. Allen, State Traffic Safety and Design Engineer

To: Meg Pirkle, Assistant Director of Preconstruction



Subject: Project Concept Report Review

We have reviewed the above referenced concept report for the proposed interchange reconstruction of Interstate 575 at SR 20 in Cherokee Count

The Office of Traffic Safety & Design finds this report satisfactory for a because it will improve safety and traffic operations within this area.

PMA/sz

Attachment (signature page)

Cc: Harvey Keepler, State Environment/Location Engineer
Gerald Ross, State Road & Airport Design Engineer
Kent L. Sager, District Engineer
Attention: William M. Darby, District Design Engineer
David Mulling, State Review Engineer, w/ attachment
Marta Rosen, State Transportation Planning Administrator
Paul Liles, State Bridge & Structural Design Engineer
Chuck Hasty, TMC
General Files
Office Files

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

PRECONSTRUCTION DIVISION
OFFICE OF ROAD AND AIRPORT DESIGN

LETTER OF TRANSMITTAL

DATE: **April 8, 2005**
PROJECT: **NH-IM-575-1(33)**
COUNTY: **Cherokee**
P.I. NO. **611270**

TO: **Margaret B. Pirkle, P.E., Assistant Director of Preconstruction**

ATTENTION: **Johnny Quarles, Project Concept Review Engineer**

We are sending you ☒ attached ☐ under separate cover

ITEMS:

☐ Correspondence	☐ Plan Sheets	☐ Utility Plans
☐ Special Provisions	☐ Profile Sheets	☐ Geometry Layout
☐ Typical Sections	☐ Preliminary Plans	☐ Revision (s)
☐ Summary of Quantities	☐ Right of Way Plans	☐ Prints
☐ Detailed Estimate	☐ Construction Plans	☐ Original Tracings
☒ Other: **APPROVED IMR**		

COPIES	DESCRIPTION
1	**Letter size**

These are transmitted as checked below:

☒ As requested ☐ For your use ☐ For approval ☐ For review and comment
☐ For revision ☐ For your information ☐ For further handling

REMARKS: **If you have any questions please contact Andy Casey at 404-656-5406.**

Signed: _____
For: Brent A. Story, P.E.
State Road and Airport Design Engineer

BAS/CAC

cc: _____

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
Georgia Division
61 Forsyth Street, S.W., Suite 17T100
Atlanta, Georgia 30303
April 6, 2005

IN REPLY REFER TO:
HTM-GA

Mr. Harold Linnenkohl, Commissioner
Georgia Department of Transportation
No. 2 Capitol Square, S. W.
Atlanta, Georgia 30334-1002

Subject: IMR-NH_IM-575-1(33) P.I. No. 611270,
I-575 @ SR20 in Cherokee County

Dear Mr. Linnenkohl:

We have reviewed your comments made in your letter dated March 18, 2005 concerning the Interchange Modification Report (IMR) for the subject project. We agree with your proposed design solution to the current safety problems at this Interchange and herby approve the subject IMR.

Given our understanding of the issues, we recommend prohibiting right turn on red at intersection number two of this interchange. This recommendation provides the driver with a safer environment, and improves operations of this interchange.

Should you have any questions or require additional information, please contact Jessica Granell, at 404-562-3644, or the Transportation Team Leader, Gus Shanine at 404-562-3632.

Sincerely,

Thassan Shanine.

FOR Robert M. Callan, P.E.
Division Administrator

770-447-8999
770-447-9070 Fax
www.wolverton-assoc.com

Wolverton & Associates

6745 Sugarloaf Parkway ♦ Suite 100
Duluth, Georgia 30097

TECHNICAL MEMORANDUM

TO: Mr. Andy Casey, P.E. – GDOT Design Group Manager, Office of Road Design

COPY: Joe Macrina - Wolverton & Associates Inc.
Steven Gaines - Wolverton & Associates Inc.

FROM: Speedy Boutwell, P.E., P.T.O.E.

DATE: March 11, 2005

RE: NH-IM-575-1(33) P.I. No. 611270 Cherokee Co. IMR
W&A Project No. – 03-449

This memorandum is in response to the comments provided by letter dated February 23, 2005 sent to the Georgia Department of Transportation (Attention Mr. Jason McCook, Office of Road Design) from the U.S. Department of Transportation Federal Highway Administration (FHWA) – Georgia Division.

The letter provided four comments. Of the four comments two, numbers 3 and 4, required additional analysis. This memorandum and supporting documentation addresses comments 3 and 4 which states:

3. *We recommend the removal of the existing I-575 northbound exit loop ramp, and that the movement from I-575 N to SR-20 westbound be handled by the proposed diagonal exit ramp. For the year 2027, the I-575 northbound exit loop ramp is expected to have a volume of only 300 vehicles in the AM peak, and 405 vehicles in the PM peak. These volumes do not justify keeping the existing loop ramp. Also, the replacement of this loop ramp with a diagonal ramp would facilitate widening I-575.*
4. *We do not recommend the proposed diagonal entrance ramp from SR-20 to I-575 southbound. For the year 2027, the I-575 southbound entrance loop ramp is expected to have a volume of only 405 vehicles in the AM peak, and 300 vehicles in the PM peak. These volumes do not justify adding a new diagonal entrance ramp.*

The following documentation is included with this technical memorandum:

- AM and PM Peak Hour analysis addressing comments three and four above using a protected-permitted phasing strategy.
- AM and PM Peak Hour analysis addressing comments three and four above using a protected only phasing strategy incorporating suggestions from comment two (not shown) addressing angle-intersecting accidents.

Preparing the intersection analysis for this task involves three scenarios using the preferred 2027 Alternative 4; 1) The original 2027 Alternative 4 scenario incorporating the existing NB to WB loop off-ramp and the proposed WB to SB diamond on-ramp, 2) 2027 Alternative 4 removing the existing NB to WB loop off-ramp and the proposed WB to SB diamond on-ramp using protected / permitted phasing as specified in the FHWA letter, and 3) 2027 Alternative 4 removing the existing NB to WB loop off-ramp and the proposed WB to SB diamond on-ramp using protected only phasing as specified in the FHWA letter.

Table 1 – Intersection LOS Comparisons compares the results between the three scenarios.

Table 1 – Intersection LOS Comparisons

	2027 ALTERNATIVE 4		
	ORIGINAL	W/O Diamond On-Ramp & NB Loop Off-Ramp	
		Protected / Permitted Phasing	Protected Only Phasing
Intersection 1 [1]	A (8.4)	C (21.4)	C (25.5)
Intersection 2 [1]	D (35.5)	D (37.3)	D (47.6)

[1] *LOS expressed in terms of control delay (sec/veh)*

Although the analysis indicates that removing the two ramps result in a marginal reduction in LOS using protected / permitted phasing and moderate reduction in LOS using protected only phasing a look at individual movements at each intersection reveals another picture.

Table 2 – Intersection Individual Movement LOS Comparisons takes a deeper look into how eliminating the two ramps effect the individual movements within each intersection. The table reveals that even though overall intersection LOS, indicated in Table 1, has marginal reduction in LOS several individual movements (highlighted in Table 2) experience LOS degradation extending two, three and four thresholds worse.

Table 2 also demonstrates that queue lengths for the left turn bays will increase beyond the current turn bay lengths for most of the movements through out the interchange.

In addition, removing the eastbound to southbound diamond off ramp will force the 405 vph to turn left onto the westbound to southbound loop on-ramp. During the AM Peak Hour, the westbound to southbound movement loads 1,055 vph onto the loop on-ramp. As shown in Figure 7 (2027 No-Build AM Design Hour Volumes) of the Technical Memorandum sent to FHA, dated January 14, 2005, adding the 405 vph to the loop on-will produce 1,460 vph, thus overloading the loop on-ramp.

In kind, removing the northbound loop off-ramp will result in the northbound diamond off-ramp having to carry 1,460 vph to the intersection with SR 20. The CD ramp layout splits the traffic volume onto separate alignments after the exit to a more manageable volume, 1,055 vph northbound to eastbound and 405 vph northbound to westbound.

Further, even though the largest volumes for these two ramps, as proposed, are 405 vph, replacing them with left turn movements increase the right angle accident rate at each location.

Table 2 – Intersection Individual Movement LOS Comparisons

INTERSECTION 1

	Volume					
	Original		FHWA Pro/Perm		FHWA Prot Only	
	AM	PM	AM	PM	AM	PM
EBL	N/A	N/A	405	300	405	300
EBT	520	1100	520	1100	520	1100
EBR	405	300	N/A	N/A	N/A	N/A
WBT	1150	735	1150	735	1150	735
WBR	1055	780	1055	780	1055	780
SBL	610	445	610	445	610	445
SBR	250	190	250	190	250	190

	LOS					
	Original		FHWA Pro/Perm		FHWA Prot Only	
	AM	PM	AM	PM	AM	PM
EBL	N/A	N/A	D (36.5)	B (11.5)	E (57.1)	C (25.7)
EBT	A (8.2)	A (8.8)	A (5.4)	A (7.1)	A (5.1)	A (6.6)
EBR	A (0.4)	A (0.3)	N/A	N/A	N/A	N/A
WBT	B (11.2)	A (7.2)	C (31.9)	C (20.9)	D (35.5)	C (21.5)
WBR	A (2.9)	A (1.3)	A (2.9)	A (1.3)	A (2.9)	A (1.3)
SBL	B (16.1)	B (14.2)	D (43.2)	C (24.2)	D (49.8)	C (26.3)
SBR	B (14.2)	A (5.4)	A (6.9)	A (5.9)	A (7.3)	A (6.5)

	Queue Lengths					
	Original		FHWA Pro/Perm		FHWA Prot Only	
	AM	PM	AM	PM	AM	PM
EBL	N/A	N/A	350	142	425	224
EBT	104	201	74	182	71	165
EBR	0	0	N/A	N/A	N/A	N/A
WBT	280	117	470	239	483	239
WBR	0	0	0	0	0	0
SBL	184	113	281	159	292	164
SBR	151	52	62	51	63	52

INTERSECTION 2

	Volume					
	Original		FHWA Pro/Perm		FHWA Prot Only	
	AM	PM	AM	PM	AM	PM
EBL	190	250	190	250	190	250
EBT	940	1295	940	1295	940	1295
WBT	1905	1110	1905	1110	1905	1110
WBR	445	610	445	610	445	610
NBL	N/A	N/A	300	405	300	405
NBR	780	1055	780	1055	780	1055
SBR	300	405	N/A	N/A	N/A	N/A

	LOS					
	Original		FHWA Pro/Perm		FHWA Prot Only	
	AM	PM	AM	PM	AM	PM
EBL	F (104.6)	F (89.0)	F (104.6)	F (89.0)	F (119.4)	F (98.0)
EBT	A (6.3)	C (20.8)	A (6.3)	C (20.8)	A (5.4)	B (17.2)
WBT	D (37.7)	D (47.2)	D (37.7)	D (47.2)	D (50.0)	E (56.8)
WBR	A (0.5)	A (0.8)	A (2.1)	A (5.7)	A (2.3)	A (5.9)
NBL	N/A	N/A	E (59.3)	C (23.9)	F (82.1)	C (28.2)
NBR	E (68.9)	D (53.1)	E (68.9)	D (53.1)	F (87.8)	F (83.7)
SBR	C (33.2)	B (10.6)	N/A	N/A	N/A	N/A

	Queue Lengths					
	Original		FHWA Pro/Perm		FHWA Prot Only	
	AM	PM	AM	PM	AM	PM
EBL	216	241	216	241	266	292
EBT	143	380	143	380	129	346
WBT	785	451	785	451	810	463
WBR	0	0	38	72	40	75
NBL	N/A	N/A	330	267	354	287
NBR	352	475	352	475	359	501
SBR	236	148	N/A	N/A	N/A	N/A

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TECHNICAL MEMORANDUM

TO: Ms. Jessica L. Grannell, Ph. D. – Federal Highway Administration – Georgia Division

COPY: Mr. Jason McCook – GDOT Design Group Manager
Joe Macrina - Wolverton & Associates Inc.
Steven Gaines - Wolverton & Associates Inc.

FROM: Speedy Boutwell, P.E., P.T.O.E.

DATE: January 14, 2005

RE: NH-IM-575-1(33) P.I. No. 611270 Cherokee Co. IMR
W&A Project No. – 03-449

This memorandum is in response to the comments resulting from the meeting at the GDOT Tuesday, January 4, 2005. This memorandum includes the following documentation:

- Revised page 3 for insertion into the Interchange Modification Report (IMR) revised and dated October 8, 2004.
    - This document includes the addition of "SOV and HOV" to the first paragraph. Please replace page 3 in the IMR with this revised page.

- A copy of the updated I-575 @ SR 20 2027 AM and PM Design Hour Volumes (DHV's). NH-IM-575-1 (33), P.I. # 611270.

- A copy of all the weaving diagram sketches (2007 & 2027) developed for the original weaving analyses.
    - Weaving diagrams used for the weaving analysis were requested during the meeting. All of the 2007 and 2027 weaving diagram sketches used in the IMR are included.

- Revised 2027 No-Build AM (Figure 7) and PM (Figure 8) DHV's using the updated GDOT traffic volumes.
    - These figures illustrate the updated GDOT traffic volumes and correspond to Figures 7 and 8, pages 15 and 16, respectively in the IMR.

- Revised 2027 Build (Alternative 4) AM (Figure 23) and PM (Figure 24) DHV's using the updated GDOT traffic volumes.
    - These figures illustrate the updated GDOT traffic volumes and correspond to Figures 23 and 24, pages 36 and 37, respectively in the IMR.

- A copy of the Build (Alternative 4) Volume Location Key (Figure 16).
    - This figure is a copy of Figure 16, page 29, from the IMR and should be used to locate the Build Volumes in Table 7 that follows.

- Revised Table 7 - Build Volume Calculations.
    - This table was revised for the 2027 AM and PM DHV's. Two additional columns were added to demonstrate the volume changes between the original and revised GDOT DHV's at each location illustrated in Figure 16. Values shown in red demonstrate an increase in volume, blue shows a decrease in volume and black shows no change. Table 7 shows that traffic volumes increased 36% on SR 20 with select locations higher. Some ramp volumes changed as much as 20%. However, it should be noted that the I-575 mainline volumes did not change north of the interchange. Mainline volumes south of the interchange had minimal changes.

- Revised Decision Matrix Table 13.
    - Table 13 was revised for Alternative 4, the preferred alternative, to demonstrate the capacity changes that would occur as a result of the volume changes. Alternatives 1, 2, and 3 would change accordingly as well but were not analyzed.

- Revised Alternative 4 Intersection capacity documentation for the AM and PM DHV's.
- Revised Alternative 4 Basic Freeway Segments capacity documentation.
- Revised Alternative 4 Weaving capacity documentation.
- Revised Alternative 4 Ramp Junction capacity documentation.

This study provides for an analysis of the I-575 and SR 20 interchange and immediate area and provides a systems approach. The study revealed the need for mainline improvements independent of whether or not the I-575 and SR 20 interchange is improved. There are no new SOV or HOV interchanges planned for the immediate area.

G. *The request for a new or revised access generated by new or expanded development demonstrates appropriate coordination between the development and related or otherwise required transportation system improvements.*

The I-575 and SR 20 interchange modification is a direct result of the traffic volume increase anticipated due to planned residential and commercial growth. The interchange improvements with this project will promote a continuous efficient movement of traffic.

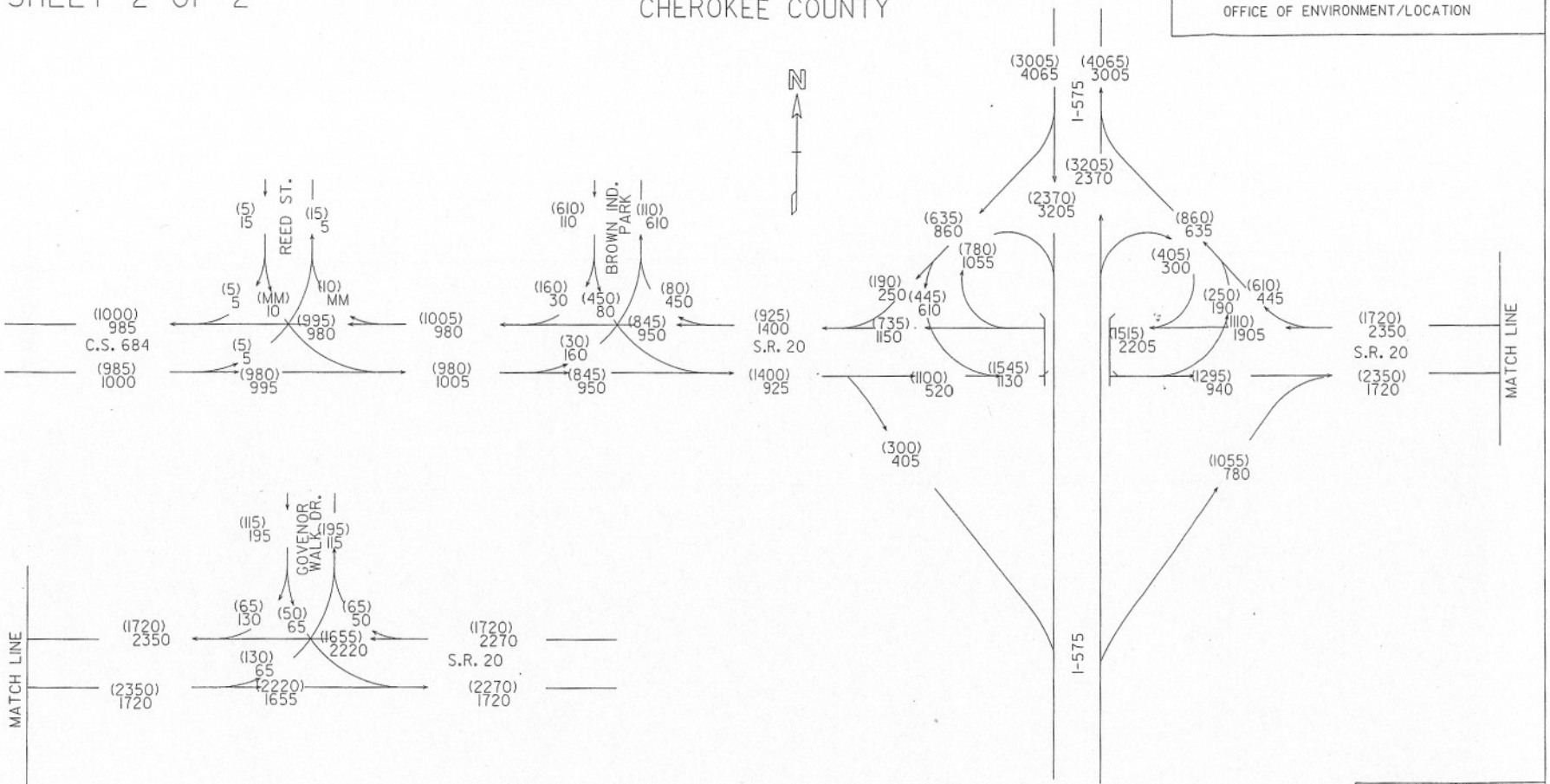
H. *The request for new or revised access contains information relative to the planning requirements and the status of the environmental processing of the proposal.*

The RTP recommends the I-575 Interchange Reconstruction at SR 20 and is identified for construction in 2005. The GDOT will address the environmental assessments for this project as stated by NEPA guidelines and procedures. There are no environmental issues identified at this point, however, the environmental process is not yet complete.

SHEET 2 OF 2

CHEROKEE COUNTY

GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF ENVIRONMENT/LOCATION



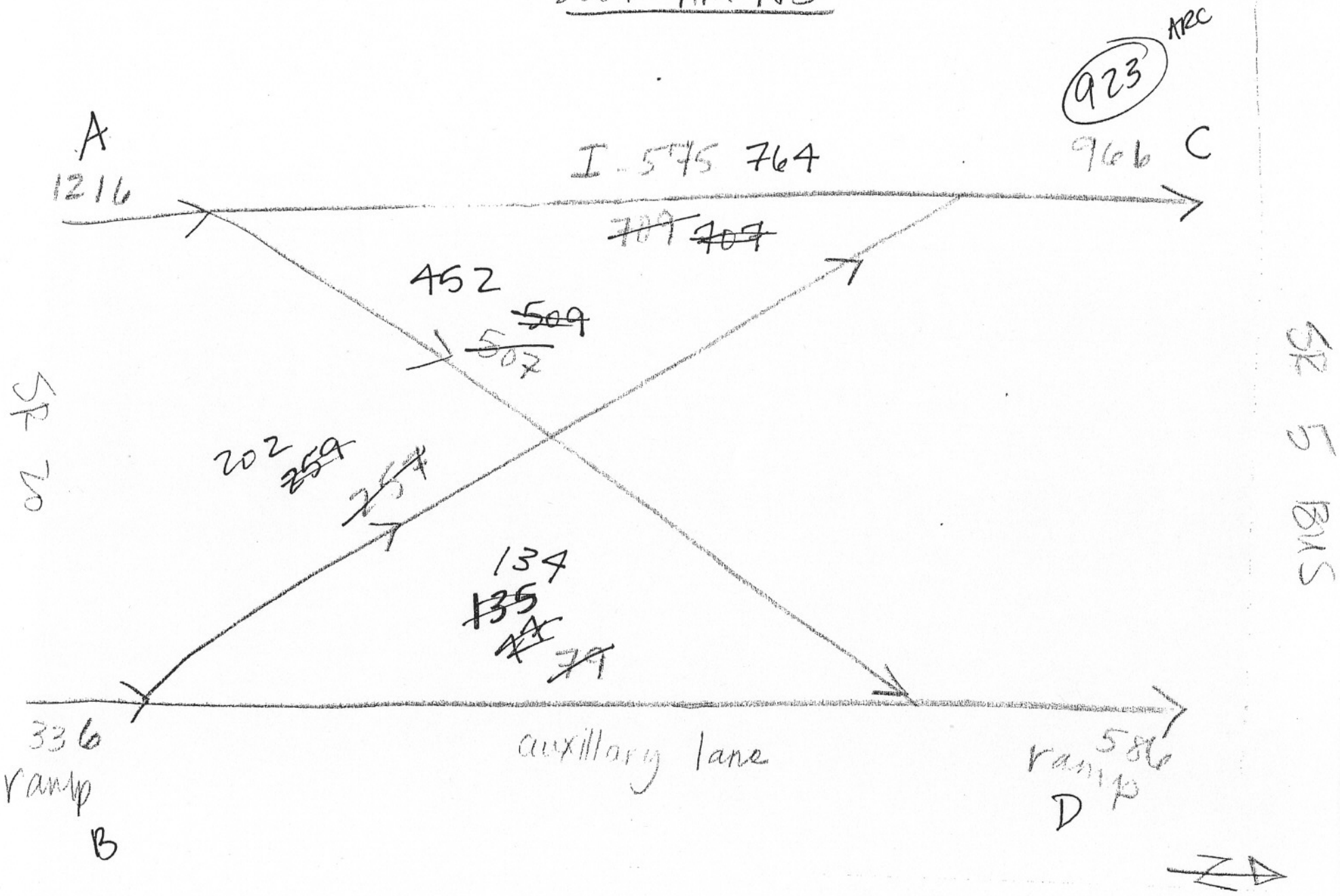
NH-IM-575-1(33)
P.I. # 611270
CHEROKEE COUNTY

I-575 @ S.R. 20

AM DHV 2027 = 000
PM DHV 2027 = (000)
T. = 12%

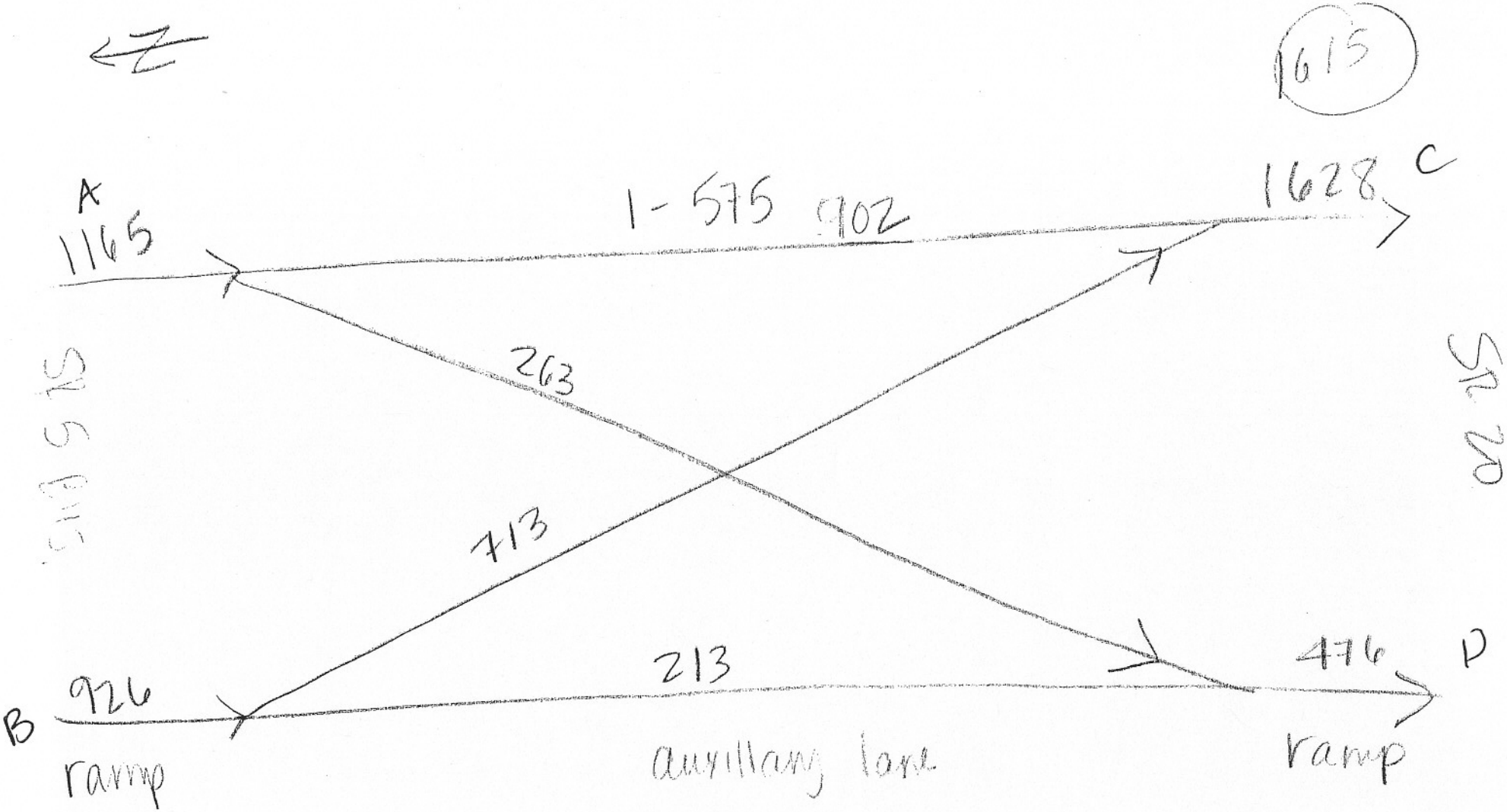
AFE
12/04

2007 AM NB

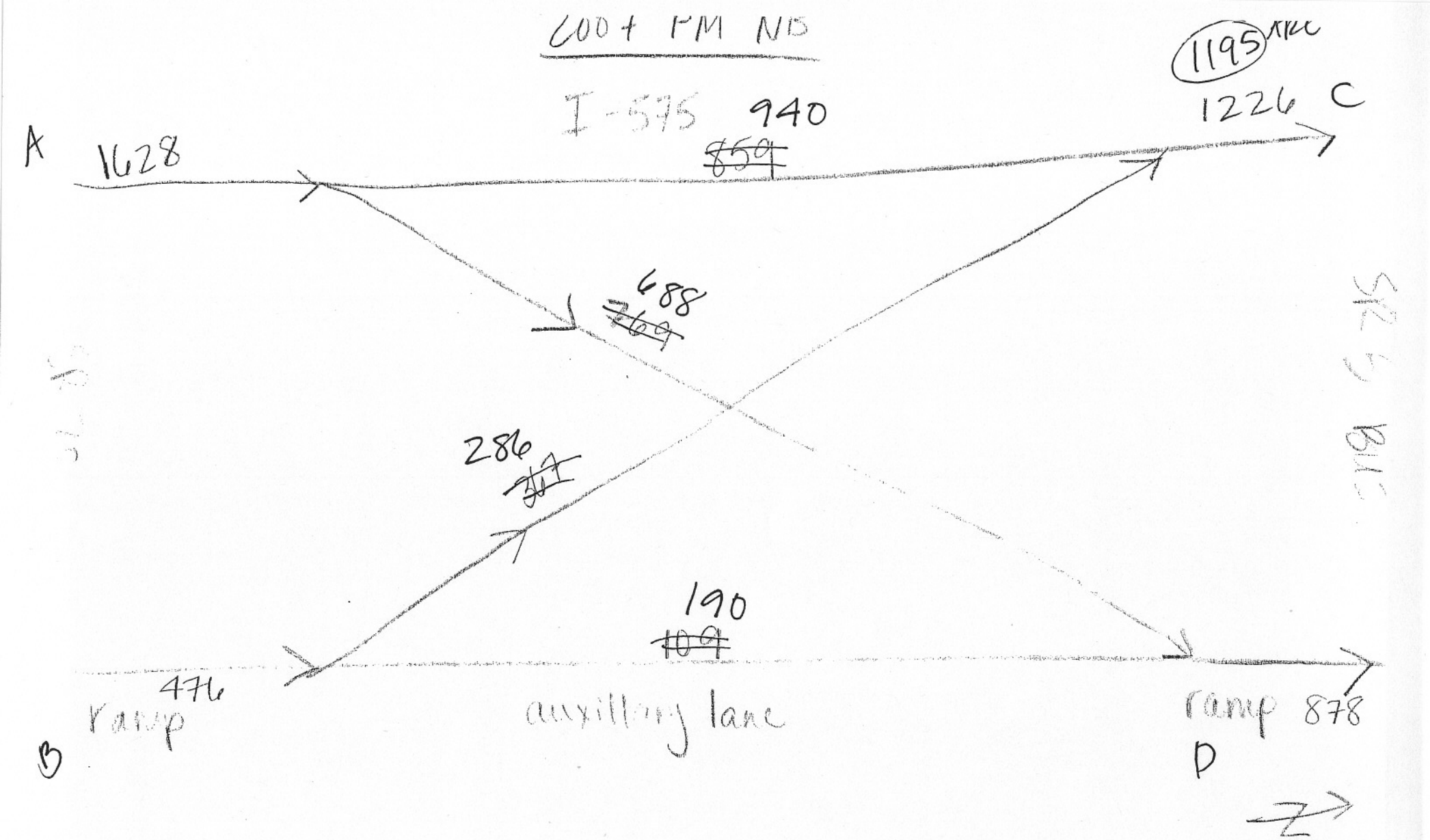


923
ARC
A
1216
I-575 764
966
C
~~709~~ ~~707~~
452
~~509~~
~~507~~
SR 20
202
~~259~~
~~257~~
134
~~135~~
~~77~~
~~79~~
SR 5 BUS
336
ramp
B
auxillary lane
586
ramp
D

2007 AM SB

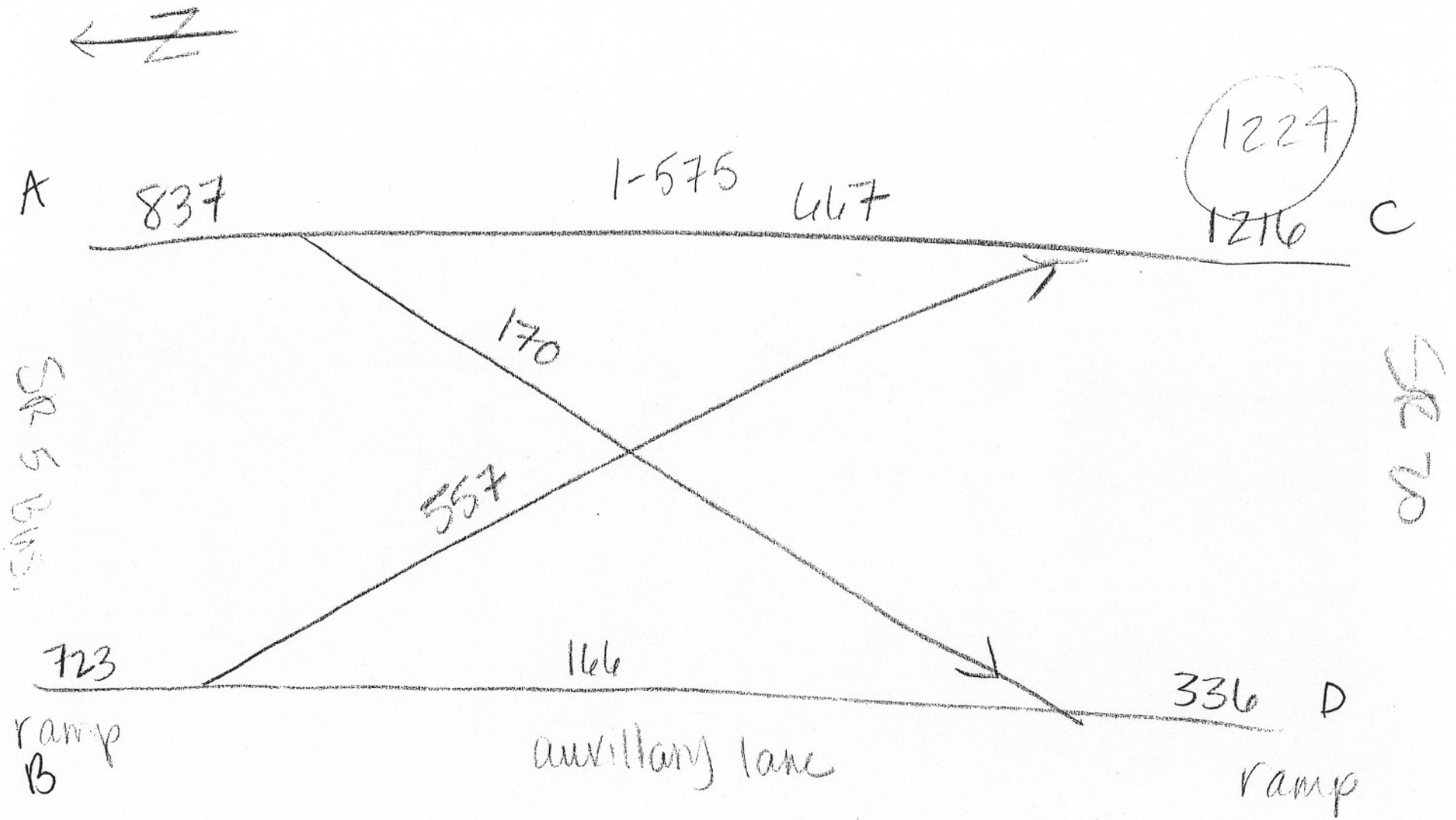


N
1615
A
1165
1-575
902
1628
C
263
713
213
476
D
B
926
ramp
auxillary lane
ramp
SR 5 [illegible]
SR 20

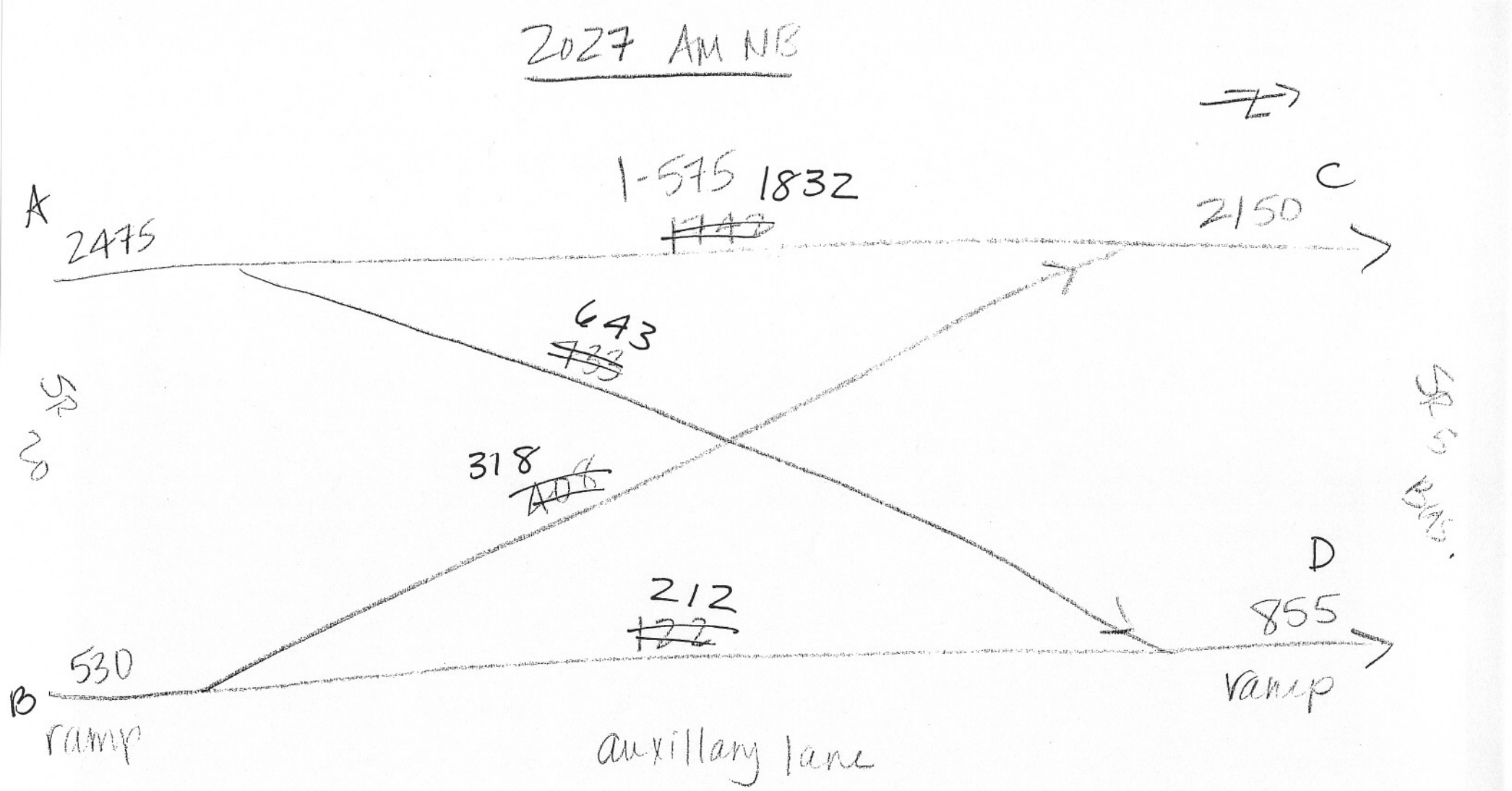


2004 PM NB
I-575
940
~~859~~
1195 ARC
1226
C
A
1628
688
~~769~~
286
~~317~~
190
~~109~~
476
ramp
auxillary lane
ramp 878
B
D

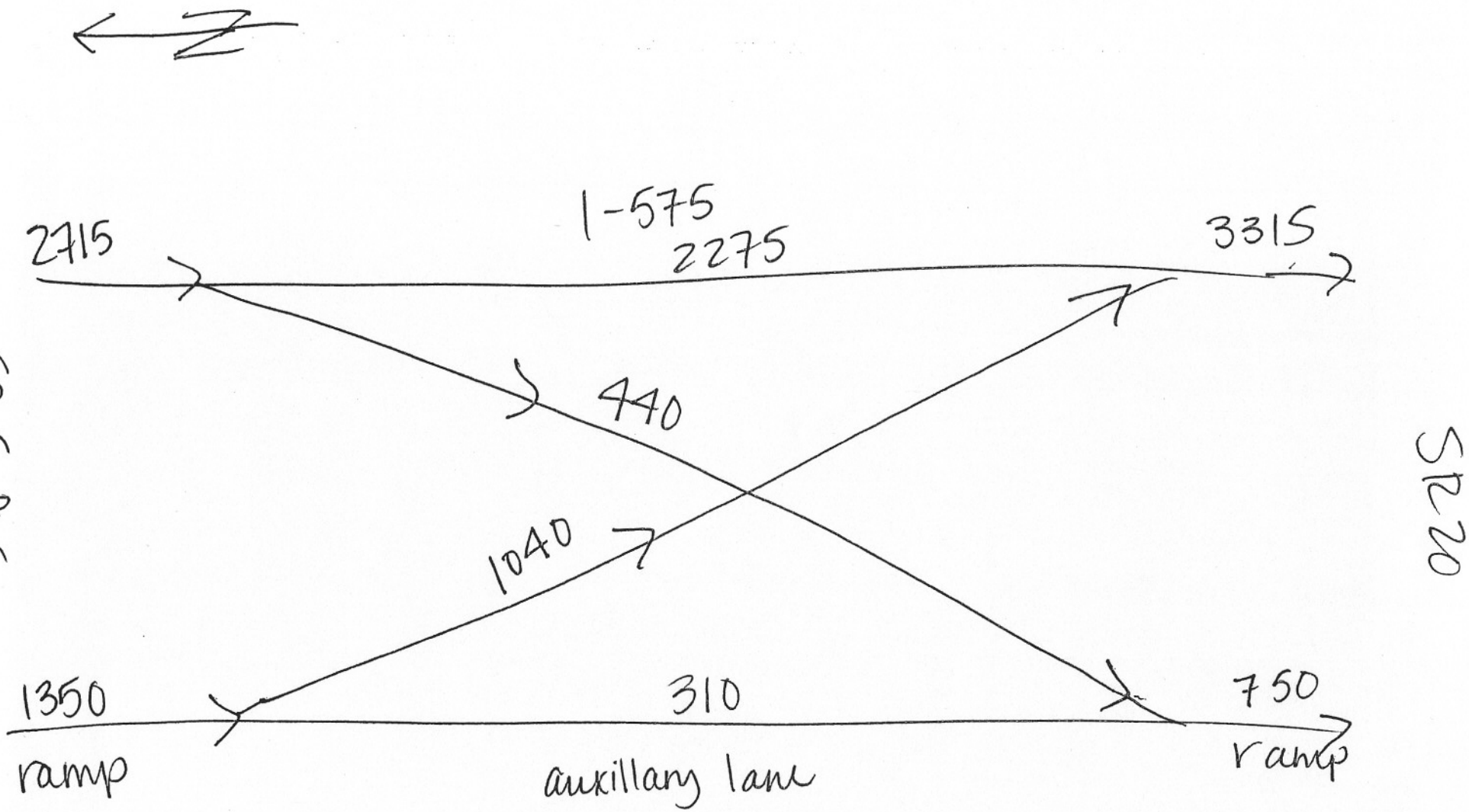
2007 PM SB



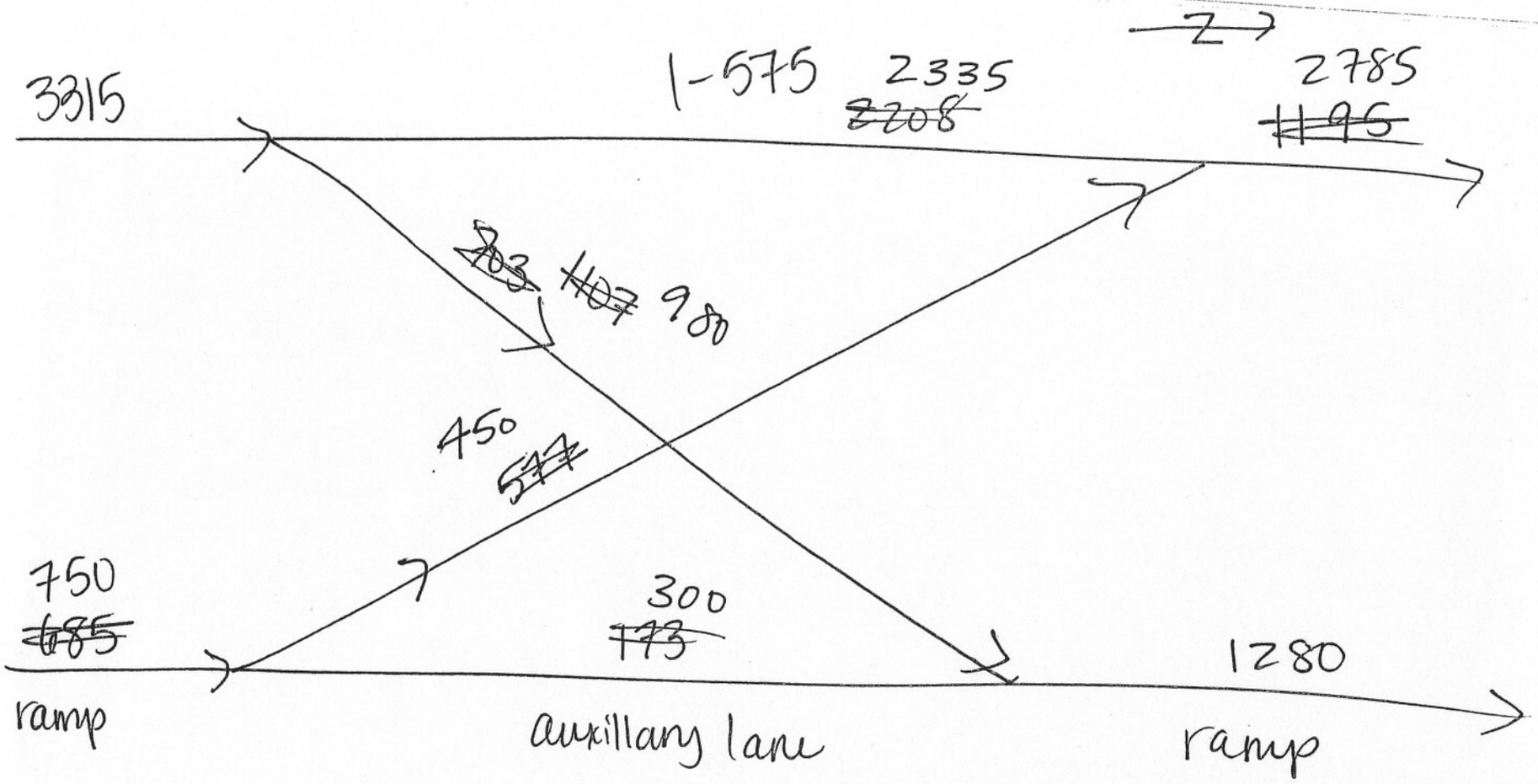
N
A
837
1-575
667
1224
1216
C
170
557
SR 5 Bus.
SR 70
723
166
336
D
ramp
B
auxillary lane
ramp


2027 AM NB
I-575
1832
A
2475
C
2150
643
318
212
B
530
D
855
ramp
ramp
auxillary lane

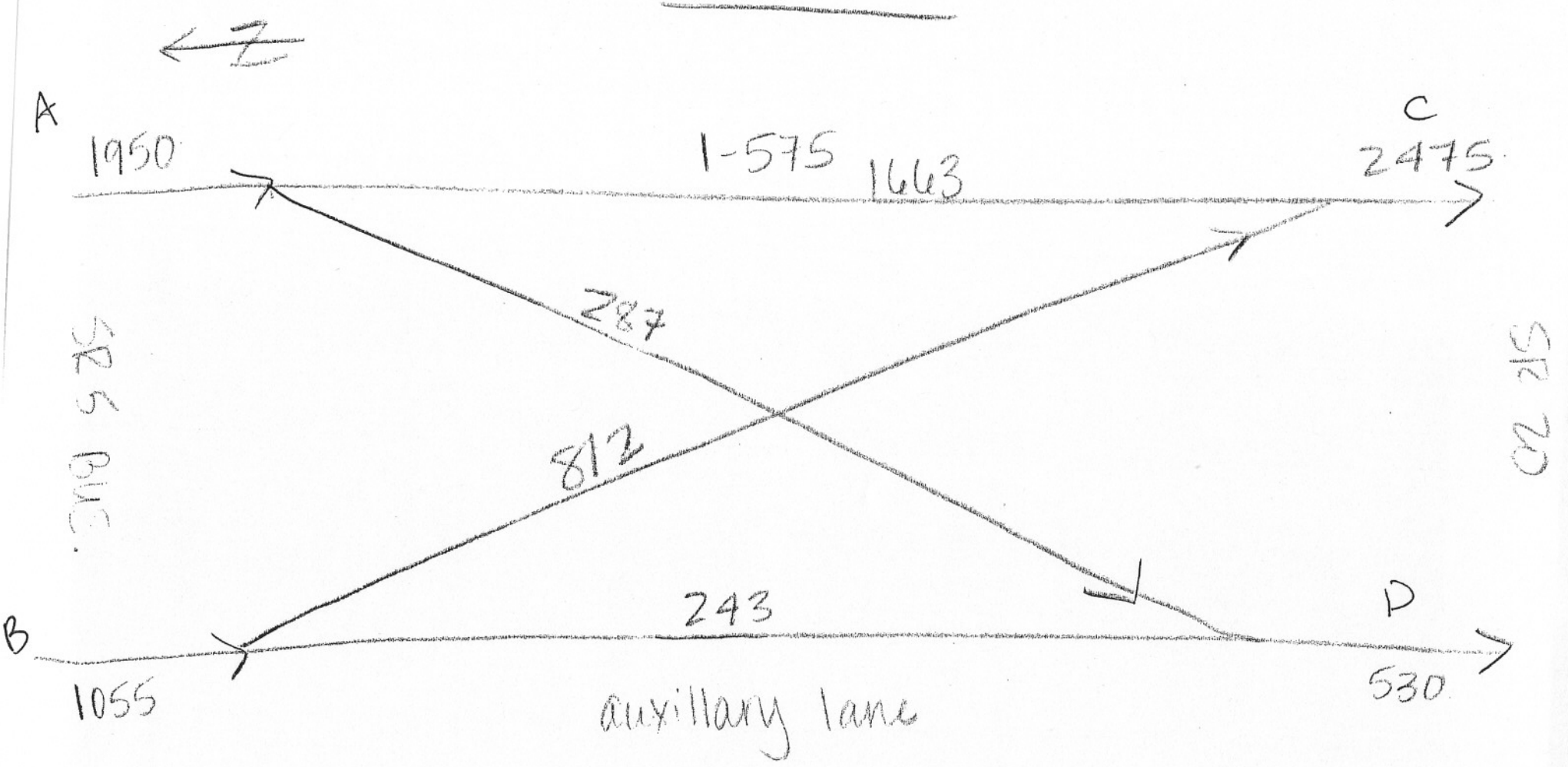
2027 AM SB

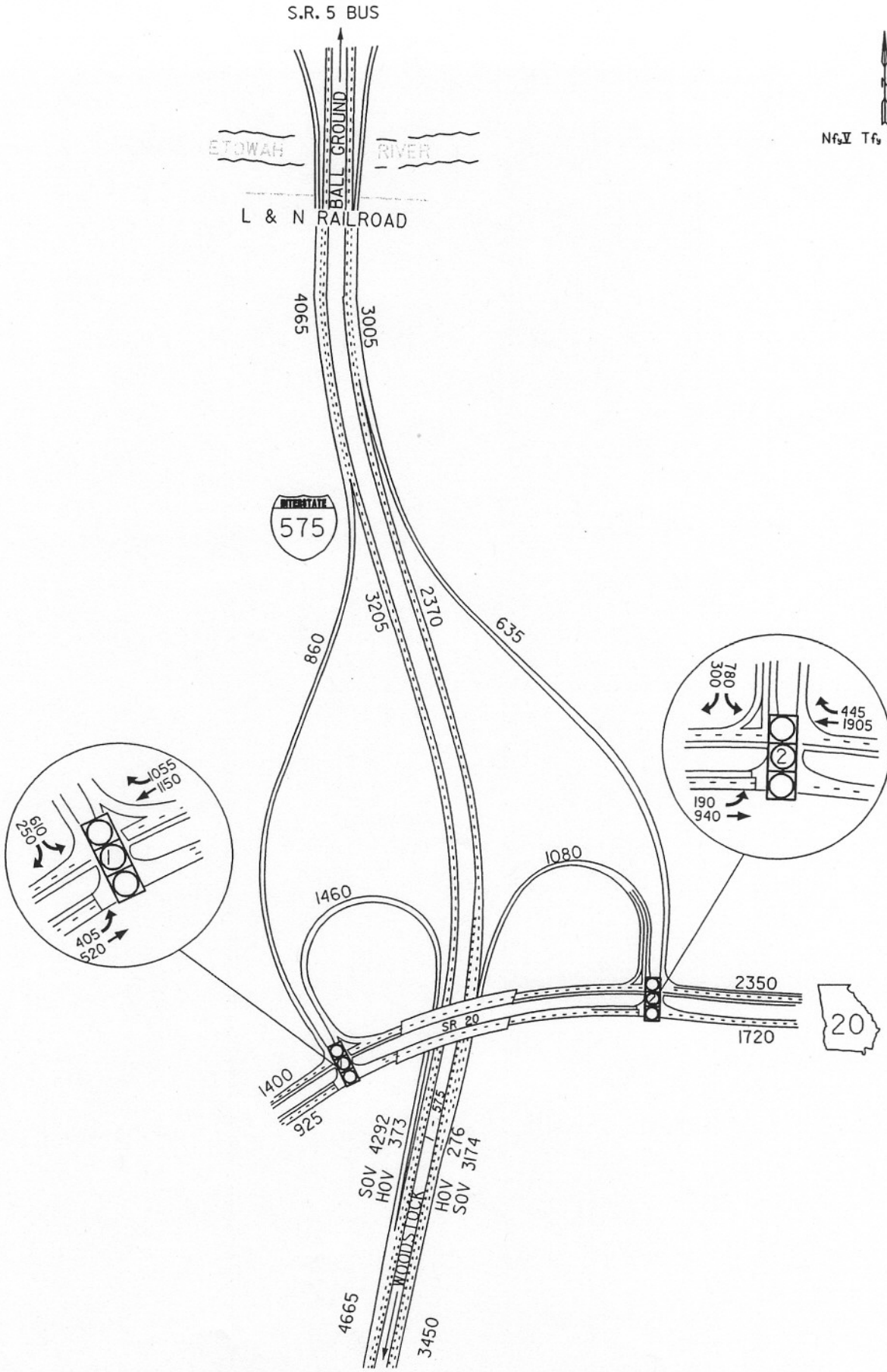

I-575
2715
2275
3315
440
1040
1350
310
750
ramp
auxillary lane
ramp
SR 5 Bus.
SR 20

2027 PM NB


3315
I-575
2335
~~2208~~
2785
~~1195~~
~~203~~
~~407~~
980
450
~~577~~
750
~~685~~
300
~~773~~
1280
ramp
auxillary lane
ramp

2027 PM SB





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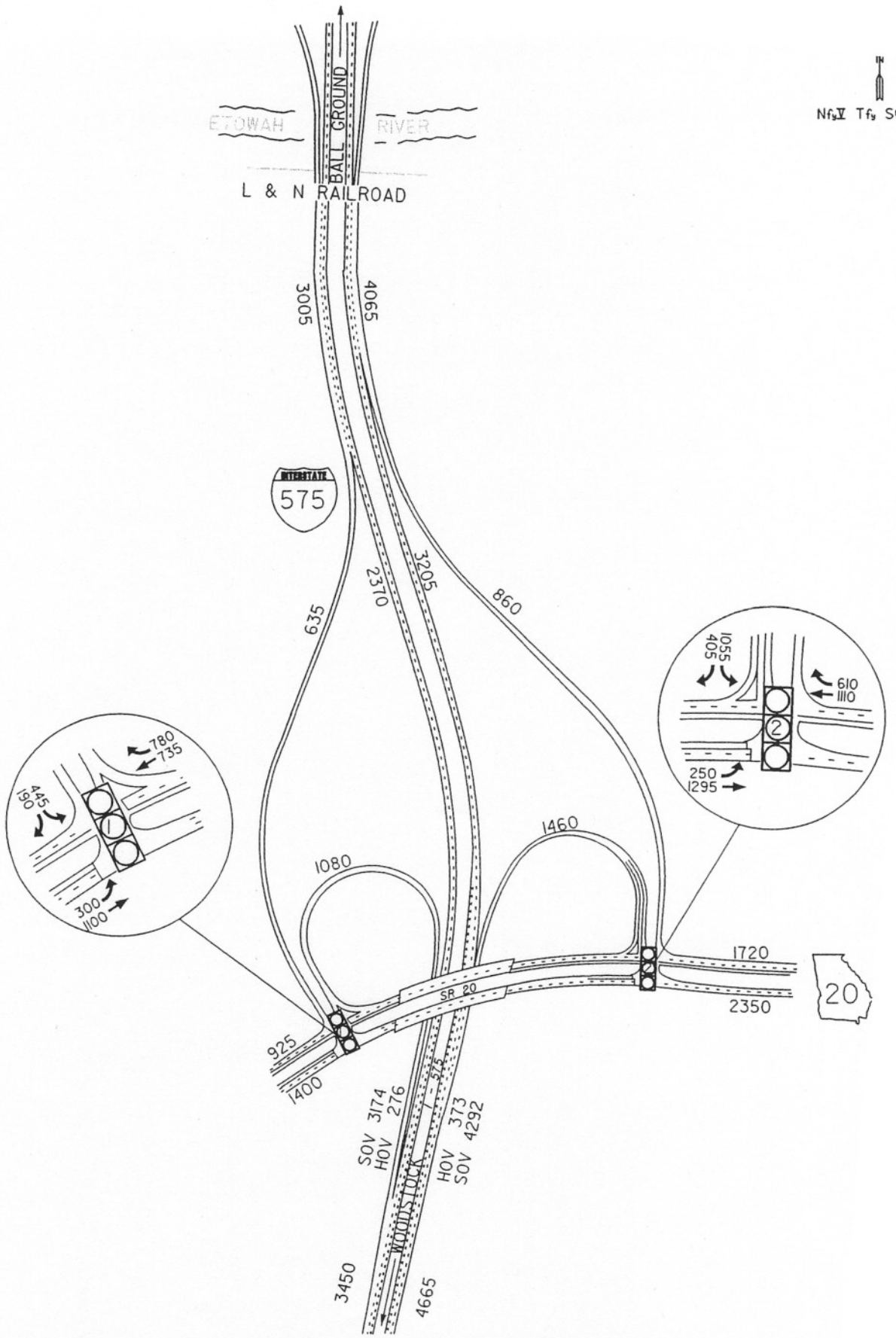
2027 NO-BUILD AM DESIGN HOUR VOLUMES
UPDATED USING GDOT 12-04 VOLUMES

FIGURE 7



2027 NO-BUILD PM DESIGN HOUR VOLUMES

UPDATED USING GDOT 12-04 VOLUMES

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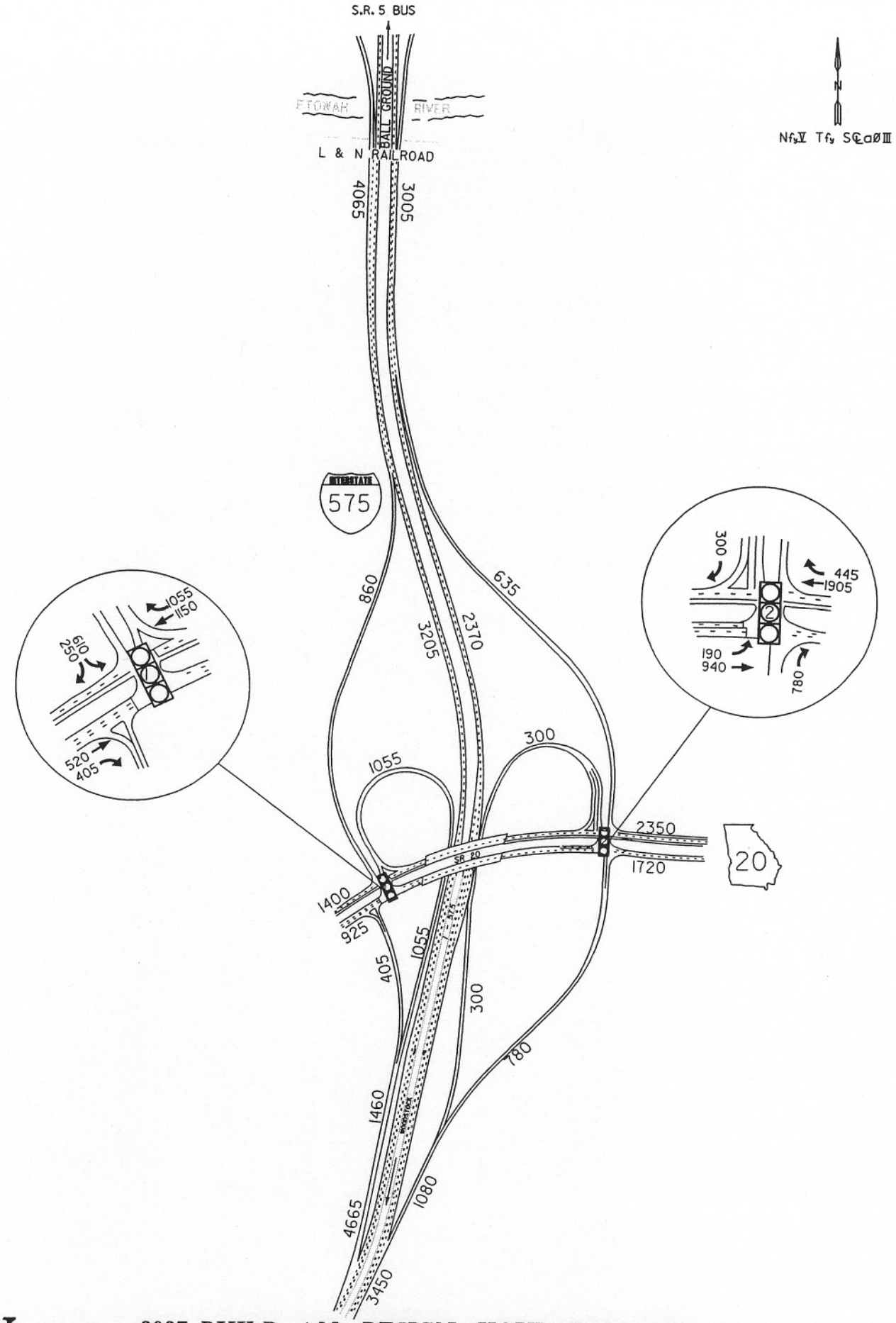
FIGURE 8



2027 BUILD AM DESIGN HOUR VOLUMES

CD RAMP LAYOUT
UPDATED USING GDOT 12-04 VOLUMES
FIGURE 23

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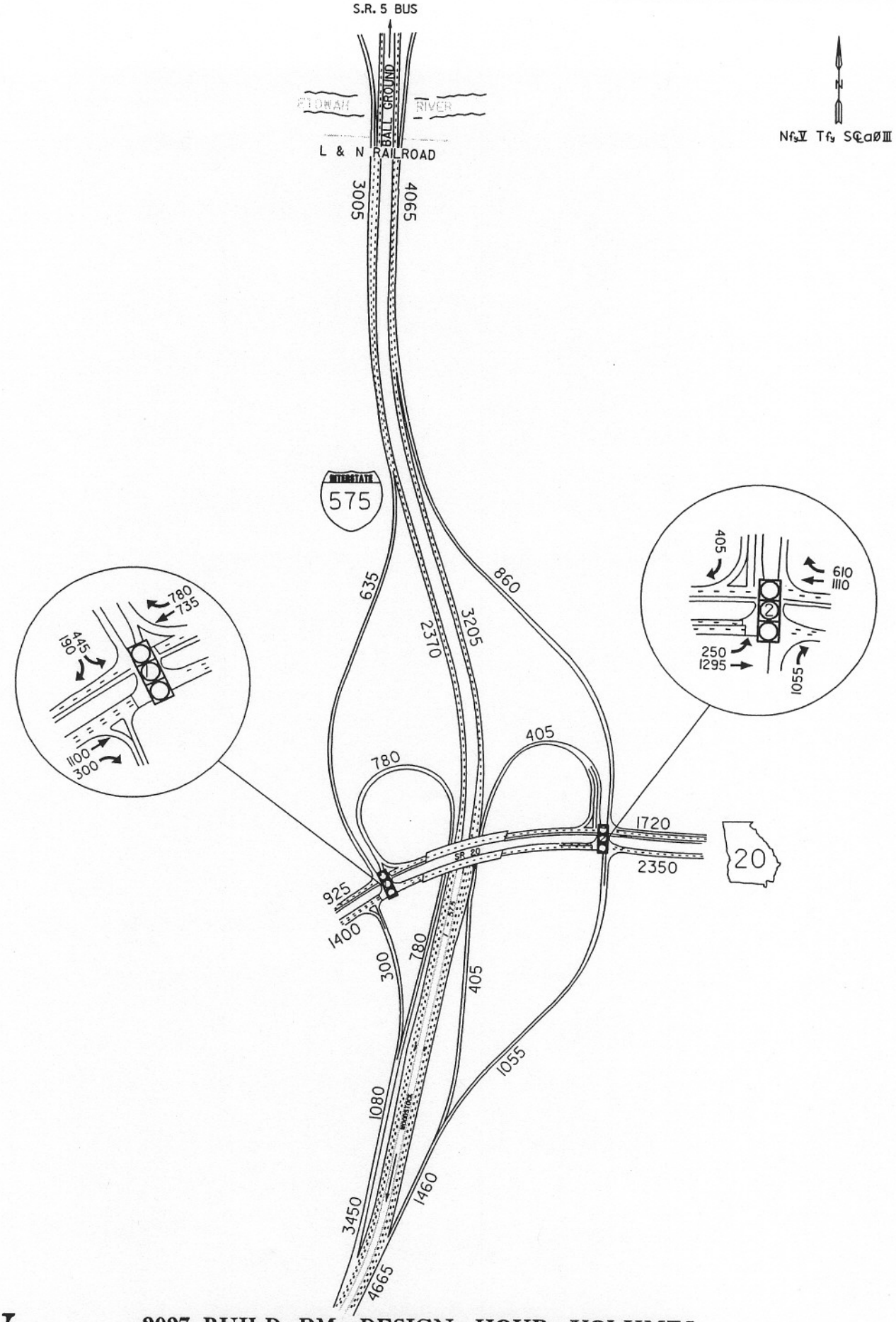

2027 BUILD PM DESIGN HOUR VOLUMES

CD RAMP LAYOUT
UPDATED USING GDOT 12-04 VOLUMES
FIGURE 24

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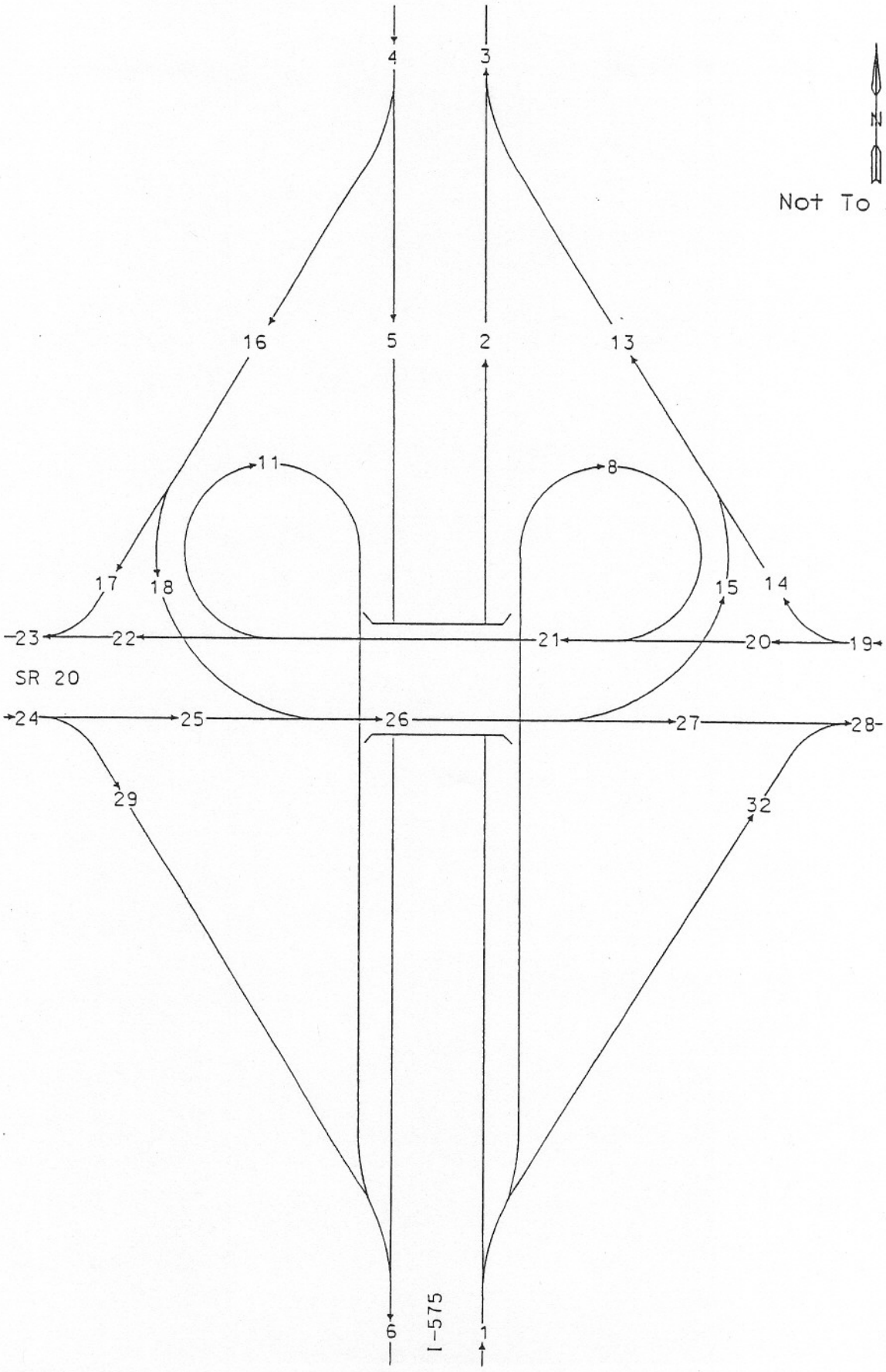

BUILD VOLUME LOCATION KEY

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CD RAMP LAYOUT

FIGURE 16

Table 7 - REVISED BUILD VOLUME CALCULATIONS

Location	2027							
	AM				PM			
	Original DHV	Revised DHV	**Increase / Decrease**	% Change	Original DHV	Revised DHV	**Increase / Decrease**	% Change
1	3760	3450	**-310**	**-8%**	4600	4665	**65**	**1%**
2	2475	2370	**-105**	**-4%**	3315	3205	**-110**	**-3%**
3	3005	3005	**0**	**0%**	4065	4065	**0**	**0%**
4	4065	4065	**0**	**0%**	3005	3005	**0**	**0%**
5	3315	3205	**-110**	**-3%**	2475	2370	**-105**	**-4%**
6	4600	4665	**65**	**1%**	3760	3450	**-310**	**-8%**
8	405	300	**-105**	**-26%**	405	405	**0**	**0%**
11	880	1055	**175**	**20%**	880	780	**-100**	**-11%**
13	530	635	**105**	**20%**	750	860	**110**	**15%**
14	320	445	**125**	**39%**	490	610	**120**	**24%**
15	210	190	**-20**	**-10%**	260	250	**-10**	**-4%**
16	750	860	**110**	**15%**	530	635	**105**	**20%**
17	260	250	**-10**	**-4%**	210	190	**-20**	**-10%**
18	490	610	**120**	**24%**	320	445	**125**	**39%**
19	1725	2350	**625**	**36%**	1265	1720	**455**	**36%**
20	1405	1905	**500**	**36%**	775	1110	**335**	**43%**
21	1810	2205	**395**	**22%**	1180	1515	**335**	**28%**
22	930	1150	**220**	**24%**	300	735	**435**	**145%**
23	1190	1400	**210**	**18%**	510	925	**415**	**81%**
24	510	925	**415**	**81%**	1190	1400	**210**	**18%**
25	105	520	**415**	**395%**	785	1400	**615**	**78%**
26	595	1130	**535**	**90%**	1105	1845	**740**	**67%**
27	385	1905	**1520**	**395%**	845	1295	**450**	**53%**
28	1265	1720	**455**	**36%**	1725	2350	**625**	**36%**
29	405	405	**0**	**0%**	405	300	**-105**	**-26%**
32	880	780	**-100**	**-11%**	880	1055	**175**	**20%**

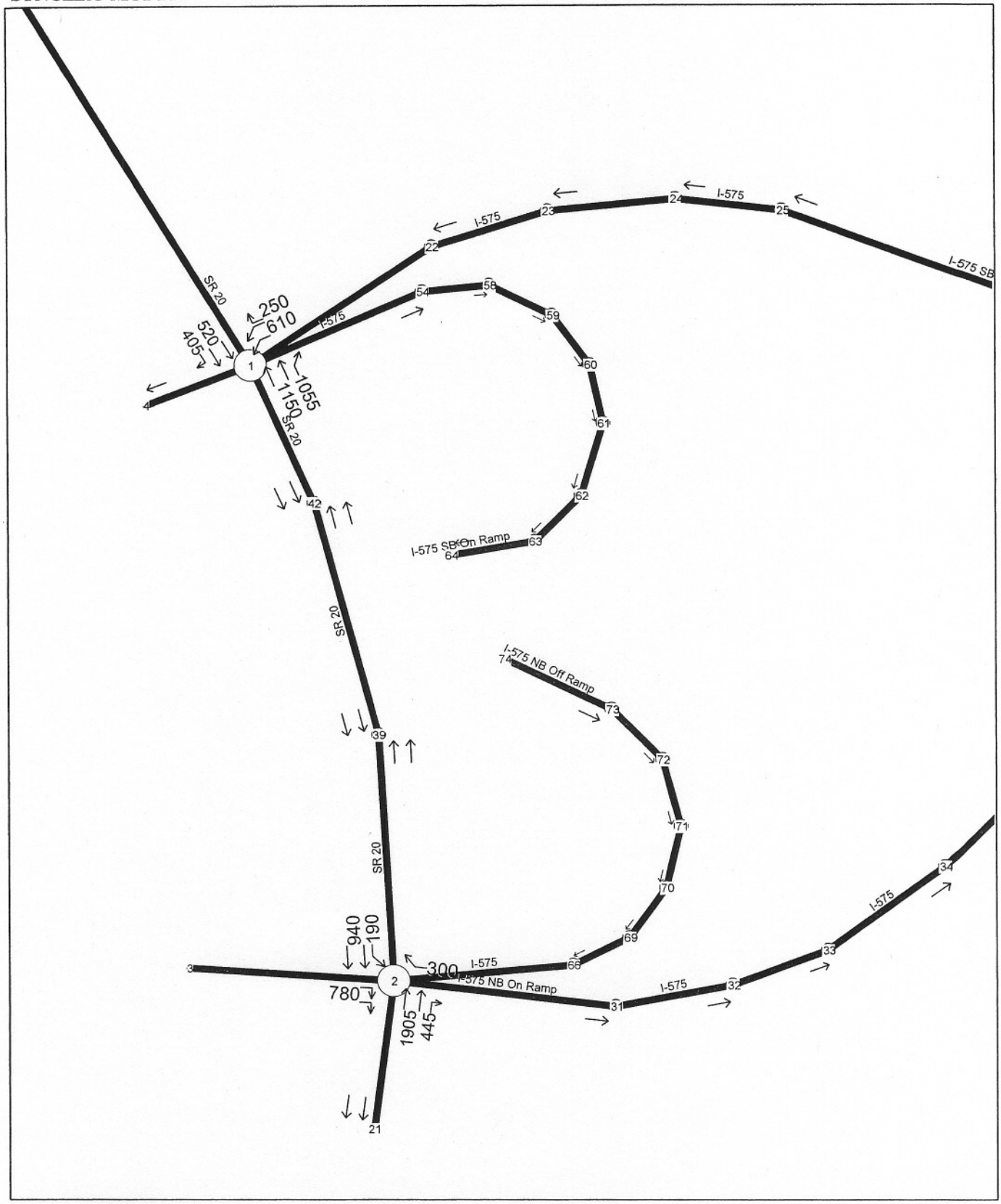
Table 13 - REVISED DECISION MATRIX

	2027 NO-BUILD	2027 BUILD	2027 BUILD W/ IMPROVEMENTS	2027 ALTERNATIVE 4
Intersection 1 [1]	D (48.3)	A (5.5)	A (5.5)	A (8.4)
Intersection 2 [1]	C (25.4)	D (53.1)	B (14.8)	D (35.5)
Basic Freeway [2]	F *	F *	F *	D (31.2)
Weave [2]	E (38.6)	E (38.6)	C (27.9)	C (28.1)
Ramp Junction [2]	F (46.3)	F (37.2)	F (32.0)	N/A
	N/A	F (52.0)	F (34.0)	D (28.3)
		Basic Ramp Layout	Basic Ramp Layout	CD Ramp Layout
	Two NB & SB SOV lanes	Two NB & SB SOV lanes	Two NB & SB SOV lanes	Three NB & SB SOV lanes
	NB & SB HOV lane to SR 20	NB & SB HOV lane to SR 20	NB & SB HOV lane to SR 20	NB & SB HOV lane to SR 20
	No add'l ramps	Add NB off and SB on diamond ramps	Add NB off and SB on diamond ramps	Add NB off and SB on diamond ramps
		Add SB dual lefts @ Int #1	Add SB dual lefts @ Int #1	Add SB dual lefts @ Int #1
			Dual NB rights @ Int #2	Dual NB rights @ Int #2
		630' decel for loop ramp	1200' decel for loop ramp	N/A
		No decel for diamond ramp	2000' NB decel lane for diamond ramp	1000' NB decel lane for diamond ramp
		840' SB accel lane for diamond ramp	840' SB accel lane for diamond ramp	1300' SB accel lane for diamond ramp
	NB & SB Auxiliary lanes between SR 20 and SR 5 Bus.	NB & SB Auxiliary lanes between SR 20 and SR 5 Bus.	NB & SB Auxiliary lanes between SR 20 and SR 5 Bus.	Reconstruct NB & SB Auxiliary lanes between SR 20 and SR 5 Bus.

[1] *LOS expressed in terms of control delay (sec/veh)*

[2] *LOS expressed in terms of passenger cars per mile per lane (pc/mi/ln)*

Revised GDOT Volumes
SYNCHRO MODEL **1/11/2005**



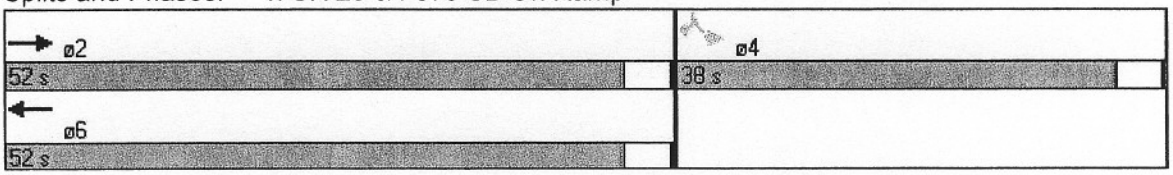
2027 ALTERNATIVE 4 **AM Peak Hour**

Lane Group	EBT	EBR2	WBT	WBR	SBL	SBR2
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	3539	1583	3539	1583	3433	1583
Flt Permitted					0.950	
Satd. Flow (perm)	3539	1583	3539	1583	3433	1583
Satd. Flow (RTOR)		440		767		47
Volume (vph)	520	405	1150	1055	610	250
Lane Group Flow (vph)	565	440	1250	1147	663	272
Turn Type		Free		Free	custom	custom
Protected Phases	2		6			
Permitted Phases		Free		Free	4	4
Total Split (s)	52.0	0.0	52.0	0.0	38.0	38.0
Act Effct Green (s)	25.0	50.5	25.0	50.5	16.4	16.4
Actuated g/C Ratio	0.50	1.00	0.50	1.00	0.32	0.32
v/c Ratio	0.32	0.28	0.71	0.72	0.59	0.50
Control Delay	8.2	0.4	11.2	2.9	16.1	14.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.2	0.4	11.2	2.9	16.1	14.2
LOS	A	A	B	A	B	B
Approach Delay	4.8		7.2			
Approach LOS	A		A			
Queue Length 50th (ft)	43	0	125	0	76	47
Queue Length 95th (ft)	104	0	280	0	184	151
Internal Link Dist (ft)	2122		580			
Turn Bay Length (ft)						
Base Capacity (vph)	2353	1583	2353	1583	1768	838
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.28	0.53	0.72	0.38	0.32

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 50.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 8.4 — Intersection LOS: A
Intersection Capacity Utilization 55.9% — ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: SR 20 & I-575 SB On Ramp



Lane Group	EBL	EBT	WBT	WBR2	NBR2	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	3539	3539	1583	2787	1611
Flt Permitted	0.070					
Satd. Flow (perm)	130	3539	3539	1583	2787	1611
Satd. Flow (RTOR)				266	282	119
Volume (vph)	190	940	1905	445	780	300
Lane Group Flow (vph)	207	1022	2071	484	848	326
Turn Type	pm+pt			Free	custom	custom
Protected Phases	5	2	6			
Permitted Phases	2			Free	8	4
Total Split (s)	10.0	67.0	57.0	0.0	23.0	23.0
Act Effct Green (s)	63.0	63.0	53.0	90.0	19.0	19.0
Actuated g/C Ratio	0.70	0.70	0.59	1.00	0.21	0.21
v/c Ratio	1.03	0.41	0.99	0.31	1.05	0.75
Control Delay	104.6	6.3	37.7	0.5	68.9	33.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	104.6	6.3	37.7	0.5	68.9	33.2
LOS	F	A	D	A	E	C
Approach Delay		22.9	30.7			
Approach LOS		C	C			
Queue Length 50th (ft)	~76	110	565	0	~222	111
Queue Length 95th (ft)	#216	143	#785	0	#352	#236
Internal Link Dist (ft)		996	567			
Turn Bay Length (ft)	150			350		250
Base Capacity (vph)	200	2477	2084	1583	811	434
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.04	0.41	0.99	0.31	1.05	0.75

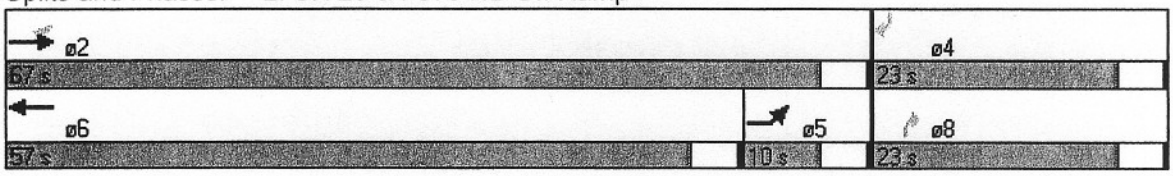
Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 35.5 Intersection LOS: D
Intersection Capacity Utilization Err% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

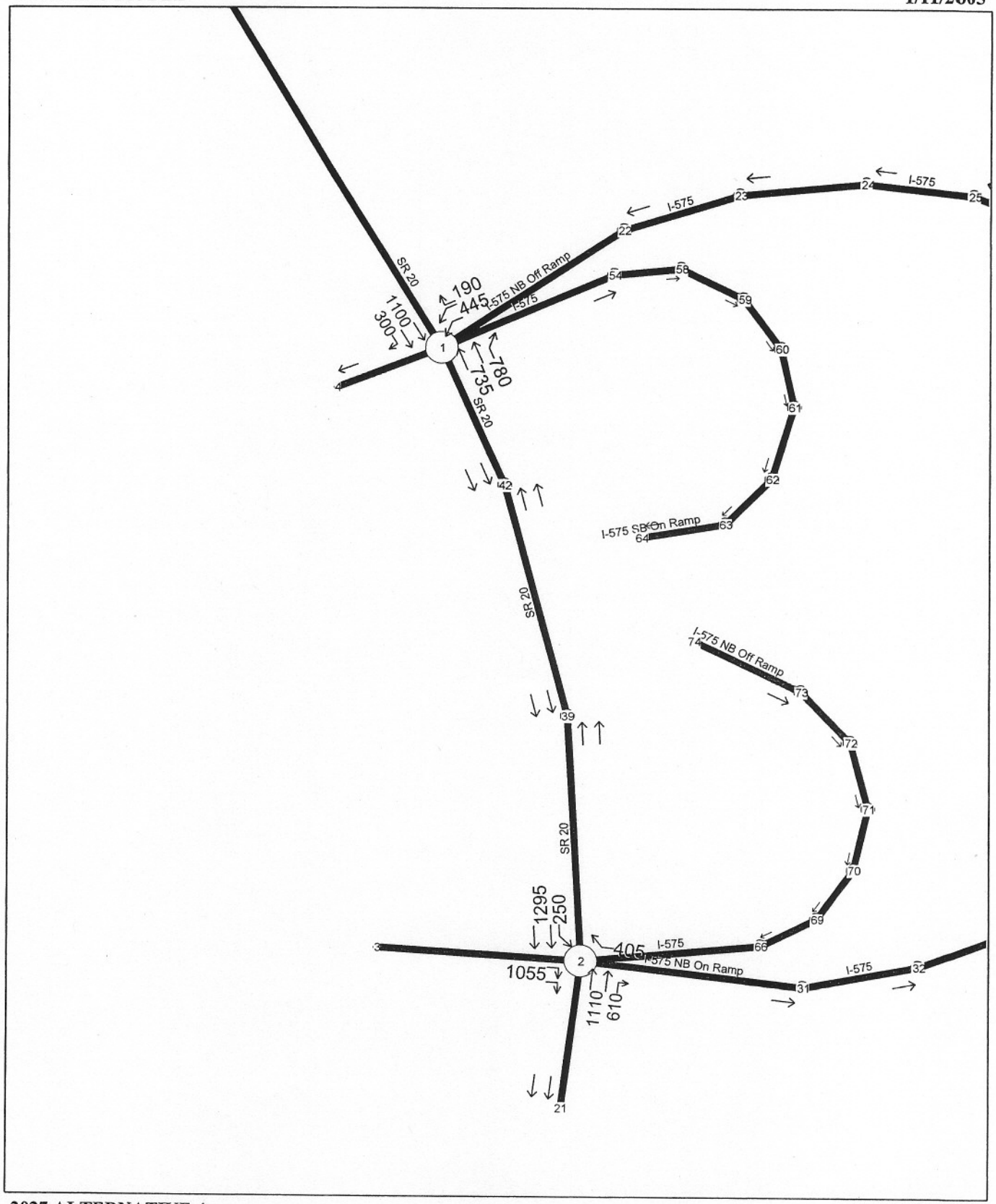
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: SR 20 & I-575 NB Off Ramp



Revised GDOT Volumes
SYNCHRO MODEL

1/11/2005



2027 ALTERNATIVE 4

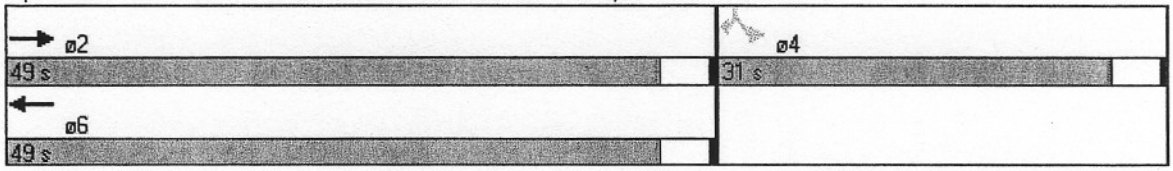
PM Peak Hour

Lane Group	EBT	EBR2	WBT	WBR	SBL	SBR2
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	3539	1583	3539	1583	3433	1583
Flt Permitted					0.950	
Satd. Flow (perm)	3539	1583	3539	1583	3433	1583
Satd. Flow (RTOR)		257		848		169
Volume (vph)	1100	300	735	780	445	190
Lane Group Flow (vph)	1196	326	799	848	484	207
Turn Type		Free		Free	custom	custom
Protected Phases	2		6			
Permitted Phases		Free		Free	4	4
Total Split (s)	49.0	0.0	49.0	0.0	31.0	31.0
Act Effct Green (s)	21.5	42.5	21.5	42.5	12.2	12.2
Actuated g/C Ratio	0.51	1.00	0.51	1.00	0.29	0.29
v/c Ratio	0.67	0.21	0.45	0.54	0.49	0.36
Control Delay	8.8	0.3	7.2	1.3	14.2	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.8	0.3	7.2	1.3	14.2	5.4
LOS	A	A	A	A	B	A
Approach Delay	7.0		4.2			
Approach LOS	A		A			
Queue Length 50th (ft)	90	0	51	0	46	6
Queue Length 95th (ft)	201	0	117	0	113	52
Internal Link Dist (ft)	2122		580			
Turn Bay Length (ft)						
Base Capacity (vph)	2444	1583	2444	1583	1659	852
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.21	0.33	0.54	0.29	0.24

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 42.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 6.6 — Intersection LOS: A
Intersection Capacity Utilization 49.8% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1: SR 20 & I-575 SB On Ramp



Lane Group	EBL	EBT	WBT	WBR2	NBR2	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	3539	3539	1583	2787	1611
Flt Permitted	0.125					
Satd. Flow (perm)	233	3539	3539	1583	2787	1611
Satd. Flow (RTOR)				663	42	250
Volume (vph)	250	1295	1110	610	1055	405
Lane Group Flow (vph)	272	1408	1207	663	1147	440
Turn Type	pm+pt			Free	custom	custom
Protected Phases	5	2	6			
Permitted Phases	2			Free	8	4
Total Split (s)	12.0	44.0	32.0	0.0	36.0	36.0
Act Effct Green (s)	40.0	40.0	28.0	80.0	32.0	32.0
Actuated g/C Ratio	0.50	0.50	0.35	1.00	0.40	0.40
v/c Ratio	1.01	0.80	0.97	0.42	1.01	0.55
Control Delay	89.0	20.8	47.2	0.8	53.1	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	89.0	20.8	47.2	0.8	53.1	10.6
LOS	F	C	D	A	D	B
Approach Delay		31.9	30.8			
Approach LOS		C	C			
Queue Length 50th (ft)	~87	290	308	0	~313	63
Queue Length 95th (ft)	#241	380	#451	0	#475	148
Internal Link Dist (ft)		996	567			
Turn Bay Length (ft)	150			350		250
Base Capacity (vph)	270	1770	1239	1583	1140	794
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.01	0.80	0.97	0.42	1.01	0.55

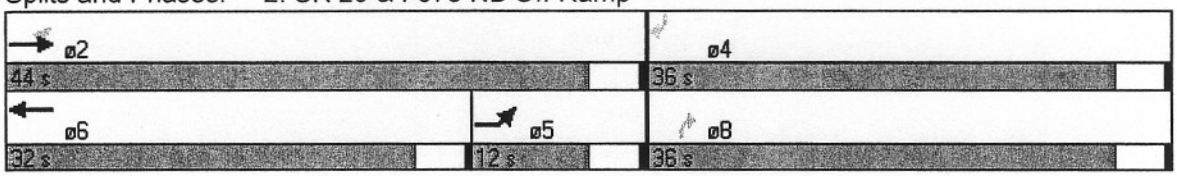
Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 34.4 Intersection LOS: C
Intersection Capacity Utilization Err% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: SR 20 & I-575 NB Off Ramp



HCS2000: Basic Freeway Segments Release 4.1d

Wolverton & Associates
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100 Oakbrook Parkway
Suite 150
Norcross, GA 30093
Phone: 770-447-8999 Fax: 770-447-9070
E-mail: sboutwell@wolverton-assoc.com

Operational Analysis

Analyst:	Kaye Onspaugh
Agency or Company:	Wolverton
Date Performed:	1/11/2005
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	I-575/SB
From/To:	south of SR 20 ramps
Jurisdiction:	GDOT/Cherokee County
Analysis Year:	2027 Build
Description:	

Flow Inputs and Adjustments

Volume, V	4292	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1192	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.847	
Driver population factor, fp	1.00	
Flow rate, vp	1876	pc/h/ln

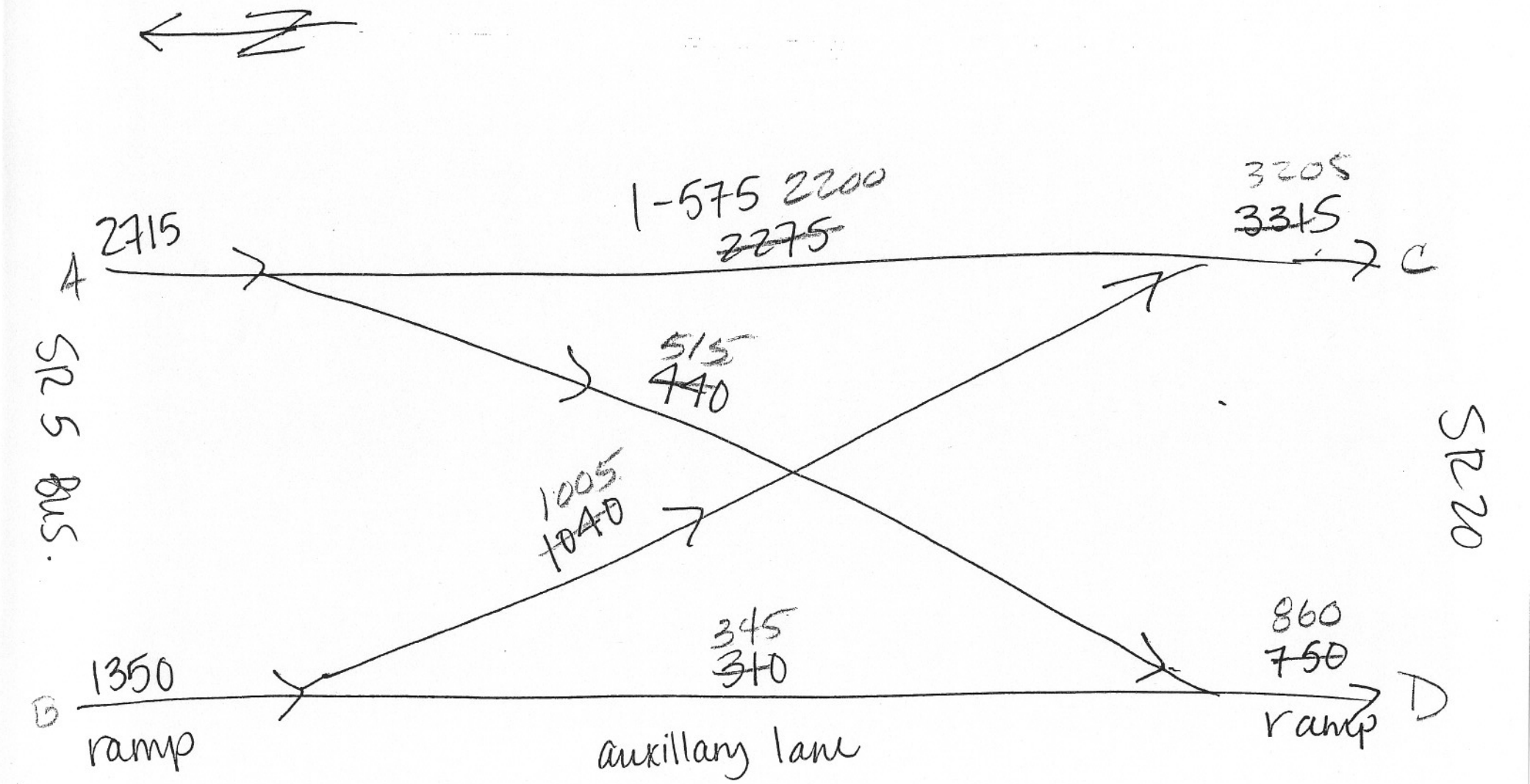
Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.67	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.9	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	61.1	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1876	pc/h/ln
Free-flow speed, FFS	61.1	mi/h
Average passenger-car speed, S	60.1	mi/h
Number of lanes, N	3	
Density, D	31.2	pc/mi/ln

2027 AM SB (REVISED 1/12/05



HCS2000: Freeway Weaving Release 4.1d

Wolverton & Associates
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)00 Oakbrook Parkway
Suite 150
Norcross, GA 30093
Phone: 770-447-8999 Fax: 770-447-9070
E-mail: sboutwell@wolverton-assoc.com

Operational Analysis

Analyst:	SB
Agency/Co.:	Wolverton
Date Performed:	1/12/2005
Analysis Time Period:	AM Peak Hour
Freeway/Dir of Travel:	I-575/SB
Weaving Location:	aux lane btwn SR 20 & SR 5 Bus
Jurisdiction:	GDOT/Cherokee County
Analysis Year:	2027
Description:	Alternative 4 (Revised 1/12/05)

Inputs

Freeway free-flow speed, SFF	65	mph
Weaving number of lanes, N	4	
Weaving segment length, L	1500	ft
Terrain type	Rolling	
Grade		%
Length		mi
)aving type	A	Multilane or C-D
Volume ratio, VR	0.36	
Weaving ratio, R	0.34	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V A-C	V B-D	V A-D	V B-C	
Volume, V	2200	345	515	1005	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	611	96	143	279	v
Trucks and buses	12	5	5	5	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	2.5	2.5	2.5	2.5	
Recreational vehicle PCE, ER	2.0	2.0	2.0	2.0	
Heavy vehicle adjustment, fHV	0.847	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2884	412	615	1200	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
)(Exhibit 24-6)	0.97	1.30
) (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	2.03	0.31
Weaving and non-weaving speeds, Si	33.17	57.12
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.72
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Constrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	45.47	mph
Weaving segment density, D	28.10	pc/mi/ln
Level of service, LOS	C	
Capacity of base condition, cb	7120	pc/h
Capacity as a 15-minute flow rate, c	6034	pc/h
Capacity as a full-hour volume, ch	5431	pc/h

Limitations on Weaving Segments

	Analyzed	If Max Exceeded Maximum	See Note Note
Weaving flow rate, Vw	1815	2800	a
Average flow rate (pcphpl)	1277	2350	b
Volume ratio, VR	0.36	0.35	c
Weaving ratio, R	0.34	N/A	d
Weaving length (ft)	1500	2500	e

Notes:

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

HCS2000: Ramps and Ramp Junctions Release 4.1d

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E-mail: sboutwell@wolverton-assoc.com

Diverge Analysis

Analyst:	SB
Agency/Co.:	Wolverton
Date performed:	1/12/05
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	I-575/NB
Junction:	I-575 @ SR 20
Jurisdiction:	GDOT/Cherokee County
Analysis Year:	2027 Build
Description:	Alternative 4 CD Layout with 3 SO

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	65.0	mph
Volume on freeway	4292	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	1460	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	860	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	5400	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4292	1460	860	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1192	406	239	v
Trucks and buses	12	5	5	%
Recreational vehicles	0	0	0	%
rrain type:	Rolling	Rolling	Rolling	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	2.5	2.5	2.5	
Recreational vehicle PCE, ER	2.0	2.0	2.0	

Heavy vehicle adjustment, fHV	0.847	0.930	0.930	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5627	1744	1026	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.539 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3837 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5627	7050	No
v_{12}	3837	4400	No
$v_{FO} = v_F - v_R$	3883	7050	No
v_R	1744	2100	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 28.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	D_S = 0.455	
Space mean speed in ramp influence area,	S_R = 54.5	mph
Space mean speed in outer lanes,	S_O = 68.2	mph
Space mean speed for all vehicles,	S = 58.3	mph