ORIGINAL TO GENERAL FILES

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

OFFICE OF DESIGN POLICY & SUPPORT
INTERDEPARTMENTAL CORRESPONDENCE

FILE P.I. # 0013248 **OFFICE** Design Policy & Support

Richmond County
GDOT District 2 - Tennille **DATE** 6/9/2016
US 78/US 278/SR 10/Gordon Highway
Improvements

FROM for Brent Story, State Design Policy Engineer

TO SEE DISTRIBUTION

SUBJECT **APPROVED CONCEPT REPORT**

Attached is the approved Concept Report for the above subject project.

Attachment

DISTRIBUTION:

Hiral Patel, Director of Engineering
Joe Carpenter, Director of P3/Program Delivery
Genetha Rice-Singleton, Assistant Director of P3/Program Delivery
Albert Shelby, State Program Delivery Engineer
Darryl VanMeter, State Innovative Delivery Engineer
Bobby Hilliard, Program Control Administrator
Cindy VanDyke, State Transportation Planning Administrator
Eric Duff, State Environmental Administrator
Bill DuVall, State Bridge Engineer
Andrew Heath, State Traffic Engineer
Angela Robinson, Financial Management Administrator
Lisa Myers, State Project Review Engineer
Charles "Chuck" Hasty, State Materials Engineer
Lee Upkins, State Utilities Engineer
Richard Cobb, Statewide Location Bureau Chief
James Smith, District Engineer
Todd Price, District Preconstruction Engineer
Jaime Lindsey, District Utilities Engineer
Bruce Anderson, Project Manager
BOARD MEMBER - 12th Congressional District

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA
LIMITED SCOPE PROJECT CONCEPT REPORT

Project Type:	Widening	P.I. Number:	0013248
GDOT District:	2	County:	Richmond
Federal Route Number:	US 78/US 278	State Route Number:	SR 10/SR 12

US 78/US 278/SR 10/Gordon Highway widening and two-lane roundabout at the proposed intersection for the new Fort Gordon Access Control Point (Gate 6) roadway.

Submitted for approval:

Brent A. Story, P.E., State Design Policy and Support Engineer — Date: 4/21/16

Albert V. Shelby, III, State Program Delivery Engineer — Date: 4-29-16

FOR Bruce Anderson, Jr., GDOT Project Manager — Date: 21 Apr 2016

Recommendation for approval:

Eric Duff, State Environmental Administrator — Date: 5/10/2016

FOR Andrew Heath, P.E., State Traffic Engineer — Date: 5/17/2016

Bill DuVall, P.E., State Bridge Engineer — Date: 5/4/2016

☒ MPO Area: This project is consistent with the MPO adopted Regional Transportation Plan (RTP)/Long Range Transportation Plan (LRTP).

☐ Rural Area: This project is consistent with the goals outlined in the Statewide Transportation Plan (SWTP) and/or is included in the State Transportation Improvement Program (STIP).

Cynthia VanDyke, State Transportation Planning Administrator — Date: 5/10/2016

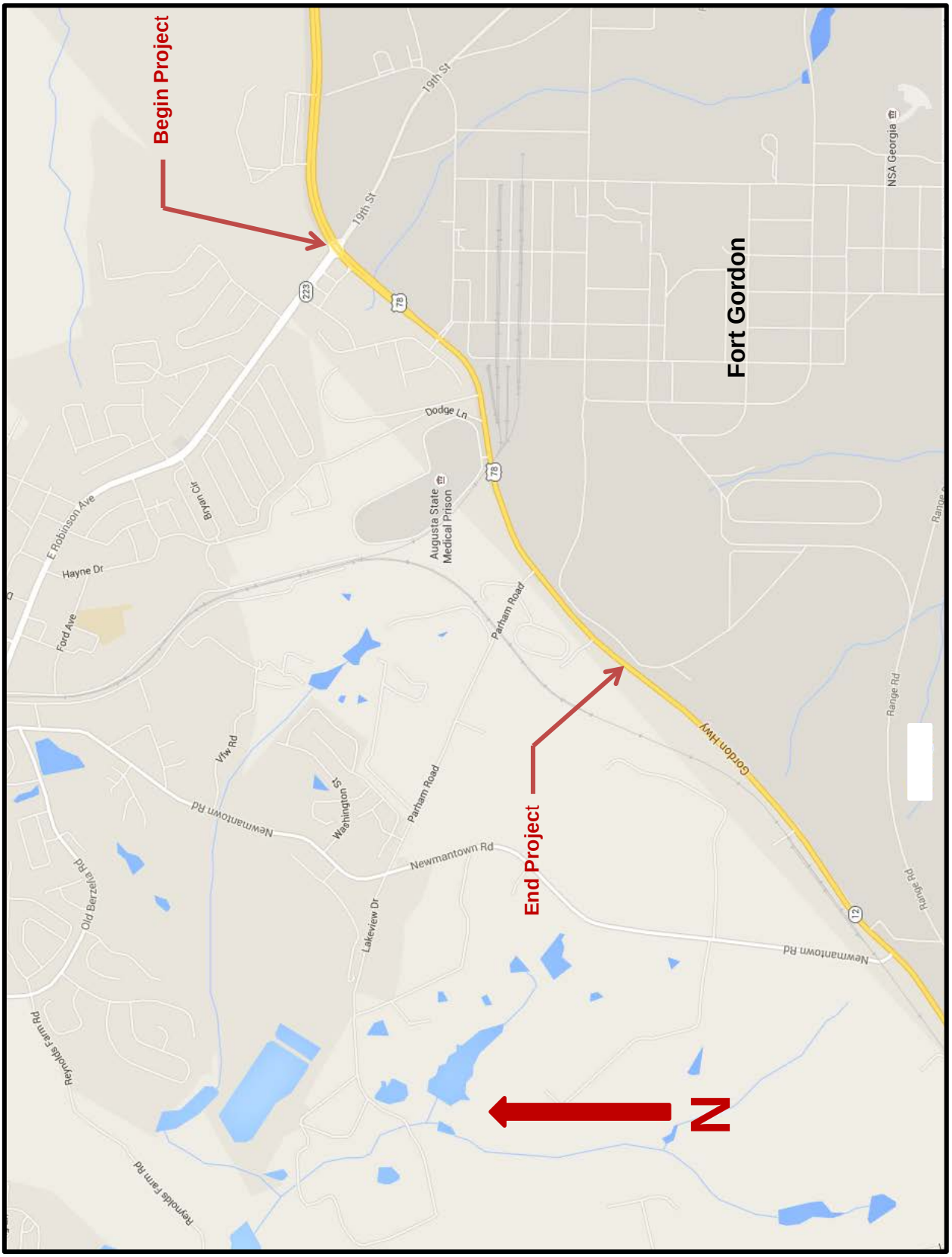
Approval:

Concur: Hiral Patel, P.E., GDOT Director of Engineering — Date: 5/31/2016

Approve: Margaret B. Pirkle, P.E., GDOT Chief Engineer — Date: 6.1.16

* - Recommendation on file

PROJECT LOCATION:



PLANNING & BACKGROUND DATA

Project Justification Statement: Prepared by the office of Design Policy and Support.

This project is proposed in response to anticipated growth in traffic volumes along US 78/US 278/SR 10 in the vicinity of Fort Gordon.

Traffic studies performed in 2013 and 2014 for the anticipated Fort Gordon structural and operational changes indicate that existing US 78/US 278/SR 10 will operate at an unacceptable Level Of Service D to F by 2020. Fort Gordon plans to construct a new Access Control Point (ACP), currently refererenced as Gate 6 within 2 years, close two existing ACP's (Gates 2 & 3), and restrict some traffic types at an additional ACP (Main Gate/Gate 1). Fort Gordon plans to redirect all traffic from Gates 2 & 3, and a significant portion of traffic from Gate 1 to the new ACP/Gate 6. As a result, the section of Gordon Hwy leading to the proposed Gate 6 roadway will see a sudden surge in daily and peak hour traffic volumes.

The sudden increase in daily traffic volume will be subsequently compounded by anticipated growth both in the surrounding area and Fort Gordon operations for the 5 to 15 year period following the opening of the new ACP/Gate 6. Traffic studies looked at several scenarios for growth and the results forecast an anticipated AM peak hour traffic volume at the proposed Gate 6 in the range of approximately 2,325 to 2,650 vehicles per hour.

The project would address the need for additional capacity and connectivity for the section of US 78/US 278/SR10 between SR 223 and the proposed Fort Gordon Access Control Point/Gate 6 access roadway.

Existing conditions: US 78/US 278/SR 10/Gordon Highway east of SR 223/East Robinson Avenue consists of four 12-foot travel lanes with a 44-foot grassed median. This typical section extends through the SR 223 intersection approximately 550 feet west of SR 223. At this point the roadway transistions to two 12-foot travel lanes with 8-foot rural shoulders on approiximately 100-feet of right-of-way. The posted speed limit is 55 mph.

Other projects in the area:

PI# 0011414, Columbia and Richmond Counties - TIA. SR 223 Improvements, from SR 388 (Columbia County) to US 78/US 278/SR10 (Richmond County). Let: September, 2015 (currently under cionstruction).

Description of the proposed project: This project will widen US 78/US 278/SR 10/Gordon Hwy to four 12-foot travel lanes with a 44-foot depressed grass median and 10-foot outside rural shoulders from approximately 550 feet southwest of the intersection of Gordon Hwy with SR 223/East Robinson Avenue and 19th Street to a proposed roundabout that will intersect with the new Fort Gordon ACP/Gate 6 roadway (which will be constructed as a separare project by Fort Gordon). The proposed intersection type will be a two-lane roundabout, chosen to accommodate the anticipated traffc volume demands resulting from anticipated changes to Fort Gordon's access plan. The length of the proposed project is approximately 1.6 miles

MPO: Augusta Regional Transportation Study (ARTS) **TIP #:** N/A

MPO Name Congressional District(s): 12

Federal Oversight: ☐Exempt ☒State Funded ☐Other

Projected Traffic: ADT 24 HR T: N/A%
Current Year (2015): 5980 Open Year (20XX): N/A Design Year (20YY): N/A
Current Year ADT data provided by: GDOT GeoTRAQS

Functional Classification (Mainline): Urban Principal Arterial

Complete Streets - Bicycle, Pedestrian, and/or Transit Standards Warrants:
Warrants met: ☒None ☐Bicycle ☐Pedestrian ☐Transit

Pavement Evaluation and Recommendations*

Preliminary Pavement Evaluation Summary Report Required? ☒No ☐Yes

Preliminary Pavement Type Selection Report Required? ☒No ☐Yes

Feasible Pavement Alternatives: ☒HMA ☐PCC ☐HMA & PCC

***Note:** Due to the compressed project schedule required to coordinate with Fort Gordon's project schedule for the construction of the new Access Control Point, the Pavement Evaluation and Selection will be determined during the Preliminary Design phase.

DESIGN AND STRUCTURAL

Description of Proposed Project:

Major Structures:

Structure ID	Existing	Proposed
245-0099-0	*Fort Gordon RR Spur Line Overpass*	*To be removed*

Mainline Design Features: *SR 10/SR 12 Gordon Hwy*

Feature	Existing	Standard*	Proposed
Typical Section			
- **Number of Lanes**	2	Varies	4
- **Lane Width(s)**	12 ft	12 ft	12 ft
- **Median Width & Type**	N/A	32 ft grassed	44 ft grassed
- **Outside Shoulder**	2 ft paved, min	10 ft (6.5 ft paved)	10 ft (6.5 ft paved)
- **Outside Shoulder Slope**	unknown	6%	6%
- **Inside Shoulder Width**	N/A	6 ft (2 ft paved)	6 ft (2 ft paved)
- **Sidewalks**	N/A	N/A	N/A
- **Auxiliary Lanes**	12 ft LTL & RTL	12 ft LTL & RTL	12 ft LTL & RTL
- **Bike Lanes**	N/A	4 ft min. width	Bikable shoulder
Posted Speed	55 mph		55 mph
Design Speed	55 mph	Varies:	55 mph
Min Horizontal Curve Radius	1172 ft	1060 ft	$\geq$ 1060 ft
Maximum Superelevation Rate	unknown	6% or 8%	$\leq$ 6% or 8%
Maximum Grade	unknown	5%	$\leq$ 5%
Access Control	By Permit	By Permit	By Permit
Design Vehicle	unknown	WB-62	TBD[#]
Pavement Type	HMA		HMA
Additional Items as warranted			

*According to current GDOT design policy if applicable

[#]The proposed design vehicle will accommodate the needs of Fort Gordon for special vehicle types, if necessary.

Major Interchanges/Intersections:

- US 78/IUS 270/SR 10/Gordon Highway & SR 223/East Robinson Avenue – 19th Street
- Two-Lane Roundabout with new ACP/Gate 6 roadway.

Lighting required: ☐ No ☒ Yes

The proposed roundabout will require lighting as per GDOT policy. A formal agreement is anticipated to be coordinated with local government officials and/or Fort Gordon concerning the maintenance, operation, and electrification of the roundabout per GDOT policy.

Transportation Management Plan [TMP] Required: ☐ No ☒ Yes

If Yes: Project classified as: ☒ Non-Significant ☐ Significant

TMP Components Anticipated: ☒ TTC ☐ TO ☐ PI

Will Context Sensitive Solutions procedures be utilized? ☐ No ☒ Yes

The project will be designed to meet the needs of Fort Gordon traffic types, which may include military vehicles with special specifications and weight limits.

Design Exceptions to FHWA/AASHTO controlling criteria anticipated: None anticipated

Design Variances to GDOT Standard Criteria anticipated: None anticipated

UTILITY AND PROPERTY

Temporary State Route Needed: ☒ No ☐ Yes ☐ Undetermined

Railroad Involvement: There is an inactive Fort Gordon Spur Line that is grade separated over SR 10. The grade separated bridge carrying the spur line over SR 10 is an eligible NRHP resource in a degraded condition. and would need to be removed in order to facilitate the proposed widening of SR 10.

Utility Involvements:

Jefferson Energy	AT&T Georgia
Columbia County Telecom	Augusta Utilites Dept. (water/sewer)
Tower Cloud, Inc.	Wide Open West Communications

SUE Required: ☒ No ☐Yes

Public Interest Determination Policy and Procedure recommended? ☒ No ☐ Yes

Right-of-Way: Existing width: approx.100 ft. Proposed width: approx. 210 ft.
Required Right-of-Way anticipated: ☐ No ☒ Yes ☐ Undetermined
Easements anticipated: ☐ None ☒ Temporary ☒ Permanent ☒ Utility ☐ Other

Anticipated total number of impacted parcels:	1
Displacements anticipated: Businesses:	0
Residences:	0
Other:	0
Total Displacements:	0

ENVIRONMENTAL AND PERMITS

Anticipated Environmental Document:
GEPA*: ☐ TYPE A ☐ TYPE B ☒ NONE **NEPA:** ☐ CE ☐ PCE ☐ EA-FONSI

*A GEPA document must be prepared only for state funded projects where the project cost meets or excedes $100 million. Environmental surveys are required for all state funded projects regardless of project cost.

MS4 Compliance – Is the project located in an MS4 area? ☐ No ☒ Yes

Environmental Permits, Variances, Commitments, and Coordination anticipated: TBD

Air Quality:
Is the project located in a PM 2.5 Non-attainment area? ☒ No ☐ Yes
Is the project located in an Ozone Non-attainment area? ☒ No ☐ Yes
Carbon Monoxide hotspot analysis: ☐ Required ☐ Not Required ☒ TBD

NEPA/GEPA Comments & Information: Fort Gordon is preparing an EA-FONSI NEPA Document that encompases the proposed SR 10 improvements as part of the proposed Fort Gordon improvements to provide a new Access Contol Point on the Fort property. GDOT will coordinate with Fort Gordon to adopt the environmental surveys conducted for the the Fort Gordon NEPA document, where appropriate. See the information presented at a 10/27/2015 coordination meeting (meeting minutes attached):

404 Permit coordination is anticipated to determine if the U.S. Army Corps of Engineers (USACE) will require a separate 404 permit for this project separate from any 404 Permit issued for the Fort Gordon project.

Further coordination should be done with the USACE to determine who will be responsible for any and all environmental mitigation, if needed, for this project.

COORDINATION, ACTIVITIES, RESPONSIBILITIES, AND COSTS

Project Meetings:

Project Activity	Party Responsible for Performing Task(s)
Concept Development	GDOT
Design	GDOT Consultant
Right-of-Way Acquisition	GDOT
Utility Coordination (Preconstruction)	GDOT
Utility Relocation (Construction)	Utility Contractors
Letting to Contract	USACE
Construction Supervision	USACE
Providing Material Pits	Construction Contractor
Providing Detours	GDOT, if needed
Environmental Studies, Documents, & Permits	USACE
Environmental Mitigation	USACE
Construction Inspection & Materials Testing	USACE

Other coordination to date: 10-27-2015 Fort Gordon EA Kick-Off Meeting (minutes attached)

Project Cost Estimate and Funding Responsibilities:

	Breakdown of PE	ROW	Reimbursable Utility	CST*	Environmental Mitigation	Total Cost
Funded By	GDOT	GDOT	GDOT	GDOT	TBD	
$ Amount	$ 2,000,000	TBD	$ 750,000	$10,406,200	TBD	$13,156,200
Date of Estimate	Auth 11/9/15	TBD	4/6/2016	4/8/2016	TBD	

*CST Cost includes: Construction, Engineering and Inspection, Contingencies and Liquid AC Cost Adjustment.

ALTERNATIVES DISCUSSION

Preferred Alternative: Widening existing US 78/US 278/SR 10/Gordon Highway from SR 223/East Robinson Avenue to the proposed Fort Gordon Gate 6 Access Roadway and construct a Double Lane Roundabout intersection.			
Estimated Property Impacts:	**Fort Gordon**	**Estimated Total Cost:**	**$12,779,500**
Estimated ROW Cost:	**TBD**	**Estimated CST Time:**	**18-24 months**
Rationale: The Double Lane Roundabout is the best combination of flexibility, cost, community and environmental impacts when compared to the other intersection alternatives studied. The double lane roundabout intersection type provides the most flexibility to meet project opening and future capacity and connectivity demands with the least cost and disruption to travelers when compared to the signalized and continuous flow intersection types. The roundabout can also operate more efficiently during power interruptions.			

No-Build Alternative:			
Estimated Property Impacts:	**none**	**Estimated Total Cost:**	**$0.00**
Estimated ROW Cost:	**$0.00**	**Estimated CST Time:**	**none**
Rationale: The alternative does not meet the project need to increase capacity and connectivity along US 78/US 278/SR10/Gordon Hwy.			

Alternative 1: Widening existing US 78/US 278/SR 10/Gordon Highway from SR 223/East Robinson Avenue to the proposed Fort Gordon Gate 6 Access Roadway and construct a 1 legged Continuous Flow Intersection			
Estimated Property Impacts:	**Fort Gordon**	**Estimated Total Cost:**	**$14,003,600**
Estimated ROW Cost:	**TBD**	**Estimated CST Time:**	**18-24 months**
Rationale: The Continuous Flow Intersection is anticipated to have highest construction cost, require most right-of-way of the 3 intersection types studied. It also may not operate as efficiently should the intersection signals suffer a power failure when compared to the double lane roundabout.			

Alternative 2: Widening existing US 78/US 278/SR 10/Gordon Highway from SR 223/East Robinson Avenue to the proposed Fort Gordon Gate 6 Access Roadway and construct a signalized intersection			
Estimated Property Impacts:	**Fort Gordon**	**Estimated Total Cost:**	**$12,322,200**
Estimated ROW Cost:	**TBD**	**Estimated CST Time:**	**18-24 months**
Rationale: While anticipated to have slightly lower construction costs that the double lane roundabout, this alternative would not be expected to operate as efficiently at the higher peak hour traffic volumes that are expected to be present once the proposed Fort Gordon ACP opens. This alternative would not operate as efficiently should the intersection signal(s) suffer a power failure when compared to the double lane roundabout.			

Comments/Additional Information: None

LIST OF ATTACHMENTS/SUPPORTING DATA

1. Concept Layout
2. Typical section
3. Cost Estimates
    - Construction Cost Estimate
    - Utility cost Estimate
    - Liquid AC Spreadsheet
4. Summary of TE Study
    - 4-7-2015 Fort Gordon Traffic Study
5. Meeting Minutes
    - 10-27-2015 Fort Gordon EA Kick-Off Meeting

PI# 0013248, Richmond County
US 78/U 278/SR 10 Improvements

Widening - 4 lanes w/44 ft Flush Median & Double Lane Roundabout

Columbia County

Richmond County

US 78/US 278/SR10 /Gordon Hwy.

Proposed ROW

Existing ROW

Inactive Rail Spur Line

Augusta State Medical Prison

SR 223/East Robinson Ave.

Double Lane Roundabout (Approximate Location)

US 78/US 278/SR 10/Gordon Hwy

Proposed ROW

Fort Gordon

Gate 3

Gate 2

19th Street

Proposed Gate 6 (Approximate Location)

PRELIMINARY CONCEPT

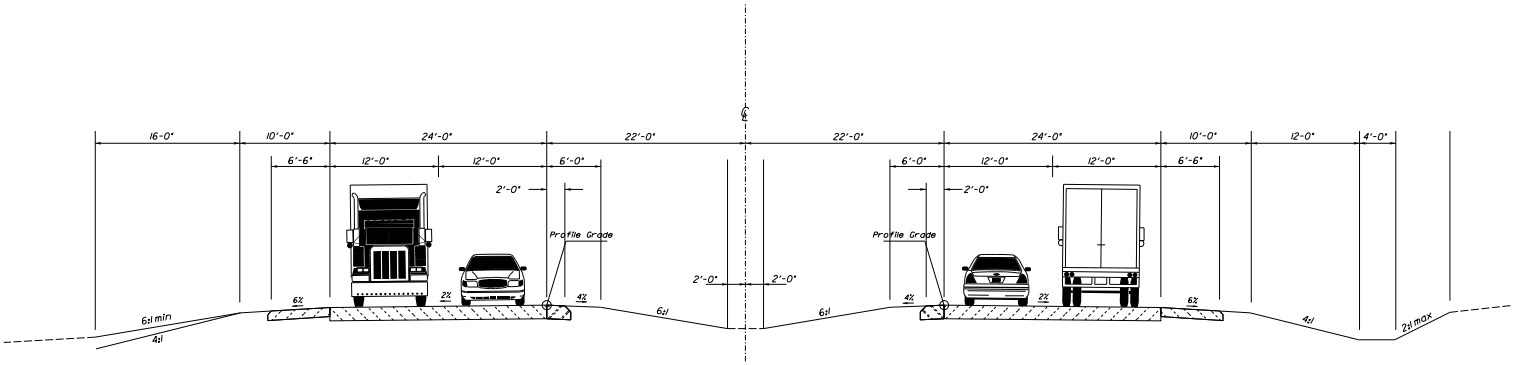
THE LOCATION AND TYPE OF ROADWAY MAY CHANGE.
PROPOSED RIGHT-OF-WAY WIDTHS ARE ESTIMATES.
CONCEPT DATE: 04/11/2016

Fort Gordon

SCALE

0 200 400 600 1000 1400

US 78/US 278/SR 10/Fort Gordon Hwy.



From SR 223/East Robinson Avenue/19th Street
to the proposed intersection with the access road
for the new Fort Gordon ACP-Gate 6

Design Speed - 55 mph

Preliminary Cost Estimate:

Widening: Replacing Existing Lanes & Double Lane Roundabout Intersection **Updated: April 11, 2016**

US 278/US 78/SR 10 - Gordon Hwy near Fort Gordon, Richmond County

Typical Section: Four 12 ft lanes, 44 ft depressed grassed median, 10 ft (6.5 ft paved) outside, 2 ft paved inside Shoulders; 55mph design speed

Approximate Length: 1.65 Miles, from the SR 223 intersection to approximately 300 ft southwest of the Proposed Fort Gordon ACP/Gate 6

Item No.	Units	Description	Quantity	Price/Unit	Amount
150-1000	LS	Traffic Control	2.50%		$184,000.00
	LS	Drainage & MS4 Compliance	1	$1,150,000.00	$1,150,000.00
210-0100	LS	Grading Complete	1	$1,548,000.00	$1,548,000.00
153-1300	LS	Field Engineer's Office	1	$91,000.00	$91,000.00
682-9030	LS	Roundabout Lighting System	1	$210,000.00	$210,000.00
Structures					
540-1101	LS	Removal of Existing Railroad Overpass Bridge	1	$180,000.00	$180,000.00
Roadway Items - (4-12 ft Lanes w/44 ft Depressed Median Typical Section) + 6.5 ft Paved Outside, 2 ft Inside Shoulders					
610-2586	SY	Rem Asph Pvmt Incl Base	26967	$2.60	$70,200.00
402-3600	TN	2" Recycl Asph Conc 12.5mm SP	6827	$73.39	$501,100.00
402-3190	TN	2.75" Recycled Asph Conc 19mm SP	9387	$70.96	$666,200.00
402-3121	TN	8" Recycled Asph Conc 25mm SP	22072	$64.64	$1,430,000.00
310-5120	SY	GR Aggr BS CRS 12 in incl Matl	49050	$24.61	$1,210,000.00
310-5080	SY	GR Aggr BS CRS 8 in incl Matl (Shldrs)	11632	$19.57	$230,000.00
441-0740	SY	Concrete Median, 4 inch	512	$29.82	$20,000.00
641-5001	EA	Guardrail Anchorage - TP 1	14	$866.34	$13,000.00
641-1200	LF	Guardrail - TP W	1600	$24.65	$40,000.00
		ITEM SUBTOTAL			**$7,359,500.00**
Percentage based costs (based on item subtotal)					

EROCPCTO	Erosion Control	5.0%	$370,000.00
SIGNPCTO	Signing	1.0%	$80,000.00
PVMKPCTO	Pavement Marking	2.5%	$190,000.00
MISCPCTO	Miscellaneous Items	4.0%	$300,000.00
	BASE CONSTRUCTION SUBTOTAL		**$8,299,500.00**
Contingencies & other costs			
	Engineering & Inspection	5%	$420,000.00
	Contingencies	15%	$1,310,000.00
	TOTAL		**$10,029,500.00**

PROJ. NO.		CALL NO.
P.I. NO.	0013248	
DATE	5/10/2016	

INDEX (TYPE)	DATE	INDEX
REG. UNLEADED	May-16	$ 2.174
DIESEL		$ 2.220
LIQUID AC		$ 328.00

Link to Fuel and AC Index:
http://www.dot.ga.gov/doingbusiness/Materials/Pages/asphaltcementindex.aspx

LIQUID AC ADJUSTMENTS

PA=[((APM-APL)/APL)]xTMTxAPL

Asphalt

Price Adjustment (PA)			**376734.24**	**$**	**376,734.24**
Monthly Asphalt Cement Price month placed (APM)	Max. Cap	60%	$ 524.80		
Monthly Asphalt Cement Price month project let (APL)			$ 328.00		
Total Monthly Tonnage of asphalt cement (TMT)			1914.3		

ASPHALT	Tons	%AC	AC ton
Leveling		5.0%	0
12.5 OGFC		5.0%	0
12.5 mm	6827	5.0%	341.35
9.5 mm SP		5.0%	0
25 mm SP	22072	5.0%	1103.6
19 mm SP	9387	5.0%	469.35
	38286		**1914.3**

BITUMINOUS TACK COAT

Price Adjustment (PA)			**$** -	**$**	-
Monthly Asphalt Cement Price month placed (APM)	Max. Cap	60%	$ 524.80		
Monthly Asphalt Cement Price month project let (APL)			$ 328.00		
Total Monthly Tonnage of asphalt cement (TMT)			0		

Bitum Tack Gals	gals/ton	tons
	232.8234	0

PROJ. NO.					CALL NO.		
P.I. NO.	0013248						
DATE	5/10/2016						

BITUMINOUS TACK COAT (surface treatment)

Price Adjustment (PA)				**0**	**$ -**
Monthly Asphalt Cement Price month placed (APM)	Max. Cap	60%	$	524.80	
Monthly Asphalt Cement Price month project let (APL)			$	328.00	
Total Monthly Tonnage of asphalt cement (TMT)				0	

Bitum Tack	SY	Gals/SY	Gals	gals/ton	tons
Single Surf. Trmt.		0.20	0	232.8234	0
Double Surf.Trmt.		0.44	0	232.8234	0
Triple Surf. Trmt		0.71	0	232.8234	0
					0

TOTAL LIQUID AC ADJUSTMENT	**$**	**376,734.24**

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE

Project No:
County **COLUMBIA/RICHMOND**

Office: **Tennille**
Date: **April 6, 2016**

P.I. # **0013248**

Description: *SR 10 From Old Louisville Rd to SR 223*

FROM James L. Lindsey, District Utilities Engineer

TO Bruce Anderson, Project Manager

SUBJECT **PRELIMINARY UTILITY COST ESTIMATE**

A review of utilities located on the above referenced project has been conducted based without a design concept. Listed below is a breakdown of the anticipated reimbursable and non-reimbursable cost.

Utility Owner	Reimbursable	Non-Reimbursable	Estimate Based on
Jefferson Energy (D)	$550,000.00	$0.00	Preliminary info from Utility
AT&T Georgia	$200,000.00	$550,000.00	Preliminary info from Utility
Columbia County Telecom	$0.00	$397,500.00	Preliminary info from Utility
Augusta Utilities Dept. (water)	$0.00	$325,000.00	Preliminary info from Utility
Augusta Utilities Dept. (sewer)	$0.00	$63,000.00	Preliminary info from Utility
Tower Cloud, Inc	$0.00	$2,500.00	Preliminary info from Utility
WOW	$0.00	$530,000.00	Preliminary info from Utility
	$0.00	$0.00	
	$0.00	$0.00	
	$0.00	$0.00	
	$0.00	$0.00	
Total 100.00%	$750,000.00	$1,868,000.00	
Department Responsibility 100.00%	$750,000.00	$0.00	
Local Sponsor Responsibility 0.00%	$ 0.00	$ 0.00	PFA Dated N/A with N/A

Update All

** Indicates Potential Utility Aid Request from Local Gov't

Estimate is based on the best available information at the current stage, unforeseen prior rights information may be provided by the Utility Company at a later date that could cause some non-reimbursable costs to shift to the reimbursable cost column.

If additional information is needed, please contact Caleb G. Lord at (478) 553-3384 or by email at clord@dot.ga.gov.

cc: Lee Upkins, State Utilities Office – via e-mail
Yulonda Pride-Foster, State Utilities Preconstruction Engineer – via e-mail

COMPREHENSIVE TRAFFIC ENGINEERING ANALYSIS

FOR

FORT GORDON, GEORGIA

FINAL

APRIL 7, 2014

Columbus Office
3000 Corporate Exchange Drive | Suite 600 | Columbus, Ohio 43231
P: 614.839.0250 | F: 614.839.0251

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List of Attachments

Attachment 17 HCS 2010 Analysis	Scenario 1, Growth Projection 3 with Mitigation
Attachment 18 HCS 2010 Analysis	Scenario 2, Growth Projection 1 with Mitigation
Attachment 19 HCS 2010 Analysis	Scenario 2, Growth Projection 2 with Mitigation
Attachment 20 HCS 2010 Analysis	Scenario 2, Growth Projection 3 with Mitigation

Columbus Office
3000 Corporate Exchange Drive | Suite 600 | Columbus, Ohio 43231
P: 614.839.0250 | F: 614.839.0251

Executive Summary

This Traffic Study has been prepared to evaluate the potential traffic-related effects associated with three separate proposed growth projections (3,000, 4,000, and 6,000 combined new personnel) spread out to four areas of Fort Gordon, Georgia. This study is to take into account two different gate scenarios that have been proposed for Fort Gordon.

The Traffic Study was developed and prepared using information (existing traffic counts, trip generation, etc.) extracted from the ARCYBER Command and Control Facility Traffic Study prepared in July 2013 and the Access Control Point Transportation Engineering Assessment prepared in April 2013. The traffic analysis was conducted using procedures and calculations published by the *Highway Capacity Manual* (Transportation Research Board [TRB] 2010), *Trip Generation, 8th Edition: An ITE Informational Report* (Institute of Transportation Engineers [ITE] 2008), National Cooperative Highway Research Program (NCHRP) Report 672 (NCHRP 2010) and other sources and materials.

The analysis found substantial traffic congestion at numerous locations under each of the scenarios for Fort Gordon that will need improvements in order to operate more efficiently. The addition of traffic from the different gate scenarios and growth projections results in substantial effects during one or both peak hours for the following conditions:

- Scenario 1 – Growth Projection 1 – 14 intersections of the 22 analyzed
- Scenario 1 – Growth Projection 2 – 14 intersections of the 22 analyzed
- Scenario 1 – Growth Projection 3 – 15 intersections of the 22 analyzed
- Scenario 2 – Growth Projection 1 – 15 intersections of the 22 analyzed
- Scenario 2 – Growth Projection 2 – 15 intersections of the 22 analyzed
- Scenario 2 – Growth Projection 3 – 16 intersections of the 22 analyzed

Measures to mitigate, minimize, and/or avoid the traffic effects are summarized as:

For the signalized intersections that require improvements this Traffic Study analyzed different improvements that may be made to the phasing of the signals such as providing overlapping right turns during left turn phases. The movements through the intersection that appear to be the root cause of the failing LOS have been analyzed to discover if adding a lane or reassigning lane uses will alleviate the delay.

Signal Warrants will be advised to be performed for the all-way stop controlled intersections that show substantial effects from the projected traffic. The Traffic Data that was provided does not contain sufficient volumes to check either the 8-Hour or 4-Hour Vehicular Volume Warrants. Using HCS 2010 with the projected traffic volumes and the current lane usage, signalization will be analyzed to determine whether the failing approaches would see significant improvements.

One and two-way stop controlled intersections that show substantial effects from the projected traffic have been analyzed for all-way stop control and signal controlled improvements. Signal Warrants will be advised to be performed where applicable. Using HCS 2010 with the projected traffic volumes and the current lane usage, signalization will be analyzed to determine whether the failing approaches would see significant improvements.

The roundabout intersection of Lane Avenue and Rice Road has been analyzed for providing additional lanes to ease the congestion the intersection sees in the eastbound and northbound directions.

CHAPTER 1

Introduction

1.1 Project Location

Fort Gordon is located in Richmond County, Georgia, a few miles southwest of Augusta, Georgia. The installation is accessible using a number of routes:

- Gordon Highway/US 278/US 78/GA 10, which runs along the north side of the installation,
- GA 223, which runs directly into Gate 2 on the northwest side of the installation
- Jimmie Dyess Parkway/GA 383, which runs directly into the Main Gate on the northeast side of the installation,
- US 1/GA4, which runs along the southeastern side of the installation, and
- Tobacco Road/Avenue of the States, which runs directly into Gate 5.

Fort Gordon currently has four access control points (ACP):

- Main Gate – Located on Chamberlain Avenue off Gordon Highway
- Gate 2 – Located on 19th Street off Gordon Highway
- Gate 3 – Located on 13th Avenue off Gordon Highway
- Gate 5 – Located on Avenue of the States off the ramps for US 1

See Figure 1.1 for a map of the installation location and of the ACPs.

Figure 1.1 – Access Control Point Location Map

1.2 Project Description

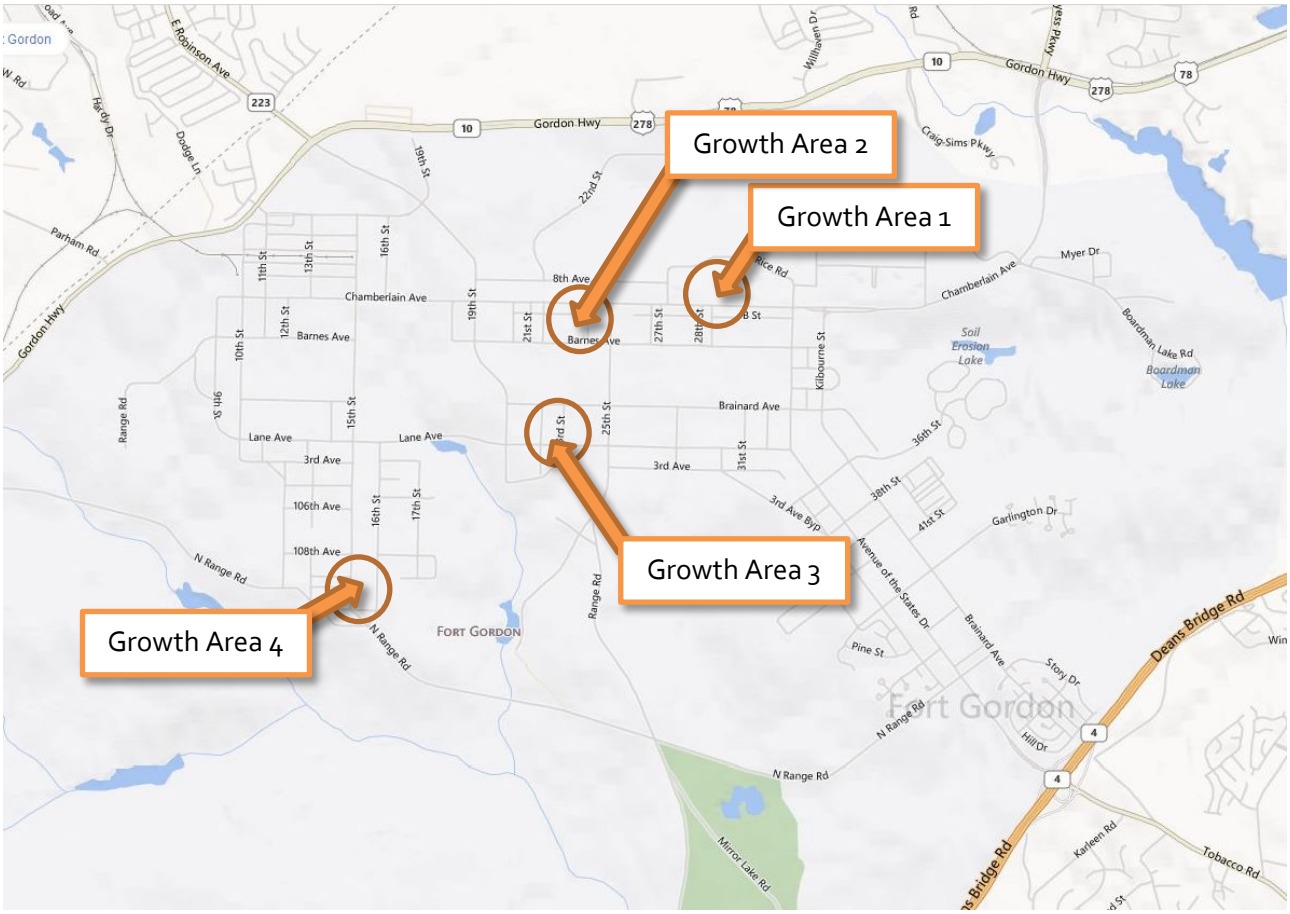
Fort Gordon is expected to see growth in personnel in the future. Three Growth Projections (3,000, 4,000, and 6,000 combined total) have been spread out to four areas of Fort Gordon. It was assumed for the purposes of this study that all trips generated by each of the growth areas would utilize the facility's ACPs and that this would be the worst case scenario for each of the ACPs. These Growth Projections and areas are as described below and shown in Figure 1.2:

- **Growth Area Number 1** – Located along Chamberlain Avenue between 25th Street and Rice Road
  - **Growth Projection 1** = 375
  - **Growth Projection 2** = 500
  - **Growth Projection 3** = 750
- **Growth Area Number 2** – Located along Barnes Avenue between 19th Street and 25th Street.

- **Growth Projection 1** = 900
- **Growth Projection 2** = 1,200
- **Growth Projection 3** = 1,800

- **Growth Area Number 3** – Located Lane Avenue between 19th Street and 25th Street.
  - **Growth Projection 1** = 225
  - **Growth Projection 2** = 300
  - **Growth Projection 3** = 450
- **Growth Area Number 4** – Located along 15th Street between Lane Avenue and 111th Avenue.
  - **Growth Projection 1** = 1,500
  - **Growth Projection 2 =** 2,000
  - **Growth Projection 3** = 3,000

Figure 1.2 – Projected Growth Area Locations



The ACP Transportation Engineering Assessment provided two scenarios for the final ACP layout. These scenarios are as follows:

- **Scenario 1** – Main Gate, Gate 2, and Gate 5 are to remain open and upgraded to handle future traffic volumes. Gate 3 is to be closed to all traffic.
- **Scenario 2** – The Main Gate and Gate 5 are to remain open. Gate 2 and Gate 3 are to be closed to all traffic. A new gate is to be constructed on the west side of the installation across from Parham Road.

The ARCYBER Command and Control Facility Traffic Study presented numerous alternatives for the establishment and operation of a proposed U.S. Army Cyber (ARCYBER) Command/2nd Army Command and Control Facility to be located at either Fort George G. Meade, Maryland or at Fort Gordon, Georgia. The end result of this Traffic Study was the selection of Alternate E and this Traffic Study focuses only the data and analyses of this Alternate E.

See Figures 1.3 and 1.4 for ACP Scenarios 1 and 2.

Figure 1.3 – Scenario 1 Access Control Points

Figure 1.4 – Scenario 2 Access Control Points

1.3 Analysis Scenarios

To determine the traffic-related implications of the Proposed Action, this Traffic Study considers the following near term traffic scenarios for both the AM and PM Peak Hours at each intersection of this Traffic Study:

1. **Existing Conditions:** reflects conditions as of July, August, and October 2012, when traffic counts were performed at the installation.
2. **Baseline Conditions:** represents projected future conditions at the time that the proposed construction is completed and operations have begun (i.e. 2016 approximately). The baseline conditions were taken from the ARCYBER and ACP Traffic Studies. The baseline conditions

are described as having a conservative growth factor of 3 percent per year for 4 years. This growth factor was uniformly applied to the existing 2012 traffic counts.

3. **Baseline plus Scenario 1:** this scenario adds the traffic volumes from all four areas of proposed growths 1, 2, and 3 for combined results of 3,000, 4,000, and 6,000 respectively to each of the three growth projections to the traffic distribution that results from the gate availability of Scenario 1.
4. **Baseline plus Scenario 2:** this scenario adds the traffic volumes from all four areas of proposed growths 1, 2, and 3 for combined results of 3,000, 4,000, and 6,000 respectively to each of the three growth projections to the traffic distribution that results from the gate availability of Scenario 2.

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Chapter 2

Traffic Analysis Methods

2.1 Capacity Analysis Procedures

Roadway and intersection operating conditions, and the adequacy of existing roadway systems to accommodate the projected future traffic volumes, are described in terms of Level of Service (LOS). LOS is a method used to rate the performance of streets, intersections, and other highway facilities. Developed by the Transportation Research Board, and documented in various editions of the *Highway Capacity Manual* (Transportation Research Board [TRB] 2010) since 1950, LOS rates performance on a scale of A to F, with LOS A representing free flow conditions and LOS F representing heavily congested conditions. Table 2.1 summarizes the different LOS ratings and the general traffic conditions associated with each.

Table 2.1: Level of Service Ratings and Associated Traffic Conditions

LOS Rating	Description of Traffic Conditions
A	Traffic flows freely with little or no restrictions to vehicle maneuvers within the traffic stream.
B	Reasonably free-flowing conditions, but freedom to maneuver within the traffic stream noticeably restricted.
C	Traffic speed approaches free-flowing conditions, but freedom to maneuver within the traffic stream is noticeably restricted.
D	Traffic speed begins to be reduced, and freedom to maneuver is seriously limited due to a high concentration of traffic.
E	Unpredictable traffic flow, with virtually no usable gaps in the traffic stream to accommodate vehicle maneuvers.
F	Unstable flow resulting in delays and the formation of queues in locations where traffic demand exceeds roadway capacity.

2.1.1 Intersection LOS

Intersection capacity analysis was conducted in accordance with procedures contained in Chapter 18 (Signalized Intersections), Chapter 19 (Two-Way Stop Controlled Intersections), and Chapter 20 (All-Way Stop-Controlled Intersections) of the *Highway Capacity Manual*. Data used in intersection analysis include

peak hour turning movement traffic volumes, the number of lanes, and the type of traffic control used. Analysis was performed using the Highway Capacity Software 2010 software (HCS2010) that was developed by the Center for Microcomputers in Transportation (McTrans) for the U.S. Department of Transportation's Federal Highway Administration (FHWA). This software incorporates the *Highway Capacity Manual* analysis procedures into each of its modules. LOS for signalized and unsignalized intersections is measured in terms of delay, in seconds per vehicle. Typically, a roadway component is seen as being as acceptable if the corresponding level of service is LOS D or better.

Peak Hour Factors and Heavy Vehicle Factors were extracted from the Traffic Studies mentioned above for each of the 22 intersections. These factors were maintained through all scenario/growth projection analyses. Worksheets documenting all of the analyses performed as part of this Traffic Study are attached.

2.3 Substantial Effects Criteria

Consistent with the Campus Development EIS (NSA 2010) and other NEPA documentation, a project is considered to have a substantial effect on operations of an intersection if the addition of traffic causes LOS to degrade from LOS D or better to LOS E or F.

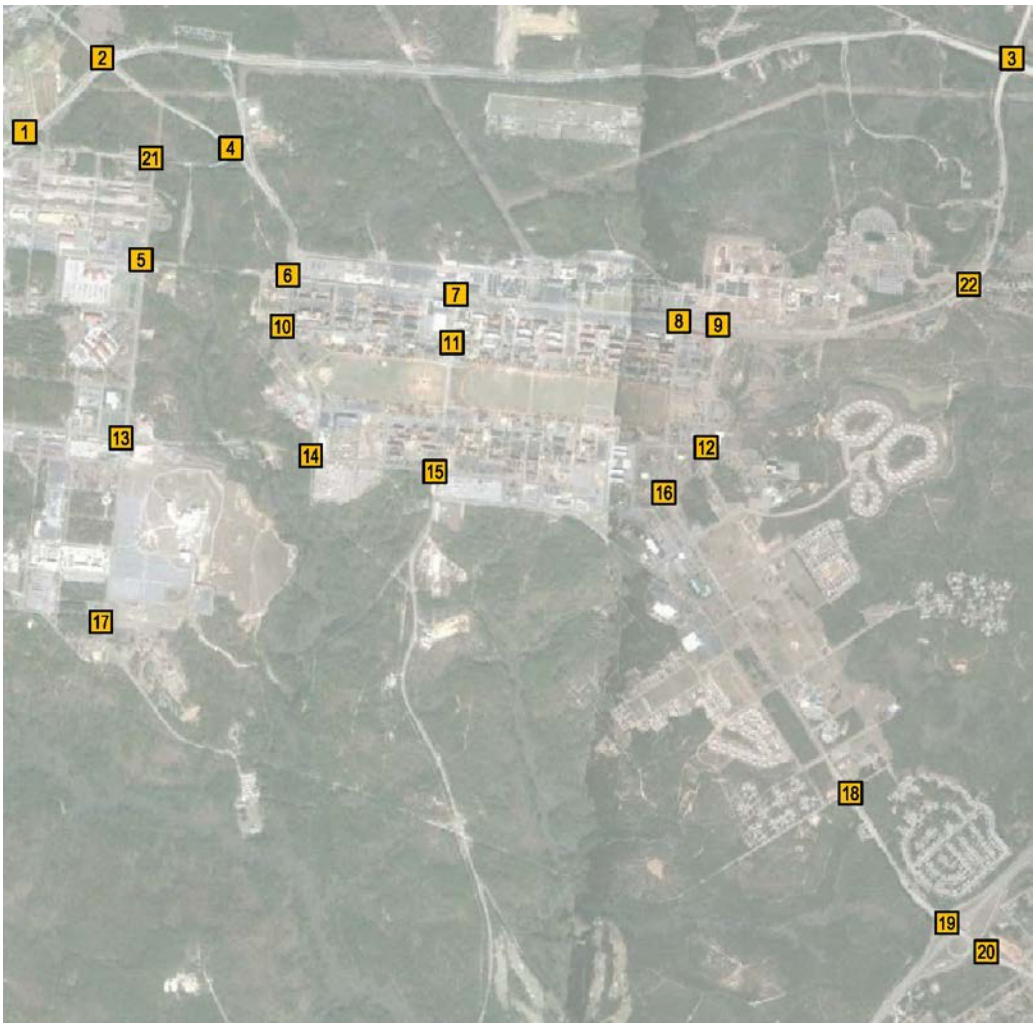
In addition, a project may contribute toward a substantial cumulative effect if its traffic, when taken together with traffic from past, present, and reasonably foreseeable future projects, causes intersection LOS to decline from LOS D or better to LOS E or F.

This traffic analysis is taking into account the LOS for the intersections as they were calculated by the previously mentioned traffic studies and comparing those to the LOS calculated as part of this Traffic Study. In this Traffic Study only those intersections or movements through the intersection that show a substantial decrease in the LOS will be recommended for improvement.

2.3 Region of Influence

The Region of Influence (ROI) for traffic encompasses the major intersections that provide access to and from the action alternatives at Fort Gordon. The ROI for this Traffic Study was were taken from list of intersections presented in the ARCYBER Command and Control Facility Traffic Study prepared in July 2013 and the Access Control Point Transportation Engineering Assessment prepared in April 2013. Figure 2.1 shows the 22 intersections in the ROI that are analyzed as part of this Traffic Study.

Figure 2.1 – Region of Influence Intersection Location Map



1. Gordon Highway and 13th Street
2. Gordon Highway and 19th Street
3. Gordon Highway and 7th Avenue
4. 13th Street and 19th Street
5. Chamberlain Avenue and 15th Street
6. Chamberlain Avenue and 19th Street
7. Chamberlain Avenue and 25th Street
8. Chamberlain Avenue and Rice Road
9. Chamberlain Avenue and Kilbourne Street
10. Barnes Avenue and 19th Street
11. Barnes Avenue and 25th Street
12. Brainard Avenue and 19th Street
13. Lane Avenue and 15th Street
14. Lane Avenue and 19th Street
15. Lane Avenue and 25th Street
16. Lane Avenue and Rice Road
17. North Range Road and 111th Street
18. North Range Road and Avenue of the States
19. US Highway 1 (SB) and Avenue of the States
20. US Highway 1 (NB) and Tobacco Road
21. 13th Avenue and 15th Avenue
22. Chamberlain Ave. and Boardman Lake Road

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CHAPTER 3

Existing Conditions

3.1 Roadway Networks

Field reviews were conducted in August 2012 at Fort Gordon by the Timmons Group as part the ARCYBER Command and Control Facility Traffic Study. The results of these field reviews have been used as the basis for this Traffic Study. These surveys reviewed and recorded various aspects of the existing transportation infrastructure within and adjacent to the ROI, including roadway lane configurations, intersection lane geometry and traffic control, traffic signal timing and phasing, and any other characteristics that are pertinent to performing traffic analysis.

3.2 Traffic Volumes

Existing morning (6:00 AM to 9:00 AM) and afternoon (3:00 PM to 6:00 PM) turning movement counts were collected at Fort Gordon over the course of several weekdays in late July and early August 2012 for the intersection numbered 1 through 20 in Figure 2.1 as part of the ARCYBER Traffic Study. Existing morning (6:30 AM to 8:00 AM) and afternoon (3:30 PM to 5:00 PM) turning movement counts were collected for intersections numbered 21 and 22 as part of the ACP Traffic Study. In general, the morning peak hour began between 6:45 AM and 7:15 AM while the afternoon peak hour typically started between 3:45 PM and 4:45 PM. In an effort to provide consistent analysis, all intersections were assumed to have similar peak hour traffic generation.

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Chapter 4

Baseline Conditions

4.1 Baseline Traffic Data

As mentioned previously, existing traffic data was collected in 2012. However, the establishment of the ARCYBER Command is not expected to be constructed and operational until the year 2016. In order to evaluate the traffic effects under 2016 conditions, a future year baseline traffic was developed. This baseline includes traffic growth associated with present and reasonably foreseeable future projects. Traffic growth was determined for Fort Gordon as a conservative growth factor of 3% annually for four years. This growth factor was uniformly applied to the existing 2012 traffic counts. The volumes used in the Traffic Study were copied from the ARCYBER Traffic Study with the appropriate growth factors applied.

See the Attachments 1 and 2 for the Baseline Intersection LOS Calculation Worksheets.

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CHAPTER 5

Baseline plus Scenario 1, Growth Projection 1

5.1 Traffic Volumes

5.1.1 Traffic Generation

Daily and peak hour traffic generation was estimated using trip generation rates published in *Trip Generation, 8th Edition: An ITE Informational Report* (Institute of Transportation Engineers [ITE] 2008). Trip generation was estimated based on the Growth Projections for each of the four designated areas using ITE trip rates for land use code 715, single tenant office. Growth Projection 1 contributes a total population growth of 3,000 to Fort Gordon. See Table 5-1 and Table 5-2 for the trips generated by Growth Projection 1 in the four growth areas for both the AM and the PM Peak Hours.

Table 5-1: Intersection Level of Service Summary Scenario 1, Growth Projection 1 – AM Peak Hour

Growth Area Number	Number of Employees	Trip Rate[(a)] per Employee	Daily Trips	AM Peak Hour				
				% of Daily	In:Out Ratio	In	Out	Total
1	375	3.62	1,358	14.6%	0.89:0.11	176	22	198
2	900	3.62	3,258	14.6%	0.89:0.11	424	52	476
3	225	3.62	815	14.6%	0.89:0.11	106	13	119
4	1,500	3.62	5,430	14.6%	0.89:0.11	706	87	793

Table 5-2: Intersection Level of Service Summary Scenario 1, Growth Projection 1 – PM Peak Hour

Growth Area Number	Number of Employees	Trip Rate[(a)] per Employee	Daily Trips	PM Peak Hour				
				% of Daily	In:Out Ratio	In	Out	Total
1	375	3.62	1,358	13.8%	0.15:0.85	28	159	187
2	900	3.62	3,258	13.8%	0.15:0.85	68	383	450
3	225	3.62	815	13.8%	0.15:0.85	17	95	112
4	1,500	3.62	5,430	13.8%	0.15:0.85	112	637	749

5.1.2 Traffic Distribution

Fort Gordon's Scenario 1, Growth Projection 1 traffic was then added to the baseline intersections in accordance with a distribution pattern that was developed based on the locations of access gates, existing

traffic volumes, growth area locations, and likely travel routes between the gates and the growth areas. This distribution pattern is consistent with the distribution provided by the Campus Development EIS contained in the ARCYBER Traffic Study. Figures 5-1 through 5-4 presents the distribution patterns by movement volume at each of the study intersections.

5.1.3 Traffic Assignment

Figures 5-5 through 5-8 shows the assignment of trips from each of the growth areas to the intersections that comprise the ROI. These volumes were calculated by applying the percentages shown in Figures 5-1 through 5-4 to the inbound and outbound trips generated in Table 5-1 and Table 5-2. The combined peak hour volumes for the baseline plus Scenario 1, Growth Projection 1 are presented in Figure 5-9. The volumes shown in Figure 5-9 were calculated by adding the assignment of projected traffic (Figures 5-1 through 5-4) to the baseline traffic volumes (Figure 4-1).

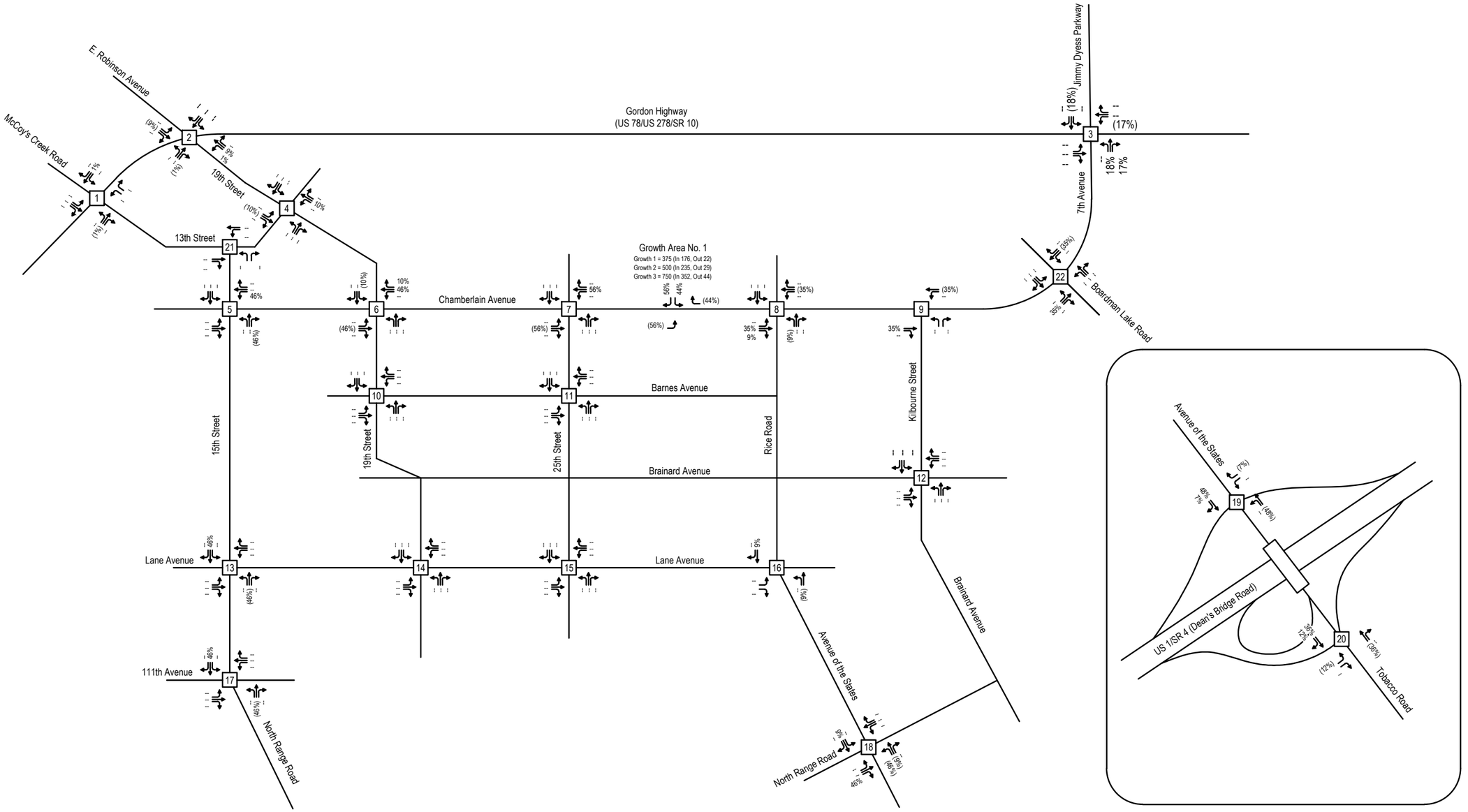

FIGURE 5 - 1
TRAFFIC DISTRIBUTION - AREA 1

Q:\PROJECTS\IDIQ Projects\C08004 USACE Huntsville\C08004-4-09E Traffic Engineering Analysis ERAFB & SAFB\2 Drawings\5 Civil\Model\Trip Distribution Area 1 - Figure 5-1.dwg Apr 07, 2014 - 4:35pm

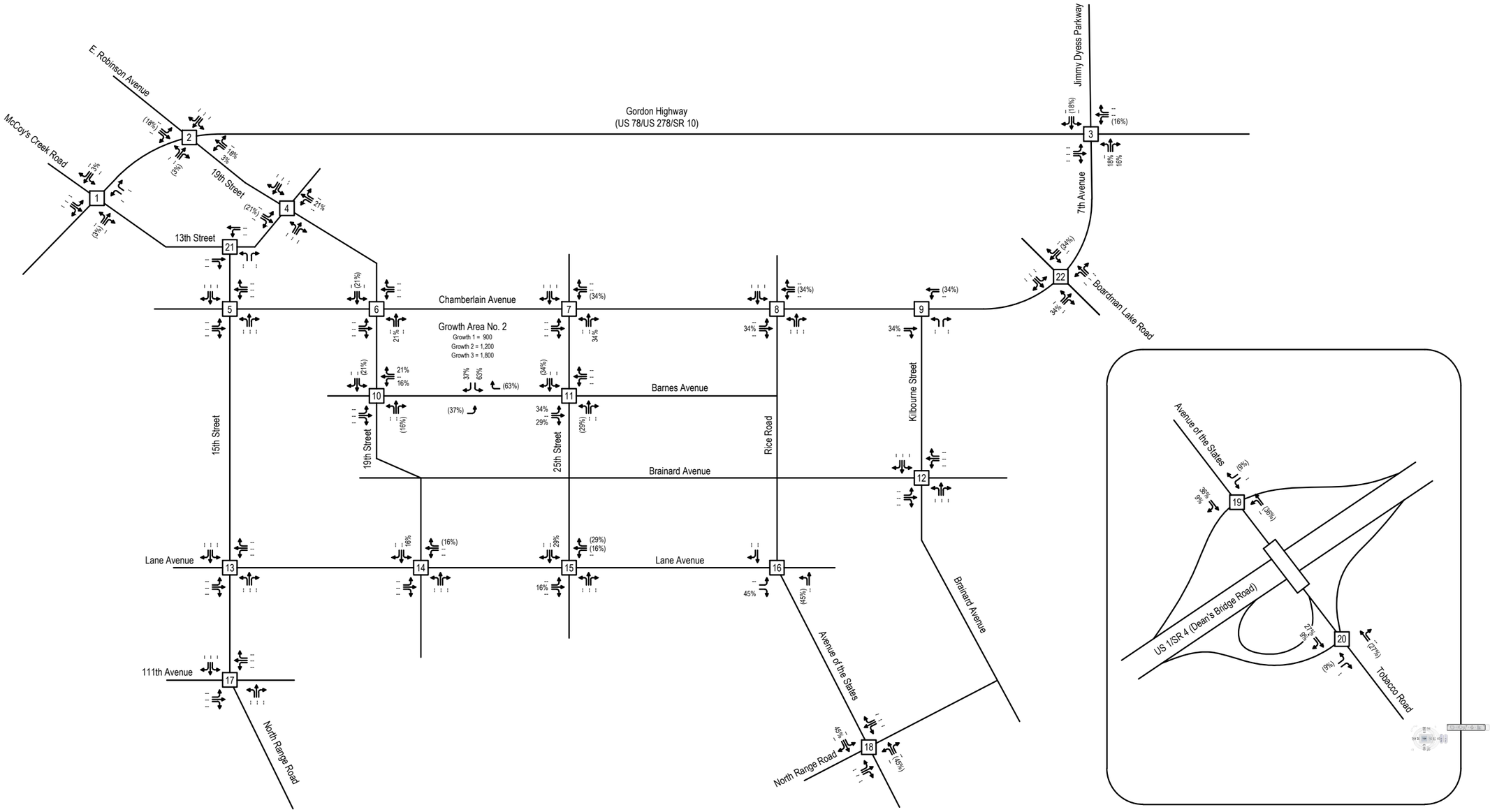

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FIGURE 5 - 2
TRAFFIC DISTRIBUTION - AREA 2

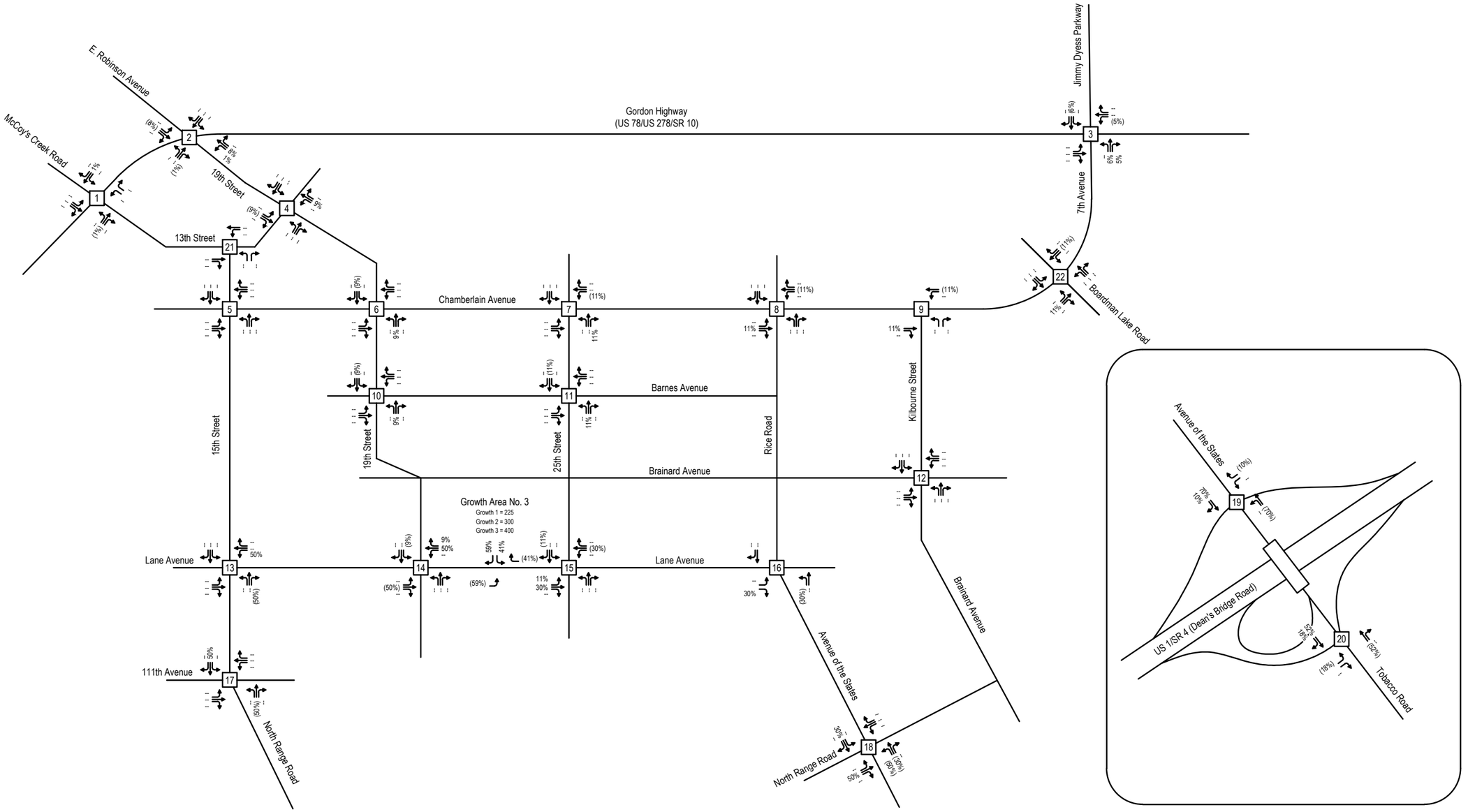

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FIGURE 5 - 3
TRAFFIC DISTRIBUTION - AREA 3

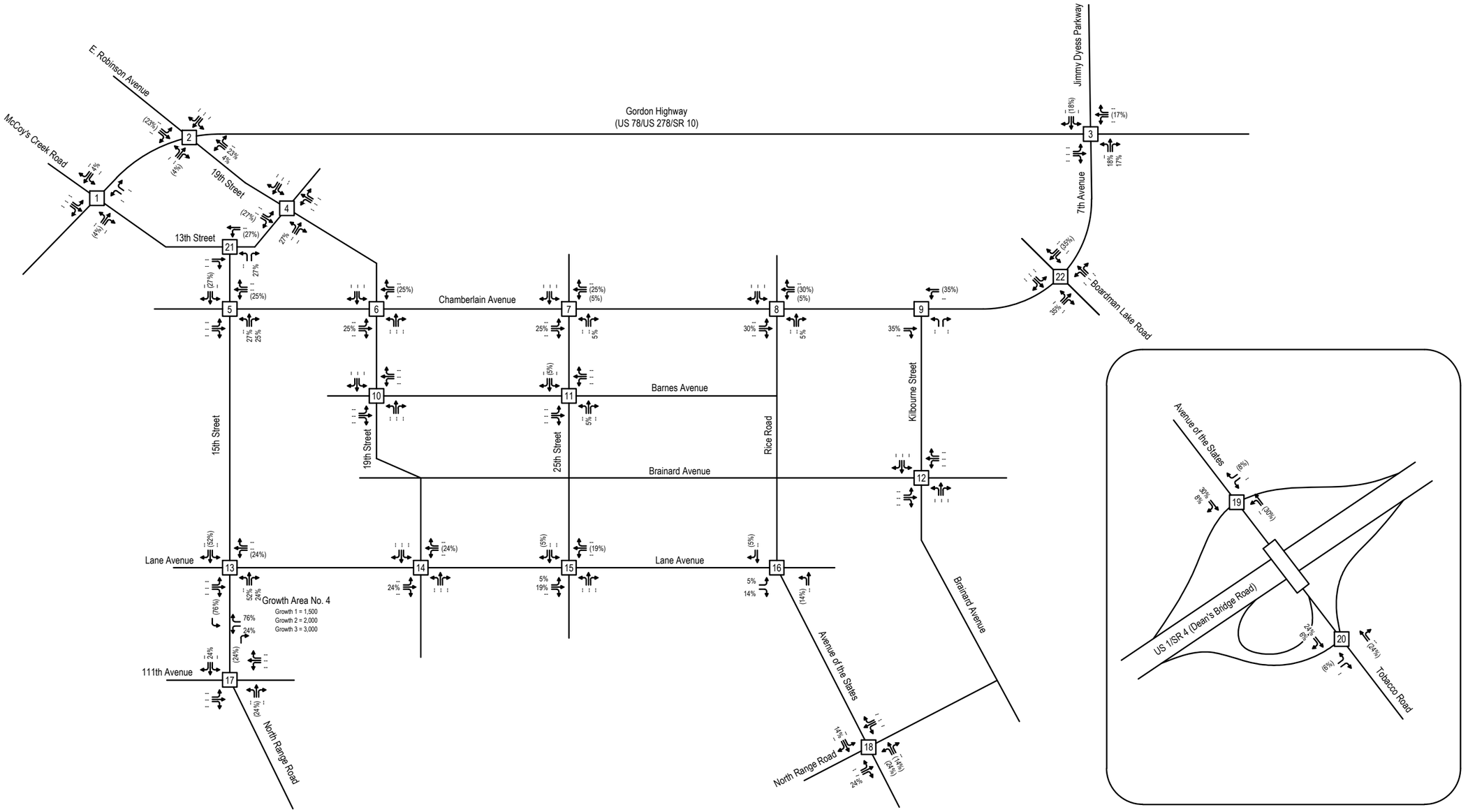

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FIGURE 5 - 4
TRAFFIC DISTRIBUTION - AREA 4

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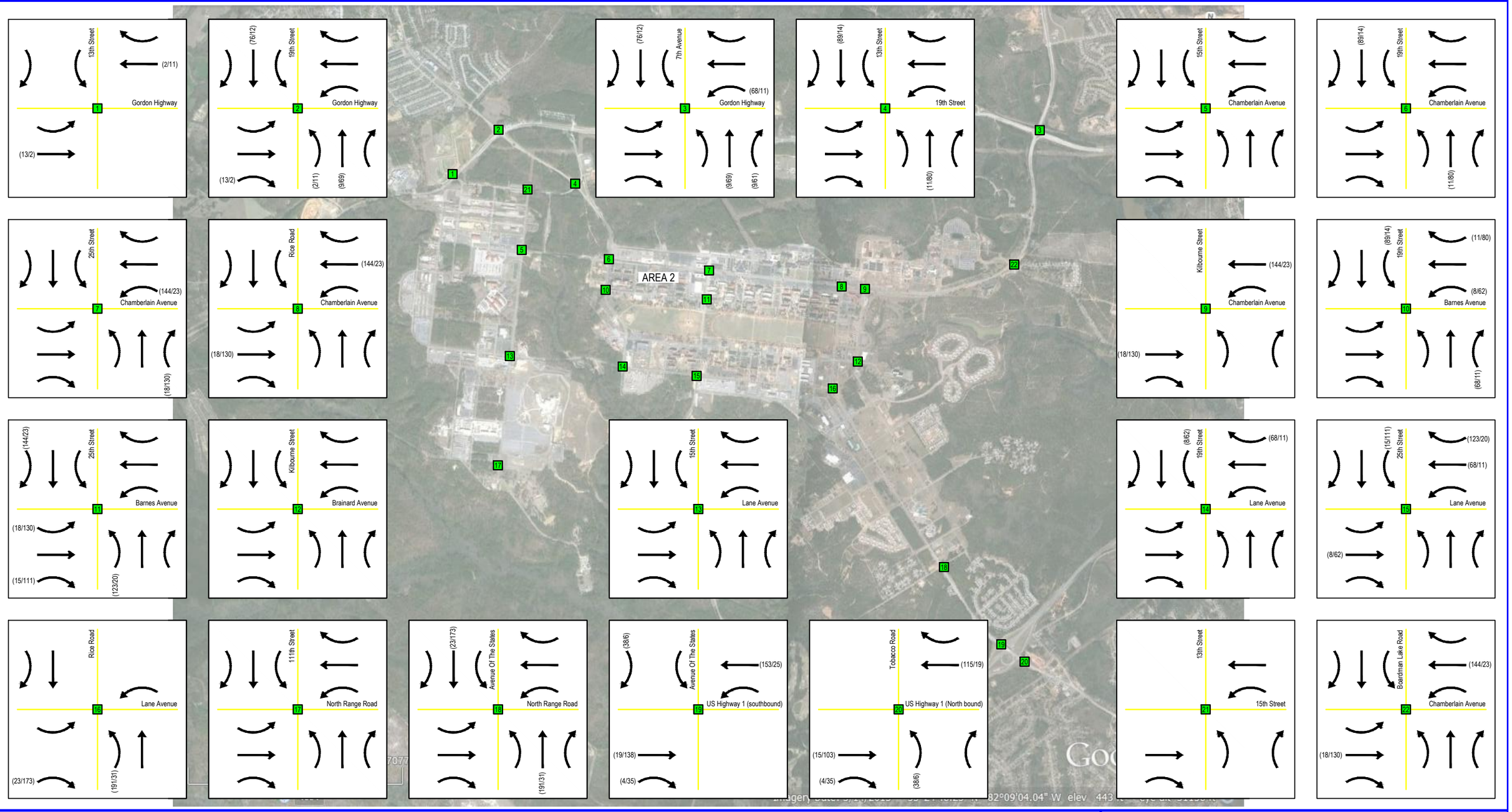
LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 5 - 5
TRAFFIC ASSIGNMENT - AREA 1
SCENARIO 1, GROWTH PROJECTION 1



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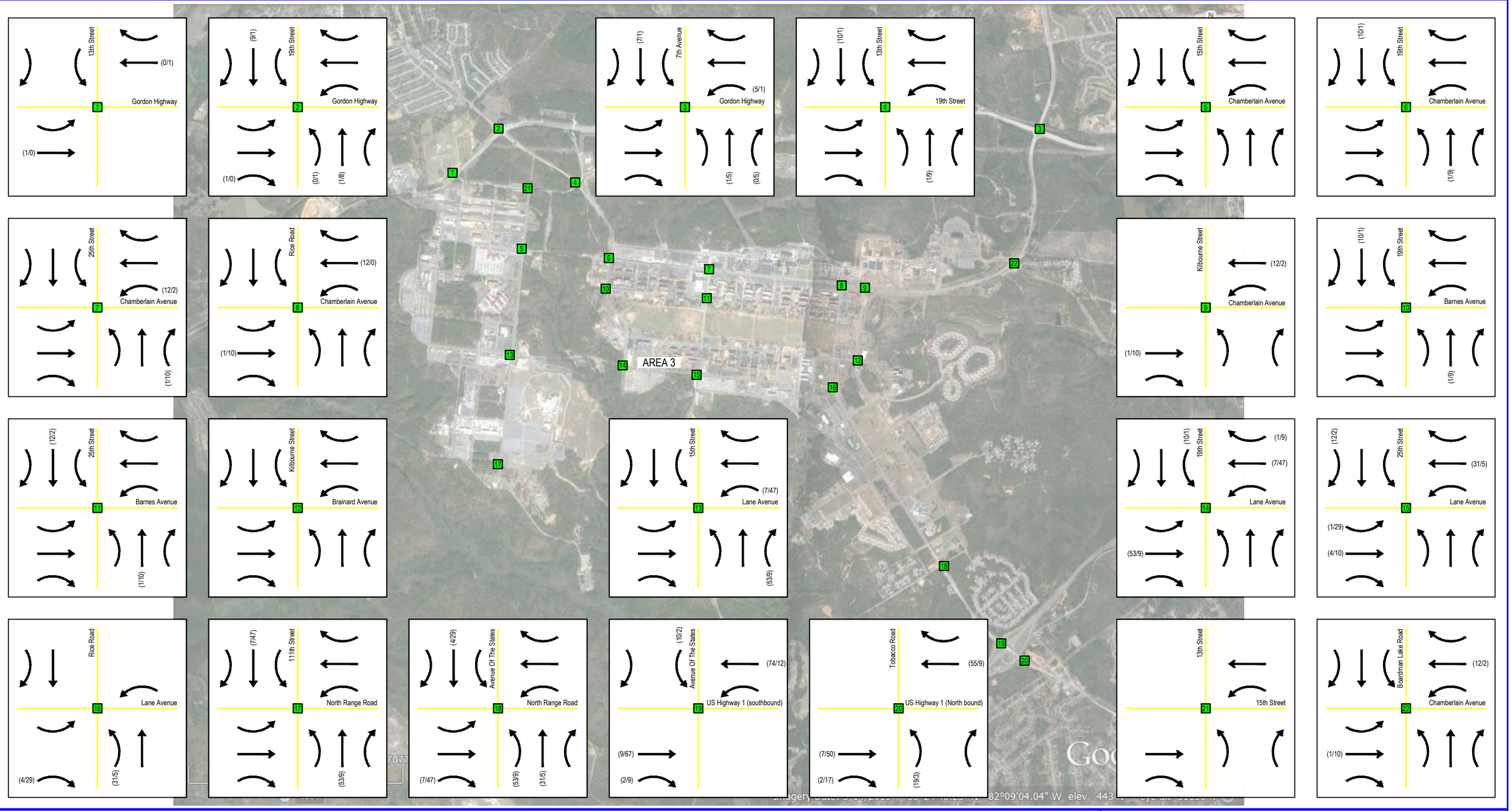
LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 5 - 6
TRAFFIC ASSIGNMENT - AREA 2
SCENARIO 1, GROWTH PROJECTION 1



LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 5 - 7
TRAFFIC ASSIGNMENT - AREA 3
SCENARIO 1, GROWTH PROJECTION 1

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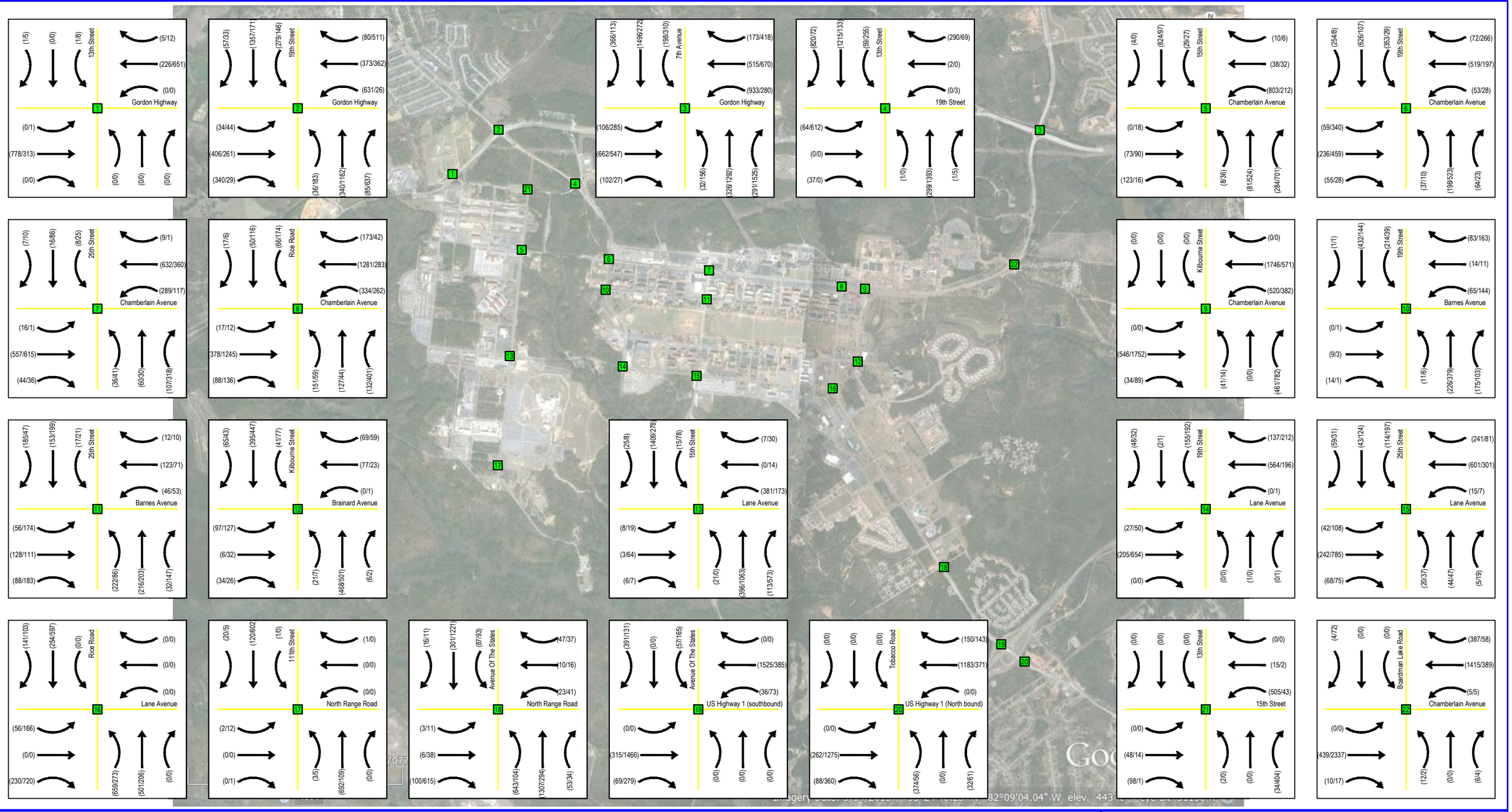
LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 5 - 8
TRAFFIC ASSIGNMENT - AREA 4
SCENARIO 1, GROWTH PROJECTION 1



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LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX % OUTBOUND TRIPS
- XX % INBOUND TRIPS

FIGURE 5 - 9
PROJECTED TRAFFIC VOLUME
SCENARIO 1, GROWTH PROJECTION 1

5.2 Capacity Analysis

5.2.1 Intersection Analysis

Table 5-2 summarizes the LOS analysis results for the study intersections under the baseline plus Scenario 1, Growth Projection 1 conditions. See the Attachments 3 and 6 for the Intersection LOS Calculation Worksheets.

Table 5-3: Intersection Level of Service Summary Scenario 1, Growth Projection 1

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
1	Gordon Highway and 13th Street	Two-Way Stop	Eastbound	A	A	--	A	A	--
			Westbound	B	--	--	A	--	--
			Northbound	C	--	--	--	--	--
			Southbound	C	B	--	C	C	--
2	Gordon Highway and 19th Street	Signal	Eastbound	D	E	D	D	D	--
			Westbound	D	F	D	E	F	--
			Northbound	E	F	D	F	F	--
			Southbound	D	D	D	F	D	--
			Intersection	D	F	D	F	F	--
3	Gordon Highway and 7th Avenue	Signal	Eastbound	E	F	E	F	F	--
			Westbound	D	E	D	F	F	--
			Northbound	C	C	C	F	F	--
			Southbound	D	E	D	F	F	--
			Intersection	D	E	D	F	F	--
4	13th Street and 19th Street	Two-Way Stop	Eastbound	F	F	--	F	F	--
			Westbound	B	C	--	E	F	--
			Northbound	B	C	--	A	A	--
			Southbound	A	A	--	C	C	--
5	Chamberlain Avenue and 15th Street	Two-Way Stop	Eastbound	A	A	--	A	A	--
			Westbound	A	B	--	A	A	--
			Northbound	F	F	--	F	F	--
			Southbound	F	F	--	F	F	--
6	Chamberlain Avenue and 19th Street	Signal	Eastbound	C	C	--	B	C	B
			Westbound	C	D	--	C	D	C
			Northbound	C	D	--	C	E	C
			Southbound	C	D	--	C	C	C
			Intersection	C	D	--	C	D	C
7	Chamberlain Avenue and 25th Street	Two-Way Stop	Eastbound	A	A	A	A	A	C
			Westbound	A	B	A	A	A	C
			Northbound	E	F	B	C	F	D
			Southbound	D	F	B	D	F	B
8	Chamberlain Avenue and Rice Road	Signal	Eastbound	B	B	--	C	C	C
			Westbound	A	B	--	B	C	B
			Northbound	C	C	--	D	F	D
			Southbound	C	C	--	C	D	C
			Intersection	B	B	--	C	D	C

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
9	Chamberlain Avenue and Kilbourne Street	One-Way Stop	Eastbound	--	--	--	--	--	B
			Westbound	B	B	--	**D**	**F**	B
			Northbound	F	F	--	F	F	D
			Southbound	--	--	--	--	--	--
10	Barnes Avenue and 19th Street	Two-Way Stop	Eastbound	C	C	A	B	C	--
			Westbound	**D**	**F**	B	C	C	--
			Northbound	A	A	C	A	A	--
			Southbound	A	A	C	A	A	--
11	Barnes Avenue and 25th Street	All-Way Stop	Eastbound	B	C	C	**B**	**E**	C
			Westbound	B	C	B	B	B	B
			Northbound	**B**	**E**	C	B	D	D
			Southbound	B	C	C	B	C	C
			Intersection	B	D	C	B	D	C
12	Brainard Avenue and Kilbourne Street	One-Way Stop	Eastbound	F	F	--	F	F	--
			Westbound	D	D	--	C	C	--
			Northbound	A	A	--	A	A	--
			Southbound	A	A	--	A	A	--
13	Lane Avenue and 15th Street	All-Way Stop	Eastbound	B	B	B	B	B	--
			Westbound	**C**	**E**	C	B	C	--
			Northbound	**C**	**F**	B	F	F	--
			Southbound	F	F	B	B	C	--
			Intersection	F	F	B	F	F	--
14	Lane Avenue and 19th Street	Two-Way Stop	Eastbound	A	A	--	A	A	C
			Westbound	A	A	--	A	A	B
			Northbound	B	C	--	B	B	A
			Southbound	C	D	--	**C**	**F**	B
15	Lane Avenue and 25th Street	Two-Way Stop	Eastbound	A	A	C	A	A	--
			Westbound	A	A	D	A	A	--
			Northbound	**C**	**F**	B	F	F	--
			Southbound	**C**	**F**	B	F	F	--
16	Lane Avenue and Rice Road	Roundabout	Eastbound	A	A	--	**D**	**F**	--
			Westbound	--	--	--	--	--	--
			Northbound	A	B	--	A	A	--
			Southbound	A	B	--	B	C	--
			Intersection	A	B	--	**C**	**F**	--
17	North Range Road and 111th Street	Two-Way Stop	Eastbound	B	C	--	B	C	--
			Westbound	B	B	--	--	--	--
			Northbound	A	A	--	A	A	--
			Southbound	A	A	--	A	A	--
18	North Range Road and Avenue of the States	Two-Way Stop	Eastbound	**D**	**F**	C	F	F	--
			Westbound	F	F	C	F	F	--
			Northbound	A	B	B	B	B	--
			Southbound	B	B	C	A	A	--
19	US Highway 1 (SB) and Avenue of the States	One-Way Stop	Eastbound	--	--	A	--	--	A
			Westbound	A	A	B	B	C	A
			Northbound	--	--	--	--	--	--
			Southbound	**C**	**F**	C	**D**	**F**	D

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
20	US Highway 1 (NB) and Tobacco Road	One-Way Stop	Eastbound	--	--	A	--	--	--
			Westbound	--	--	A	--	--	--
			Northbound	**C**	**F**	B	C	D	--
			Southbound	--	--	--	--	--	--
21	13^{th} Avenue and 15^{th} Avenue	One-Way Stop	Eastbound	--	--	--	--	--	--
			Westbound	A	A	--	A	A	--
			Northbound	A	B	--	A	B	--
			Southbound	--	--	--	--	--	--
22	Chamberlain Avenue and Boardman Lake Road	Two-Way Stop	Eastbound	--	--	--	--	--	--
			Westbound	A	A	--	C	C	--
			Northbound	C	C	--	F	F	--
			Southbound	B	B	--	A	A	--

Specific physical improvements to select intersections will reduce the effect of the additional traffic to a less than substantial level. Refer to Chapter 13 for a description of these and other mitigation, avoidance and/or minimization measures.

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CHAPTER 6

Baseline plus Scenario 1, Growth Projection 2

6.1 Traffic Volumes

6.1.1 Traffic Generation

Daily and peak hour traffic generation was estimated using trip generation rates published in *Trip Generation, 8th Edition: An ITE Informational Report* (Institute of Transportation Engineers [ITE] 2008). Trip generation was estimated based on the Growth Projections for each of the four designated areas using ITE trip rates for land use code 715, single tenant office. Growth Projection 2 contributes a total population growth of 4,000 to Fort Gordon. See Table 6-1 and Table 6-2 for the trips generated by Growth Projection 2 in the four growth areas for both the AM and the PM Peak Hours.

Table 6-1: Intersection Level of Service Summary Scenario 1, Growth Projection 2 – AM Peak Hour

Growth Area Number	Number of Employees	Trip Rate[(a)] per Employee	Daily Trips	AM Peak Hour				
				% of Daily	In:Out Ratio	In	Out	Total
1	500	3.62	1,810	14.6%	0.89:0.11	235	29	264
2	1,200	3.62	4,344	14.6%	0.89:0.11	564	70	634
3	300	3.62	1,086	14.6%	0.89:0.11	142	17	159
4	2,000	3.62	7,240	14.6%	0.89:0.11	941	116	1,057

Table 6-2: Intersection Level of Service Summary Scenario 1, Growth Projection 2 – PM Peak Hour

Growth Area Number	Number of Employees	Trip Rate[(a)] per Employee	Daily Trips	PM Peak Hour				
				% of Daily	In:Out Ratio	In	Out	Total
1	500	3.62	1,810	13.8%	0.15:0.85	38	213	250
2	1,200	3.62	4,344	13.8%	0.15:0.85	90	509	599
3	300	3.62	1,086	13.8%	0.15:0.85	23	128	150
4	2,000	3.62	7,240	13.8%	0.15:0.85	150	849	999

6.1.2 Traffic Distribution

Fort Gordon's Scenario 1, Growth Projection 2 traffic was then added to the baseline intersections in accordance with a distribution pattern that was developed based on the locations of access gates, existing traffic volumes, growth area locations, and likely travel routes between the gates and the growth areas. This distribution pattern is consistent with the distribution provided by the Campus Development EIS contained in the ARCYBER Traffic Study. Figures 5-1 through 5-4 presents the distribution patterns by movement volume at each of the study intersections.

6.1.3 Traffic Assignment

Figures 6-1 through 6-4 shows the assignment of trips from each of the growth areas to the intersections that comprise the ROI. These volumes were calculated by applying the percentages shown in Figures 5-1 through 5-4 to the inbound and outbound trips generated in Table 6-1 and Table 6-2. The combined peak hour volumes for the baseline plus Scenario 1, Growth Projection 2 are presented in Figure 6-5. The volumes shown in Figure 6-5 were calculated by adding the assignment of projected traffic (Figures 6-1 through 6-4) to the baseline traffic volumes (Figure 4-1).

FIGURE 6 - 1
TRAFFIC ASSIGNMENT - AREA 1
SCENARIO 1, GROWTH PROJECTION 2

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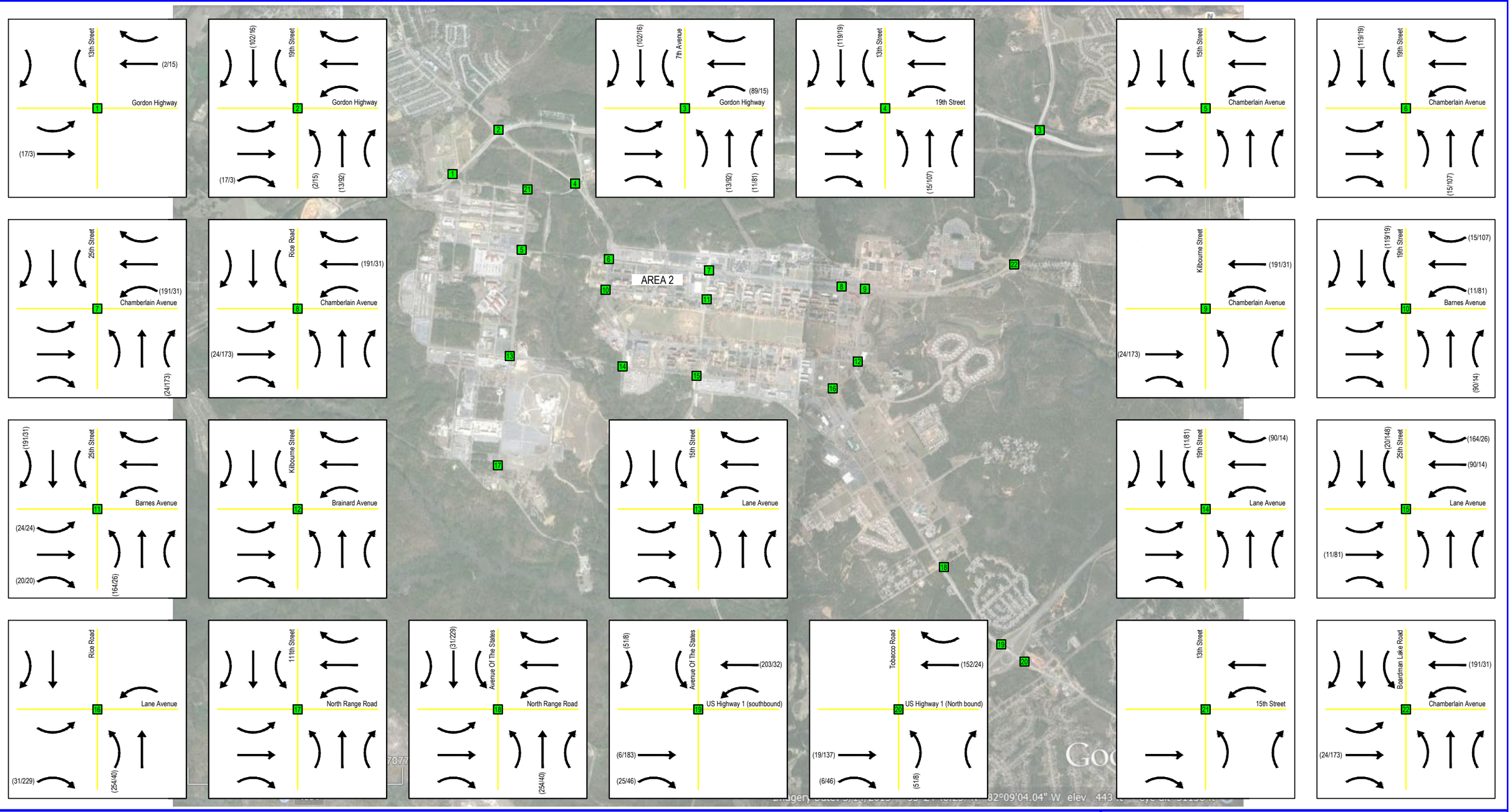

LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 6 - 2
TRAFFIC ASSIGNMENT - AREA 2
SCENARIO 1, GROWTH PROJECTION 2

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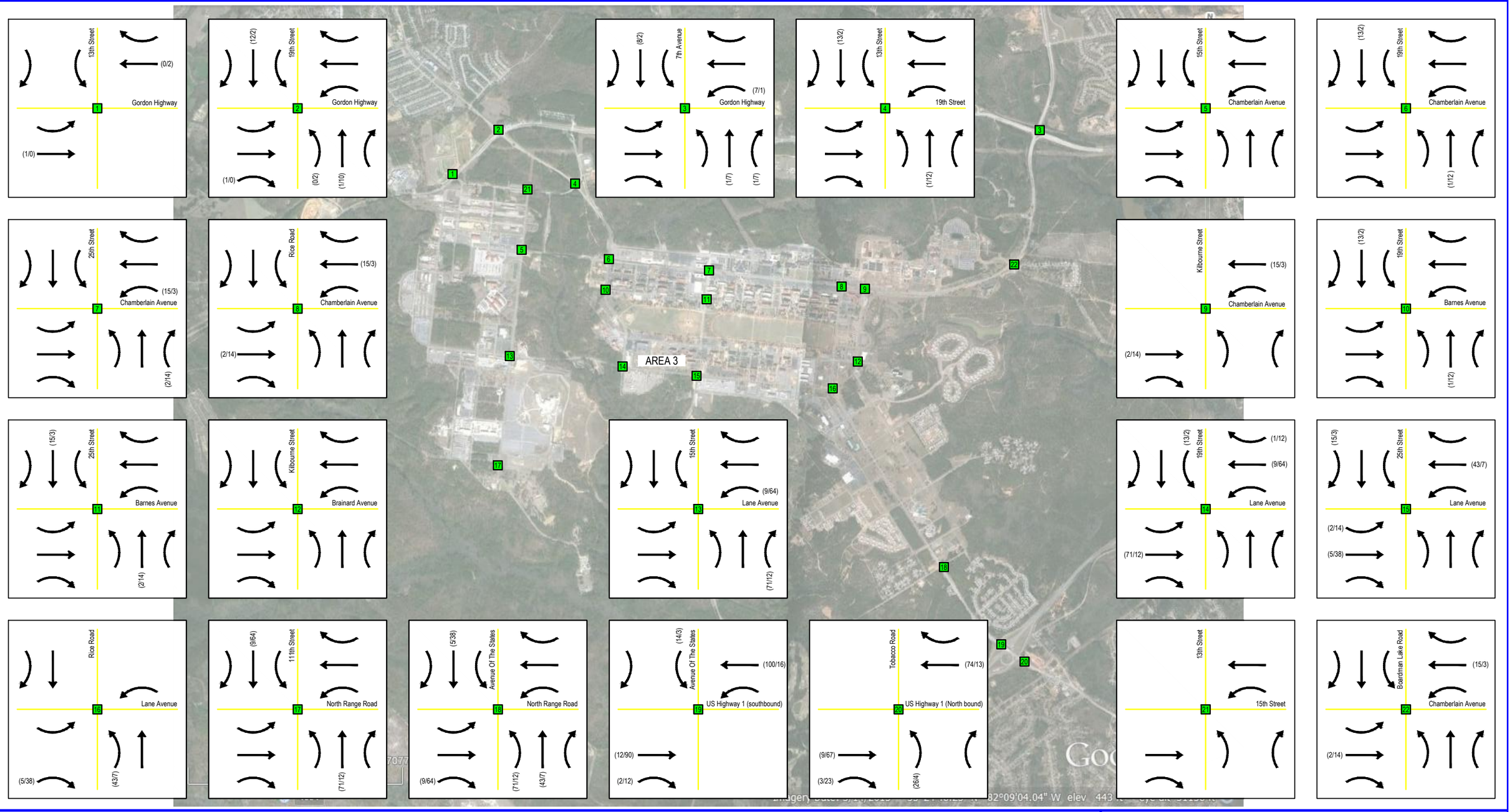

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LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 6 - 3
TRAFFIC ASSIGNMENT - AREA 3
SCENARIO 1, GROWTH PROJECTION 2

LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 6 - 4
TRAFFIC ASSIGNMENT - AREA 4
SCENARIO 1, GROWTH PROJECTION 2

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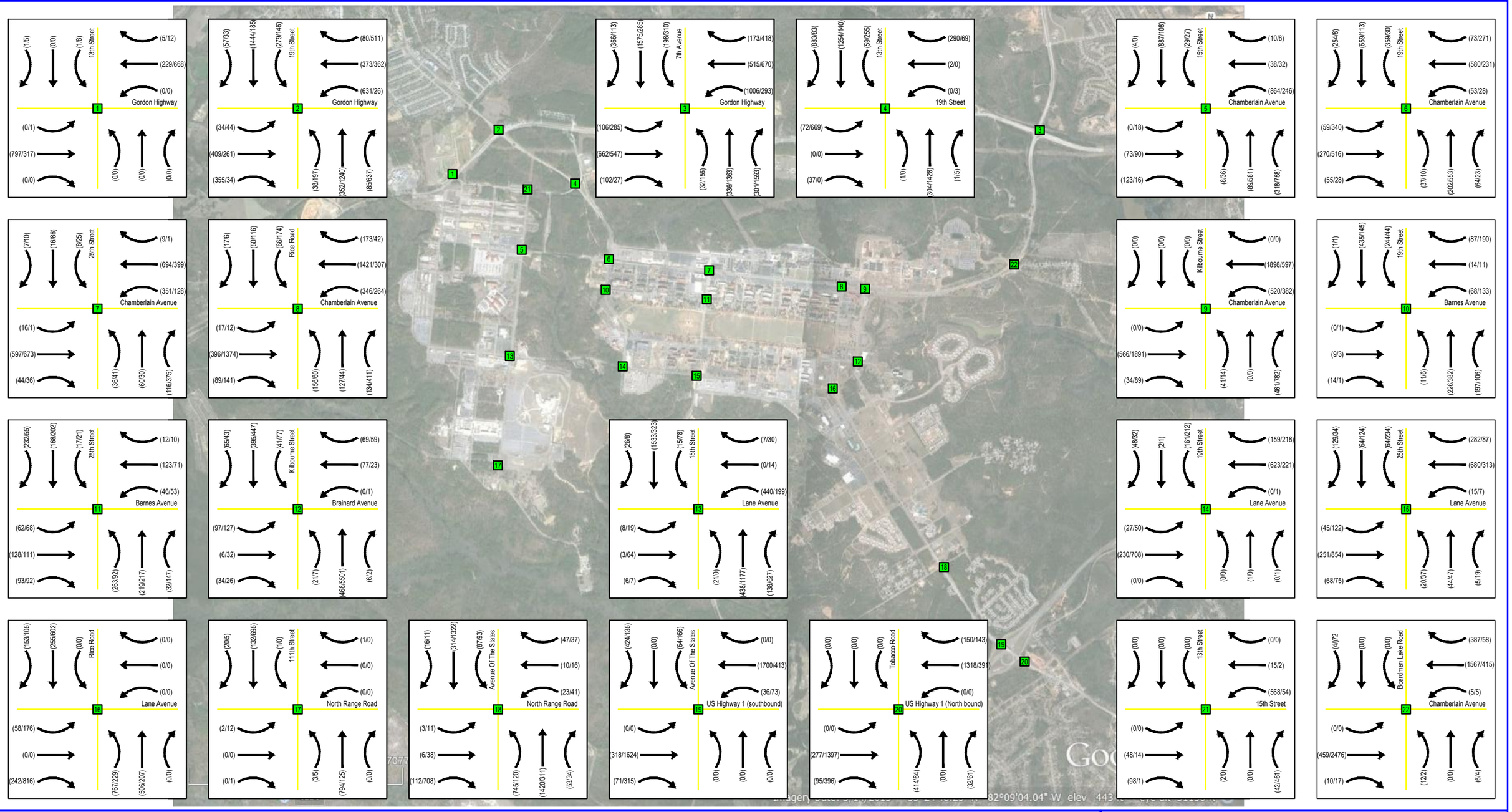

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LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX % OUTBOUND TRIPS
- XX % INBOUND TRIPS

FIGURE 6 - 5
PROJECTED TRAFFIC VOLUME
SCENARIO 1, GROWTH PROJECTION 2

6.2 Capacity Analysis

6.2.1 Intersection Analysis

Table 6-2 summarizes the LOS analysis results for the study intersections under the baseline plus Scenario 1, Growth Projection 2 conditions. See the Attachments 4 and 7 for the Intersection LOS Calculation Worksheets.

Table 6-3: Intersection Level of Service Summary Scenario 1, Growth Projection 2

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
1	Gordon Highway and 13th Street	Two-Way Stop	Eastbound	A	A	--	A	A	--
			Westbound	B	--	--	A	--	--
			Northbound	C	--	--	--	--	--
			Southbound	C	B	--	C	C	--
2	Gordon Highway and 19th Street	Signal	Eastbound	D	F	D	D	C	--
			Westbound	D	F	D	E	F	--
			Northbound	E	F	E	F	F	--
			Southbound	D	D	D	F	D	--
			Intersection	D	F	D	F	F	--
3	Gordon Highway and 7th Avenue	Signal	Eastbound	E	F	E	F	F	--
			Westbound	D	E	D	F	F	--
			Northbound	C	D	C	F	F	--
			Southbound	D	F	D	F	F	--
			Intersection	D	E	D	F	F	--
4	13th Street and 19th Street	Two-Way Stop	Eastbound	F	F	--	F	F	--
			Westbound	B	C	--	E	F	--
			Northbound	B	C	--	A	A	--
			Southbound	A	A	--	C	C	--
5	Chamberlain Avenue and 15th Street	Two-Way Stop	Eastbound	A	A	--	A	A	--
			Westbound	A	B	--	A	A	--
			Northbound	F	F	--	F	F	--
			Southbound	F	F	--	F	F	--
6	Chamberlain Avenue and 19th Street	Signal	Eastbound	C	C	C	B	C	B
			Westbound	C	E	C	C	D	C
			Northbound	C	D	C	C	F	C
			Southbound	C	D	C	C	D	C
			Intersection	C	D	C	C	D	C
7	Chamberlain Avenue and 25th Street	Two-Way Stop	Eastbound	A	A	A	A	A	A
			Westbound	A	B	A	A	A	A
			Northbound	E	F	C	C	F	B
			Southbound	D	F	B	D	F	A
8	Chamberlain Avenue and Rice Road	Signal	Eastbound	B	B	--	C	D	C
			Westbound	A	B	--	B	E	B
			Northbound	C	C	--	D	F	D
			Southbound	C	C	--	C	D	D
			Intersection	B	B	--	C	E	C

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
9	Chamberlain Avenue and Kilbourne Street	One-Way Stop	Eastbound	--	--	--	--	F	B
			Westbound	B	B	--	**D**	**F**	B
			Northbound	F	F	--	F	F	C
			Southbound	--	--	--	--	--	--
10	Barnes Avenue and 19th Street	Two-Way Stop	Eastbound	C	C	A	B	C	--
			Westbound	**D**	**F**	B	C	D	--
			Northbound	A	A	C	A	A	--
			Southbound	A	A	C	A	A	--
11	Barnes Avenue and 25th Street	All-Way Stop	Eastbound	B	C	C	B	B	--
			Westbound	B	C	B	B	B	--
			Northbound	**B**	**F**	B	B	C	--
			Southbound	B	D	C	B	B	--
			Intersection	**B**	**E**	C	B	C	--
12	Brainard Avenue and Kilbourne Street	One-Way Stop	Eastbound	F	F	--	F	F	--
			Westbound	D	D	--	C	C	--
			Northbound	A	A	--	A	A	--
			Southbound	A	A	--	A	A	--
13	Lane Avenue and 15th Street	All-Way Stop	Eastbound	B	B	B	B	B	--
			Westbound	**C**	**F**	C	B	C	--
			Northbound	**C**	**F**	C	**F**	**F**	--
			Southbound	F	F	B	B	D	--
			Intersection	F	F	C	F	F	--
14	Lane Avenue and 19th Street	Two-Way Stop	Eastbound	A	A	B	A	A	C
			Westbound	A	A	C	A	A	B
			Northbound	B	C	A	B	B	A
			Southbound	**C**	**E**	B	**C**	**F**	B
15	Lane Avenue and 25th Street	Two-Way Stop	Eastbound	A	B	B	A	A	--
			Westbound	A	A	B	A	B	--
			Northbound	**C**	**F**	D	F	F	--
			Southbound	**C**	**F**	D	F	F	--
16	Lane Avenue and Rice Road	Roundabout	Eastbound	A	A	--	A	A	--
			Westbound	--	--	--	--	--	--
			Northbound	A	C	--	A	A	--
			Southbound	A	C	--	B	C	--
			Intersection	A	B	--	B	A	--
17	North Range Road and 111th Street	Two-Way Stop	Eastbound	B	C	--	B	C	--
			Westbound	B	B	--	--	--	--
			Northbound	A	A	--	A	A	--
			Southbound	A	A	--	A	A	--
18	North Range Road and Avenue of the States	Two-Way Stop	Eastbound	**D**	**F**	C	F	F	--
			Westbound	F	F	C	F	F	--
			Northbound	A	B	B	B	B	--
			Southbound	B	B	C	A	A	--
19	US Highway 1 (SB) and Avenue of the States	One-Way Stop	Eastbound	--	--	A	--	--	A
			Westbound	A	A	B	B	C	A
			Northbound	--	--	--	--	--	--
			Southbound	**C**	**F**	C	**D**	**F**	D

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
20	US Highway 1 (NB) and Tobacco Road	One-Way Stop	Eastbound	--	--	A	--	--	A
			Westbound	--	--	A	--	--	A
			Northbound	**C**	**F**	B	**C**	**F**	B
			Southbound	--	--	--	--	--	--
21	13th Avenue and 15th Avenue	One-Way Stop	Eastbound	--	--	--	--	--	--
			Westbound	A	A	--	A	A	--
			Northbound	A	B	--	A	B	--
			Southbound	--	--	--	--	--	--
22	Chamberlain Avenue and Boardman Lake Road	Two-Way Stop	Eastbound	--	--	--	--	--	--
			Westbound	A	A	--	C	D	--
			Northbound	C	D	--	F	F	--
			Southbound	B	B	--	A	A	--

Specific physical improvements to select intersections will reduce the effect of the additional traffic to a less than substantial level. Refer to Chapter 13 for a description of these and other mitigation, avoidance and/or minimization measures.

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CHAPTER 7

Baseline plus Scenario 1, Growth Projection 3

7.1 Traffic Volumes

7.1.1 Traffic Generation

Daily and peak hour traffic generation was estimated using trip generation rates published in *Trip Generation, 8th Edition: An ITE Informational Report* (Institute of Transportation Engineers [ITE] 2008). Trip generation was estimated based on the Growth Projections for each of the four designated areas using ITE trip rates for land use code 715, single tenant office. Growth Projection 3 contributes a total population growth of 6,000 to Fort Gordon. See Table 7-1 and Table 7-2 for the trips generated by Growth Projection 2 in the four growth areas for both the AM and the PM Peak Hours.

Table 7-1: Intersection Level of Service Summary Scenario 1, Growth Projection 3 – AM Peak Hour

Growth Area Number	Number of Employees	Trip Rate[(a)] per Employee	Daily Trips	AM Peak Hour				
				% of Daily	In:Out Ratio	In	Out	Total
1	750	3.62	2,715	14.6%	0.89:0.11	352	44	396
2	1,800	3.62	6,516	14.6%	0.89:0.11	846	105	951
3	400	3.62	1,448	14.6%	0.89:0.11	188	23	211
4	3,000	3.62	10,860	14.6%	0.89:0.11	1,412	174	1,586

Table 7-2: Intersection Level of Service Summary Scenario 1, Growth Projection 3 – PM Peak Hour

Growth Area Number	Number of Employees	Trip Rate[(a)] per Employee	Daily Trips	PM Peak Hour				
				% of Daily	In:Out Ratio	In	Out	Total
1	750	3.62	2,715	13.8%	0.15:0.85	56	319	375
2	1,800	3.62	6,516	13.8%	0.15:0.85	135	764	899
3	400	3.62	1,448	13.8%	0.15:0.85	30	170	200
4	3,000	3.62	10,860	13.8%	0.15:0.85	225	1,274	1,499

7.1.2 Traffic Distribution

Fort Gordon's Scenario 1, Growth Projection 3 traffic was then added to the baseline intersections in accordance with a distribution pattern that was developed based on the locations of access gates, existing

traffic volumes, growth area locations, and likely travel routes between the gates and the growth areas. This distribution pattern is consistent with the distribution provided by the Campus Development EIS contained in the ARCYBER Traffic Study. Figures 5-1 through 5-4 presents the distribution patterns by movement volume at each of the study intersections.

7.1.3 Traffic Assignment

Figures 7-1 through 7-4 shows the assignment of trips from each of the growth areas to the intersections that comprise the ROI. These volumes were calculated by applying the percentages shown in Figures 5-1 through 5-4 to the inbound and outbound trips generated in Table 7-1 and Table 7-2. The combined peak hour volumes for the baseline plus Scenario 1, Growth Projection 3 are presented in Figure 7-5. The volumes shown in Figure 7-5 were calculated by adding the assignment of projected traffic (Figures 7-1 through 7-4) to the baseline traffic volumes (Figure 4-1).

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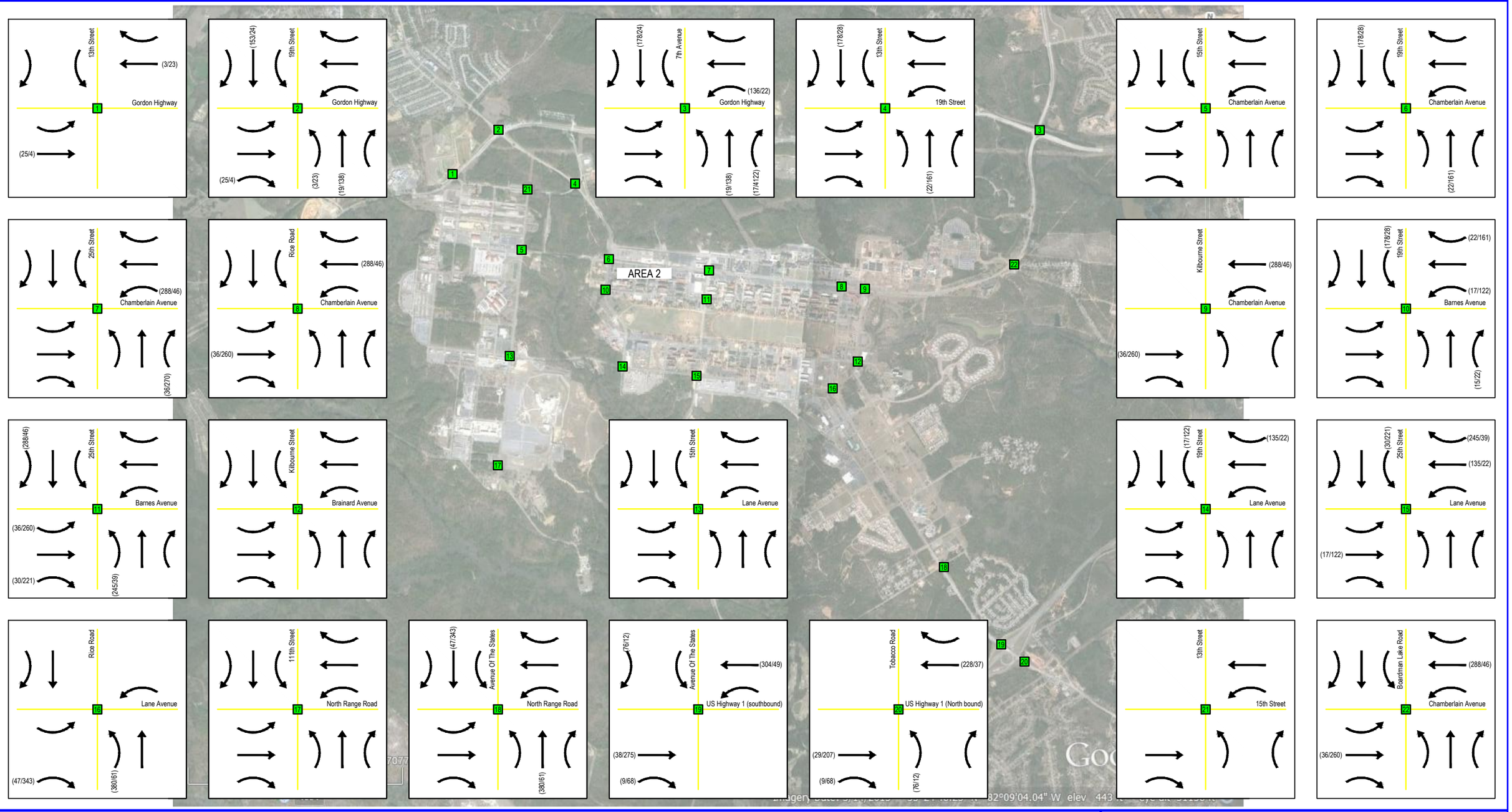
LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 7 - 1
TRAFFIC ASSIGNMENT - AREA 1
SCENARIO 1, GROWTH PROJECTION 3



LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 7 - 2
TRAFFIC ASSIGNMENT - AREA 2
SCENARIO 1, GROWTH PROJECTION 3

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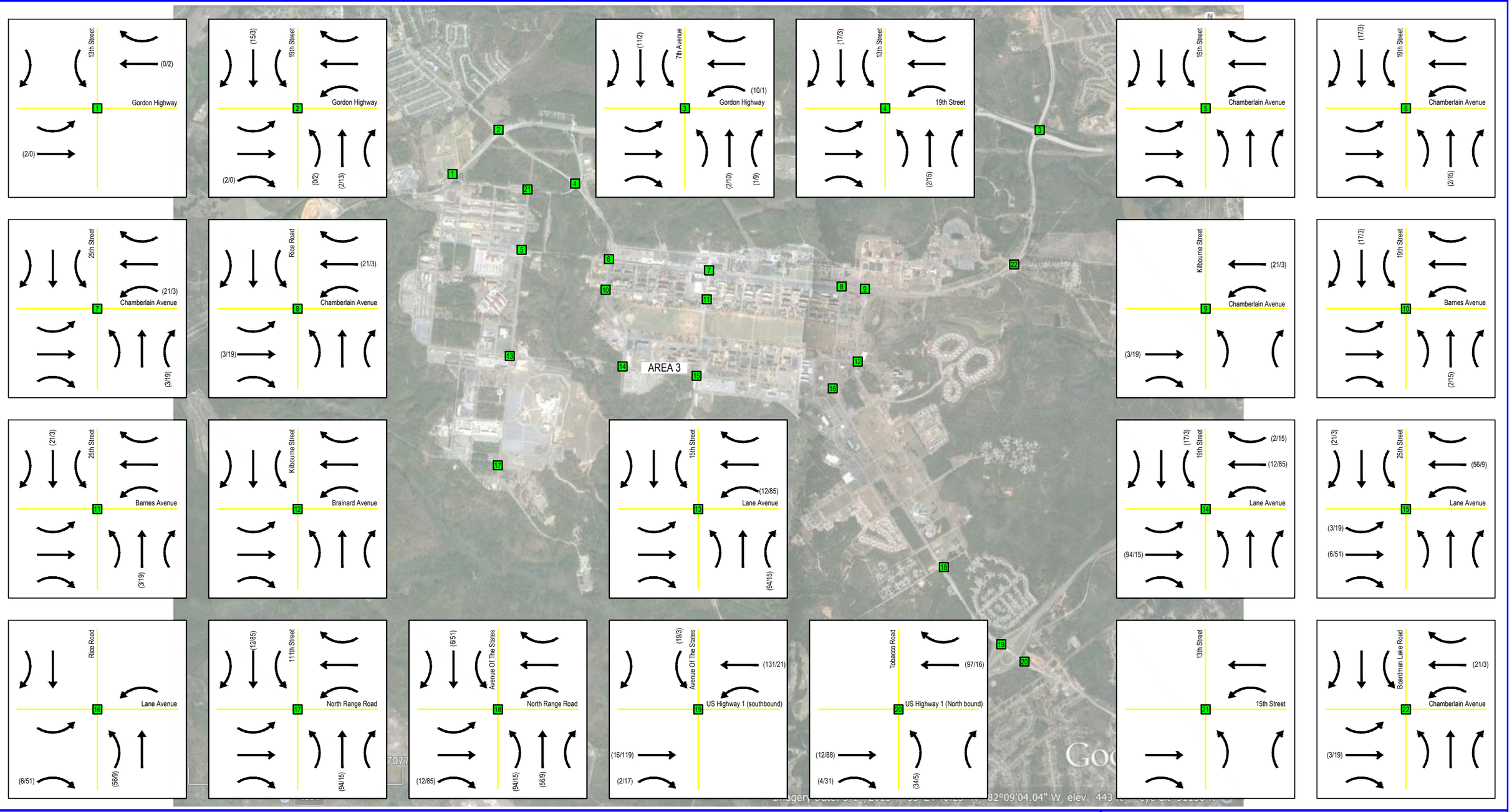

LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 7 - 3
TRAFFIC ASSIGNMENT - AREA 3
SCENARIO 1, GROWTH PROJECTION 3

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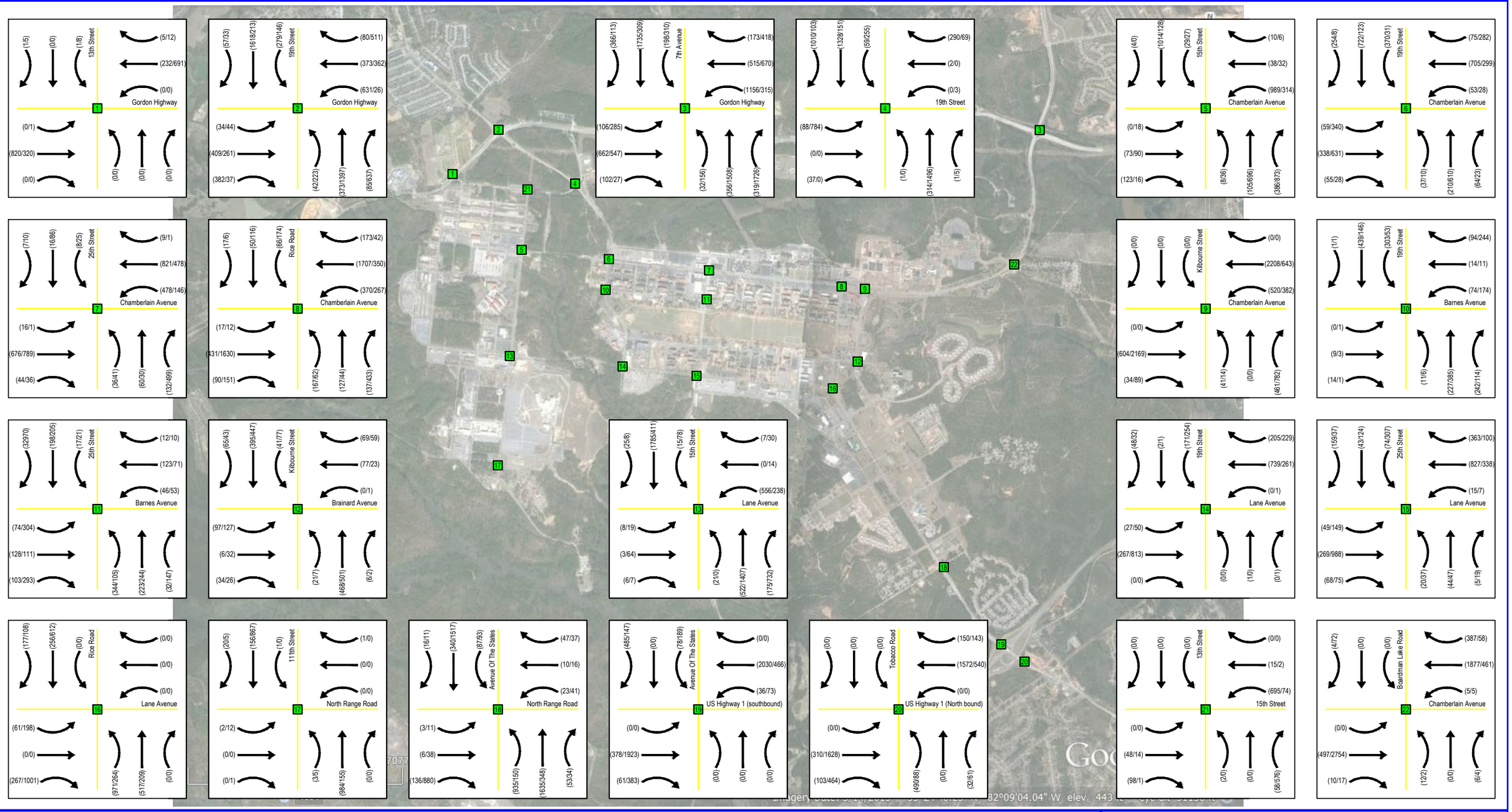
LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 7 - 4
TRAFFIC ASSIGNMENT - AREA 4
SCENARIO 1, GROWTH PROJECTION 3



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LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX % OUTBOUND TRIPS
- XX % INBOUND TRIPS

FIGURE 7 - 5
PROJECTED TRAFFIC VOLUME
SCENARIO 1, GROWTH PROJECTION 3

7.2 Capacity Analysis

7.2.1 Intersection Analysis

Table 7-2 summarizes the LOS analysis results for the study intersections under the baseline plus Scenario 1, Growth Projection 3 conditions. See the Attachments 5 and 8 for the Intersection LOS Calculation Worksheets.

Table 7-3: Intersection Level of Service Summary Scenario 1, Growth Projection 3

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
1	Gordon Highway and 13th Street	Two-Way Stop	Eastbound	A	A	--	A	A	--
			Westbound	B	--	--	A	--	--
			Northbound	C	--	--	--	--	--
			Southbound	C	B	--	C	C	--
2	Gordon Highway and 19th Street	Signal	Eastbound	D	F	D	D	C	--
			Westbound	D	D	D	E	F	--
			Northbound	E	F	E	F	F	--
			Southbound	D	F	D	F	D	--
			Intersection	D	F	D	F	F	--
3	Gordon Highway and 7th Avenue	Signal	Eastbound	E	E	D	F	F	--
			Westbound	D	E	D	F	F	--
			Northbound	C	E	C	F	F	--
			Southbound	D	F	C	F	F	--
			Intersection	D	F	D	F	F	--
4	13th Street and 19th Street	Two-Way Stop	Eastbound	F	F	--	F	F	--
			Westbound	B	C	--	E	F	--
			Northbound	B	C	--	A	A	--
			Southbound	A	A	--	C	C	--
5	Chamberlain Avenue and 15th Street	Two-Way Stop	Eastbound	A	A	--	A	A	--
			Westbound	A	B	--	A	A	--
			Northbound	F	F	--	F	F	--
			Southbound	F	F	--	F	F	--
6	Chamberlain Avenue and 19th Street	Signal	Eastbound	C	D	C	B	D	C
			Westbound	C	F	C	C	D	C
			Northbound	C	E	C	C	F	D
			Southbound	C	D	C	C	D	D
			Intersection	C	E	C	C	E	C
7	Chamberlain Avenue and 25th Street	Two-Way Stop	Eastbound	A	A	B	A	A	B
			Westbound	A	B	A	A	B	C
			Northbound	E	F	C	C	F	B
			Southbound	D	F	C	D	F	A
8	Chamberlain Avenue and Rice Road	Signal	Eastbound	B	B	--	C	D	C
			Westbound	A	B	--	B	D	B
			Northbound	C	D	--	D	F	D
			Southbound	C	D	--	C	F	D
			Intersection	B	B	--	C	F	C

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
9	Chamberlain Avenue and Kilbourne Street	One-Way Stop	Eastbound	--	--	--	--	--	B
			Westbound	B	B	--	D	F	C
			Northbound	F	F	--	F	F	C
			Southbound	--	--	--	--	--	--
10	Barnes Avenue and 19th Street	Two-Way Stop	Eastbound	C	D	B	B	C	A
			Westbound	D	F	B	C	F	C
			Northbound	A	A	C	A	A	D
			Southbound	A	A	C	A	A	B
11	Barnes Avenue and 25th Street	All-Way Stop	Eastbound	B	D	C	B	F	D
			Westbound	B	C	B	B	C	B
			Northbound	B	F	C	B	F	D
			Southbound	B	F	C	B	C	C
			Intersection	B	F	C	B	F	C
12	Brainard Avenue and Kilbourne Street	One-Way Stop	Eastbound	F	F	--	F	F	--
			Westbound	D	D	--	C	C	--
			Northbound	A	A	--	A	A	--
			Southbound	A	A	--	A	A	--
13	Lane Avenue and 15th Street	All-Way Stop	Eastbound	B	B	C	B	B	--
			Westbound	C	F	D	B	C	--
			Northbound	C	F	B	F	F	--
			Southbound	F	F	B	B	D	--
			Intersection	F	F	B	F	F	--
14	Lane Avenue and 19th Street	Two-Way Stop	Eastbound	A	B	B	A	A	D
			Westbound	A	A	D	A	A	C
			Northbound	B	D	A	B	B	B
			Southbound	C	F	B	C	F	C
15	Lane Avenue and 25th Street	Two-Way Stop	Eastbound	A	B	B	A	A	--
			Westbound	A	A	B	A	B	--
			Northbound	C	F	C	F	F	--
			Southbound	C	F	C	F	F	--
16	Lane Avenue and Rice Road	Roundabout	Eastbound	A	A	A	D	F	--
			Westbound	--	--	--	--	--	--
			Northbound	A	E	C	A	A	--
			Southbound	A	D	D	B	C	--
			Intersection	A	E	C	C	F	--
17	North Range Road and 111th Street	Two-Way Stop	Eastbound	B	D	--	B	C	--
			Westbound	B	C	--	--	--	--
			Northbound	A	A	--	A	A	--
			Southbound	A	B	--	A	A	--
18	North Range Road and Avenue of the States	Two-Way Stop	Eastbound	D	F	C	F	F	--
			Westbound	F	F	C	F	F	--
			Northbound	A	C	B	B	C	--
			Southbound	B	C	C	A	A	--
19	US Highway 1 (SB) and Avenue of the States	One-Way Stop	Eastbound	--	--	A	--	--	A
			Westbound	A	A	B	B	D	A
			Northbound	--	--	--	--	--	--
			Southbound	C	F	D	D	F	C

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
20	US Highway 1 (NB) and Tobacco Road	One-Way Stop	Eastbound	--	--	A	--	--	A
			Westbound	--	--	B	--	--	A
			Northbound	**C**	**F**	C	**C**	**F**	B
			Southbound	--	--	--	--	--	--
21	13th Avenue and 15th Avenue	One-Way Stop	Eastbound	--	--	--	--	--	--
			Westbound	A	B	--	A	A	--
			Northbound	A	B	--	A	B	--
			Southbound	--	--	--	--	--	--
22	Chamberlain Avenue and Boardman Lake Road	Two-Way Stop	Eastbound	--	--	A	--	--	--
			Westbound	A	A	A	C	D	--
			Northbound	**C**	**E**	D	F	F	--
			Southbound	B	C	A	A	A	--

Specific physical improvements to select intersections will reduce the effect of the additional traffic to a less than substantial level. Refer to Chapter 13 for a description of these and other mitigation, avoidance and/or minimization measures.

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CHAPTER 8

Baseline plus Scenario 2, Growth Projection 1

8.1 Traffic Volumes

8.1.1 Traffic Generation

Daily and peak hour traffic generation was estimated using trip generation rates published in *Trip Generation, 8th Edition: An ITE Informational Report* (Institute of Transportation Engineers [ITE] 2008). Trip generation was estimated based on the Growth Projections for each of the four designated areas using ITE trip rates for land use code 715, single tenant office. Growth Projection 1 contributes a total population growth of 3,000 to Fort Gordon. See Table 8-1 and Table 8-2 for the trips generated by Growth Projection 1 in the four growth areas for both the AM and the PM Peak Hours.

Table 8-1: Intersection Level of Service Summary Scenario 2, Growth Projection 1 – AM Peak Hour

Growth Area Number	Number of Employees	Trip Rate[(a)] per Employee	Daily Trips	AM Peak Hour				
				% of Daily	In:Out Ratio	In	Out	Total
1	375	3.62	1,358	14.6%	0.89:0.11	176	22	198
2	900	3.62	3,258	14.6%	0.89:0.11	424	52	476
3	225	3.62	815	14.6%	0.89:0.11	106	13	119
4	1,500	3.62	5,430	14.6%	0.89:0.11	706	87	793

Table 8-2: Intersection Level of Service Summary Scenario 2, Growth Projection 1 – PM Peak Hour

Growth Area Number	Number of Employees	Trip Rate[(a)] per Employee	Daily Trips	PM Peak Hour				
				% of Daily	In:Out Ratio	In	Out	Total
1	375	3.62	1,358	13.8%	0.15:0.85	28	159	187
2	900	3.62	3,258	13.8%	0.15:0.85	68	383	450
3	225	3.62	815	13.8%	0.15:0.85	17	95	112
4	1,500	3.62	5,430	13.8%	0.15:0.85	112	637	749

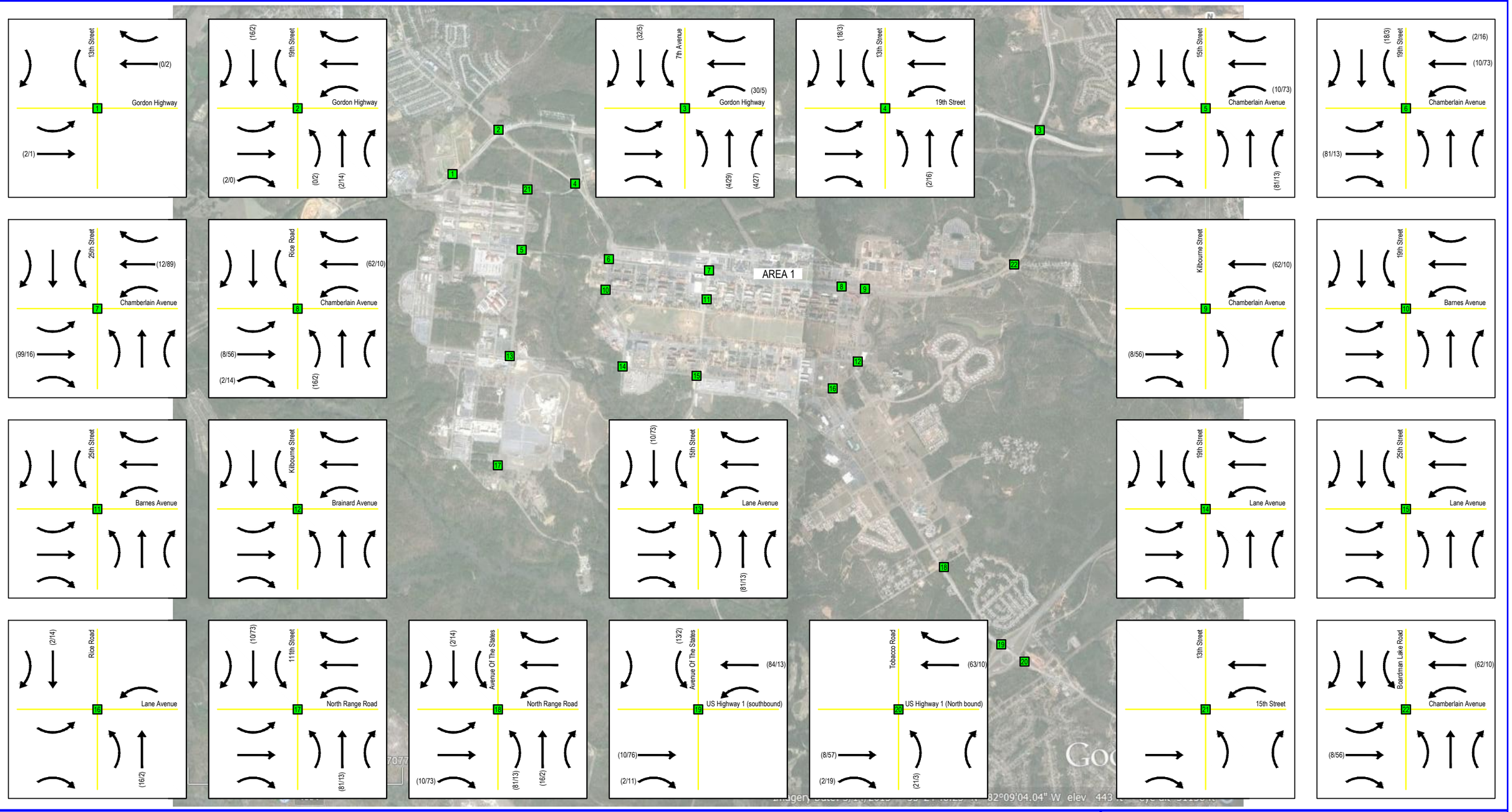
8.1.2 Traffic Distribution

Fort Gordon's Scenario 2, Growth Projection 1 traffic was then added to the baseline intersections in accordance with a distribution pattern that was developed based on the locations of access gates, existing

traffic volumes, growth area locations, and likely travel routes between the gates and the growth areas. This distribution pattern is consistent with the distribution provided by the Campus Development EIS contained in the ARCYBER Traffic Study. Figures 5-1 through 5-4 presents the distribution patterns by movement volume at each of the study intersections.

8.1.3 Traffic Assignment

Figures 8-1 through 8-4 shows the assignment of trips from each of the growth areas to the intersections that comprise the ROI. These volumes were calculated by applying the percentages shown in Figures 5-1 through 5-4 to the inbound and outbound trips generated in Table 8-1 and Table 8-2. The combined peak hour volumes for the baseline plus Scenario 2, Growth Projection 1 are presented in Figure 8-5. The volumes shown in Figure 8-5 were calculated by adding the assignment of projected traffic (Figures 8-1 through 8-4) to the baseline traffic volumes (Figure 4-1).



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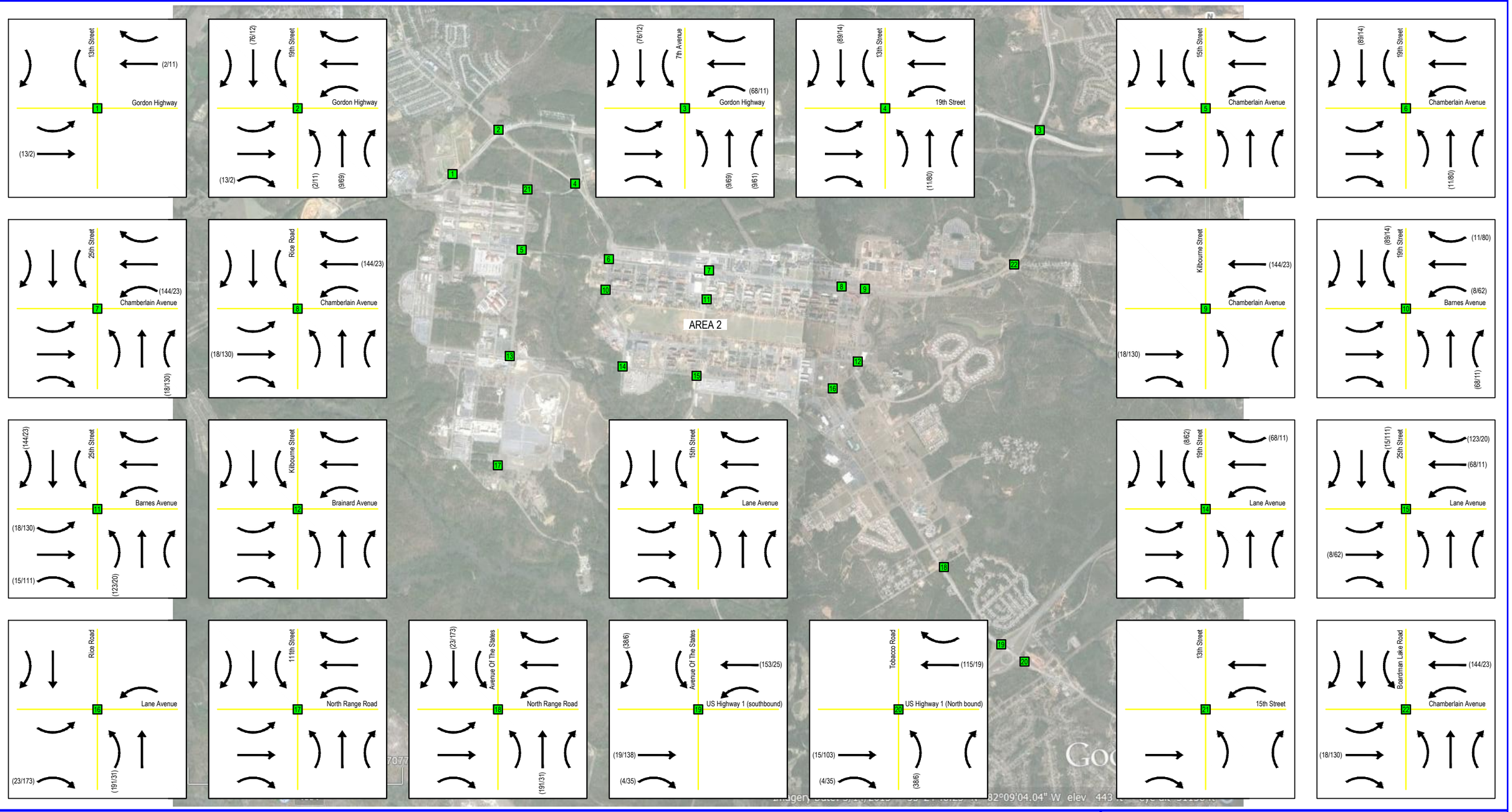
LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 8 - 1
TRAFFIC ASSIGNMENT - AREA 1
SCENARIO 2, GROWTH PROJECTION 1



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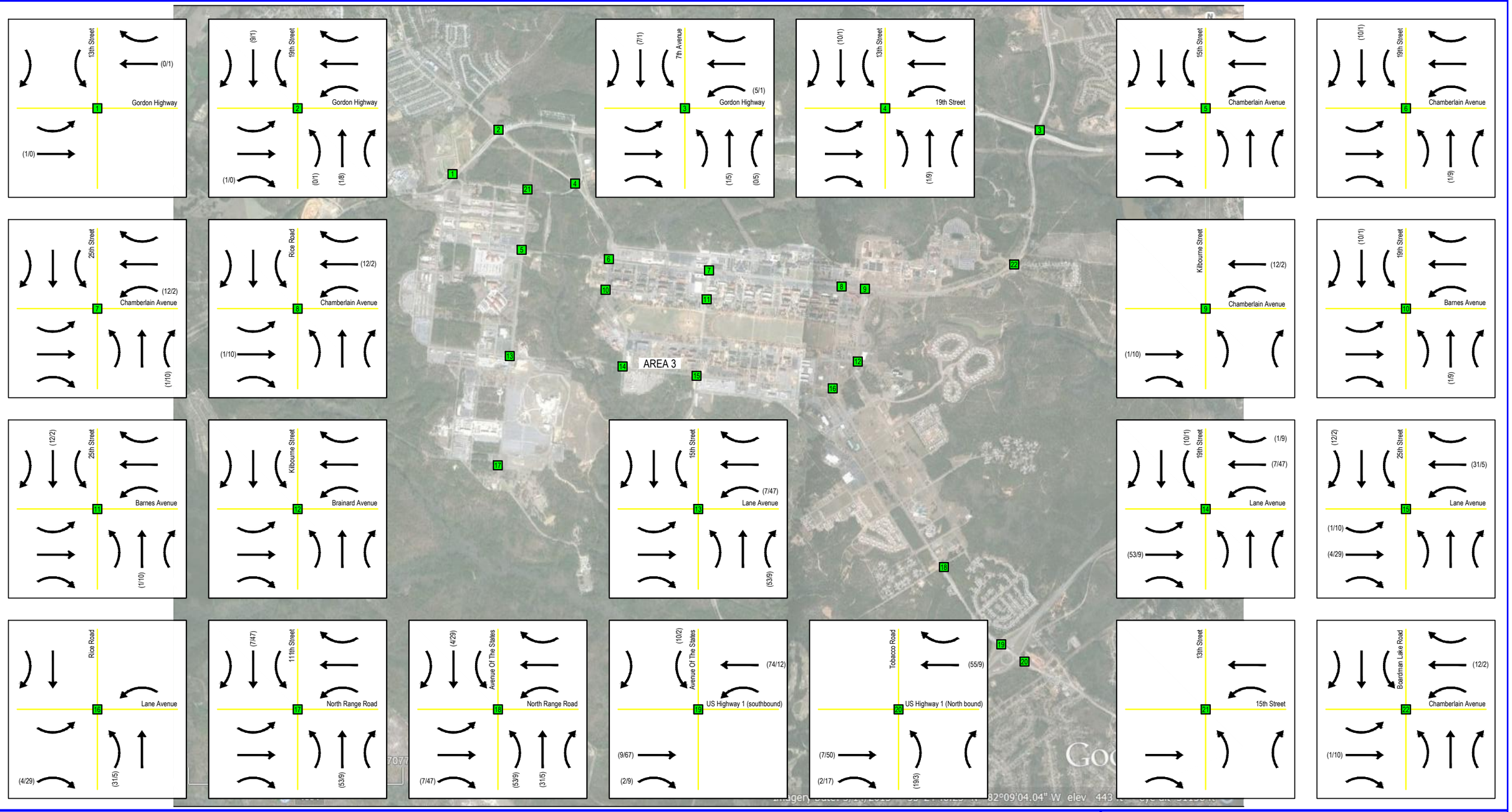
LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 8 - 2
TRAFFIC ASSIGNMENT - AREA 2
SCENARIO 2, GROWTH PROJECTION 1



LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 8 - 3
TRAFFIC ASSIGNMENT - AREA 3
SCENARIO 2, GROWTH PROJECTION 1

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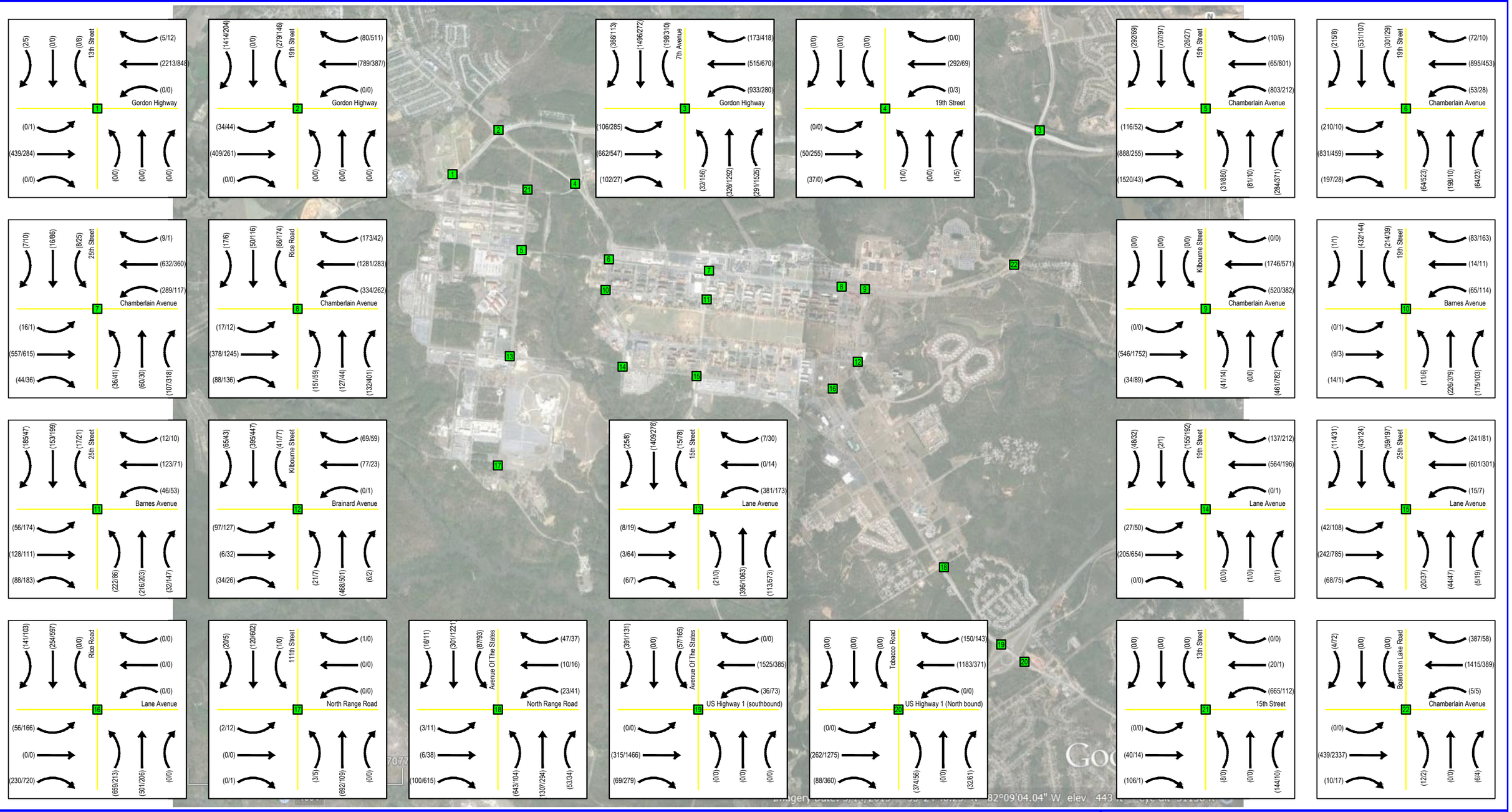
LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 8 - 4
TRAFFIC ASSIGNMENT - AREA 4
SCENARIO 2, GROWTH PROJECTION 1



LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX % OUTBOUND TRIPS
- XX % INBOUND TRIPS

FIGURE 8 - 5
PROJECTED TRAFFIC VOLUME
SCENARIO 2, GROWTH PROJECTION 1

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8.2 Capacity Analysis

8.2.1 Intersection Analysis

Table 8-2 summarizes the LOS analysis results for the study intersections under the baseline plus Scenario 2, Growth Projection 1 conditions. See the Attachments 9 and 12 for the Intersection LOS Calculation Worksheets.

Table 8-3: Intersection Level of Service Summary Scenario 2, Growth Projection 1

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
1	Gordon Highway and 13th Street	Two-Way Stop	Eastbound	A	C	--	A	A	--
			Westbound	B	--	--	A	--	--
			Northbound	C	--	--	--	--	--
			Southbound	C	F	--	C	C	--
2	Gordon Highway and 19th Street	Signal	Eastbound	D	D	C	D	A	--
			Westbound	D	F	D	E	B	--
			Northbound	E	--	--	F	--	--
			Southbound	D	F	C	F	B	--
			Intersection	D	F	C	F	B	--
3	Gordon Highway and 7th Avenue	Signal	Eastbound	E	F	E	F	F	--
			Westbound	D	E	D	F	F	--
			Northbound	C	C	C	F	F	--
			Southbound	D	E	D	F	F	--
			Intersection	D	E	D	F	F	--
4	13th Street and 19th Street	Two-Way Stop	Eastbound	F	A	--	F	B	--
			Westbound	B	B	--	E	A	--
			Northbound	B	A	--	A	A	--
			Southbound	A	--	--	C	A	--
5	Chamberlain Avenue and 15th Street	Two-Way Stop	Eastbound	A	A	C	A	B	--
			Westbound	A	F	C	A	A	--
			Northbound	F	F	D	F	F	--
			Southbound	F	F	D	F	F	--
6	Chamberlain Avenue and 19th Street	Signal	Eastbound	C	D	C	B	C	--
			Westbound	C	F	C	C	C	--
			Northbound	C	F	D	C	C	--
			Southbound	C	E	C	C	D	--
			Intersection	C	F	C	C	C	--
7	Chamberlain Avenue and 25th Street	Two-Way Stop	Eastbound	A	A	A	A	A	C
			Westbound	A	B	A	A	A	C
			Northbound	E	F	B	C	F	D
			Southbound	D	F	B	D	F	B
8	Chamberlain Avenue and Rice Road	Signal	Eastbound	B	B	--	C	D	C
			Westbound	A	B	--	B	C	B
			Northbound	C	C	--	D	F	D
			Southbound	C	C	--	C	D	C
			Intersection	B	B	--	C	D	C

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
9	Chamberlain Avenue and Kilbourne Street	One-Way Stop	Eastbound	--	--	--	--	--	B
			Westbound	B	B	--	**D**	**F**	B
			Northbound	F	F	--	F	F	D
			Southbound	--	--	--	--	--	C
10	Barnes Avenue and 19th Street	Two-Way Stop	Eastbound	C	C	A	B	C	--
			Westbound	**D**	**F**	B	C	C	--
			Northbound	A	A	C	A	A	--
			Southbound	A	A	C	A	A	--
11	Barnes Avenue and 25th Street	All-Way Stop	Eastbound	B	C	C	**B**	**E**	C
			Westbound	B	C	B	B	B	B
			Northbound	**B**	**E**	C	B	D	D
			Southbound	B	C	C	B	C	C
			Intersection	B	D	C	B	D	C
12	Brainard Avenue and Kilbourne Street	One-Way Stop	Eastbound	F	F	--	F	F	--
			Westbound	D	D	--	C	C	--
			Northbound	A	A	--	A	A	--
			Southbound	A	A	--	A	A	--
13	Lane Avenue and 15th Street	All-Way Stop	Eastbound	B	B	B	B	B	--
			Westbound	**C**	**E**	C	B	C	--
			Northbound	**C**	**F**	B	F	F	--
			Southbound	F	F	A	B	C	--
			Intersection	F	F	B	F	F	--
14	Lane Avenue and 19th Street	Two-Way Stop	Eastbound	A	A	--	A	A	C
			Westbound	A	A	--	A	A	B
			Northbound	B	C	--	B	B	A
			Southbound	C	D	--	**C**	**F**	B
15	Lane Avenue and 25th Street	Two-Way Stop	Eastbound	A	A	C	A	A	--
			Westbound	A	A	D	A	A	--
			Northbound	**C**	**F**	B	F	F	--
			Southbound	**C**	**F**	B	F	F	--
16	Lane Avenue and Rice Road	Roundabout	Eastbound	A	A	--	A	A	--
			Westbound	--	--	--	--	--	--
			Northbound	A	B	--	A	A	--
			Southbound	A	B	--	B	C	--
			Intersection	A	B	--	A	A	--
17	North Range Road and 111th Street	Two-Way Stop	Eastbound	B	C	--	B	C	--
			Westbound	B	B	--	--	--	--
			Northbound	A	A	--	A	A	--
			Southbound	A	A	--	A	A	--
18	North Range Road and Avenue of the States	Two-Way Stop	Eastbound	**D**	**F**	--	F	F	--
			Westbound	F	F	--	F	F	--
			Northbound	A	B	--	B	B	--
			Southbound	B	B	--	A	A	--
19	US Highway 1 (SB) and Avenue of the States	One-Way Stop	Eastbound	--	--	--	--	--	A
			Westbound	A	A	--	B	C	A
			Northbound	--	--	--	--	--	--
			Southbound	**C**	**F**	--	**D**	**F**	D

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
20	US Highway 1 (NB) and Tobacco Road	One-Way Stop	Eastbound	--	--	A	--	--	--
			Westbound	--	--	A	--	--	--
			Northbound	**C**	**F**	B	C	D	--
			Southbound	--	--	--	--	--	--
21	13th Avenue and 15th Avenue	One-Way Stop	Eastbound	--	--	--	--	--	--
			Westbound	A	B	--	A	A	--
			Northbound	A	B	--	A	B	--
			Southbound	--	--	--	--	--	--
22	Chamberlain Avenue and Boardman Lake Road	Two-Way Stop	Eastbound	--	--	--	--	--	--
			Westbound	A	A	--	C	C	--
			Northbound	C	C	--	F	F	--
			Southbound	B	B	--	A	A	--

Specific physical improvements to select intersections will reduce the effect of the additional traffic to a less than substantial level. Refer to Chapter 13 for a description of these and other mitigation, avoidance and/or minimization measures.

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CHAPTER 9

Baseline plus Scenario 2, Growth Projection 2

9.1 Traffic Volumes

9.1.1 Traffic Generation

Daily and peak hour traffic generation was estimated using trip generation rates published in *Trip Generation, 8th Edition: An ITE Informational Report* (Institute of Transportation Engineers [ITE] 2008). Trip generation was estimated based on the Growth Projections for each of the four designated areas using ITE trip rates for land use code 715, single tenant office. Growth Projection 2 contributes a total population growth of 4,000 to Fort Gordon. See Table 9-1 and Table 9-2 for the trips generated by Growth Projection 2 in the four growth areas for both the AM and the PM Peak Hours.

Table 9-1: Intersection Level of Service Summary Scenario 2, Growth Projection 2 – AM Peak Hour

Growth Area Number	Number of Employees	Trip Rate[(a)] per Employee	Daily Trips	AM Peak Hour				
				% of Daily	In:Out Ratio	In	Out	Total
1	500	3.62	1,810	14.6%	0.89:0.11	235	29	264
2	1,200	3.62	4,344	14.6%	0.89:0.11	564	70	634
3	300	3.62	1,086	14.6%	0.89:0.11	142	17	159
4	2,000	3.62	7,240	14.6%	0.89:0.11	941	116	1,057

Table 9-2: Intersection Level of Service Summary Scenario 2, Growth Projection 2 – PM Peak Hour

Growth Area Number	Number of Employees	Trip Rate[(a)] per Employee	Daily Trips	PM Peak Hour				
				% of Daily	In:Out Ratio	In	Out	Total
1	500	3.62	1,810	13.8%	0.15:0.85	38	213	250
2	1,200	3.62	4,344	13.8%	0.15:0.85	90	509	599
3	300	3.62	1,086	13.8%	0.15:0.85	23	128	150
4	2,000	3.62	7,240	13.8%	0.15:0.85	150	849	999

9.1.2 Traffic Distribution

Fort Gordon's Scenario 2, Growth Projection 2 traffic was then added to the baseline intersections in accordance with a distribution pattern that was developed based on the locations of access gates, existing

traffic volumes, growth area locations, and likely travel routes between the gates and the growth areas. This distribution pattern is consistent with the distribution provided by the Campus Development EIS contained in the ARCYBER Traffic Study. Figures 5-1 through 5-4 present the distribution patterns by movement volume at each of the study intersections.

9.1.3 Traffic Assignment

Figures 9-1 through 9-4 shows the assignment of trips from each of the growth areas to the intersections that comprise the ROI. These volumes were calculated by applying the percentages shown in Figures 5-1 through 5-4 to the inbound and outbound trips generated in Table 9-1 and Table 9-2. The combined peak hour volumes for the baseline plus Scenario 2, Growth Projection 2 are presented in Figure 9-5. The volumes shown in Figure 9-5 were calculated by adding the assignment of projected traffic (Figures 9-1 through 9-4) to the baseline traffic volumes (Figure 4-1).

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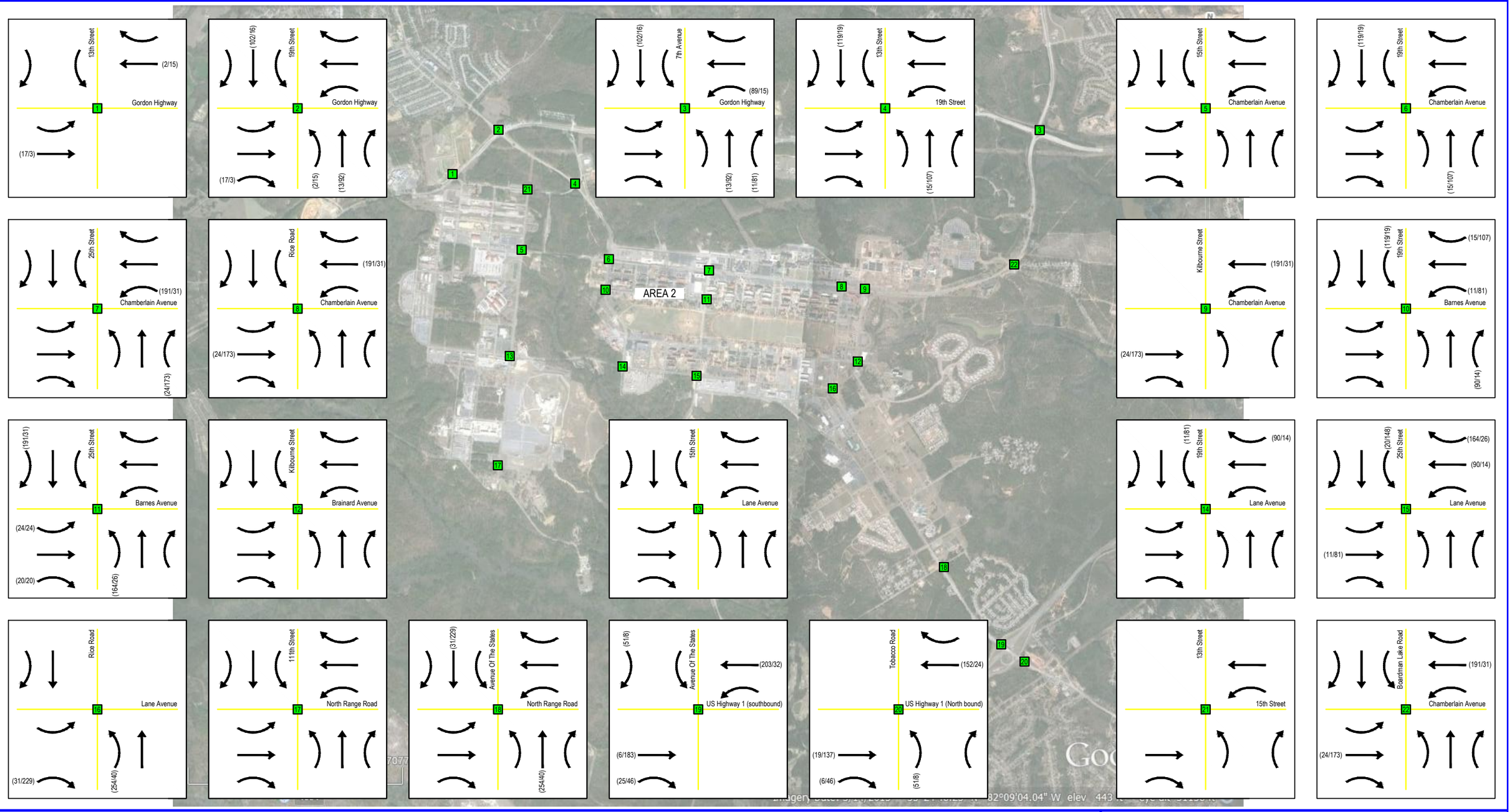
LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 9 - 1
TRAFFIC ASSIGNMENT - AREA 1
SCENARIO 2, GROWTH PROJECTION 2



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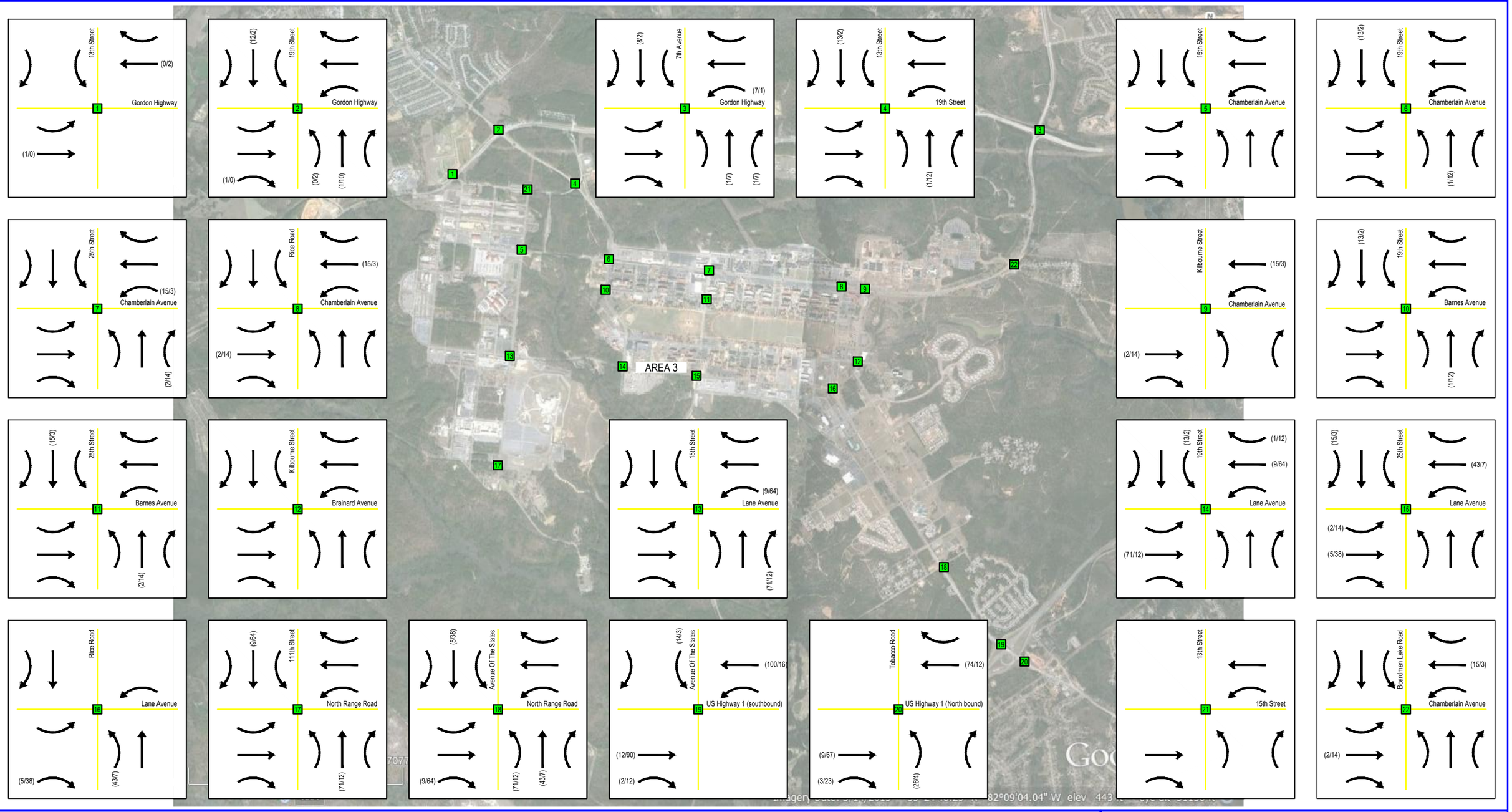
LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 9 - 2
TRAFFIC ASSIGNMENT - AREA 2
SCENARIO 2, GROWTH PROJECTION 2



LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 9 - 3
TRAFFIC ASSIGNMENT - AREA 3
SCENARIO 2, GROWTH PROJECTION 2

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LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 9 - 4
TRAFFIC ASSIGNMENT - AREA 4
SCENARIO 2, GROWTH PROJECTION 2

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LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX % OUTBOUND TRIPS
- XX % INBOUND TRIPS

FIGURE 9 - 5
PROJECTED TRAFFIC VOLUME
SCENARIO 2, GROWTH PROJECTION 2

9.2 Capacity Analysis

9.2.1 Intersection Analysis

Table 9-2 summarizes the LOS analysis results for the study intersections under the baseline plus Scenario 2, Growth Projection 2 conditions. See the Attachments 10 and 13 for the Intersection LOS Calculation Worksheets.

Table 9-3: Intersection Level of Service Summary Scenario 2, Growth Projection 2

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
1	Gordon Highway and 13th Street	Two-Way Stop	Eastbound	A	C	--	A	A	--
			Westbound	B	--	--	A	--	--
			Northbound	C	--	--	--	--	--
			Southbound	C	F	--	C	C	--
2	Gordon Highway and 19th Street	Signal	Eastbound	D	E	C	D	A	--
			Westbound	D	F	D	E	B	--
			Northbound	E	--	--	F	--	--
			Southbound	D	F	B	F	B	--
			Intersection	D	F	B	F	B	--
3	Gordon Highway and 7th Avenue	Signal	Eastbound	E	F	E	F	F	--
			Westbound	D	E	D	F	F	--
			Northbound	C	D	C	F	F	--
			Southbound	D	F	D	F	F	--
			Intersection	D	E	D	F	F	--
4	13th Street and 19th Street	Two-Way Stop	Eastbound	F	A	--	F	B	--
			Westbound	B	B	--	A	A	--
			Northbound	B	A	--	A	A	--
			Southbound	A	A	--	A	A	--
5	Chamberlain Avenue and 15th Street	Two-Way Stop	Eastbound	A	A	C	A	B	--
			Westbound	A	F	D	A	A	--
			Northbound	F	F	E	F	F	--
			Southbound	F	F	F	F	F	--
6	Chamberlain Avenue and 19th Street	Signal	Eastbound	C	F	D	B	C	--
			Westbound	C	F	D	C	C	--
			Northbound	C	F	D	C	C	--
			Southbound	C	F	D	C	D	--
			Intersection	C	F	D	C	C	--
7	Chamberlain Avenue and 25th Street	Two-Way Stop	Eastbound	A	A	A	A	A	A
			Westbound	A	B	A	A	A	A
			Northbound	E	F	C	C	F	B
			Southbound	D	F	B	D	F	A
8	Chamberlain Avenue and Rice Road	Signal	Eastbound	B	B	--	C	D	C
			Westbound	A	B	--	B	D	B
			Northbound	C	C	--	D	F	D
			Southbound	C	C	--	C	F	D
			Intersection	B	B	--	C	F	C

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
9	Chamberlain Avenue and Kilbourne Street	One-Way Stop	Eastbound	--	--	--	--	--	B
			Westbound	B	B	--	**D**	**F**	B
			Northbound	F	F	--	F	F	C
			Southbound	--	--	--	--	--	--
10	Barnes Avenue and 19th Street	Two-Way Stop	Eastbound	C	C	A	B	C	--
			Westbound	**D**	**F**	B	C	D	--
			Northbound	A	A	C	A	A	--
			Southbound	A	A	C	A	A	--
11	Barnes Avenue and 25th Street	All-Way Stop	Eastbound	B	C	C	B	B	--
			Westbound	B	C	C	B	B	--
			Northbound	**B**	**F**	C	B	C	--
			Southbound	B	D	D	B	B	--
			Intersection	**B**	**E**	C	B	C	--
12	Brainard Avenue and Kilbourne Street	One-Way Stop	Eastbound	F	F	--	F	F	--
			Westbound	D	D	--	C	C	--
			Northbound	A	A	--	A	A	--
			Southbound	A	A	--	A	A	--
13	Lane Avenue and 15th Street	All-Way Stop	Eastbound	B	B	B	B	B	--
			Westbound	**C**	**F**	C	B	C	--
			Northbound	**C**	**F**	C	**F**	**F**	--
			Southbound	F	F	B	B	D	--
			Intersection	F	F	C	F	F	--
14	Lane Avenue and 19th Street	Two-Way Stop	Eastbound	A	A	B	A	A	C
			Westbound	A	A	C	A	A	B
			Northbound	B	C	A	B	B	A
			Southbound	**C**	**E**	B	**C**	**F**	B
15	Lane Avenue and 25th Street	Two-Way Stop	Eastbound	A	B	B	A	A	--
			Westbound	A	A	B	A	B	--
			Northbound	**C**	**F**	D	F	F	--
			Southbound	**C**	**F**	D	F	F	--
16	Lane Avenue and Rice Road	Roundabout	Eastbound	A	A	--	A	B	--
			Westbound	--	--	--	--	--	--
			Northbound	A	C	--	A	A	--
			Southbound	A	C	--	B	C	--
			Intersection	A	B	--	B	B	--
17	North Range Road and 111th Street	Two-Way Stop	Eastbound	B	C	--	B	C	--
			Westbound	B	B	--	--	--	--
			Northbound	A	A	--	A	A	--
			Southbound	A	A	--	A	A	--
18	North Range Road and Avenue of the States	Two-Way Stop	Eastbound	**D**	**F**	C	F	F	--
			Westbound	F	F	C	F	F	--
			Northbound	A	B	B	B	B	--
			Southbound	B	B	C	A	A	--
19	US Highway 1 (SB) and Avenue of the States	One-Way Stop	Eastbound	--	--	A	--	--	A
			Westbound	A	A	B	B	C	A
			Northbound	--	--	--	--	--	--
			Southbound	**C**	**F**	C	**D**	**F**	D

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
20	US Highway 1 (NB) and Tobacco Road	One-Way Stop	Eastbound	--	--	A	--	--	A
			Westbound	--	--	A	--	--	A
			Northbound	**C**	**F**	B	**C**	**F**	B
			Southbound	--	--	--	--	--	--
21	13th Avenue and 15th Avenue	One-Way Stop	Eastbound	--	--	--	--	--	--
			Westbound	A	B	--	A	A	--
			Northbound	A	B	--	A	A	--
			Southbound	--	--	--	--	--	--
22	Chamberlain Avenue and Boardman Lake Road	Two-Way Stop	Eastbound	--	--	--	--	--	--
			Westbound	A	A	--	C	D	--
			Northbound	C	D	--	F	F	--
			Southbound	B	B	--	A	A	--

Specific physical improvements to select intersections will reduce the effect of the additional traffic to a less than substantial level. Refer to Chapter 13 for a description of these and other mitigation, avoidance and/or minimization measures.

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CHAPTER 10

Baseline plus Scenario 2, Growth Projection 3

10.1 Traffic Volumes

10.1.1 Traffic Generation

Daily and peak hour traffic generation was estimated using trip generation rates published in *Trip Generation, 8th Edition: An ITE Informational Report* (Institute of Transportation Engineers [ITE] 2008). Trip generation was estimated based on the Growth Projections for each of the four designated areas using ITE trip rates for land use code 715, single tenant office. Growth Projection 3 contributes a total population growth of 6,000 to Fort Gordon. See Table 10-1 and Table 10-2 for the trips generated by Growth Projection 3 in the four growth areas for both the AM and the PM Peak Hours.

Table 10-1: Intersection Level of Service Summary Scenario 2, Growth Projection 3 – AM Peak Hour

Growth Area Number	Number of Employees	Trip Rate[(a)] per Employee	Daily Trips	AM Peak Hour				
				% of Daily	In:Out Ratio	In	Out	Total
1	750	3.62	2,715	14.6%	0.89:0.11	352	44	396
2	1,800	3.62	6,516	14.6%	0.89:0.11	846	105	951
3	400	3.62	1,448	14.6%	0.89:0.11	188	23	211
4	3,000	3.62	10,860	14.6%	0.89:0.11	1,412	174	1,586

Table 10-2: Intersection Level of Service Summary Scenario 2, Growth Projection 3 – PM Peak Hour

Growth Area Number	Number of Employees	Trip Rate[(a)] per Employee	Daily Trips	PM Peak Hour				
				% of Daily	In:Out Ratio	In	Out	Total
1	750	3.62	2,715	13.8%	0.15:0.85	56	319	375
2	1,800	3.62	6,516	13.8%	0.15:0.85	135	764	899
3	400	3.62	1,448	13.8%	0.15:0.85	30	170	200
4	3,000	3.62	10,860	13.8%	0.15:0.85	225	1,274	1,499

10.1.2 Traffic Distribution

Fort Gordon's Scenario 2, Growth Projection 3 traffic was then added to the baseline intersections in accordance with a distribution pattern that was developed based on the locations of access gates, existing

traffic volumes, growth area locations, and likely travel routes between the gates and the growth areas. This distribution pattern is consistent with the distribution provided by the Campus Development EIS contained in the ARCYBER Traffic Study. Figures 5-1 through 5-4 presents the distribution patterns by movement volume at each of the study intersections.

10.1.3 Traffic Assignment

Figures 10-1 through 10-4 shows the assignment of trips from each of the growth areas to the intersections that comprise the ROI. These volumes were calculated by applying the percentages shown in Figures 5-1 through 5-4 to the inbound and outbound trips generated in Table 10-1 and Table 10-2. The combined peak hour volumes for the baseline plus Scenario 2, Growth Projection 3 are presented in Figure 10-5. The volumes shown in Figure 10-5 were calculated by adding the assignment of projected traffic (Figures 10-1 through 10-4) to the baseline traffic volumes (Figure 4-1).

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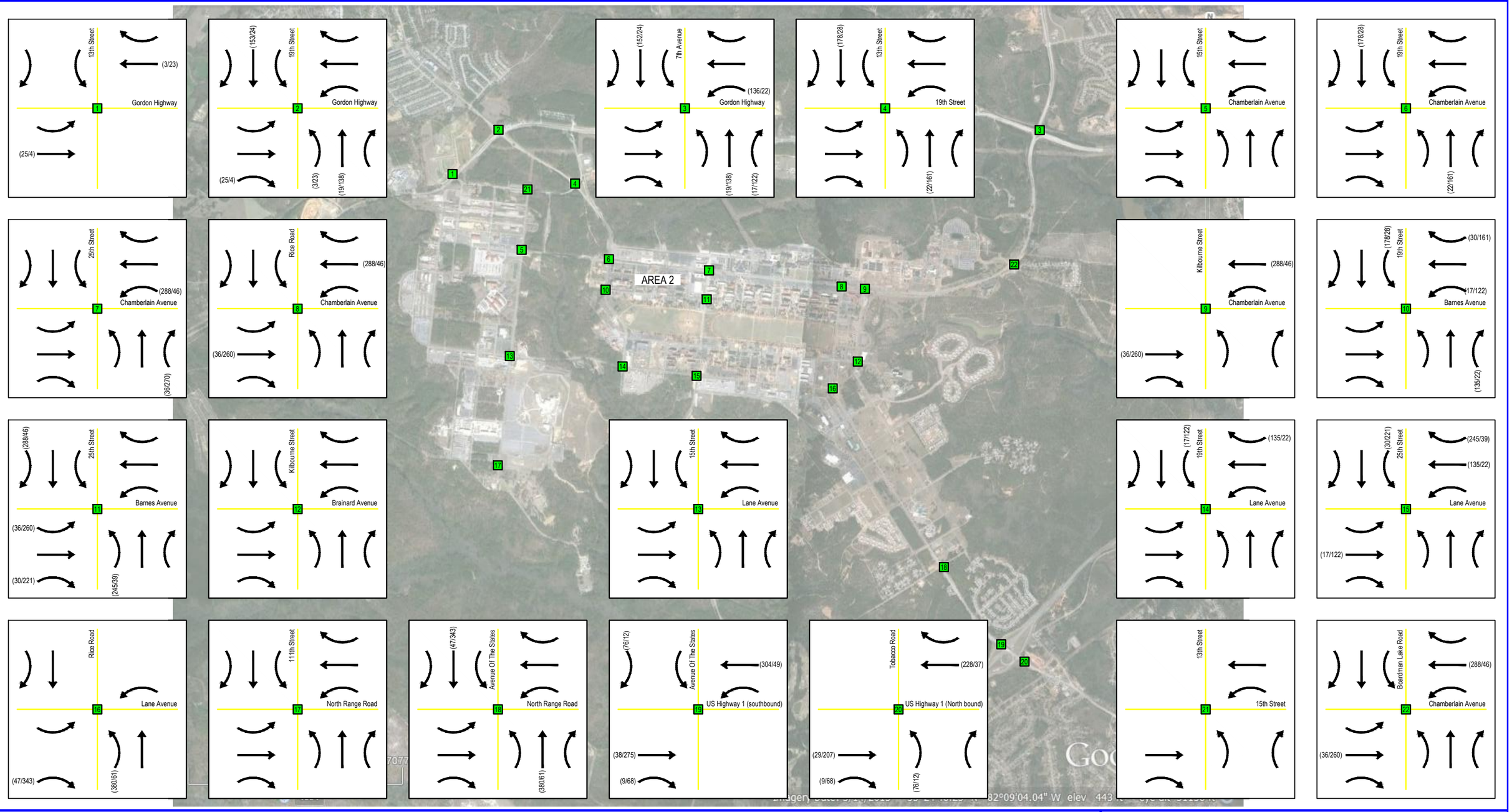
LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 10 - 1
TRAFFIC ASSIGNMENT - AREA 1
SCENARIO 2, GROWTH PROJECTION 3



LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 10 - 2
TRAFFIC ASSIGNMENT - AREA 2
SCENARIO 2, GROWTH PROJECTION 3

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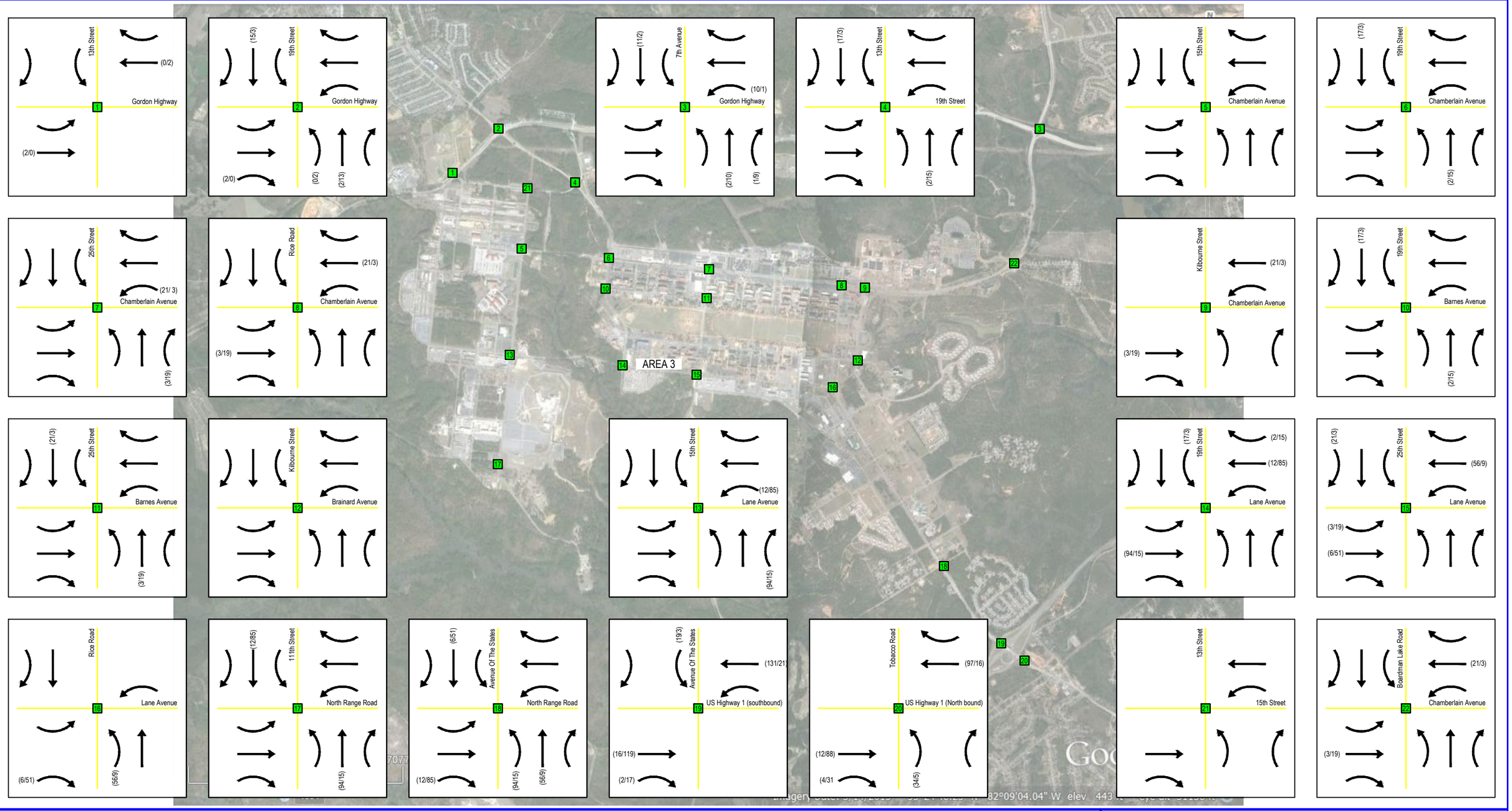

LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 10 - 3
TRAFFIC ASSIGNMENT - AREA 3
SCENARIO 2, GROWTH PROJECTION 3

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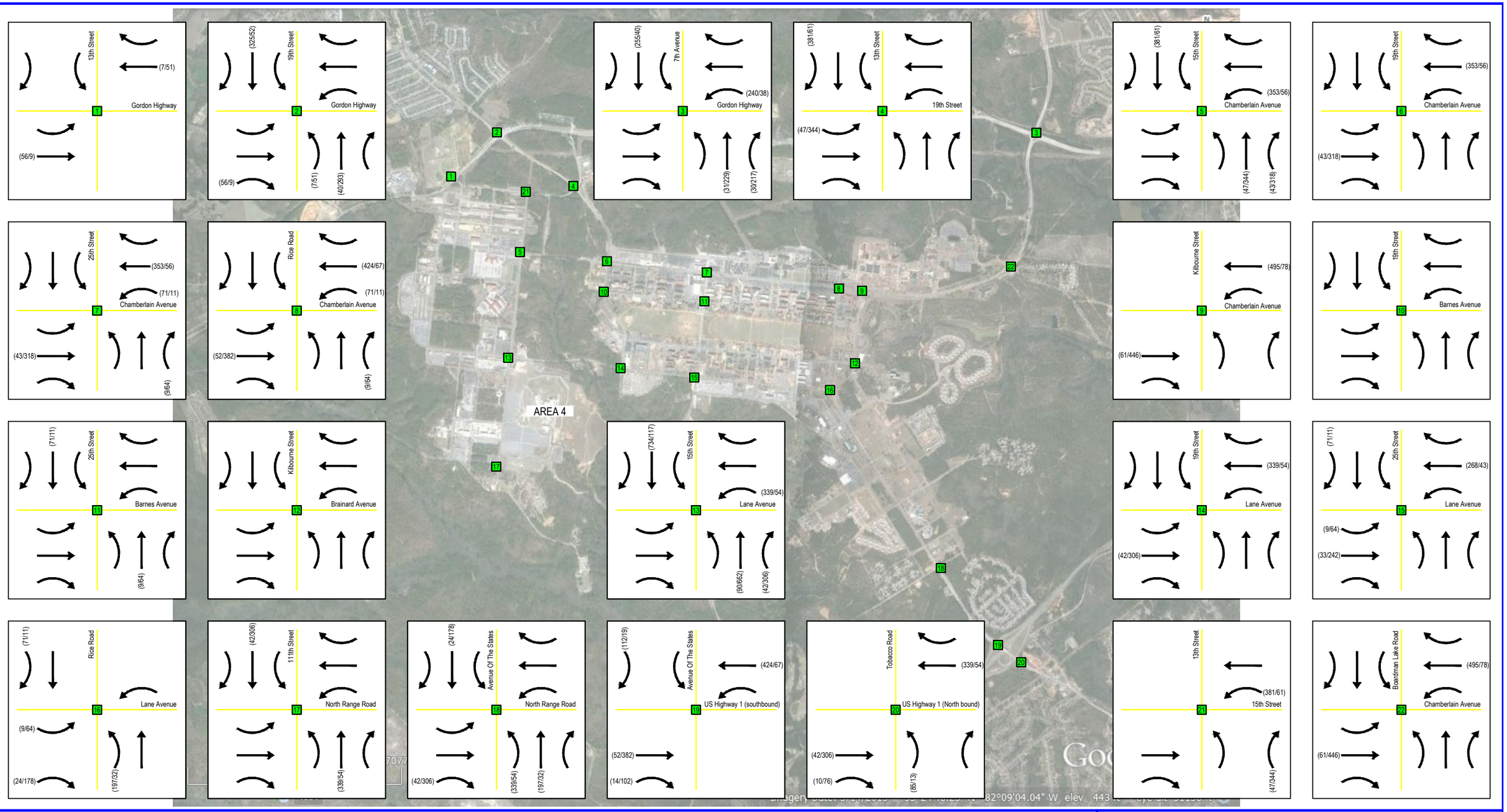

LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX / XX PEAK HOUR TRAFFIC ASSIGNMENT (AM/PM)

FIGURE 10 - 4
TRAFFIC ASSIGNMENT - AREA 4
SCENARIO 2, GROWTH PROJECTION 3

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LEGEND

- INTERSECTION NUMBER
- INTERSECTION TURNING MOVEMENT
- XX % OUTBOUND TRIPS
- XX % INBOUND TRIPS

FIGURE 10 - 5
PROJECTED TRAFFIC VOLUME
SCENARIO 2, GROWTH PROJECTION 3

Q:\PROJECTSVDIO Projects\C08004 USACE Huntsville\C08004-4-09E Traffic Engineering Analysis ERAFB & SAFB\2 Drawings\5 Civil\Model\Projected Traffic Volume - Figure 10-5.dwg Apr 07, 2014 - 3:38pm

10.2 Capacity Analysis

10.2.1 Intersection Analysis

Table 10-2 summarizes the LOS analysis results for the study intersections under the baseline plus Scenario 2, Growth Projection 3 conditions. See the Attachments 11 and 14 for the Intersection LOS Calculation Worksheets.

Table 10-3: Intersection Level of Service Summary Scenario 2, Growth Projection 3

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
1	Gordon Highway and 13th Street	Two-Way Stop	Eastbound	A	C	--	A	A	--
			Westbound	B	--	--	A	--	--
			Northbound	C	--	--	--	--	--
			Southbound	C	F	--	C	C	--
2	Gordon Highway and 19th Street	Signal	Eastbound	D	E	D	D	A	--
			Westbound	D	F	D	E	B	--
			Northbound	E	--	--	F	--	--
			Southbound	D	F	B	F	B	--
			Intersection	D	F	C	F	B	--
3	Gordon Highway and 7th Avenue	Signal	Eastbound	E	E	D	F	F	--
			Westbound	D	E	D	F	F	--
			Northbound	C	E	C	F	F	--
			Southbound	D	F	C	F	F	--
			Intersection	D	F	D	F	F	--
4	13th Street and 19th Street	Two-Way Stop	Eastbound	F	A	--	F	B	--
			Westbound	B	B	--	E	A	--
			Northbound	B	A	--	A	A	--
			Southbound	A	A	--	C	A	--
5	Chamberlain Avenue and 15th Street	Two-Way Stop	Eastbound	A	A	D	A	B	--
			Westbound	A	F	D	A	A	--
			Northbound	F	F	E	F	F	--
			Southbound	F	F	F	F	F	--
6	Chamberlain Avenue and 19th Street	Signal	Eastbound	C	F	C	B	D	C
			Westbound	C	F	C	C	D	C
			Northbound	C	F	D	C	D	D
			Southbound	C	F	C	C	E	D
			Intersection	C	F	C	C	D	C
7	Chamberlain Avenue and 25th Street	Two-Way Stop	Eastbound	A	A	B	A	A	B
			Westbound	A	B	A	A	B	C
			Northbound	E	F	C	C	F	B
			Southbound	D	F	C	D	F	A
8	Chamberlain Avenue and Rice Road	Signal	Eastbound	B	B	--	C	D	C
			Westbound	A	B	--	B	D	B
			Northbound	C	D	--	D	F	D
			Southbound	C	D	--	C	F	D
			Intersection	B	B	--	C	F	C

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
9	Chamberlain Avenue and Kilbourne Street	One-Way Stop	Eastbound	--	--	--	--	--	B
			Westbound	B	B	--	**D**	**F**	C
			Northbound	F	F	--	F	F	C
			Southbound	--	--	--	--	--	--
10	Barnes Avenue and 19th Street	Two-Way Stop	Eastbound	C	D	B	B	C	A
			Westbound	**D**	**F**	B	**C**	**F**	C
			Northbound	A	A	C	A	A	D
			Southbound	A	A	C	A	A	B
11	Barnes Avenue and 25th Street	All-Way Stop	Eastbound	B	D	C	**B**	**F**	D
			Westbound	B	C	B	B	C	B
			Northbound	**B**	**F**	C	**B**	**F**	D
			Southbound	**B**	**F**	C	B	C	C
			Intersection	**B**	**F**	C	**B**	**F**	C
12	Brainard Avenue and Kilbourne Street	One-Way Stop	Eastbound	F	F	--	F	F	--
			Westbound	D	D	--	C	C	--
			Northbound	A	A	--	A	A	--
			Southbound	A	A	--	A	A	--
13	Lane Avenue and 15th Street	All-Way Stop	Eastbound	B	B	C	B	B	--
			Westbound	**C**	**F**	D	B	C	--
			Northbound	**C**	**F**	B	F	F	--
			Southbound	F	F	B	**B**	**F**	--
			Intersection	F	F	B	F	F	--
14	Lane Avenue and 19th Street	Two-Way Stop	Eastbound	A	B	B	A	A	D
			Westbound	A	A	D	A	A	C
			Northbound	B	D	A	B	B	B
			Southbound	**C**	**F**	B	**C**	**F**	C
15	Lane Avenue and 25th Street	Two-Way Stop	Eastbound	A	B	B	A	A	--
			Westbound	A	A	B	A	B	--
			Northbound	**C**	**F**	C	F	F	--
			Southbound	**C**	**F**	C	F	F	--
16	Lane Avenue and Rice Road	Roundabout	Eastbound	A	A	A	A	B	--
			Westbound	--	--	--	--	--	--
			Northbound	**A**	**E**	C	A	A	--
			Southbound	A	D	D	B	C	--
			Intersection	A	D	C	A	C	--
17	North Range Road and 111th Street	Two-Way Stop	Eastbound	B	D	--	B	C	--
			Westbound	B	C	--	--	--	--
			Northbound	A	A	--	A	A	--
			Southbound	A	B	--	A	A	--
18	North Range Road and Avenue of the States	Two-Way Stop	Eastbound	**D**	**F**	C	F	F	--
			Westbound	F	F	C	F	F	--
			Northbound	A	C	B	B	C	--
			Southbound	B	C	C	A	A	--
19	US Highway 1 (SB) and Avenue of the States	One-Way Stop	Eastbound	--	--	A	--	--	A
			Westbound	A	A	B	B	D	A
			Northbound	--	--	--	--	--	--
			Southbound	**C**	**F**	D	**D**	**F**	C

Intersection		Traffic Control	Approach	AM Peak Hour			PM Peak Hour		
				Base LOS	LOS	With Mitigation	Base LOS	LOS	With Mitigation
20	US Highway 1 (NB) and Tobacco Road	One-Way Stop	Eastbound	--	--	A	--	--	A
			Westbound	--	--	B	--	--	A
			Northbound	**C**	**F**	C	**C**	**F**	B
			Southbound	--	--	--	--	--	--
21	13th Avenue and 15th Avenue	One-Way Stop	Eastbound	--	--	--	--	--	--
			Westbound	A	B	--	A	A	--
			Northbound	A	B	--	A	A	--
			Southbound	--	--	--	--	--	--
22	Chamberlain Avenue and Boardman Lake Road	Two-Way Stop	Eastbound	--	--	A	--	--	--
			Westbound	A	A	A	C	D	--
			Northbound	**C**	**E**	D	F	F	--
			Southbound	B	C	A	A	A	--

As indicated in this table, the addition of Growth Projection 3 traffic to Scenario 2 would result in substantial traffic effects a the following locations:

Specific physical improvements to select intersections will reduce the effect of the additional traffic to a less than substantial level. Refer to Chapter 13 for a description of these and other mitigation, avoidance and/or minimization measures.

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CHAPTER 11

Growth Projections at Access Control Points

11.1 Growth Projections at ACPs

This study compared the increase of traffic volumes at the ACPs during the AM peak hour during which time the inbound traffic to the facility is at its greatest. It was assumed for the purposes of this study that all trips generated by each of the growth areas would utilize the facility's ACPs. By doing so, this study presents a "worst case" scenario for the ACPs in regards to the number of vehicles that would need to be processed during this AM peak hour. It is assumed that a percentage of each growth projection would utilize on base housing that would thereby lower these peak hour demands in the tables below.

Table 11-1: Access Control Point AM Peak Hour Demand – Scenario 1

Access Control Point	Previous Study AM Peak Hour Demand	Growth Projection 1 AM Peak Hour Demand	Growth Projection 2 AM Peak Hour Demand	Growth Projection 3 AM Peak Hour Demand
Main Gate	1,650	2,531	2,683	2,993
Gate 2	1,757	2,328	2,430	2,631
Gate 5	1,273	1,916	2,124	2,515

Table 11-2: Access Control Point AM Peak Hour Demand – Scenario 2

Access Control Point	Previous Study AM Peak Hour Demand	Growth Projection 1 AM Peak Hour Demand	Growth Projection 2 AM Peak Hour Demand	Growth Projection 3 AM Peak Hour Demand
Main Gate	1,551	2,531	2,683	2,993
New Gate	1,856	2,328	2,430	2,631
Gate 5	1,273	1,916	2,124	2,515

11.2 Future Access Control Point Lane Calculations

The Army Standard for ACPs requires that gates be designed to have enough ID check lanes to meet Level of Service D. The following calculations use the demands determined in Tables 11-1 and 11-2to determine the required number of ID check lanes for each ACP scenario and growth projection for a variety of processing methods.

11.2.1 *Scenario 1 , Growth Projection 1 Lane Calculations*

Table 11-3 summarizes the lanes needed to achieve at least a LOS D for the various processing rates under Scenario 1, Growth Projection 1. As Table 11-3 shows, the capacities from the previous ACP Traffic Study are insufficient to accommodate most of the future demands at the Main Gate, Gate 2, and Gate 5.

Table 11-3 – Scenario 1, Growth Projection 1 Lane Calculation Summary

	ACP	Main Gate	Gate 2	Gate 5
Previous ACP Traffic Study	Design Demand	1,650	1,757	1,273
	Previous Study Process Lanes	5	5	4
	Trips Generated	**2,531**	**2,328**	**1,916**
Manual Single	Design Processing Rate: 375 vphpl	375	375	375
	ROUNDED LANE REQUIREMENTS	7	6	5
	Resulting Manpower Requirement	7	6	5
Manual Tandem	Design Processing Rate: 500 vphpl	500	500	500
	ROUNDED LANE REQUIREMENTS	5	5	4
	Resulting Manpower Requirement	10	9	8
Handheld Devices, Single	Design Processing Rate: 325 vphpl	325	325	325
	ROUNDED LANE REQUIREMENTS	8	7	6
	Resulting Manpower Requirement	8	7	6
Handheld Devices, Tandem	Design Processing Rate: 425 vphpl	425	425	425
	ROUNDED LANE REQUIREMENTS	6	5	5
	Resulting Manpower Requirement	12	10	10
Automated, No Traffic Arms	Design Processing Rate: 425 vphpl	425	425	425
	ROUNDED LANE REQUIREMENTS	6	5	5
	Resulting Manpower Requirement	6	5	5
Automated, Traffic Arms	Design Processing Rate: 350 vphpl	350	350	350
	ROUNDED LANE REQUIREMENTS	7	7	5
	Resulting Manpower Requirement	7	7	5

vphpl : vehicles per hour per lane

11.2.2 *Scenario 1 , Growth Projection 2 Lane Calculations*

Table 11-4 summarizes the lanes needed to achieve at least a LOS D for the various processing rates under Scenario 1, Growth Projection 2. As Table 11-4 shows, the capacities from the previous ACP Traffic Study are insufficient to accommodate most of the future demands at the Main Gate, Gate 2, and Gate 5.

Table 11-4 – Scenario 1, Growth Projection 2 Lane Calculation Summary

	ACP	Main Gate	Gate 2	Gate 5
Previous ACP Traffic Study	Design Demand	1,650	1,757	1,273
	Previous Study Process Lanes	5	5	4
	Trips Generated	**2,683**	**2,430**	**2,124**
Manual Single	Design Processing Rate: 375 vphpl	375	375	375
	ROUNDED LANE REQUIREMENTS	7	6	6
	Resulting Manpower Requirement	7	6	6
Manual Tandem	Design Processing Rate: 500 vphpl	500	500	500
	ROUNDED LANE REQUIREMENTS	5	5	4
	Resulting Manpower Requirement	11	10	8
Handheld Devices, Single	Design Processing Rate: 325 vphpl	325	325	325
	ROUNDED LANE REQUIREMENTS	8	7	7
	Resulting Manpower Requirement	8	7	7
Handheld Devices, Tandem	Design Processing Rate: 425 vphpl	425	425	425
	ROUNDED LANE REQUIREMENTS	6	6	5
	Resulting Manpower Requirement	13	10	10
Automated, No Traffic Arms	Design Processing Rate: 425 vphpl	425	425	425
	ROUNDED LANE REQUIREMENTS	6	6	5
	Resulting Manpower Requirement	6	6	5
Automated, Traffic Arms	Design Processing Rate: 350 vphpl	350	350	350
	ROUNDED LANE REQUIREMENTS	8	7	6
	Resulting Manpower Requirement	8	7	6

vphpl : vehicles per hour per lane

11.2.3 *Scenario 1 , Growth Projection 3 Lane Calculations*

Table 11-5 summarizes the lanes needed to achieve at least a LOS D for the various processing rates under Scenario 1, Growth Projection 3. As Table 11-5 shows, the capacities from the previous ACP Traffic Study are insufficient to accommodate all of the future demands at the Main Gate, Gate 2, and Gate 5.

Table 11-5 – Scenario 1, Growth Projection 3 Lane Calculation Summary

	ACP	Main Gate	Gate 2	Gate 5
Previous ACP Traffic Study	Design Demand	1,650	1,757	1,273
	Previous Study Process Lanes	5	5	4
	Trips Generated	**2,993**	**2,631**	**2,515**
Manual Single	Design Processing Rate: 375 vphpl	375	375	375
	ROUNDED LANE REQUIREMENTS	8	7	7
	Resulting Manpower Requirement	8	7	7
Manual Tandem	Design Processing Rate: 500 vphpl	500	500	500
	ROUNDED LANE REQUIREMENTS	6	5	5
	Resulting Manpower Requirement	12	10	10
Handheld Devices, Single	Design Processing Rate: 325 vphpl	325	325	325
	ROUNDED LANE REQUIREMENTS	9	8	8
	Resulting Manpower Requirement	9	8	8
Handheld Devices, Tandem	Design Processing Rate: 425 vphpl	426	425	425
	ROUNDED LANE REQUIREMENTS	4	6	6
	Resulting Manpower Requirement	14	12	10
Automated, No Traffic Arms	Design Processing Rate: 425 vphpl	425	425	425
	ROUNDED LANE REQUIREMENTS	7	6	6
	Resulting Manpower Requirement	7	6	6
Automated, Traffic Arms	Design Processing Rate: 350 vphpl	350	350	350
	ROUNDED LANE REQUIREMENTS	9	8	7
	Resulting Manpower Requirement	9	8	7

vphpl : vehicles per hour per lane

11.2.4 *Scenario 12, Growth Projection 1 Lane Calculations*

Table 11-6 summarizes the lanes needed to achieve at least a LOS D for the various processing rates under Scenario 2, Growth Projection 1. As Table 11-6 shows, the capacities from the previous ACP Traffic Study are insufficient to accommodate most of the future demands at the Main Gate, the New Gate, and Gate 5.

Table 11-6 – Scenario 2, Growth Projection 1 Lane Calculation Summary

	ACP	Main Gate	New Gate	Gate 5
Previous ACP Traffic Study	Design Demand	1,551	1,856	1,273
	Previous Study Process Lanes	5	6	4
	Trips Generated	**2,531**	**2,328**	**1,916**
Manual Single	Design Processing Rate: 375 vphpl	375	375	375
	ROUNDED LANE REQUIREMENTS	7	6	5
	Resulting Manpower Requirement	7	6	5
Manual Tandem	Design Processing Rate: 500 vphpl	500	500	500
	ROUNDED LANE REQUIREMENTS	5	5	4
	Resulting Manpower Requirement	10	10	8
Handheld Devices, Single	Design Processing Rate: 325 vphpl	325	325	325
	ROUNDED LANE REQUIREMENTS	8	7	6
	Resulting Manpower Requirement	8	7	6
Handheld Devices, Tandem	Design Processing Rate: 425 vphpl	425	425	425
	ROUNDED LANE REQUIREMENTS	6	5	5
	Resulting Manpower Requirement	12	10	10
Automated, No Traffic Arms	Design Processing Rate: 425 vphpl	425	425	425
	ROUNDED LANE REQUIREMENTS	6	5	5
	Resulting Manpower Requirement	6	5	5
Automated, Traffic Arms	Design Processing Rate: 350 vphpl	350	350	350
	ROUNDED LANE REQUIREMENTS	7	7	5
	Resulting Manpower Requirement	7	7	5

vphpl : vehicles per hour per lane

11.2.5 *Scenario 2 , Growth Projection 2 Lane Calculations*

Table 11-7 summarizes the lanes needed to achieve at least a LOS D for the various processing rates under Scenario 2, Growth Projection 2. As Table 11-7 shows, the capacities from the previous ACP Traffic Study are insufficient to accommodate most of the future demands at the Main Gate, the New Gate, and Gate 5

Table 11-7 – Scenario 2, Growth Projection 2 Lane Calculation Summary

	ACP	Main Gate	New Gate	Gate 5
Previous ACP Traffic Study	Design Demand	1,551	1,856	1,273
	Previous Study Process Lanes	5	6	4
	Trips Generated	**2,683**	**2,430**	**2,124**
Manual Single	Design Processing Rate: 375 vphpl	375	375	375
	ROUNDED LANE REQUIREMENTS	7	6	6
	Resulting Manpower Requirement	7	6	6
Manual Tandem	Design Processing Rate: 500 vphpl	500	500	500
	ROUNDED LANE REQUIREMENTS	5	5	4
	Resulting Manpower Requirement	10	10	8
Handheld Devices, Single	Design Processing Rate: 325 vphpl	325	325	325
	ROUNDED LANE REQUIREMENTS	8	7	7
	Resulting Manpower Requirement	8	7	7
Handheld Devices, Tandem	Design Processing Rate: 425 vphpl	425	425	425
	ROUNDED LANE REQUIREMENTS	6	6	5
	Resulting Manpower Requirement	12	10	10
Automated, No Traffic Arms	Design Processing Rate: 425 vphpl	425	425	425
	ROUNDED LANE REQUIREMENTS	6	6	5
	Resulting Manpower Requirement	6	6	5
Automated, Traffic Arms	Design Processing Rate: 350 vphpl	350	350	350
	ROUNDED LANE REQUIREMENTS	8	7	6
	Resulting Manpower Requirement	8	7	6

vphpl : vehicles per hour per lane

11.2.6 *Scenario 2 , Growth Projection 3 Lane Calculations*

Table 11-8 summarizes the lanes needed to achieve at least a LOS D for the various processing rates under Scenario 2, Growth Projection 3. As Table 11-8 shows, the capacities from the previous ACP Traffic Study are insufficient to accommodate most of the future demands at the Main Gate, the New Gate, and Gate 5

Table 11-8 – Scenario 2, Growth Projection 3 Lane Calculation Summary

	ACP	Main Gate	New Gate	Gate 5
Previous ACP Traffic Study	Design Demand	1,551	1,856	1,273
	Previous Study Process Lanes	5	6	4
	Trips Generated	**2,993**	**2,631**	**2,515**
Manual Single	Design Processing Rate: 375 vphpl	375	375	375
	ROUNDED LANE REQUIREMENTS	8	7	7
	Resulting Manpower Requirement	8	7	7
Manual Tandem	Design Processing Rate: 500 vphpl	500	500	500
	ROUNDED LANE REQUIREMENTS	6	5	5
	Resulting Manpower Requirement	12	10	10
Handheld Devices, Single	Design Processing Rate: 325 vphpl	325	325	325
	ROUNDED LANE REQUIREMENTS	9	8	8
	Resulting Manpower Requirement	9	8	8
Handheld Devices, Tandem	Design Processing Rate: 425 vphpl	425	425	425
	ROUNDED LANE REQUIREMENTS	7	6	6
	Resulting Manpower Requirement	14	12	10
Automated, No Traffic Arms	Design Processing Rate: 425 vphpl	425	425	425
	ROUNDED LANE REQUIREMENTS	7	6	6
	Resulting Manpower Requirement	7	6	6
Automated, Traffic Arms	Design Processing Rate: 350 vphpl	350	350	350
	ROUNDED LANE REQUIREMENTS	9	8	7
	Resulting Manpower Requirement	9	8	7

vphpl : vehicles per hour per lane

11.3 Future Access Control Point Lane Conclusion

If these population growth projections occur, the number of ID check lanes will need to increase from what is displayed in the previous ACP Traffic Study. The number of required ID check lanes will be dependent of the type of processing as shown in the above tables. It was assumed for the purposes of this study that all trips generated by each of the growth areas would utilize the facility's ACPs. By doing so, this study presents a "worst case" scenario for the ACPs in regards to the number of vehicles that would need to be processed during this AM peak hour. It is assumed that a percentage of each growth projection would utilize on base housing that would thereby lower these peak hour demands in the tables below.

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CHAPTER 12

Other Traffic Effects

12.1 Cumulative Effects

Population growth to any of the four growth areas will contribute to the traffic within the base to many of the study intersections. In those cases which the additional traffic contributes to an intersection being degraded in LOS from LOS D or better to LOS E or F mitigation measures are recommended to restore the operations back to acceptable levels.

Proposed new construction and the purpose of the work involved in those new areas will greatly affect the amount of trips generated. It was assumed for the purposes of this Traffic Study that the trip generation is based on typical civilian work hours. However, some of the work force at these new locations may work in shifts and the actual traffic impact to the study intersections may be less. To minimize and avoid potential cumulative impacts at various intersections, traffic conditions should be monitored before and after the construction and occupancy of the new areas and to identify any other feasible measures that may be implemented to minimize the traffic effects of the additional traffic volume.

12.2 Construction Effects

Construction in any of the growth areas would involve short-term traffic increases within the ROI. These trips would include construction workers, delivery of construction materials and equipment, and the removal of excess soils, demolition materials, and/or construction debris. Most trips generated by the construction during the AM peak hour will be inbound only and outbound only during the PM peak hour. Additionally, some materials and equipment may be staged on or near the construction site, alleviating the need for certain delivery trips to enter the installation on a recurring basis. To minimize and avoid potential temporary impacts associated with construction traffic, the construction contractor should coordinate with installation representatives to develop and implement a traffic management plan, which may specify construction timeframes, internal routing, carpooling and/or other measures to minimize the effects of construction related traffic on internal streets and intersections.

12.3 Site Access Effects

During project development to any of the growth areas, design plans will be prepared for the selected alternative. In order to provide safe and efficient access to and from the growth area facility, it is recommended that the designer coordinates with the installation's public works representatives to develop an appropriate design of access driveways, including traffic control, dedicated turn lanes, and any other improvements in and around the proposed area.

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CHAPTER 13

Findings and Recommendations

13.1 Findings

The analysis found as part of this Traffic Study found substantial congestion at numerous intersections throughout the installation. The additional traffic generated from the growth projections to the growth areas for both access point scenarios would result in substantial effects during one or both peak hours as follows:

- Scenario 1 – Growth Projection 1 – 14 intersections of the 22 analyzed
- Scenario 1 – Growth Projection 2 – 14 intersections of the 22 analyzed
- Scenario 1 – Growth Projection 3 – 15 intersections of the 22 analyzed
- Scenario 2 – Growth Projection 1 –15 intersections of the 22 analyzed
- Scenario 2 – Growth Projection 2 – 15 intersections of the 22 analyzed
- Scenario 2 – Growth Projection 3 – 16 intersections of the 22 analyzed

13.2 Recommendations

For the signalized intersections that require improvements this Traffic Study analyzed different improvements that may be made to the phasing of the signals such as providing overlapping right turns during left turn phases. The movements through the intersection that appear to be the root cause of the failing LOS have been analyzed to discover if adding a lane or reassigning lane uses will alleviate the delay.

Signal Warrants will be advised to be performed for the all-way stop controlled intersections that show substantial effects from the projected traffic. The Traffic Data that was provided does not contain sufficient volumes to check either the 8-Hour or 4-Hour Vehicular Volume Warrants. Using HCS 2010 with the projected traffic volumes and the current lane usage, signalization will be analyzed to determine whether the failing approaches would see significant improvements.

One and two-way stop controlled intersections that show substantial effects from the projected traffic have been analyzed for all-way stop control and signal controlled improvements. Signal Warrants will be advised to be performed where applicable. Using HCS 2010 with the projected traffic volumes and the current lane usage, signalization will be analyzed to determine whether the failing approaches would see significant improvements.

The roundabout intersection of Lane Avenue and Rice Road has been analyzed for providing additional lanes to ease the congestion the intersection sees in the eastbound and northbound directions.

See Tables 13-1 and 13-2 for specific physical improvements for each intersection under the varying circumstances.

Table 13-1: Summary of Mitigation Recommendations by Intersection – Scenario 1

Intersection		Growth Projection 1	Growth Projection 2	Growth Projection 3
1	Gordon Highway and 13th Street	No Mitigation Required	No Mitigation Required	No Mitigation Required
2	Gordon Highway and 19th Street	Add NB Left, SB Left, and EB Right Turn Lanes	Add NB Left, SB Left, and EB Right Turn Lanes	Add NB Left, SB Left, EB Right Turn Lanes
3	Gordon Highway and 7th Avenue	Add EB Thru and WB Left Turn Lanes	Add EB Thru and WB Left Turn lanes	Add EB Thru, WB Left, and SB Thru Lanes
4	13th Street and 19th Street	No Mitigation Required	No Mitigation Required	No Mitigation Required
5	Chamberlain Avenue and 15th Street	No Mitigation Required	No Mitigation Required	No Mitigation Required
6	Chamberlain Avenue and 19th Street	Add NB Thru Lane	Add NB Thru and WB Thru Lanes	Add NB Thru and WB Thru Lanes
7	Chamberlain Avenue and 25th Street	Official Signal Warrant Advised	Official Signal Warrant Advised	Official Signal Warrant Advised
8	Chamberlain Avenue and Rice Road	Adjust Signal Phasing to include NB Right Turns During WB Left Turn Phase	Adjust Signal Phasing to include NB Right Turns During WB Left Turn Phase	Add NB Right, SB Right, and EB Right Turn Lanes
9	Chamberlain Avenue and Kilbourne Street	Official Signal Warrant Advised. Add EB Thru, WB Thru, and 2 NB Right Turn Lanes	Official Signal Warrant Advised. Add EB Thru, WB Thru, and 2 NB Right Turn Lanes	Official Signal Warrant Advised. Add EB Thru, WB Thru, and 2 NB Right Turn Lanes
10	Barnes Avenue and 19th Street	Change to All-Way Stop Control	Change to All-Way Stop Control	Change to All-Way Stop Control
11	Barnes Avenue and 25th Street	Add NB Left and EB Left Turn Lanes	Add NB Left Turn Lane	Add NB Left, SB Left, EB Left and WB Left Turn Lanes
12	Brainard Avenue and Kilbourne Street	No Mitigation Required	No Mitigation Required	No Mitigation Required
13	Lane Avenue and 15th Street	Official Signal Warrant Advised. Add SB Thru Lane	Official Signal Warrant Advised. Add SB Thru and SB Left Turn Lanes	Official Signal Warrant Advised. Add NB Left, SB Thru and Left, and WB Left Turn Lanes
14	Lane Avenue and 19th Street	Change to All Way Stop Control. Add EB Thru and WB Thru Lanes	Change to All Way Stop Control. Add EB Thru and WB Thru Lanes	Change to All Way Stop Control. Add EB Thru and WB Thru Lanes

Intersection		Growth Projection 1	Growth Projection 2	Growth Projection 3
15	Lane Avenue and 25th Street	Change to All Way Stop Control. Add WB Left Turn Lane	Official Signal Warrant Advised	Official Signal Warrant Advised. Add NB Left, SB Left, EB Right, and WB Right Turn Lanes
16	Lane Avenue and Rice Road	No Mitigation Required	No Mitigation Required	Add NB Left Turn Lane
17	North Range Road and 111th Street	No Mitigation Required	No Mitigation Required	No Mitigation Required
18	North Range Road and Avenue of the States	Official Signal Warrant Advised. Add NB Left Turn Lane	Official Signal Warrant Advised. Add NB Left Turn Lane	Official Signal Warrant Advised. Add NB Left Turn Lane
19	US Highway 1 (SB) and Avenue of the States	Official Signal Warrant Advised	Official Signal Warrant Advised	Official Signal Warrant Advised. Add SB Right Turn Lane
20	US Highway 1 (NB) and Tobacco Road	Official Signal Warrant Advised	Official Signal Warrant Advised	Official Signal Warrant Advised
21	13th Avenue and 15th Street	No Mitigation Required	No Mitigation Required	No Mitigation Required
22	Chamberlain Avenue and Boardman Lake Road	No Mitigation Required	No Mitigation Required	The failing movement for this intersection contains 3 vehicles per hour. Mitigation is not required for this small of a volume.

Table 13-2: Summary of Mitigation Recommendations by Intersection – Scenario 2

Intersections		Growth Projection 1	Growth Projection 2	Growth Projection 3
1	Gordon Highway and 13th Street	No Mitigation Required	No Mitigation Required	The failing movement for this intersection contains 3 vehicles per hour. Mitigation is not required for this small of a volume.
2	Gordon Highway and 19th Street	Add SB Right Turn Lane	Add SB Right and WB Thru Lanes	Add SB Right and WB Thru Lanes
3	Gordon Highway and 7th Avenue	Add EB Thru and WB Left Turn Lanes	Add EB Thru and WB Left Turn Lanes	Add SB Thru, EB Thru, and WB Left Turn Lanes
4	13th Street and 19th Street	No Mitigation Required	No Mitigation Required	No Mitigation Required
5	Chamberlain Avenue and 15th Street	Official Signal Warrant Advised. This signal will see significant increases to the vehicle volumes. Multiple lane additions will be required in all directions	Official Signal Warrant Advised. This signal will see significant increases to the vehicle volumes. Multiple lane additions will be required in all directions	Official Signal Warrant Advised. This signal will see significant increases to the vehicle volumes. Multiple lane additions will be required in all directions
6	Chamberlain Avenue and 19th Street	Add WB Thru and EB Thru Lanes	Add WB Right, WB Thru, and EB Thru Lanes	Add NB Thru, SB Thru, EB Thru and WB Thru Lanes
7	Chamberlain Avenue and 25th Street	Official Signal Warrant Advised	Official Signal Warrant Advised	Official Signal Warrant Advised. Add NB Left, NB Right, and WB Left Turn Lanes
8	Chamberlain Avenue and Rice Road	Adjust Signal Phasing to include NB Right Turns During WB Left Turn Phase	Adjust Signal Phasing to include NB Right Turns During WB Left Turn Phase	Add NB Right, SB Right, and EB Right Turn Lanes
9	Chamberlain Avenue and Kilbourne Street	Official Signal Warrant Advised. Add EB Thru, WB Thru, and 2 NB Right Turn Lanes	Official Signal Warrant Advised. Add EB Thru, WB Thru, and 2 NB Right Turn Lanes	Official Signal Warrant Advised. Add EB Thru, WB Thru, and 2 NB Right Turn Lanes
10	Barnes Avenue and 19th Street	Change to All Way Stop Control	Change to All Way Stop Control	Change to All Way Stop Control

Intersections		Growth Projection 1	Growth Projection 2	Growth Projection 3
11	Barnes Avenue and 25th Street	Add NB Left and EB Left Turn Lanes	Add NB Left Turn Lane	Add NB Left, SB Left, EB Left and WB Left Turn Lanes
12	Brainard Avenue and Kilbourne Street	No Mitigation Required	No Mitigation Required	No Mitigation Required
13	Lane Avenue and 15th Street	Add SB Thru Lane	Add SB Thru and Left Turn Lanes	Add NB Left, SB Thru, SB Left, and WB Left Turn Lanes
14	Lane Avenue and 19th Street	Change to All Way Stop Control. Add EB Thru and WB Thru Lanes	Change to All Way Stop Control. Add EB Thru and WB Thru Lanes	Change to All Way Stop Control. Add EB Thru and WB Thru Lanes
15	Lane Avenue and 25th Street	Change to All Way Stop Control. Add WB Thru Lane	Official Signal Warrant Advised	Official Signal Warrant Advised. Add NB Left, SB Left, EB Right, and WB Right Turn Lanes
16	Lane Avenue and Rice Road	No Mitigation Required	No Mitigation Required	Add NB Left Turn Lane
17	North Range Road and 111th Street	No Mitigation Required	No Mitigation Required	No Mitigation Required
18	North Range Road and Avenue of the States	Official Signal Warrant Advised. Add NB Left Turn Lane	Official Signal Warrant Advised. Add NB Left Turn Lane	Official Signal Warrant Advised. Add NB Left Turn Lane
19	US Highway 1 (SB) and Avenue of the States	Official Signal Warrant Advised	Official Signal Warrant Advised	Official Signal Warrant Advised. Add SB Right Turn Lane
20	US Highway 1 (NB) and Tobacco Road	Official Signal Warrant Advised	Official Signal Warrant Advised	Official Signal Warrant Advised
21	13th Avenue and 15th Street	No Mitigation Required	No Mitigation Required	No Mitigation Required
22	Chamberlain Avenue and Boardman Lake Road	No Mitigation Required	No Mitigation Required	The failing movement for this intersection contains 3 vehicles per hour. Mitigation is not required for this small of a volume.

13.3 Other Recommendations

The following items are other recommendations that are suggested to be considered for any future facilities on Fort Gordon:

- Any planned installations that will contribute to the traffic volume of Fort Gordon will need to be coordinated with Fort Gordon representatives and the appropriate stage and local representatives in order to minimize the amount of negative traffic effects. Specific physical improvements that have been mentioned in this Traffic Study may be modified upon further study and during the design process of those improvements.

- To the extent feasible, incorporate various measures into the design or operation of the facility to minimize the concentration of inbound or outbound traffic during the peak AM or PM commuting hours. Non-infrastructure measures may include staggered/flexible working hours, telecommuting, incentives to encourage walking or biking or transit or carpooling. Facility measures may include bike storage, showers and locker rooms, etc.

- Site access driveways should be carefully coordinated with Fort Gordon representatives during the design phase of any new facility to help minimize negative effects to the installations

TETRA TECH, INC.

Memorandum

DATE: 28 October 2015
TO: Crystal Darnell, USACE Mobile District; Rob Drumm – Fort Gordon and Kristin Shields – Tetra Tech
FROM: Kristi Hagood – Tetra Tech
RE: Installation Kick-Off Meeting Notes – Environmental Assessment for Construction and Operation of a New Access Control Point (ACP), Gate 6 Fort Gordon, Georgia (Contract No. W91278-11-D-0019 Task Order No. 0032)

Participants:

Robert Drumm (Fort Gordon – DPW ED)
Crystal Darnell (USACE Mobile District)
Kristi Hagood (Tetra Tech, Fort Gordon – DPW ED)
Phil Moore (Tetra Tech)
Mike Whitten (Tetra Tech)
Kevin Wall (USACE Savannah District)
John Wood (Fort Gordon – DPTMS)
Steve Camp (Fort Gordon – DPW ED NRB)
Hagan Ratliff (Fort Gordon – DPW ED)
Allen Braswell (Fort Gordon – DPW ED NRB)
Heidi Helmlinger (Tetra Tech, Fort Gordon – DPW ED)
Renee Lewis (Tetra Tech, Fort Gordon – DPW ED)
Carlton Shuford (Fort Gordon – DPW M-P)
James Wilson (Fort Gordon – DES PS)
Steve Exley (Columbia County)
Paul DeCamp (City of Augusta)
Don Grantham (GaDOT)
Ron Lampkin (City of Augusta)
Thom Tuckey (CSRA Alliance)
Keith Scott (Fort Gordon – DPW M-P)
Robert Laconis (Fort Gordon – DPW Eng Division)
Glen Bollinger (City of Augusta)
Tim Lavalle – by phone (LPES, Inc.)
Kristin Shields – by phone (Tetra Tech)
Glenn Bowman – by phone (Ga DOT)

Purpose:

The purpose of this meeting was to begin the Environmental Assessment (EA) process for the construction and operation of a new Access Control Point (ACP)/Gate 6 on Fort Gordon, Georgia. The meeting was held on October 27, 2015 at 1:30pm (EST) in the Fort Gordon Building 14600 conference room. A summary of the meeting follows.

Introductions:

Introductions for those in attendance were made. Participants included representatives from Tetra Tech; Fort Gordon Environmental Division, Engineering Division and Master Planning Division; Fort Gordon Directorate of Emergency Services; Fort Gordon Directorate of Plans, Training, Mobilization and Security; U.S. Army Corps of Engineers Mobile and Savannah Districts; Columbia County; the City of Augusta; CSRA Alliance; and the Georgia Department of Transportation.

EA Template to Use:

Tetra Tech will use the recent Fort Gordon Road to Growth PEA as the template for this EA.

Draft EA Outline:
The proposed draft outline was reviewed. It is subject to change as the EA progresses.

Schedule:
The EA process schedule was reviewed and the entire EA process should be completed by late September 2016.

Purpose and Need of the Proposed Action:
A new ACP is needed to accommodate the growth Fort Gordon is currently experiencing. This is based on projected growth for the next 10-15 years (analyzed in the Road to Growth PEA and existing traffic studies extend out to 2025). The current traffic situation is causing safety issues/concerns in the City of Grovetown. During peak traffic times, traffic stacks into Grovetown on Robinson Avenue. A new ACP will accommodate ease of access to mission support where it is needed. It would direct traffic to the area of Fort Gordon where the mission continues to grow.

Proposed Action and Alternatives:
The proposed action and alternatives were discussed. The following four alternatives will be considered in the EA:

- No Action Alternative. The No Action alternative will be included as required by the Council on Environmental Quality regulations to identify the existing baseline conditions against which potential impacts will be evaluated. The No Action Alternative would be to continue the mission at Fort Gordon as it was being performed in January 2015 without the construction of a new access control point.
- Alternative 1, Northern route. Under this alternative a new gate and access road would be built in the northern part for Training Area 17 and connect from Gordon Highway to Chamberlain Avenue.
- Alternative 2, Central route (Proposed Action). Under this alternative, a new gate and access road would be built in the central part of Training area 16 and 17 with a connection from Gordon Highway to a road south of Lane Avenue.
- Alternative 3 Southern route. Under this alternative a new gate and access road would be built in the southern part of Training area 16 and 17 with a connection form Gordon Highway to a road south of Lane Avenue.

Maps of these alternatives were reviewed. The No Action Alternative and Alternative 2 will be carried throughout the EA for full analysis. Alternatives 1 and 3 will be dismissed based on screening criteria that will be presented in the EA. Alternative 1 does not meet the purpose and need of the action since it would not provide stacking space for traffic off of Gordon Highway. Alternative 3 will be dismissed based on significant adverse impacts it would cause to wetlands, cultural resources and biological resources.

Issues to be addressed:
Issues that will be addressed in the EA were discussed. Known impacts were briefly mentioned for each resource area.

- *Air Quality*
  Fort Gordon is in attainment for NAAQS. Back-up generators will be used at Gate 6. It is expected that there will not be significant impacts to local or regional air quality as a result of the proposed action.
- *Cultural Resources*
  There is an old, railroad bridge that belongs to Fort Gordon that crosses Gordon Highway. This bridge will need to be removed in order to widen the highway and it is eligible for listing in the National Register of Historic Properties (NRHP). Fort Gordon will conduct Section 106

coordination with the Georgia SHPO to determine a mitigation plan for the removal of this bridge. The timing of the mitigation plan could determine if the EA results in a FNSI or a mitigated FNSI. There are no other known cultural resources in the proposed action area.

- *Geology & Soils*
  Tetra Tech will use the Fort Gordon soil survey to determine where erodible soils are located within the proposed action area. Increased sedimentation and erosion would be expected as a result of a construction project like the proposed action. There could also be longer term impacts as a result of the road that will be installed.
- *Noise*
  Fort Gordon has a new noise plan that includes new noise contours. This will be provided to Tetra Tech. There will be increased traffic noise near the TASC building as a result of the proposed action. It will also increase long term traffic noise moving down Gordon Highway and onto Fort Gordon in the area of the new ACP. Short term noise impacts would be expected as a result of the construction of the new ACP.
- *Biological Resources* (this section will include Federal and State endangered species)
  A Red-cockaded woodpecker survey will be required of the proposed action area and surrounding area. Fort Gordon biologists will perform this survey. Tetra Tech will be relying on existing biological data for the proposed action area and raised the concern that although this is not a biologically sensitive area, agencies could possibly request newer data.
- *Wetlands*
  There will be impacts to wetlands as a result of this action. If needed, the impacts will be mitigated to less than significant. Tetra Tech has already been provided the wetlands delineation report and GIS data.
- *Water Resources*
  Through the Fort Gordon Installation Restoration Program, there is a lot of stream data available. Fort Gordon also has good water quality sampling data. Impacts to water resources would be expected as a result of increased sedimentation and erosion. In addition, increased runoff with petroleum products could occur as a result of the road that will be installed through Training Area 17.
- *Infrastructure and Facilities*
  All utilities will be needed at the new gate/ACP including water, electricity, communications, etc… To the extent possible, right-of-ways for these utilities will be included in the EA analysis. Training land will also be lost as a portion of Training Area 17 will be converted from training land to the new ACP.
- *Traffic and transportation*
  The most recent traffic study was completed in 2012. It is not clear if a new traffic study will be required at this time. If a new study is required, it is not included in Tetra Tech's scope for this EA. There will be increased traffic down Gordon Highway as traffic that is currently using Gates 1, 2 and 3 will be shifted down Gordon Highway to the new ACP.
- *Energy*
  It is expected that there will not be any significant impacts to energy as a result of the proposed action.
- *Land Use and Visual Resources*
  Impacts to visual resources will occur as a result of large amounts of timber removal within Training Area 17 and widening Gordon Highway. Training land will also be lost as a portion of Training Area 17 will be converted from training land to the new ACP. Impacts are expected to be less than significant.
- *Hazards and Hazardous Materials*
  SWMU 9 is in the area of the proposed action. There are institutional controls in place. There is also the potential that the highway widening near the railhead could impact a potentially

contaminated area that is under investigation. Field work for this site is expected to begin within the next two months. Both of these areas will be fully analyzed in the EA with respect to the proposed action.

- *Socioeconomics*
  Short term positive impacts could occur to the local economy as a result of increased construction jobs needed for the proposed action. It is expected that there will not be a significant impact to socioeconomics as a result of the proposed action.
- *Environmental Justice*
  It is expected that there will not be any impacts to environmental justice as a result of the proposed action.
- *Climate Change*
  It is expected that there will be no significant impacts to climate change as a result of the proposed action. The climate change discussion will be included in the air quality discussion.

Initial Data Request:

The initial data request was reviewed and Fort Gordon will begin to pull data together to submit to Tetra Tech. More data maybe requested as the EA progresses.

List of Agencies to Contact:

Fort Gordon has a list of agencies that are contacted during an EA process. This list will be provided to Tetra Tech and other agencies that are normally not involved will likely be added to the list to be contacted during the scoping process. The list will be finalized after the DOPAA is completed and prior to sending out scoping letters.

Issues/Questions/Misc Notes:

- Columbia County's long term plan (~2030) for an I-20 interchange at Louisville Road to hook into the new ACP (a bypass around Grovetown) as well as a near term plan (~2020) to convert the conventional diamond interchange at Lewiston Road/I-20 to a diverging diamond interchange will be included in the cumulative impacts analysis to the extent possible.
- The visitor control center will be moved from Gate 1 to the new ACP.
- Gate 1 will become a DOD only gate.
- Gate 2 will be "mothballed" or placed in an inactive status. It may be used in the future for special events or emergencies but will not be used on a regular basis.
- Gate 3 will be closed permanently. Contractors will use the new ACP.
- The Gordon Hwy widening will be included as part of the proposed action. The widening will occur on Fort Gordon between Gate 2 and the new ACP in order to accommodate adding more lanes through that area. The widening will occur on the Fort Gordon side (south of the highway) and no widening will happen north of the highway.
- A temporary entrance for construction equipment will be needed and should be included in the EA.
- Any current 4283s that are in the work order system that are in support of a new ACP should be included in this EA as part of the proposed action or within the cumulative impacts analysis.
- IMCOM needs to be informed when the training area usage changes. A letter of utilization will need to be provided showing the transfer from training area to road. Fort Gordon DPW would perform this action.
- Georgia DOT would like to sign the EA as a reviewer and Fort Gordon will sign as the approver.
- This EA will tier off of the RTG PEA as much as possible. This EA will NOT analyze the additional personnel coming. It will only analyze the proposed action of constructing and operating a new ACP.

- Impacts to the tank trail will be included in the EA analysis. Based on the current proposed route of the new ACP, the new road would cross the tank trail. This could have impacts on training and potentially increased erosion along the tank trail.
- It is recommend that consideration be made to doing a noise survey of the EST and noise producing simulators and devices as they relate to the location of the preferred route location. A new noise survey is not part of the Tetra Tech scope of work but noise impacts along the preferred route will given consideration in the EA.
- It is recommend that internal and external noise impacts around the TADS buildings be reviewed as well that impact to both traffic and training. Random exposure to very realistically loud simulator/device noise may affect drivers and potentially distract drivers unexpectedly as they come within the TADS AO. A new noise survey is not part of the Tetra Tech scope of work but noise impacts along the preferred route will given consideration in the EA. This will include impacts to traffic and training in these areas.