


**DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA**

INTERDEPARTMENT CORRESPONDENCE

FILE: I-95 @ SR 21 DDI, Chatham County **OFFICE:** Innovative Delivery
PI No.0012722
Design-Build **DATE:** October 1, 2014

FROM:  Darryl D. VanMeter, P.E., State Innovative Delivery Engineer

TO: Brent A. Story, P.E., State Design Policy Engineer

SUBJECT: Request for Design Exception

RECEIVED
OCT 03 2014
DESIGN POLICY & SUPPORT
TPro logged in ✓

Please find the attached Design Exception request for the above referenced project. The Design Exception requested is:

1. Horizontal Alignment

This office concurs with the request, and is submitting for your review and approval, the attached documentation provided by Arcadis.

If additional information is needed, please contact Andrew Hoenig at (404) 631-1757.


DVM:CAN

Attachments: as stated

cc: Project File



Andrew Hoenig, PE
Project Manager
Office of Innovative Delivery
Georgia Department of Transportation
600 West Peachtree Street
Atlanta, GA 30308

Subject:
Request for Design Exception – Horizontal Alignment
P.I. No. 0012722
Chatham County
SR 21 at I-95 Diverging Diamond Interchange

Dear Mr. Hoenig:

Approval of the following Design Exception is requested for the above-referenced project.

PROJECT DESCRIPTION

The proposed project consists of a diverging diamond interchange at the existing underpass of SR 21 at I-95, in Chatham County, Georgia. The project is approximately 4 miles NW of Port Wentworth and 10 miles NW of Savannah. Total length of project is approximately 1 mile. The speed design of the project is 45 mph, and the typical section lane widths are 12 feet. Existing SR 21 is primarily two lanes in each direction with right and left turn lanes at intersections. Shoulders are paved and grassed inside the median and outside of travel lanes. Commercial driveways and side roads radii are curb and gutter. Existing conditions are observed that the NB off-ramp traffic from I-95 to SR 21 backs up on I-95 mainline creating blocking on I-95 in the NB direction. The three through lanes will be carried through the interchange northbound and southbound, and the northbound right turn lanes at multiple driveways will be converted to a right turn auxiliary lane on SR 21. Additional lane added in each direction on SR 21 from SR 30 to Hendley Rd. **Attachment 1** shows a project location map, and **Attachment 2** shows the project layout.

FEATURE REQUIRING A DESIGN EXCEPTION

Design Exception Request: to use radius less than the 35 mph Design Speed for the crossovers inside the diverging diamond interchange.

Imagine the result

ARCADIS U.S., Inc.
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Tel 770 431 8666
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TRANSPORTATION

Date:
October 2, 2014

Contact:
Doug Tilt, PE

Phone:
770.431.8666

Email:
doug.tilt@arcadis-us.com

Our ref:
TM130034

The design exception requested is to provide radii that deviate from those recommended in the current AASHTO "A Policy on Geometric Design of Highways and Streets".

At locations where the "cross over" of traffic occurs just north and south of the SR 21 underpass, the project will match existing cross slopes. The existing typical section in these areas is a normal crown section. Therefore, exhibit 3-16 of AASHTO requires a 510 ft turning radius for 35 mph turning movements with normal crown (*Attachment 3*).

CURRENT AND FUTURE TRAFFIC DATA

Traffic diagrams are provided in *Attachment 4* showing the existing year (2014), open year (2015), and design year (2035) average daily traffic volumes (ADT) and peak hour traffic volumes (DHV) for build and no-build alternatives.

CRASH DATA

The results of the Crash Analysis conducted for the interchange are summarized in *Attachment 5*. Table 1 presents five (5) years of intersection crash data showing the numbers and type of crashes. Figure 1 shows that rear-end crashes occurred the most frequently at the interchange. The severity of the crashes was also analyzed; the findings show that only 44 injuries occurred at the intersection. During the five years of study, one crash involving fatalities occurred at this interchange.

WHY THE CURRENT STANDARD CANNOT BE MET

Due to the inherent design of a diverging diamond interchange and the limited amount of available right of way, we propose 300 ft as the minimum turning radius at these cross over locations. The AASHTO criteria is a 510 ft radius. If the project were to be required to meet the standard, the intersection crossing angle would need to be smaller than desirable. There is no Right of Way on this project. There will be no additional construction cost of using a 300 ft radius as opposed to a 510 ft radius.

COST TO MEET STANDARD CRITERIA

There is no Right of Way on this project. There will be no additional construction cost of using a 300 ft radius as opposed to a 510 ft radius. If the project were to be required to meet the standard, the intersection crossing angle would need to be smaller than desirable.

MITIGATION PROPOSED

The project will be clearly striped, with additional signing and marking beyond what is required to enhance clarity and safety for users. Additionally, the functionality of this interchange by the nature of the crossovers that require the design exception eliminates the most severe type of crash, which are angle collisions. The design

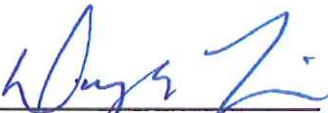
team has worked closely with GDOT Traffic Operations in preparing adequate warnings to the motoring public.

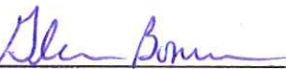
RECOMMENDATION


The project will be clearly striped, with additional signing and marking beyond what is required to enhance clarity and safety for users. Additionally, the functionality of this interchange by the nature of the crossovers that require the design exception eliminates the most severe type of crash, which are angle collisions. The design team has worked closely with GDOT Traffic Operations in preparing adequate warnings to the motoring public.

Based on these criteria and circumstances, the design team recommends approval of the design exception.

If you have any questions or further clarification is needed, please contact Doug Tilt at 770.431.8666.

Recommend:  10/1/14
Engineer of Record Date

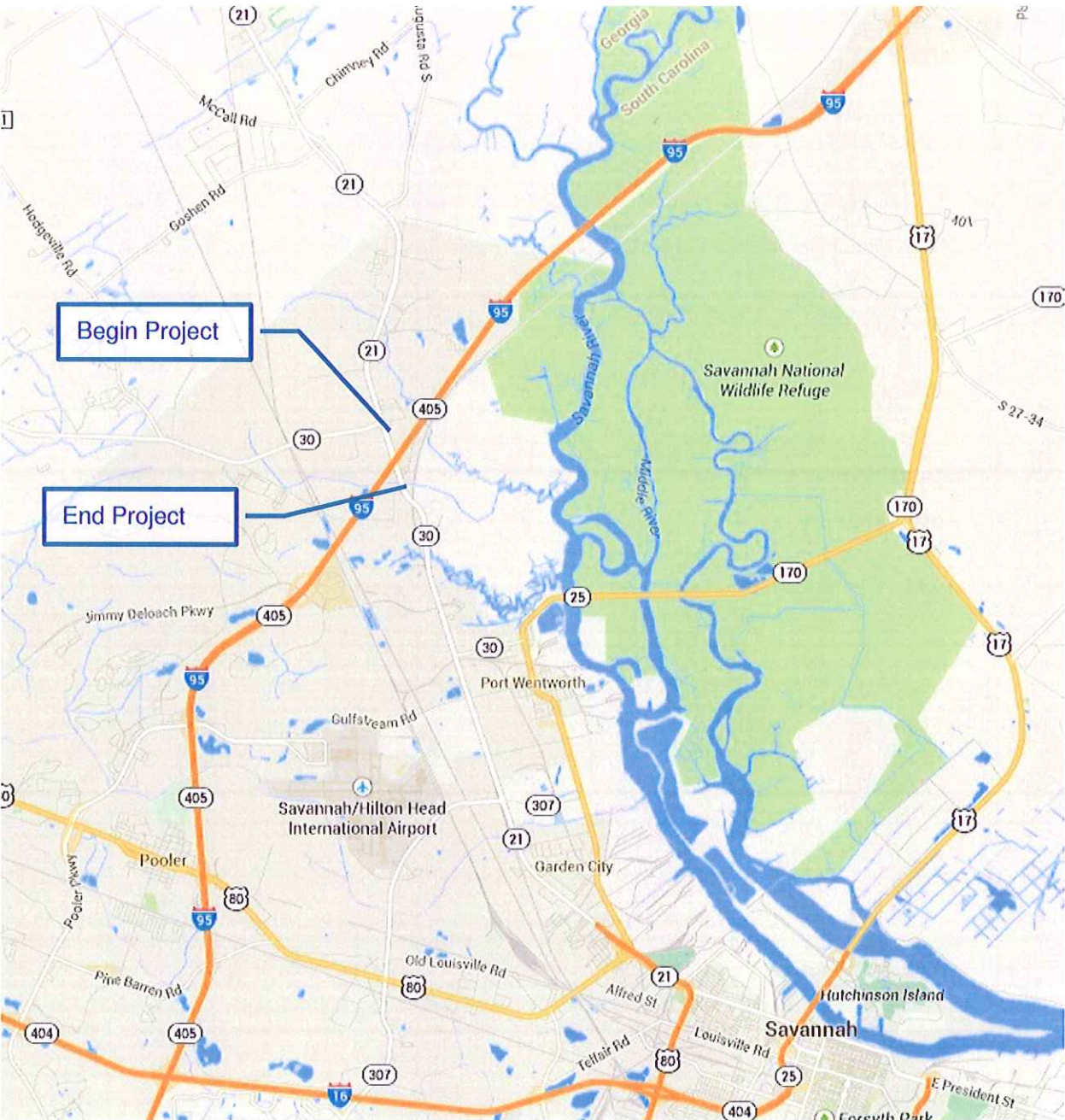
Concur:  10/3/14
GDOT Director of Engineering Date

Approve:  10/2/14
GDOT Chief Engineer Date

Attachments:

- 1. Project Location Map
- 2. Project Layout
- 3. AASHTO Publication, A Policy on Geometric Design of Highways and Streets, 2011, Chapter 3, page 3-55, Table 3-13b
- 4. Traffic Diagrams
- 5. Crash Data and Analysis

PROJECT LOCATION MAP



Project Layout

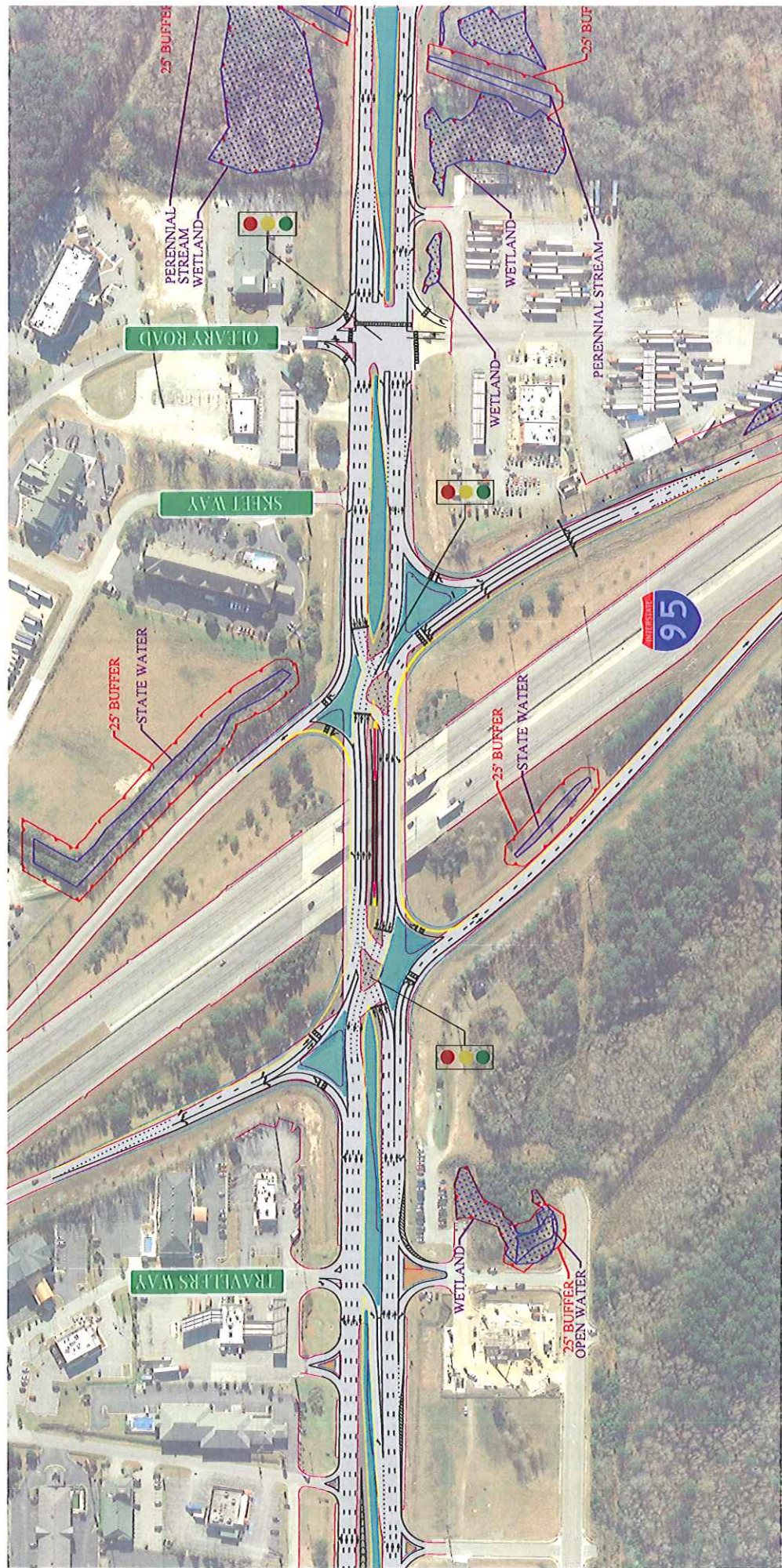


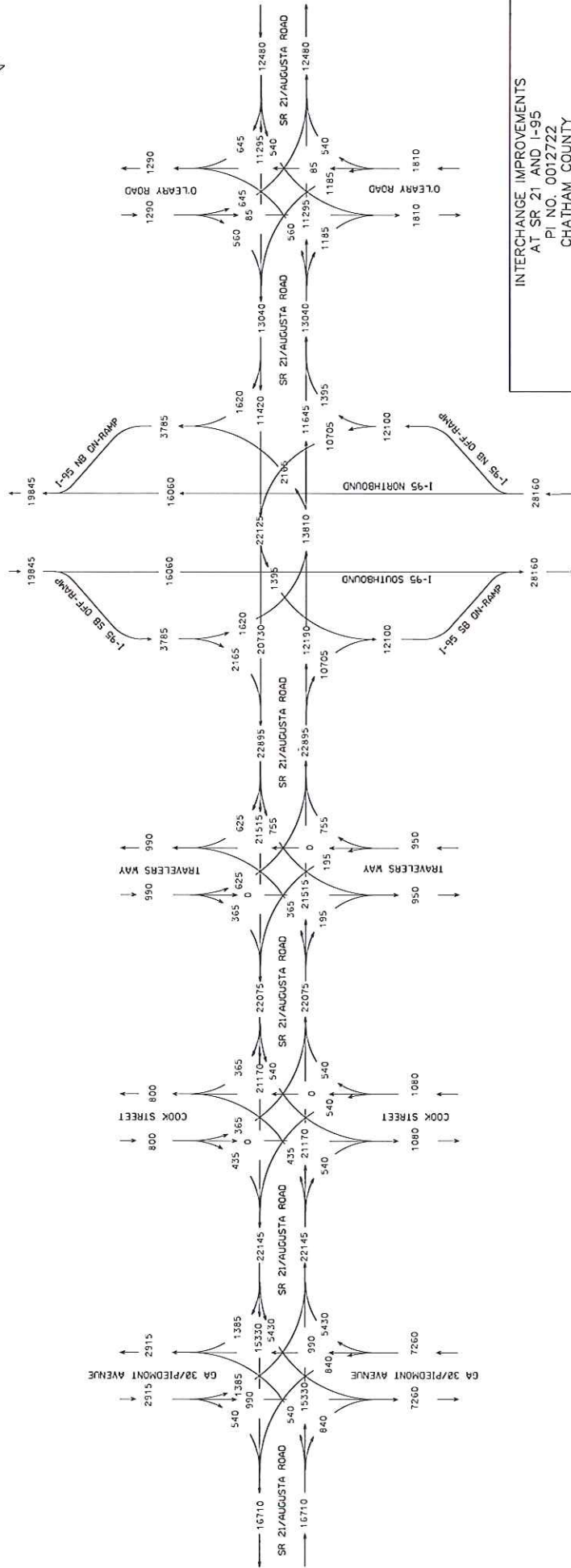
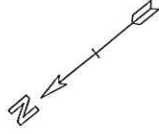
Table 3-13b. Minimum Radii and Superelevation for Low-Speed Urban Streets

U.S. Customary							
e (%)	$V_d = 15$ mph	$V_d = 20$ mph	$V_d = 25$ mph	$V_d = 30$ mph	$V_d = 35$ mph	$V_d = 40$ mph	$V_d = 45$ mph
	R (ft)	R (ft)	R (ft)	R (ft)	R (ft)	R (ft)	R (ft)
-6.0	58	127	245	429	681	1067	1500
-5.0	56	121	231	400	628	970	1350
-4.0	54	116	219	375	583	889	1227
-3.0	52	111	208	353	544	821	1125
-2.8	51	110	206	349	537	808	1107
-2.6	51	109	204	345	530	796	1089
-2.4	51	108	202	341	524	784	1071
-2.2	50	108	200	337	517	773	1055
-2.0	50	107	198	333	510	762	1039
-1.5	49	105	194	324	495	736	1000
0	47	99	181	300	454	667	900
1.5	45	94	170	279	419	610	818
2.0	44	92	167	273	408	593	794
2.2	44	91	165	270	404	586	785
2.4	44	91	164	268	400	580	776
2.6	43	90	163	265	396	573	767
2.8	43	89	161	263	393	567	758
3.0	43	89	160	261	389	561	750
3.2	43	88	159	259	385	556	742
3.4	42	88	158	256	382	550	734
3.6	42	87	157	254	378	544	726
3.8	42	87	155	252	375	539	718
4.0	42	86	154	250	371	533	711
4.2	41	85	153	248	368	528	703
4.4	41	85	152	246	365	523	696
4.6	41	84	151	244	361	518	689
4.8	41	84	150	242	358	513	682
5.0	41	83	149	240	355	508	675
5.2	40	83	148	238	352	503	668
5.4	40	82	147	236	349	498	662
5.6	40	82	146	234	346	494	655
5.8	40	81	145	233	343	489	649
6.0	39	81	144	231	340	485	643
6.2	39	80	143	229	337	480	637
6.4	39	80	142	227	335	476	631
6.6	39	79	141	226	332	472	625
6.8	39	79	140	224	329	468	619
7.0	38	78	139	222	327	464	614
7.2	38	78	138	221	324	460	608
7.4	38	78	137	219	322	456	603
7.6	38	77	136	217	319	452	597
7.8	38	77	135	216	317	448	592
8.0	38	76	134	214	314	444	587
8.2	37	76	134	213	312	441	582
8.4	37	75	133	211	309	437	577
8.6	37	75	132	210	307	434	572
8.8	37	74	131	208	305	430	567
9.0	37	74	130	207	302	427	563
9.2	36	74	129	205	300	423	558
9.4	36	73	129	204	298	420	553
9.6	36	73	128	203	296	417	549
9.8	36	72	127	201	294	413	544
10.0	36	72	126	200	292	410	540
10.2	36	72	126	199	290	407	536
10.4	35	71	125	197	288	404	531
10.6	35	71	124	196	286	401	527
10.8	35	71	123	195	284	398	523
11.0	35	70	123	194	282	395	519
11.2	35	70	122	192	280	392	515
11.4	35	69	121	191	278	389	511
11.6	34	69	120	190	276	386	508
11.8	34	69	120	189	274	384	504
12.0	34	68	119	188	272	381	500

Notes

1. Computed using Superelevation Distribution Method 2.
2. Superelevation may be optional on low-speed urban streets.
3. Negative superelevation values beyond -2.0 percent should be used for unpaved surfaces such as gravel, crushed stone, and earth. However, a normal cross slope of -2.5 percent may be used on paved surfaces in areas with intense rainfall.

EXISTING (2014) ADT



INTERCHANGE IMPROVEMENTS
AT SR 21 AND I-95
PI NO. 0012722
CHATHAM COUNTY

AVERAGE DAILY TRAFFIC
(ADT) = 000

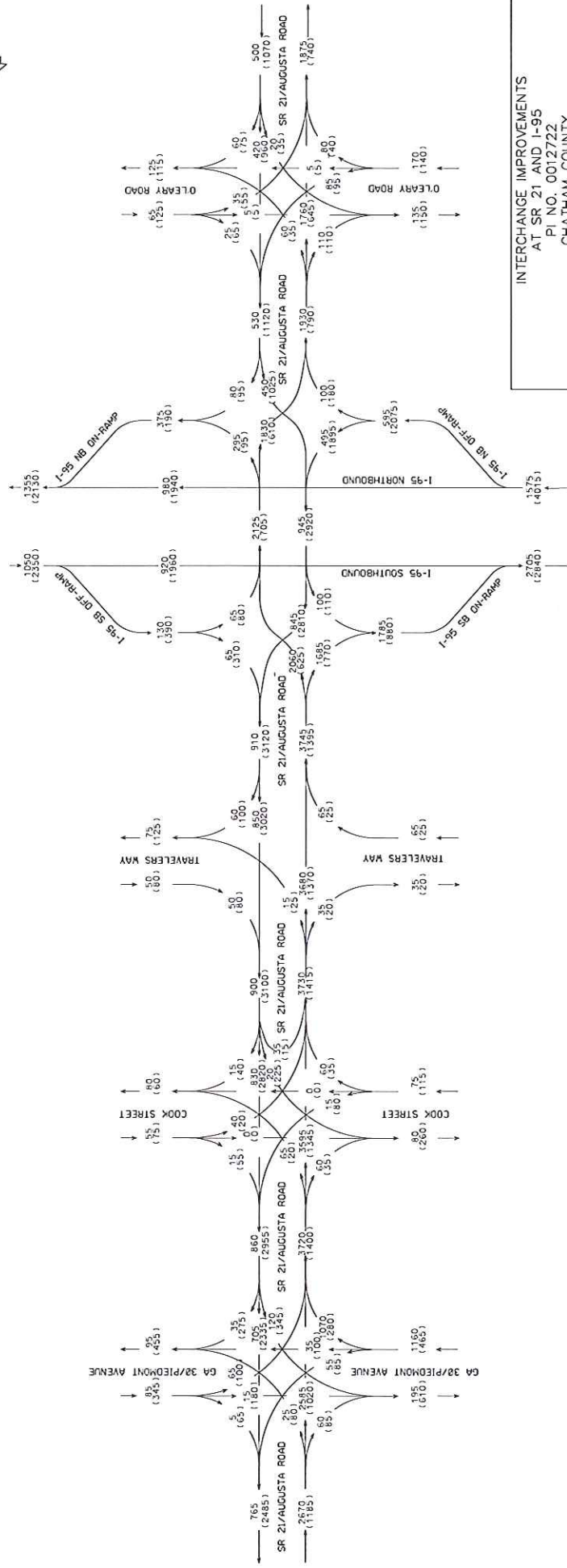
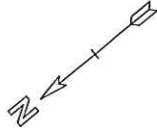
TRUCK PERCENTAGES:

LOCATION	24 HR	T%	S.U.	%	COMB %
SR 21	15%	9%	6%	6%	
I-95	29%	5%	24%	24%	
I-95 RAMP (N. OF SR 21)	11%	4%	7%	7%	
I-95 RAMP (S. OF SR 21)	13%	3%	10%	10%	

COMPLETED BY: KC
CHECKED BY: JP
DATE: 6/16/2014



DESIGN (2035) DHV
BUILD



INTERCHANGE IMPROVEMENTS
AT SR 21 AND I-95
PI NO. 0012722
CHATHAM COUNTY

AM PEAK HOUR = 000
PM PEAK HOUR = (000)

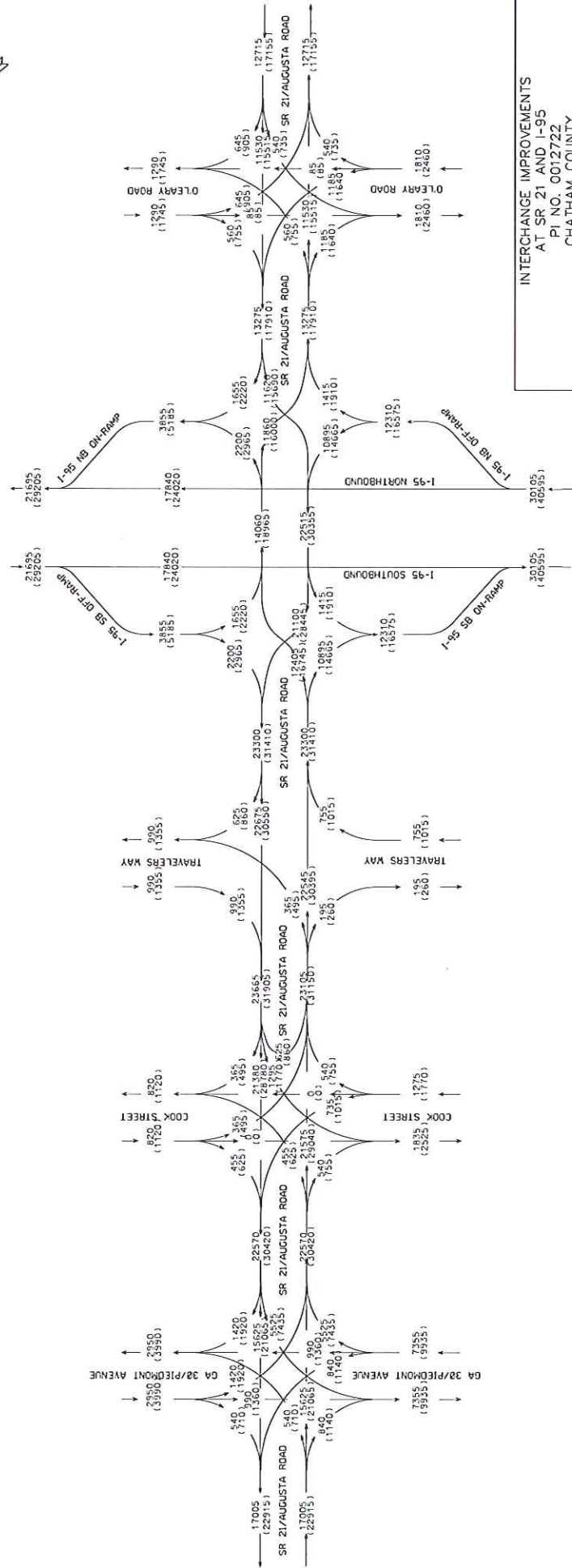
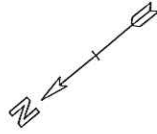
TRUCK PERCENTAGES:

LOCATION	PK	HR	T%	S.U.	%	COMB	%
SR 21			12%	7%		5%	
I-95			24%	5%		19%	
I-95 RAMP (N. OF SR 21)			8%	4%		4%	
I-95 RAMP (S. OF SR 21)			12%	3%		9%	

COMPLETED BY: KC
CHECKED BY: JP
DATE: 6/16/2014

ARCADIS
Infrastructure, Water, Environment, Buildings

OPEN (2015)/DESIGN (2035) ADT
BUILD



INTERCHANGE IMPROVEMENTS
AT SR 21 AND I-95
PI NO. 0012722
CHATHAM COUNTY

2015 ADT = 000
2035 ADT = (000)

TRUCK PERCENTAGES:

LOCATION	24 HR	T%	I.S.U.	%	COMB %
SR 21	15%	9%	6%		
I-95	29%	5%	24%		
I-95 RAMP (N. OF SR 21)	11%	4%	7%		
I-95 RAMP (S. OF SR 21)	13%	3%	10%		

COMPLETED BY: KC
CHECKED BY: JP
DATE: 6/16/2014



Crash Data and Analysis

Table 1 Study Area Intersection Crash Rates vs. Statewide Average Crash Rates

SR 21		Statewide Average Crashes	2009 Actual Crashes	2010 Actual Crashes	2011 Actual Crashes	2012 Actual Crashes	2013 Actual Crashes
I-95 Interchange	Total	25.428	24	34	36	60	69
	Fatality	0.020	0	0	0	1	0
	Injury	5.348	6	7	7	10	14
	PDO	20.060	18	27	29	49	55

Figure 1 I-95 Interchange Crash Frequency by Crash Type (2009-2013)

