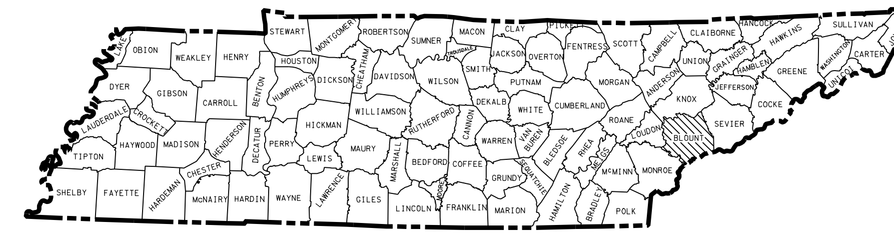
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TENN.	YEAR	SHEET NO.
	2013	1
FED. AID PROJ. NO.		
STATE PROJ. NO.		

Index Of Sheets

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF ENVIRONMENT & PLANNING



PELLISSIPPI PARKWAY EXTENSION

Preferred Alternative

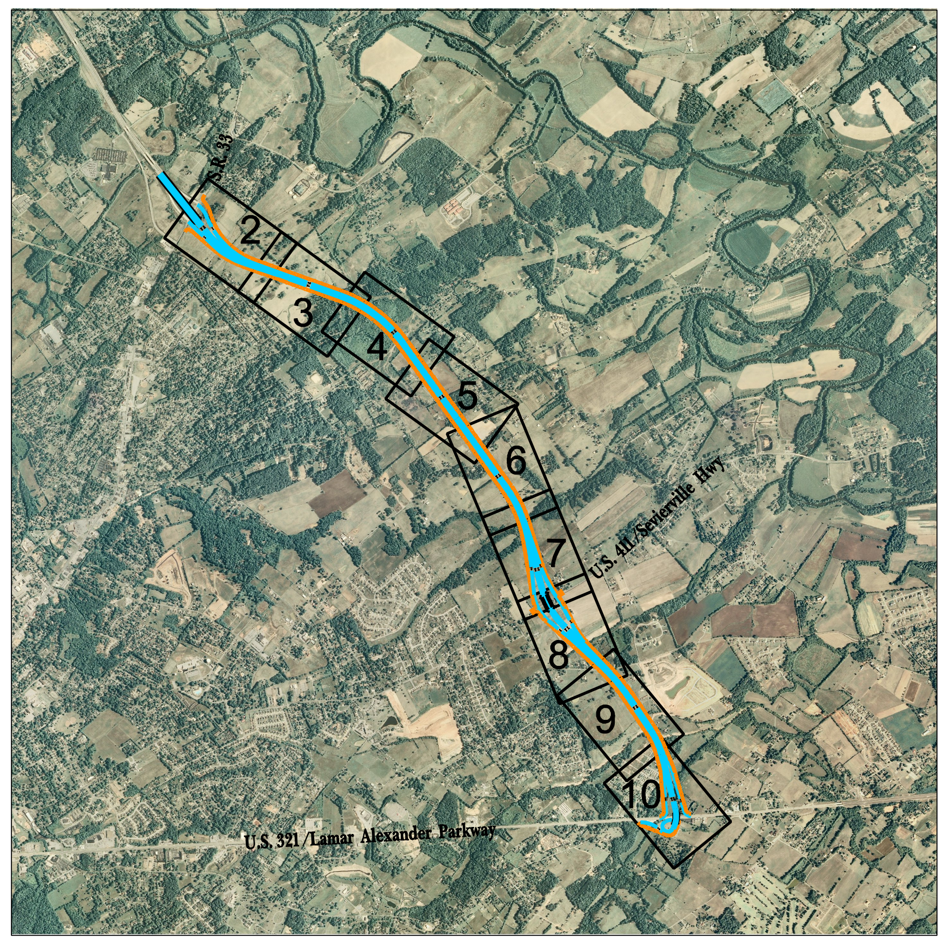
STATE HIGHWAY NO. F.A.H.S. NO.

LEGEND

2➞ NO. OF LANES/ DIRECTION OF TRAVEL

PROPOSED RIGHT-OF-WAY

APPROXIMATE CENTERLINE OF LANE(S)



SCALE: 1"= 1 MILE

PRELIMINARY SUBJECT TO REVISIONS

APPROVED: ____________________
CHIEF ENGINEER

DATE: ____________________

APPROVED: ____________________
COMMISSIONER

SPECIAL NOTES

PROPOSALS MAY BE REJECTED BY THE COMMISSIONER IF ANY OF THE UNIT PRICES CONTAINED THEREIN ARE OBVIOUSLY UNBALANCED, EITHER EXCESSIVE OR BELOW THE REASONABLE COST ANALYSIS VALUE.

THIS PROJECT TO BE CONSTRUCTED UNDER THE STANDARD SPECIFICATIONS OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION DATED MARCH 1, 2006 AND ADDITIONAL SPECIFICATIONS AND SPECIAL PROVISIONS CONTAINED IN THE PLANS AND IN THE PROPOSAL CONTRACT.

TDOT C.E. MANAGER 1 OR
TDOT TRANSPORTATION MANAGER 1 ____________________
TDOT ROAD SP. SV. 2 ____________________
DESIGNED BY ____________________
DESIGNER ____________________ CHECKED BY ____________________

P.E. NO. ____________________

PIN NO. 101423.00

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED:

DIVISION ADMINISTRATOR DATE

3-SEP-2013 f5ill
\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\West Shift Plan Sheets\TitleSheet.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONCEPT	2013	PELLISSIPPI PKWY	2

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PREFERRED ALT. WEST SHIFT

SCALE: 1"=200'

09-SEP-2013 15:12
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\West Shift Plan Sheets\Sheet002.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONCEPT	2013	PELLISSIPPI PKWY	3

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PPREFERRED ALT.
WEST SHIFT

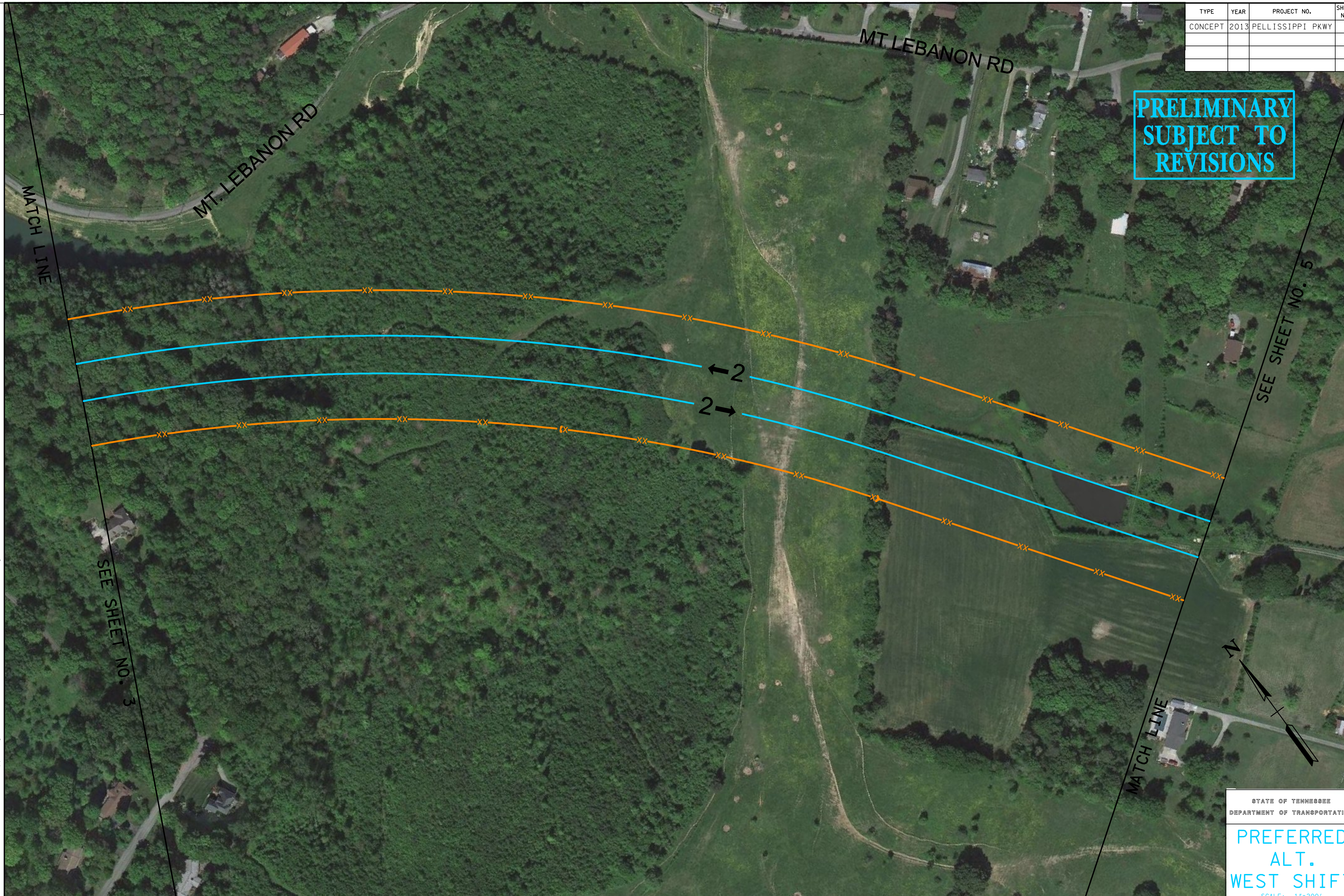
SCALE: 1"=200'

09-SEP-2013 15:12
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\West Shift Plan Sheets\Sheet003.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONCEPT	2013	PELLISSIPPI PKWY	4



PRELIMINARY SUBJECT TO REVISIONS

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PREFERRED ALT.
WEST SHIFT

SCALE: 1"=200'

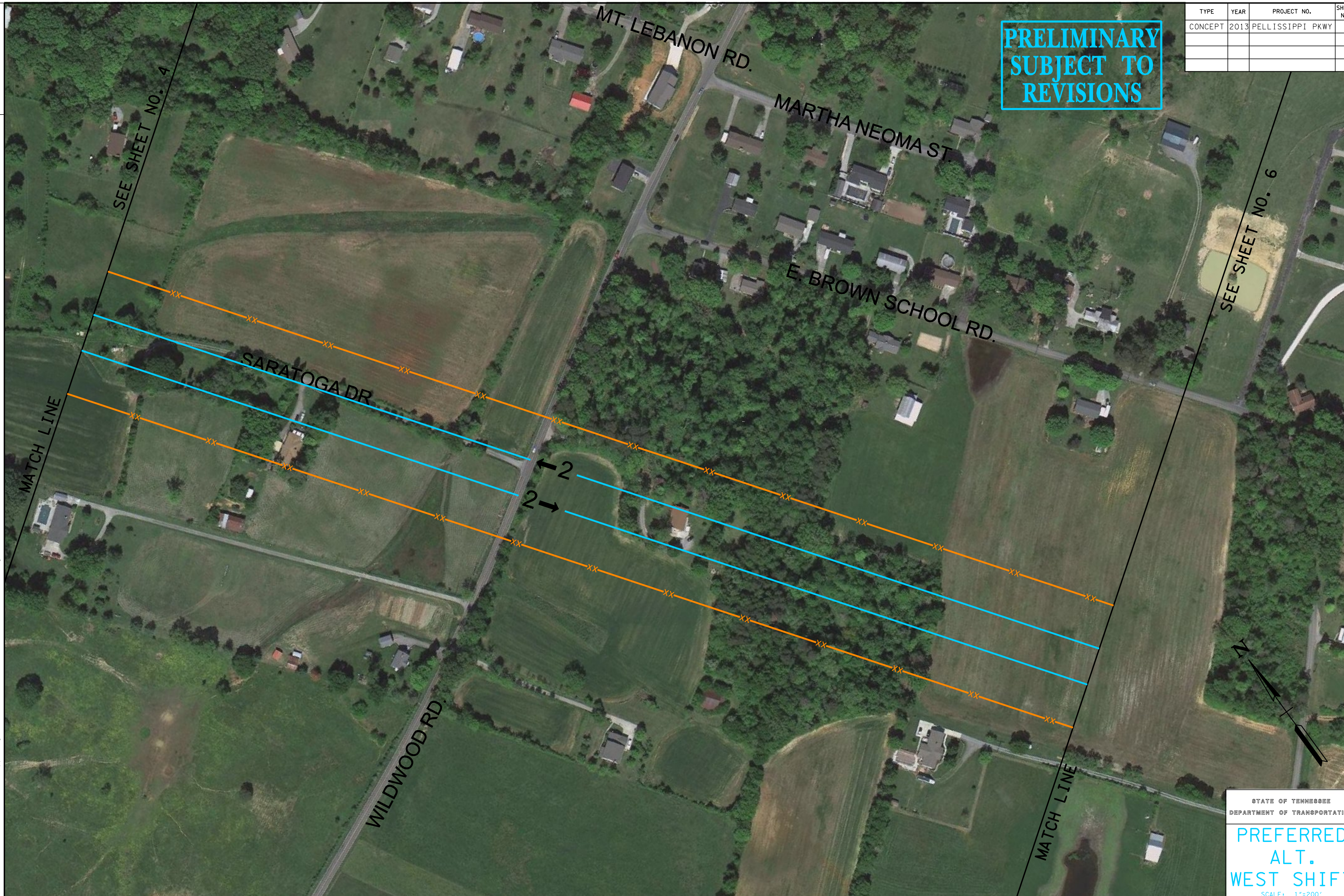
09-SEP-2013 15:12
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\West Shift Plan Sheets\Sheet004.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONCEPT	2013	PELLISSIPPI PKWY	5

PRELIMINARY SUBJECT TO REVISIONS



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PREFERRED ALT. WEST SHIFT

SCALE: 1"=200'

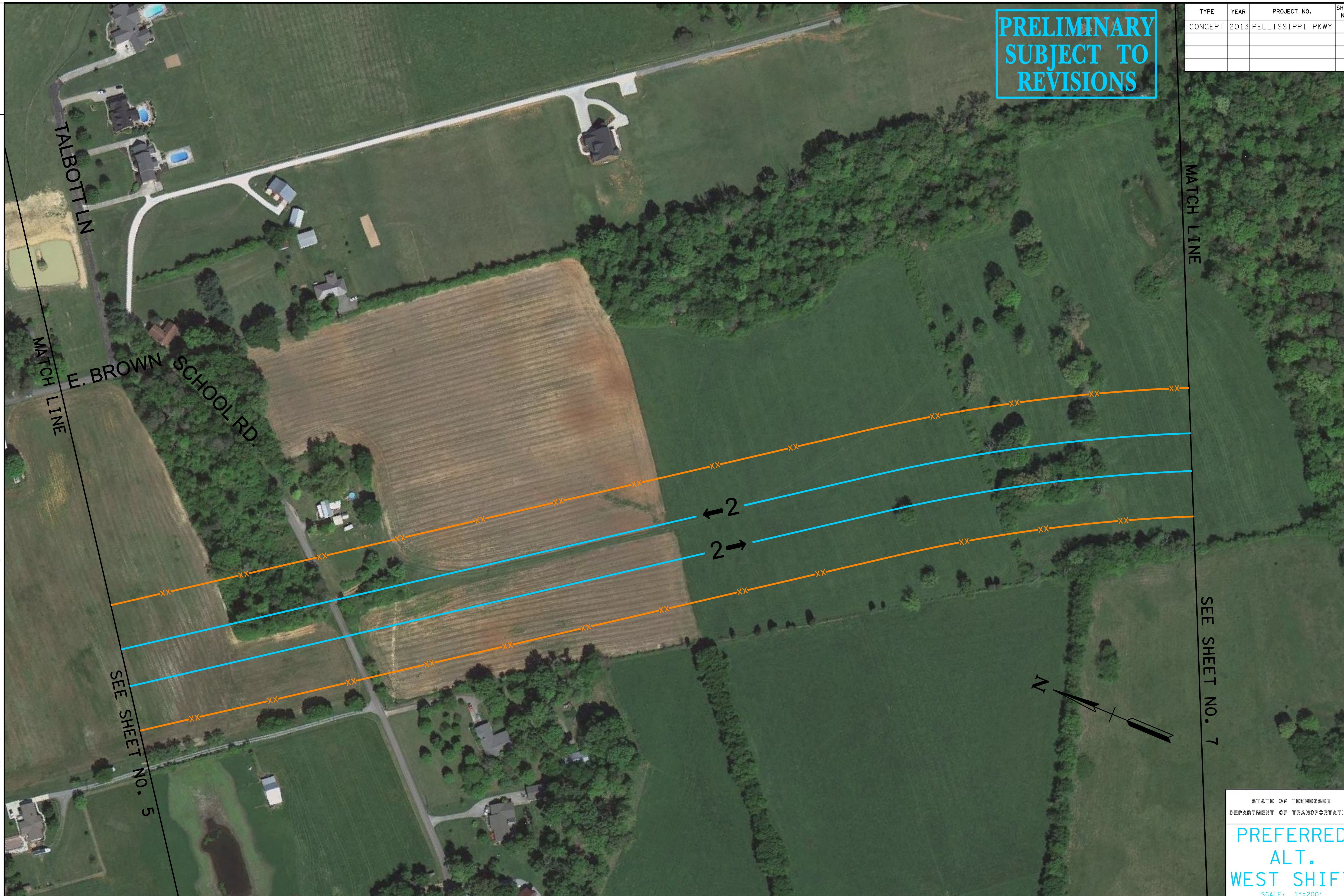
09-SEP-2013 15:12
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\West Shift Plan Sheets\Sheet005.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONCEPT	2013	PELLISSIPPI PKWY	6

PRELIMINARY SUBJECT TO REVISIONS



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PREFERRED ALT.
WEST SHIFT

SCALE: 1"=200'

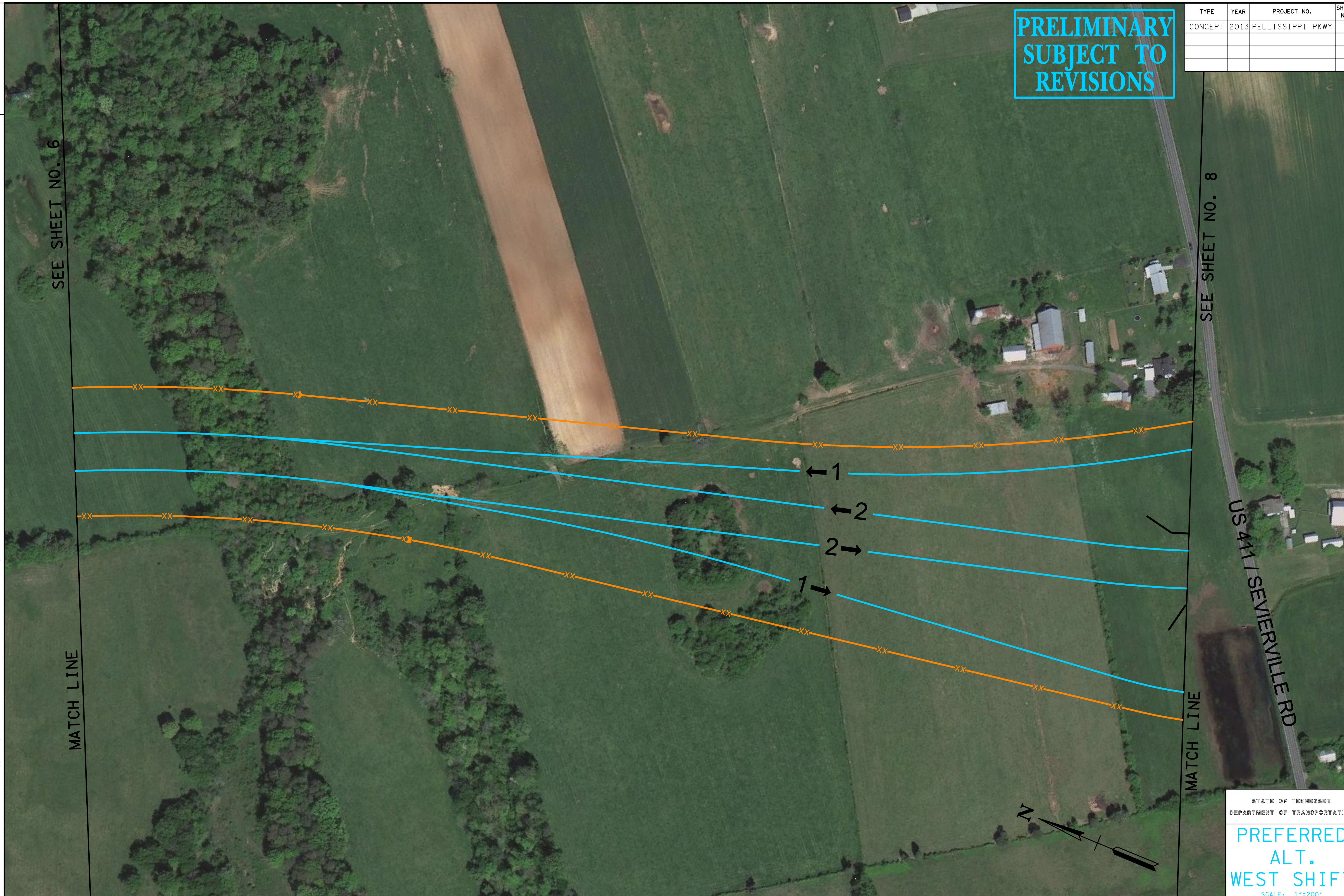
09-SEP-2013 15:12
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\West Shift Plan Sheets\Sheet006.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONCEPT	2013	PELLISSIPPI PKWY	7

PRELIMINARY SUBJECT TO REVISIONS



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PREFERRED ALT. WEST SHIFT

SCALE: 1"=200'

09-SEP-2013 15:13
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\West Shift Plan Sheets\Sheet007.dgn

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONCEPT	2013	PELLISSIPPI PKWY	8

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

PRELIMINARY SUBJECT TO REVISIONS

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PREFERRED ALT. WEST SHIFT

SCALE: 1"=200'

09-SEP-2013 15:13
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\West Shift Plan Sheets\Sheet008.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONCEPT	2013	PELLISSIPPI PKWY	9

PRELIMINARY SUBJECT TO REVISIONS

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PREFERRED ALT. WEST SHIFT

SCALE: 1"=200'

09-SEP-2013 15:13
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\West Shift Plan Sheets\Sheet009.dgn

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONCEPT	2013	PELLISSIPPI PKWY	10

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PREFERRED ALT. WEST SHIFT

SCALE: 1"=200'

09-SEP-2013 15:13
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\West Shift Plan Sheets\Sheet010.dgn

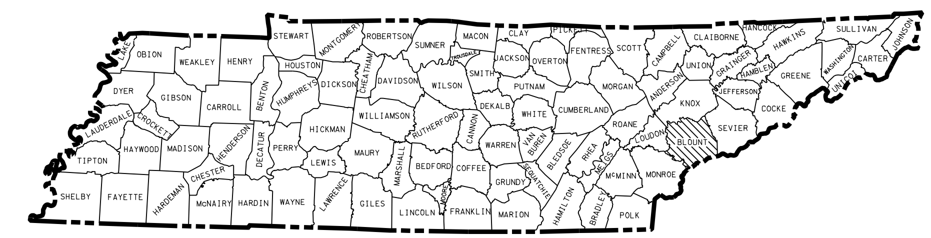
TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

Index Of Sheets

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF ENVIRONMENT & PLANNING

TENN.	YEAR	SHEET NO.
	2013	1
FED. AID PROJ. NO.		
STATE PROJ. NO.		



PELLISSIPPI PARKWAY EXTENSION

Preferred Alternative with East Shift

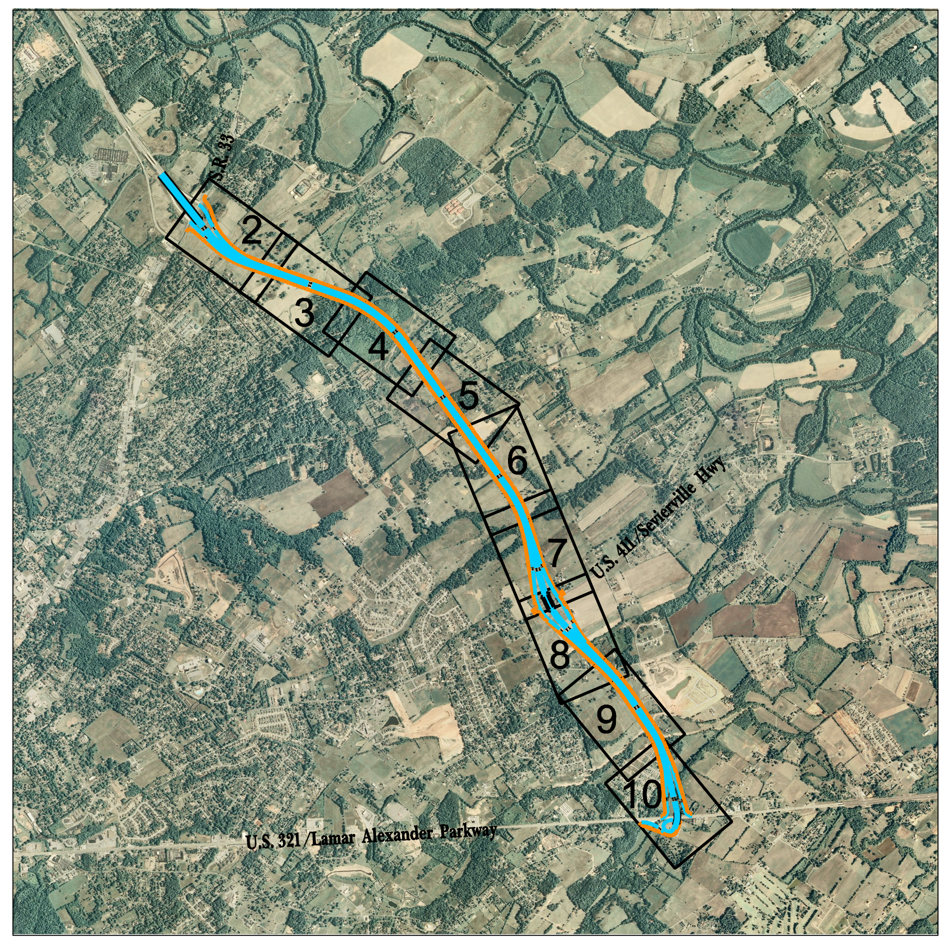
STATE HIGHWAY NO. F.A.H.S. NO.

LEGEND

2➞ NO. OF LANES/ DIRECTION OF TRAVEL

PROPOSED RIGHT-OF-WAY

APPROXIMATE CENTERLINE OF LANE(S)



SCALE: 1"= 1 MILE

PRELIMINARY SUBJECT TO REVISIONS

APPROVED: ______ CHIEF ENGINEER

DATE: ______

APPROVED: ______ COMMISSIONER

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED: ______
DIVISION ADMINISTRATOR DATE

SPECIAL NOTES

PROPOSALS MAY BE REJECTED BY THE COMMISSIONER IF ANY OF THE UNIT PRICES CONTAINED THEREIN ARE OBVIOUSLY UNBALANCED, EITHER EXCESSIVE OR BELOW THE REASONABLE COST ANALYSIS VALUE.

THIS PROJECT TO BE CONSTRUCTED UNDER THE STANDARD SPECIFICATIONS OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION DATED MARCH 1, 2006 AND ADDITIONAL SPECIFICATIONS AND SPECIAL PROVISIONS CONTAINED IN THE PLANS AND IN THE PROPOSAL CONTRACT.

TDOT C.E. MANAGER 1 OR
TDOT TRANSPORTATION MANAGER 1 ______
TDOT ROAD SP. SV. 2 ______
DESIGNED BY ______
DESIGNER ______ CHECKED BY ______
P.E. NO. ______
PIN NO. 101423.00

3-SEP-2013 fsll
\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\West Shift Plan Sheets\TitleSheet.dgn

TYPE	YEAR	PROJECT NO.	SHEET NO.
CSRP	2013	PELLISSIPPI EIS	1

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

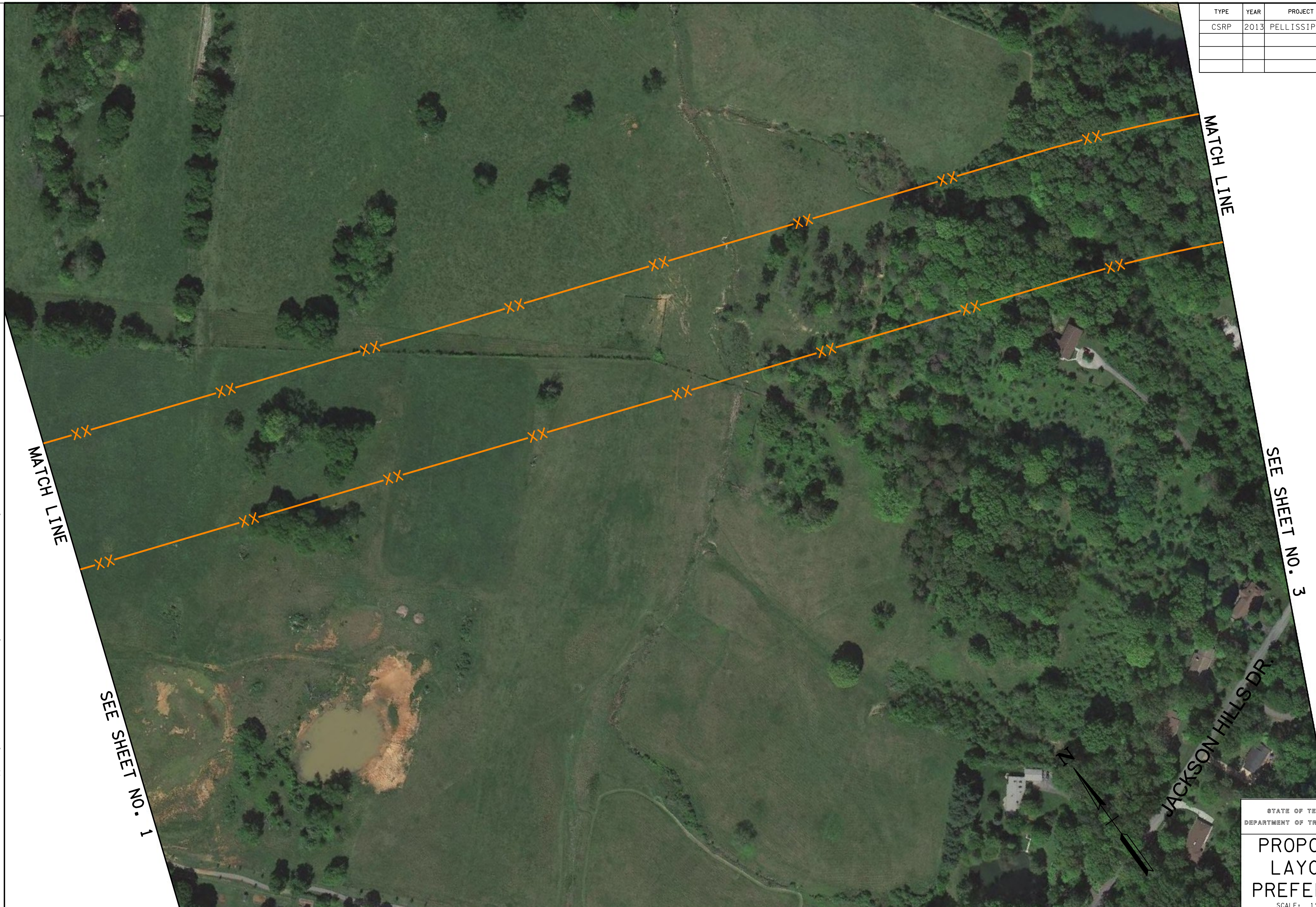
PROPOSED R.O.W. PREFERRED

SCALE: 1"=200'

20-JUN-2013 13:54
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\CSRP Sheets\Orig Alternative Sheets\Sheet00l.dgn

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CSRP	2013	PELLISSIPPI EIS	2



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PROPOSED LAYOUT PREFERRED

SCALE: 1"=200'

20-JUN-2013 14:12
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\CSRP Sheets\Orig Alternative Sheets\Sheet002.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CSRP	2013	PELLISSIPPI EIS	3

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PROPOSED
R.O.W.
PREFERRED

SCALE: 1"=200'

20-JUN-2013 14:15
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\CSRP Sheets\Orig Alternative Sheets\Sheet003.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CSRP	2013	PELLISSIPPI EIS	4

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PROPOSED
R.O.W.
PREFERRED

SCALE: 1"=200'

20-JUN-2013 14:15
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\CSRP Sheets\Orig Alternative Sheets\Sheet004.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CSRP	2013	PELLISSIPPI EIS	5

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PROPOSED
R.O.W.
PREFERRED

SCALE: 1"=200'

20-JUN-2013 14:16
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\CSRP Sheets\Orig Alternative Sheets\Sheet005.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CSRP	2013	PELLISSIPPI EIS	6

SEE SHEET NO. 5

MATCH LINE

SEE SHEET NO. 7

MATCH LINE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PROPOSED
R.O.W.
PREFERRED

SCALE: 1"=200'

20-JUN-2013 14:17
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\CSRP Sheets\Orig Alternative Sheets\Sheet006.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CSRP	2013	PELLISSIPPI EIS	7

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PROPOSED
R.O.W.
PREFERRED

SCALE: 1"=200'

20-JUN-2013 14:17
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\CSRP Sheets\Orig Alternative Sheets\Sheet007.dgn

TYPE	YEAR	PROJECT NO.	SHEET NO.
CSRP	2013	PELLISSIPPI EIS	8A

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PROPOSED
R.O.W.
EAST SHIFT

SCALE: 1"=200'

20-JUN-2013 14:24
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\CSRP Sheets\East Alternative Sheets\Sheet008A.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CSRP	2013	PELLISSIPPI EIS	9A

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PROPOSED
R.O.W.
EAST SHIFT

SCALE: 1"=200'

20-JUN-2013 14:25
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\CSRP Sheets\East Alternative Sheets\Sheet009A.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
CSRP	2013	PELLISSIPPI EIS	10A

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PROPOSED
R.O.W.
EAST SHIFT

SCALE: 1"=200'

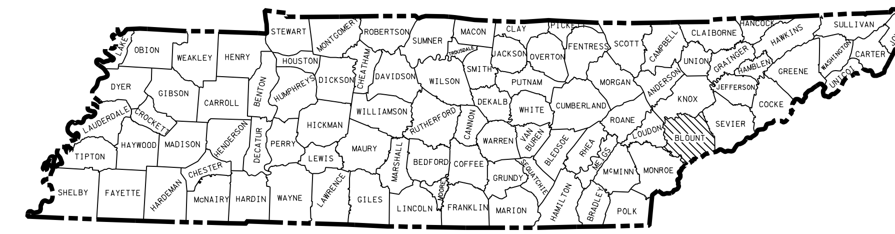
20-JUN-2013 14:28
\\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\CSRP Sheets\East Alternative Sheets\Sheet010A.dgn

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

Index Of Sheets

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF ENVIRONMENT & PLANNING

TENN.	YEAR	SHEET NO.
	2013	1
FED. AID PROJ. NO.		
STATE PROJ. NO.		



PELLISSIPPI PARKWAY EXTENSION

2012 Preferred Alternative (A)

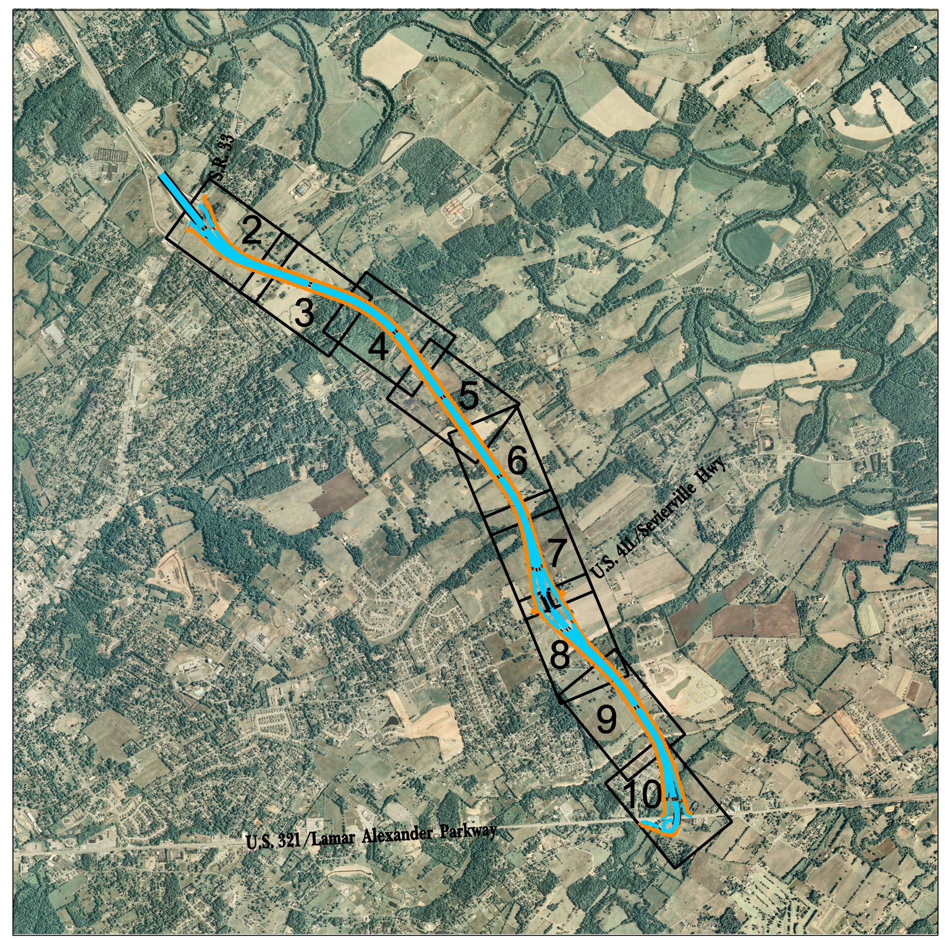
STATE HIGHWAY NO. F.A.H.S. NO.

LEGEND

2➡ NO. OF LANES/ DIRECTION OF TRAVEL

PROPOSED RIGHT-OF-WAY

APPROXIMATE CENTERLINE OF LANE(S)



SCALE: 1"= 1 MILE

PRELIMINARY SUBJECT TO REVISIONS

APPROVED: ______________________ CHIEF ENGINEER

DATE: ______________________

APPROVED: ______________________ COMMISSIONER

SPECIAL NOTES

PROPOSALS MAY BE REJECTED BY THE COMMISSIONER IF ANY OF THE UNIT PRICES CONTAINED THEREIN ARE OBVIOUSLY UNBALANCED, EITHER EXCESSIVE OR BELOW THE REASONABLE COST ANALYSIS VALUE.

THIS PROJECT TO BE CONSTRUCTED UNDER THE STANDARD SPECIFICATIONS OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION DATED MARCH 1, 2006 AND ADDITIONAL SPECIFICATIONS AND SPECIAL PROVISIONS CONTAINED IN THE PLANS AND IN THE PROPOSAL CONTRACT.

TDOT C.E. MANAGER 1 OR
TDOT TRANSPORTATION MANAGER 1 ______________________
TDOT ROAD SP. SV. 2 ______________________
DESIGNED BY ______________________
DESIGNER ______________________ CHECKED BY ______________________

P.E. NO. ______________________

PIN NO. 101423.00

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED:

DIVISION ADMINISTRATOR ______ DATE ______

3-SEP-2013 tfsill
\AMNASFIL02\CADD\PRJ\34230A_Pellissippi Pkwy Ext\CADD\West Shift Plan Sheets\TitleSheet.dgn

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	A1

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT A

SCALE: 1:200

03-FEB-2009 15:27
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment A\Sheet001.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	A2

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT A

SCALE: 1:200

18-SEP-2008 21:52
H:\3423DA Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment A\Sheet002.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	A3

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT A

SCALE: 1:200

19-SEP-2008 2:54
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment A\Sheet003.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	A4

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP
ALIGNMENT A

SCALE: 1:200

18-SEP-2008 21:59
H:\3423DA Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment A\Sheet004.dgn

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	A5

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT A

SCALE: 1:200

18-SEP-2008 22:04
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment A\Sheet005.dgn

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	A6

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP
ALIGNMENT A

SCALE: 1:200

03-FEB-2009 16:58
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment A\Sheet006.dgn

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	A7

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP
ALIGNMENT A

SCALE: 1:200

03-FEB-2009 17:00
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment A\Sheet007.dgn

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	A8

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP
ALIGNMENT A

SCALE: 1:200

18-SEP-2008 22:17
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment A\Sheet008.dgn

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	A9
-	-	-	-
-	-	-	-
-	-	-	-

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT A

SCALE: 1:200

03-FEB-2009 17:03
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment A\Sheet009.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	C1

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT C

SCALE: 1:200

03-FEB-2009 17:05
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 Conceptual Engineering\Sheets\Alignment C\Sheet001.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	C2

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT C

SCALE: 1:200

03-FEB-2009 17:17
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 Conceptual Engineering\Sheets\Alignment C\Sheet002.dgn

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	C3

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT C

SCALE: 1:200

03-FEB-2009 17:19
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 Conceptual Engineering\Sheets\Alignment C\Sheet003.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	C4

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL
STUDIES MAP
ALIGNMENT C

SCALE: 1:200

03-FEB-2009 17:21
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment C\Sheet004.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	C5

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP
ALIGNMENT C

SCALE: 1:200

03-FEB-2009 17:23
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 Conceptual Engineering\Sheets\Alignment C\Sheet005.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	C6

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT C

SCALE: 1:200

03-FEB-2009 17:25
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 Conceptual Engineering\Sheets\Alignment C\Sheet006.dgn

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	C7

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT C

SCALE: 1:200

03-FEB-2009 17:27
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 Conceptual Engineering\Sheets\Alignment C\Sheet007.dgn

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	C8

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT C

SCALE: 1:200

03-FEB-2009 17:29
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 Conceptual Engineering\Sheets\Alignment C\Sheet008.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	C9

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT C

SCALE: 1:200

03-FEB-2009 17:31
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment C\Sheet009.dgn

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	C10

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT C

SCALE: 1:200

03-FEB-2009 17:32
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 Conceptual Engineering\Sheets\Alignment C\Sheet010.dgn

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	D1

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL
STUDIES MAP
ALIGNMENT D

SCALE: 1:200

19-SEP-2008 06:46
H:\3423DA Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment D\Sheet001.dgn

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	D2

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT D

SCALE: 1:200

09-SEP-2008 06:57
H:\3423DA Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 Conceptual Engineering\Sheets\Alignment D\Sheet002.dgn

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	D3

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT D

SCALE: 1:200

19-SEP-2008 07:01
H:\3423DA Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment D\Sheet003.dgn

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	D4

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL
STUDIES MAP
ALIGNMENT D

SCALE: 1:200

19-SEP-2008 07:06
H:\3423DA Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment D\Sheet004.dgn

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	D5

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP
ALIGNMENT D

SCALE: 1:200

19-SEP-2008 07:40
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 Conceptual Engineering\Sheets\Alignment D\Sheet005.dgn

TENNESSEE D.O.T.	DESIGN DIVISION	FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	D6

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP
ALIGNMENT D

SCALE: 1:200

19-SEP-2008 07:14
H:\3423DA Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment D\Sheet006.dgn

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	D7

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP
ALIGNMENT D

SCALE: 1:200

19-SEP-2008 07:47
H:\3423DA Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment D\Sheet007.dgn

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	D8

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

19-SEP-2008 07:21
H:\3423DA Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 Conceptual Engineering\Sheets\Alignment D\Sheet008.dgn

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP
ALIGNMENT D

SCALE: 1:200

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	D9

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP
ALIGNMENT D

SCALE: 1:200

19-SEP-2008 07:25
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment D\Sheet009.dgn

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	D10

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP
ALIGNMENT D

SCALE: 1:200

19-SEP-2008 07:28
H:\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment D\Sheet010.dgn

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	D11

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

9-SEP-2008 07:32
4\34230A Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment D\Sheet011.dgn

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT D

SCALE: 1:200

TENNESSEE D.O.T.
DESIGN DIVISION

FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	D12

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP
ALIGNMENT D

SCALE: 1:200

19-SEP-2008 07:26
H:\3423DA Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment D\Sheet012.dgn

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
ENVIRO	2008	PELLISSIPPI EIS	D11

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TECHNICAL STUDIES MAP ALIGNMENT D

SCALE: 1:200

9-SEP-2008 07:32
+\3423DA Pellissippi Pkwy Ext EIS\5.0 Define Alternatives\5.2 ConceptualEngineering\Sheets\Alignment D\Sheet011.dgn

Appendix N

Website Materials Cited in FEIS

SR 162 Pellissippi Parkway Extension

TDOT, in cooperation with the Federal Highway Administration (FHWA), is proposing to extend and construct Pellissippi Parkway (SR 162) from its current terminus at SR 33 (Old Knoxville Highway) to SR 73 (US 321 or Lamar Alexander Highway) in Blount County. The length of the proposed extension would be approximately 4.4 miles. (Project Area Map) TDOT and FHWA are preparing an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA) to identify and evaluate the environmental effects of the proposed project and to identify measures to minimize harm.

The Draft Environmental Impact Statement (DEIS) for the project was approved in April 2010. (DEIS and Technical Studies) The DEIS evaluated the following alternatives: **No-Build**; **Build Alternatives A and C** - extend Pellissippi Parkway as a new four-lane divided roadway with interchanges at SR-33, SR-35/US411, and SR-73/US 321; and **Build Alternative D** - upgrade existing two-lane network to connect SR-33 with SR-73/US 321. Alternative A was selected as the Preferred Alternative in May 2012. In July 2013, TDOT modified the alignment of the Preferred Alternative to avoid an archaeological resource determined to be eligible for the National Register of Historic Places.

FHWA approved a reevaluation of the DEIS on July 17, 2014. This document was prepared pursuant to 23 CFR 771 because more than three years had passed since approval of the DEIS. The finding of the reevaluation was that changes to the alternatives considered in the DEIS as well as modifications to the Preferred Alternative would not result in significant environmental impacts that were not evaluated in the DEIS. Therefore, a supplement to the approved 2010 DEIS or a new DEIS is not required. (Reevaluation and Technical Studies)

TDOT and FHWA are currently preparing the Final Environmental Impact Statement, which is expected to be made available for review in late summer 2015.

Purpose and Need for the Project

The proposed action is intended to address the following transportation needs in the study area:

- Limited mobility options in Blount County and Maryville due to the primarily radial roadway network that now exists
- Poor local road network with substandard cross sections.
- Lack of northwest/east connection of Alcoa and Maryville to help serve:
  - Expanding residential development occurring in eastern Alcoa and the Knoxville area to the north.
  - Increasing in demand for trips between Maryville and Alcoa, and the Knoxville area to the north.
- Safety issues on roadways in the area, including roads in Maryville core that through travelers between north and western portions of the county and the eastern portions of the county must pass. Numerous rear-end crashes and angle crashes have been reported due to high volumes of traffic and lack of access management along the roadways.
- Traffic congestion and poor levels of service on the major arterial roads in the study area (US 129, SR 33, US 411 and US 321)

The purpose of the proposed action is to:

Enhance regional transportation system linkages.

- Improve circumferential mobility by providing travel options to the existing radial roadway network in Blount County, Maryville, and Alcoa.
- Improve roadway safety on the existing roadway network, including the Maryville core.
- Achieve acceptable traffic flows (level of service) on the transportation network or not adversely affect traffic flows on the existing network.

Additional objectives of the proposed action include:

- Support community and growth management goals.
- Minimize adverse impacts to neighborhoods and businesses, farmlands, and the natural and cultural environment.

Tennessee Department of Transportation
John Schroer

James K. Polk Bldg., Suite 700, 505 Deaderick Street Nashville, TN 37243
(615)741-2848
TDOT.Comments@tn.gov

Go to TN.gov

Driver how do I... Business how do I.. Government how do I

Find local information Contact TDOT Index of Services

Transportation Projects

Region 1

I-40 Bridge Over French Broad River

SR 93 in Sullivan/Washington County

Proposed Greeneville Bypass

I-640 Interchange at North Broadway

SR 73 (US 321) at Fort Loudoun Dam

SR 332 Proposed Widening - Knox County

SR 32 (US 321) Improvements - Cocke County

SR 70 - Edward R. Talley Bridge

SR 62 - Western Avenue (Texas Ave. to Major Ave.) Knoxville

SR 62 - Western Ave (Schaad Rd. to Copper Kettle Rd.)

SR 115 (US 129) Relocated Alcoa Highway

SR 126 Memorial Boulevard

SR 115 (US 129) Alcoa Highway - Knox and Blount Counties

SR 73 (US 321) East Parkway

SR 162 Pellissippi Parkway Extension

SR 92 Bridge Replacement in Dandridge

I-40 Exit 407 Diverging Diamond Interchange Project

Improving Highway 66

Region 2

Region 3

Region 4

Transportation Studies

SR 162 Pellissippi Parkway Extension

Home | News | Timeline | Involvement | Library | Contacts

News

Modification of the Preferred Alternative - 2012

Following the selection of the Preferred Alternative in 2012, the Phase II archaeological investigations revealed one site that has been determined to be eligible for the National Register of Historic Places. Since the Preferred Alternative had already been analyzed and selected over the other Build Alternatives, TDOT focused on identifying potential avoidance options via minor alignment shifts in the vicinity of the sensitive portion of the eligible archaeology site, rather than major shifts of the alignment. TDOT identified and investigated two possible minor shifts in the route of the Preferred Alternative, between Davis Ford Road and US 321/SR 73 (the southern terminus of the project). TDOT investigated potential archaeology, noise, ecology, farmland, relocations and environmental justice impacts for each shift.

The two minor alignment shifts considered are identified below and illustrated in the figure of 2 alignment shifts.

- The **east alignment shift** would move the ROW about 300 feet eastward, away from the Kensington Place mobile home community and toward the developing Sweetgrass Plantation subdivision.
- The **west alignment shift** would move the ROW about 150 feet to the west into the mobile home community. The overall length of the west shift is shorter and the amount of right-of-way required is less. The west shift minimizes the impacts to the operations of two active farms.

The typical section of each alignment shift would be the same as defined for the Preferred Alternative: a four-lane divided roadway with a 48-foot depressed median. The avoidance shifts would each be about 1.4 miles in length.

The two potential alignment shifts and the impacts of these shifts were presented to the public at a Community Briefing held on May 30, 2013 in the project area. The meeting was attended by 136 persons, and approximately 150 comments were received.

On July 29, 2013, TDOT announced that the west alignment shift at the southern end of the project had been selected to modify the Preferred Alternative. In making the determination of the alignment shift, TDOT considered the amount and type of impacts of each shift and the potential to mitigate adverse effects. TDOT also gave consideration to public input received during the May 30th Community Briefing and the associated comment period.

The reasons for the selection of the West Shift are:

- The West Shift minimizes impacts to the operations of two active farms.
- The West Shift is farther away from a recently constructed church, thus minimizing potential access impacts to the church.
- With either alignment shift, Kensington Place residents would experience increased noise levels compared to the no-build scenario. With the East Shift, the mobile home community would not be eligible for a noise barrier for this community. With the West Shift the mobile home community would be eligible for a noise barrier that will reduce noise and visual impacts provided that the majority of benefited residents and property owner(s) give their approval. TDOT will also allow the Kensington Place residents to have input into the landscaping and color/patterns for the noise barrier.

- Though the west shift increases impacts to streams, wetlands, and floodplains, these will be minimized during the design and permitting process of the project.
- Since the mobile home community is not completely occupied, any displaced resident who wants to stay within their existing community may be able to relocate to one of the numerous site pads available, if they so choose.

While there would be adverse impacts within Kensington Place with the West Shift, TDOT and FHWA have determined through an environmental justice analysis that these impacts would not change the finding of the approved DEIS, and that the project would have no disproportionately high and adverse impacts to minority and low-income populations compared with the rest of the corridor pursuant to Title VI of the 1964 Civil Rights Act and Executive Order 12898.

The conceptual plans for the Preferred Alternative (with the west alignment shift) are available for the public view. Click here to view a PDF of the 11-sheet set of conceptual plans.

Hard copies of the plan sets are available for viewing at the following locations:

Blount County Public Library
508 N Cusick Street
Maryville, TN 37804

Blount County Chamber of Commerce
201 S Washington Street
Maryville, TN 37804

Knoxville Regional Transportation Planning Organization
400 Main Street Suite 403
Knoxville, TN 37902

TDOT Region 1
7345 Region Lane
Knoxville, TN 37914

Please keep in mind that alternative alignments are conceptual during the NEPA evaluation phase of a project, and these conceptual plans are subject to change. A preferred alternative concept in the NEPA phase is not yet a final design. After the Final Environmental Impact Statement (FEIS) is approved and the Record of Decision (ROD) is issued, TDOT's Design Division will prepare detailed engineering plans for the project. When field surveys are conducted during final design, TDOT will be able to determine right-way limits, edges of pavement, location of shoulders and, for those areas in which it is proposed, curb and gutters, and sidewalk widths. Until the final design plans are prepared, it is not possible to know specifically how a particular property and property owner will be impacted by the project.

The schedule to complete the FEIS and the Record of Decision (ROD) has been adjusted to take into account additional steps that were identified in 2013.

- Evaluation of alignment options to avoid an identified environmentally sensitive (archaeological) site
- An update of the project's traffic forecasts and operational analysis based on the June 2013 update to the Knoxville regional traffic model
- Preparation of a reevaluation of the DEIS since more than 3 years have passed since the DEIS was circulated

The expected schedule to complete the FEIS and ROD as shown below is dependent upon expeditious agency reviews.

- FHWA issues Final EIS - Summer 2015
- FHWA issues Record of Decision - End of 2015

Highway | Public Transportation | Bike & Pedestrian | Aeronautics | Waterway | Rail | Freight

Social Media

About TDOT

- Commissioner
- TDOT Strategic Management
- Organizational Chart
- Transportation System Overview
- TDOT Centennial
- Commissioner History

Quick Links

- SmartWay
- Tennessee Maps
- Calendar & Events
- Renew Your Driver License
- Vehicle Titling Information

Contact & Feedback

- Customer Service Survey
- Request a Speaker
- Key Staff Directory
- Record-A-Comment
- Community Relations

TDOT Partners

- Federal Department of Transportation
- Local Transportation
- Tennessee Department of Safety
- Tennessee Department of Environment & Conservation
- Tennessee Department of Revenue

Tennessee Department of Transportation
John Schroer
James K. Polk Bldg., Suite 700, 505 Deaderick Street
Nashville, TN 37243
(615)741-2848
TDOT.Comments@tn.gov

Flag Status: Full Staff | Live Chat: Offline | Help | Share | Translate | Font Size

TN.gov Services | TN.gov Directory | Transparent TN | Web Policies | Title VI | About Tennessee | Accessibility | About TN.gov | Help & Contact | Survey

SR 162 Pellissippi Parkway Extension

Project Timeline Activities Completed:

Public Alternatives Workshop – October 2007

Public Information Workshop – February 2008

Development of Refined Alternatives – April through June 2008

Identification of Alternatives to be Evaluated in the DEIS – August 2008

Environmental Technical Studies, including field studies – September 2008 through August 2009

Draft Environmental Impact Statement (DEIS) preparation – Spring and Summer 2009

DEIS approved by FHWA – April 14, 2010

Notice of Availability of DEIS in Federal Register – May 7, 2010

Comment Period for DEIS - May 7 through August 10, 2010

Public Hearing – July 20, 2010

Review and Address Public and Agency Comments – Fall 2010 / Summer 2011

Agency Concurrence with Preferred Alternative and Preliminary Mitigation – May 2012

Selection of Preferred Alternative – June 2012

Community Briefing on Alignment Modification Options to avoid environmentally sensitive (archaeological) site – May 2013

Selection of West Alignment Shift to modify Preferred Alternative - July 2013

Reevaluation of FEIS - July 2014

Upcoming Activities (Updated June 6, 2015):

FHWA issues Final EIS - Summer 2015*

FHWA Issues Record of Decision - End of 2015*

*Schedule is dependent upon expeditious agency reviews.

Highway | Public Transportation | Bike & Pedestrian | Aeronautics | Waterway | Rail | Freight

Social Media

About TDOT

- Commissioner
- TDOT Strategic Management
- Organizational Chart
- Transportation System Overview
- TDOT Centennial
- Commissioner History

Quick Links

- SmartWay
- Tennessee Maps
- Calendar & Events
- Renew Your Driver License
- Vehicle Titling Information

Contact & Feedback

- Customer Service Survey
- Request a Speaker
- Key Staff Directory
- Record-A-Comment
- Community Relations

TDOT Partners

- Federal Department of Transportation
- Local Transportation
- Tennessee Department of Safety
- Tennessee Department of Environment & Conservation
- Tennessee Department of Revenue

Tennessee Department of Transportation
John Schroer

James K. Polk Bldg., Suite 700, 505 Deaderick Street
Nashville, TN 37243
(615)741-2848
TDOT.Comments@tn.gov

Flag Status: Full Staff | Live Chat: Offline | Help | Share | Translate | Font Size

TN.gov Services | TN.gov Directory | Transparent TN | Web Policies | Title VI | About Tennessee | Accessibility | About TN.gov | Help & Contact | Survey

SR 162 Pellissippi Parkway Extension

This Web site, http://www.tn.gov/tdot/article/pellissippi, will be one of the principal means of public involvement and feedback. Public comments concerning this project can also be submitted to: TDOT.Comments@tn.gov

Project Newsletters

Newsletter Issue 2 June 2012 (PDF)

Newsletter Issue 1 Sept 2008 (PDF)

Past Meetings

Community Briefing

May 20, 2013

Maryville, TN

TDOT held an informal Community Briefing on Thursday, May 30, 2013. It was held at the Rio Revolution Church in Maryville from 5:00 to 7:00 PM (Briefing Announcment). There were 136 attendees. TDOT shared information regarding potential shifts in the previously selected Preferred Alternative (Alternative A, among others evaluated in the DEIS) near the southern portion. A shift is necessary to avoid an identified environmentally sensitive area.

Click here for the Community Briefing Summary Report (PDF)

Click here for the announcement flyer on the Community Briefing. (English and Spanish). (PDF)

Click here for the Briefing Notice Postcard

Click here to view the presentation from the Community Briefing (in English) (Powerpoint)

Click here to view the presentation from the Community Briefing (en Espanol) (Powerpoint)

Click here to view the handout from the Community Briefing (in English) (PDF)

Click here to view the handout from the Community Briefing (en Espanol) (PDF)

Click here to view the comment form made at available at the Community Briefing (PDF)

Click here to view the Frequently Asked Questions (FAQs) made available at the Community Briefing (PDF)

Click here to view the map display from the Community Briefing (PDF)

DEIS Public Hearing

July 20, 2010

Heritage High School

Maryville, TN

View the presentation from the July 20, 2010 Public Hearing. (PDF)

View the July 20, 2010 Public Hearing handout. (PDF)

Click here for a copy of the Public Hearing Transcript.

Click here (Large PDF File, 46 MB) for a copy of the combined public comments received on the DEIS from the public hearing and comment period, which ended August 30, 2010.

Copies of the Draft Environmental Impact Statement (DEIS) are available for public inspection at the following locations:

Draft Environmental Impact Statement (DEIS)

Blount County Public Library
508 N. Cusick Street
Maryville, TN 37804

Blount County Chamber of Commerce
201 S. Washington Street
Maryville, TN 37804

Mike Russell
TDOT Region 1
7345 Region Lane
Knoxville, TN 37914

Public Information Meeting,
February 19, 2008
Heritage High School
Maryville, TN
View the Presentation from the February 19, 2008 Public Meeting (PDF)
View the preliminary alternative corridors map presented at February 19, 2008 Public Meeting (PDF)
View the February 19, 2008 Public Meeting handout. (PDF)

Public Alternatives Work Shop
October 25, 2007
Maryville, TN
View the formal presentation from the October 25, 2007 Public Alternatives Workshop (PDF)
View the preliminary alternative corridors map presented on October 25, 2007 Public Alternatives Workshop (PDF)
View the October 25, 2007 Public Alternatives Workshop Handout (PDF)

Project Coordination Plan

A Coordination Plan for Agency and Public Involvement for the Pellissippi Parkway Extension is listed below:

Coordination Plan for Agency and Public Involvement (PDF)

Notice of Intent
A Notice of Intent to Prepare an Environmental Impact Statement (EIS) was published in the Federal Register on April 25, 2006.

View Notice of Intent published in Federal Register, April 25, 2006 (PDF)

Public Scoping Meetings
Two Public Scoping Meetings were held on June 13, 2006, in Blount County. The purpose of the meetings was to receive input from the public for defining the purpose and need fro the project; determining the range of alternatives to be considered in the EIS; and identifying the environmental, social, and economic issues and concerns to be addressed in the EIS.

The two meetings shared the same format and information. TDOT representatives were on hand to answer questions concerning the project. The meetings were held at Eagleton Elementary School and Heritage High School. The official transcripts of the meeting are below.

Pellissippi Scoping Comments for April 25, 2006 through July 5, 2006 (PDF)

These comments do not represent the entirety of public comments received on this project. Comment Forms submitted between June 13, 2006 and July 5, 2006 are retained as public record at the Tennessee Department of Transportation Community Relations Office, Suite 700, Jame K. Polk Building, 505 Deaderick Street, Nashville, Tennessee. Hard copies of these documents are also available for viewing at the Blount County Chamber of Commerce.

Social Media

About TDOT

- Commissioner
- TDOT Strategic Management
- Organizational Chart
- Transportation System Overview
- TDOT Centennial
- Commissioner History

Quick Links

- SmartWay
- Tennessee Maps
- Calendar & Events
- Renew Your Driver License
- Vehicle Titling Information

Contact & Feedback

- Customer Service Survey
- Request a Speaker
- Key Staff Directory
- Record-A-Comment
- Community Relations

TDOT Partners

- Federal Department of Transportation
- Local Transportation
- Tennessee Department of Safety
- Tennessee Department of Environment & Conservation
- Tennessee Department of Revenue

Tennessee Department of Transportation
John Schroer

James K. Polk Bldg., Suite 700, 505 Deaderick Street
Nashville, TN 37243
(615)741-2848
TDOT.Comments@tn.gov

Flag Status: Full Staff Live Chat: Offline Help Share Translate Font Size

TN.gov Services TN.gov Directory Transparent TN Web Policies Title VI About Tennessee Accessibility About TN.gov Help & Contact Survey

SR 162 Pellissippi Parkway Extension

Home | News | Timeline | Involvement | Library | Contacts

Project Library

Approved Reevaluation of DEIS 2014
Appendix A - TIP & LRTP Page
Appendix B- Public and Agency Comments Since DEIS
Appendix C-Traffic & Safety Reports, 2011-2014
Appendix D - CSRP 2014
Appendix E -Environmental Justice Analysis
Appendix F- Additional Farmland Coordination
Appendix G- Cultural Resources Coordination
Appendix H - Air Quality Tech Report Update 2014
Appendix I - Noise Technical Report, June 2014
Appendix J- Phase II Preliminary Site Investigation
Appendix K- Ecology Reports, 2012-2014
Appendix L - Website Materials Cited

Approved DEIS 2010
Addendum to the Traffic Operations Technical Report 2011
Preliminary Geological Report 2010
Traffic Forecast Report 2007
Traffic Operations Report 2008
Crash Analysis Report Update 2009
Community Impacts Assessment 2009
Economic Impacts Analysis 2009
Air Quality Report 2010
Noise Report_2009
Historic Report_2009
Ecology Report 2010
Phase 1 Haz Mat Assessment 2008
Indirect Cumulative Analysis_2009

Tennessee Department of Transportation
John Schroer

James K. Polk Bldg., Suite 700, 505 Deaderick Street
Nashville, TN 37243
(615)741-2848
TDOT.Comments@tn.gov

SR 162 Pellissippi Parkway Extension

For more information on this project you may contact:

Director of Project Development
Danny Oliver, P.E., R.L.S.
TDOT Region 1
7345 Region Lane Knoxville, TN 37914 or P.O. Box 58 Knoxville, TN 37901
Phone: 865.594.2400

Environmental Division
Jim Ozment, Director
TDOT Environmental Division
505 Deaderick Street Ste. 900
Nashville, TN 37243
Main 615.741.3655
Jim.Ozment@tn.gov

Tennessee Department of Transportation
John Schroer

James K. Polk Bldg., Suite 700, 505 Deaderick Street
Nashville, TN 37243
(615)741-2848
TDOT.Comments@tn.gov

About this map

The Regional Bicycle Program has developed this map to assist residents and visitors in finding appropriate routes to bicycle for recreation or for transportation. The roads are classified according to traffic volumes and speeds and the amount of space on the road for bicyclists. What one bicyclist considers a comfortable road may not be comfortable to another bicyclist. This map enables people to choose routes based on the road conditions they prefer. Most local streets are not rated because they tend to have low traffic volumes and speeds and are therefore comfortable for most bicyclists.

Remember that conditions on the roads vary with time of day and with day of the week. Increased congestion during rush hour and construction may call for extra caution. Be prepared to make your evaluation of traffic and road conditions. The user of this map bears the full responsibility for his or her safety.

This map also shows two popular bike routes that are used for recreation and exercise. The Tuckaleechee route runs from Heritage High School to Townsend, with great views along the way. The Louisville Point Park route starts at the park and rides through some beautiful rural scenery.

Who are we?

The Bicycle Program is housed within the Knoxville Regional Transportation Planning Organization (TPO) and is staffed by a Bicycle Coordinator. The Coordinator helps oversee implementation of the Bicycle Plan and coordinates various programs. The Bicycle Advisory Committee is made up of 12 citizens from Knox, Blount, Sevier and Loudon counties. The committee's duties include overseeing implementation of the Bicycle Plan, as well as updating the Plan, and promoting bicycling as a means of transportation.

Resources

Bike Commute Guide

Thinking about biking to work but have some questions? Check out our Bicycle Commute Guide, available on our website.

Bike classes

Want to learn how to ride your bike safely and confidently in traffic? We offer a class combining classroom learning with on-bike exercises and a practice ride in traffic. Check our website for the next scheduled class.

Street Maintenance

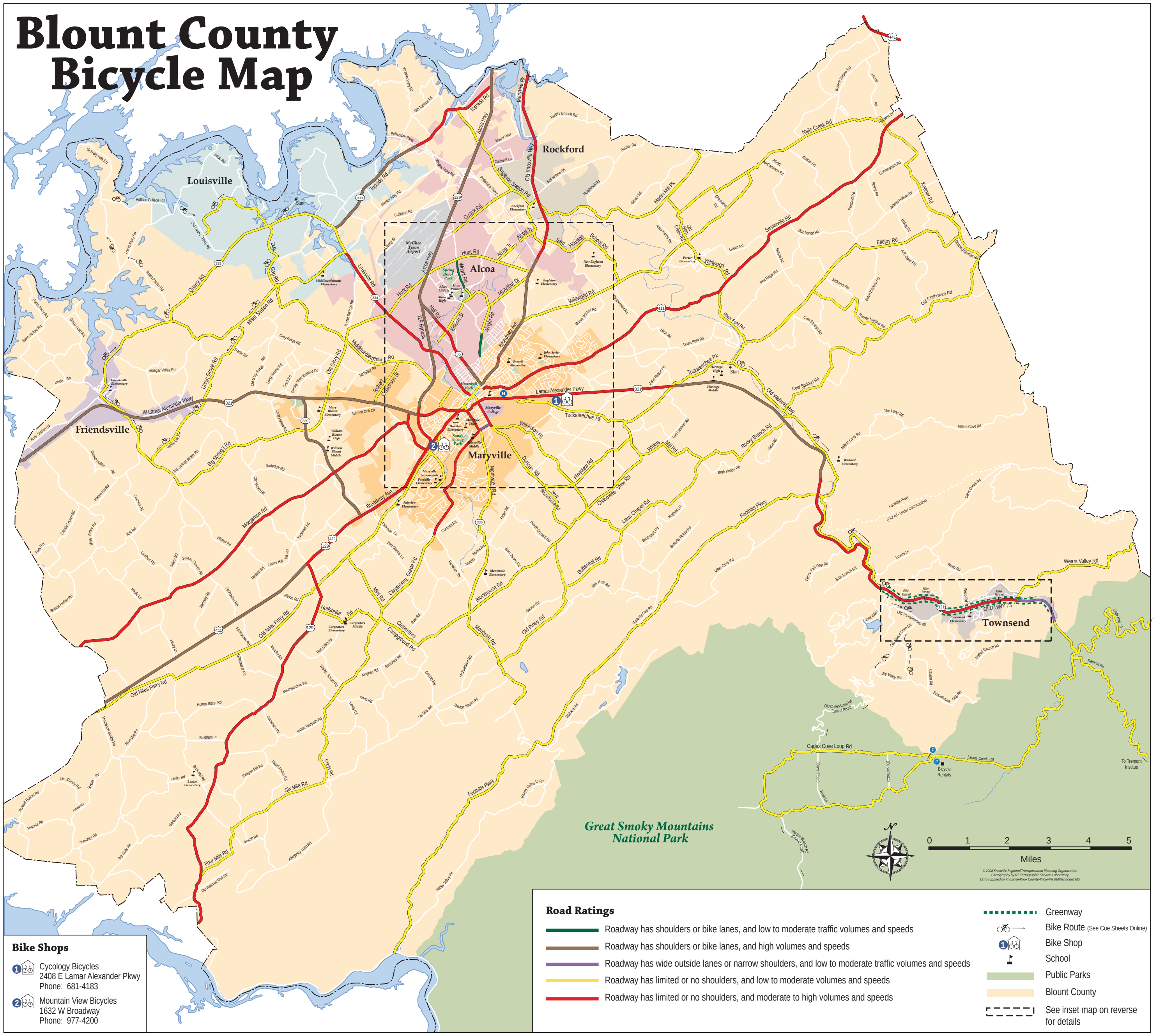
To report problems on streets within the City of Maryville, call 273-3302. In the City of Alcoa, call 981-4146. To report problems on streets in Blount County, call 982-4652.

Group rides

There are many opportunities to participate in group bicycle rides. Call 675-BIKE to find out what rides are going on, or check the bike clubs' websites.
Foothill Striders www.foothillstriders.org
Smoky Mountain Wheelmen http://www.smwbike.org

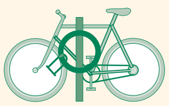
Visit us online at
http://www.knoxtrans.org/plans/bikeprog.htm
for more information.

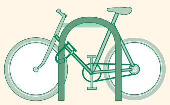
Funding for this map provided by:
- Tennessee Department of Transportation
- Federal Highway Administration
- Smoky Mountain Convention and Visitors Bureau
- Cycology Bicycles
- Foothill Striders
- Mountain View Bicycles
- Smoky Mountain Wheelmen



Theft Prevention Tips

- Never leave your bike unlocked.
- Always use a high quality U-lock or chain.
- Always lock the frame and front wheel to a bike rack or pole. If using a chain, make sure the bike cannot be lifted over the top of the pole.
- For extra security, remove the front wheel and lock it with the frame and rear wheel.





Visit us online at
http://www.knoxtrans.org/plans/bikeprog.htm
for more information.

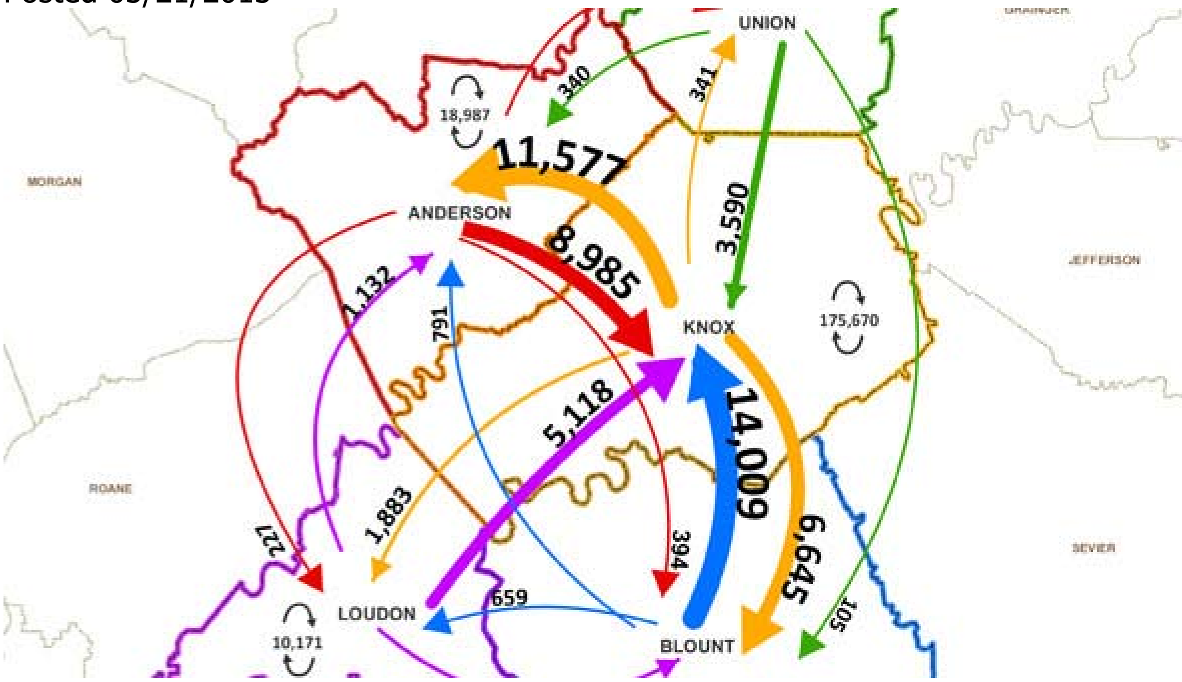
TPO Transportation Planning Organization

Blount County BICYCLE MAP

TPO Transportation Planning Organization

New Census Figures Confirm Regional Connections

Posted 03/21/2013



A recent data release from the U.S. Census Bureau showed that 1 in 6 area workers, or almost 60,000 people, commute to another PlanET county for work. What are the implications for this level of mobility on our region?

A recent data release from the U.S. Census Bureau has confirmed what residents of Anderson, Blount, Knox, Loudon, and Union Counties already know: the people who live and work in our region share daily connections. With one in six local workers driving to a neighboring county in the region to go to work each day, it's clear that our economic, environmental, and cultural ties don't stop at county lines.

Almost 60,000 of the PlanET region's 350,000 workers commute to another county within the region every day. In Anderson County alone, nearly 10,000 residents—one-third of its workers—go to a different county elsewhere in the five-county region for work. Similar rates of daily commuting are reported for Blount and Loudon counties. And more than half of Union County's residents travel to a neighboring county to work. (See map.)

According to the American Community Survey—a product of the U.S. Census Bureau— the flow of commuters traveling to work from their home counties to some other county in the PlanET region is on the rise, continuing a decade-long trend.

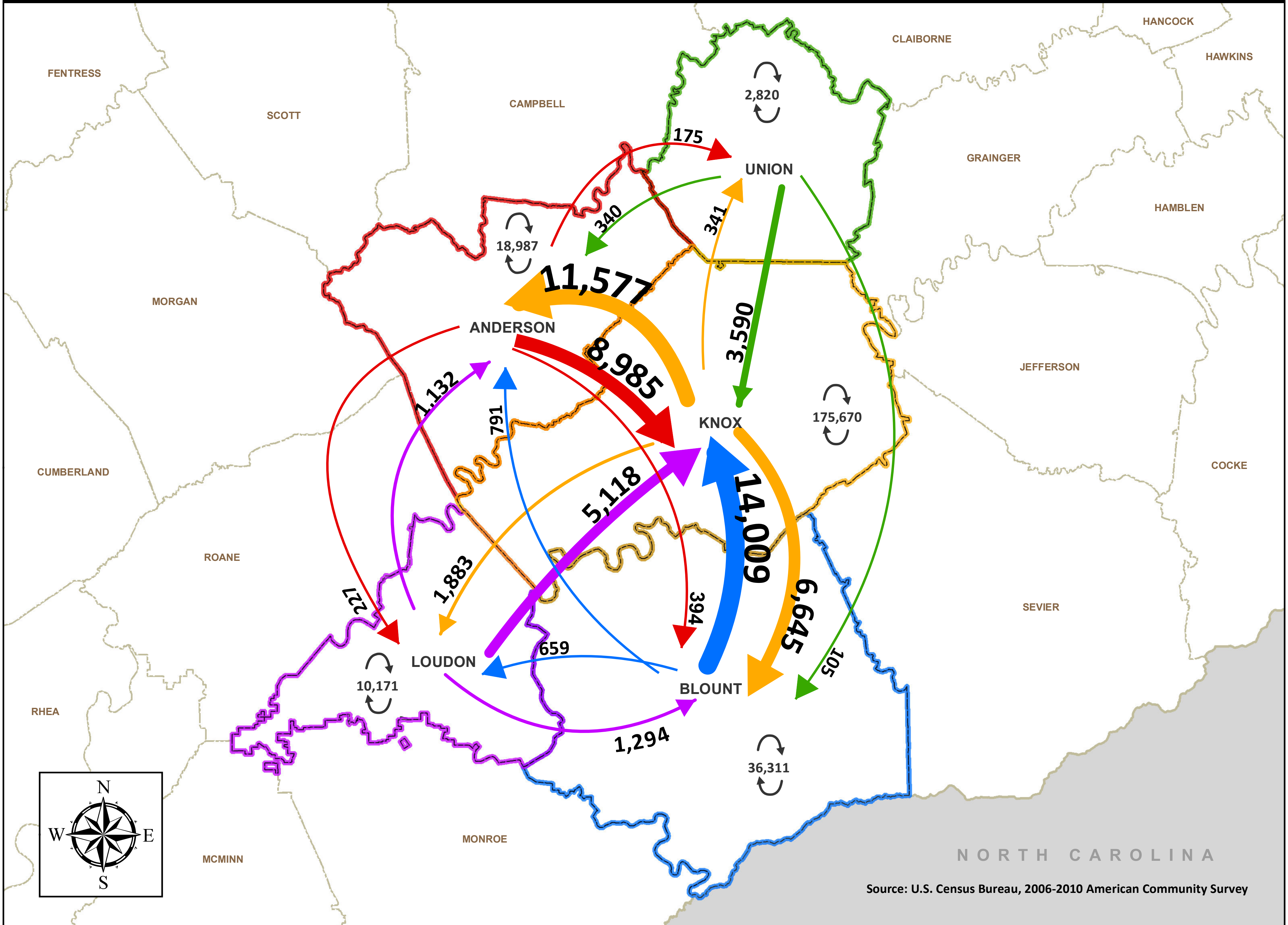
A look at commuting figures leads to questions about how our region works, and how some changes might be desired for its future. For example, can more jobs be brought to Union County so 55 percent of its workers don't have to drive to another county for work? Do Union County residents face transportation cost burdens that affect their quality of life? With more than 20,000 people traveling between Knox and Anderson counties each workday, should we take a look at regional transit? Can we do a better job providing housing opportunities in areas closer to employment centers? What are the impacts on our region's air quality in light of the growing need to drive farther for work?

Our region's population is expected to reach over 1,000,000 in the next 30 years. The trend in commuter flows reaffirms a need to think regionally, not just about our transportation system, but also about the economy, environment, and overall health and well-being of our communities.

Because we are living regionally, we need to plan regionally. The decisions that residents, developers, and elected officials make now will have a huge impact on the future of our communities. We need to ask the right questions and develop a vision for that future now because how we grow matters!

Related Articles
Why Do We Live Where We Live?

RESIDENCE COUNTY TO WORKPLACE COUNTY FLOWS FOR PlanET REGION



Source: U.S. Census Bureau, 2006-2010 American Community Survey

Labor Force, Employment and Unemployment for Blount County in 2014

Labor Force Table

The table below shows the annual not seasonally adjusted Labor Force, Employment and Unemployment data for Blount County in 2014.

Labor Force	Employed	Unemployed	Unemployment Rate	Preliminary
58,300	54,790	3,510	6.0%	No

Source: US Census Bureau
Downloaded: 07/22/2015 2:40 PM

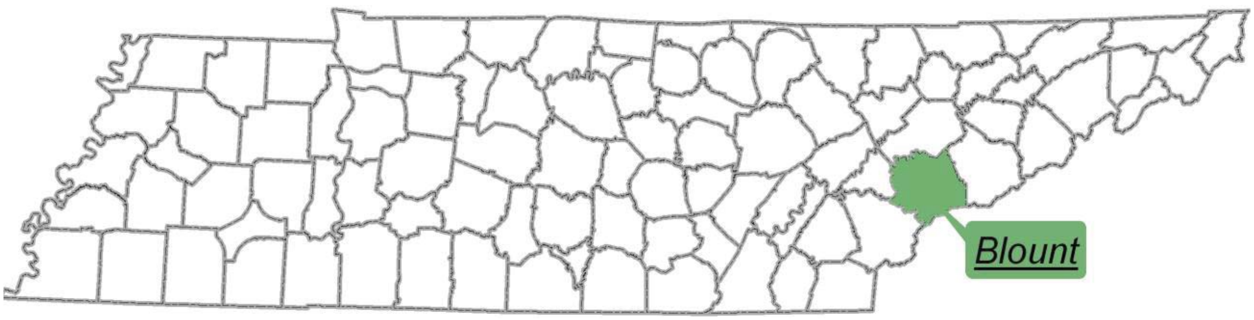
Supplemental Information and Analysis for Blount County Plans

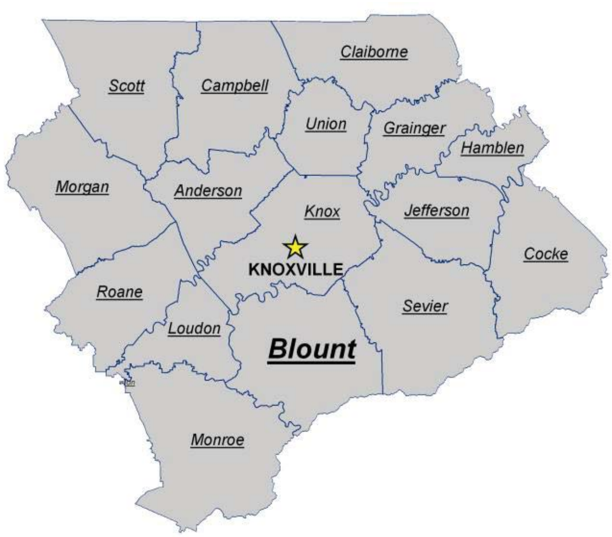
Table of Contents

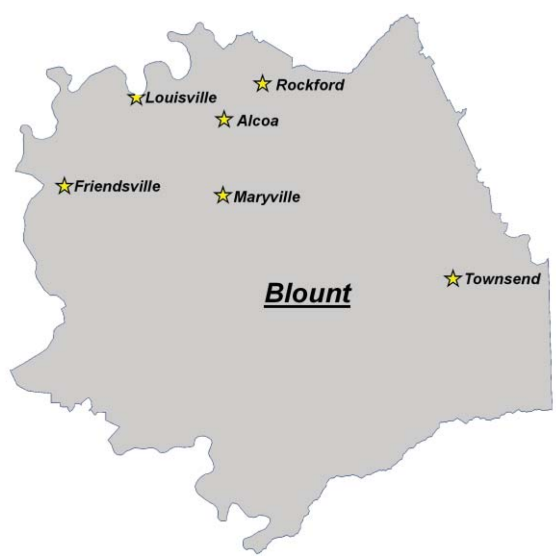
Supplemental Information and Analysis for Blount County Plans

Introduction

Blount County is located at the eastern boundary of Tennessee, just south of Knoxville and Knox County, and is part of the 16 county East Tennessee Development District region. The county is also part of the urbanized, metropolitan area associated with the City of Knoxville and Knox County to the north. The county contains six cities – Alcoa, Friendsville, Louisville, Maryville, Rockford, and Townsend. Using 2008 US Census Bureau estimates of population, Alcoa at 8,606 and Maryville at 27,156 were the two largest cities. The 2008 estimated populations of the other cities were: Friendsville 921; Louisville 2,192; Rockford 814; and Townsend 272. The 2009 estimated population for the whole county was 122,784.







Blount County has many plans and planning studies, produced over the years to inform and guide decisions about the future of our community. The Planning Commission adopted a

general Policies Plan in 1999 that covered a wide range of issues related to growth and development in the County. The Planning Commission also consulted, at various times, plans produced prior to 1999, including a School Facilities Plan (1997 with horizon year to 2010), a Mountain Area Plan (1997 with horizon year to 2010), and the Land Use and Policies Plan (1976 with horizon year to 1990). From 1999 to 2008, many other plans and studies were completed, including 1101 Growth Plan (1999 with final State approval 2001), Conceptual Land Use Plan (2000), Roadway Needs Study (2000 updated 2004), Water Quality Plan (2003), Parks and Recreation Master Plan (2005), and County Growth Strategy (2005). The Planning Commission adopted an updated Policies Plan in 2008 that considered previous plans and studies. After updating the Policies Plan, the Planning Commission undertook and adopted the Blount County Green Infrastructure Plan in 2009 and an updated Major Road Plan in 2010. In addition, the Planning Department produced an updated population analysis with projections in 2010.

Planning in Blount County did not proceed along the traditional path of master plan or comprehensive plan production, but addressed issues identified as most important from several planning processes conducted over more than twelve years. Not finding a unitary document that encompasses traditional and easily identifiable planning information and analysis may cause some to conclude that our plans are incomplete. The State of Tennessee Three Star Program has as a benchmark for a minimum traditional plan in the following:

> *Land Use and Transportation Plan***.** An adopted Land Use and Transportation Plan, whether stand-alone or as part of a larger Comprehensive Plan, covering the current time period (ex. 2001-2011; 2000-2015), and approved by the local planning commission. Land Use plans may be prepared in various formats and using differing approaches, but the study at a minimum should include the following information: a description of the existing land uses in the jurisdiction and an analysis of past and present land use patterns; a description and analysis of the local physical environment; a description and analysis of current municipal and/or county public facilities and services; an analysis of past, present and future demographics, including population projections and ranges; a listing of community employment information including at a minimum a breakdown of employment by sector; an analysis of current and proposed transportation facilities and patterns; development goals, policies, and implementation action steps. (from Three Star program manual)

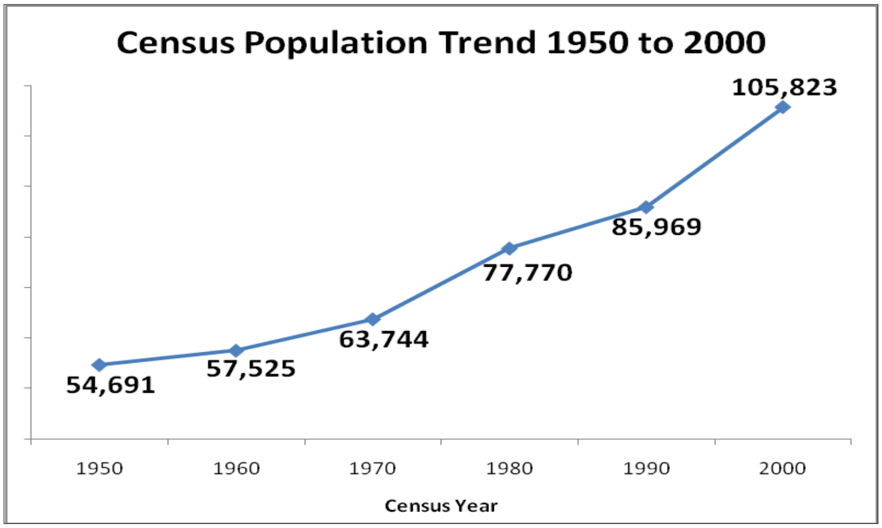
This document is intended to meet the above benchmark for supplemental planning information and analysis. The content of present plans will remain unchanged and stand on their own. For the most part, this document constitutes background information and analysis for plans, highlighting population growth and characteristics, households and housing, economy, physical characteristics of the land, infrastructure supporting growth, and land use. The following provides as much as practical a dynamic view of trends from past to future.

Time Horizon.

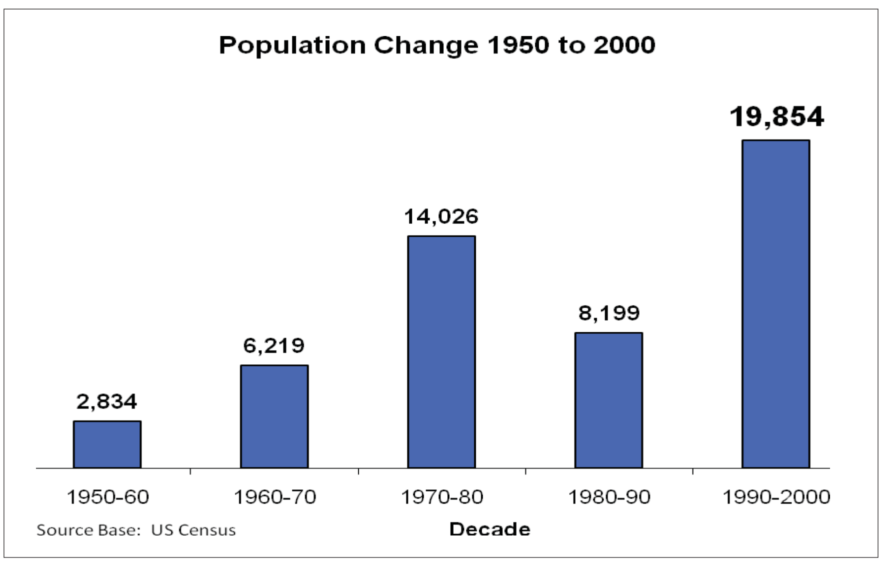
Being oriented to the future, a plan has some future time horizon. For plans and studies from 1995 to 2008, projections of population were to the year 2010 or 2020, thus establishing plan time horizons. The plans produced from 2009 to 2010 used projections to the year 2030. This document uses projections to the year 2030, the time horizon for present planning.

Population Growth – Historical Trends.

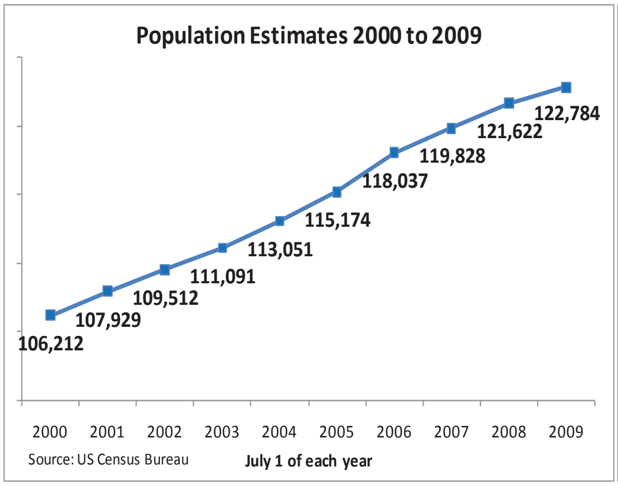
Our population is composed of people residing in Blount County. Counting people over time provides us with a trend of population growth. The US Census Bureau counts population every ten years. To the right is a graph of population trend, showing that county population grew continuously from 1950 to 2000.

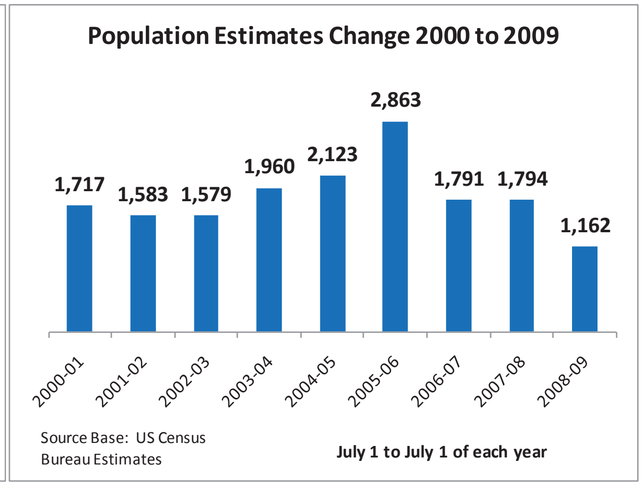


However, growth over the decades was uneven. To the right is a graph of population change by decade. Population growth was relatively low in the 1950's, increased through the 1960's, and showed a peak in the 1970's. This was followed by a slow-down in the 1980's, and then a substantial increase to highest historical growth in the 1990's.

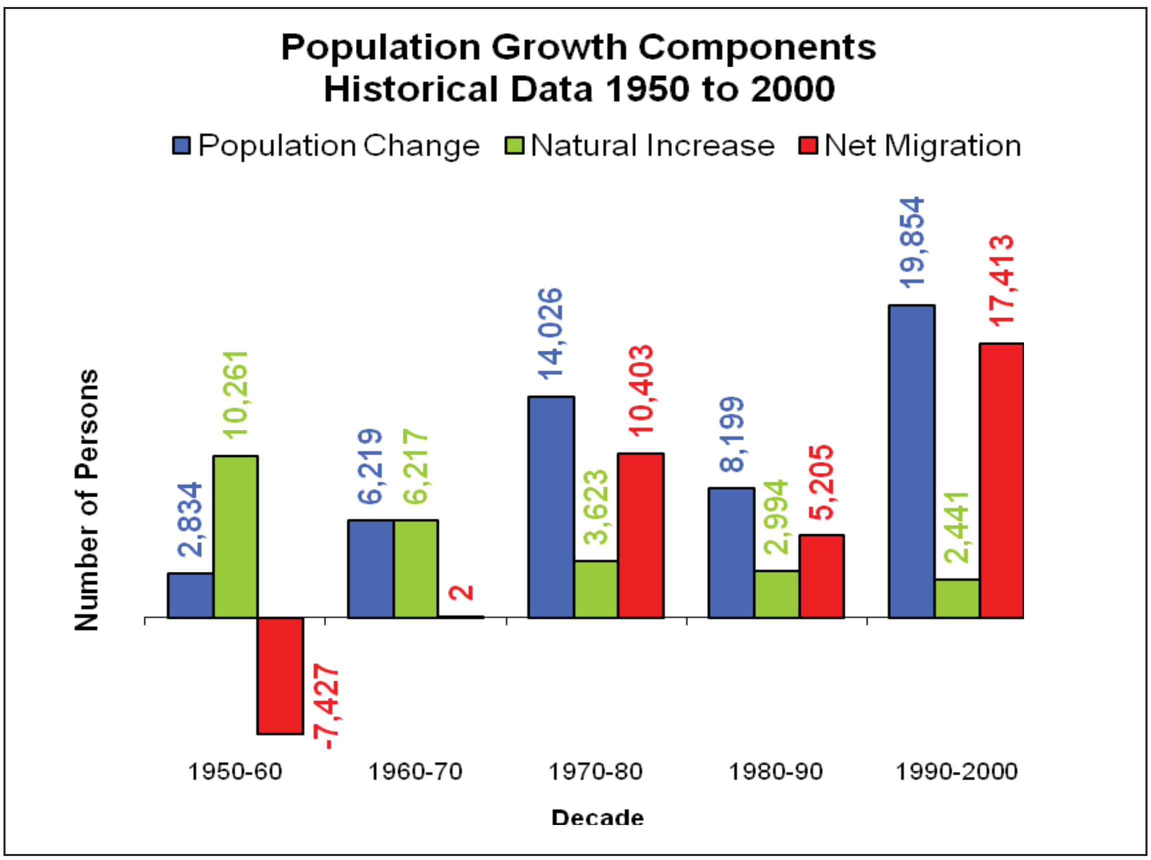


The US Census Bureau also publishes yearly estimates of population. Population estimates from 2000 to 2009 (graphs on next page) showed a continuation of population growth. Average yearly growth from 1990 to 2000 was 1,985 persons per year, and continued at a slightly lower estimated average of 1,841 persons per year to 2009.





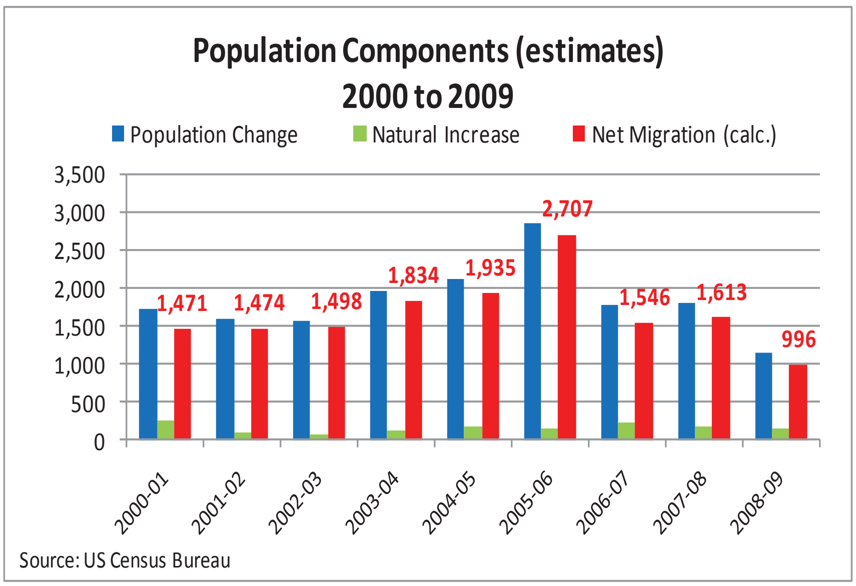
The components of population growth were the natural processes of births and deaths, and the movement of people into or out of the county. Births and deaths may be combined into a summary number called natural increase, calculated as births minus deaths. The movement of people into or out of the county can be summarized as net migration, and can be calculated as population change minus natural increase. The graph below presents in summary form the components of population growth from 1950 to 2000.



Natural increase showed a downward trend from peak in the 1950's. The peak was due to the "baby boom" of higher birth rates, and consequent greater number of births that started shortly after World War II and lasted from 1946 to 1964. After that, the birth rate dropped and leveled out. In recent decades, births again began to climb, but this was due to an increasing population of parents and not to any substantial increase in birth rate. For all the decades, deaths increased in a growing population, and this was fueled recently by aging of the "baby boom" into older years with higher death rates. The continual decline of natural increase was the result of deaths increasing faster than births in an increasing and aging population.

Net migration showed a more variable pattern. In the 1950's, many people left the county, due probably to limited job opportunities at the time. This out-migration began to shift in the 1960's and transitioned to high in-migration in the 1970's. The 1980's saw a slow-down of net migration, which was followed by a jump again to historical high in-migration in the 1990's. From 1970 to 2000, net in-migration dominated the population growth trend, and accounted for 89 percent of population growth in the 1990's.

The trend of net in-migration dominance continued to 2009. The graph to the right, based on Census population estimates, illustrates this. Net migration continued at an average rate similar to the 1990's and still dominated the growth trend, accounting for about 90 percent of estimated growth over the nine years.



<u>Population Projections to 2030</u>.

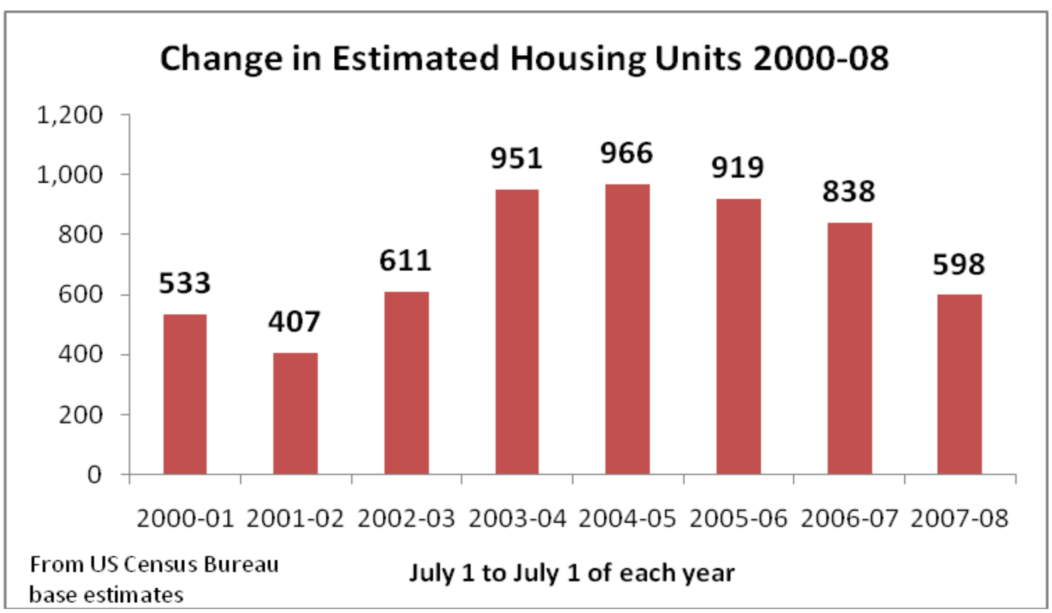
To make projections, we need to make assumptions about the components of population growth. The projection years will be 2010, 2020 and 2030. For the 2010 projections, we have at least partial information from population estimates provided by the Census Bureau to 2009 as shown above. In addition we also know that the last part of the 2000 to 2010 decade was characterized by a severe recession. We can use this information and clues from the past to get a more precise range for end of decade 2010 projections. Note that the 2010 census count of population was conducted as this report was being written, and data that can confirm the 2010

projections will be available by the end of 2010, after completion of this report. Projections to 2020 and 2030 may need to be adjusted based on 2010 Census results.

Major changes occurred at the end of the 2000-2010 decade that could affect the trend in net migration to the end of decade and beyond. The national and local economy slowed into the worst recession since the great depression of the 1930's. The recession began in December of 2007, and indicators showed that it may have been technically over by early 2010. However, some predict that associated high unemployment may be slow to recover (see An Economic Report to the Governor of the State of Tennessee – The State's Economic Outlook, January 2010, by the University of Tennessee, Center for Business and Economic Research).

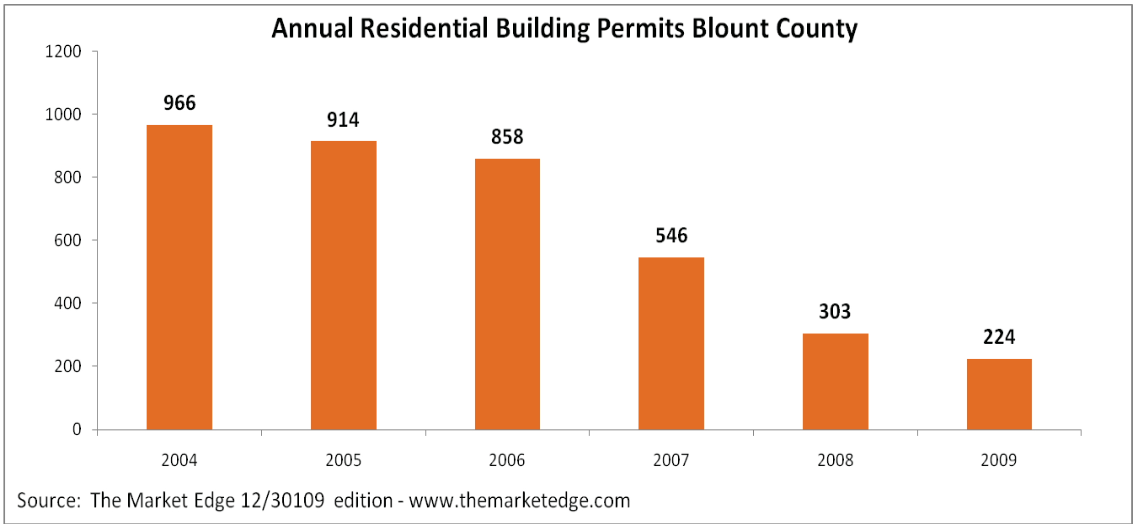
The level of net migration may be related to the economy, with restricted jobs leading to slowed in-migration or even out-migration. The most recent indicative decade would be 1980-1990 which saw a decrease of net-migration. A relatively prolonged recession with high unemployment occurred at the beginning of the 1980s. While the cause and effect relationship may not be rigorously proven, we can assume that restricted job prospects in the local economy related to deep and prolonged recession may lead to a reduction of net migration.

In addition to other indicators showing a recession, trends in housing and residential building permits showed considerable decrease in the last years of the 2000-2010 decade. The graph below shows yearly increase in estimated housing units in the County from 2000 to 2008. Note the dip in 2001 to 2002, associated with a mild recession at the beginning of the decade. Note also the decrease from 2007 to 2008 that could indicate a slowing in the first year of the most recent severe recession.



The graph on the next page shows trend in residential building permits for Blount County from 2004 to 2009. Note the substantial decrease in residential building permits beginning in 2007,

and intensifying in 2008 and 2009 as the recession deepened. The data were from a quarterly report compiled by The Market Edge (www.themarketedge.com).



From the indications of decrease in housing growth, we may surmise that the demand for new housing units was decreaseing toward the end of the decade. This in turn may be associated with a decrease of net migration as we approach the end of the decade. If we assume this, we would need to adjust average yearly net migration downward from the 1,675 level of the first nine years of the decade. For the purposes of more realistic projections, we can assume a range of net migration figures to capture possible futures.

To generate projections for future population, we will need to make assumptions about births, deaths and net migration – the main components of population growth.

Net Migration Assumptions. Net migration probably will continue to be the most important component defining population growth into the future. The table below presents the assumptions for net migration used in generating a range of population projections.

Net Migration Assumptions

Projection Decade	2000-2010	2010-2020	2020-2030
Very High Assumption	16,500	19,000	22,500
High Assumption	16,500	17,500	20,000
Moderate Assumption	16,000	16,000	17,500
Low Assumption	15,500	10,500	15,500
Very Low Assumption	15,500	5,500	12,500

For very high projections, the assumption is for quick recovery from effects of the end of decade 2000-2010 recession, and boost of net migration during the succeeding two decades to numbers greater than the 1990's historic high net in-migration of 17,413. The underlying assumption is that the end of decade 2000-2010 recession will not affect net migration to a great degree, and that the local economy will rebound quickly to a higher level than pre-recession. This also assumes the strength of being part of a larger metropolitan regional economy, and the favorable place that Blount County holds in that regional economy.

For high projections, the assumption is for modest effect of the recent recession early in the 2010-2020 decade, with recovery of net migration early in the decade. The recovery of net migration is assumed to be to 1990's level. For 2020-2030, the assumption is for a boost in net migration level to greater than the historic high of the 1990's. The underlying assumptions concerning local and regional economy are the same as above for very high projections.

For moderate projections, the assumption is for a greater and more prolonged effect of the recent recession into the 2010-2020 decade, with recovery of net migration during the second quarter of the decade. The future trend is assumed to be roughly a mirror image of the 2000-2010 decade, thus leading to essentially the same net migration for both decades. For 2020-2030 the assumption is for net migration to return to the same level as the historic high of the 1990's. The underlying assumption is that the most recent recession will have a substantial effect, but that the local economy will be basically strong on its own and as part of a larger regional economy.

For low projections, the assumption is for a greater and more prolonged effect of the most recent recession, with possible addition of other factors, into the decade of 2010-2020. This is based on observation of the possible deeper effect of recession historically in the 1980's, though of lesser expression in net migration. For 2020-2030 the assumption is for a low level of net migration recovery, and assumes that the decade of the 1990's will not be a model for level of net migration during the term of the projections. The underlying assumption is that the local economy may be subject to other factors that could prolong a weaker job market. The other factors could be a succession of recessions, or closing of a large business.

To capture the most recent historic low of net migration in the 1980's we may assume an even more severe effect of economic conditions lasting nearly the whole decade from 2010 to 2020. We will call this scenario the very low assumption, and assume a level of net migration similar to the 1980's. The trend is assumed to improve only slightly in 2020-2030. The underlying assumption is the same as for low projections above, but with more severe effect of other factors.

Note that the moderate, high and very high assumptions indicate a level of optimism in this very important component of population growth. Even the low assumption does not approach

the low level of net migration during the 1980's, and the very low assumption does not approach the negative net migration of the 1950's. This optimism is based on observation that the economy of Blount County is basically strong, and more importantly is stronger by integration with a larger regional economy centered on the metropolitan hub of Knoxville and Knox County.

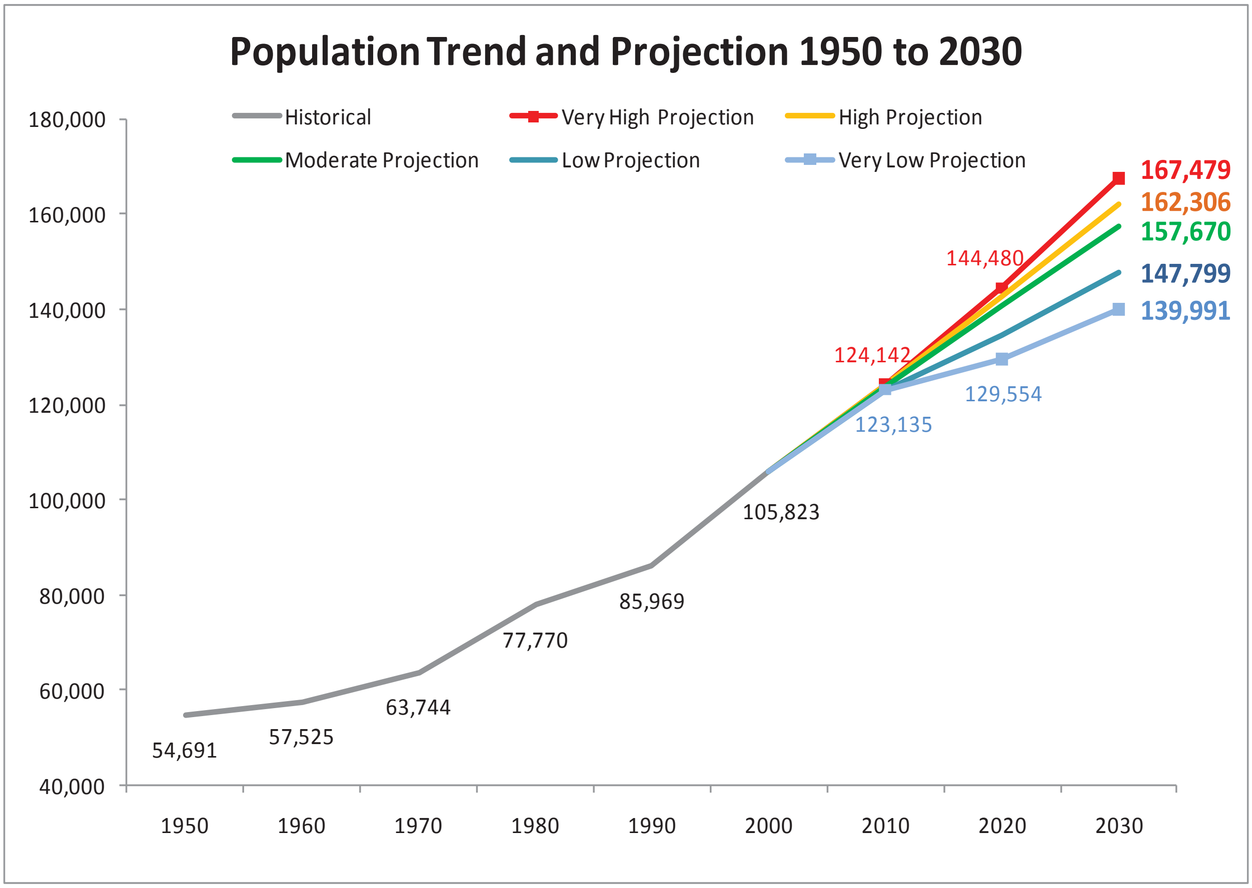
Birth Assumptions. The next most variable component of population growth historically has been births, and particularly birth rates. The "baby boom" of the 1950's and early 1960's defined much more than just the two decade growth trend of their birth, and we need to consider this in long term projections. The evidence showed a long term trend of decrease and levelling out of birth rates after the initial interruption of the "baby boom". For the the five standard projection scenarios, we assume that crude birth rate (ratio of births to population age 15 to 44) has levelled-out and will remain the same for the three projection decades.

Death or Survival Assumptions. Survival rates are the inverse of death rates, and indicate the proportion of a population or sub-population who are expected to survive from one decade to the next. The basic assumption is that survival rates will continue to improve in all projection scenarios, but at different marginal rates. The very high and high projections assume greatest improvement in survival rates, perpetuating the same rate of improvement shown in the 1990's. The moderate, low and very low projections assume least improvement, with decreasing marginal improvement from the 1990's base level. The decreasing marginal improvement scenario would perpetuate a trend noted in the last few decades.

Projections of Total Population. We can "plug" our assumptions into a simple cohort model to generate a set of population projections to the year 2030. Projections are shown in table below, and the graph on the following page.

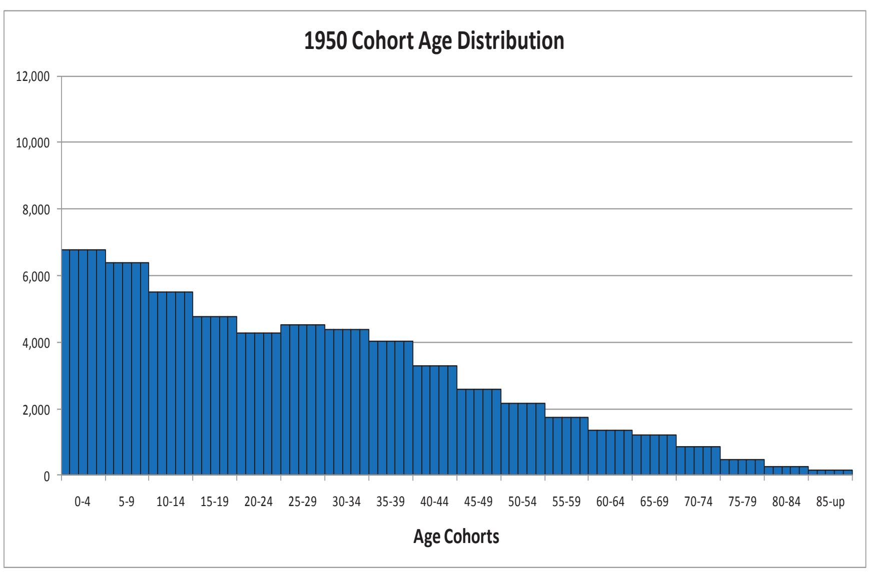
Population Projections to 2030

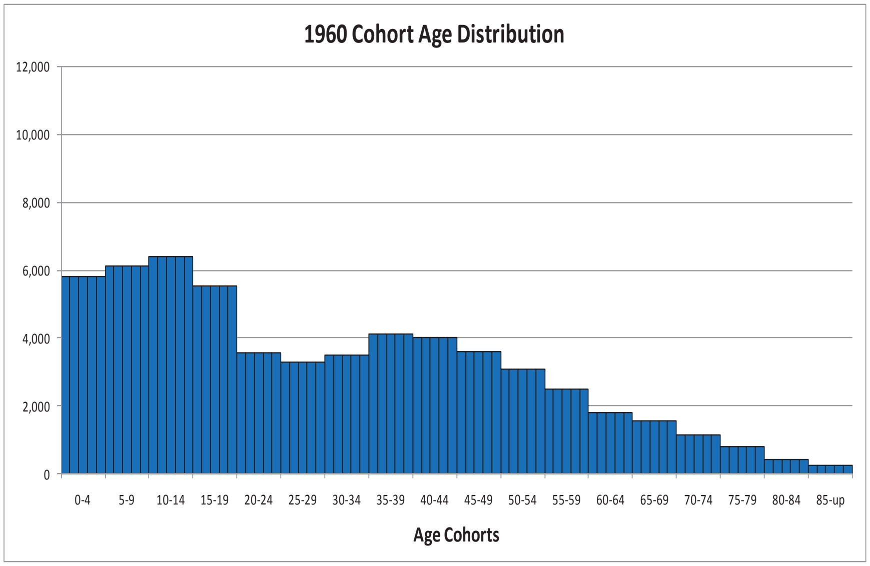
	Census 2000	2010	2020	2030
Very High Projection	105,823	124,142	144,480	167,479
High Projection	105,823	124,142	142,713	162,306
Moderate Projection	105,823	123,642	140,683	157,670
Low Projection	105,823	123,135	134,554	147,799
Very Low Projection	105,823	123,135	129,554	139,991

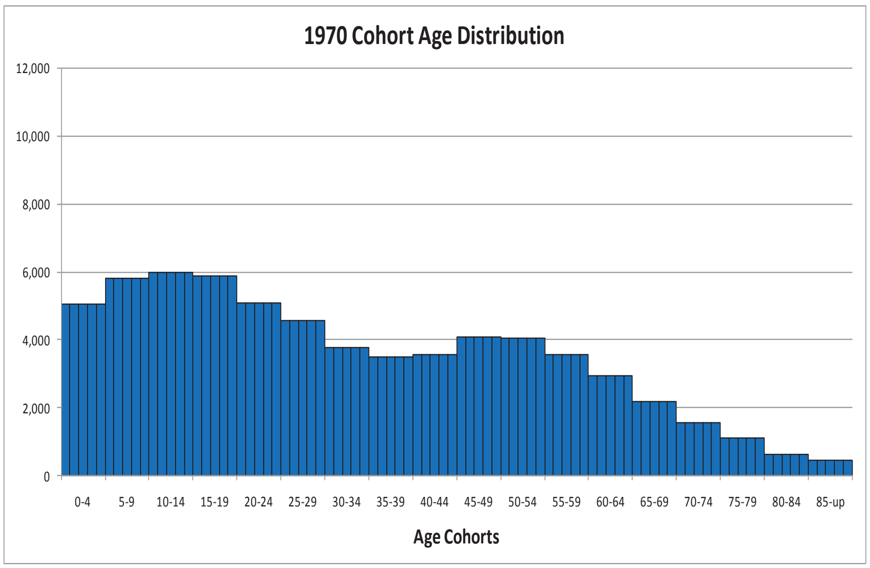


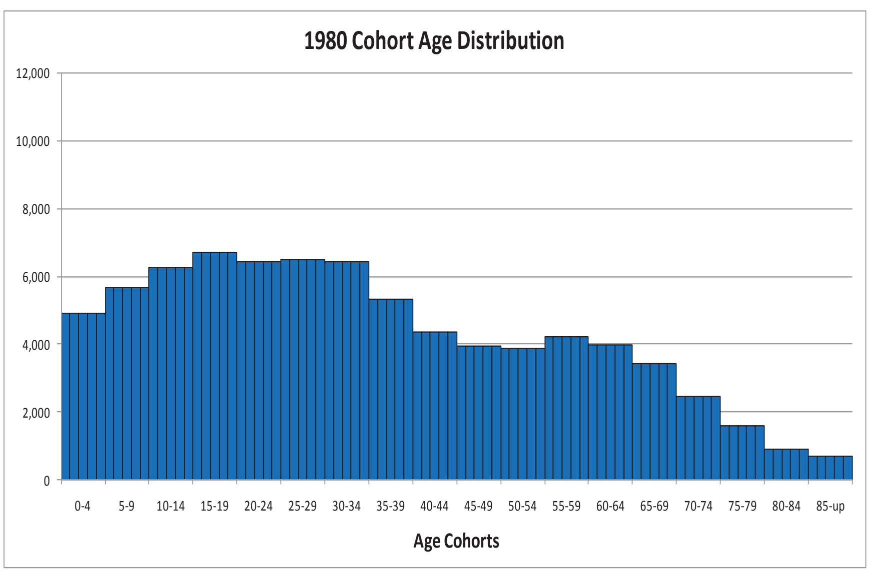
Population Characteristics – Age, Gender and Race.

Age of the Population. Analysis of population distribution by different age groups within the population can provide insight into important changes and trends over time. The graphs below and on the following pages present population age distributions from 1950 to 2000, and projected to 2030. The cohorts represent arbitrary five year age categories containing people that grew older as a group over time. This concept will be important in understanding cohort net migration later. The 1950 age distribution looked like a pyramid laid on its side, with a large base of young people and a









small tip of old people. The large base included the first four years of the "baby boom" born from 1946 through 1949.

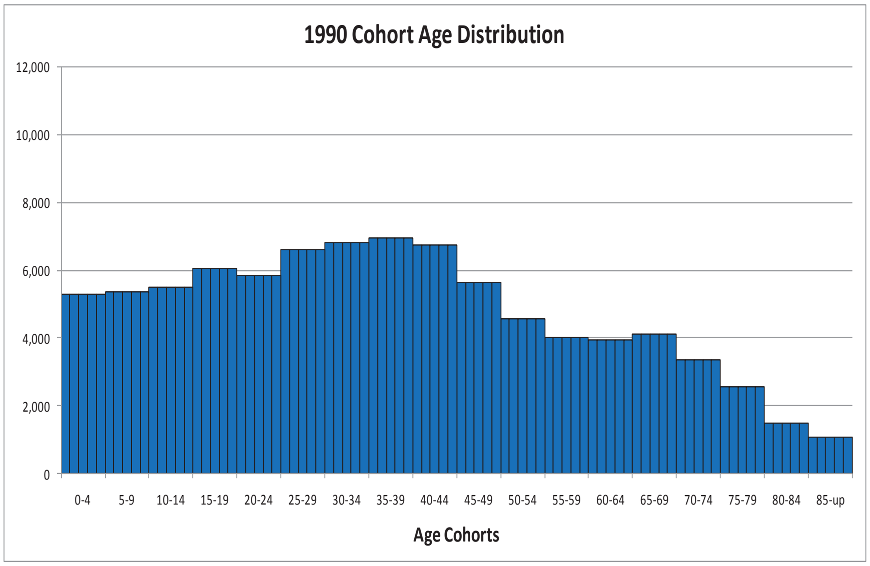
The 1960 age distribution showed the bulge of the "baby boom", born from 1946 through 1959, and also showed a depression in ages 20 to 34. This depression was related to high out-migration shown previously in the 1950's.

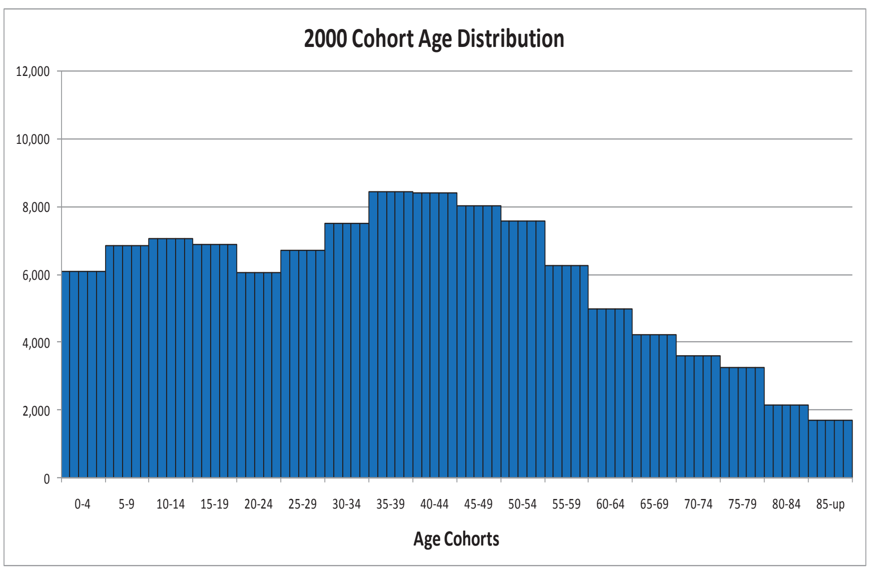
The 1970 age distribution showed slight shifts of age cohort population when compared to 1960. The shifts occurred during the decade from 1960 to 1970, a decade with little overall net migration. However, there was shift in age specific migration which will be presented later. The now completed "baby boom" bulge was prominent within ages 5 to 24. The distribution was beginning to show a decreasing base of young people. This was due to the decreased birth rate after the "baby boom".

The decade from 1970 to 1980 showed a spike of in-

migration, and this was expressed as increases for most cohorts as they aged ten years from 1970 to 1980. The "baby boom" bulge was prominent within ages 15 to 34.

The "baby boom" aged ten years into the 1990 age distribution, showing increased prominence within ages 25 to 44. The decade from 1980 to 1990 showed a slowing of net migration, but much of the in-migration was concentrated in the "baby boom" cohorts.

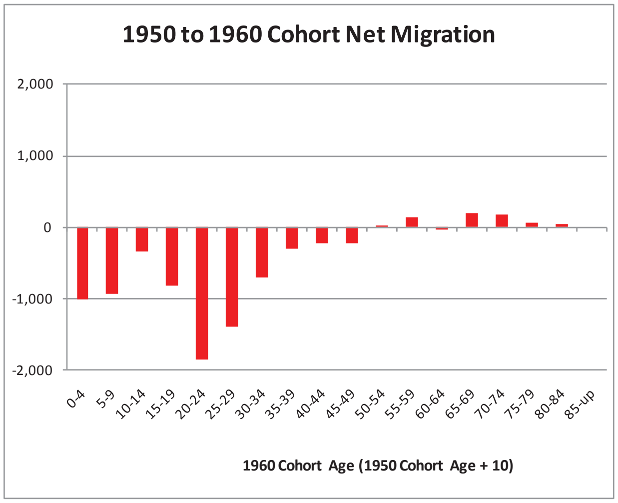


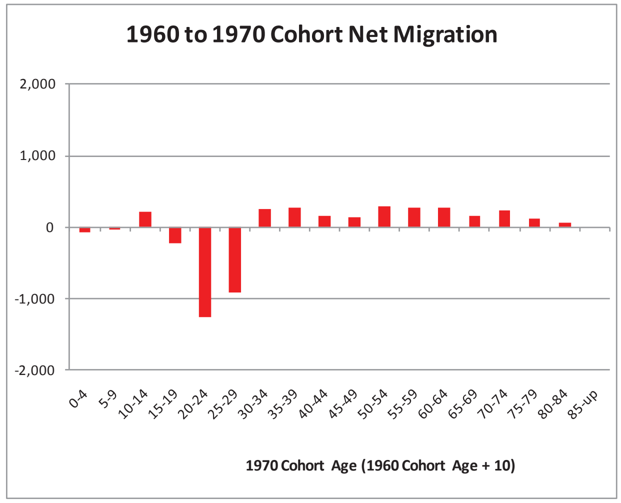


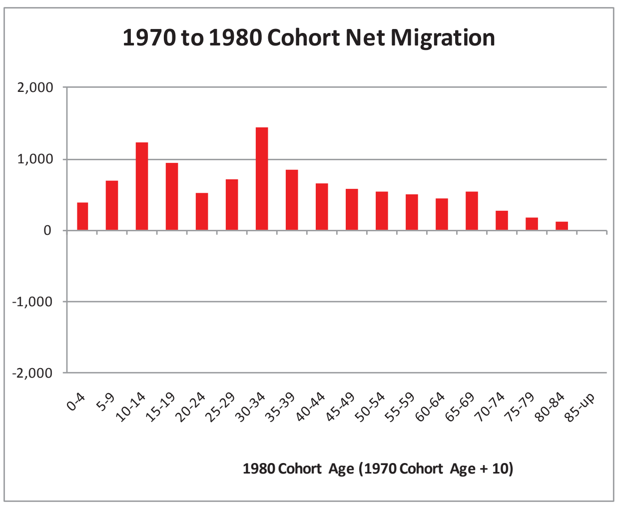
The 1990 to 2000 decade showed highest historical growth and net migration. The 2000 age distribution reflected this with increases in most age cohorts. The "baby boom" was again prominent within ages 35 to 54. Associated with increases in the "baby boom" cohorts were increases in cohorts of children that in-migrated with "baby boom" parents, resulting in a smaller second bulge within ages 5 to 19.

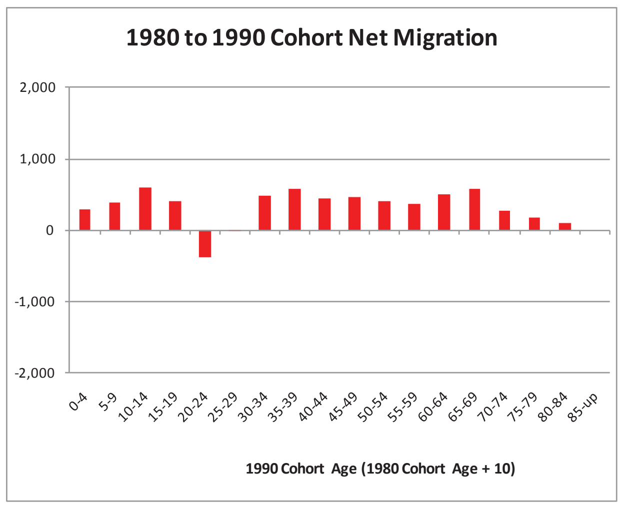
Compared to the 1950 age distribution, the 2000 age distribution no longer looked like a pyramid laid on its side. It showed the effects of changes in births, deaths and net migration over five decades. The "baby boom" became evident in the 1950's and early 1960's, followed by reduction and leveling out of the birth rate. Thus the "baby boom" bulge aged over 40 to 50 years to 2000, leaving a smaller base in the younger years to the left of the graph. Survival rates improved over the decades, especially for the older population. This resulted in more people surviving each decade as they aged into the older age groups, reflected in larger numbers in the older age cohorts. The most variable component of population growth was net migration, and it would be informative to study this in more detail.

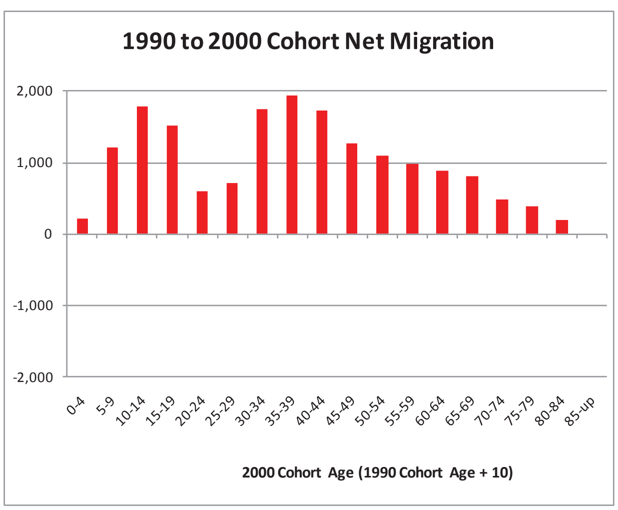
The graphs below show age cohort net migration by decade from 1950 to 2000. The graphs should be read as the number within an age cohort that net in-migrated (positive number) or net out-migrated (negative number) as they aged ten years from beginning of decade to end.











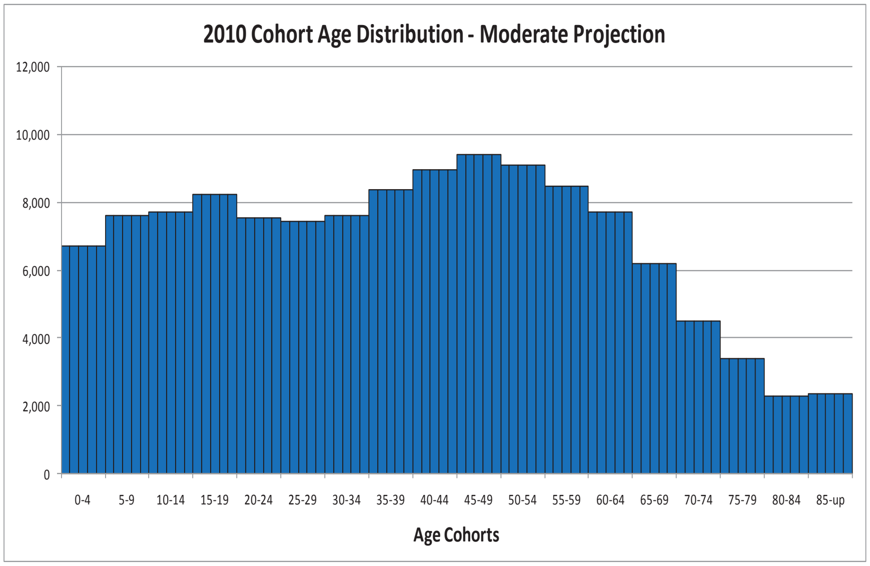
The graph for 1950 to 1960 (previous page) was for the same decade that had high out-migration. The out-migration cut across a wide range of age cohorts from 0 to 49 years old. There were distinct troughs (negative peaks) around the ages of 0 to 9 and 20 to 29 years old. The double troughs indicated movement of families out of the county, young parents with their children. This was associated with reductions in employment in both agriculture and manufacturing, and was probably related to limited job prospects during the decade. The limited job prospects most affected young adults entering the job market.

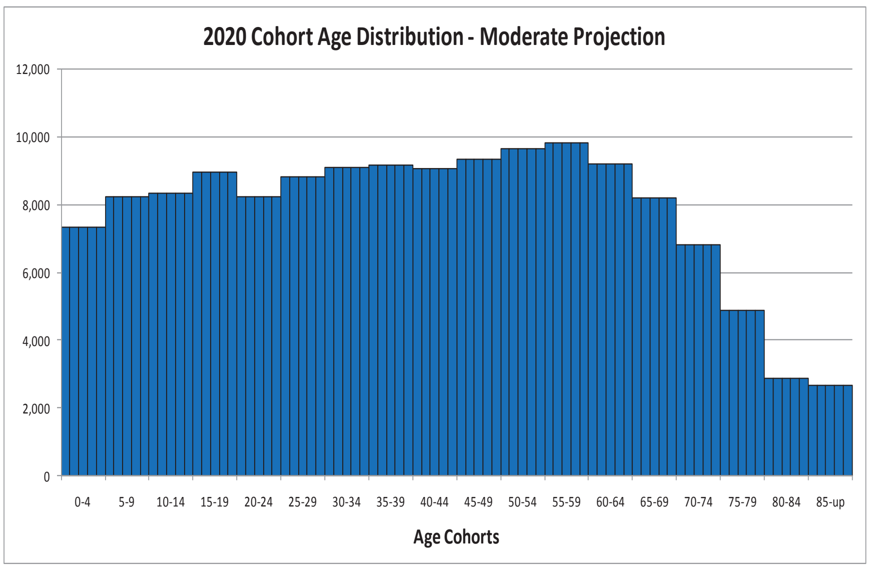
The graph for 1960 to 1970 was for the same decade that had almost no overall net migration. This did not mean there was no movement of people, just that the net flow was close to zero. There was continued out migration in the young adult age cohorts 20 to 29 years old, indicating a continued limitation in the job market. However, there was no second trough in the youngest cohorts. This lack of a second trough may have been due to the reversal to net in-migration for the age cohorts 30 to 39 years old, who may have been moving into the county with children as younger parents were moving out with children. The in-migration for the age cohorts 30 years old and older could indicate a transition to a more accommodating job market for experienced workers, and also could indicate retirement destination moves for ages 60 and older.

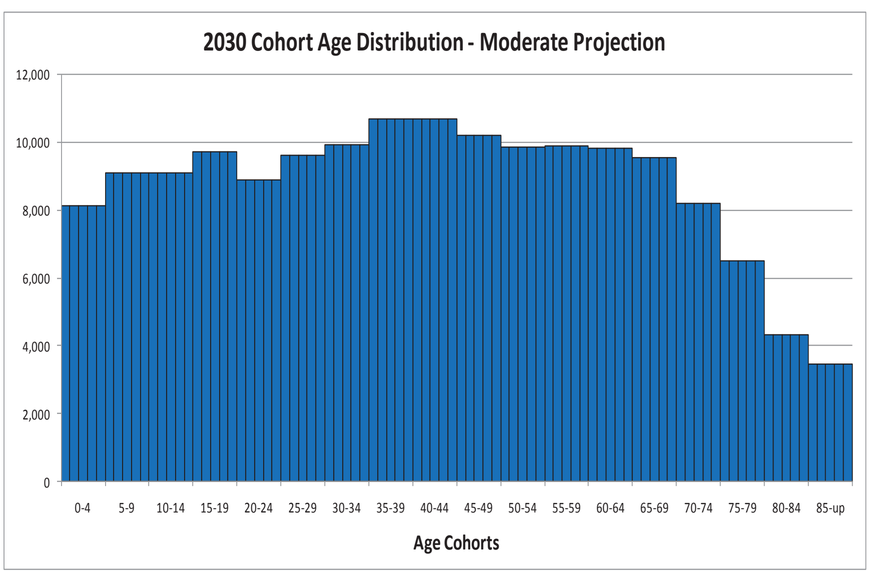
The graph for 1970 to 1980 was for the same decade that had a peak of high net in-migration. This high in-migration was expressed across all age cohorts, except the oldest. This would indicate a transition to an expansive job market, and possibly a quickening of retirement destination moves for ages 60 and older. There were two distinct peaks of in-migration, one around parent ages 30 to 34, and the other around children ages 10 to 14 years old. This would indicate a reversal and complete transition from 1950's *out-migration* of parents with their children, to 1970's *in-migration* of parents with their children.

The graph for 1980 to 1990 was for the same decade that had a decrease of net in-migration. This decreased was associated with reduced net in-migration for almost all age cohorts, with reversal to net out-migration shown for the young adult age cohort 20 to 24 years old. This may indicate a weaker job market for new entrants to the labor force, but could also indicate a newer phenomenon of greater numbers of young people leaving for higher education. The small peak at age 65 to 69 years old may indicate that retirement moves were independent of overall economic conditions.

The graph for 1990 to 2000 was for the same decade that had highest net in-migration in the historical series. This peak of in-migration was again expressed across all age cohorts, except the oldest. There were again two peaks, indicating in-migration of parents with children. The breadth of in-migration across the age groups would indicate a very favorable job market in the county for the decade, and also an intensification of retirement destination moves for older age cohorts.







If we assume continuation of the 1990 to 2000 decade age cohort in-migration pattern, we can project the age distribution of the population to the years 2010, 2020 and 2030 as shown to the left. For this presentation, moderate projection assumptions were used.

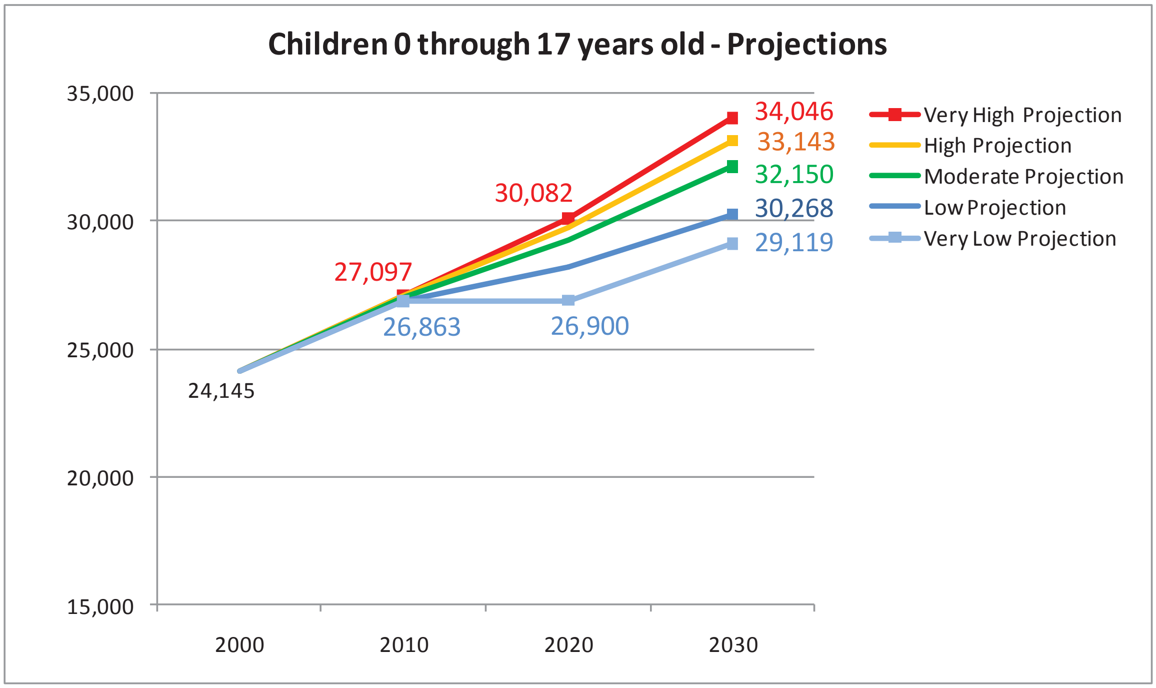
For the 2010 projection, the "baby boom" bulge will probably still be prominent within the ages 45 to 64 years old. The "baby boom" and preceding generations will be aging in greater numbers into the ages where greater deaths are expected. This will continue into the succeeding projection years and further reduce natural increase as a driver of population growth.

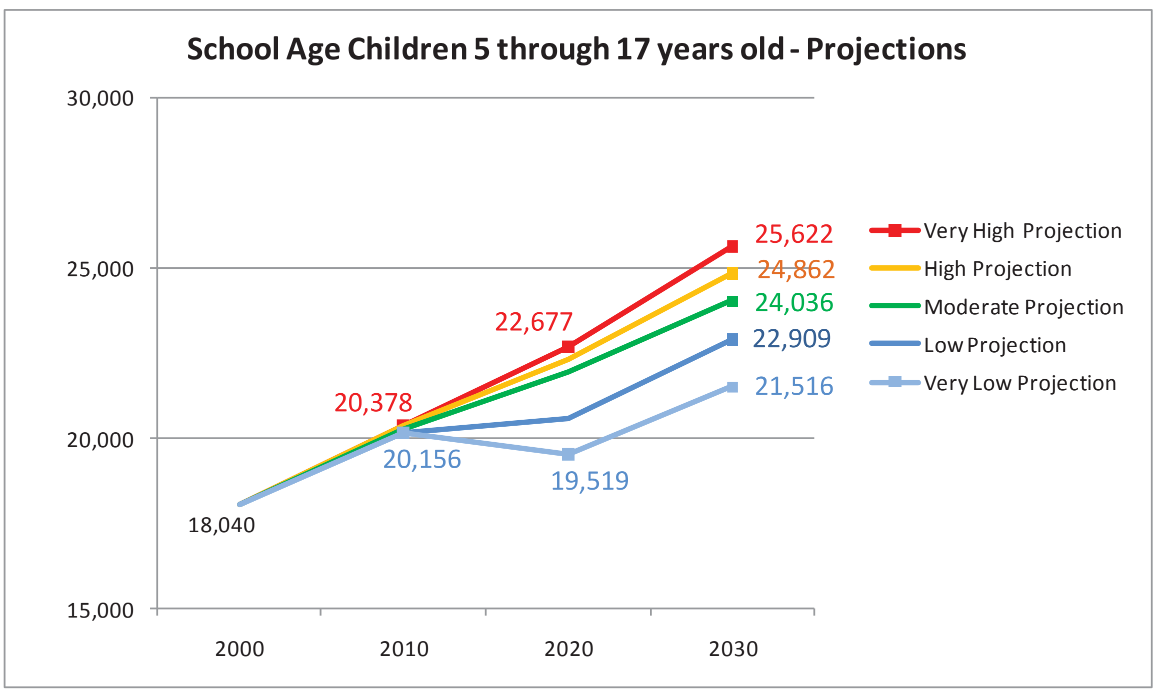
By 2020, the "baby boom" peak will begin to lose its prominence due to greater deaths, and increases in younger cohorts through continued net in-migration.

By 2030, the age distribution of the population could look radically different than the

distributions in past decades, with greater evenness in the proportions of the population across most of the cohorts. We can now show projections for specific age groupings of interest.

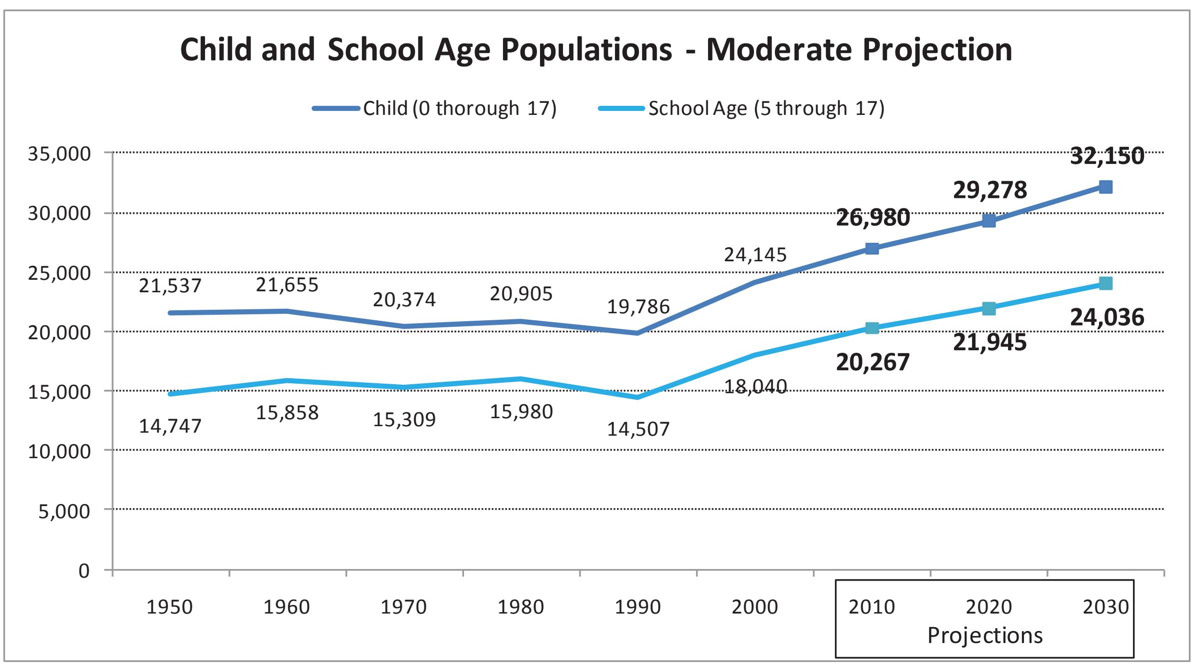
Children. Below are projections for children ages 0 to 17 years old, and a subset of school age children ages 5 to 17. Projection of school age children may be of particular importance in planning for schools.



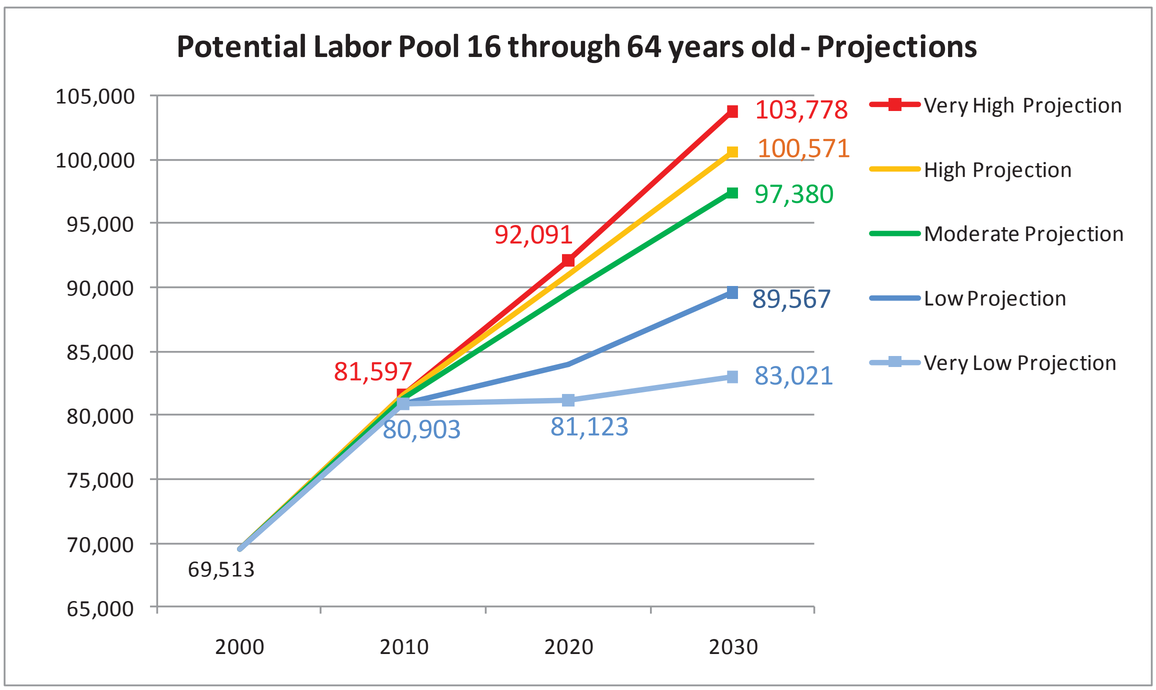


The projections on the preceding page for children and school age children show similar trend, and the following will focus on school age children. Note that for moderate to very high projections, the upward trend of projections is very similar. These projections have common assumption of continued strength in the local and regional economy that will continue to support in-migration of parents with children, similar to the pattern for the decade 1990-2000. The implication for schools of this kind of growth over the next 20 years is the need to accommodate 4,000 to 5,000 new students (city and county combined) between 2010 and 2030. The low and very low projections paint a different picture, with possibility of short term leveling-out or even decrease in school age population. This slowing of school age population growth would be related to the assumption of disruption in the local and regional economy that would lead to depressed in-migration of parents with children, or even out-migration. Keep in mind that both economic scenarios have been part of the past history of the county.

The graph below puts the moderate projection into historical perspective. Note that in the past, school age population showed an erratic up and down trend, but in a relatively tight range of numbers. Note the increase from 1950 to 1960 as the “baby boom” aged into school years, followed by reduction from 1960 to 1970 with the waning of the “baby boom”. Note also the increase from 1970 to 1980 as net in-migration peaked, followed by reduction from 1980 to 1990 as in-migration waned for a decade. From 1990 to 2000, the historical high in-migration decade, and projected also to 2010, the trend shows dramatic and consistent increase of almost 6,000, followed by a projected increase of about 4,000 from 2010 to 2030. This could indicate that the pace of need to accommodate students in schools may be reduced over the next 20 years compared to the last 20 years, but the need will probably remain substantial.



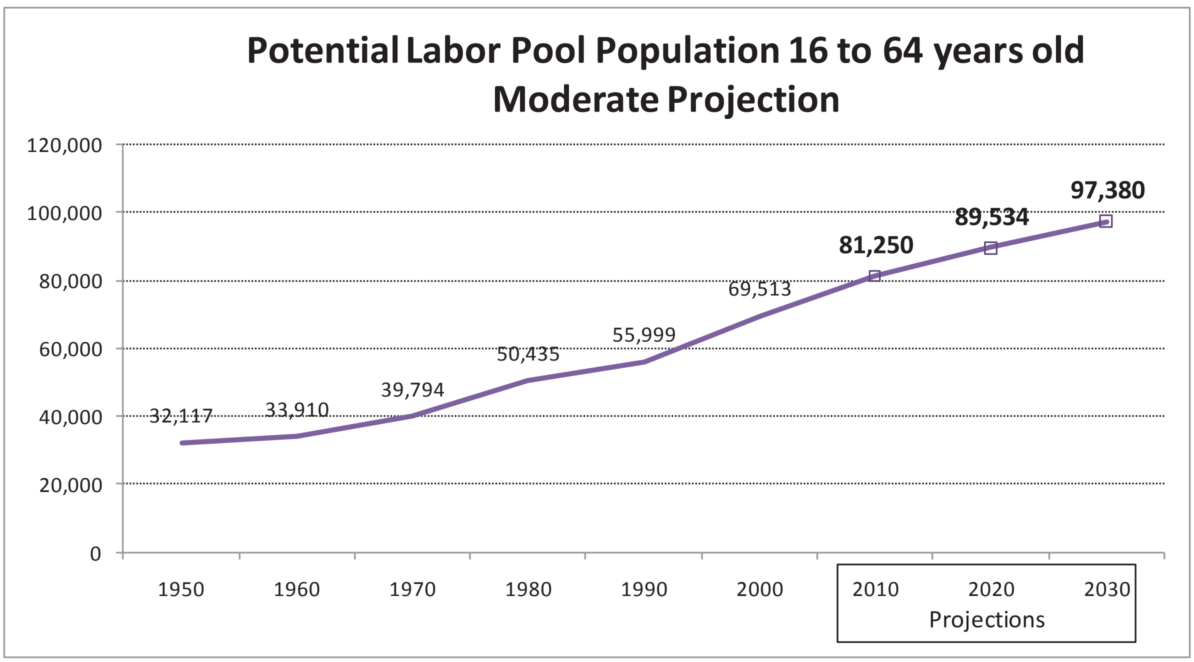
Labor Pool. In age progression, the next age grouping of interest can be termed the labor pool. The labor pool is the population bounded by traditional employable ages, and does not constitute actual employment or number of employable people. Analysis of labor force and economic sectors follows in a separate section and focuses on actual employment in the population. Below are projections for the population age 16 to 64. The employable age break for the young end of the range was 14 years old in 1950 and 1960, but was changed in 1970 to 16 years old and remained so since. The 16 year old age was used for consistency in this analysis. The 64 year old age was based on traditional qualification for Social Security benefits at age 65. Note that the age span of this population overlaps slightly with both the children age group (0 to 17) presented above, and the senior citizen age group (60 and older) to be presented later. Projection of the potential labor pool age population may be of particular importance in analysis of economic strategies that can accommodate a growing population.



The graph above shows similar trend for the moderate to high projections. This is based on similar assumptions of continued strength in the local and regional economy that will continue to support in-migration across all ages in this population group, similar to the pattern of for the decade 1990 to 2000. The implication for the economy from this type of growth over the next 20 years is that jobs will need to continue to grow at an average of about 2.1 to 2.7 percent per year to accommodate entry into the job market of new workers through aging of younger cohorts and in-migration. The low and very low projections assume a more limited expansion of jobs in the economy that may be reflected in reduced in-migration into this age group, particularly for younger or less experienced new entrants into the job market, and thus a

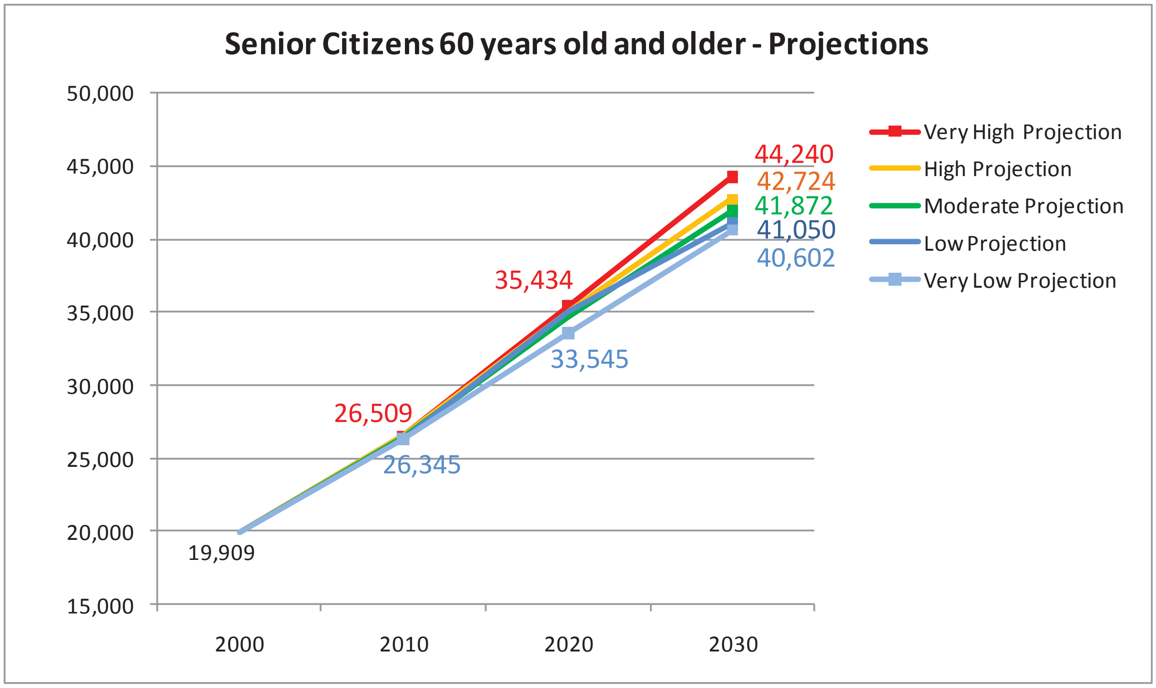
reduction or flattening-out in the pace of growth. Keep in mind that both economic scenarios have been part of the past history of the county.

The graph below puts the moderate projection into historical perspective. Note the low level of increase from 1950 to 1960 as a wide range of age cohorts within the potential labor pool out-migrated. This was followed by a quickening of increase from 1960 to 1970 and from 1970 to 1980 as the growth pattern was shaped by transition to increasing net in-migration into this age group. At the same time, the large “baby boom” aged into this group. This was followed by a slowing of increase from 1980 to 1990 as in-migration waned for a decade and smaller post-“baby boom” cohorts aged into this group. From 1990 to 2000, the historical high in-migration decade, and projected also to 2010, the trend shows quickened increase based mainly on increased in-migration into this group. This is projected to be followed by a slight slowing of the pace of increase as the large “baby boom” ages out of this group and into senior citizen and retirement years.



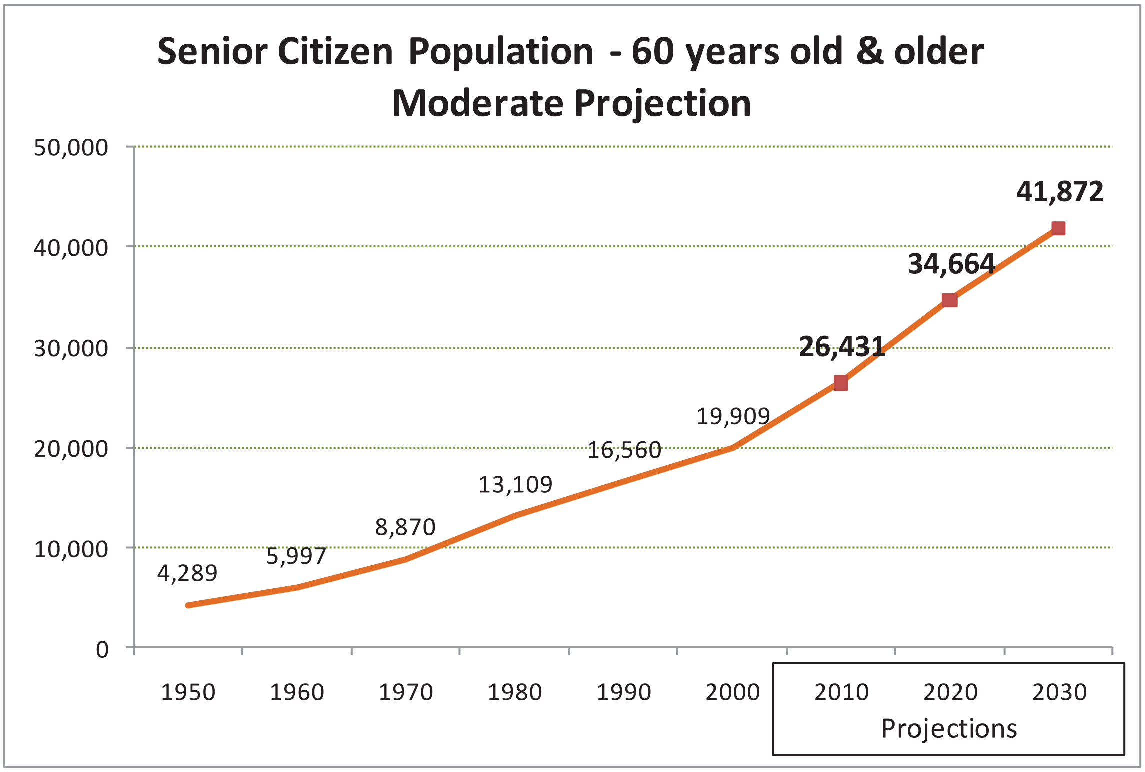
Senior Citizens. In age progression, the next age grouping of interest is senior citizens. The category of senior citizens can be defined by beginning age ranging from 60 to 65. The 65 year old beginning would coincide with traditional qualification for full Social Security coverage. However, retirement often begins at ages less that 65, and many qualify for early retirement or less traditional senior citizen benefits at age 60. For the purpose of this analysis, age 60 is the beginning point for the senior citizen age group. Note that this age group span of 60 and older overlaps with the previously discussed potential labor pool population. Projection of the senior citizen population may be of particular importance in addressing issues of an aging population,

and the wave of demand and special needs specific to senior citizens that may be forthcoming from aging of the large "baby boom" in the coming decades.

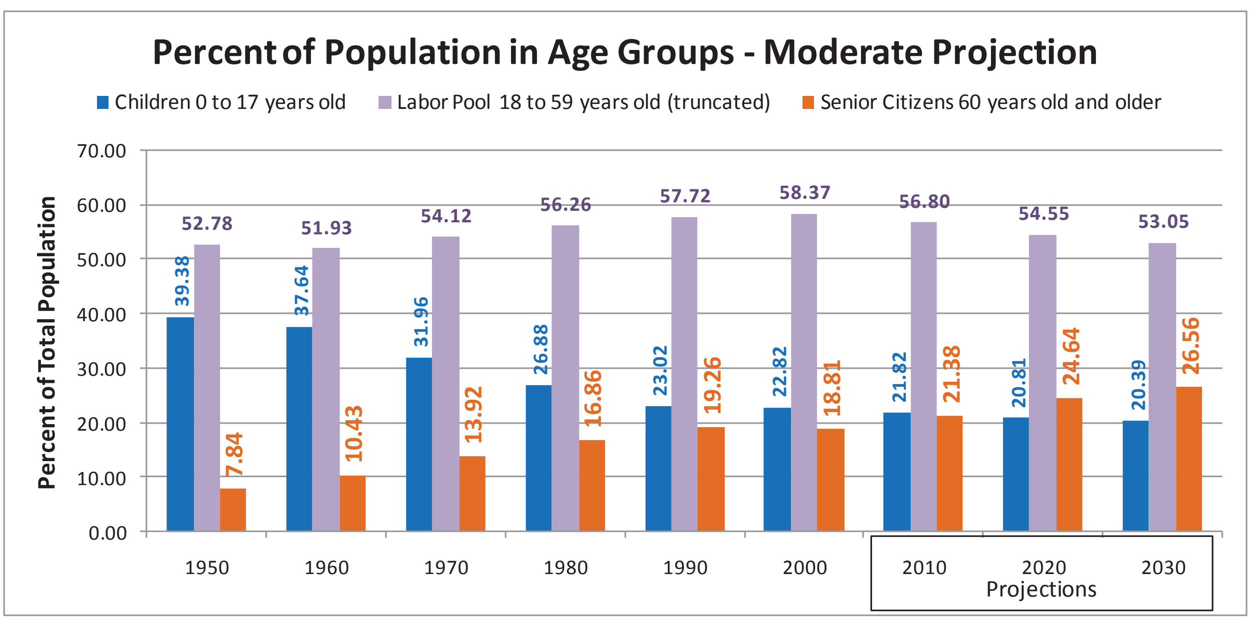


The graph above shows similar trend for all assumption scenarios, and shows much less spread in the projections when compared to the other age groups discussed earlier. For the most part, younger cohorts respond to economic conditions with migration much more than the older cohorts included in the senior citizen age group. Thus, the assumptions about migration show little effect in this older age group. In addition, some of the spread in projections for senior citizens is related to assumptions about marginal improvement in survival rates, with high projections assuming greater marginal improvement than low projections. The assumptions about survival rates have greater expression in the older age groups where expected survival shows greater change (reduction) between five-year cohorts over the decade.

The graph on the following page puts the moderate projection into historical perspective. Note that the trend line and projection line form a smoother curve when compared to the other age groups, and the curve shows generally increasing slope over the decades. This is due to three factors. First, the curve is smoother due to the lesser effect of shifts in net migration between decades for the senior citizen population. Second is the natural progression of larger precedent cohorts over the decades, aging with greater survival rates from younger cohorts into the senior citizen age group. Third, the upward trend will be particularly noticeable as the "baby boom" ages into senior citizen status from 2000 to 2030, showing on the graph as a noticeable increase in the slope of the projection line from past trend line.



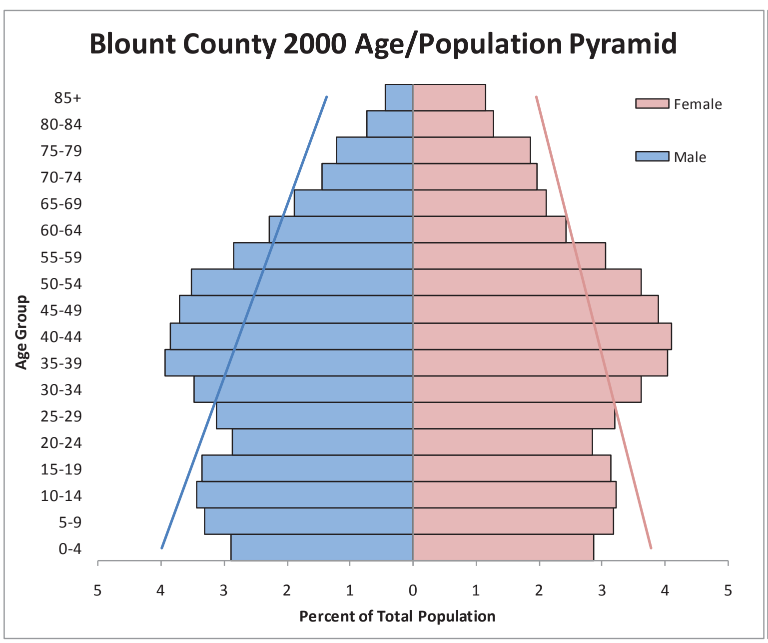
Percent of Population by Age Group. Comparing the moderate trends and projections for all three age groups as proportion of total population illustrates the concept of an aging population over time. For consistency in comparison to total population, the labor pool population was truncated at 18 instead of 16 years old for beginning of age span, and was truncated at 59 instead of 64 years old for end of age span. The children and senior citizen age spans remained the same. See graphic comparisons below.

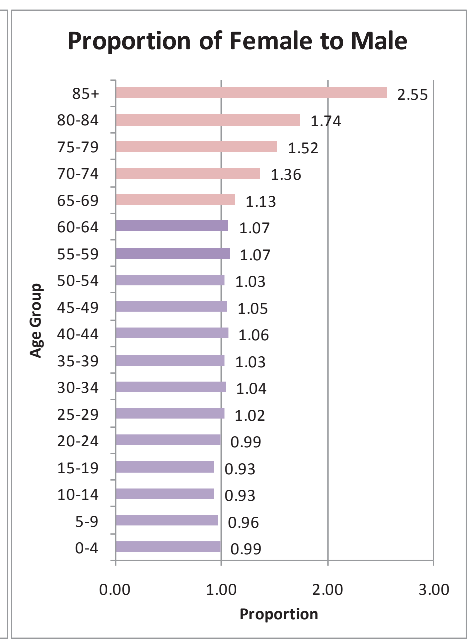


The graph on the preceding page shows that the percent of total population accounted to the senior citizen age group increased substantially from 1950 to 2000, and is projected to continue increase to 2030. Comparing 2010 and 2030 projections shows that the senior citizen age group is expected to increase from about 1 in 5 of total population in 2010, to 1 in 4 in 2030.

This aging of the population was due to several factors over the span of trend and projection years. From 1950 to 1960, the population of children was expanded by the "baby boom", the labor pool was reduced by out-migration, and senior citizens increased by aging of larger precedent cohorts in a period of improved survival rates. From 1960 to 2000, the population of children decreased in percent of total population after the "baby boom" aged out and birth rates fell and remained at lower rates. At the same time, the labor pool showed increased representation as the "baby boom" aged in and as in-migration swelled this group. Senior citizens continued proportional increase by aging of larger precedent cohorts and improved survival rates. Note also that previous in-migration into labor pool cohorts in earlier decades was expressed several decades later with increase in the percent of population accounted to senior citizens as the larger precedent cohorts aged into senior citizen status. The projection years show a relatively stable percent of population in the children group, and a decrease in the percent representation in the labor pool group. The decrease in the percent of population in the labor pool group will be due to aging out of the "baby boom". Consequently, much of the projected increase in the percent of population in the senior citizens group will be due to aging in of the previuosly in-migration augmented "baby boom" in the projection years.

Gender of the Population – Male and Female. Turning now to the latest Census count, we can look at one aspect of gender that has an effect on how a population grows. Below is a standard population pyramid of percent of total population by age and gender for 2000.

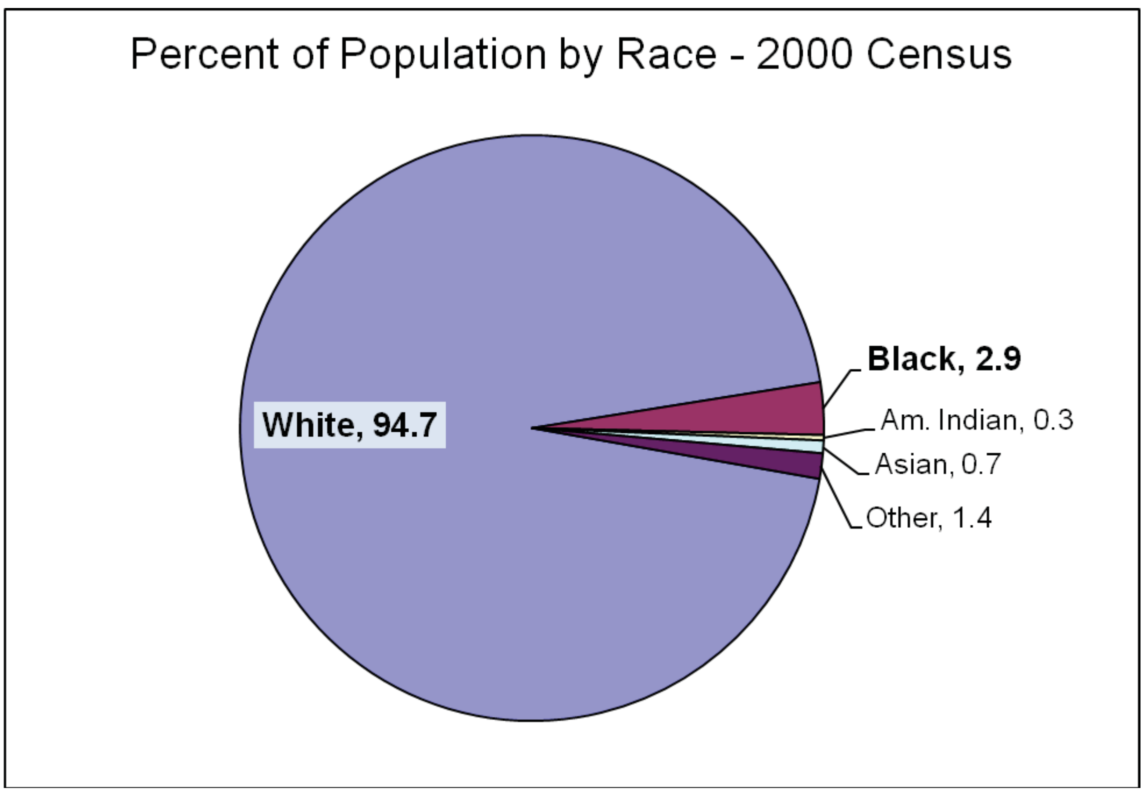




The "Population Pyramid" graph on the preceding page shows two lines that would indicate how a true pyramid might look if the cohort populations were distributed more like the 1950 distribution, with a wide base of young people and a smaller top of older people. The divergence from the lines was the result of past changes in the basic components of population growth – births, deaths and net migration – as they shifted and changed over the previous decades. The "baby boom" bulge was evident in the 35 to 54 year old age groups. The secondary bulge in the 5 to 19 year old age groups was due to net in-migration with parents. The smaller base was due to continued relatively low birth rate after the "baby boom" peak in the 1950s and early 1960s. The small tip in the older age groups was due to progressively lower survival rates from age category to age category for older age cohorts.

Of interest is the proportion of female to male in comparing the age cohorts. The younger cohorts showed roughly equal distribution of male and female, with 1.00 being equal. However, at around age 65, females began to substantially outnumber males, reaching a ratio of 2.55 females for each male surviving to age 85 and older. This was due to a long term trend of females having higher survival rates than males. Thus, not only was the whole population aging, the aging was proportionately more concentrated in the female population.

Race of the Population – White, Black and 0ther. Population growth dynamics, and the major components of births, deaths and migration, may be different for different races in the population. The percent of total population by race for 2000 is shown graphically below.



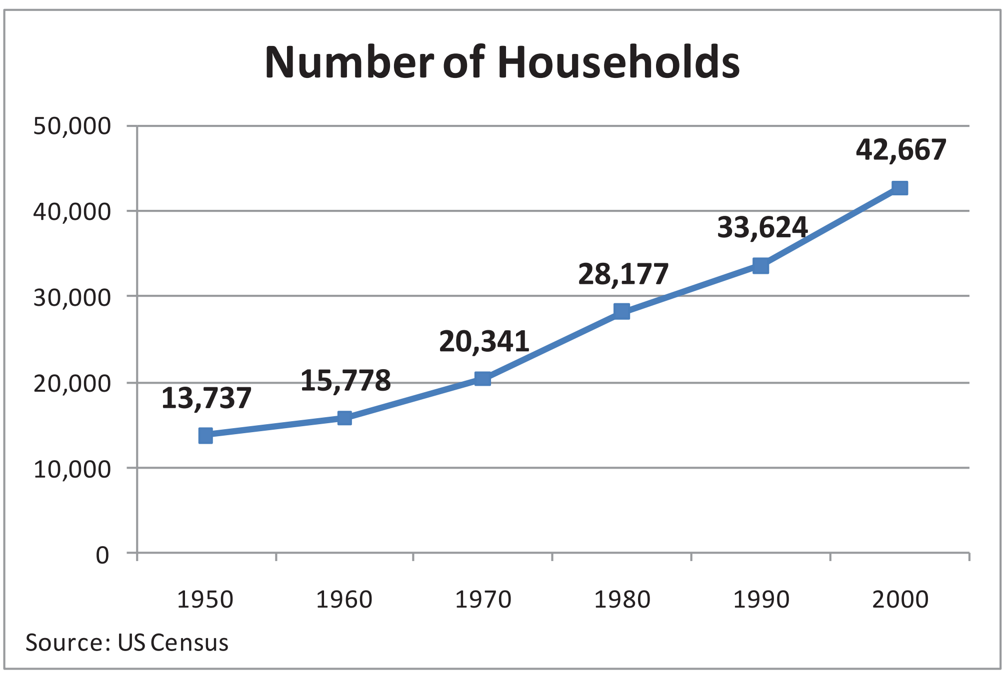
The population was predominantly white. Only 2.9 percent of the population was black, and all other races accounted for much less of the total population. Given the small representation of black and other races in the population, a separate analysis of population growth based on race was not undertaken for this report.

Households and Housing Units.

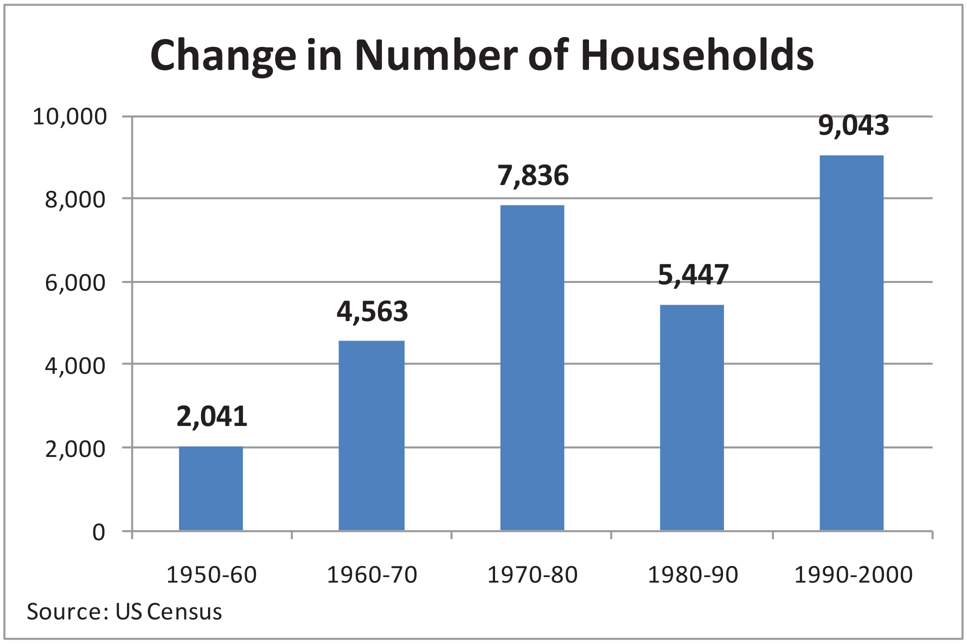
Population may be accounted into households which live in housing units. The US Census Bureau provides the following definitions of household and housing unit (or separate living quarters):

> A household includes all the persons who occupy a housing unit. A housing unit is a house, an apartment, a mobile home, a group of rooms, or a single room that is occupied (or if vacant, is intended for occupancy) as separate living quarters. Separate living quarters are those in which the occupants live and eat separately from any other persons in the building and which have direct access from the outside of the building or through a common hall. The occupants may be a single family, one person living alone, two or more families living together, or any other group of related or unrelated persons who share living arrangements. (People not living in households are classified as living in group quarters.) (http://quickfacts.census.gov/qfd/meta/long_HSD310200.htm)

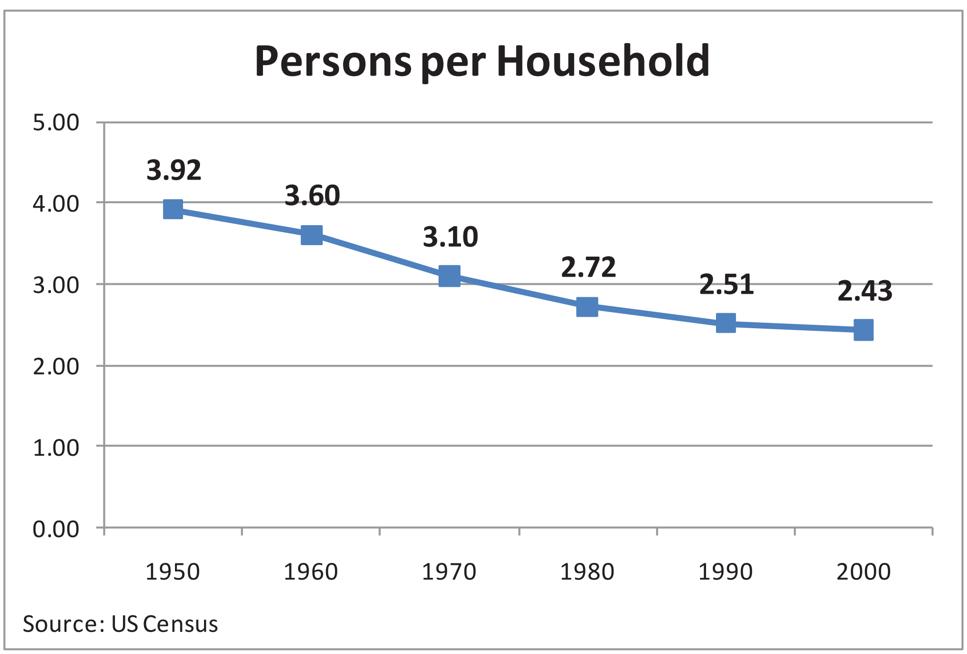
Households – Trends and Projections. The US Decennial Census provides a count of households each decade, and from this we can see trends over time. The graph below presents the trend in household count for Blount County from 1950 to 2000.



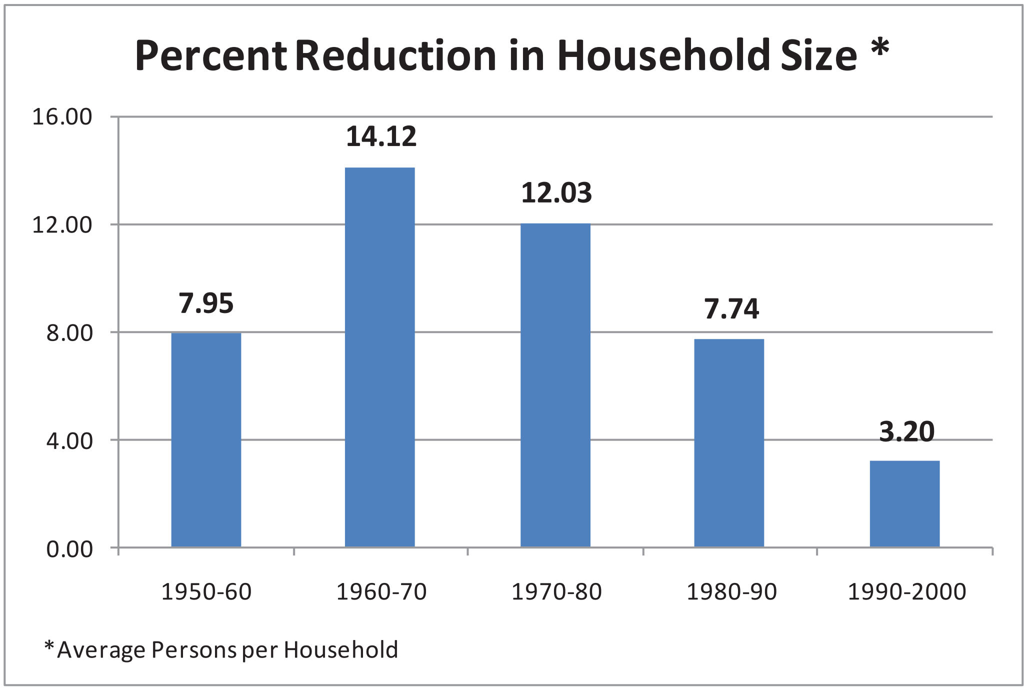
The trend was similar to the trend in population, and was reflected also in change in number of households decade to decade as shown on the graph below. However, there were differences, and these differences were related to change in household size.



The graph below presents the trend in household size, or average number of persons living in households divided by number of households (excluding persons living in group quarters). The trend was for smaller and smaller household size from census year to census year, resulting in a 38 percent reduction in average household size from 1950 to 2000.



The graph below shows that the rate of reduction in average household size was greatest from 1960 to 1980, and began to level out with smaller reduction from 1990 to 2000.



There were at least two underlying trends that could account for the change in average household size over the decades. First, the “baby boom” tended to increase household size in the 1950’s and 1960’s. After that, household size tended to decrease as the “baby boom” aged into household formation ages, and decreased birth rate resulted in smaller household size.

Second, the structure of the family and household changed over the decades as a reflection of changes found in society as a whole. Extended families became less common, divorce rates increased resulting in splits of households, marriages were delayed to older ages, never married single parent households increased, younger households with single individuals increased as a lifestyle choice, and elderly single person households increased with deaths of partners in an ever increasing elderly population.

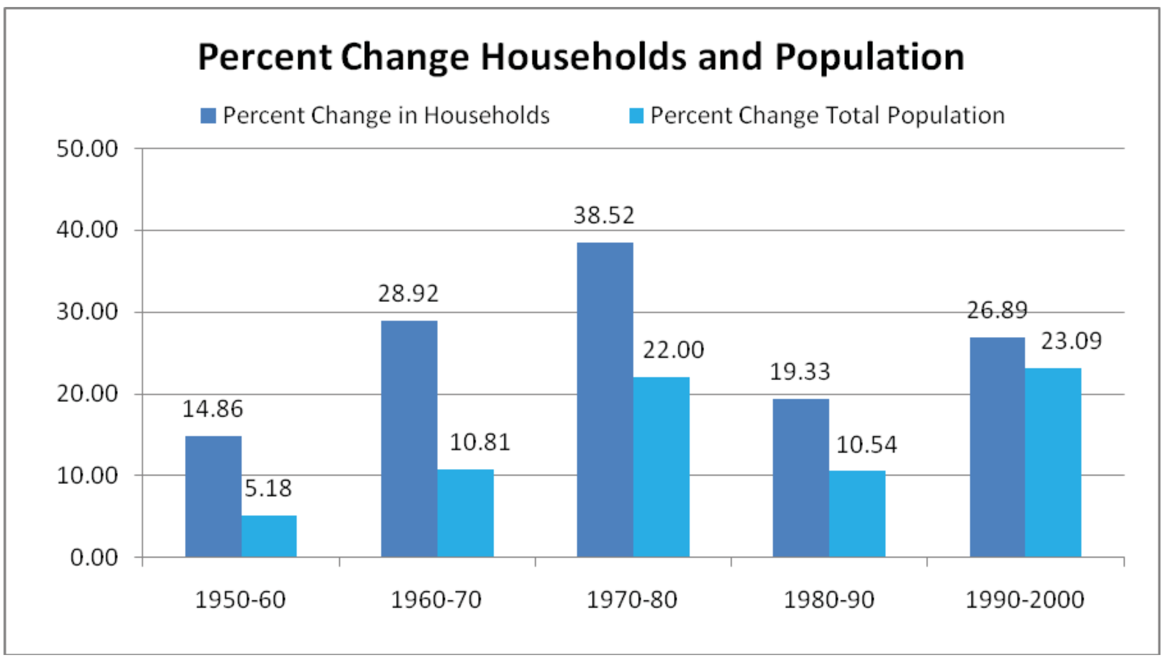
The effects of many of these trends were evident in household characteristics reported in the 2000 Census. Married couple family households predominated with 58 percent of total households. Non-family households accounted for 28 percent of total households. Single head of family households with no spouse accounted for 13 percent of total households, with female head (no husband) outnumbering male head (no wife) by three to one.

The percent of households with only one person accounted for 21 percent of all households, with solitary elderly person householder age 65 years old and older accounting for 9 percent of all households. The proportion of female to male age 65 years old and older who lived alone

was 2.8 to 1, reflecting the findings earlier in this report on the survival differential between elderly females and males, with females having substantially greater survival rates than males in senior cohorts.

The small decrease in household size from 1990 to 2000 may indicate that some of the shifts in underlying trends were beginning to level out. As with any shift in overall social trends, the trends themselves can change. An increase in household size in the future should not be discounted, and this could have dramatic effect on household formation and consequent demand for housing units.

The reduction in household size had an effect on the pace of household creation over the years. The graph below compares percent change in number of households and percent change in total population. Note that the rate of change in number of households far outpaced the rate of change in population for all decades except 1990-2000.



If we assume that the change in average household size has leveled out at about 2.4 persons per household and will continue at that level to our projection horizon year of 2030, we can convert our projected population to projected households. To do this, we first will need to adjust projected total population by subtracting projected group quarters population. Assuming that the 2000 Census count of about 2,100 persons in group quarters will hold steady to 2030, we can calculate the projected number of households from 2010 to 2030 shown in the table on the following page.

Number of Households Projected (2.4 persons/HH)

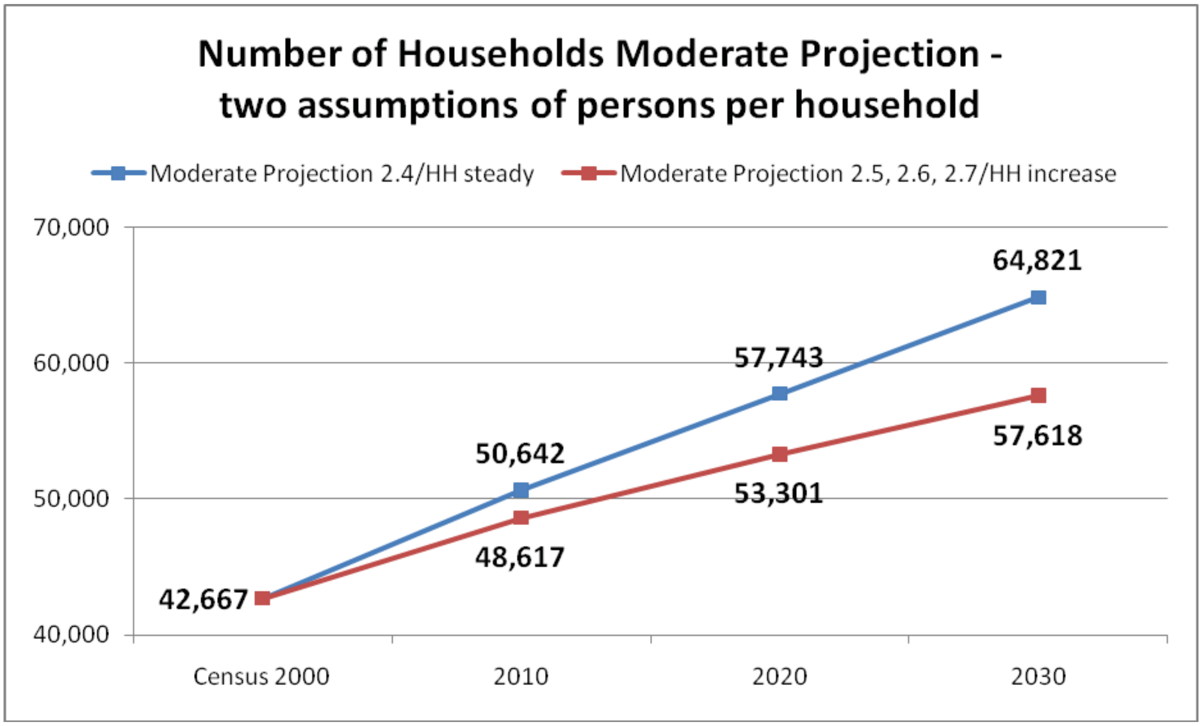
	Census 2000	2010	2020	2030
Very High Projection	42,667	50,851	59,325	68,908
High Projection	42,667	50,851	58,589	66,752
Moderate Projection	42,667	50,642	57,743	64,821
Low Projection	42,667	50,431	55,189	60,708
Very Low Projection	42,667	50,431	53,106	57,455

The projection of number of households can be sensitive to the assumption about average household size, or number of persons per household. If the household size trend were to reverse and show increase over the projection period, the number of households projected could be considerably less. This is illustrated in the table below with assumption of 2.5, 2.6 and 2.7 persons per household for 2010, 2020 and 2030 respectively, as a possible trend of increase in average household size. Note that these numbers are within the realm of recent historical levels, and the difference could be even more dramatic if average household size were to increase to other, higher historical levels.

Number of Households Projected (increase in persons/HH)

	Census 2000	2010 (2.5)	2020 (2.6)	2030 (2.7)
Very High Projection	42,667	48,817	54,761	61,252
High Projection	42,667	48,817	54,082	59,336
Moderate Projection	42,667	48,617	53,301	57,618
Low Projection	42,667	48,414	50,944	53,963
Very Low Projection	42,667	48,414	49,021	51,071

The graph on the next page continues the illustration of how assumptions about household size can affect projection of number of households, or future household formation. The moderate projection assumption is used to compare projected number of households for the two scenarios of steady average 2.4 persons per household (in blue), and increasing average of 2.5, 2.6 and 2.7 persons per household (in red) over the projection period. By 2030, the projected number of households could be less by about 7,200 households if average persons per household were to increase by only 0.1 persons per decade.

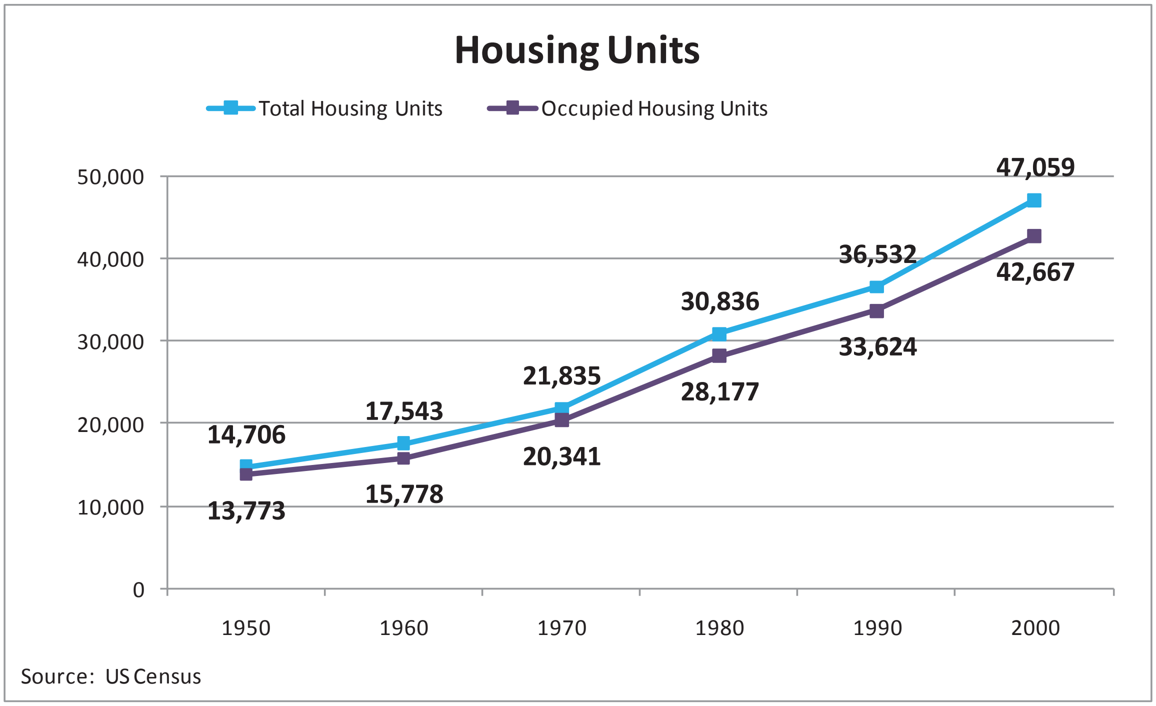


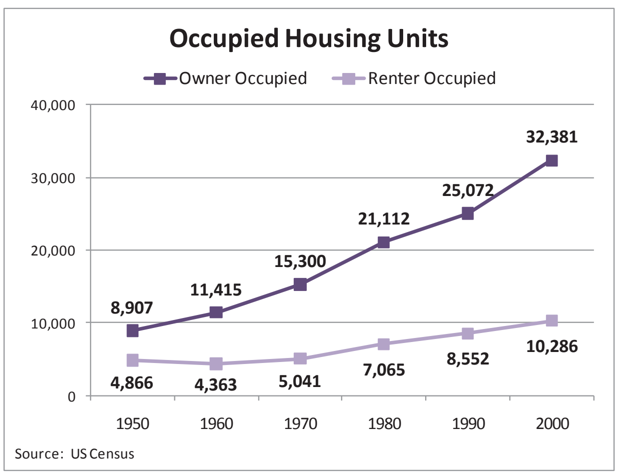
Housing – Historical Trends. Households provide demand for housing units. Housing is the physical structure that shelters a household. A housing unit can be a single family house (including detached site built houses and manufactured homes), a unit in a duplex or multi-unit attached housing, or an apartment. The housing unit may be owned by the household, or rented, and also may be vacant or not occupied for a period of time. The housing unit, for the most part, is fixed geographically during the time of occupancy or vacancy. See below for Census counts.

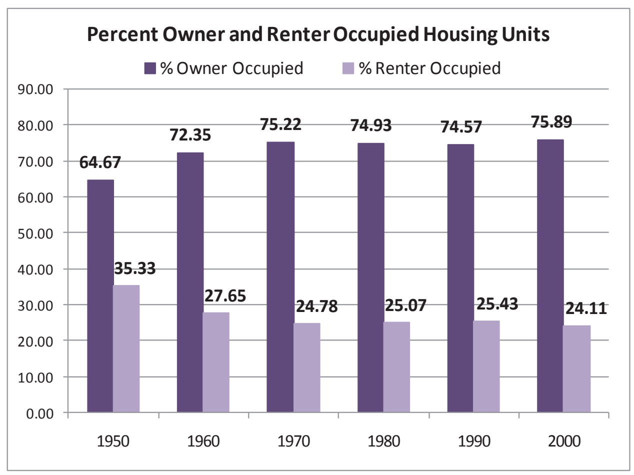
Housing Units

Census Year	1950	1960	1970	1980	1990	2000
Total Housing Units	14,706	17,543	21,835	30,836	36,532	47,059
Non-occupied Housing Units	933	1,765	1,494	2,659	2,908	4,392
Occupied Housing Units	13,773	15,778	20,341	28,177	33,624	42,667
Owner Occupied	8,907	11,415	15,300	21,112	25,072	32,381
Renter Occupied	4,866	4,363	5,041	7,065	8,552	10,286

The graph on the next page shows that total housing units and occupied housing units grew in similar fashion to population. The trend in occupied housing units is the same as households presented previously, and shows rate of increase greater than for total population.



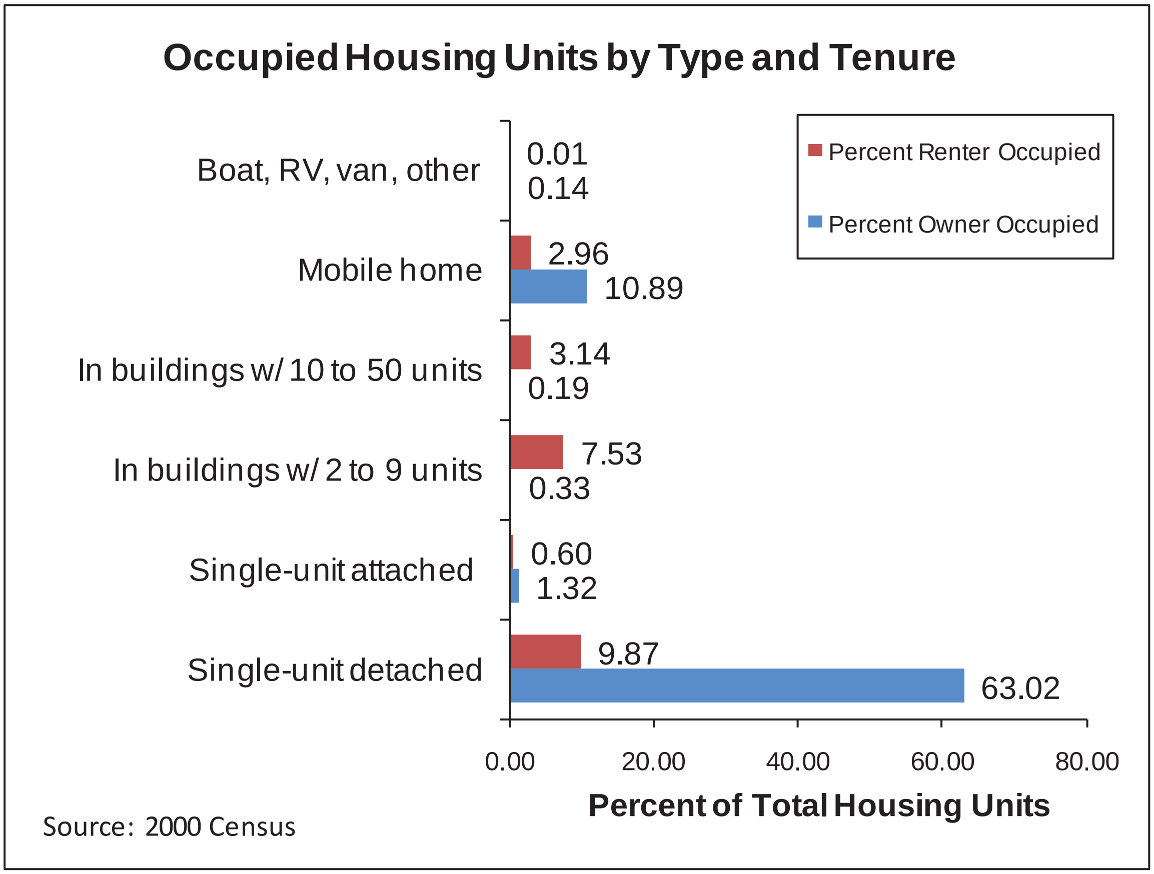




The two graphs immediately above show that owner occupied housing units increased in proportion from 1950 to 1970, and then leveled out at roughly 75 percent of total occupied housing units from 1970 to 2000. Conversely, renter occupied housing units decreased in proportion from 1950 to 1970, and then leveled out at about 25 percent of total occupied housing units from 1970 to 2000.

The graph on the next page shows the percent of housing units by type and tenure. Single unit houses (commonly called single family houses) accounted for 73 percent of all housing units, with 63 percent of all housing units being owner occupied single family houses. Of the single family rental units, other information from the 2000 Census indicated that a majority were

older units built prior to 1960. Mobile homes accounted for 14 percent of all housing units, with 11 percent of all housing units being owner occupied mobile homes. Mobile homes showed increased popularity in the 1990's, with 55 percent being placed from 1990 to 2000. Apartments (housing units in multi-unit buildings) accounted for 10.7 percent of all housing units, with almost all such units being rental. The majority of rental apartments were constructed between 1960 and 2000, with peak construction between 1970 and 1990.

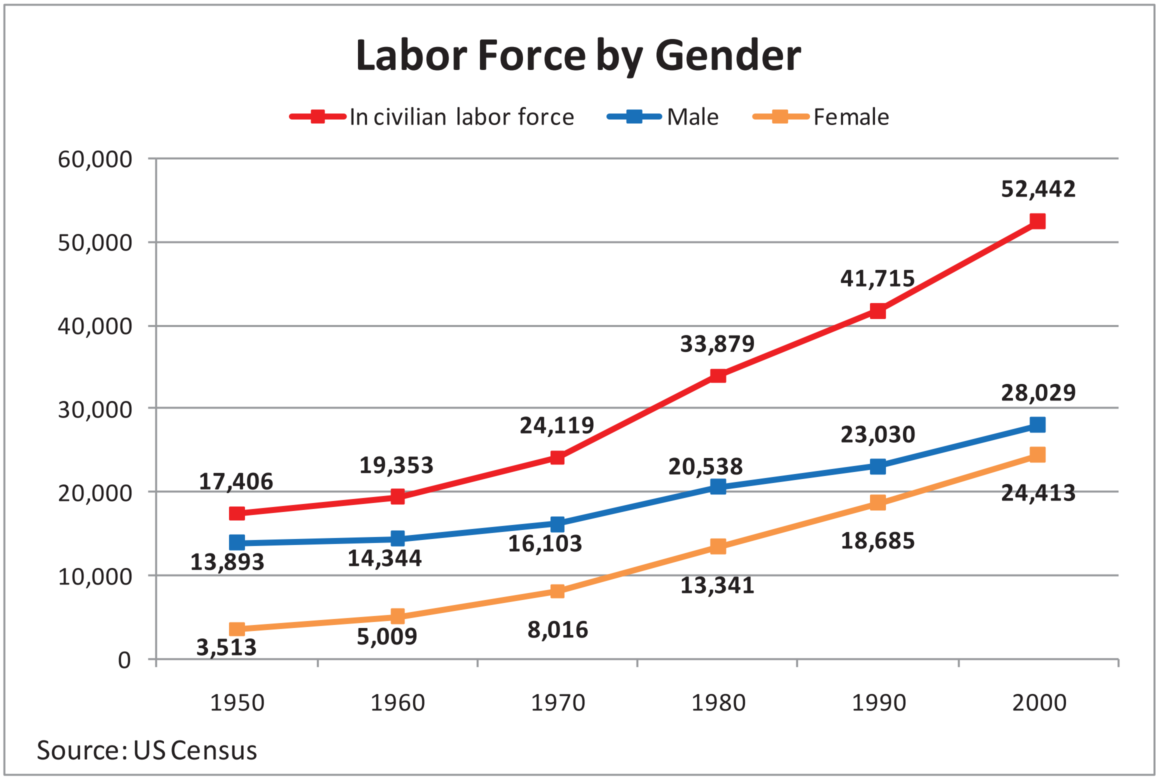


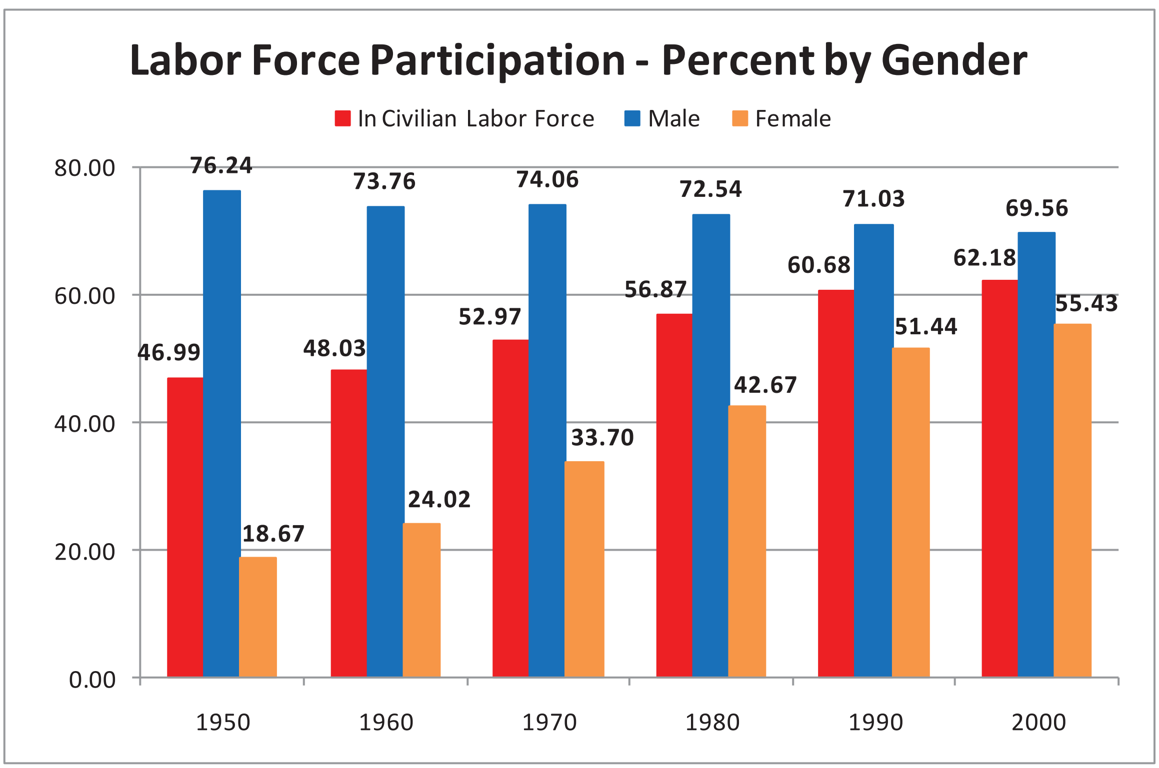
Labor Force, Employment, Businesses and Income.

Individuals are employed, are paid for their employment or otherwise gain monetarily, and provide income for households. Individuals participate in employment at different rates, and find employment in different sectors or industries in the economy. Businesses in the different sectors provide employment, wages or salaries to employees, and income or profit for owners. Income turned into consumption can drive the demand for businesses within a community.

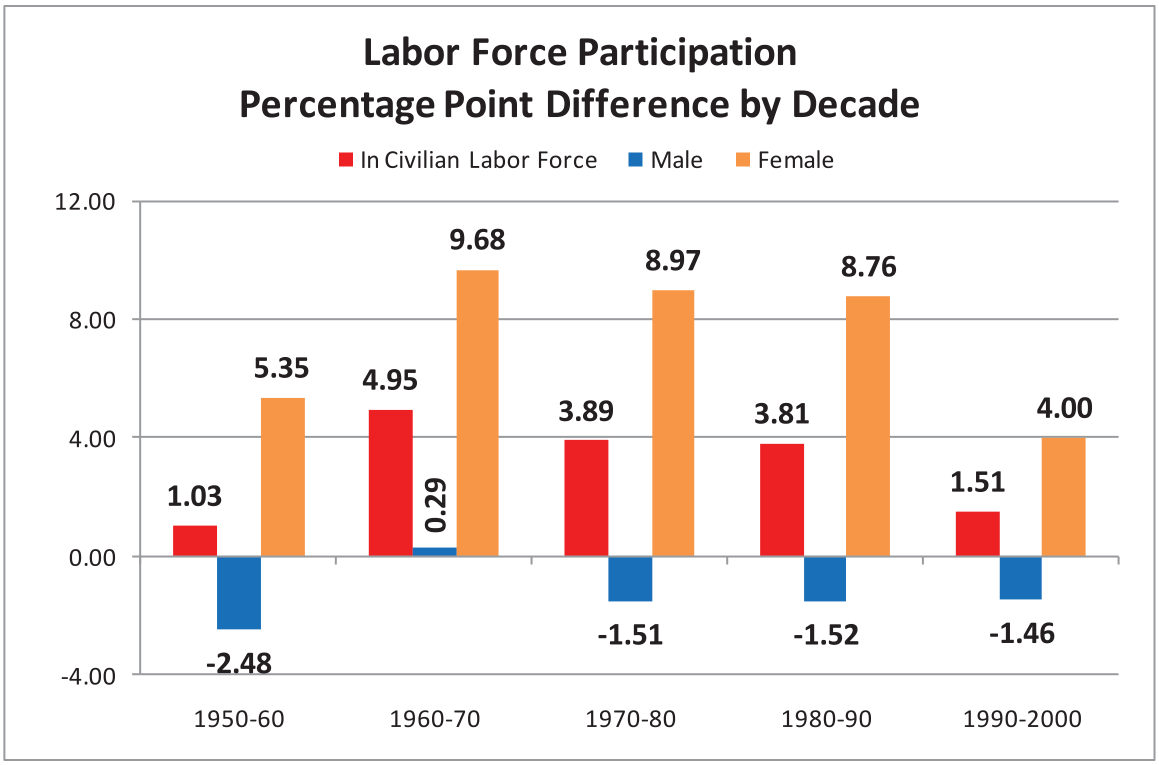
Labor Force and Participation Rate. The labor force, specifically the civilian labor force, is composed of those individuals who are employed or are unemployed and seeking employment, excluding those in the armed services. Labor force participation is the relation between labor force and the number of individuals that are considered to be of employable age. The age

range considered employable changed over the years for Census purposes, with 14 years old and older used in 1950 and 1960, and 16 years old and older used from 1970 to date. The graphs below show trends in labor force and labor force participation by gender.





Note from the graphs on the preceding page that the total civilian labor force increased slowly from 1950 to 1970, and then increased at a greater rate from 1970 to 2000. The trend by gender showed that male labor force increased at a rate less than female labor force. This was reflected in labor force participation rates (bottom graph on preceding page). Total civilian labor force participation rate increased each decade. The difference between genders was striking, and showed that most of the increase in total civilian labor force participation rate was due to increase in female participation rate, while male participation rate decreased for most of the decades. This can be seen in summary form comparing the percentage point increase or decrease in participation rate for each decade shown in graph below, and this can be related to other population trends noted in previous sections.



From 1950 to 1960, there was little change in civilian labor force participation rate, decrease in male participation rate, and a substantial increase in female participation rate. This was during the decade that showed large outmigration from the county common to most labor force ages, due probably to limited employment prospects at the time.

From 1960 to 1970, total civilian labor force participation rate increased substantially, with both male and female participation rates increasing, and with female participation rate showing dramatic increase and leading the trend. Note that some of this change may have been due to the change in beginning age for labor force from 14 to 16 years old between 1960 and 1970. This was during the decade that saw the beginning of a migration turnaround, with in-migration evident in the middle and mature labor force ages. The economy thus expanded enough to

accommodate greater female participation and the beginnings of a turnaround to in-migration in employable ages.

For the two decades 1970-80 and 1980-90, the increase in total civilian labor force participation rate was less than in the 1960's, with male participation rate decreasing, and female participation rate still increasing substantially but at a slightly lower rate both decades. This was during the first peak of in-migration for the county in the 1970's, followed by continued in-migration at a lower level in the 1980's. In addition, the "baby boom" aged fully into labor force ages during the two decades from 1970 to 1990. The economy thus expanded employment sufficient to accommodate increases in labor force participation for females, increases in labor force from in-migration for both genders, and increases in labor force from entry of a large "baby boom" cohort.

From 1990 to 2000, the rate of increase in total civilian labor force participation lessened, along with lessening of the rate of increase for female participation. Male participation continued decrease. This was in the decade that saw the largest increase in population for the county, and the decade that saw the largest net in-migration, concentrated in labor force ages. Thus, the economy expanded employment sufficient to accommodate a more moderate increase in labor force participation and a substantial increase in labor force from in-migration.

Employment. Of those who participated in the labor force, some were temporarily unemployed but seeking employment (usually a small proportion much less than 10 percent), and the remaining participants were employed in various industries. The term industry included all forms of employment generation in the economy. Industries were divided into primary, secondary and tertiary sectors.

The primary or first level sector included those employment generators that were associated with extraction or direct production of raw materials. This included agriculture, forestry, fishing, and mining, and the incidental processing and packaging of raw materials.

The secondary sector included those employment generators that were associated mainly with processing raw materials into finished products, or further processing products from others in the sector to final consumable product. This included manufacturing and construction.

The tertiary or third level sector included those employment generators that transported products, sold products produced by the primary and secondary sectors, or provided services. This included retail businesses and service businesses.

Employment of the population residing in the county was not necessarily the same as employment generated by businesses within the county. The following analysis looks first at employment of the resident population in historical context, then looks at employment accounted within and outside the county through commuting patterns, and then looks at a

snapshot of employment generation by businesses. The following tables present employment and percent of total employment for the resident population in Blount County by Census year.

Employed Population by Industry

	1950	1960	1970	1980	1990	2000
Agriculture, Forestry, Fisheries, Mining	2,335	1,298	583	792	1,053	513
Construction	903	1,303	1,766	1,976	2,974	4,062
Manufacturing	6,980	6,641	8,291	8,293	7,683	9,225
Transportation, Communication, Utilities	595	650	1,290	2,456	3,011	2,705
Wholesale Trade	176	359	774	1,292	1,686	2,063
Retail Trade	2,334	2,868	3,428	5,154	7,561	6,095
Services	2,628	4,041	6,174	10,024	13,622	23,450
Public Administration	354	527	814	1,371	1,250	1,952
Other not specified	291	437	0	0	0	0
TOTAL EMPLOYED POPULATION	16,596	18,124	23,120	31,358	38,840	50,065

Source: US Census

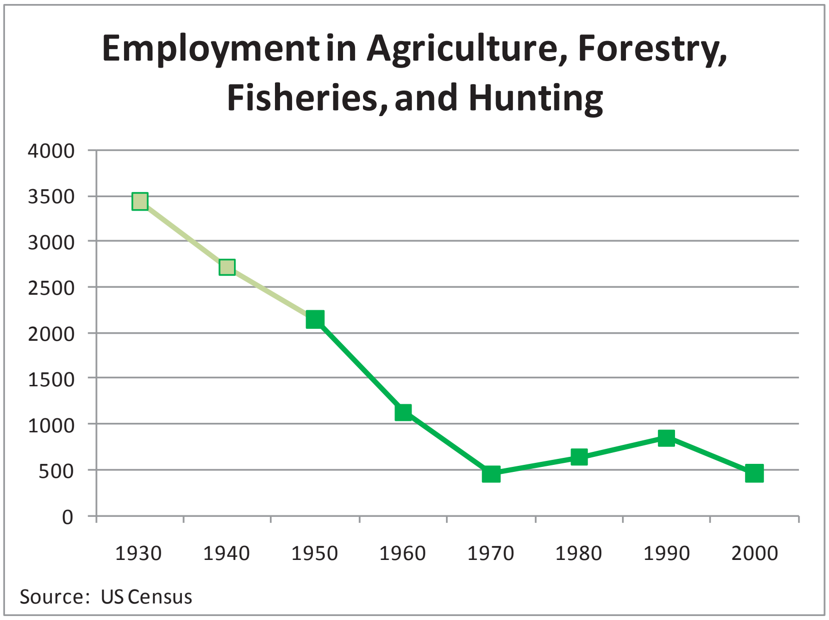
Percent of Total Employed Population

	1950	1960	1970	1980	1990	2000
Agriculture, Forestry, Fisheries, Mining	14.07	7.16	2.52	2.53	2.71	1.02
Construction	5.44	7.19	7.64	6.30	7.66	8.11
Manufacturing	42.06	36.64	35.86	26.45	19.78	18.43
Transportation, Communication, Utilities	3.59	3.59	5.58	7.83	7.75	5.40
Wholesale Trade	1.06	1.98	3.35	4.12	4.34	4.12
Retail Trade	14.06	15.82	14.83	16.44	19.47	12.17
Services	15.84	22.30	26.70	31.97	35.07	46.84
Public Administration	2.13	2.91	3.52	4.37	3.22	3.90
Other not specified	1.75	2.41	0.00	0.00	0.00	0.00
TOTAL EMPLOYED POPULATION	100.00	100.00	100.00	100.00	100.00	100.00

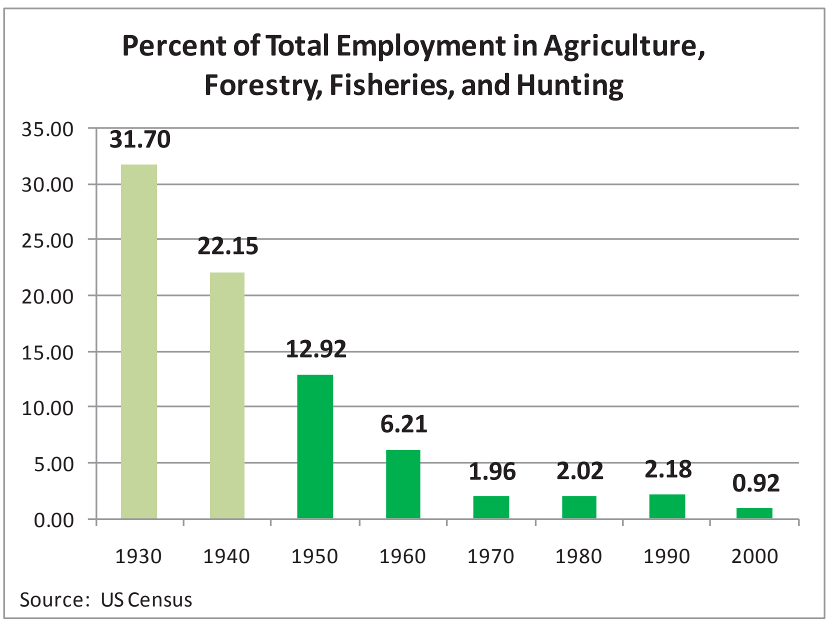
The tables on the previous page were used to produce the following analysis by sector and industry.

Primary Sector Employment of the Population. The primary sector of the economy was composed of agriculture, forestry, fisheries and mining. For Blount County, this sector was composed mainly of employment in agriculture. The following graphs show that agriculture, reported here combined with minor employment in forestry, fisheries and hunting, showed a long term trend of decrease in numbers and as a proportion of the overall employment of the population.

The analysis has been extended to 1930 to show that the decrease was part of a long term trend that began to level out after 1970. From a dominant position in the 1930 economy, agriculture became less of a factor for employment, decreasing to very minor employment generation in the overall economy of 2000.

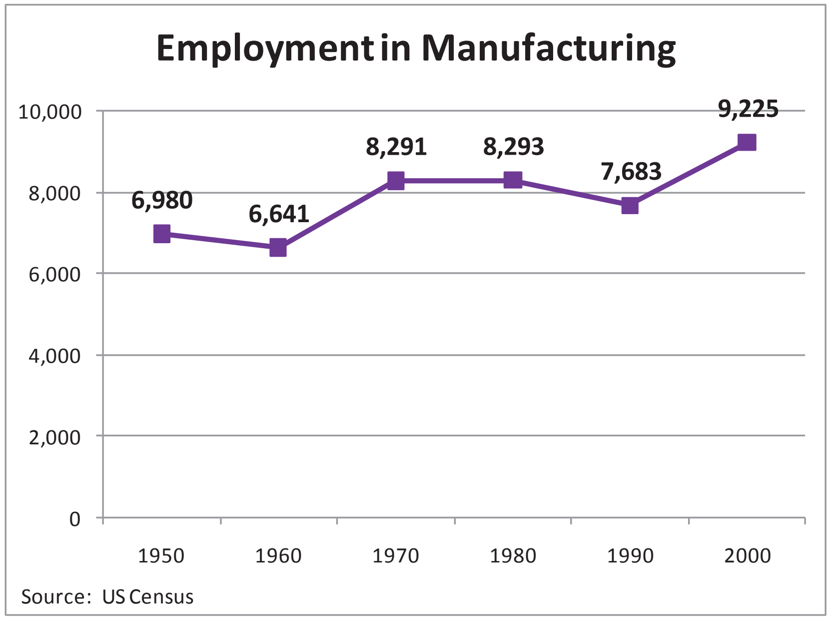


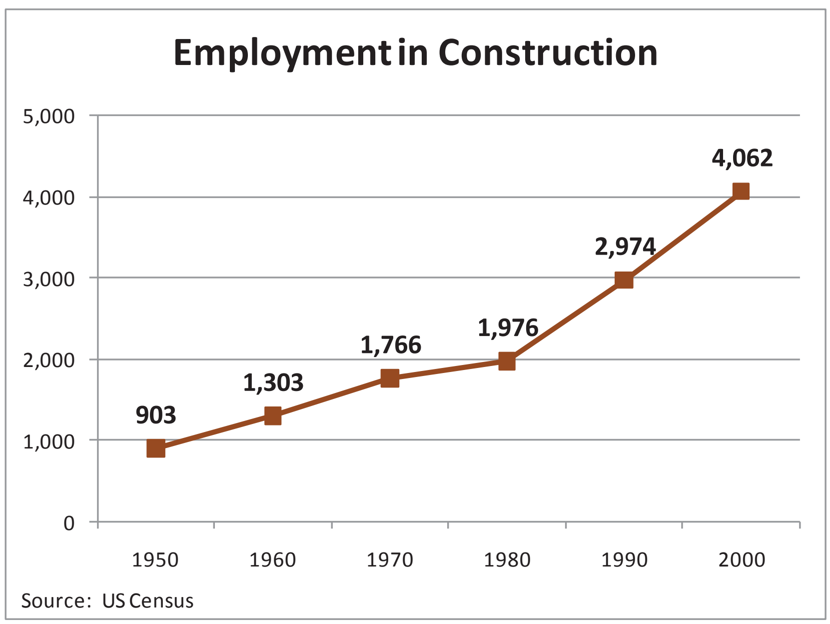
The long term trend was associated with progressively greater mechanization of agriculture that made much labor obsolete or of marginal utility. Of particular note was the decrease in employment for agriculture between 1950 to 1960, the decade that showed substantial net outmigration, and between 1960 and 1970, the decade that showed close to zero net migration overall but with continued net outmigration for younger cohorts in the beginning of the labor force age group. The outmigration may have been associated, at least in part, with decrease of



employment opportunities in agriculture during the two decades. As will be seen below, decreases in manufacturing during the 1950's added to the limitations in the job market that may have accounted for the large outmigration in the decade.

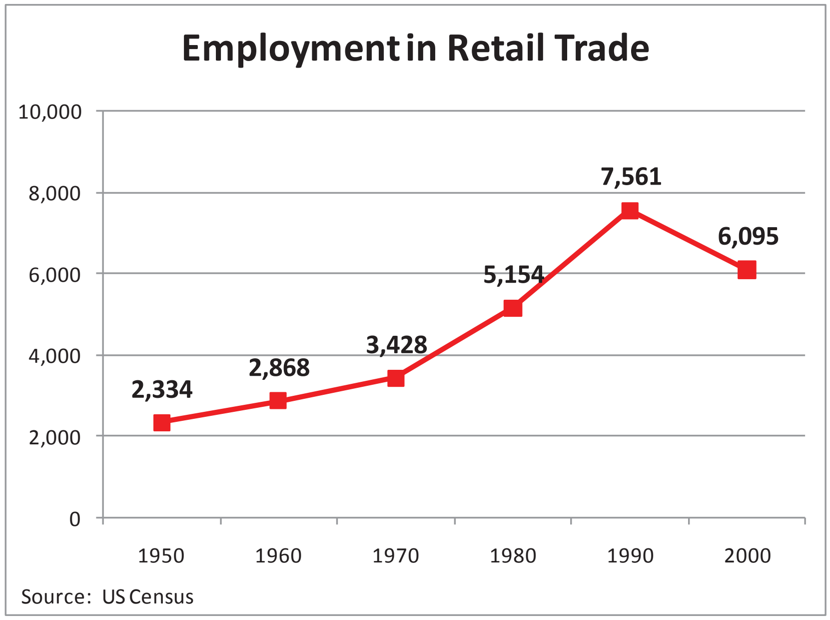
Secondary Sector Employment of the Population. The secondary sector of the economy was composed of manufacturing and construction. The graphs below show historical employment in these two components. In 1950, manufacturing was dominant with 42 percent of total employed population. From 1950 to 1960, employment in manufacturing fell during the decade that also saw decrease in agriculture employment and substantial out-migration from the county. Thus, decrease in manufacturing employment, added to decrease in agricultural employment, may have been related to a weak job market and the out-migration during the decade. From 1960 to 2000, the trend of employment in manufacuring was uneven, but generally trended upward. However, by 2000, manufacturing accounted for only 18 percent of total employed population.

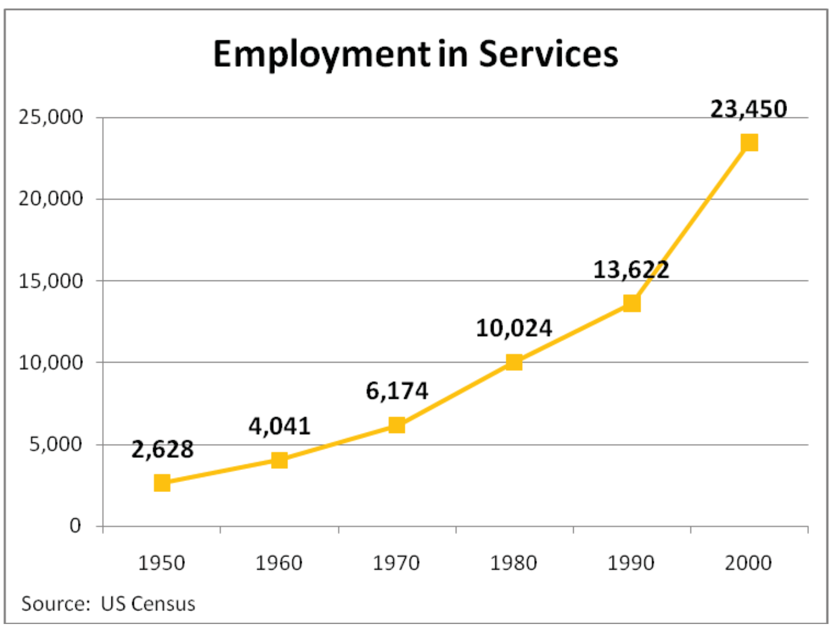




Employment in construction saw a continuous increase from 1950 to 2000, with substantial gains from 1980 to 2000. The proportionate share of total employed population rose from five percent in 1950 to eight percent in 2000.

Tertiary Sector Employment of the Population. The tertiary sector of the economy included transportation, communication, utilities, wholesale trade, and public administration, each accounting for less than six percent of total employed population in 2000. The sector also included the larger industries of retail trade and services. The graphs below show the historical employment in these last two industries.



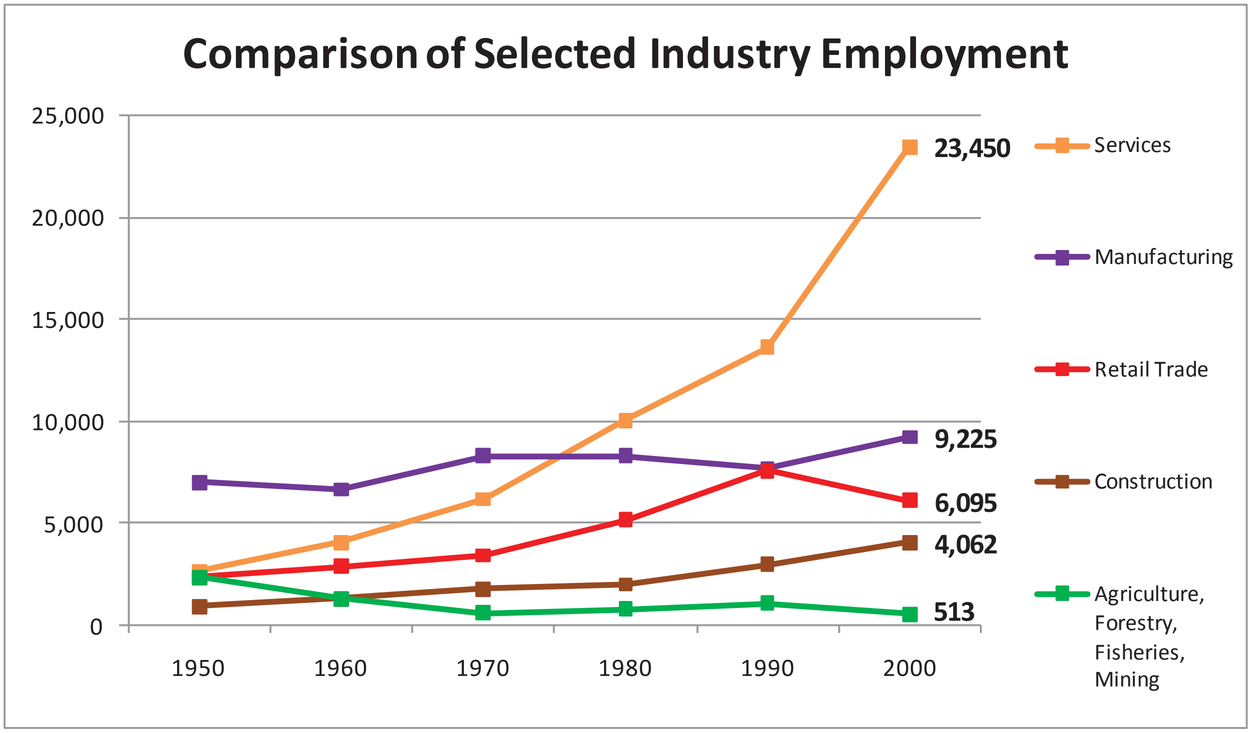


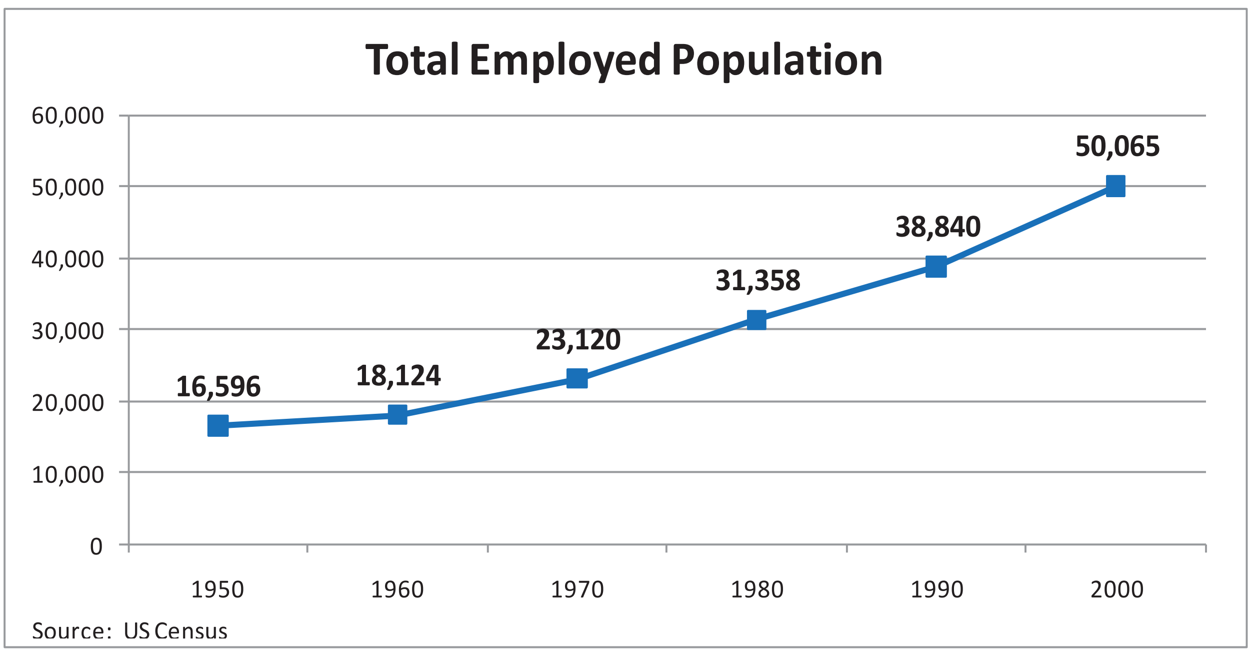
Retail trade employment showed increase from 1950 to 1990, and then decrease to 2000. As a proportion of total employed population, retail trade rose from 14 percent in 1950, to 19 percent in 1990, and fell to 12 percent in 2000.

Service employment showed dramatic and consistent growth from 1950 to 2000, with a sharp increase from 1990 to 2000. As a proportion of total employed population, service employment rose from 16 percent in 1950, to dominance in the economy at 47 percent in 2000.

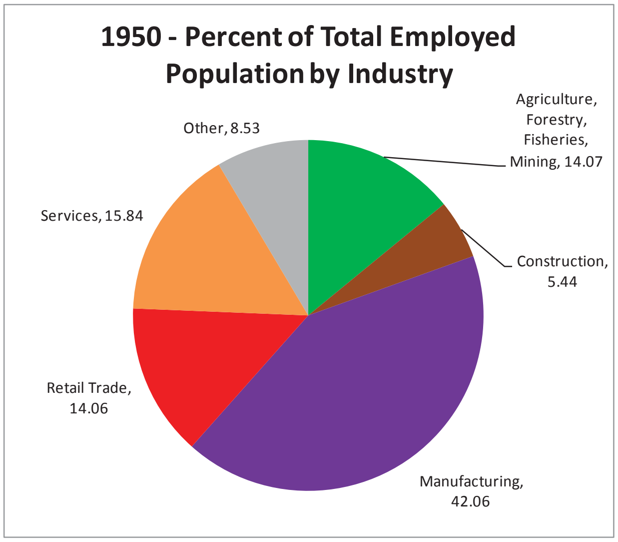
Comparison of Employment Sectors. The shifts between sector employment in the county reflected trends in the larger state and national economy. The primary sector, particularly agriculture, showed strength at the turn of the last century, but declined in importance as an employment generator into mid-century, and declined further to account for a very small percent of employment of the population by 2000. The secondary sector, particularly manufacturing, showed dominance at mid-century, but decreased in proportionate share by 2000. Over the last half of the last century, the tertiary sector rose dramaticaly to dominance.

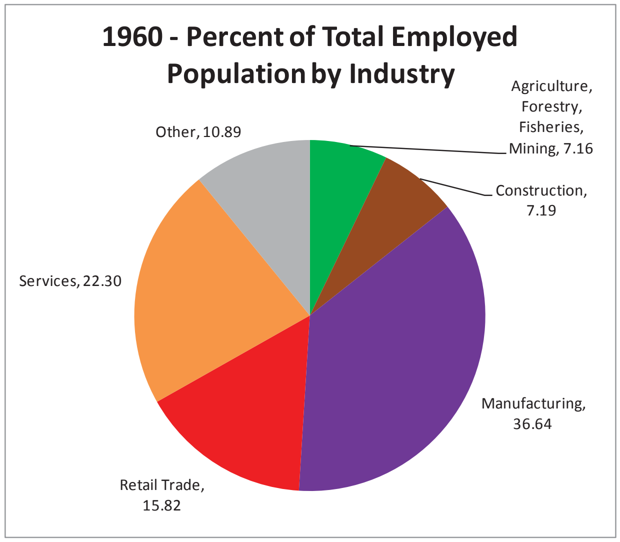
This is illustrated by comparison of the trends in main sector and industry employment from 1950 to 2000 in graph below. The trend in total employed population is shown in the graph at the bottom of the page for comparison.

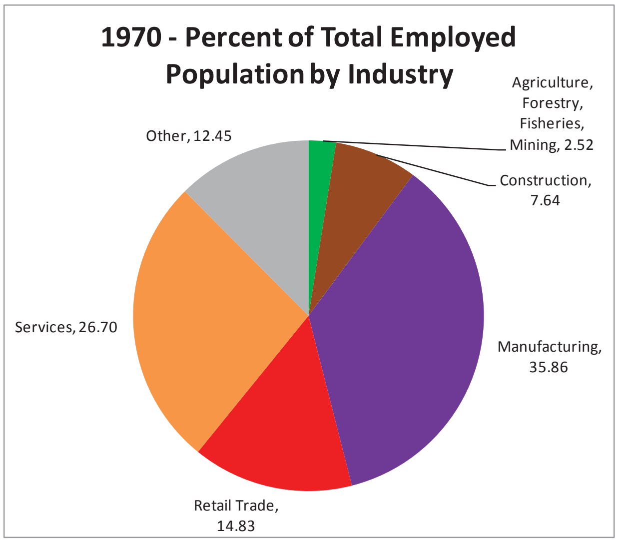


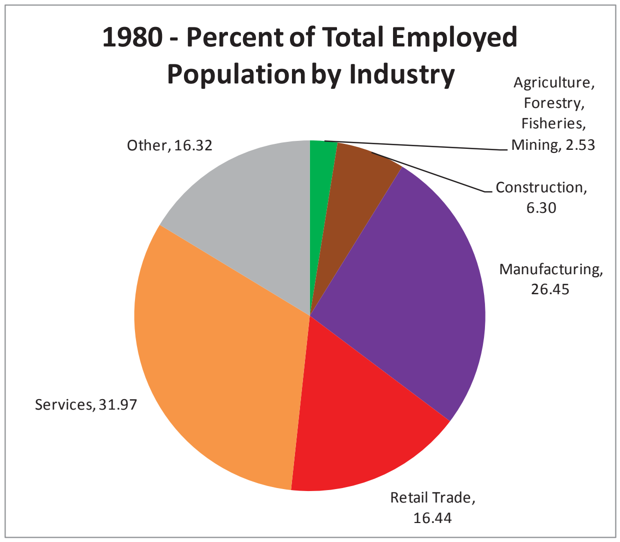


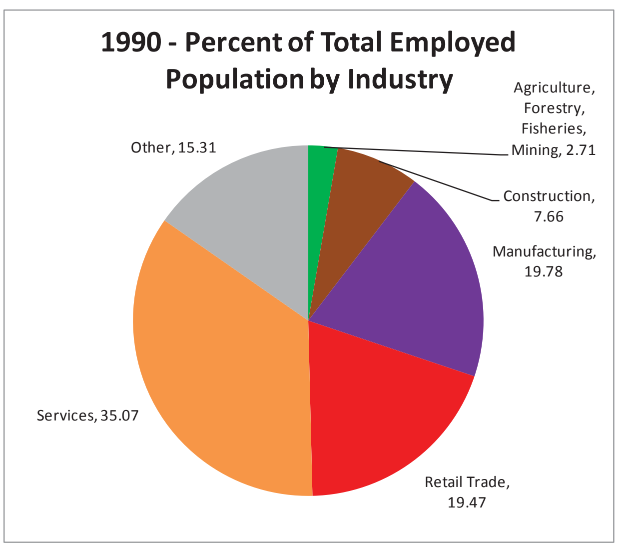
The graphs above can be translated into proportion of employment in the various industries over time, as shown on the following page.

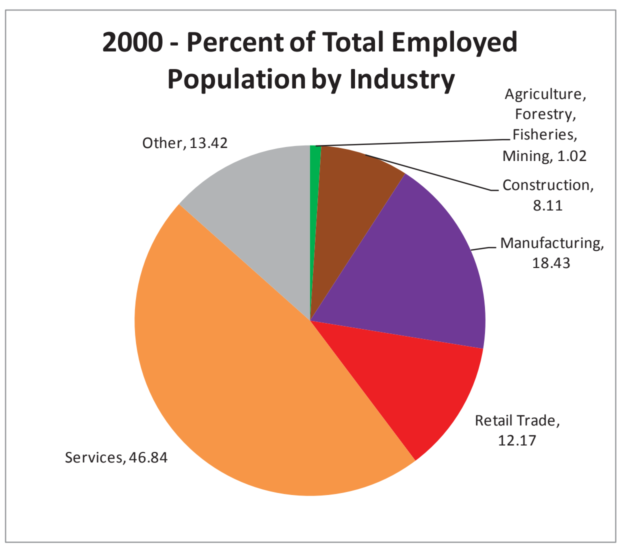

1950 - Percent of Total Employed Population by Industry
Agriculture, Forestry, Fisheries, Mining, 14.07
Construction, 5.44
Manufacturing, 42.06
Retail Trade, 14.06
Services, 15.84
Other, 8.53


1960 - Percent of Total Employed Population by Industry
Agriculture, Forestry, Fisheries, Mining, 7.16
Construction, 7.19
Manufacturing, 36.64
Retail Trade, 15.82
Services, 22.30
Other, 10.89


1970 - Percent of Total Employed Population by Industry
Agriculture, Forestry, Fisheries, Mining, 2.52
Construction, 7.64
Manufacturing, 35.86
Retail Trade, 14.83
Services, 26.70
Other, 12.45

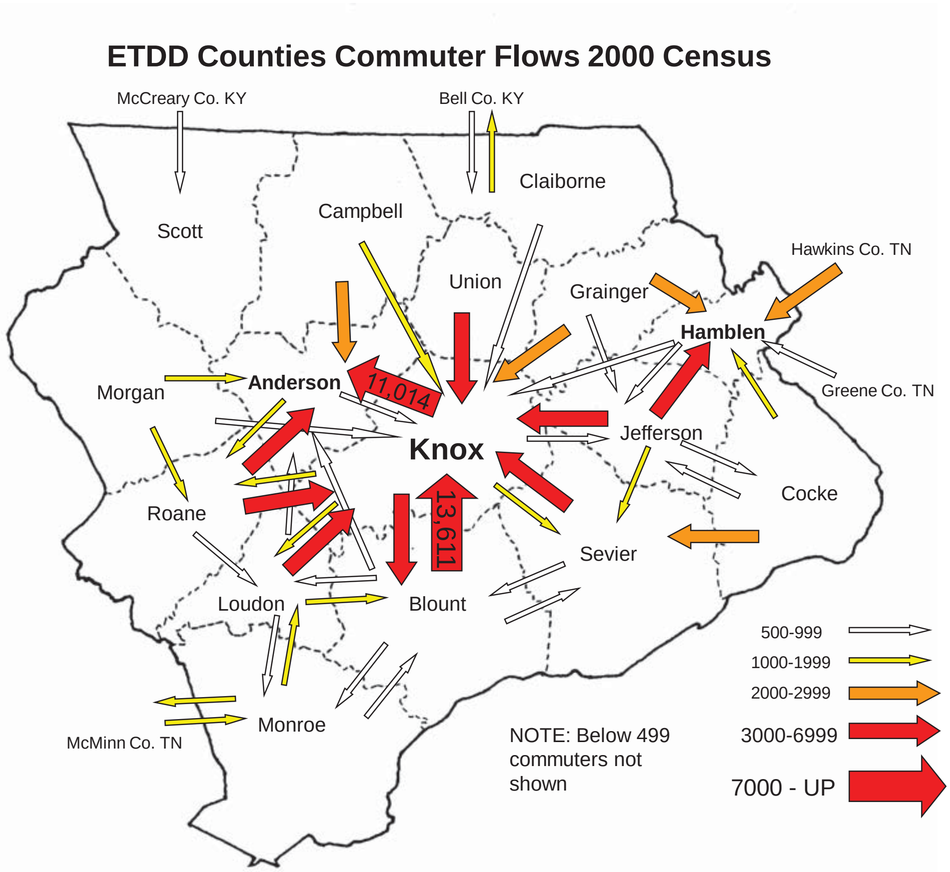

1980 - Percent of Total Employed Population by Industry
Agriculture, Forestry, Fisheries, Mining, 2.53
Construction, 6.30
Manufacturing, 26.45
Retail Trade, 16.44
Services, 31.97
Other, 16.32


1990 - Percent of Total Employed Population by Industry
Agriculture, Forestry, Fisheries, Mining, 2.71
Construction, 7.66
Manufacturing, 19.78
Retail Trade, 19.47
Services, 35.07
Other, 15.31


2000 - Percent of Total Employed Population by Industry
Agriculture, Forestry, Fisheries, Mining, 1.02
Construction, 8.11
Manufacturing, 18.43
Retail Trade, 12.17
Services, 46.84
Other, 13.42

The pie charts on the preceding page show that primary sector employment (Agriculture, etc.) was on par with the tertiary industries of Retail Trade and Services in 1950. The secondary sector industries of Construction and Manufacturing accounted for almost half of employment in 1950, with Manufacturing being the dominant industry. Agriculture quickly decreased as a proportion of employment over the next two decades. Manufacturing started to decrease from 1950 on as a proportion of employment, with the tertiary sector growing to account for about half of employment of the population in 1960, and a majority from 1970 on, and with Services overtaking manufacturing as the dominant industry by 1980. Services continued increase as the dominant proportion of employment into 2000, showing dramatic jump from 1990 to 2000.

Commuting – Employment in a Regional Context. Not all workers who live in Blount County are employed in Blount County. Blount County is part of a larger regional economy. Excluding those who worked out of their home or home site (815 workers) and thus did not commute, 49,250 workers commuted from home to work in 2000. Of these, 31,298 workers, or 64 percent, commuted to their jobs within Blount County. Those workers who lived in Blount County but commuted out of the county to their jobs numbered 17,952 or 36 percent of total commuting workers living in the county. The following map summarizes the regional worker commuter flows for the 16 county East Tennessee Development District (ETDD) region.



Those commuting from Blount County to Knox County accounted for 13,616 workers or 28 percent of workers living in Blount County. Thus, Knox County provided employment for more than one in four workers who lived in Blount County in 2000. Note from the map on the preceding page that a substantial number of workers also commuted from Knox County to Blount County, numbering 5,328 workers living in Knox County who were employed by Blount County businesses in 2000.

Accounting for all flows of commuters shows that 9,676 workers lived outside Blount County and commuted to work in Blount County. If we add this number to the 31,298 who lived in and commuted to work within Blount County and the 815 who worked in Blount County but did not commute, we find that businesses or organizations located within Blount County provided or generated 41,789 jobs in 2000.

The commuting flows over time showed development of a long term regional economic relationship between Blount and Knox Counties, illustrated in the table below.

Worker Commuting Flows Between Blount and Knox Counties

Year	from Blount to Knox	from Knox to Blount
1960	**2,560**	**478**
1970	**4,858**	**1,155**
1980	**8,034**	**1,496**
1990	**10,938**	**2,796**
2000	**13,611**	**5,328**

(Source: US Census)

Note in particular that the flows of commuters to and from both counties increased substantially over the decades. Knox County was a large regional generator of employment, with Blount County linked strongly by economic ties and commuting patterns to the larger regional neighbor. The growth of population within Blount County, particularly the growth related to in-migration, was at least in part the result of regional economic relationships, and not just factors contained within the boundaries of the county.

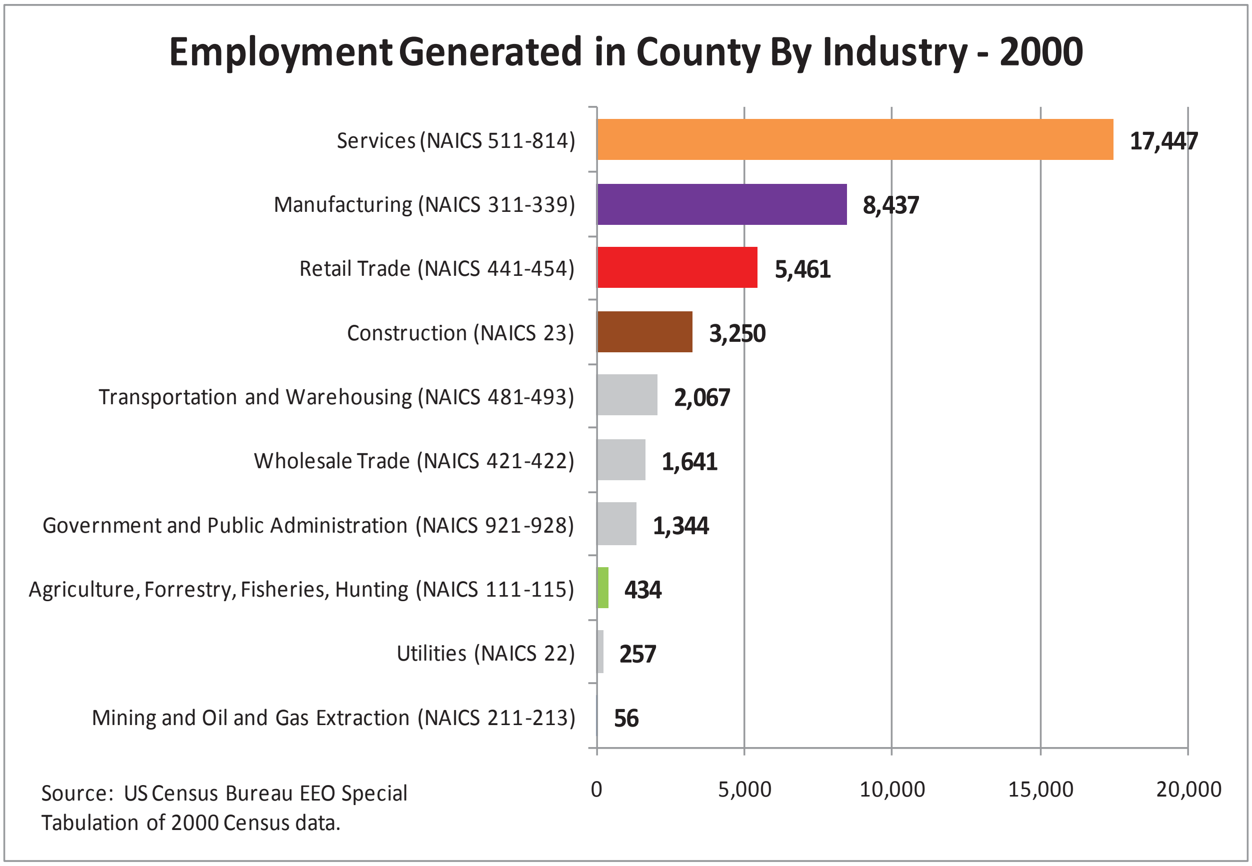
Employment Generated by Businesses in the County. As shown above, the employment generated within Blount County did not account for all the employment of the population living in the county, and did not provide employment exclusively to county residents. However, businesses located in the county provided part of the framework for growth and development. It is instructive then to study the employment generated by businesses in the county, and also to study income generation potential of businesses. Since the analysis in the previous sub-section on employment of the population gave a historical view, this sub-section will focus only on information produced with the 2000 Census and later to give a "snapshot" of businesses in the county.

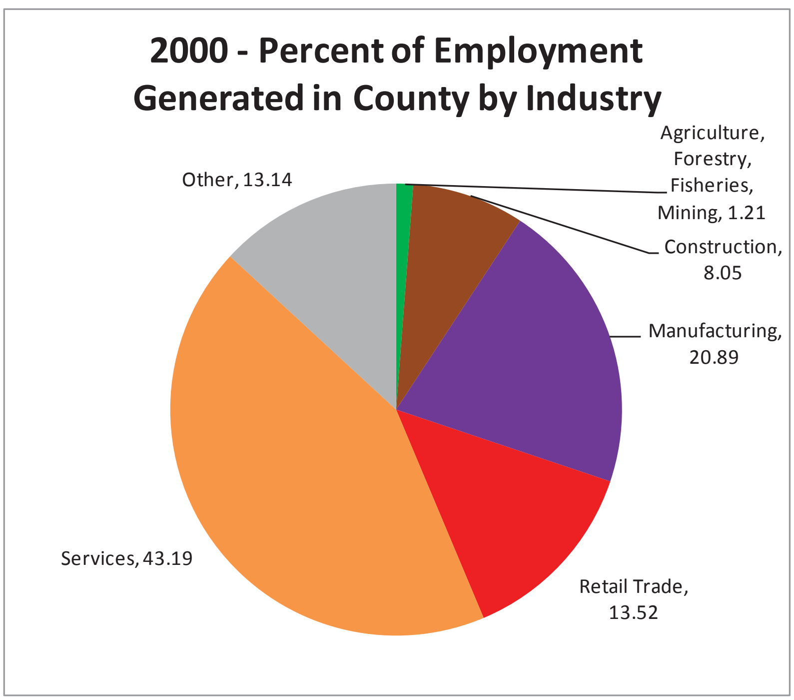
The US Census Bureau conducted a special tabulation of commuter data by industry of persons employed in Blount County from the 2000 Census, thus providing a snapshot of employment generated by businesses in the county. See summary table below and graph on following page. Note that the total employment estimate was different from the total reported above in discussion on commuting, due in part to estimation methodology and rounding within the base of 88 industries used in the special tabulation. The NAICS codes referred to the North American Industry Classification System, and the table below was a summary of 88 categories.

Equal Employment Opportunity (EEO) Special Tabulation - Estimates of Blount County Worksite Specific Employment by Industry from 2000 Census

	Employment Estimates	Percent
Agriculture, Forestry, Fisheries, Hunting (NAICS 111-115)	434	1.07
Mining and Oil and Gas Extraction (NAICS 211-213)	56	0.14
Utilities (NAICS 22)	257	0.64
Construction (NAICS 23)	3,250	8.05
Manufacturing (NAICS 311-339)	8,437	20.89
Wholesale Trade (NAICS 421-422)	1,641	4.06
Retail Trade (NAICS 441-454)	5,461	13.52
Transportation and Warehousing (NAICS 481-493)	2,067	5.12
Services (NAICS 511-814)	17,447	43.19
Government and Public Administration (NAICS 921-928)	1,344	3.33
TOTAL	40,394	100.00

Source: US Census Bureau at http://www.census.gov/eeo2000/





The graph above shows that Services was the largest employment generator in 2000, followed by Manufacturing at less than one-half the number of Services employment, Retail Trade at less than one-third the number, and Construction at less than one-fifth the number.

The pie chart to the left is comparable to the pie chart in previous analysis of employment of the resident population, and shows similar proportions, with Services being the dominant industry for employment generation in the county. The tertiary sector of Retail Trade, Services and Other industries generated almost 70 percent of employment in Blount County in 2000.

For more recent data, County Business Patterns can provide a relatively complete view of business sectors and industries in the county, along with payroll. See the table below for 2007 County Business Patterns for Blount County (most recent data as of this writing).

2007 County Business Patterns - Selected Information by Industry

	Number of Establishments	Annual Payroll ($1,000)	Number of Employees *	Average Payroll per Employee ($) (calculated)
TOTAL ALL INDUSTRIES	2,463	1,519,692	43,346	35,060
Manufacturing	**127**	**372,084**	**7,728**	**48,148**
Construction	**305**	**204,448**	**4,980**	**41,054**
Wholesale Trade	**113**	**71,026**	**1,336**	**53,163**
Retail Trade	**387**	**145,324**	**5,926**	**24,523**
Transportation & Warehousing	**86**	**54,998**	**1,687**	**32,601**
**Services (Total) ** **	**1,355**	**514,994**	**18,310**	**28,126**
Information	25	14,486	in range 250-499	NC
Finance, Insurance	174	84,835	2,178	38,951
Real Estate, Rental, Leasing	100	25,681	521	49,292
Professional, Scientific, Technical	190	60,285	1,281	47,061
Management ***	31	withheld	in range 1000-2499	NC
Administrative Support, et al ***	122	32,224	1,481	21,758
Educational	24	25,248	in range 500-999	NC
Health Care, Social Assistance	223	204,529	5,905	34,637
Arts, Entertainment, Recreation	34	5,933	434	13,671
Accommodation & Food Services	207	62,948	4,683	13,442
Other Services ***	305	38,559	1,827	21,105
Other Sectors and not classified	10	withheld	withheld	NC

Source: US Bureau of the Census, 2007 County Business Patterns

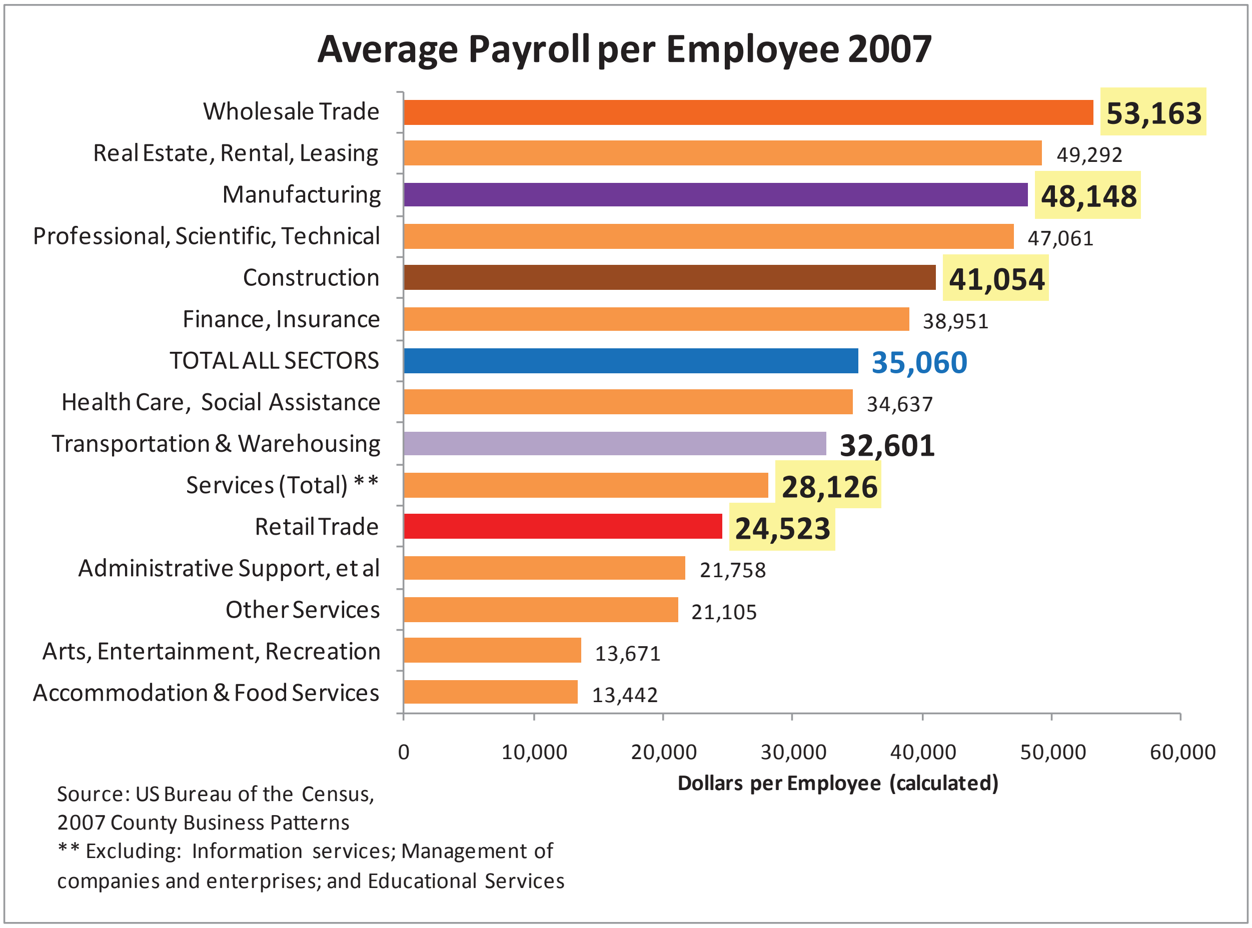
* Paid employees for pay period including March 12

** Except Information, Management and Educational with ranged or withheld information

*** Management of companies and enterprises; Administrative & support & waste management & remediation services; Other services except public administration

**** Excluding professional, scientific and technical services due to withholding of data in source
NC - Not Calculated due to limitation of data in source

The information on average payroll per employee is shown in graph below, ranked from highest to lowest. The tertiary sector industry of Wholesale Trade led the list in average payroll per employee. The secondary sector industries of Manufacturing and Construction ranked third and fifth respectively. The tertiary sector industries of Services (Total) and Retail Trade ranked below the total average for all sectors and industries. However, some of the components of the Service industry such as real estate, rental and leasing, professional, scientific and technical services, and finance and insurance ranked in the top of the list.



Note that County Business Patterns accounted for only selected businesses that generated payroll employment, and did not account for self employed persons, employees of private households, railroad employees, agricultural production employment, and government employment. To account for some of these exclusions, we need to turn to non-employer statistics.

Non-employer statistics for Blount County for 2006 (most recent data as of writing) were found at http://www.census.gov/epcd/nonemployer/2006/tn/TN009.HTM and showed that there was a total of 8,436 firms which were not accounted in County Business Patterns. This was much

greater than the total of 2,385 firms with employees accounted in the County Business Patterns for 2006 for Blount County, and probably accounted in total employment on the order of magnitude of some of the large major industries that generated payroll employment. The non-employer firms were concentrated in Services (5,052 firms), including professional, scientific and technical services (832 firms), real estate, rental and leasing (757 firms), and administrative and support and waste management and remediation services (723 firms). In addition to Services, other industries accounting for a substantial share of non-employer firms were Construction (1,892 firms), and Retail Trade (801 firms). Total receipts for non-employer firms were over $401 million in 2006.

Income**.** For most of the population and households, employment provided the majority of income. Added to this were incomes from such sources as interest payments, investment returns, transfer payments, pensions or retirement benefits, social security payments, and disability payments. For senior citizen households with retirees, the majority of income probably did not include income from employment.

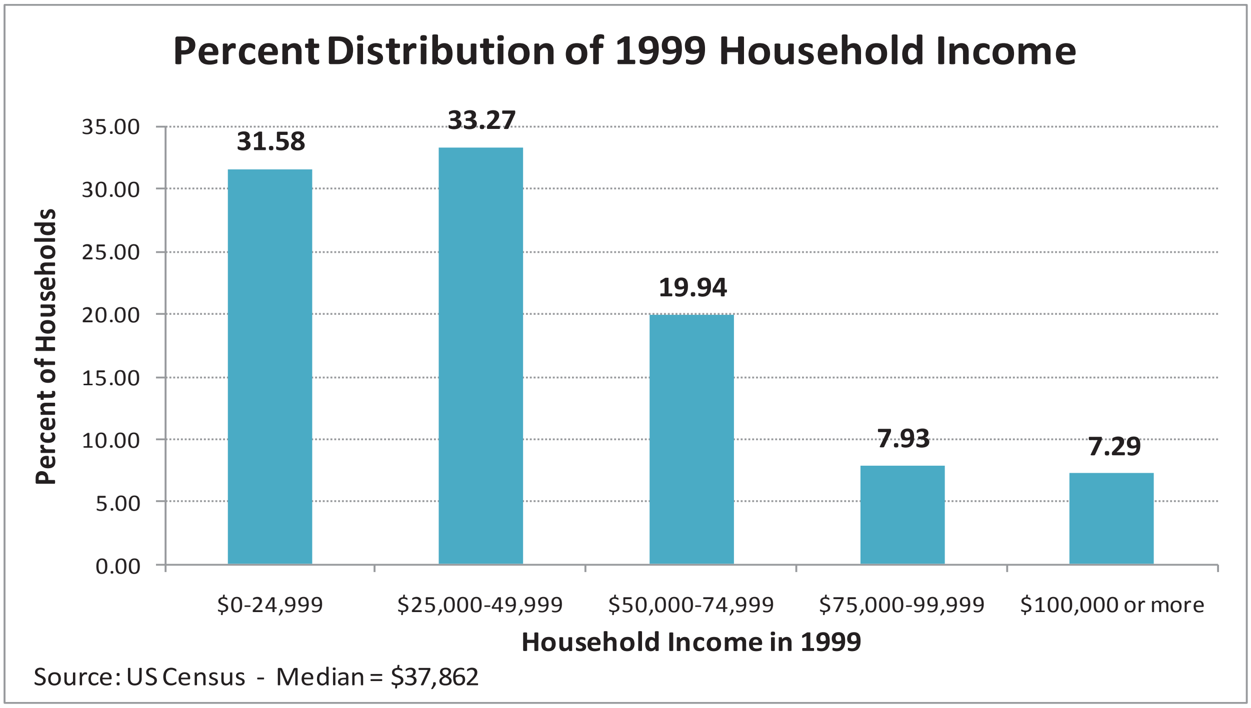
In relation to previous analysis, Income can be viewed per household, or per capita (total divided by population). Differences in gathering and reporting of income information between sources, and even between dates, can result in data that are not comparable. To present an overview of income, the following focused on two perspectives and sources, the 1950 to 2000 decennial Censuses for household income, and personal income from the Regional Economic Information System (REIS), Bureau of Economic Analysis, U.S. Department of Commerce. The time span for analysis of Census information was 1950 to 2000, to allow link back to previous analysis. The time span for the REIS data was limited by start in 1969, but extended analysis to 2008. The two sources were not necessarily comparable.

Income per Household. Each decade, the Census asks information about income for the previous year. Thus, for the 2000 Census, the year for reported income would be 1999. Household income distribution in 1999 (from the 2000 Census) is presented in table below and graph on the following page.

Household Income Distribution 1999

1999 Household Income (2000 Census in 1999 dollars)	$0-24,999	$25,000-49,999	$50,000-74,999	$75,000-99,999	$100,000 or more
Households	13,526	14,249	8,542	3,395	3,122
Percent of Households	31.58	33.27	19.94	7.93	7.29

Source: US Census Median = $37,862



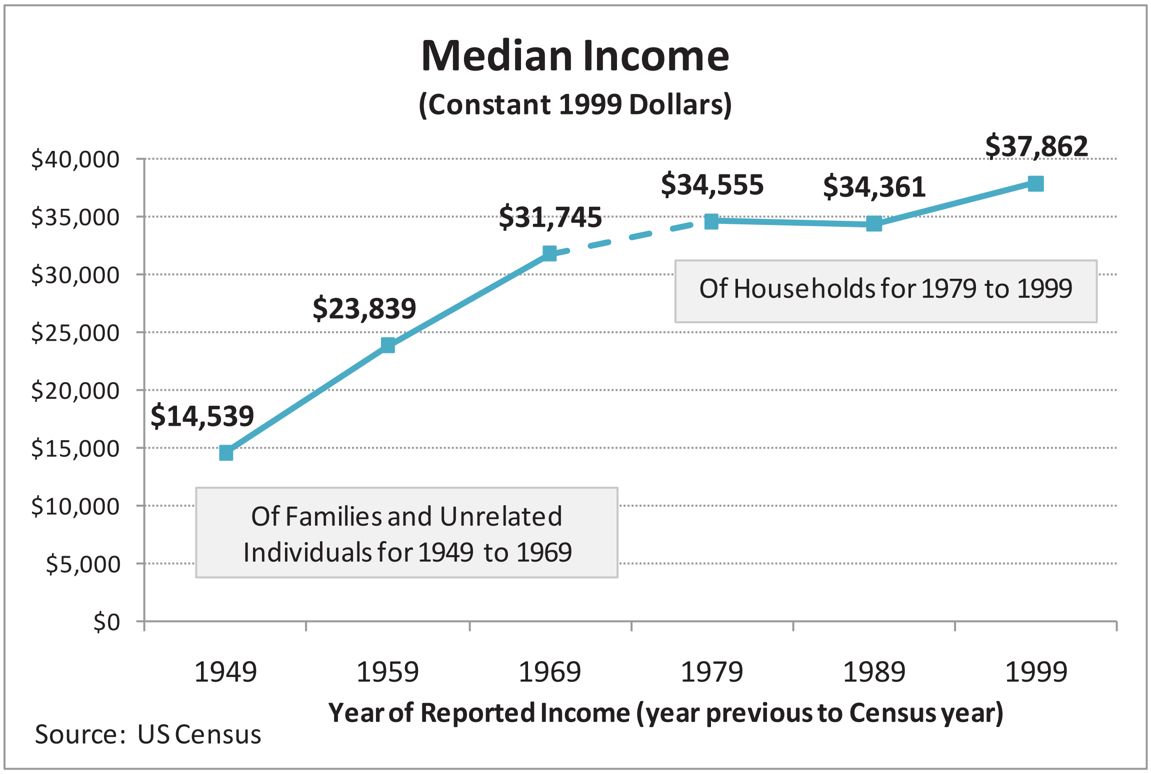
Note that the distribution was skewed toward the lower end of the scale for household income. The median household income of $37,862 defined the income point at which 50 percent of households reported less than that figure, and 50 percent of households reported more. The following table presents comparable median income figures using Censuses from 1950 to 2000, based on reported income from 1949 to 1999.

Median Income - 1949 to 1999
in Constant 1999 Dollars

Census Year	Year of Reported Income	Median Income
For Households		
2000	1999	$37,862
1990	1989	$34,361
1980	1979	$34,555
*For Families and Unrelated Individuals **		
1970	1969	$31,745
1960	1959	$23,839
1950	1949	$14,539

Source: US Census - Dollar figures inflated by CPI indexed to 1999.
* 1950, 1960 and 1970 Census reported previous year median income for families and unrelated individuals which was not necessarily comparable to median household income.

The median income figures in the table on the preceding page were inflated using the Consumer Price Index, indexed to 1999 dollars to create constant, and thus comparable 1999 dollar figures for each Census year. Note that the scheme of reporting changed between the 1970 and 1980 Censuses, from median income for families and unrelated individuals for 1950 to 1970, to median income for households from 1980 to 2000. The numbers were thus not completely comparable, but the differences were probably slight since households encompassed family and individual person households. The differences seemed to be for households that contained more than one unrelated individual. The graph below shows the trend in median income.



Real median income increased substantially from 1949 to 1969 (from 1950 to 1970 Censuses respectively). These were the same two decades that saw a reversal from high out-migration across a wide range of ages in the 1950's, to moderate in-migration in the experienced labor force ages in the 1960's. During the two decades, female particpation rate in the labor force increased substantially, resulting in more two income families. Also during the two decades, lower wage agricultural employment decreased, and relatively higher wage tertiary sector employment such as retail trade and services increased.

Since the change in median income reporting occurred between 1969 and 1979 (1970 and 1980 Censuses respectively), the trend was not completely comparable during that decade. However, the graph indicates that increase in median income began to slow during the decade

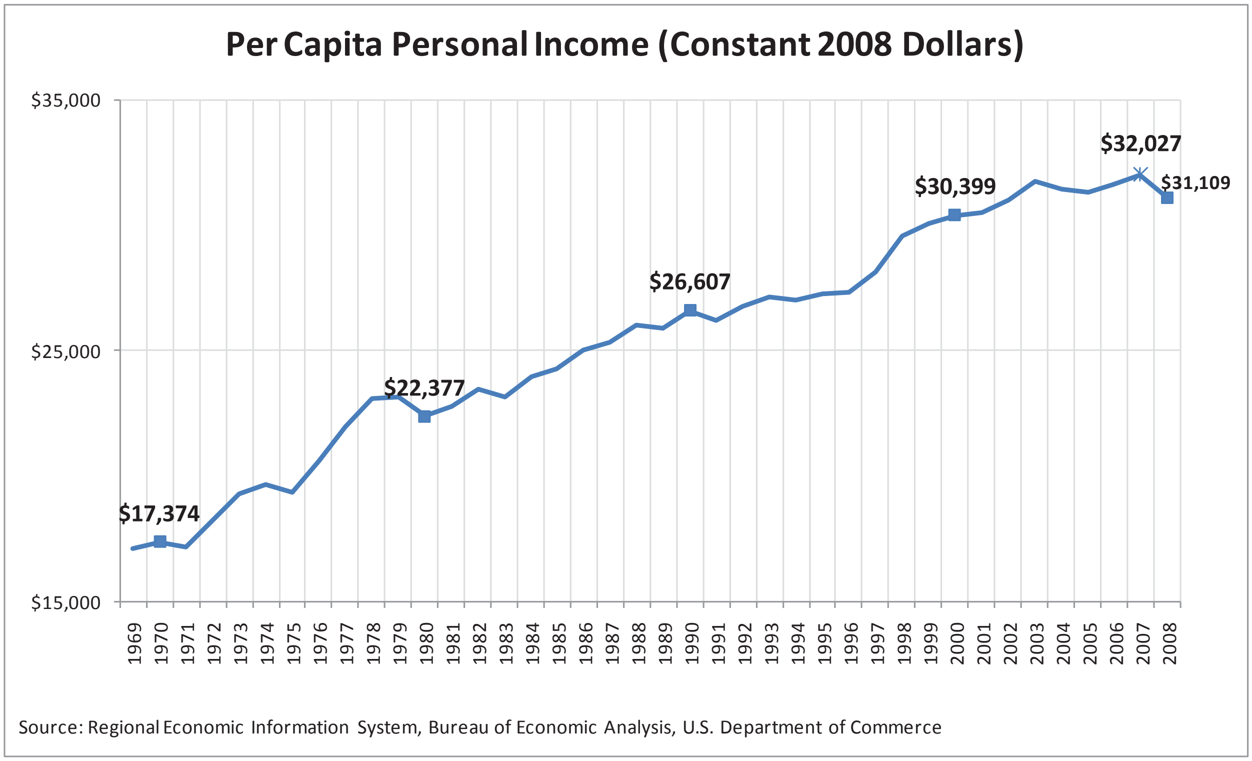
of the 1970's. This was the decade that saw a completion of migration transition with reversal to high in-migration across most age groups, a continuation of increase in female participation rate, and aging into the labor force of a large "baby boom" cohort. If looked at in terms of supply and demand for labor, businesses expanded employment generation to accommodate the larger supply of labor force entrants, but with more moderate increases for income generation. At the same time, average household size was continuing a long term decrease, thus spreading household income over relatively fewer people per household on average.

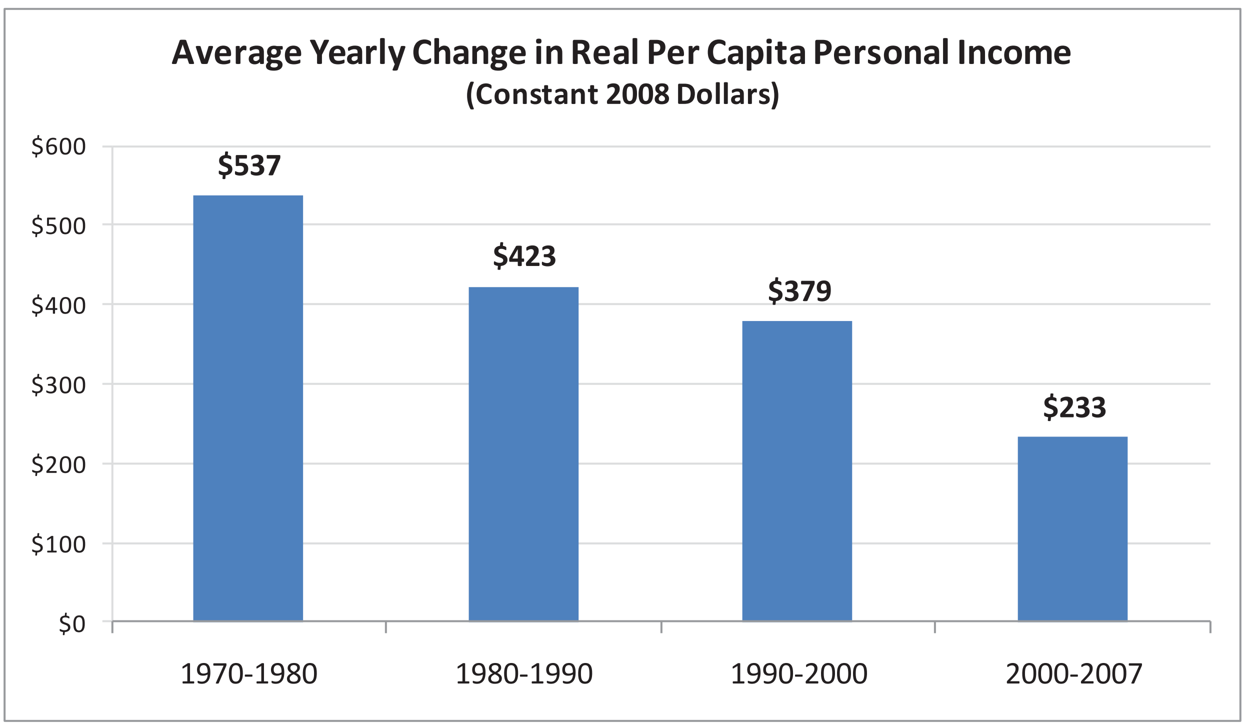
From 1979 to 1989 (reported from 1980 and 1990 Censuses respectively), real median household income fell slightly. This was a period that saw a decrease of in-migration associated with a relatively prolonged recession at the beginning of the decade, a decrease in high wage manufacturing employment, and increases in the proportion of employment in relatively lower wage retail trade and service industries.

From 1989 to 1999 (reported from 1990 and 2000 Censuses respectively), real median household income increased moderately, on the order of magnitude seen in the 1970's. As with the 1970's, the decade of the 1990's saw a historically high peak of net in-migration expressed across all age groups. Decrease in average household size and increases in female participation rate began to level out. Service industries increased substantially and expanded dominance of employment, including some component industries that rivaled relatively high wage manufacturing and construction. Relatively high wage manufacturing bounced back with substantial employment increase.

Income per Capita. Turning now to per capita income, or average income across all persons in the population, we can extend our analysis to 2008. The first graph on the following page presents trend in real percapita income from 1969 to 2008. Reported percapita income from the source was inflated by use of the Consumer Price Index, indexed to 2008 dollars to create constant, and thus comparable 2008 dollar figures for each year. Highlighted are the ammounts of per capita income for years corresponding to the last four Census years, and 2007 and 2008 to highlight the last two years of the series.

Note that real per capita income showed general increase from 1969 to 2008. However, the rate of increase slowed across the span of analysis. The second graph on the following page illustrates this slowing of increase over time. Note that 2007 was the final year for analysis of trend, excluding the first year of the recent severe recession that began in 2007. (If 2008 per capita income were used, the average yearly increase would have been only $88 from 2000 to 2008.) The rate of average yearly increase slowed by half from 1970-1980 to 2000-2007. This trend was generally consistent with findings about slowing of increases for median household income to the year 2000, and may indicate that median household income may have continued its trend of slowed increase beyond the year 2000.



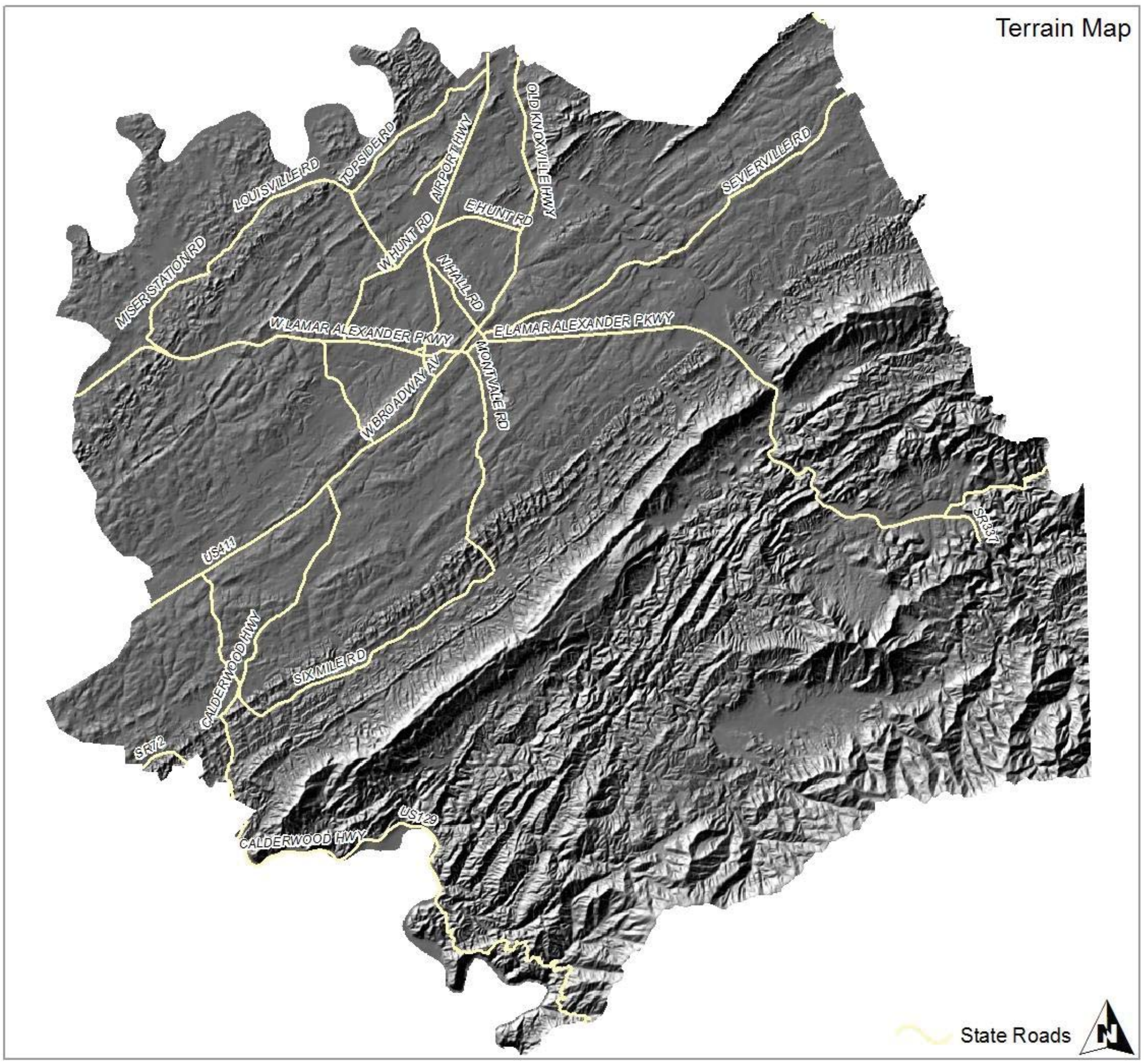


As a final note on income, total real personal income in 2008 constant dollars increased more than three-fold from $1.1 Billion in 1970 to $3.78 Billion in 2008. Even with slowing of increases for median household income and average yearly increases for per capita income, the overall economy of the county showed substantial expansion consistent with overall population trend.

Land, Water and Air – The Geographic Base.

The growth of population, the increase in households and housing, and the development of a framework of businesses that generate employment and income play out across a physical landscape. The basic characteristics of county geography are important to understanding patterns on the physical landscape, and future possibilities.

Terrain and Relief. The following map shows a representation of the terrain or relief of the land in Blount County.



Blount County has ridge/mountain and valley terrain characteristic of East Tennessee. The ridge and valley pattern runs in a southwest to northeast direction. Proceding perpendicular to the ridge and valley pattern, the county boundary starts along the Tennessee River (Fort Loundon Lake) to the north, northwest and west of Alcoa and Maryville. The terrain from the

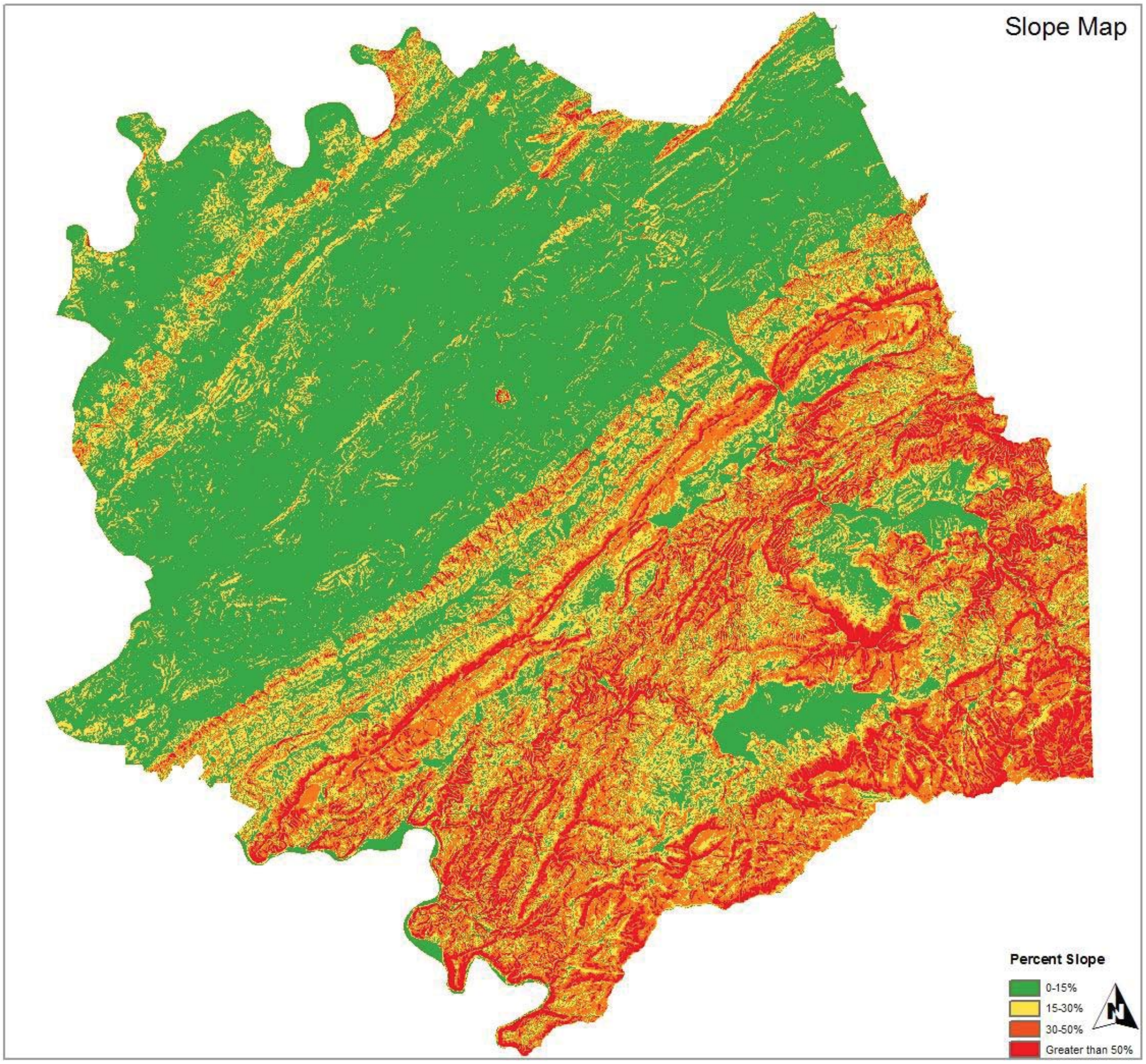
river inland toward Friendsville, Louisville and Alcoa shows a defined low ridge and narrow valley pattern. Closer to Alcoa, Rockford and Maryville, the pattern shifts to a more rolling low ridge and valley pattern. Southeast of Maryville the pattern again changes, first to prominent knob (broken ridge) and narrow valley pattern, then transitions into prominent foothills, and then the more prominent and elevated Chilhowee Mountain range. On the other side of the Chilhowee Mountains the pattern changes to coves and narrow valleys before transitioning to the prominent and steep mountains of the Great Smoky Mountains National Park.

The elevation of the land around the Tennessee River ranges from 800 to 840 feet (above sea level). The hills between the Tennessee River and the knobs range up to 1000 to 1300 feet. In front of Chilhowee Mountain, the knobs and foothills range up to 1300 to 1400 feet. The Chilhowee Mountain range is very prominent when viewed from the lowlands with elevations up to 2000 to 2600 feet. The mountains in the Great Smoky Mountains National Park gain elevation to greater than 5000 feet toward the state boundary to the south of the county.

Slope. Slope is the relation between relief, or vertical elevation, and horizontal distance. The map on the following page portrays slope by categories. As example of the measurment scale, a 15% slope defines a situation on the land where average rise in elevation is 15 feet for every 100 feet of horizontal distance. A 0-15% slope is generally conducive to development. A 15-30% slope begins to pose constraints to development, but can be overcome with appropriate design and engineering. A slope greater than 30% begins to pose severe constraints to development that may be overcome by design and engineering, but generally at greater cost and with more risk of long term failure. Slopes greater than 50% are generally not conducive to development.

Lowland slopes from the Tennessee River to the knobs and foothills generally are within the range of 0 to 15%. The slopes are generally greater than 30% for the knobs and foothills, the Chilhowee Mountains, and the mountains surrounding the coves and into the Great Smoky Mountains Park.

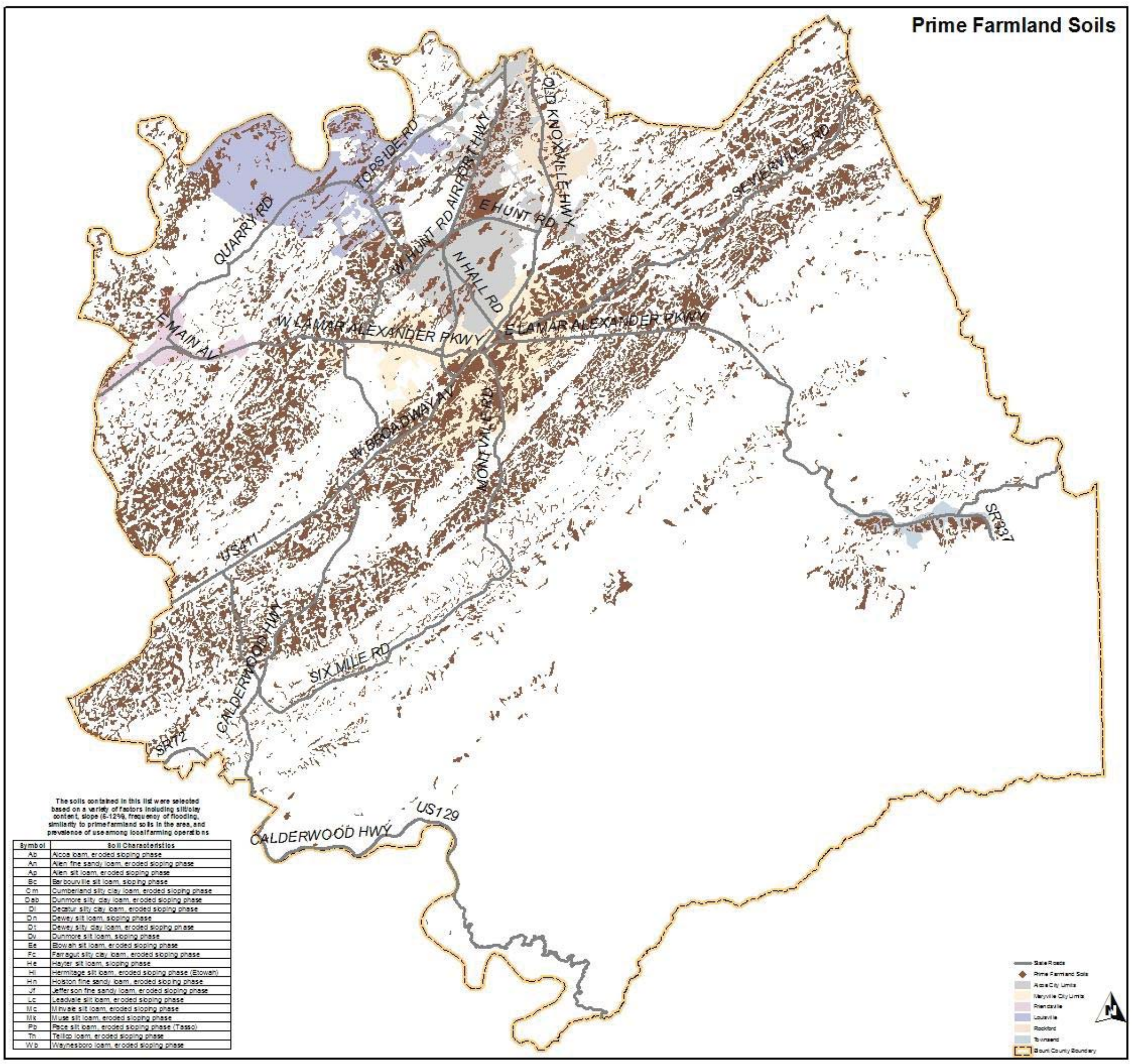
Geology. The geology of Blount County is varied, and technical discussion is left to other sources. See in particular http://tn.gov/environment/tdg/images/geolog_l.jpg for a generalized map of Tennessee geology where Blount County can be viewed if enlarged. See also a discussion under “Tennessee Geology Summarized” at http://geology.about.com/od/geology_tn/Tennessee_Geology.htm. Lowland geology is relatively unremarkable, with exception of karst formations that can result in sink-holes. The “Blount County Land Use Plan: A Plan for Mountain Areas” adopted by the Planning Commission in 1998 presents the following analysis taken from a previous “Blount County: 1990 Land Use Plan and Policy” adopted in 1976, to highlight some important geological considerations in the mountains of the county including the Chilhowee Mountains (see http://www.blounttn.org/planning/mountain%20area%20plan%201997%20with%20maps.pdf.)



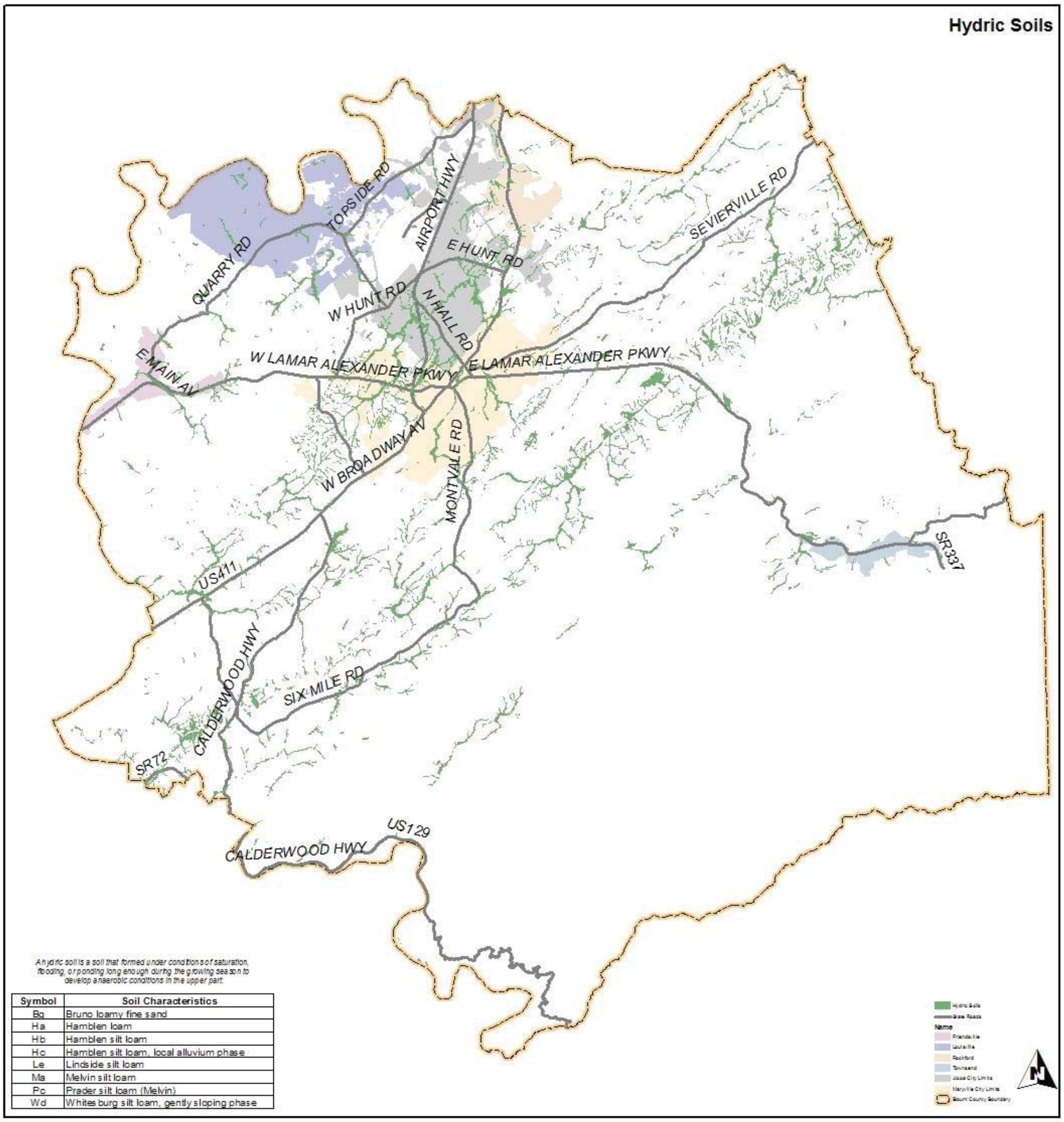
The Unaka Mountains are the high, rugged peaks and ranges in southern Blount County. The rocks are meta-morphosed sediments, and consist of slates, quartzites, and conglomerates, with minor limestones. These rocks are greatly folded and faulted, relatively tough and resistant and underlie the high ridges and mountains. They are generally lacking in available lime and so weather to produce acid soils. The steep slopes, high rainfall, and slow decay of the rocks result in generally thin soil cover, commonly with stone fragments in a humic clay. The slaty rocks have cleavages (partings) as a result of metamorphism and break up into slabs or thin sheets. All the rocks are thoroughly fractured. Water and roots penetrate these fractures, loosen the broken fragments, and start them moving down-slope. These conditions produce masses of unstable materials that if undercut, over-saturated, or denuded of vegetation may slide suddenly and with great force and possibly disastrous consequences. Many of

the streams and wet weather drainage courses are marked by trains of bouldery material so formed. Cuts and structures through or located on such materials are extremely hazardous as are developments located down slope from these hazards.

Soils and Prime Agricultural Land. Soils provide the physical base on which plants grow, particularly those that support agriculture. Soils also provide the matrix into which a substantial amount of human waste is deposited for those households that are dependent on individual septic fields (about 56 percent of total households based on Blount County Environmental Department estimate). With few exceptions, soils in the lowlands of the county are generally favorable to some form of agricultural use, and to some form of development. Mountains provide a much more limited amount of suitable soils and soil depth. Soils that are most conducive to agriculture may be called prime farmland soils.



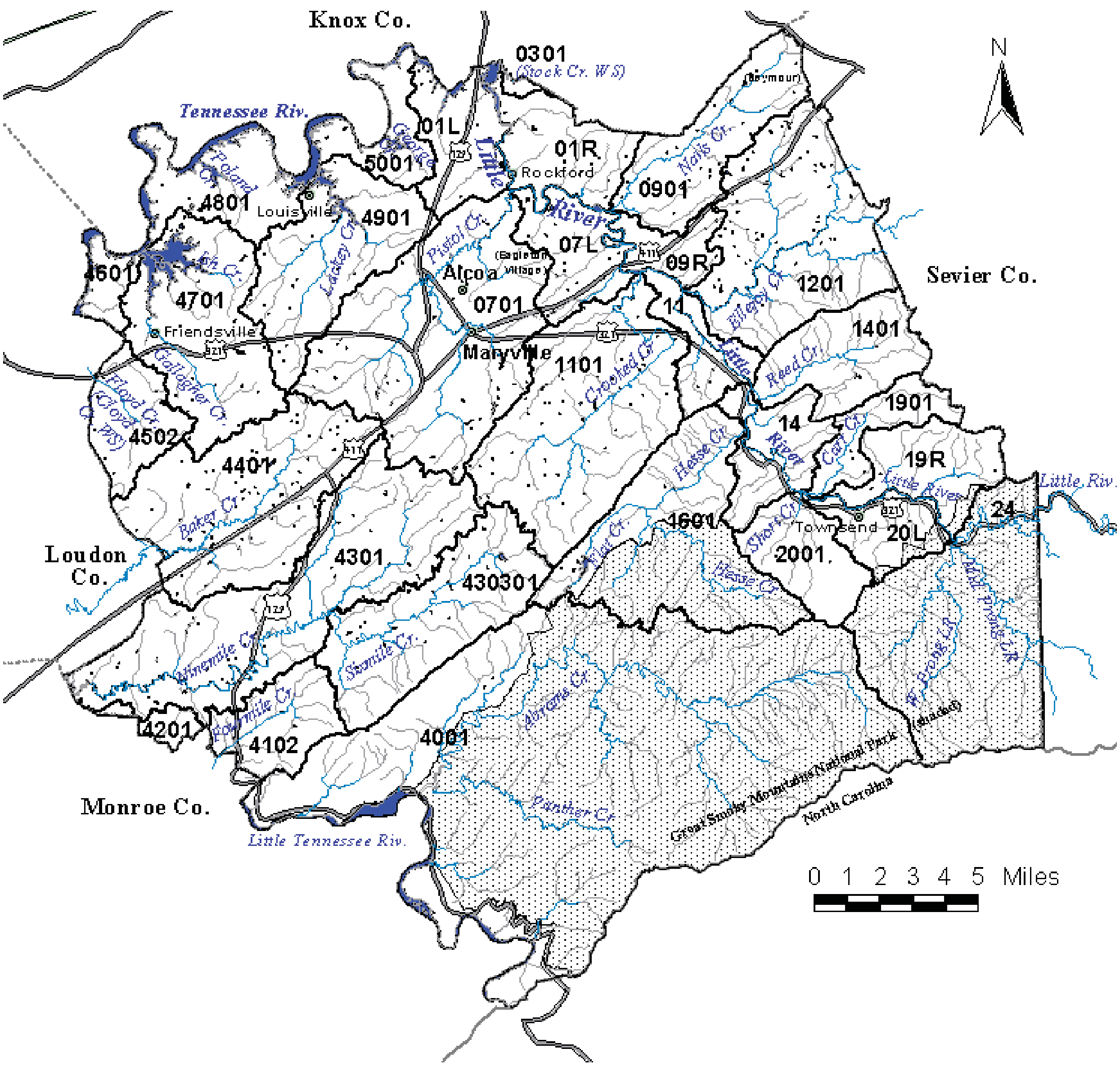
The map on the preceding page shows the prime farmland soils in the county. Most of these soils are also conducive to development on individual septic fields. The bands of prime farmland soils run with the characteristic ridge and valley pattern of the lowlands. The mountain areas of the county are generally not conducive to agriculture or to intensive development. See http://websoilsurvey.nrcs.usda.gov/app/ for a more detailed description of soils in the county.



Another characteristic of soils is the relation between water and slope. Lowlying soils with little relief (flat) can accumulate water for longer periods of time and have characteristics that limit

both agriculture and residential use. The map on the preceding page shows the distribution of hydric soils, or those soils "that are sufficiently wet in the upper part to develop anaerbic conditions during the growing season", as identified by the US Department of Agriculture, Natural Resources Conservation Service (http://soils.usda.gov/use/hydric/). However, such soils are not entirely without merit, since hydric soils are useful in identifying areas of existing or potential wetlands that can be important parts of the green infrastructure of the county.

Water, Water Quality, and Flood Plains. All of Blount County is within one watershed or another. The map below and table on the following page portray the system of waterways and associated watersheds in Blount County.



See following page for watershed codes and names.

Little Tennessee River Basin (flows into Tennessee River through Loudon County)

4001	Abrams Creek – National Park and Happy Valley
4102	Fourmile Creek
4201	Minor tributaries to Little Tennessee River (part)
4301	Ninemile Creek
430301	Six Mile Creek
4401	Baker Creek

Little River Basin (flows into Tennessee River in Blount County)

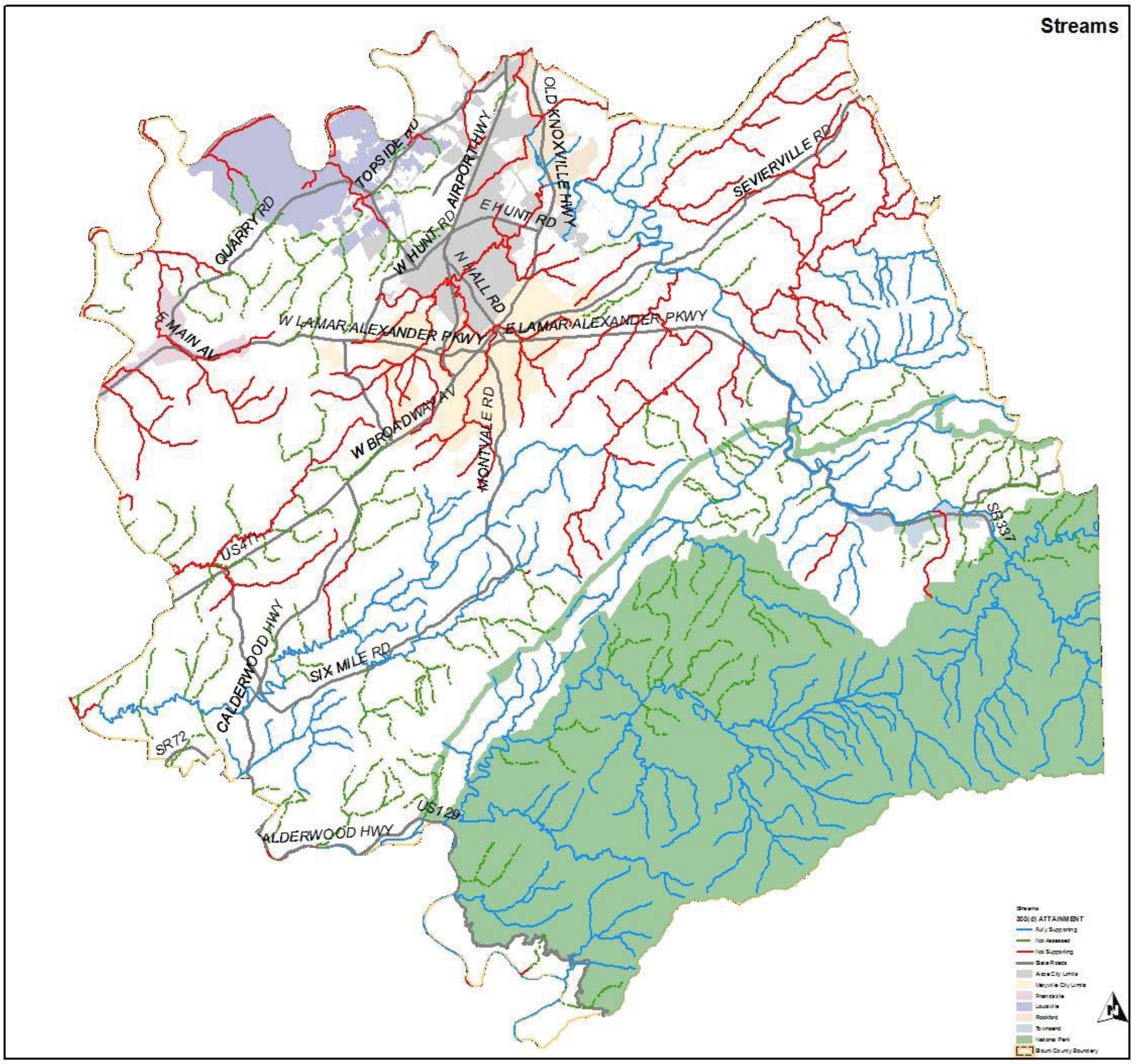
01L	Left side of Little River from mouth to Pistol Creek
01R	Right side of Little River from mouth to Nails Creek
0301	Stock Creek (most in Knox County)
0701	Pistol Creek
07L	Left side of Little River from Pistol Creek to Crooked Creek
0901	Nails Creek
09R	Right side of Little River from Nails Creek to Ellejoy Creek
11	Little River from Crooked Creek & Ellejoy Creek to Reed Creek
1101	Crooked Creek
1201	Ellejoy Creek
14	Little River from Reed Creek to Carr Creek & Short Creek
1401	Reed Creek
1601	Hesse Creek
1901	Carr Creek
19R	Right side of Little River from Carr Creek to National Park
2001	Short Creek
20L	Left side of Little River from Short Creek to National Park
24	Little River within Great Smoky Mountain National Park

Tennessee River Basin

4502	Floyd Creek (into larger Cloyd Creek in Loudon County)
4601	Minor tributaries to Tennessee River west of Gallager Creek
4701	Gallager and Ish Creeks
4801	Poland Creek and surrounding minor tributaries to Tennessee River
4901	Lackey Creek
5001	George Creek and surrounding minor tributaries to Tennessee River

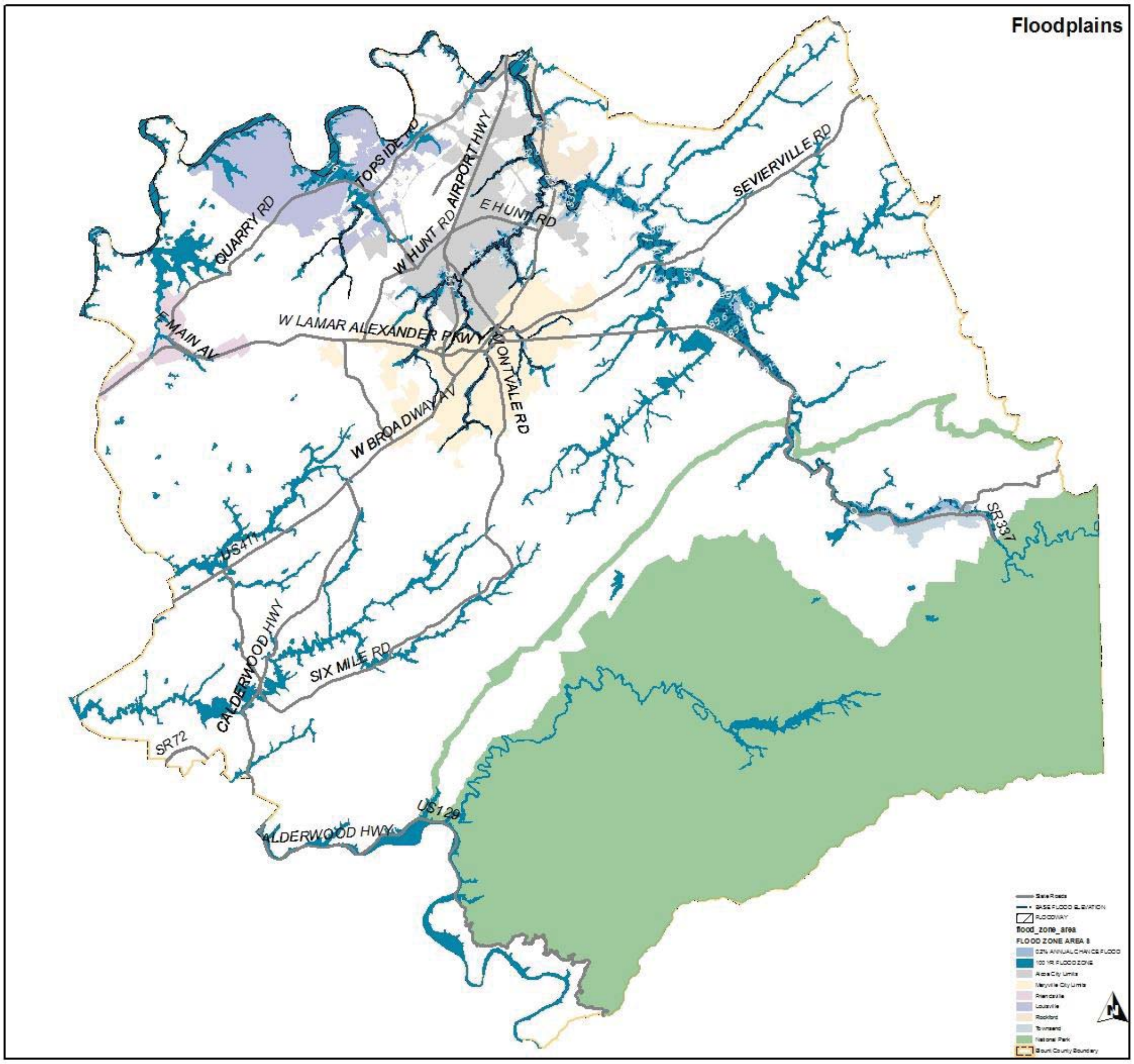
Source: TVA through the Integrated Pollution Source Identification Project, consistent with report at http://www.blounttn.org/planning/I%20-%20IPSI%20report.pdf.

A watershed is the area of land in which all surface water drains to a particular waterway. An example might be the Little River Watershed in which all water drains to the Little River. The Little River has smaller sub-watersheds, and these could be divided even further into smaller sub-watersheds. The network that connects all these watersheds is the system of waterways – streams, creeks and rivers. To the west and southwest, the Baker Creek, Nine-Mile/Six-Mile Creeks, Four-Mile Creek, Abrams Creek and other small tributairy watersheds comprising about two-fifths of the county flow to the Little Tennessee River (Tellico Lake), and thence to the Tennessee River. The remainder of the county is covered by the Galagar Creek, Lacky Creek, Little River and smaller tributaries that flow into the Tennessee River (Fort Loudon Lake).



The Tennessee Department of Environment and Conservation (TDEC) evaluates streams and rivers in the state and reports in a 303(d) list those that are not in compliance with minimum

water quality standards (see at http://www.state.tn.us/environment/wpc/publications/pdf/2008_303d.pdf). The map on the preceding page highlights those waterways (in red) that are listed as impaired by pollution sources in the 2008 303(d) list. (As of writing, TDEC released a draft 2010 303(d) list.) Most of the urban streams listed in and around Maryville and Alcoa showed impairment from discharges of runoff from more densly developed urban areas, with impairment from bacteria, stream alterations, and siltation. In the more rural areas, the prime pollutant sources were from pasture grazing, cattle access and some discharge from development, with impairment from loss of streambank cover, stream alterations, siltation, bacteria, and nitrates.



Another aspect of waterways is their propensity to flood. The Federal Emergency Management Agency (FEMA) produced a set of Flood Insurance Rate Maps (FIRM) for use in administering the National Flood Insurance Program (NFIP). Blount County and all the municipalities

participate in the NFIP. The areas of the county that are subject to a one percent probablity of flooding within a year, commonly called the 100 year flood, are shown in map on the preceding page. For complete and detailed coverage of flood plain delineation in the county, see at http://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1&userType=G.

The Fort Loudon Lake reservoir on the Tennessee River and the Tellico Lake Reservoir on the Little Tennessee River control flood levels by dams. The most prominent flood plains are along the Little River. Heavy rains can cause frequent flood events less than the 100 year flood level. Flood levels may change over time due to upstream development, siltation of waterways, and errosion of waterway banks.

Air Quality. State Statutes in Tennessee Code Annotated provide the following guidance for considering air quality in local plans.

> 13-7-118. Land use plan in certain counties that are in an early action compact or in nonattainment for air quality.
>
> (a) This section applies to any county in the state of Tennessee that either is in an early action compact or is in nonattainment for air quality according to the environmental protection agency as of April 15, 2004.
>
> (b) Any county that qualifies under subsection (a) and whose population according to the 2000 federal census was sixty thousand (60,000) or more and the county as of April 15, 2004, did not have a land use plan, shall adopt a land use plan which states that air quality issues will be considered as part of the county-wide land use plans.

Blount County is in nonattainment for ozone and particulate matter (PM 2.5) air pollution, and is also part of an early action compact under provisions of the Environmental Protection Agency. Blount County has a population greater than 60,000. Although Blount County adopted a land use plan prior to April 15, 2004, and thus does not fall strictly under the provisions of the statutes, the intent of the statutes would indicate that air quality should be considered in local planning.

The Blount County Environmental Health Action Team (EHAT), a part of the Blount County Community Health Initiative, analyzed the air quality situation in an Action Plan (see at http://www.blounttn.org/planning/final%20issue%20profiles%20and%20action%20plans%201-07.pdf). Included were findings that air quality was generally less favorable in higher elevations (mountains of the county) than in lowlands. Some of the problem with air quality was related to high elevation pollution blowing in from other regions, some far away. However, much of the air quality problem was generated locally, and was exacerbated by the ridge and valley geography that trapped pollutants when climatic inversions occurred. While the air quality situation has shown

improvement over time, air quality still may cause health problems for those that are particularly sensitive.

<u>Infrastructure – The Support Base</u>.

Supporting the growth of population, the functioning of household and individual activities, and the functioning of businesses is an array of systems called infrastructure. This infrastructure includes many public support systems such as roads and schools, and public services such as law enforcement and fire protection. Some infrastructure such as water, sewer and electric may be provided by a local government, but may also be provided by a chartered public utility. The following highlights the major support infrastructure in the county.

***Roads*.** Roads in the county may be classified for different functions. A road network serves dual purposes: providing access to property, and providing routes for traffic, or mobility to and from places. Places range from individual properties, to larger centers of activity, all of which generate traffic. The larger centers of activity may be cities, with large populations, dense pattern of properties, and heavy generators of traffic such as commercial and industrial uses. Places also may include recreation areas and schools which generate substantial traffic independent of urban centers.

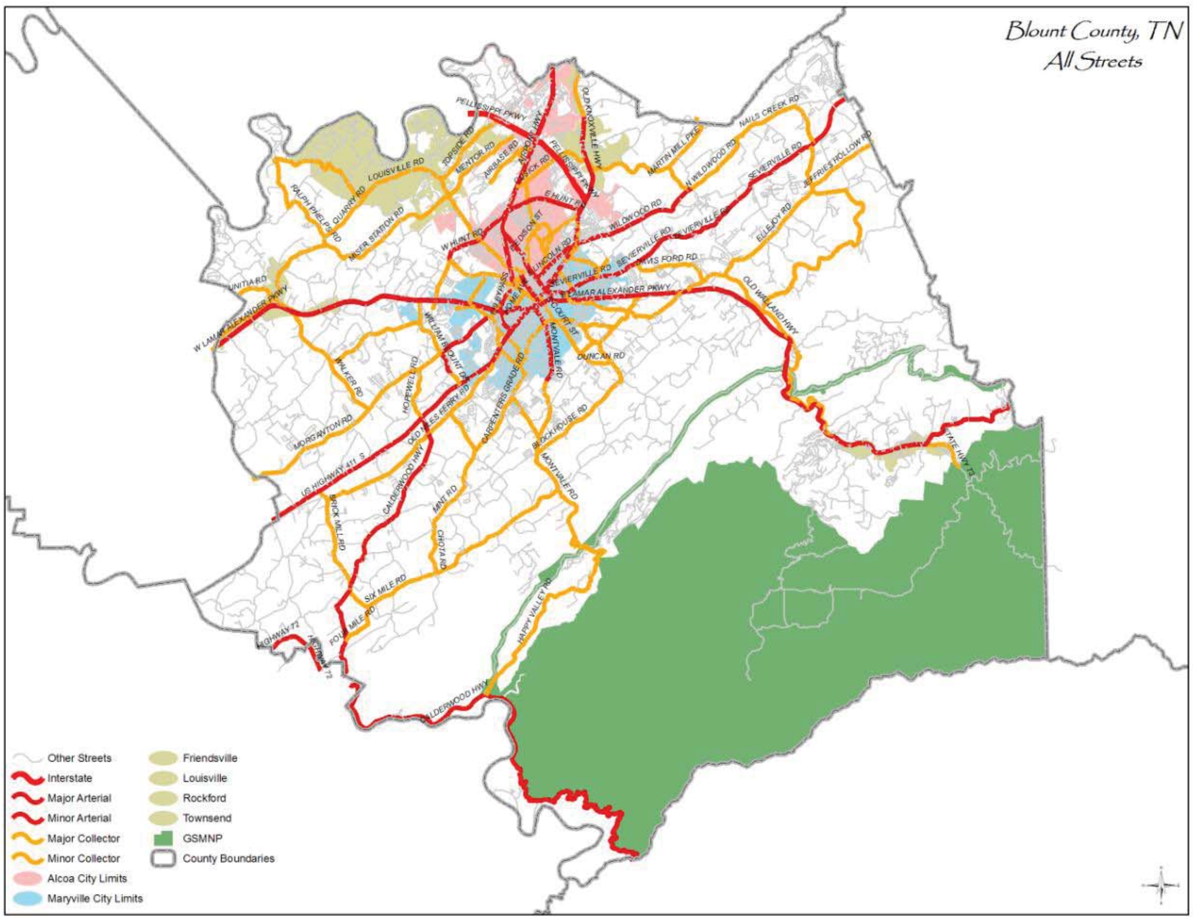
Roads are classified based on relative importance of function in providing access and mobility (accommodating traffic). At the lowest level of local roads, the function is mainly provision of access to property, which in turn becomes the lowest level of place. Traffic is generated from a desire to get from one place (property) to another often higher order place (such as a business in a town center). A local road provides first order function in providing a route from origin place (property), but usually does not provide a direct route to destination, with traffic needing to connect through higher level roads toward final destination.

Higher level roads provide mobility, or routes for accumulated traffic to go efficiently from place to place, but can also provide access to property along the way. Collector roads provide access and mobility functions on a roughly balanced basis. In other words, collector roads provide access to adjoining properties, but also accumulate and carry traffic from lower level local roads and properties to higher level roads and places.

Arterial roads have the main functions of accumulating traffic from lower level roads, and carrying large amounts of traffic to and through large centers of activity such as cities. Arterial roads may also provide access to adjoining properties, but the access function is secondary and may be restricted to accommodate the main function of mobility or traffic conveyance.

The application of the classifications is different in rural and urban areas. Urban areas have the dual character of place destinations in a larger road network, and also provide access and mobility on a denser internal network of arterial, collector and local roads. Urban areas thus

provide not only a network of access and mobility within the urban boundaries, but also a network connection into rural areas and connections to other major centers of activity. Tennessee Department of Transportation (TDOT) functional classification maps for Blount County can be accessed at http://www.tdot.state.tn.us/longrange/maps/co05.pdf for rural areas, and at http://www.tdot.state.tn.us/longrange/maps/co47c.pdf for urbanized areas. The map below shows an adaptation of state classification of roads in the county, including the cities.



Most of the roads in the county are publicly maintained. However, there are a substantial number of privately maintained roads serving mainly low density development. Each municipality is responsible for maintaining the local public roads within its corporate jurisdiction, except major roads maintained by the state. The County maintains all other public roads, except major state routes maintained directly by the State of Tennessee. The Blount County Highway Department maintains 823 miles of roads outside the jurisdictions of the six municipalities. The roads are a mix of local roads and collector roads, but no arterial roads. The arterial roads are maintained by the State of Tennessee. The official Blount County Roads List can be accessed at http://www.blounttn.org/highway/PDF/Official%20Roads%20List.pdf.

Growth and development can place increased demands on the road system in the county. A 2004 Blount County Roadway Needs Update (update of a 2000 study – see at http://www.blounttn.org/planning/Roadway%20Needs%20Study%20update%202004.pdf), presented traffic counts for the different classification of roads as of 2003, and projections to 2030, along with a wealth of other information about the road system in the county. The study estimated that immediate need for road improvements amounted to over $29 million.

Water. Public water utilities serve most of the population and most of the territory in the county. There are only a few areas that are not covered by public water supplies, mainly in the more remote and sparsely settled rural and mountain areas, small areas in the vicinity of Friendsville, and to the east and northeast of Rockford.

Providers with water source in Blount County

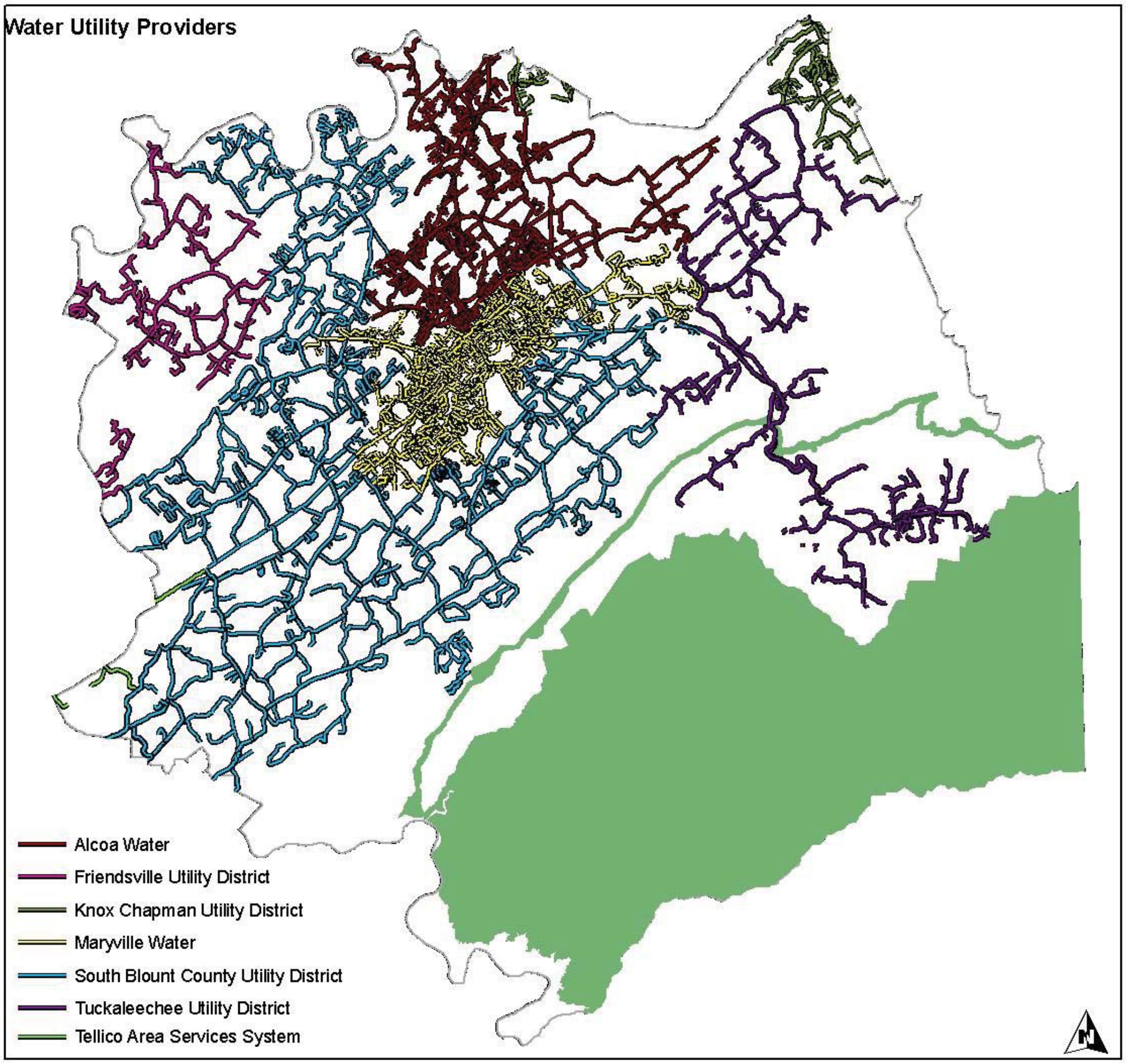
Water Utility	Residential Customers	Commercial Customers	Water Source	Treatment Capacity (gpd)	Pumping Capacity (gpd)	Storage Capacity (gallons)	Average Daily Water Use (gpd)
City of Alcoa *	8,700	1,500	Little River	16,000,000	16,000,000	13,350,000	8,000,000
City of Maryville	12,877	1,552	Little River	6,000,000	9,000,000	6,800,000	3,752,000
South Blount Utility Dist. **	13,923	52	Tellico Reservoir	8,000,000	6,000,000	7,700,000	3,150,000
Tuckaleechee Utility District	3,294	90	Alcoa ***	NA	1,152,000	5,600,000	500,000
Friendsville Waterworks	1,742	24	SBUD & TASS ***	NA	distribution only	871,000	412,000
TOTAL	40,536	3,218		30,000,000	32,152,000	34,321,000	15,814,000

(gpd) - gallons per day

* includes three industrial customers and also sells water to Tuckaleechee Utility District

** also sells water to Friendsville Waterworks

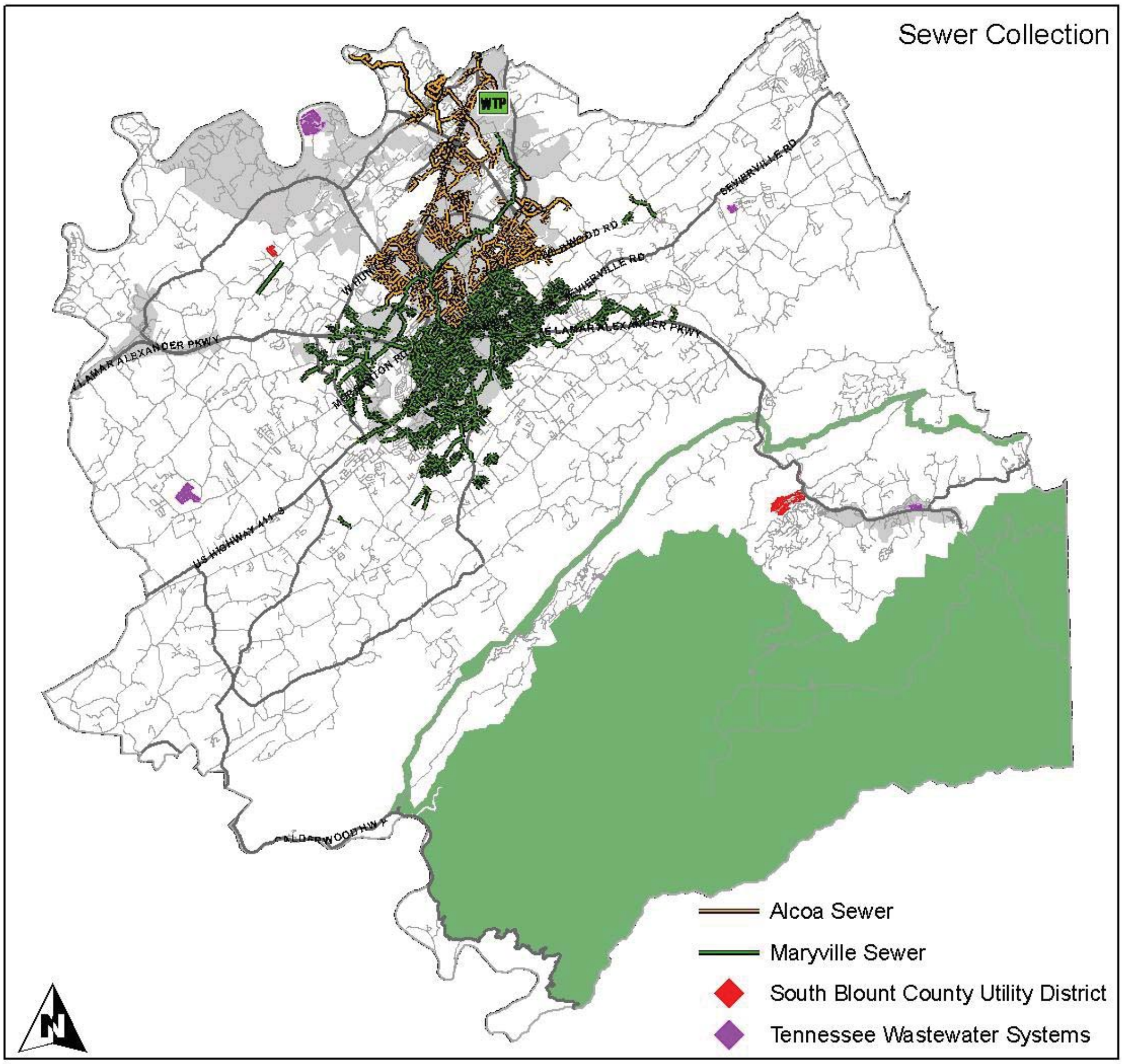
*** Tuckaleechee Utility District purchases water from the Alcoa city utility, Friendsville Waterworks purchases water from South Blount Utility District and Tellico Area Services System.



See map above for coverage of public utility water, and table on preceding page. There are seven public water utilities that serve Blount County residents and businesses. The two cities of Alcoa and Maryville operate separate municipal utilities with separate intakes and processing plants on the Little River. Both utilities serve some customers outside municipal boundaries. Alcoa also sells water to Tuckaleechee Utility District. South Blount Utility District covers a large, mainly rural area and has an intake and processing plant on the Little Tennessee River (Tellico Lake), and also sells water to Friendsville Water Works. Friendsville Waterworks operates a distribution system and purchases water from South Blount Utilities and Tellico Area Services System. Tuckaleechee Utility District operates a distribution system, and purchases water from the Alcoa municipal utility. Knox Chapman Utility District (not shown in table on preceding page) provides water from outside the county in the Seymour area and a small area

to the north of Rockford. Tellico Area Services System (not shown in table on preceding page) provides water from outside the county to a very small area in the southwest of the county, and also sells water to the Friendsville Water Works.

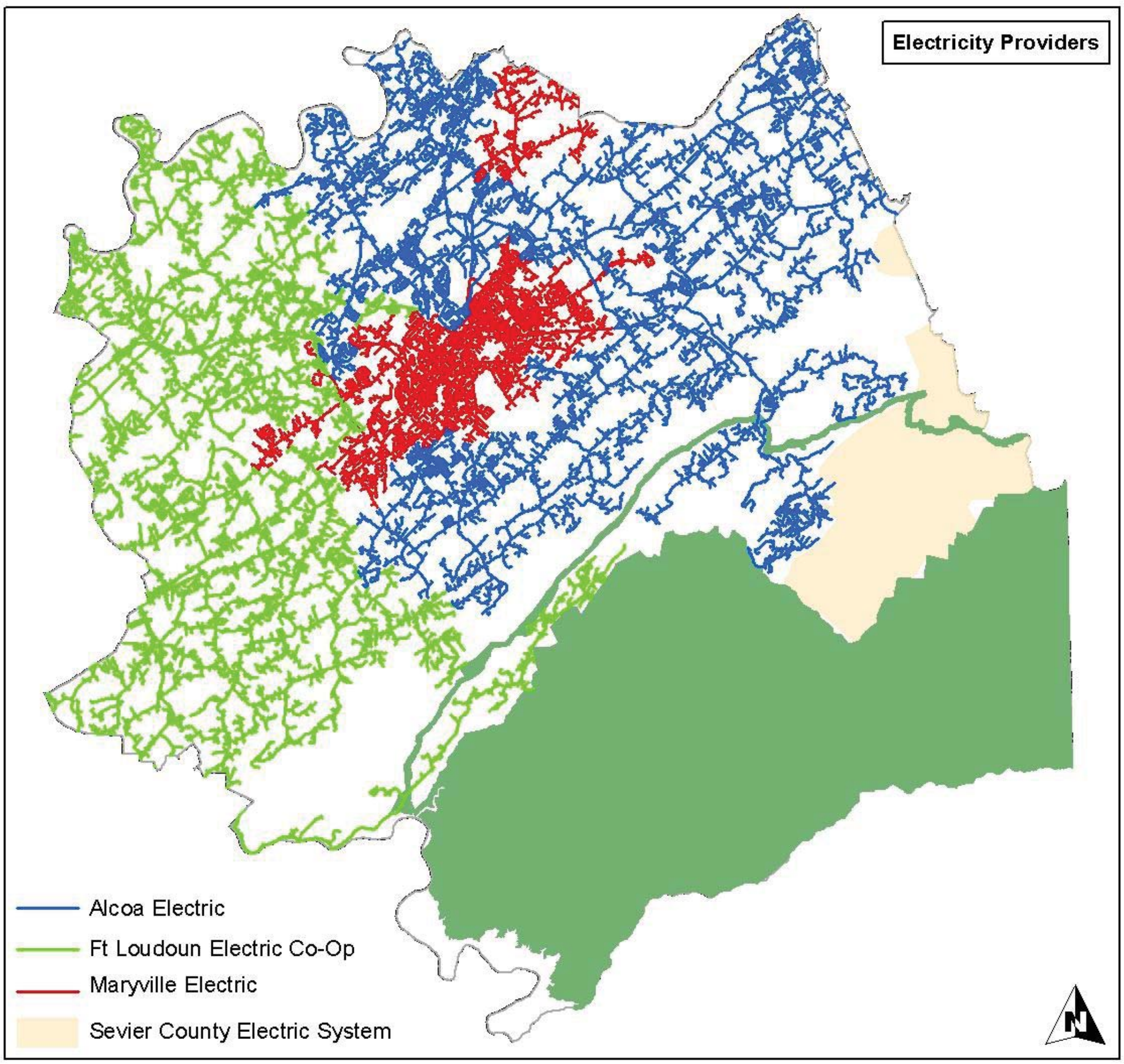
Sewer. Public sewer serves only part of the households and businesses in the county. The Blount County Environmental Department estimates that about 56 percent of households are not connected to public utility sewer, but rely on on-site septic tank and leach field for disposal of waste. The map below presents the coverage of the municipal providers and small utility systems.



The main providers of public utility sewer are the two cities of Alcoa and Maryville, which jointly operate a regional sewage treatment plant. The municipal systems cover most of the

area within the two large cities, and limited areas outside the cities. Alcoa covers 5,100 residential customers and 900 commercial customers. Maryville covers 11,156 residential customers and 1,333 commercial customers. In addition to the integrated city systems, South Blount Utility District and Tennessee Wastewater Systems operate small, site specific wastewater treatment facilities scattered outside the two municipal systems.

Electric**.** Utility electric service essentially covers all households and businesses in the county. The map below shows the coverage of the four electric utility providers in the county.



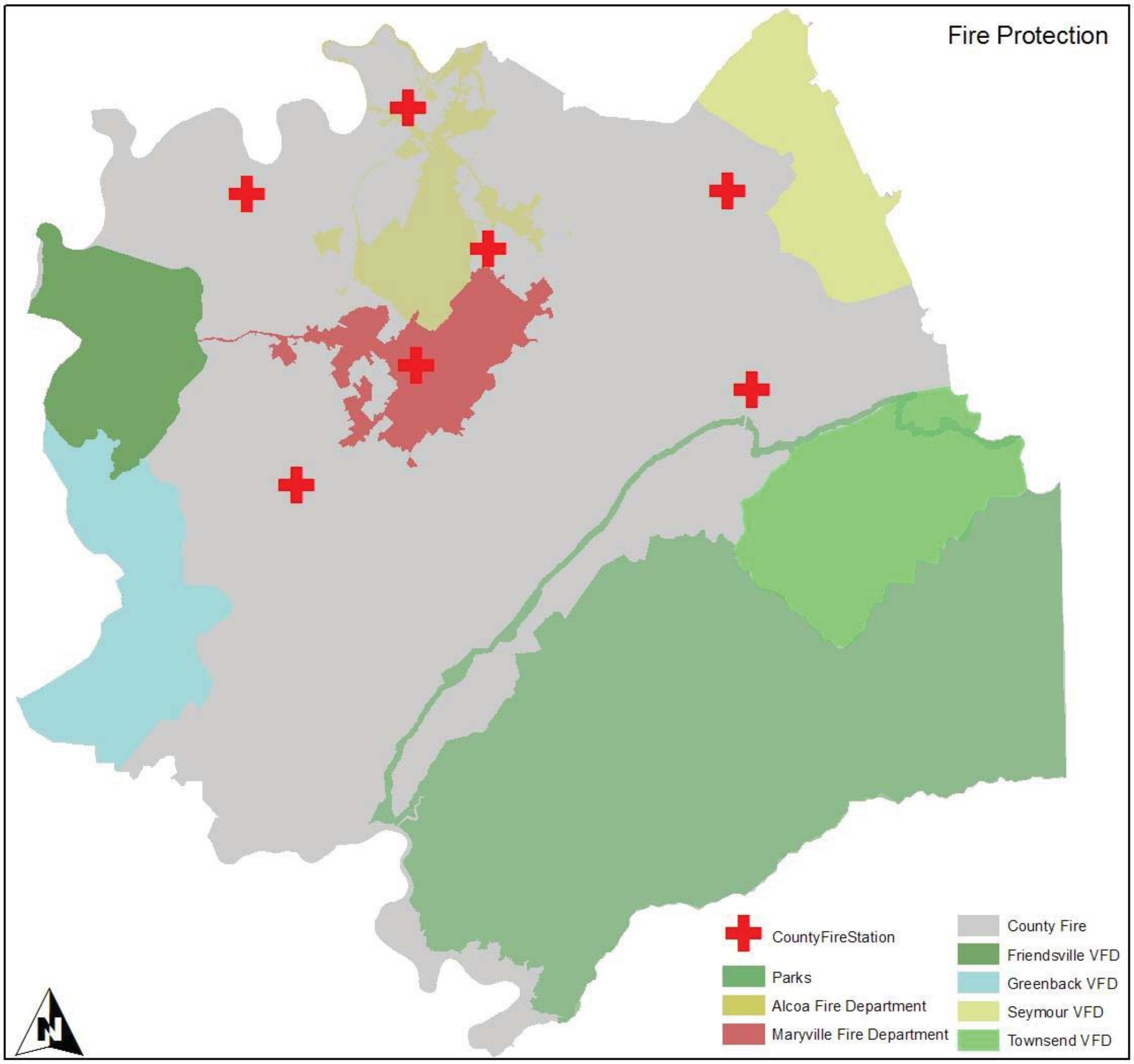
Alcoa Electric covers the city of Alcoa, the city of Louisville, and much of the eastern and southern portion of the county, with 23,719 residential customers and 3,667 commercial customers. Maryville Electric covers the city of Maryville, the city of Rockford and other small

portions of the county outside city limits, with 16,000 residential customers and 4,000 commercial customers. Fort Loudon Electric Cooperative covers the western portion of the county and the city of Friendsville, with 12,051 residential customers and 1,919 commercial customers. Sevier County Electric System covers the Townsend and Tuckaleechee Cove area with 1,920 residential customers and 100 commercial customers. Note that the total residential customers accounted from reports by providers exceeded the number of households projected for the county in 2010. This may be due to error in estimation for multi-county service providers Fort Loudon Electric serving parts of Monroe and Loudon County also, and to a lesser extent Sevier County Electric System with main service area in Sevier County, and may also be due to counting certain non-commercial and non-residential uses as residential customers.

None of the utility providers generates electricity, and all electricity is purchased from the Tennessee Valley Authority. Not shown is TAPOCO, a dedicated industrial generator which operates a series of four dams along the Little Tennessee and Cheoah Rivers to serve the large electricity demand of the Aluminum Corporation of America (ALCOA) operations in the City of Alcoa.

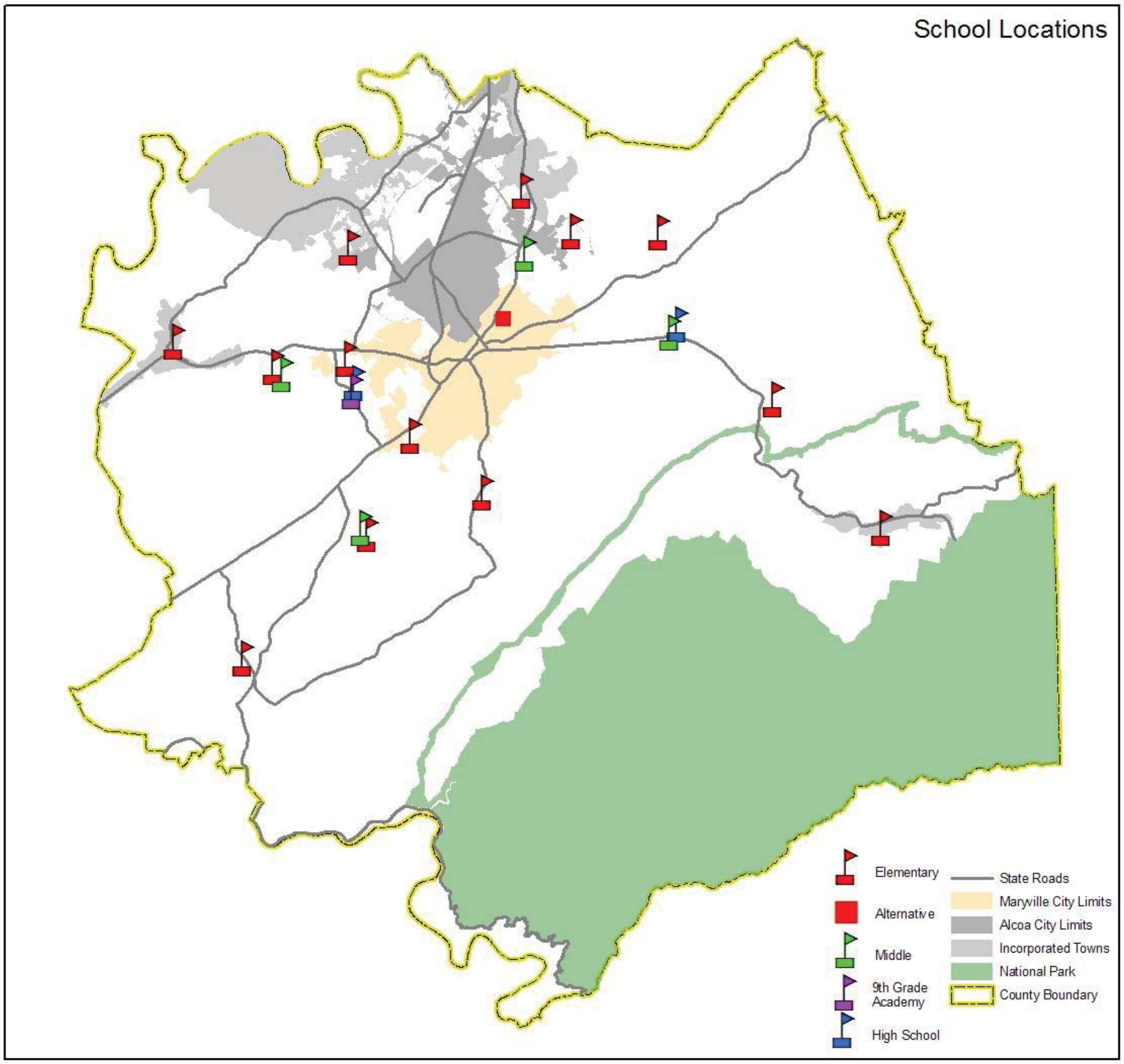
***Fire Protection*.** The cities of Alcoa and Maryville operate municipal fire departments that cover incorporated areas. The remainder of the county is covered by the Blount County Fire Protection District and four volunteer fire districts. See map on the following page for area of coverage and fire stations. In addition, the McGhee Tyson Airport and the Great Smoky Mountains National Park have internal firefighting operations. All jurisdictions operate under mutual aid agreements that allow cross-jurisdiction provision of fire protection when necessary.

Law Enforcement and Justice. The Blount County Sheriff's Office (BCSO) covers all of Blount County for law enforcement. However, the cities of Alcoa, Maryville and Townsend have their own police departments and effectively have separate jurisdiction. The other cities of Friendsville, Louisville and Rockford come under the general law enforcement service of the BCSO. The BCSO also administers the county jail at the Blount Count Justice Center, and a juvenile detention facility in the Blount County Courthouse. The offices of the BCSO are located in the Blount County Justice Center, along with all courts in the county (except Juvenile Court), and related offices of Circuit Court Clerk, Clerk and Master, and District Attorney General. The Juvenile Court and related administrative offices are housed in the Blount County Courthouse along with the juvenile detention facility. The McGhee Tyson Airport has its own security force, as does the National Parks Service in the Great Smoky Mountains National Park. Other law enforcements officers from the State of Tennessee and the federal government provide additional service in the county. All jurisdictions operate under mutual aid agreements that allow cross-jurisdiction enforcement activities when necessary.



Schools. Alcoa, Maryville and Blount County operate separate public school systems educating approximately 18,000 students. There are eight private schools operating in the county educating approximately 570 students, as well as families opting for private home schooling for approximately 500 students. In addition, Sevier County public schools accept several students (number unknown) from the Seymour area in the upper northeast of the county through informal agreement. See the following sources for more detailed information: State report on public schools including enrollment of the various public school systems and separate schools at http://www.tennessee.gov/education/reportcard/; list of private schools and school enrollment at http://www.privateschoolreview.com/county_private_schools/stateid/TN/county/47009; and

information on home schooling in Blount County at http://www.bhea.net/. The map below shows Blount County public school locations. See at http://www.blountgis.com/maps.html for maps of attendance zones for the public school systems and separate schools.



Parks and Recreation. Blount County along with the cities of Alcoa and Maryville jointly support a Parks and Recreation Commission with a staff of 20 that operates and maintains several parks and recreation facilities in the county. Most of the facilities are located in or near the two large cities of Alcoa and Maryville, but a park in Louisville and a trail system in Townsend provide recreation opportunities to the outlying areas. The facilities are owned by the respective governments. There are also some smaller facilities that are owned and

operated independently by the smaller towns, and some facilities related to Fort Loudon Lake access that are owned and maintained by the Tennessee Valley Authority. See at http://parksrec.com/ for more information on individual facilities and programs. The Parks and Recreation Master Plan provides detailed analysis of capacities and coverage and can be found at http://www.blounttn.org/planning/plans.asp (scroll then to bottom of web page). A map of the greenway park system in Alcoa and Maryville can be found at http://www.blountindustry.com/library/Greenway_Trail_System__1184872305.pdf.

Solid Waste and Landfill. The City of Alcoa operates a Solid Waste Landfill for the county under supervision of the Alcoa, Maryville and Blount County Solid Waste Authority, with membership appointed by the two cities and the county. Alcoa and Maryville provide municipal garbage pick-up and disposal. The remainder of the county is covered by several private garbage hauling service providers. Recycling drop-off services are provided at the Solid Waste Landfill, and at convenience centers in the cities of Maryville and Alcoa.

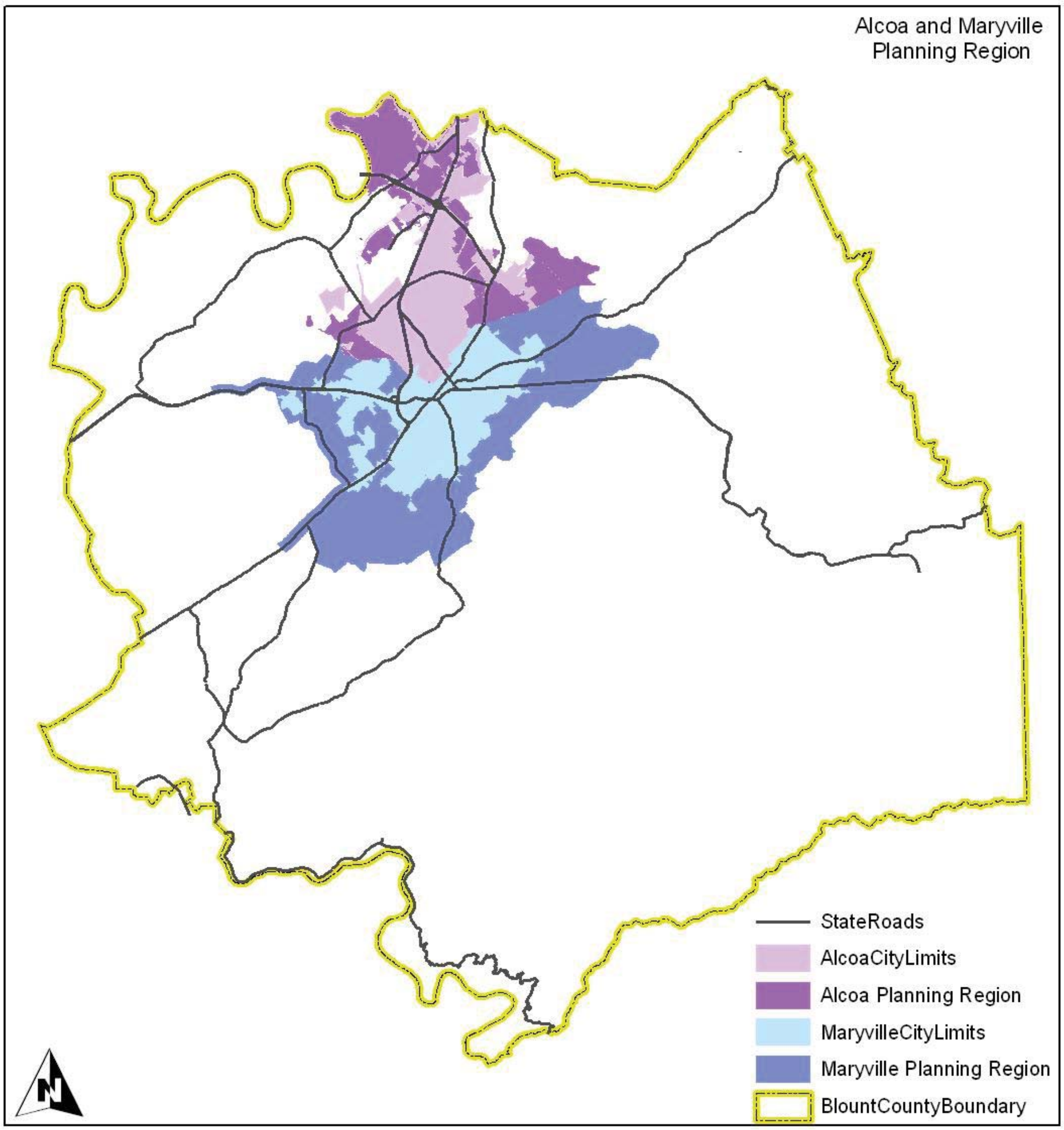
Industrial Development. Industrial development is promoted by the Blount County Economic Development Board, with joint membership and support from Blount County and the cities of Alcoa and Maryville. The Board has been instrumental in developing several industrial parks in the county. See at http://www.blountindustry.com/about/strategy.html for information about the Economic Development Board and its programs, and map of industrial park sites at http://www.blountindustry.com/library/IndustrialParkOverviewMap_1178892822.pdf.

Health and Hospital. The Blount County Health Department operates a public health center located in the City of Maryville with support from Blount County and the State of Tennessee (see more information at http://www.blounttn.org/health.asp). Also located in the City of Maryville is the Blount Memorial Hospital, a public hospital owned by Blount County, which provides a wide range of services and is administered by a Board that is appointed by Blount County, Alcoa and Maryville (see history at http://www.blountmemorial.org/body.cfm?id=148).

Public Library. Blount County, Alcoa and Maryville jointly support the Blount County Public Library located in the City of Maryville (see more information at http://www.blountlibrary.org/). The City of Townsend supports the Mary E. Tippet Memorial Library in Townsend.

General Government. Blount County and all the cities provide general government services. In accordance with state statutes and with elected office heads, Blount County provides services of County Clerk, Register of Deeds, Property Assessor, and Trustee in addition to the services of highways and roads, schools, law enforcement, justice, and hospital and health noted earlier. Under the County Mayor's office, the county provides public services such as animal control, soil conservation and agricultural extension, veteran affairs assistance, records management, and planning and codes enforcement.

The planning function in the county is administered independently in each jurisdiction by separate planning commissions. Blount County, Alcoa and Maryville all provide planning staff support to their respective planning commissions. The cities of Friendsville, Louisville, Rockford and Townsend contract their planning staff support from the Local Planning Assistance Office of the State of Tennessee Department of Economic and Community Development. The cities of Alcoa and Maryville have planning regions that extend outside their city limits as shown on the map below. The cities have subdivision regulation authority while the county retains zoning authority in the planning regions, and the cities and the county plan for the regions.



Development and Land Use – Patterns on the Land.

Blount County had a history of non-native settlement that stretched back to the 1700's. Blount County was formed by division from Knox County in 1795, and Maryville was designated as the county seat. Agriculture was the main industry in the early history of the county, and was accommodated in the rolling lowlands and along rivers and streams. Friendsville was formed by settlement of Quakers in the late 1700's. The Rockford community developed along the main route from Maryville to Knoxville, now Old Knoxville Highway, near a ford in the Tennessee River. The community of Louisville was an important river landing for cargo until its partial inundation by the Fort Loudon reservoir in the 1940's. Lumbering came into its prime in the early 1900's, and the Little River Lumber Company gave rise to the community of Townsend. Alcoa was formed as an extension of the founding of the Aluminum Corporation of America in the early 1900's, and grew also as a northern urban extension of Maryville. McGhee Tyson Airport was deeded to the City of Knoxville in 1934 adjacent to the City of Alcoa. With major transportation improvements linking the airport to Knoxville, urbanization of the Alcoa/Maryville area intensified. Many other small and unincorporated communities developed as Blount County settlement progressed, including Wildwood, Ellejoy, Chilhowee View (Nickel Point), Walland, Benfield, Happy Valley, and Lanier. Eagleton Village developed as an outgrowth of housing development for the ALCOA plant, Top of the World evolved as a transformation of a camping and recreation development, and Seymour spread as an extension of settlement pattern from Sevier and Knox counties off of Chapman Highway. This history of settlement, from residential, commercial, industrial and agricultural development, left its mark in patterns on the land.

Population Patterns, Urban and Rural Development. We can get an overall view of settlement pattern by looking at where people live and concentrate. Population density is one measure of settlement pattern and intensity. The map on the following page shows the population density of the county in 2000 as persons per square mile at the census block level. There was a concentration in and around the two cities of Alcoa and Maryville, historically the main urban center of growth in the county. Population density decreased from this urban center into the more rural areas of the county, but showed scattered areas of substantial concentration. These scattered areas included some defined older communities, but also included residential subdivisions that were developed independent of older settlement patterns. This will be explored further in the section on historical residential development patterns below.

Urban areas are generally characterized by higher density of population, while rural areas are generally characterized by lower density of population. The point at which density becomes urban or rural is not precise, but the Bureau of the Census defines urbanized areas as follows:

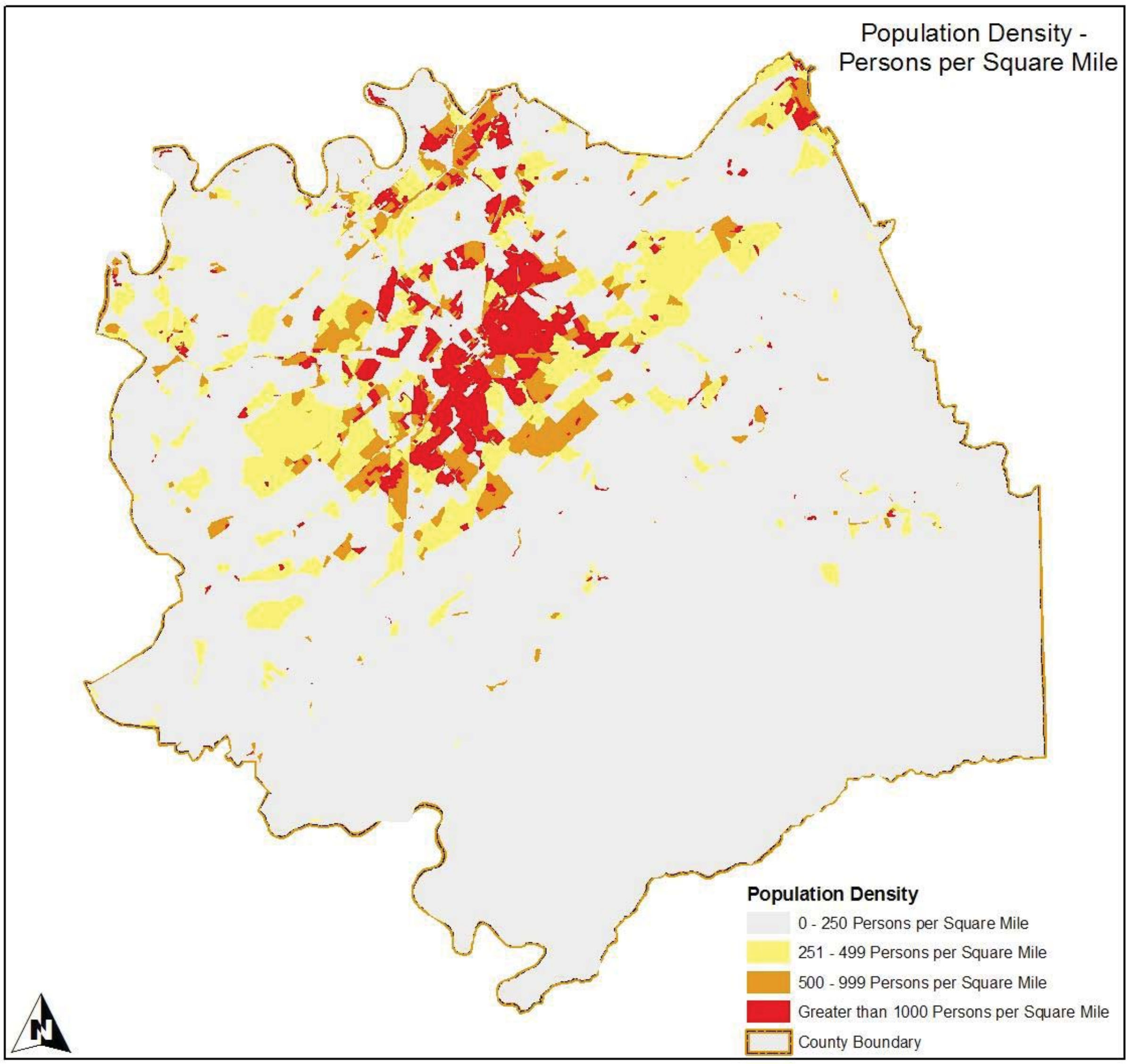
> For Census 2000, the Census Bureau classifies as "urban" all territory, population, and housing units located within an urbanized area (UA) or an urban

cluster (UC). It delineates UA and UC boundaries to encompass densely settled territory, which consists of:

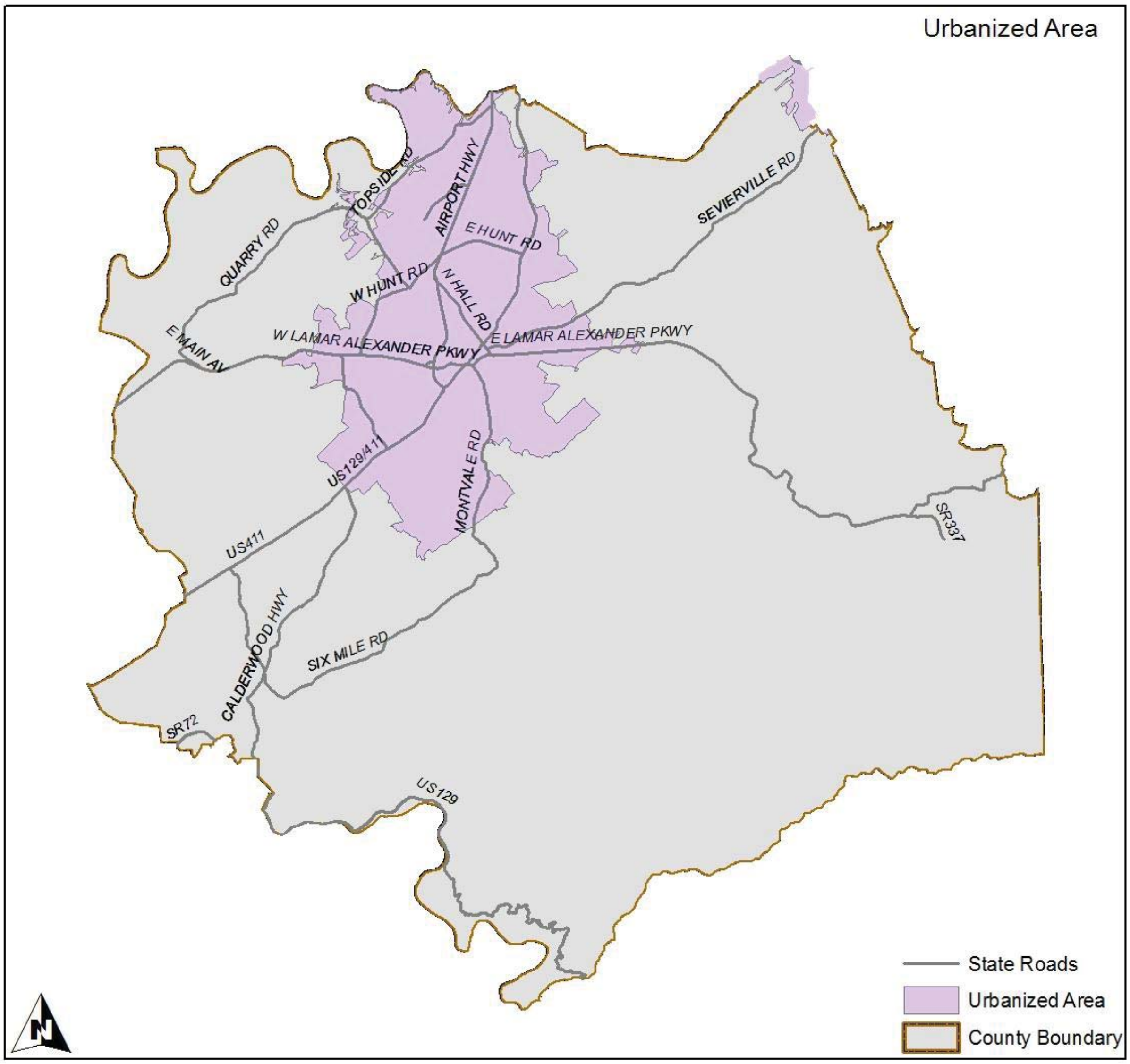
- core census block groups or blocks that have a population density of at least 1,000 people per square mile; and
- surrounding census blocks that have an overall density of at least 500 people per square mile.

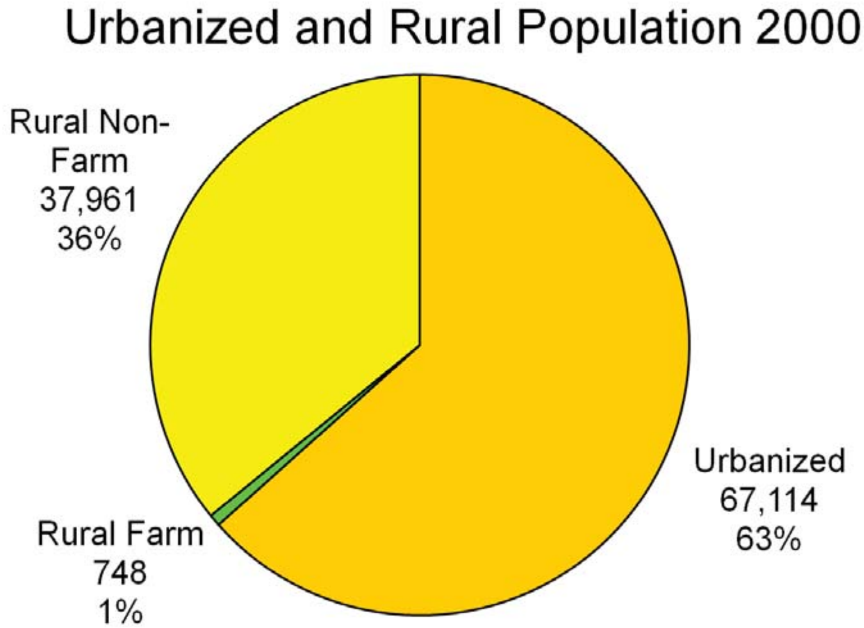
In addition, under certain conditions, less densely settled territory may be part of each UA or UC. The Census Bureau's classification of "rural" consists of all territory, population, and housing units located outside of UAs and UCs.

(See more at http://www.census.gov/geo/www/ua/ua_2k.html.)

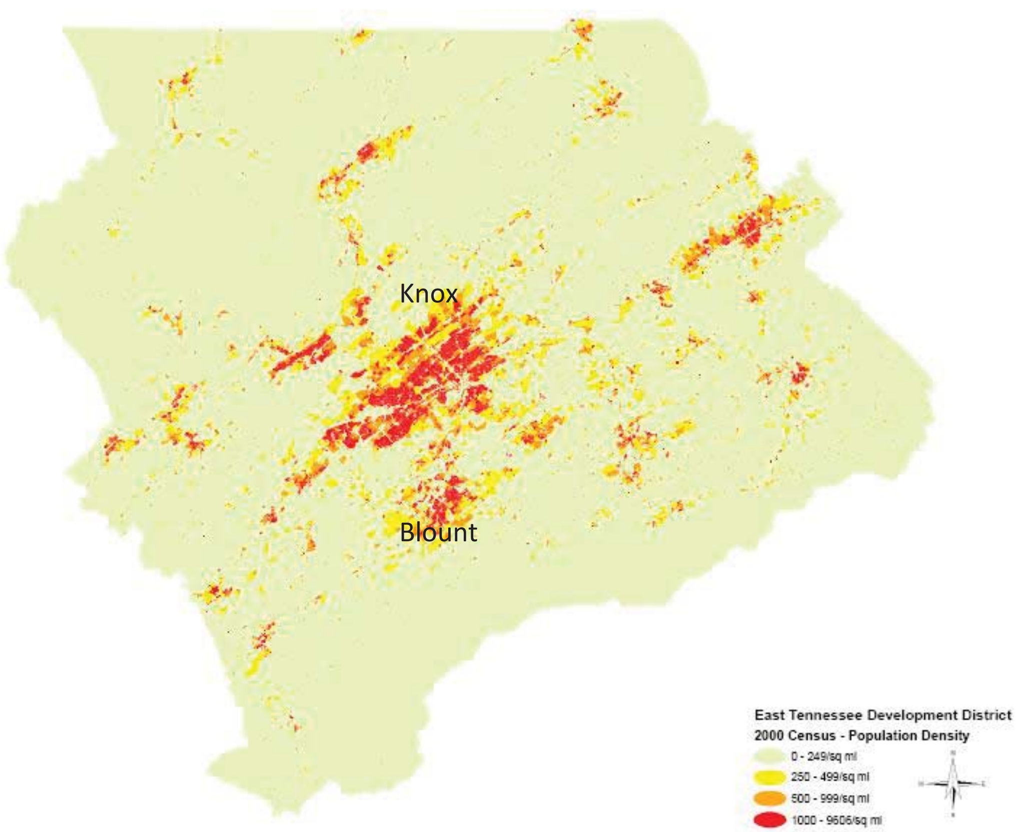


The map below shows the urbanized area of the county, basically being the concentration of population and settlement in and around Alcoa and Maryville, and including parts of Rockford and Louisville, as well as unincorporated Eagleton Village. A small portion of unincorporated Seymour in the northeast of the county also was identified as urbanized, and was an extension of the urbanized area within Knox and Sevier counties. The pie chart on the following page shows that the majority of the population in Blount County lived in urbanized areas. The pie chart also shows that most of the "rural" population was not associated with farming, but was just living in low density areas not directly associated with the urban pattern in the county.





The map below shows population density in a regional context for the 16 counties of the East Tennessee Development District (county boundaries not shown), with the red areas identifying a larger pattern of urban settlement.



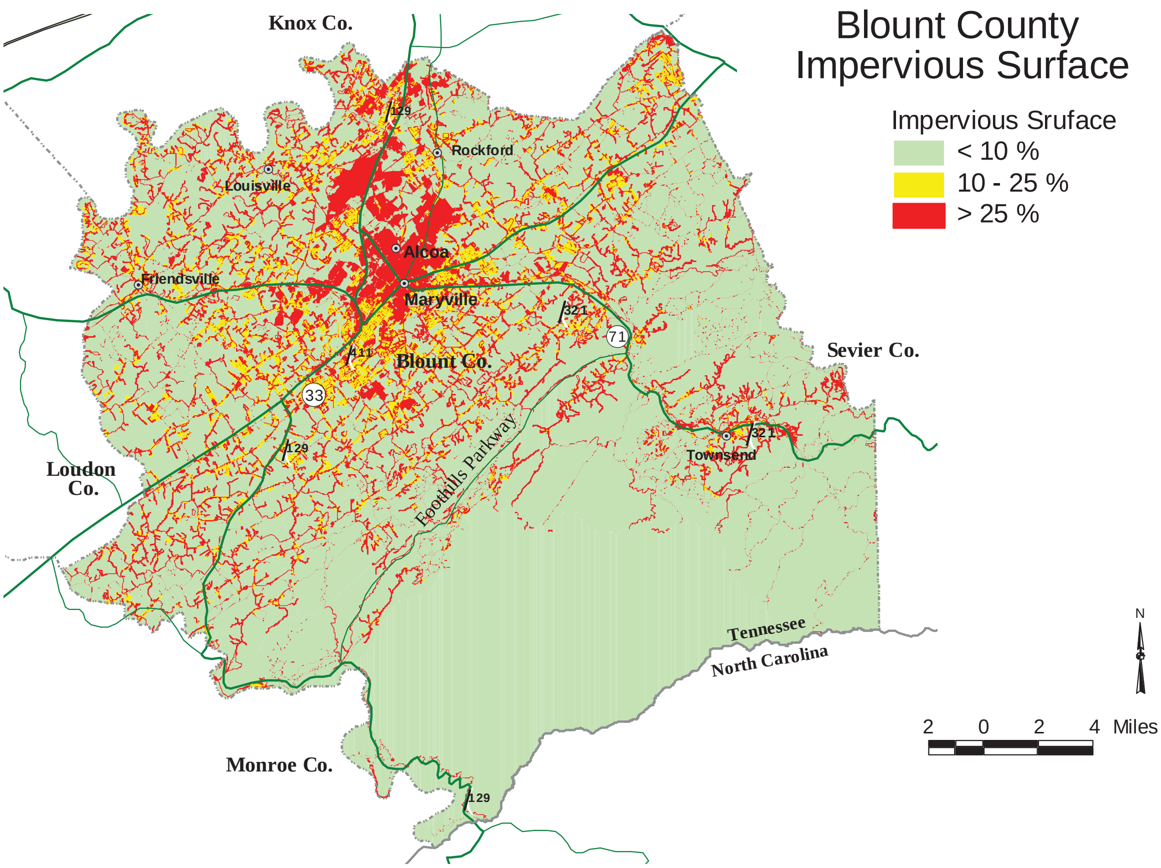
The regional pattern shows varying degrees of geographical continuity and connectivity. Continuity is evident between the Blount County cities of Alcoa and Maryville and the large urban center of Knoxville and Knox County to the north, and reinforces the relationships shown previously with map and discussion of employment commuting pattern (see at page 41). The Office of Management and Budget delineates metropolitan areas based on presence of a core urban area of population 50,000 or greater, and surrounding counties with substantial connectivity to the core (see definition and lists of metropolitan areas at http://www.census.gov/population/www/metroareas/metrodef.html). Knoxville provides the urban core of a metropolitan region that includes Blount County, along with Anderson, Knox, Loudon and Union counties.

Development Pattern in Impervious Surfaces. The density of population presents one overall view of development pattern related to where people live. People conduct other activities on the land, such as commerce, production, education, and worship, all of which take place at certain locations. These activities along with residential location are usually concentrated in urban areas, and form a pattern of impervious surfaces with roads, driveways parking lots, and rooftops, that do not allow penetration of water into the ground. The pattern of these impervious surfaces can give an overall view of where development is concentrated. The map on the following page shows the pattern of impervious surface from the Integrated Pollution Source Identification project interpreted from year 2000 aerial photographs.

The pattern of impervious surface, and thus of overall intensity of development, follows closely the pattern of population density, with concentration in and near the cities of Alcoa and Maryville. The outlying areas show a lattice pattern related to roads and linear development along roads.

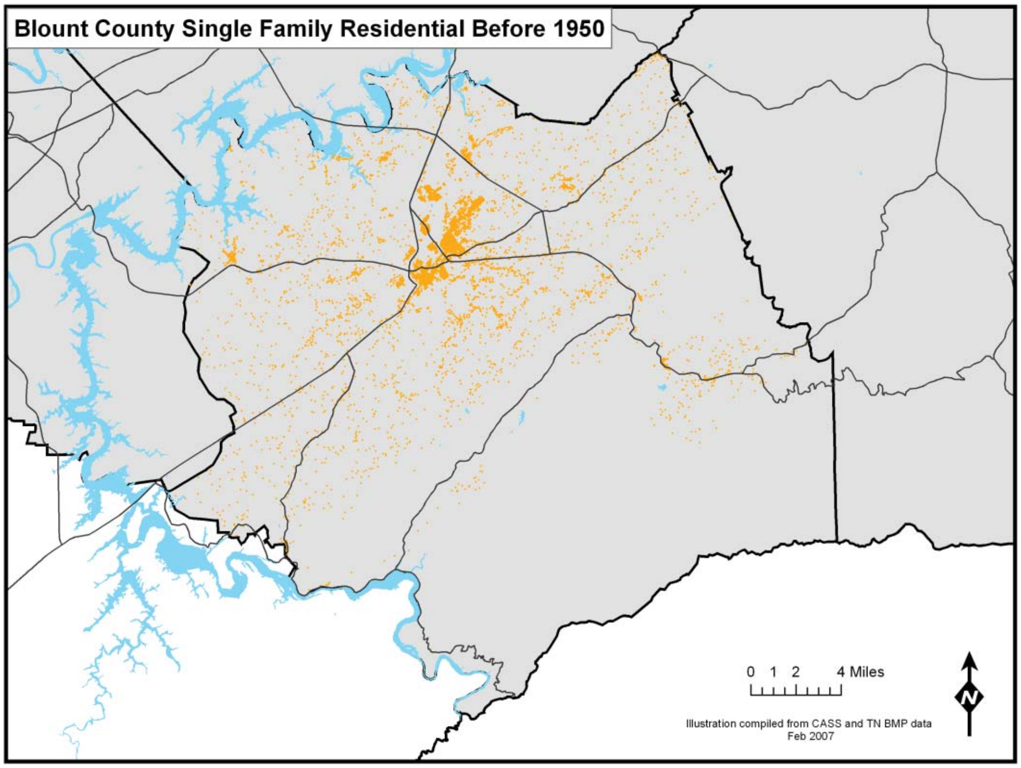
The significance of the impervious surface categories relates to water quality. With greater impervious surface, and the usual greater intensity of use, rainfall runs off at a faster rate, and carries with the runoff a greater amount of accumulated pollution from such surfaces as roads and parking lots. This is related to previous analysis and map of polluted streams (see at page 59) from the State of Tennessee 303(d) list. For those watersheds covering Alcoa and Maryville, the associated streams showed substantial pollution from urban development.

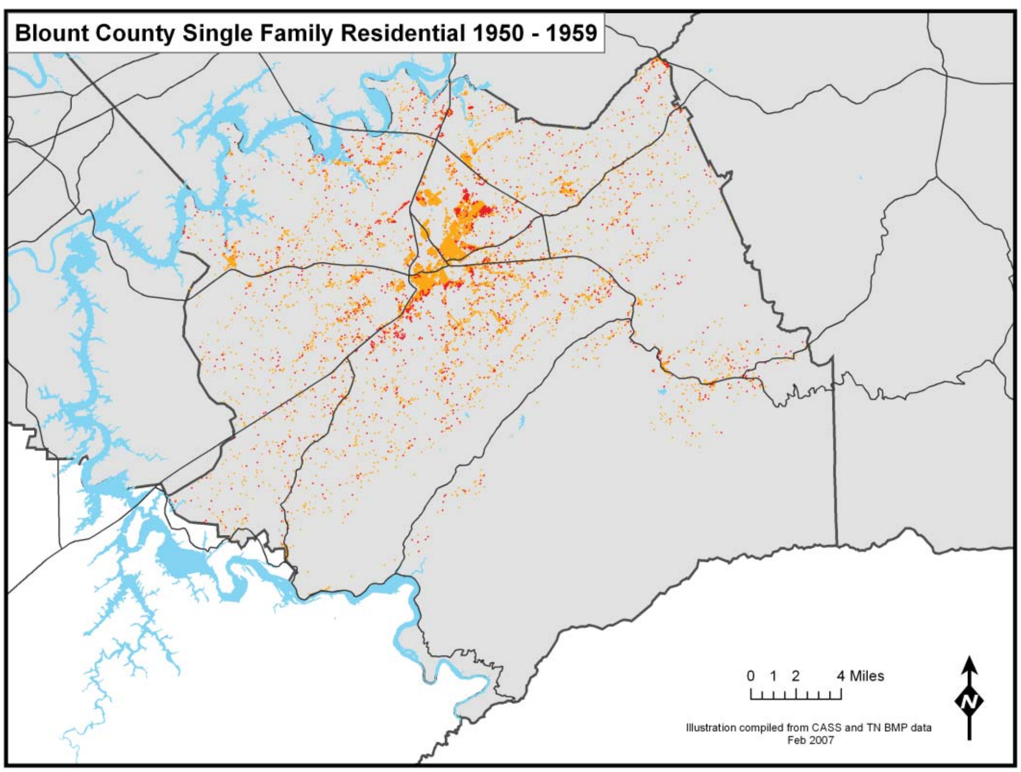
As a general rule, for areas or watersheds with average impervious surface of less than 10 percent, characteristic of most of the rural areas of the county, the probability of substantial pollution load from development is slight. For average impervious surface of between 10 to 25 percent, the probability of pollution load increases since there is greater area to both accumulate pollutants and to wash off in rain events. For areas or watersheds with average impervious surface greater than 25 percent, the probability of stream pollution is high, characteristic of the developed urban areas of the county.

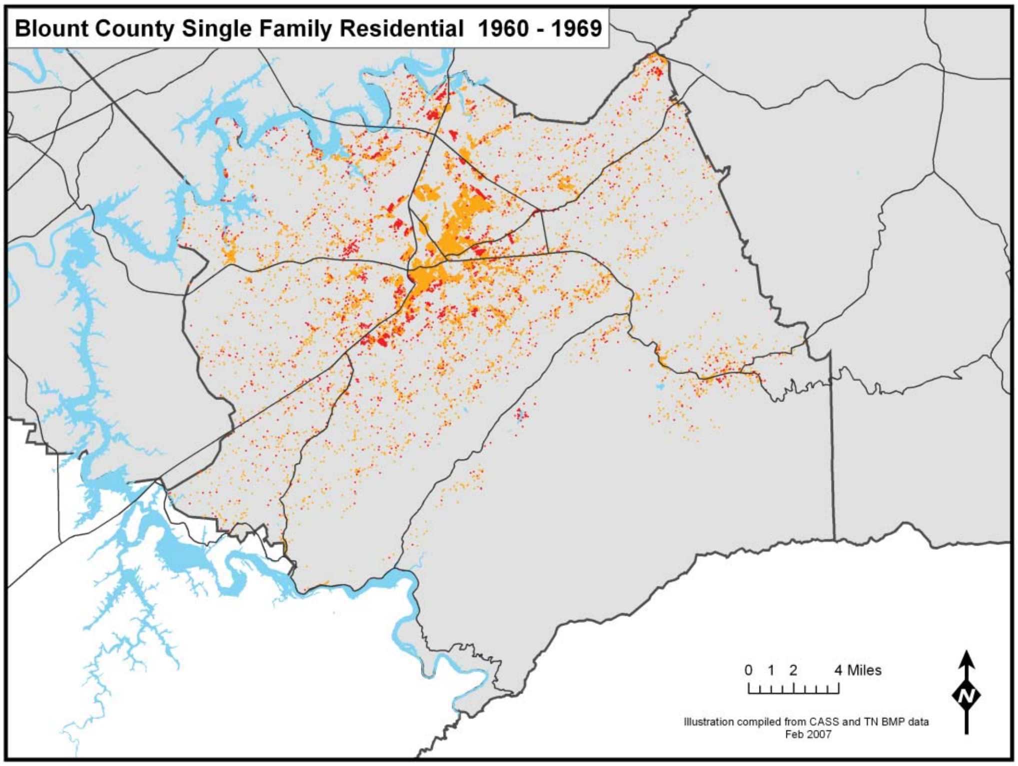


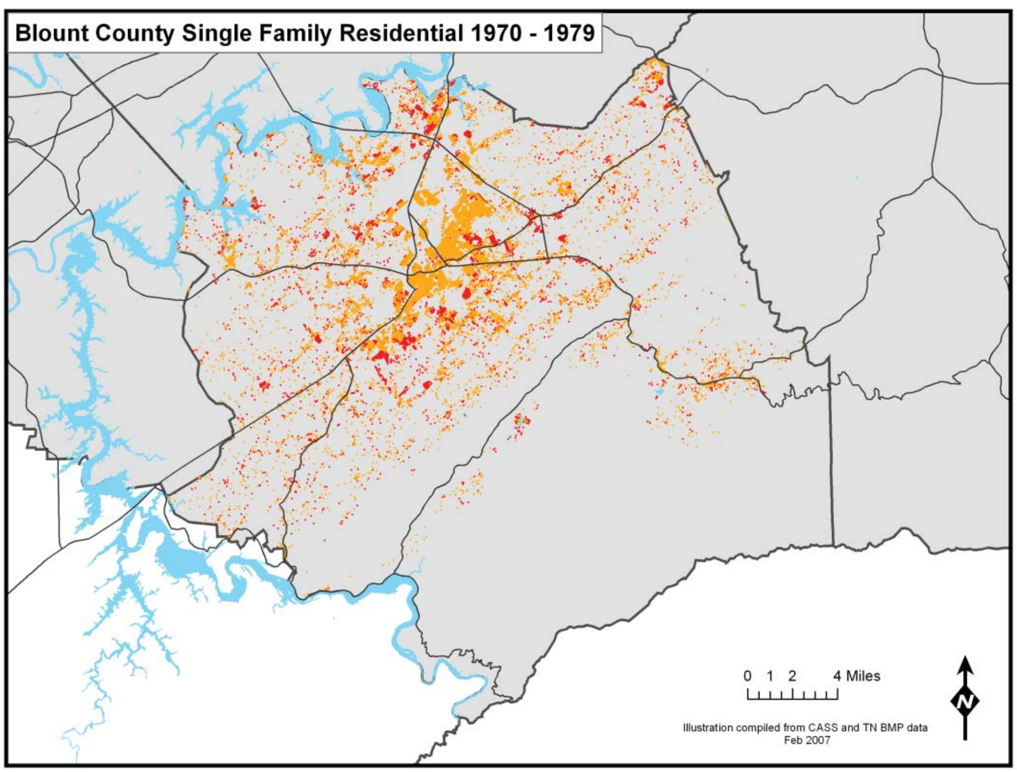
Residential Development, Historical Patterns. Population density is related to where people live as households. Households live in physical structures called housing units (see also analysis starting at page 29). We can create a historical view of residential development by mapping housing units by date of construction from records in the office of the Blount County Property Assessor (thanks to the East Tennessee Region Local Planning Assistance Office for the following maps).

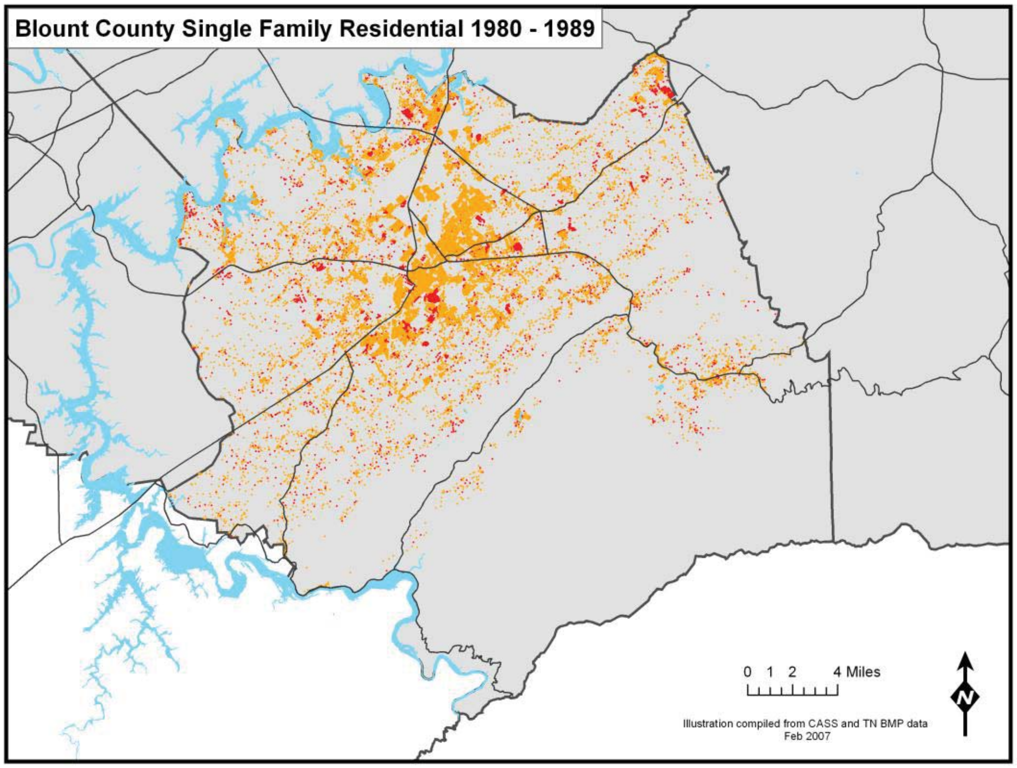
The series of maps on the following pages capture about 85 percent of current housing units (multiple units in a structure and mobile home parks were not included – older housing units from the past could have been destroyed and thus not of current record). The maps portray first the pattern of residential structures at the end of 1949, and progress by highlighting additional residential structures by decade in red from 1950 to 2006. The dots for each residential structure are exaggerated to highlight pattern. For a more proportioned perspective, see the section on land use following.

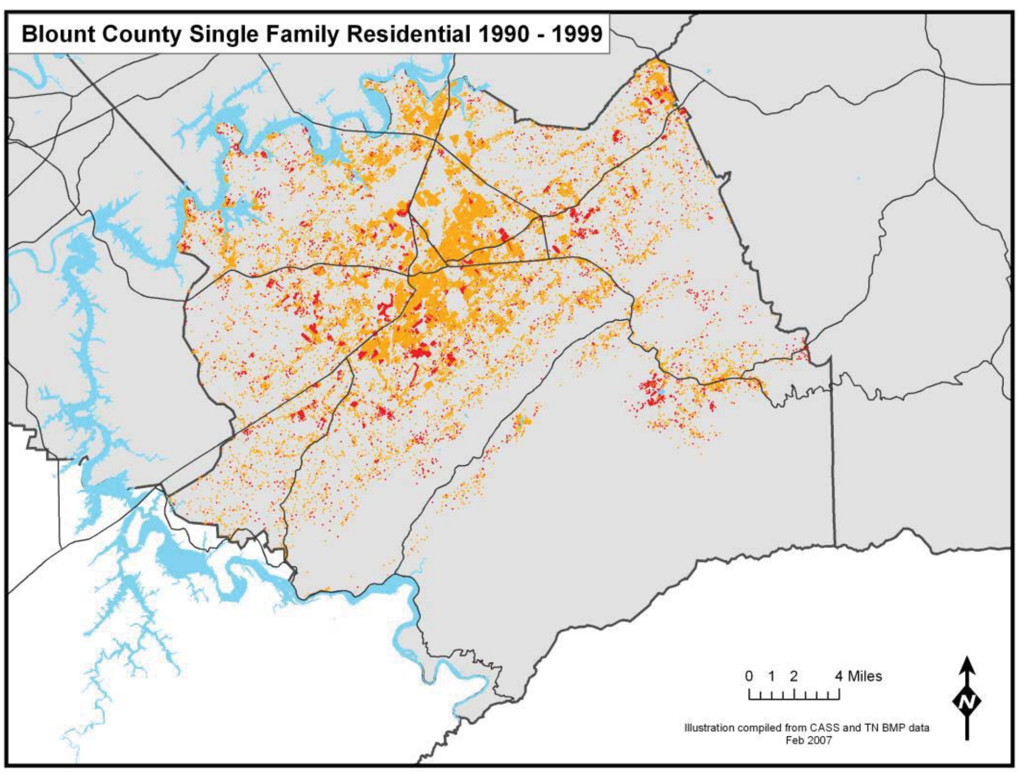

Blount County Single Family Residential Before 1950
0 1 2 4 Miles
Illustration compiled from CASS and TN BMP data
Feb 2007
N

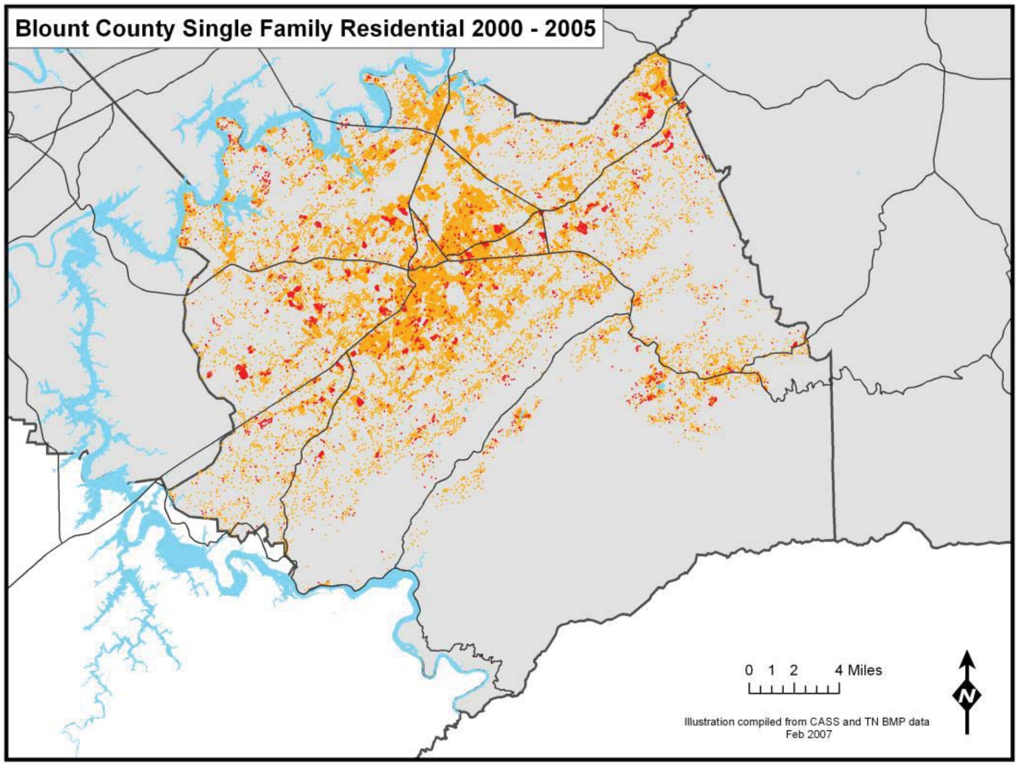

Blount County Single Family Residential 1950 - 1959
0 1 2 4 Miles
Illustration compiled from CASS and TN BMP data
Feb 2007
N

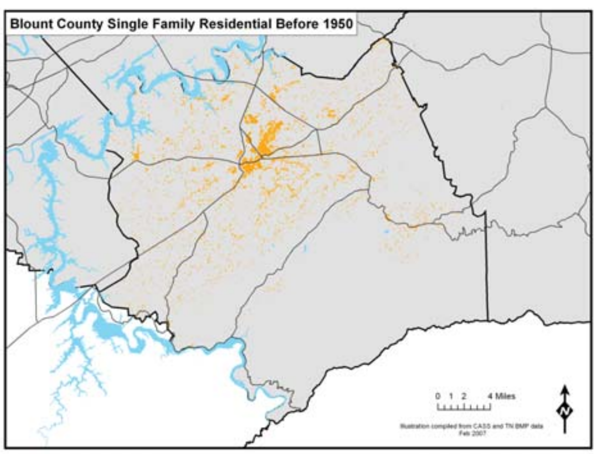

Blount County Single Family Residential 1960 - 1969
0 1 2 4 Miles
Illustration compiled from CASS and TN BMP data
Feb 2007

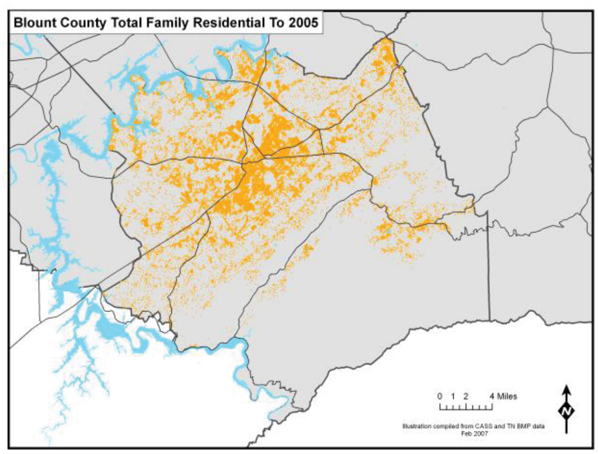

Blount County Single Family Residential 1970 - 1979
0 1 2 4 Miles
Illustration compiled from CASS and TN BMP data
Feb 2007


Blount County Single Family Residential 1980 - 1989
0 1 2 4 Miles
Illustration compiled from CASS and TN BMP data
Feb 2007


Blount County Single Family Residential 1990 - 1999
0 1 2 4 Miles
Illustration compiled from CASS and TN BMP data
Feb 2007







Before 1950, the pattern of residential structures was concentrated in the cities of Alcoa and Maryville, and such pattern was characterized by grid street layout, small lots and higher density. Scattered and low density development was present in the rural areas, much of it related to agriculture, but some related to older historical communities such as Friendsville (now incorporated) and Wildwood (unincorporated).

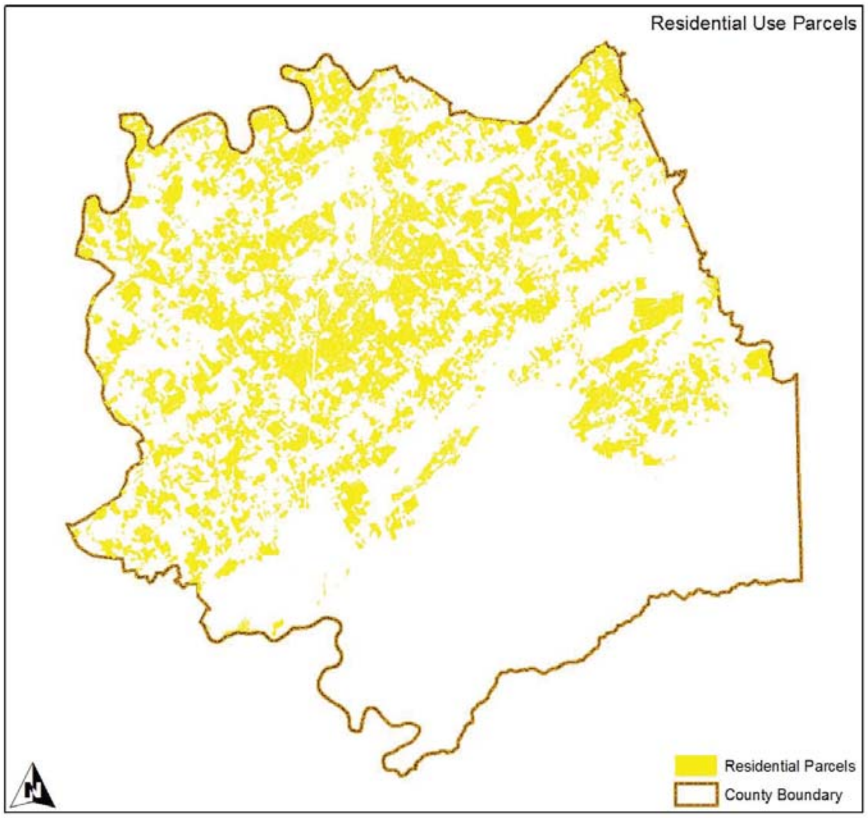
A substantial number of residential structures were added in the 1950's, even as population growth was characterized by substantial outmigration. Outmigration was occurring at the same time that average household size was beginning to decrease, and demand for new housing may have been fueled by resulting greater household formation. Also, additions of residential structures were predominantly located close to the existing urban core, and decreases in rural households related to decrease in agriculture employment during the decade may have resulted in abandonment of some agricultural related housing. A pattern of scattered residential development into rural areas was just emerging at the fringe of the Alcoa and Maryville urban core.

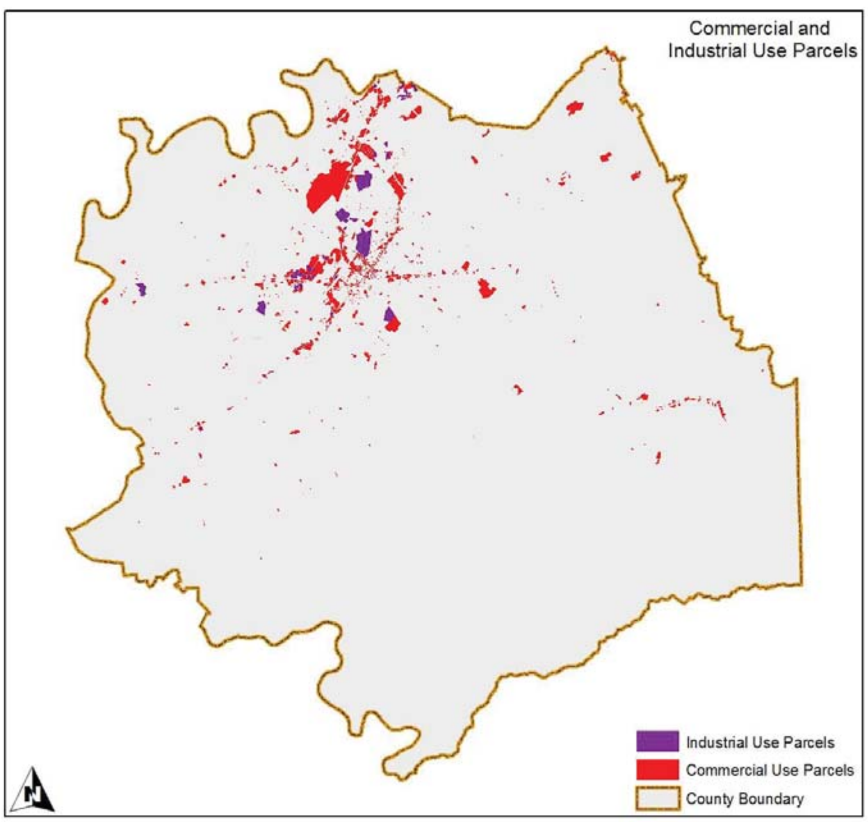
From 1960 to 2005 as county population grew with substantial in-migration, new residential development took on a much more scattered pattern with large tract subdivisions in rural areas, but with much development still located near the urban center. The net effect of the five and-one-half decades of residential development is compared in the two smaller maps on the preceding page. The urban center still showed a higher density around the old 1949 urban core, but substantial residential use was scattered throughout the lowlands of the county.

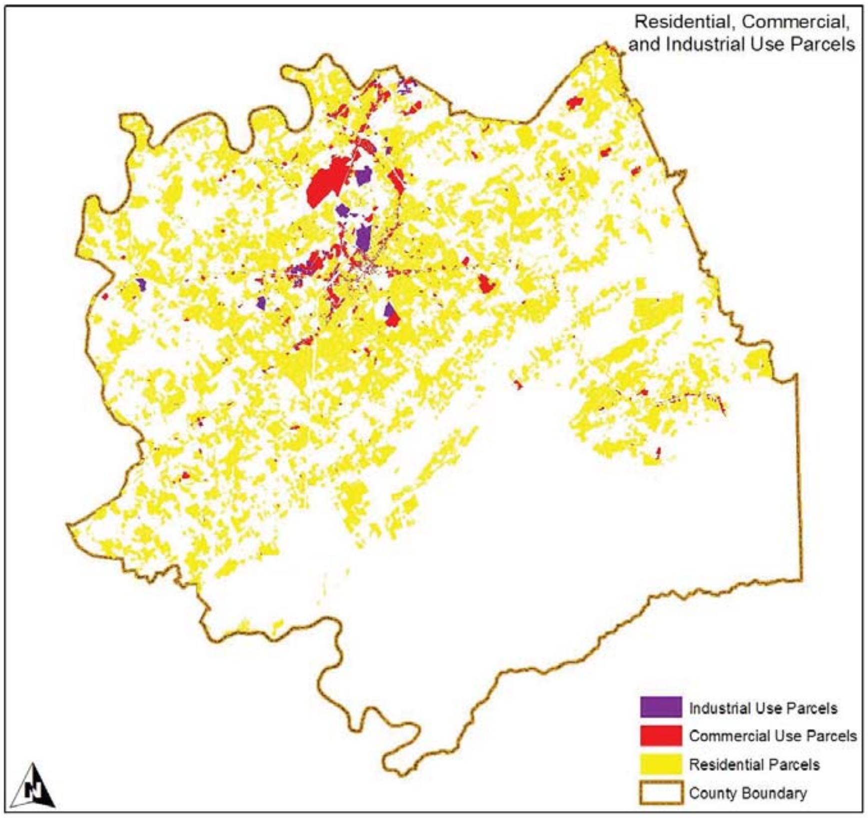
Land Use Maps - Integrating Residential, Economic and Other Patterns. The maps on the preceding pages showed residential structure location as a point. As a land use, residences used varying areas of land (lots or parcels), as did other uses such as commercial, industrial and agricultural land use.

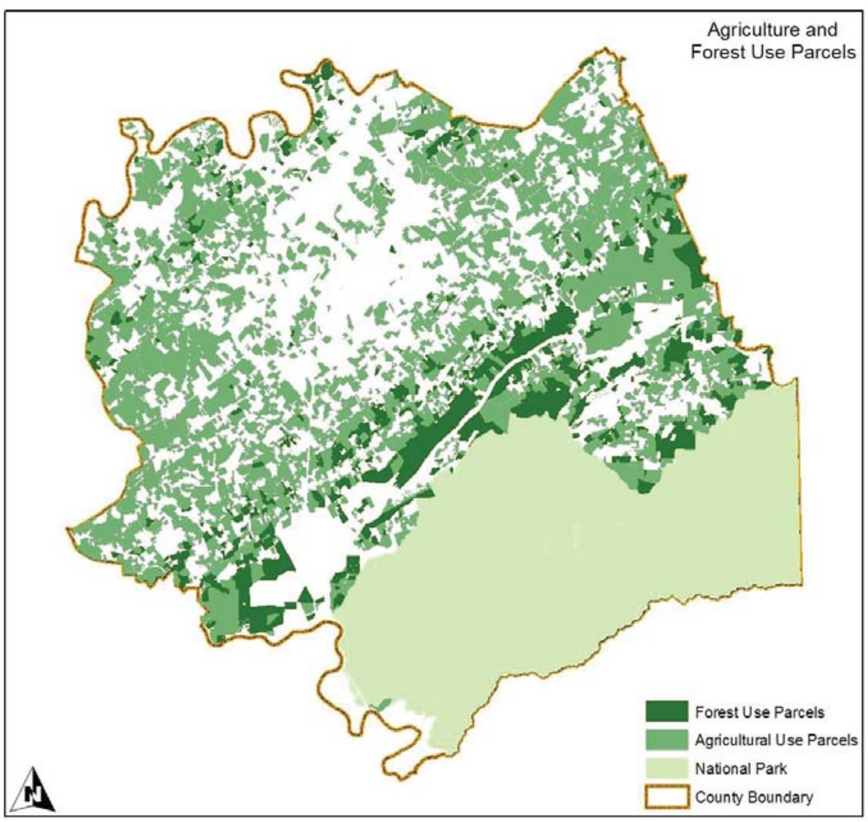
There are many ways of portraying land use. The following analyses used three sources and formats of presentation. First was a mapping to show overall pattern of present residential, commercial/industrial, and agricultural uses coded in the files of the Blount County Property Assessor as of June 2010. Second was a more detailed and adjusted analysis done in 2006 by the East Tennessee Region of the Local Planning Assistance Office (Tennessee Department of Economic and Community Development) using also the same parcel information from the Office of the Blount County Assessor (also stored as a file in the Tennessee Comptroller of the Treasury – see at http://www.assessment.state.tn.us/). Third was result of an interpretation of year 2000 aerial photographs done for the Integrated Pollution Source Identification (IPSI) project (see final IPSI report at http://www.blounttn.org/planning/l%20-%20IPSI%20report.pdf).

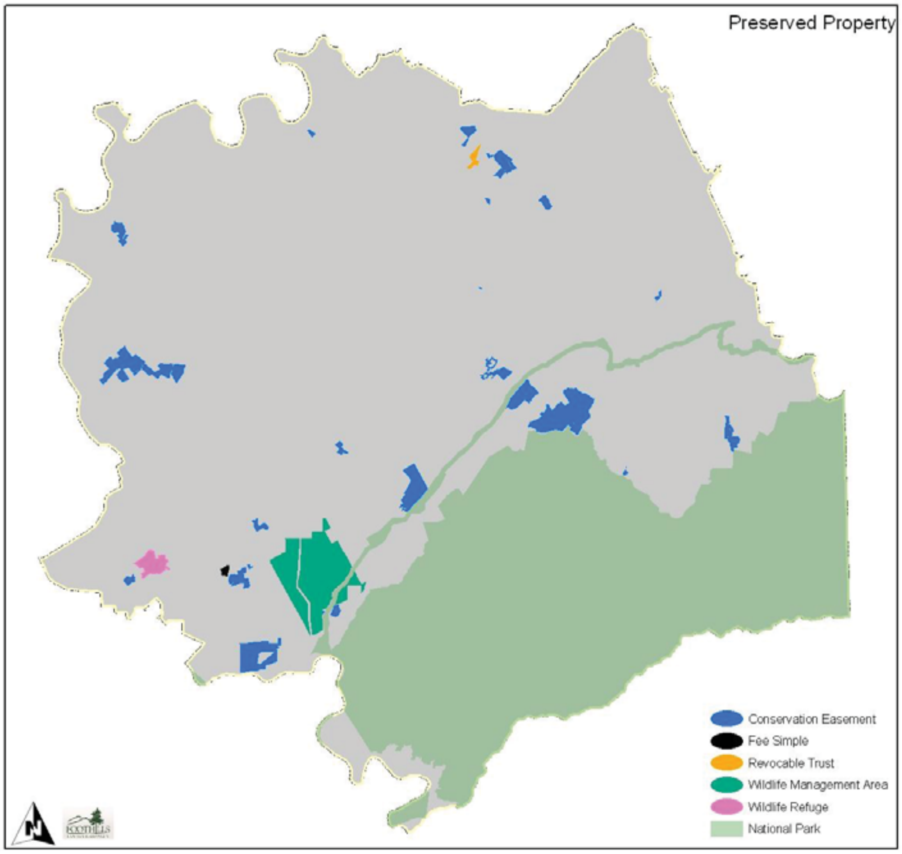
2010 Land Use Patterns – Tax Record Base. The Blount County Property Assessor's office keeps records of all parcels in the county, and assesses for tax purposes each parcel based on use. The maps on the following pages portray in general categories the uses of residential lands (excluding apartments and mobile home parks), commercial/industrial lands, a composite map of residential/commercial/industrial lands to show overall development pattern, agriculture/forest lands, and preserved land.


Residential Use Parcels
Residential Parcels
County Boundary


Commercial and
Industrial Use Parcels
Industrial Use Parcels
Commercial Use Parcels
County Boundary


Residential, Commercial, and Industrial Use Parcels
Industrial Use Parcels
Commercial Use Parcels
Residential Parcels
County Boundary
N


Agriculture and Forest Use Parcels
Forest Use Parcels
Agricultural Use Parcels
National Park
County Boundary
N



The following will reference the above five maps in sequence. The map of residential use parcels portrays a pattern that looks denser in the rural areas than the analysis of historical residential development in the previous section (last map in that sequence). This is due to coding whole lots as residential regardless of size. Thus, the pattern of actual intensity of use is relatively overstated in rural areas. Still, the pattern mirrors the scattered nature of residential development in rural areas noted previously.

The map of commercial and industrial use parcels shows a pattern of concentration in and around the cities of Alcoa and Maryville in the urbanized area of the county, but with noticeable linear pattern stretching out along major roads. This is not surprising since commercial and industrial activities are generally traffic oriented or oriented to transportation routes. This category included the McGhee Tyson Airport even though technically the airport was owned by the City of Knoxville and could be classified as a public use.

The composite map of residential, commercial and industrial uses shows the overall pattern of development in the county, with concentration of development within the urbanized area of Alcoa and Maryville, and with scattered, mainly residential development in the rural areas.

The map of agriculture and forest uses begins to fill in the blanks of previous maps, showing a pattern of substantial agriculture and forest use still existing in the rural areas of the county.

The blanks in this map show that the urban uses in and around Alcoa and Maryville excluded most agriculture and forest use, but there were still some small embedded agriculture use parcels even within the urbanized area.

The last map fills in some of the other gaps in the previous maps, showing those lands that were purposefully preserved, particularly the large land holdings of the National Parks Service, and a relatively large wildlife management area in the south of the county. Most of these lands were in forest cover. Some of the preserved lands in conservation easements overlapped with parcels classified as agriculture or forest on the preceding map.

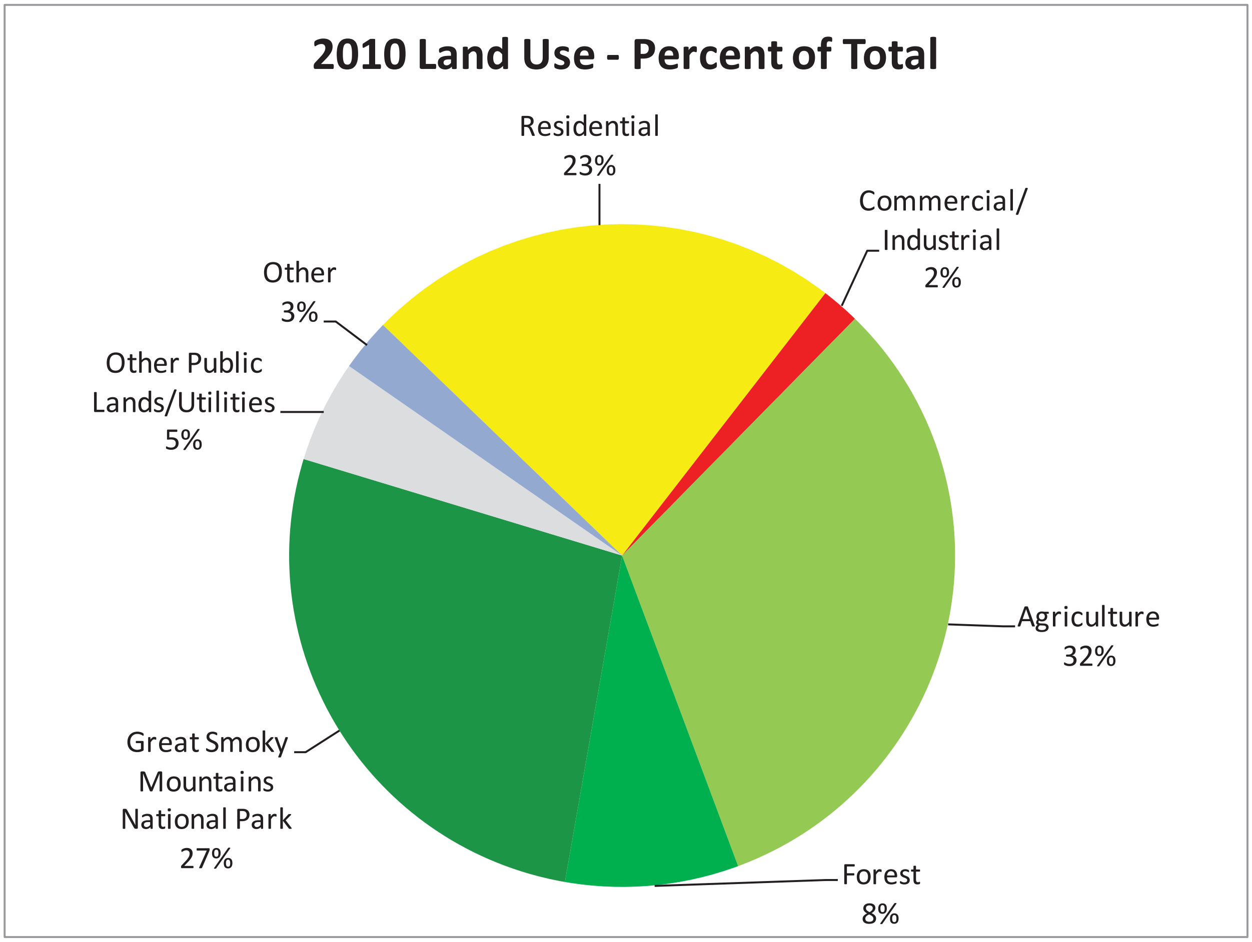
The following table presents the land areas and percent of total associated with the general land use categories above. The pie chart on the following page presents the percent of total graphically.

2010 Land Use Classifications and Acreage
From Blount County Assessor Records

Land Use Category	Acreage	Percent of Total
Residential	80,971	23.26
Commercial/Industrial	6,537	1.88
Agriculture	111,289	31.96
Forest	29,372	8.44
Great Smoky Mountains National Park	93,776	26.93
Other Public Lands/Utilities	17,331	4.98
Other	8,894	2.55
Total	348,169	100.00

The table and the pie chart show that about 25 percent of the county was developed in residential and commercial and industrial uses. About 40 percent was in agriculture and forest use, and about 27 percent was preserved in the Great Smoky Mountains National Park which was generally forest with some preserved historical agricultural areas.

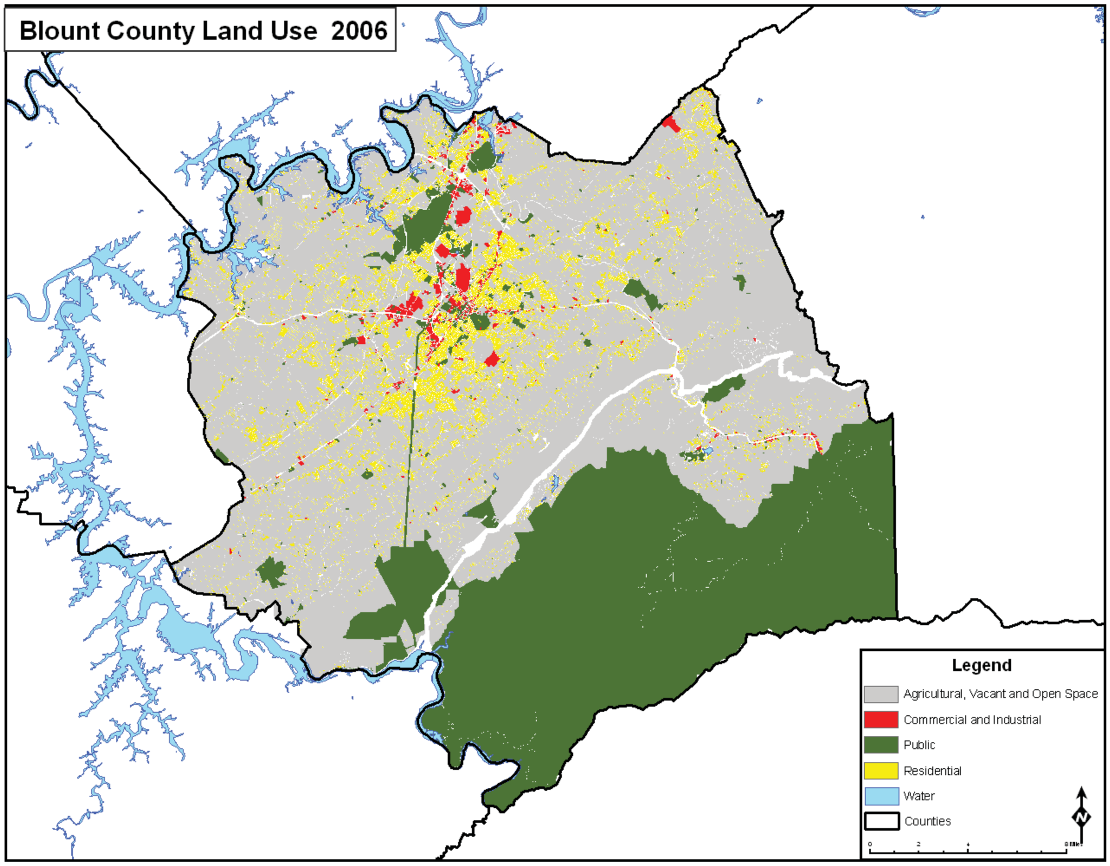
Note that the total land area did not match the land area reported in other sources. Land area from all sources consulted (including Census measurements) ranged between 348,000 to 363,000 acres. The variation probably was due to variations in the detail of county boundary, and/or method of area measurement.



2006 Land Use Patterns – Local Planning Assistance Office Analysis. The map on the following page shows the land use pattern of the county in 2006 produced by the East Tennessee Region Local Planning Assistance Office (LPAO of the Tennessee Department of Economic and Community Development). The information on land use was taken from the Tax Records of the Blount County Assessor's Office through a central database in the Tennessee Office of the Comptroller.

The pattern of residential land use (in yellow) was similar to the pattern shown in the last map of historical residential development in a previous section (see at page 82). Note that the LPAO allocation of residential land area used a method that accounted to residential use only the first two acres of tracts with greater than two acres of land area that were classified as residential. The remainder greater than two acres was accounted to agriculture/open space. Using this allocation method reduced the residential pattern effect of large tracts that were accounted in

total in the previous analysis of 2010 land use, or were accounted to agriculture or forest outside a small home site.



Just as population and households found pattern in residential development and land use, economic activity found pattern in commercial development and land use. Like population and households, commercial activity was concentrated in the urban centers of Alcoa and Maryville, but also showed a linear pattern along the major roads in the county. Another concentration of commercial activity was in the Townsend area associated with tourism at a major gateway to the Great Smoky Mountains National Park.

Public land was a general category that included publicly owned land and land that was encumbered by some form of public or semi-public easement such as utilities (excluding roads). Of note were some large public lands, the largest being the Great Smoky Mountains National Park, a large wildlife management area in the south of the county, and the large area just to the northwest of Alcoa that contained the McGhee Tyson Airport (owned by Knoxville and accounted to public use).

The residual land use category of Agriculture, Vacant and Open Space was mainly agriculture and forest use, but also included that portion of land in excess of two acres for large residential tracts that may not have been in active agriculture or forest use.

The following table shows the areas allocated to the various land use categories used in the LPAO analysis. The pie chart on the following page presents the percent of total graphically.

2006 Land Use Classifications and Acreage
Local Planning Assistance Office Analysis

Land Use Classification	Acreage	Percent of Total
Residential 2 acres or less	17,407	4.97
Rural Residential > 2 acres allocated *	14,860	4.24
Multi-family Housing/Mobile Home Park	1,835	0.52
Commercial	944	0.27
Industrial	1,496	0.43
Office	744	0.21
Open Space/Agriculture *	106,728	30.48
Public Lands **	103,519	29.57
Utility	10,090	2.88
Vacant	87,312	24.94
Water ***	5,171	1.48
Total	350,104	100.00

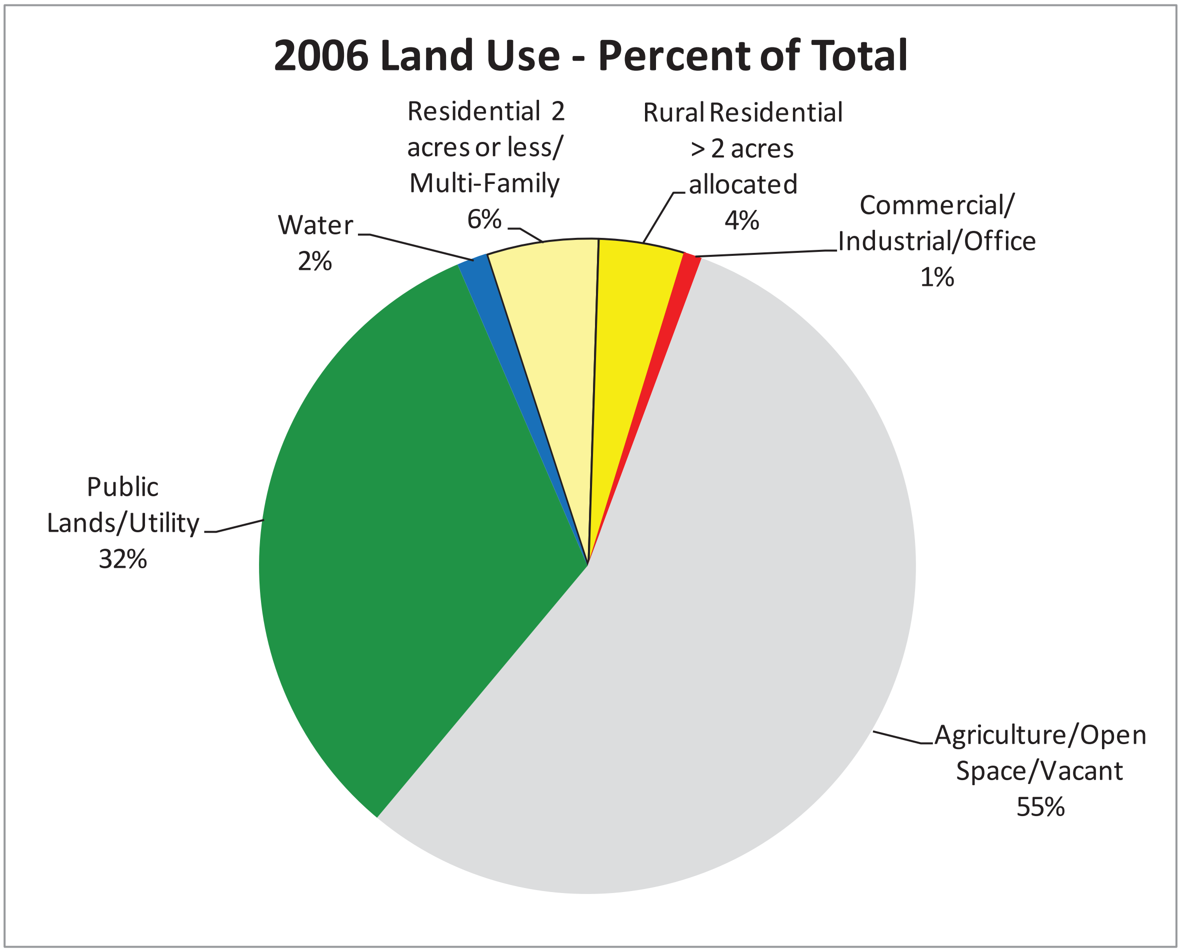
* Allocating only first two acres of tracts 2 acres or greater in size - remainder allocated to Open Space/Agriculture

** Including Great Smoky Mountains National Park and McGhee-Tyson Airport

*** Calculated from other source

Rural residential highlights residential parcels larger than 2 acres, but accounting only two acres of total tract size to residential use with remainder accounted to open space or agriculture (allocation method of the Local Planning Assistance Office). Residential highlights parcels of 2

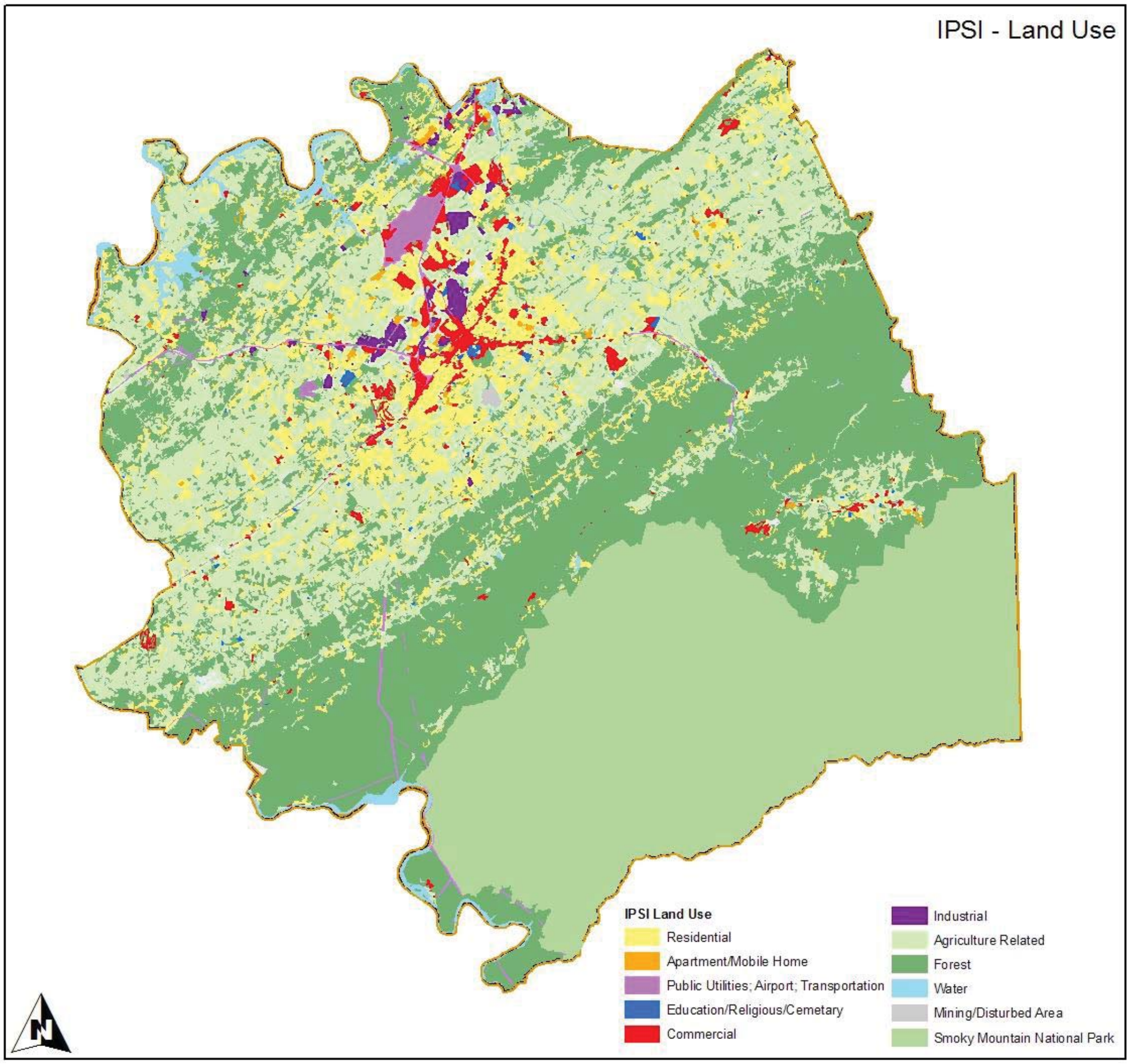
acres or less and multifamily developments (mobile home parks and apartments). The residential parcels greater than 2 acres were generally located in the rural areas and included a substantial amount of five acre or greater lots in both mountain and lowland contexts. A substantial amount of residential development on parcels less than 2 acres was outside the urbanized area within subdivision tract development or as single lots along older county roads. The two residential categories together accounted for 10 percent of total land. This was substantially less than the 23 percent accounted to residential use in the previous analysis of 2010 land use due to the LPAO allocation methodology.



Commercial and industrial land accounted for only 1 percent of total land area. Public land, including the Great Smoky Mountains National Park and the McGhee Tyson Airport, accounted for about one-third of total land. More than half of the land area in the county was accounted as agriculture, open space and vacant.

Note that the total land area did not match the land area reported in other sources. Land area from all sources consulted (including Census measurements) ranged between 348,000 to 363,000 acres. The variation probably was due to variations in the detail of county boundary, and/or method of area measurement.

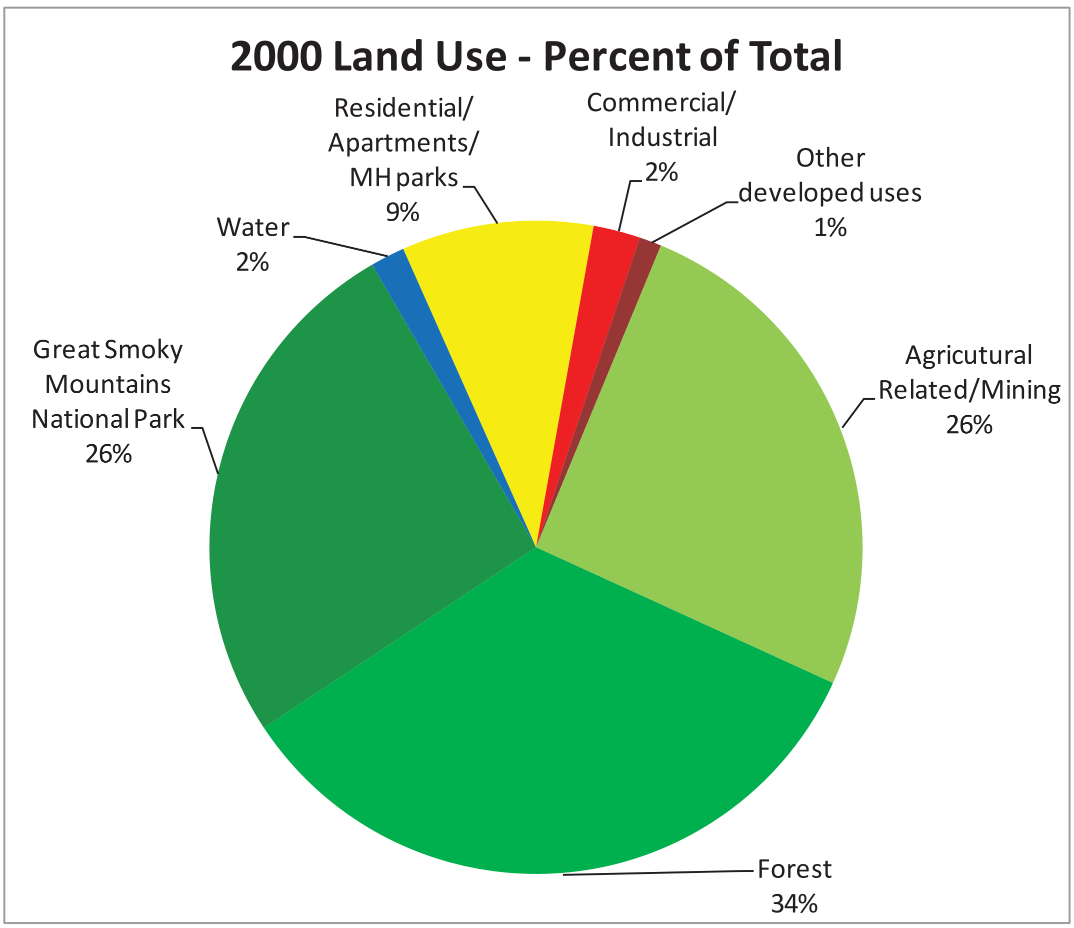
2000 Land Use Patterns – IPSI Aerial Photo Interpretation. The Integrated Pollutant Source Identification (IPSI) project included aerial photo interpretation of land use by experts from the Tennessee Valley Authority. The map below shows the summary result of the IPSI land use interpretation. The table and pie chart on the following page presents the acreage and percent of total for the summary land use categories.



The pattern of residential, commercial, industrial and public utilities/airport/transportation land use categories is similar to the LPAO analysis in the previous section and is reflective of interpretation of residential locations regardless of associated parcel size. Agriculture was interpreted directly, and the map probably portrays the extent of agriculture and forest uses more accurately than the other two previous sections.

IPSI Land Use Map Categories with Acreage
From Interpretation of Year 2000
Aerial Photographs

Land Use Category	Acreage	Percent of Total
Residential/Apartments/Mobile Home parks	34,316	9.50
Commercial/Industrial	8,387	2.32
Other developed uses	3,973	1.10
Agricultural Related/Mining	92,420	25.57
Forest	122,331	33.85
Great Smoky Mountains National Park	93,836	25.97
Water	6,129	1.70
Total	361,392	100.00



As with the previous two analyses of 2010 and 2006 land use, residential and commercial uses were concentrated in and around the two cities of Alcoa and Maryville, with scattering of residential use into the rural areas of the county. Agriculture related land was concentrated in the rolling lowlands of the county, while forest cover predominated in the more rugged hills and mountains (see also analysis of terrain and slope starting on page 53). The Great Smoky Mountains National Park (GSMNP) also was predominantly in forest cover, with some embedded agriculture areas preserved for historical purposes.

Residential, commercial, industrial and other developed uses accounted for about 13 percent of total land area. Agriculture and Forest accounted for 60 percent of total land area, and the GSMNP accounted for about one-quarter of land area. From this and the two previous analyses, we can see that the majority of land in the county was still not developed into urban and suburban uses.

Note that the total land area did not match the land area reported in other sources. Land area from all sources consulted (including Census measurements) ranged between 348,000 to 363,000 acres. The variation probably was due to variations in the detail of county boundary, and/or method of area measurement.

Indicative Land Use Projections. The analysis of land use for 2010, 2006 and 2000 using different data bases and different methodologies highlights the variability of results while showing that the general pattern holds approximately true. With such variability, land use projection becomes a task of choosing a base from which to project, making assumptions, and tying the whole together with a common projection factor. The common projection factor will be the moderate projection of population produced in a previous section (see at page 9). The assumptions will build upon relationships between population and acres of land use, and the base will be the IPSI land use data. The IPSI data was chosen since the year 2000 aerial photography interpretation aligned with the 2000 Census, allowing a more certain relation between land use areas and population. In addition, the IPSI data did not inflate assignment of residential use for large tracks such as in the 2010 land use analysis.

The table on the following page shows calculation of the initial proportion of land use area to population for the year 2000 for developed land uses of residential, commercial/industrial and other developed land. The acres per person proportions are assumed to remain constant for projection years, and allow conversion of moderate projection of population for the years 2010, 2020 and 2030. The acres per person would translate to about one whole acre of developed land per household assuming an average household size of 2.4 persons.

Developed Land Acres per Person Calculation in 2000

	Acreage	Population 2000	Acres per Person
Residential	34,316	105,823	0.32
Commercial/Industrial	8,387	105,823	0.08
Other Developed Land	3,973	105,823	0.04

The table below shows the result of converting population projections to projected land use acreage, using the acres per person proportion for residential, commercial/industrial, and other developed land from the table above. Since the conversion adds land to the different developed uses, the additions will need to be subtracted from other categories. It is assumed that the conversion will take land from agriculture related land use and forest land use, at 80 percent and 20 percent respectively.

Indicative Land Use Projections 2010 to 2030

Land Use Category	2010 acreage projection	2020 acreage projection	2030 acreage projection	2010 to 2030 acreage gain/loss
Residential	40,094	45,620	51,129	11,035
Commercial/Industrial	9,799	11,150	12,496	2,697
Other developed uses	4,642	5,282	5,920	1,278
Agricultural Related/Mining	86,132	80,119	74,125	-12,007
Forest	120,759	119,256	117,757	-3,002
GSMNP	93,836	93,836	93,836	0
Water	6,129	6,129	6,129	0
Total	361,392	361,392	361,392	0

	2010 Moderate Population Projection	2020 Moderate Population Projection	2030 Moderate Population Projection	2010 to 2030 projected population change
	123,642	140,683	157,670	34,028

The table on the preceding page shows that there could be a conversion of about 15,000 acres to developed land use in the next 20 years, taken mainly from agriculture land and to a lesser extent forest land. Where this conversion will occur is a big question, and one that cannot be answered with any degree of precision in this report. If past trends hold, much of the land conversion will be around the fringe of the Alcoa and Maryville urban center, with substantial scattering of residential use in the rural areas. However, if infill of the urban area was to intensify, and the density of new development was to increase, then the scattering of residential development and the conversion of agricultural and forest land may be lessened. The path of future land use will depend on a wide range of underlying factors, including land use policy which is outside the scope of this report and which should be the subject of planning processes within the community.

Maintaining and Extending Information and Analysis for Planning

Many agencies generate data and information periodically or on a continuous basis. To capture that information in a timely manner, this document should be updated periodically as needed.

The US Census Bureau conducted a decennial census for 2010 as this report was being written. The results of that census will not be available until after this report is finished. Upon release, the 2010 Census should be integrated into the historical analysis of population trends, and projections should be adjusted as necessary.

For birth and death data, Tennessee Department of Health publications should be accessed yearly. Life table data on survival rates for Tennessee seem to be published on a longer schedule, and should be accessed for updated information as available. Yearly net migration can be tracked from estimates provided by the US Census Bureau.

The US Census Bureau also conducts a sample based American Community Survey (ACS) each year. This started in 2006. The ACS was a shift in the way that the Census Bureau collects the more detailed population and household data formerly collected each decennial census year. The samples are merged over three years to produce more precise results, and to provide a rolling three year base. ACS data were not integrated into this report, and should be integrated in the future, especially in conjunction with integration of the 2010 Census results. The ACS could then be tracked yearly for more timely analysis of trends.

There was a wealth of historical economic data that was not included in this report due to time constraints and difficulties in dealing with changing definitions and classifications over the years. The Economic Census series should be evaluated and integrated, especially for added historical analysis if possible. More time series data could also be integrated from the County Business Patterns, and the County Business Patterns could be tracked yearly for more timely analysis of trends.

Some of the analysis in this report showed that Blount County cannot be viewed apart from its larger region. Many of the data and information sources provide the same information for other counties in both the 16 county East Tennessee Development District Region, and the smaller six county Knoxville Metropolitan Statistical Area (MSA). This data and information could be collated and integrated to give a more robust regional comparison and context in relation to Blount County.

For land use information, the Blount County Property Assessor files can be utilized for periodic updates on pattern and trend. To do this, a uniform method of using codes for land use purposes needs to be developed. A more direct measurement of land use change could be accomplished with another aerial photo interpretation project, but such interpretations are expensive.

As a standalone document, the Supplemental Information and Analysis for Blount County Plans should be edited, updated and republished periodically to remain current for general planning purposes. As planning progresses in the county, other information needs may become evident. Such needs should be addressed as they arise by separate analysis and report, but should then be considered for future integration in the body of this report.

Acknowledgements.

Parts of this report were dependent on work of others. Most of the maps were produced by Ray Boswell of the Alcoa-Maryville-Blount County GIS Office. The Maps and data for 2006 land use and the historical series of maps for residential development were produced by the East Tennessee Region Local Planning Assistance Office staff under the leadership of Sheryl Ely and Dan Hawk. The 2000 IPSI land use data were produced by the Tennessee Valley Authority with leadership of Tom McDonough (retired). Staff of the US Census Bureau provided assistance in tracking down some archived census information not readily available on the internet.

CERTIFIED APPROVED
By the Blount County Planning Commission
August 26, 2010 Regular Meeting

____

Secretary, Blount County Planning Commission

Relocation and Property Management Office

The Right-of-Way Division Relocation and Property Management Office is responsible for the prompt and equitable relocation and reestablishment of persons, businesses and farms which are displaced as a result of State of State-aid highway construction projects and the management of acquired improvements. This office is also responsible for assisting with the testing for and the removal of underground fuel storage tanks, pumps and piping facilities or other hazardous materials within the proposed rights of way.

For residential relocation assistance information click here.

For non-residential relocation assistance information click here.

For Acquisition and Relocation Consultants click here.

Consultant Submittal Forms

Skip to Main Content

Latest Online Manual

View

The latest online Tennessee Environmental Procedures Manual 2011 (complete)

Print

Tennessee Environmental Procedures Manual 2011 (complete)

Tennessee Environmental Procedures Manual 2011 (no appendices)

Tennessee Environmental Procedures Manual 2011 (appendices only)

Purpose of Manual

The Tennessee Environmental Procedures Manual (TEPM or manual) provides guidance for the preparation of environmental analysis and documentation for federally-funded and state-funded transportation projects. Projects that are funded in whole or in part with federal funds or have major federal actions must follow the requirements of the National Environmental Policy Act of 1969, widely known as NEPA, as well as related federal and state environmental regulations. Certain state-funded transportation projects undertaken by the Tennessee Department of Transportation (TDOT) or by local governments for TDOT are subject to a state-level environmental evaluation, the Tennessee Environmental Evaluation Report (TEER).

The intended audience of this manual is the professional staff in the TDOT Environmental Division and other TDOT Divisions and consultants working on TDOT projects. Other state and local agency staff and consultants who are working on transportation projects may use the TEPM for guidance, either voluntarily or as required under TDOT's Local Government Guidelines for the Management of Federally and State Funded Transportation Projects.

While this manual is a "how-to guide," it is not intended to be the sole textbook for conducting detailed technical studies. More detailed guidance for performing specific types of studies, such as ecological studies, historic architecture, hazardous materials, air quality, noise and permits, are available from the Environmental Division's Natural Resource Office and Social and Cultural Resources Office and will soon be made available on the Environmental Division's website.

Contacts

For more information, please contact Victoria Martinez.

Recent Examinations of Mobile Source Air Toxics

A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives

Next

Michael Claggett, Ph.D.
Air Quality Modeling Specialist, Federal Highway Administration Resource Center, 12300 West Dakota Avenue, Suite 340, Lakewood, Colorado 80228

Terry L. Miller, Ph.D., P.E.
Associate Professor, Department of Civil and Environmental Engineering, 73B Perkins Hall, The University of Tennessee, Knoxville, Tennessee 37996-2010

ABSTRACT

With the final update to its on-road mobile source emission factor model, MOBILE6.2, the U.S. Environmental Protection Agency (EPA) added capabilities of predicting emission factors for a select number of mobile source air toxics (MSAT), commonly referred to as the six priority MSATs. These are acetaldehyde, acrolein, benzene, 1,3-butadiene, diesel particulate matter, and formaldehyde. This presentation describes a methodology for computing and evaluating emissions of MSATs among a group of transportation project alternatives. The suggested scale of analysis is the affected transportation network, defined as those links where the annual average daily traffic is expected to change by ±5% or more as a result of the project. This analysis scale is considered reasonably representative of the regional scale emission factors predicted by MOBILE6.2. To gauge how emissions could change over an affected transportation network, provided are calculation ranges of MSAT emission factors produced by the model due to changes in a variety of input parameters. These include calendar year, ambient temperature, fuel Reid vapor pressure, and vehicle speed.

Finally, a technique is presented for assessing MSAT emissions from the affected transportation network considering their relative toxicities. The technique allows a way to gauge the importance of increases and decreases in individual MSAT species amid proposed transportation alternatives and/or mitigation measures.

INTRODUCTION

This paper provides the results of an analysis of air toxic emissions due to mobile sources for a hypothetical transportation project designed to mitigate traffic congestion. The example project involves the expansion of an existing urban freeway, plus upgraded arterial/collectors and freeway ramps to improve vehicular access. It is assumed that the freeway corridor extends 10 miles and that arterials cross the freeway every 2 miles with freeway/arterial access provided by freeway ramps. A No-Action Alternate was evaluated for the calendar year 2005 (present); the No-Action and two Build alternates were evaluated for calendar years 2010 (estimated time of completion) and 2030 (design year). The following notation/description is used in referring to the alternatives:

- 6-lane No-Action Alternate -- no upgrades to the existing 6-lane freeway and 4-lane crossing arterials;
- 6- to 8-lane Build Alternate -- upgrade the existing 6-lane freeway and 4-lane crossing arterials by adding 2 travel lanes; and
- 6- to 10-lane Build Alternate -- upgrade the existing 6-lane freeway by adding 4 travel lanes and upgrade the 4-lane crossing arterials by adding 2 travel lanes.

The underlying purpose of this effort is to provide a practical example of how a mobile source air toxics analysis may be applied to a planned project. This exercise offers additional insight into the technical challenges involved, including the formulation of analysis techniques; the types and sources of data required to complete such an analysis; the assumptions that may need to be made; the data forecasting routines and issues involved; and the comparative results likely to be obtained.

ANALYSIS METHODOLOGY

Fundamentals

The basic procedure for conducting an emissions analysis or emissions inventory for on-road mobile sources is to calculate emission factors using the Environmental Protection Agency's (EPA) MOBILE model (EPA, 2003), then multiply by the vehicle-miles of travel (VMT) for each affected roadway link. The EPA's current version of the model, MOBILE6.2 (dated November 2003), is capable of predicting composite emission factors of the six priority mobile source air toxics (acetaldehyde, acrolein, benzene, butadiene, diesel particulate matter, and formaldehyde) in units of g/VMT. Most MOBILE6.2 emission

factors are sensitive to changes in vehicle activity parameters so that the appropriate emission factors for a link are matched to the corresponding VMT/day. The sum product (g/VMT x VMT/day) for all affected links is obtained to provide emissions by pollutant on a ton per day or ton per year basis.

The mobile source emission factors predicted by the MOBILE6.2 model are applicable to a regional scale not an individual project corridor. Consequently, an emissions analysis for a project should include links beyond the project corridor and evaluated with respect to its effect on the transportation system. The affected transportation network can be defined as those links where the annual average daily (AADT) traffic is expected to change by more than ±5% as a result of a project.

Key Assumptions

The core assumption made in developing the traffic data for the emissions analysis is that the existing freeway and crossing arterials are operating at capacity (e.g., the volume-to-capacity ratio, V/C = 1) during the peak hour. Lanes are added to relieve the traffic congestion anticipated in future years. A growth rate of 1.5% per year in hourly traffic volumes on the freeway and crossing arterials was assumed for the No-Action Alternates based on Bureau of Transportation Statistics data (BTS, 2003) for the most recent 5-year record available (1998 through 2002). A higher growth rate (i.e., 1.75% per year) in hourly volumes was assumed for the upgraded projects to account for redirected trips from the surrounding area that may be diverted to a new, more efficient facility. The maximum hour-by-hour V-to-C ratios allowed on the facilities were 1.25 for the freeway and 1.15 for the crossing arterials. These are the major assumptions used to establish traffic volumes and speeds for the hypothetical upgrading projects.

In practice, a systems-level analysis would be required to adequately account for the redistribution of traffic on the upgraded project and on other parts of the affected transportation network as previously recommended. Or for projects located in relatively undeveloped areas, there is the potential for changes in surrounding land use and associated implications with respect to affected growth rates in traffic volumes. An actual systems-level analysis would need to account for this as well.

Traffic Data

Traffic activity data were developed based on methodology formulated by the Texas Transportation Institute (TTI) as provided in the National Highway Institute (NHI) course "Estimating Regional Mobile Source Emissions" and national data built into the MOBILE6.2 model. The capacity of the urban freeway is assumed to be 2100 vehicles per hour per lane (vphpl) (NHI, 2003; TRB, 2000) and the capacity of the urban crossing arterials is assumed to be 673 vphpl (NHI, 2003). Traffic volumes are assumed to vary hourly according to EPA's (2003) VMT fraction by hour of the day. For the 2005 existing

condition, the roadways (i.e., freeway and crossing arterials) are assumed to be operating at capacity during the peak-hour traffic condition of 4 to 5 pm. Traffic volumes for the remaining hours are distributed based on the assumed capacity multiplied by a ratio of the VMT fraction for each hour divided by the VMT fraction for the peak hour. Total hourly volumes were determined considering the number of lanes associated with the existing condition, i.e., 6-lane freeway with 4-lane crossing arterials. A 50/50 directional split was employed. No distinction for weekend travel was made.

Traffic volumes for future years were determined by applying the assumed annual growth rate of 1.5% per year for the No-Action Alternate and 1.75% per year for the Build Alternates, limited to 1.25 x V/C for the freeway and 1.15 x V/C for the crossing arterials during any one hour. Capacity-limited volumes were only applicable for the 2030 No-Action Alternate. The resulting hourly traffic volumes are provided in Figure 1.

One reason for computing hourly traffic volumes is to determine hourly travel speeds, which vary according to the V-to-C ratio. The TTI method (NHI, 2003) for predicting congested speeds was applied. The basis for the methodology is calculating a congested speed (in mph) accounting for the effects of delay (min/mi) on the free-flow speed (in mph):

$$\text{Congested Speed} = \frac{60}{\frac{60}{\text{Freeflow Speed}} + \text{Delay}}$$

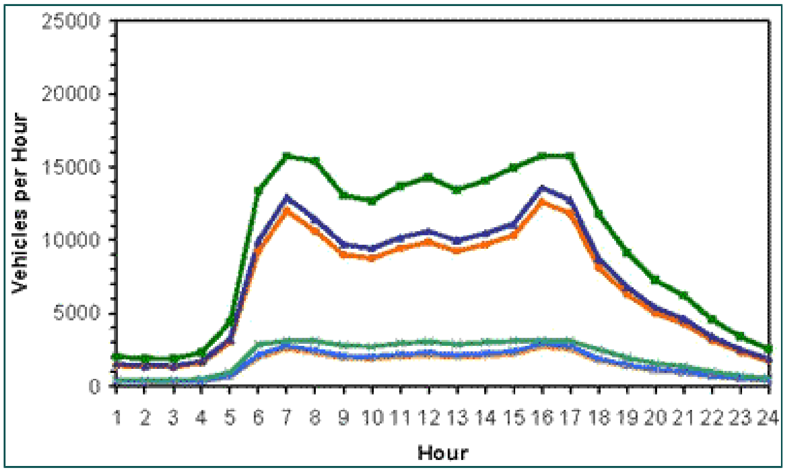
Default free-flow speeds are provided as a function of area type and roadway functional classification defined in the FHWA Highway Performance Monitoring System (HPMS). The default free-flow speeds for urban freeways and urban other principal arterials are 65 mph and 40 mph, respectively. The formula for calculating delay is:

$$\text{Delay} = \text{Minimum}\left[A \times e^{B\left(\frac{V}{C}\right)}, M \right]$$

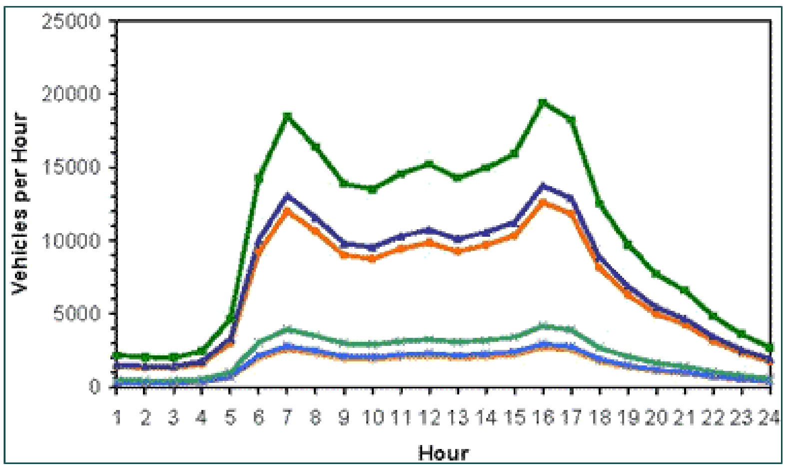
where A and B are volume/delay equation coefficients and M is the maximum minutes of delay per mile. Default values are provided: A = 0.015, B = 3.5, and M = 5 for high-capacity facilities; A = 0.05, B = 3, and M = 10 for low-capacity facilities. Default capacities are also provided as a function of area type and roadway functional classification: C = 2100 vphpl for urban freeways and C = 673 vphpl for urban other principal arterials. Locale-specific parameters should be derived and used in calculating congested speeds for most applications.

Figure 1. Hourly Traffic Volumes and Congested Speeds.

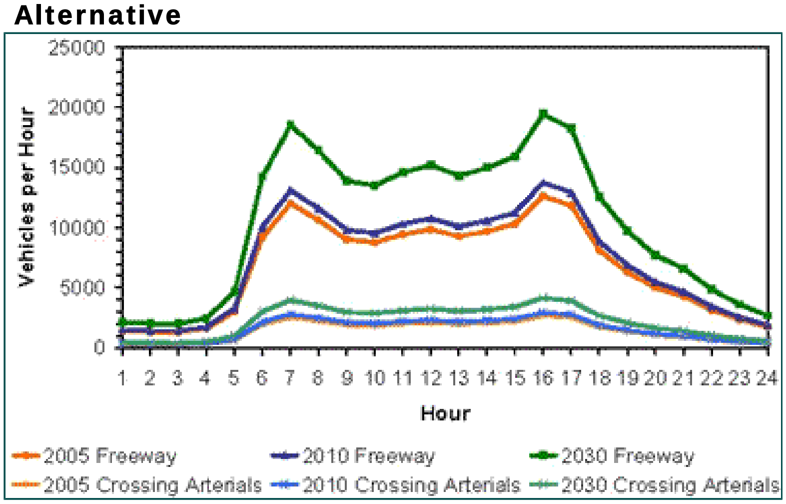
Hourly Traffic Volumes for the 6-Lane No-Action Alternative



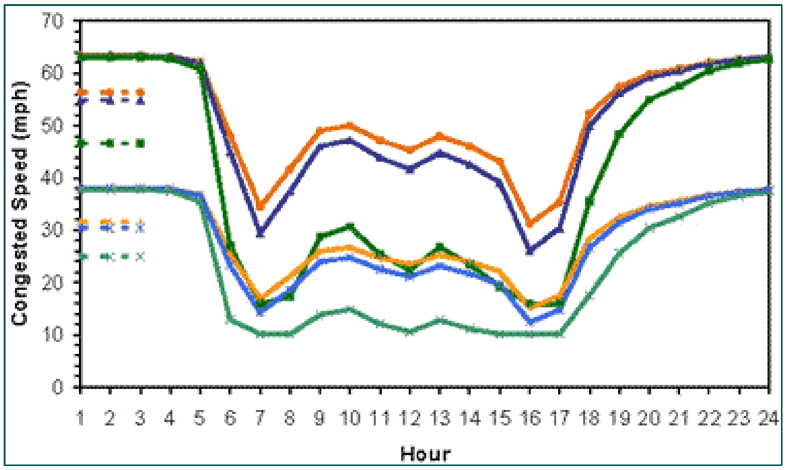
Hourly Traffic Volumes for the 6- to 8-Lane Build Alternative



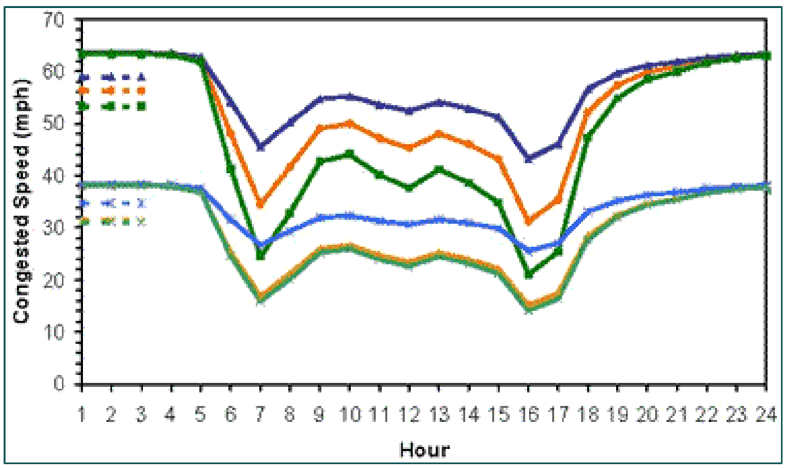
Hourly Traffic Volumes for the 6- to 10-Lane Build Alternative



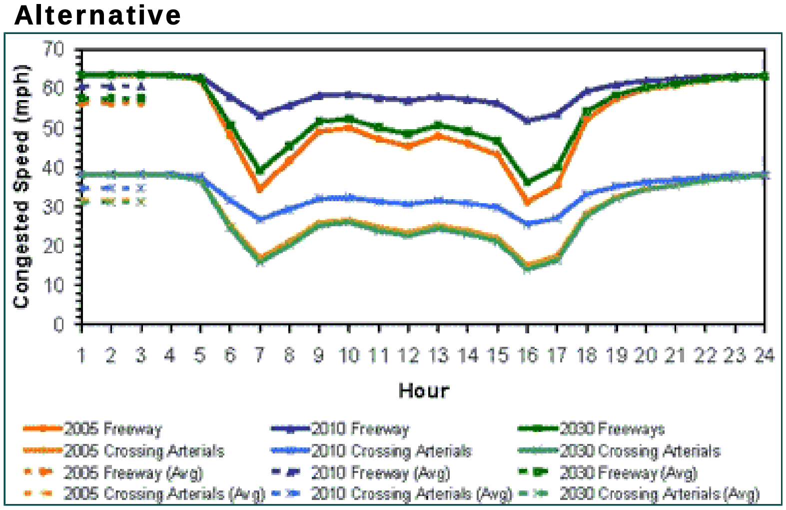
Hourly Congested Speeds for the 6-Lane No-Action Alternative



Hourly Congested Speeds for the 6- to 8-Lane Build Alternative



Hourly Congested Speeds for the 6- to 10-Lane Build Alternative



The resulting travel speeds are given in Figure 1 as previously referenced. An average hourly congested speed for the day was also computed to determine if it may be used as a surrogate for an hour-by-hour variation in speeds. The average hourly congested speeds illustrated in the figure are applicable to all hours of the day, but only a portion of each series is presented so that the hourly congested speeds can be more

clearly shown. The hourly congested speeds predicted encompass the average speeds of the test cycles used in developing the speed correction factors in MOBILE6.2, i.e.:

- For freeways, low speed -- 13.1 mph; level of service (LOS) F -- 18.6 mph; LOS E -- 30.5 mph; LOS D -- 52.9 mph; LOS A-C -- 59.7 mph; and high speed -- 63.2 mph, as well as
- For arterial/collectors, LOS E-F -- 11.6 mph; LOS C-D -- 19.2 mph; and LOS A-B -- 24.8 mph.

The daily VMT is the product of the Annual Average Daily Traffic (AADT) and the facility length. The hourly volumes by facility type were summed to obtain the AADT as provided in Table 1 by alternate. The facility lengths assumed are 10 miles for the freeway and 6 miles for the crossing arterials (i.e., 6 arterials of 1 mile in length each). The resulting daily VMT for each alternate are also presented in Table 1.

Identical hourly traffic volumes, AADT, and daily VMT are realized for the 6- to 8-Lane and 6- to 10-Lane Build Alternates. Even so, there are differences in the capacities and predicted congested speeds for the build alternates that may affect the respective MSAT emission totals. In contrasting the No-Action and Build Alternates, differences in hourly traffic volumes, AADT, and daily VMT are observed due to the AADT growth rates and V-to-C ratio limits implemented.

MOBILE6.2 Inputs

The MOBILE6.2 model was run using EPA's national default data built into the program with the following exceptions. Parameters for which there are no default values include calendar year; minimum and maximum temperature; gasoline fuel Reid vapor pressure (RVP); average diesel fuel sulfur level and maximum particle size cutoff (for diesel particulate matter); and specifications of the gasoline fuel used (for acetaldehyde, acrolein, benzene, 1,3-butadiene, and formaldehyde). Parameters for which national defaults were not used include month of evaluation and average speeds. Emission reductions that may be realized from a local inspection/maintenance program were not taken into account.

The calendar years evaluated include 2005 as the baseline year; 2010 as the estimated time of completion; and 2030 as the design year. When conducting annual emissions inventories, EPA recommends that monthly emission factors be developed via mathematical interpolation between January and July and summing the monthly emissions results. To simplify this analysis, the parameters that would vary by month are represented by a single value as the basis for the annual emissions inventory. An evaluation of the variability of MOBILE6.2 emission factors is provided to gauge how changes in certain assumptions would affect emission factors representative of freeway and arterial operation.

The MOBILE6.2 model was run assuming no temperature

variation over the day simulated (i.e., minimum temperature = maximum temperature) using a temperature of 55 ºF to represent an annual average. The median of the annual average daily minimum and maximum temperatures measured in the U.S. are 43.3 ºF and 63.6 ºF, respectively; 55 ºF is about midway

Table 1. Travel Characteristics of Each Alternate.

Annual Average Daily Traffic (vpd)

Alternate	Year							
	2005			2010			2030	
	Freeway	Arterials	Total	Freeway	Arterials	Total	Freeway	Arte
6-Lane No-Action	162162	34646	196808	174695	37324	212018	229669	47
6- to 8-Lane Build				176857	37786	214642	250213	53
6- to 10-Lane Build				176857	37786	214642	250213	53

Daily Vehicle-Miles of Travel (VMT per day)

Alternate	Year							
	2005			2010			2030	
	Freeway	Arterials	Total	Freeway	Arterials	Total	Freeway	Ar
6-Lane No-Action	1621622	207876	1829498	1746947	223942	1970889	2296691	2
6- to 8-Lane Build				1768567	226713	1995281	2502131	3
6- to 10-Lane Build				1768567	226713	1995281	2502131	3

between these values. The median of the normal daily minimum temperatures measured in the U.S. during the coldest month of the year (January) is 23.5 ºF and the median of the normal daily maximum temperatures measured in the U.S. during the warmest month of the year (July) is 86.1 ºF. The fuel RVP would change over the course of a year from the switching of winter fuel blends to summer fuel blends and back again. The range of fuel RVP in some locales can be expected to encompass the volatility of class AA (7.8 psi) through class E (15.0 psi) fuels prescribed by the American Society of Testing Materials (ASTM). A fuel RVP of 12.5 psi (Class C/D) was assumed for this analysis. The evaluation month selected was July.

Emission factors of diesel particulate matter include the organic carbon, elemental carbon, and sulfate portions of diesel exhausts for a maximum particle size cutoff of 10 µm. The diesel fuel sulfur levels used are consistent with the 49-state average values reflecting more stringent federal controls (i.e., 11 ppm for 2010 and 2030). For the baseline year of 2005, an average diesel fuel sulfur level of 350 ppm was assumed. Emission factors for the hydrocarbon MSATs were based on the

2007/2020 30 ppm fuel specifications for the northeastern states during summer and no reformulated fuel program (RFP).

The emissions analysis was conducted by accounting for the vehicle emission types specific to the operation of the facility, e.g., exhaust running and evaporative running loss emissions for vehicles operating on the freeway and crossing arterials. The national defaults for start and soak emissions built into the MOBILE6.2 model are not applicable to a project-level analysis as most of the starts and ends of vehicle trips would not occur on the upgraded project or on the affected transportation network. Start and soak emissions need to be accounted for if a project would significantly increase the number of trips above the No-Action Alternate, not just a redistribution of existing trips.

Next

Updated: 07/06/2011

EPA Table ES-2

EPA 430-R-14-003

Inventory of U.S. Greenhouse Gas Emissions and Sinks:

1990 – 2012

APRIL 15, 2014

U.S. Environmental Protection Agency

1200 Pennsylvania Ave., N.W.

Washington, DC 20460

U.S.A.

Figure ES-2: Annual Percent Change in U.S. Greenhouse Gas Emissions

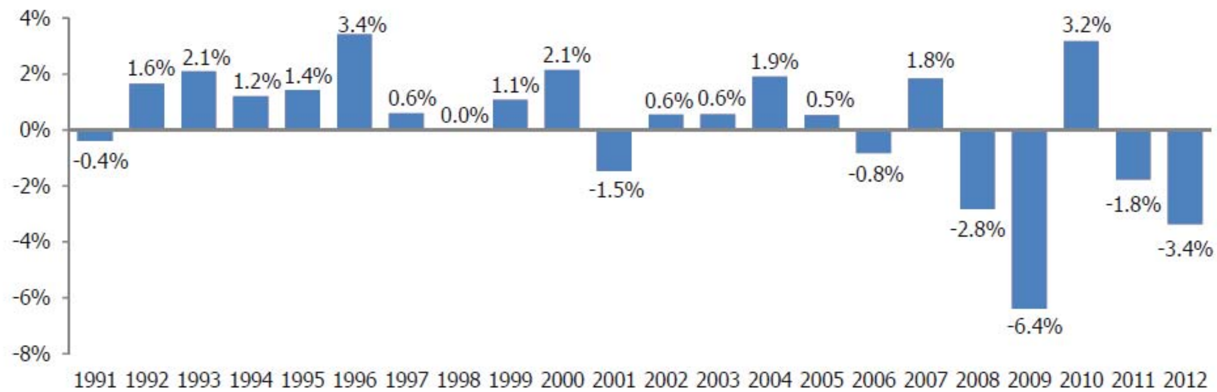


Figure ES-3: Annual Greenhouse Gas Emissions Relative to 1990 (1990=0)

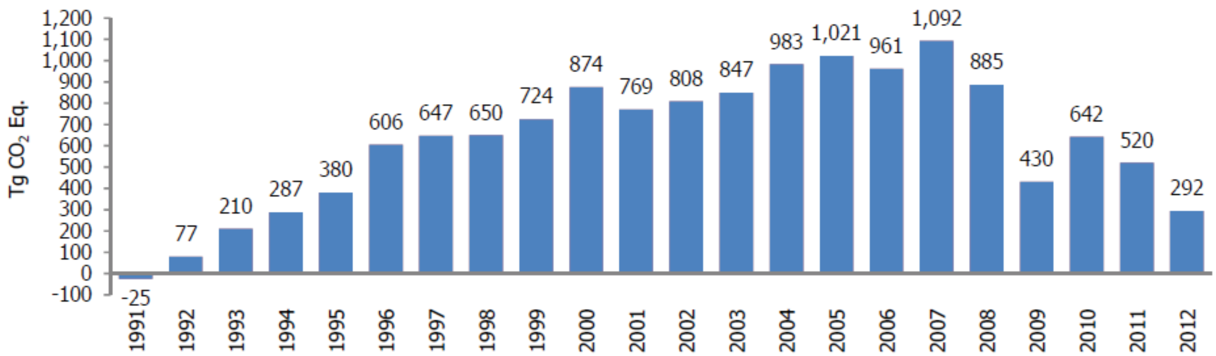


Table ES-2: Recent Trends in U.S. Greenhouse Gas Emissions and Sinks (Tg or million metric tons CO_2 Eq.)

Gas/Source	1990	2005	2008	2009	2010	2011	2012
CO_2	**5,108.7**	**6,112.2**	**5,936.9**	**5,506.1**	**5,722.3**	**5,592.2**	**5,383.2**
Fossil Fuel Combustion	4,745.1	5,752.9	5,593.4	5,225.7	5,404.9	5,271.1	5,072.3
Electricity Generation	1,820.8	2,402.1	2,360.9	2,146.4	2,259.2	2,158.5	2,022.7
Transportation	1,494.0	1,891.7	1,816.5	1,747.7	1,765.0	1,747.9	1,739.5
Industrial	845.1	827.6	804.1	727.5	775.6	768.7	774.2
Residential	338.3	357.9	346.2	336.4	334.8	324.9	288.9
Commercial	219.0	223.5	224.7	223.9	220.7	221.5	197.4
U.S. Territories	27.9	50.0	41.0	43.8	49.6	49.6	49.6
Non-Energy Use of Fuels	120.8	141.0	128.0	108.1	120.8	117.3	110.3
Iron and Steel Production & Metallurgical Coke Production	99.8	66.7	66.8	43.0	55.7	60.0	54.3
Natural Gas Systems	37.7	30.0	32.7	32.2	32.4	35.1	35.2
Cement Production	33.3	45.9	41.2	29.4	31.3	32.0	35.1
Lime Production	11.4	14.0	14.0	10.9	12.8	13.5	13.3
Incineration of Waste	8.0	12.5	11.9	11.7	12.0	12.1	12.2
Ammonia Production	13.0	9.2	8.4	8.5	9.2	9.4	9.4
Other Process Uses of Carbonates	4.9	6.3	5.9	7.6	9.6	9.3	8.0
Cropland Remaining Cropland	7.1	7.9	8.6	7.2	8.6	7.9	7.4

Urea Consumption for Non-Agricultural Purposes	3.8	3.7	4.1	3.4	4.7	4.0	5.2
Petrochemical Production	3.4	4.3	3.6	2.8	3.5	3.5	3.5
Aluminum Production	6.8	4.1	4.5	3.0	2.7	3.3	3.4
Soda Ash Production and Consumption	2.7	2.9	2.9	2.5	2.6	2.6	2.7
Carbon Dioxide Consumption	1.4	1.3	1.8	1.8	2.3	1.8	1.8
Titanium Dioxide Production	1.2	1.8	1.8	1.6	1.8	1.7	1.7
Ferroalloy Production	2.2	1.4	1.6	1.5	1.7	1.7	1.7
Zinc Production	0.6	1.0	1.2	0.9	1.2	1.3	1.4
Glass Production	1.5	1.9	1.5	1.0	1.5	1.3	1.2
Phosphoric Acid Production	1.6	1.4	1.2	1.0	1.1	1.2	1.1
Wetlands Remaining Wetlands	1.0	1.1	1.0	1.1	1.0	0.9	0.8
Lead Production	0.5	0.6	0.5	0.5	0.5	0.5	0.5
Petroleum Systems	0.4	0.3	0.3	0.3	0.3	0.3	0.4
Silicon Carbide Production and Consumption	0.4	0.2	0.2	0.1	0.2	0.2	0.2
Land Use, Land-Use Change, and Forestry (Sink)[a]	*(831.1)*	*(1,030.7)*	*(981.0)*	*(961.6)*	*(968.0)*	*(980.3)*	*(979.3)*
Wood Biomass and Ethanol Consumption[b]	*219.4*	*229.8*	*254.7*	*250.5*	*265.1*	*268.1*	*266.8*
International Bunker Fuels[c]	*103.5*	*113.1*	*114.3*	*106.4*	*117.0*	*111.7*	*105.8*
CH_4	**635.7**	**585.7**	**606.0**	**596.5**	**585.5**	**578.3**	**567.3**
Enteric Fermentation	137.9	142.5	147.0	146.1	144.9	143.0	141.0
Natural Gas Systems	156.4	152.0	151.6	142.9	134.7	133.2	129.9
Landfills	147.8	112.1	114.3	115.3	109.9	107.4	102.8
Coal Mining	81.1	53.6	63.5	67.1	69.2	59.8	55.8
Manure Management	31.5	47.6	51.5	50.5	51.8	52.0	52.9
Petroleum Systems	35.8	28.8	28.8	29.1	29.5	30.5	31.7
Forest Land Remaining Forest Land	2.5	8.1	8.7	5.8	4.7	14.0	15.3
Wastewater Treatment	13.2	13.3	13.3	13.1	13.0	12.8	12.8
Rice Cultivation	7.7	7.5	7.8	7.9	9.3	7.1	7.4
Stationary Combustion	7.5	6.6	6.6	6.6	6.4	6.3	5.7
Abandoned Underground Coal Mines	6.0	5.5	5.3	5.1	5.0	4.8	4.7
Petrochemical Production	2.3	3.1	2.9	2.9	3.1	3.1	3.1
Mobile Combustion	4.6	2.4	1.9	1.8	1.8	1.7	1.7
Composting	0.3	1.6	1.7	1.6	1.5	1.6	1.6
Iron and Steel Production & Metallurgical Coke Production	1.0	0.7	0.6	0.4	0.5	0.6	0.6
Field Burning of Agricultural Residues	0.3	0.2	0.3	0.2	0.2	0.3	0.3
Ferroalloy Production	+	+	+	+	+	+	+
Silicon Carbide Production and Consumption	+	+	+	+	+	+	+
Incineration of Waste	+	+	+	+	+	+	+
International Bunker Fuels[c]	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
N_2O	**398.6**	**415.8**	**423.3**	**412.2**	**409.3**	**417.2**	**410.1**
Agricultural Soil Management	282.1	297.3	319.0	316.4	310.1	307.8	306.6
Stationary Combustion	12.3	20.6	21.1	20.8	22.5	21.6	22.0
Manure Management	14.4	17.1	17.8	17.7	17.8	18.0	18.0
Mobile Combustion	44.0	36.9	25.5	22.7	20.7	18.5	16.5
Nitric Acid Production	18.2	16.9	16.9	14.0	16.7	15.8	15.3
Forest Land Remaining Forest Land	2.1	7.0	7.5	5.1	4.2	11.8	12.8

Adipic Acid Production	15.8	7.4	2.6	2.8	4.4	10.6	5.8
Wastewater Treatment	3.5	4.5	4.8	4.8	4.9	5.0	5.0
N_2O from Product Uses	4.4	4.4	4.4	4.4	4.4	4.4	4.4
Composting	0.4	1.7	1.9	1.8	1.7	1.7	1.8
Settlements Remaining Settlements	1.0	1.5	1.5	1.4	1.5	1.5	1.5
Incineration of Waste	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Field Burning of Agricultural Residues	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Wetlands Remaining Wetlands	+	+	+	+	+	+	+
International Bunker Fuels[c]	*0.9*	*1.0*	*1.0*	*0.9*	*1.0*	*1.0*	*1.0*
HFCs	**36.9**	**119.8**	**136.0**	**135.1**	**144.0**	**148.6**	**151.2**
Substitution of Ozone Depleting Substances[d]	0.3	103.8	122.2	129.6	137.5	141.5	146.8
HCFC-22 Production	36.4	15.8	13.6	5.4	6.4	6.9	4.3
Semiconductor Manufacture	0.2	0.2	0.2	0.1	0.2	0.2	0.2
PFCs	**20.6**	**5.6**	**5.1**	**3.3**	**3.8**	**6.0**	**5.4**
Semiconductor Manufacture	2.2	2.6	2.4	1.7	2.2	3.0	2.9
Aluminum Production	18.4	3.0	2.7	1.6	1.6	2.9	2.5
SF_6	**32.6**	**14.7**	**10.7**	**9.6**	**9.8**	**10.8**	**8.4**
Electrical Transmission and Distribution	26.7	11.0	8.4	7.5	7.2	7.2	6.0
Magnesium Production and Processing	5.4	2.9	1.9	1.7	2.2	2.9	1.7
Semiconductor Manufacture	0.5	0.7	0.5	0.3	0.4	0.7	0.7
Total	**6,233.2**	**7,253.8**	**7,118.1**	**6,662.9**	**6,874.7**	**6,753.0**	**6,525.6**
Net Emissions (Sources and Sinks)	**5,402.1**	**6,223.1**	**6,137.1**	**5,701.2**	**5,906.7**	**5,772.7**	**5,546.3**

+ Does not exceed 0.05 Tg CO_2 Eq.
[a] Parentheses indicate negative values or sequestration. The net CO_2 flux total includes both emissions and sequestration, and constitutes a net sink in the United States. Sinks are only included in net emissions total.
[b] Emissions from Wood Biomass and Ethanol Consumption are not included specifically in summing energy sector totals. Net carbon fluxes from changes in biogenic carbon reservoirs are accounted for in the estimates for Land Use, Land-Use Change, and Forestry.
[c] Emissions from International Bunker Fuels are not included in totals.
[d] Small amounts of PFC emissions also result from this source.
Note: Totals may not sum due to independent rounding.

Figure ES-4 illustrates the relative contribution of the direct greenhouse gases to total U.S. emissions in 2012. The primary greenhouse gas emitted by human activities in the United States was CO_2, representing approximately 82.5 percent of total greenhouse gas emissions. The largest source of CO_2, and of overall greenhouse gas emissions, was fossil fuel combustion. CH_4 emissions, which have decreased by 10.8 percent since 1990, resulted primarily from enteric fermentation associated with domestic livestock, natural gas systems, and decomposition of wastes in landfills. Agricultural soil management, manure management, mobile source fuel combustion and stationary fuel combustion were the major sources of N_2O emissions. Ozone depleting substance substitute emissions and emissions of HFC-23 during the production of HCFC-22 were the primary contributors to aggregate HFC emissions. PFC emissions resulted as a by-product of primary aluminum production and from semiconductor manufacturing, while electrical transmission and distribution systems accounted for most SF_6 emissions.

U.S. Energy Information Administration
Total Carbon Dioxide Emissions from the Consumption of Energy

http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=90&pid=44&aid=8

U.S. Energy Information Administration

International Energy Statistics

Country: All Countries by Region   Start Year: 2008   End Year: 2012   UPDATE

Product: Total Carbon Dioxide Emissions from the Consumption of Energy   Unit: Million Metric Tons

Total Carbon Dioxide Emissions from the Consumption of Energy (Million Metric Tons)   Units Conversion   Download Excel

	2008	2009	2010	2011	2012
North America	6,869.070	6,397.257	6,563.769	6,482.327	6,298.306
Bermuda	0.750	0.712	0.712	0.592	0.614
Canada	574.243	544.890	547.925	551.587	550.829
Greenland	0.642	0.648	1.001	0.616	0.605
Mexico	452.794	421.124	434.023	446.228	453.833
Saint Pierre and Miquelon	0.092	0.089	0.092	0.092	0.151
United States	5,840.549	5,429.795	5,580.015	5,483.212	5,270.422
Central & South America	1,220.357	1,197.999	1,310.845	1,335.237	1,399.618
Antarctica	0.264	0.245	0.245	0.142	0.099
Antigua and Barbuda	0.659	0.666	0.722	0.586	0.586
Argentina	170.432	169.461	188.425	194.610	195.999

Footnotes:

-- = Not applicable
(s) = Value is too small for the number of decimal places shown
NA = Not available
W = Data withheld to avoid disclosure

Related Information:

- Table Notes
- Sources
- Glossary
- Contacts
- Country

Table: (Million Metric Tons)

	2008	2009	2010	2011	2012
North America	6869.06976	6397.25739	6563.76913	6482.32656	6298.30616
Bermuda	0.75025	0.71151	0.71202	0.59220	0.61419
Canada	574.24320	544.88997	547.92522	551.58734	550.82886
Greenland	0.64170	0.64787	1.00099	0.61560	0.60494
Mexico	452.79369	421.12377	434.02347	446.22753	453.83269
Saint Pierre and Miq	0.09159	0.08899	0.09226	0.09166	0.15105
United States	5840.54934	5429.79527	5580.01518	5483.21223	5270.42188
Central & South Ame	1220.35657	1197.99867	1310.84450	1335.23747	1399.61807
Antarctica	0.26439	0.24476	0.24481	0.14209	0.09946
Antigua and Barbuda	0.65897	0.66632	0.72231	0.58643	0.58643
Argentina	170.43170	169.46090	188.42465	194.61001	195.99869
Aruba	1.07222	1.03984	1.05483	0.89644	0.87641
Bahamas, The	5.07692	3.60306	3.60685	3.64329	3.83606
Barbados	1.49191	1.51017	1.41190	1.44285	1.31158
Belize	1.03903	0.46869	0.46976	0.47263	0.67518
Bolivia	14.00281	13.00468	13.56189	14.45368	17.28493
Brazil	427.39904	406.96236	461.35654	476.60014	500.22847
Cayman Islands	0.48557	0.55311	0.55701	0.53744	0.47297
Chile	65.44430	72.50944	77.65490	78.49444	81.50608
Colombia	63.13901	63.47436	66.45918	70.58393	74.89564
Costa Rica	7.13499	6.92866	7.04218	6.67046	7.29026
Cuba	29.08832	29.25529	28.04129	27.87703	25.98690
Dominica	0.12709	0.12966	0.12999	0.14095	0.13206
Dominican Republic	19.32287	18.12788	18.64030	20.70312	20.79598
Ecuador	27.11630	30.41280	35.03907	34.73195	37.23169
El Salvador	5.93183	5.93246	5.93334	6.34964	6.37496
Falkland Islands (Isla	0.04578	0.04764	0.04766	0.04557	0.04557
French Guiana	1.05598	0.82375	0.98756	1.07359	1.04010
Grenada	0.28688	0.27073	0.27035	0.27243	0.43129
Guadeloupe	2.35198	2.12595	2.12921	2.18799	2.32746
Guatemala	10.92361	11.73055	10.76745	12.52109	13.06910
Guyana	1.52034	1.64218	1.63656	1.67985	1.66138
Haiti	2.00563	2.24946	2.12937	2.08969	2.09431
Honduras	7.91242	7.21091	7.53264	8.03133	10.33080
Jamaica	12.55466	9.28644	8.10729	9.61757	12.75118
Martinique	2.45345	2.67338	2.67523	2.79553	2.84116
Montserrat	0.09267	0.08324	0.08346	0.08801	0.08801
Netherlands Antilles	10.59241	12.20526	12.42646	12.15432	11.84310
Nicaragua	4.50239	4.49305	4.46766	4.82218	5.28522
Panama	14.98225	15.87199	18.91654	17.18339	16.22762
Paraguay	3.82742	4.09420	4.45272	3.99472	3.86876
Peru	36.28661	37.04558	44.46547	42.21615	53.58213
Puerto Rico	34.37078	28.99281	27.69574	26.75769	26.81328
Saint Kitts and Nevis	0.27314	0.27004	0.25632	0.27299	0.25068
Saint Lucia	0.43082	0.41273	0.43317	0.41898	0.41567
Saint Vincent/Grenad	0.22615	0.19548	0.20149	0.20064	0.26886
Suriname	1.95248	2.05052	2.71822	2.18749	2.26822

Table: (Million Metric Tons)

	2008	2009	2010	2011	2012
Trinidad and Tobago	49.55566	47.82784	52.84523	52.16596	51.26732
Turks and Caicos Isl	0.07776	0.16529	0.19585	0.16061	0.15936
Uruguay	8.00138	9.06087	8.18432	8.37201	7.59142
Venezuela	161.79438	157.55979	172.23949	171.11994	184.79320
Virgin Islands, U.S.	12.93401	15.21083	14.45133	13.75365	12.40965
Virgin Islands, Britisl	0.11827	0.11372	0.17694	0.11756	0.16008
Europe	4581.14957	4279.51721	4386.99056	4348.06268	4263.25738
Albania	4.37229	2.81575	3.79862	4.07652	3.96221
Austria	69.99211	65.26445	70.03595	69.33971	66.67506
Belgium	153.53279	134.71218	143.21842	140.12547	139.13890
Bosnia and Herzegov	21.06355	21.57786	23.00197	27.50758	25.99681
Bulgaria	50.61403	44.73865	46.02672	52.56494	48.84771
Croatia	21.74174	20.04659	18.96968	17.83133	20.17905
Cyprus	9.82260	9.22531	8.91436	8.73090	8.80140
Czech Republic	99.10063	92.09819	95.58812	94.35327	91.15491
Denmark	51.90644	48.83244	49.58838	45.30879	40.51219
Faroe Islands	0.69970	0.72467	0.73226	0.77233	0.75336
Finland	53.61809	50.93984	57.28586	51.60939	46.80946
Former Czechoslova	--	--	--	--	--
Former Serbia and M	--	--	--	--	--
Former Yugoslavia	--	--	--	--	--
France	421.56022	386.37242	385.58970	374.32358	364.53817
Germany	812.60627	758.17828	796.95629	784.37750	788.32100
Germany, East	--	--	--	--	--
Germany, West	--	--	--	--	--
Gibraltar	4.55158	4.86385	8.88013	4.75354	3.94625
Greece	106.04136	99.82669	93.54463	92.08394	87.55789
Hungary	56.01399	51.90245	52.50846	52.17165	47.90274
Iceland	3.71576	3.31827	3.80893	3.59020	3.50465
Ireland	44.86961	38.92150	39.57119	36.20716	35.48918
Italy	449.74859	407.63010	419.81124	411.56229	385.81281
Kosovo	6.28906	7.23411	9.33910	7.55743	7.57555
Luxembourg	11.96111	11.43675	12.10320	11.62882	11.68678
Macedonia	8.98171	8.41201	8.00855	8.68723	8.08411
Malta	3.17696	6.68233	8.03025	7.52033	6.56426
Montenegro	2.15773	1.54992	2.75156	16.90526	19.71808
Netherlands	229.52664	222.93083	234.30998	239.73916	239.60496
Norway	40.02858	44.71699	43.57717	41.65102	41.05790
Poland	294.69969	286.47039	304.60756	308.10411	289.45477
Portugal	56.13857	57.10018	53.22172	53.16434	51.19574
Romania	93.87531	81.16977	78.10375	89.48119	86.05824
Serbia	51.56919	49.73258	49.28028	43.87622	41.37553
Slovakia	38.30476	35.17909	36.95972	35.04475	32.08004
Slovenia	17.42004	16.11383	16.21085	15.99411	15.87215
Spain	354.69977	327.80082	312.58798	318.23195	312.44200
Sweden	54.71347	51.83961	56.45176	54.04320	51.07729
Switzerland	45.26299	43.90447	45.61776	41.92415	42.96573

Table: (Million Metric Tons)

	2008	2009	2010	2011	2012
Turkey	272.90035	269.06308	268.54747	294.90915	296.93193
United Kingdom	563.87228	516.19096	529.45101	488.31018	498.87714
Eurasia	2534.58423	2211.98119	2466.16827	2551.37033	2671.97941
Armenia	11.07748	10.00618	4.59601	11.49885	12.11792
Azerbaijan	43.18015	34.08686	33.08787	32.23371	35.14012
Belarus	66.95291	61.11662	64.11263	67.73201	67.12583
Estonia	6.31650	5.22293	5.47340	5.53453	5.68609
Former U.S.S.R.	--	--	--	--	--
Georgia	5.78545	6.53244	6.41224	5.90351	6.25780
Kazakhstan	196.67064	172.83056	188.22808	206.85835	224.22000
Kyrgyzstan	5.83766	8.29788	7.34709	8.65890	9.27750
Latvia	8.03126	7.92022	8.55420	8.05008	7.89709
Lithuania	18.11897	13.38762	13.93040	15.19170	16.68922
Moldova	7.31975	6.62063	6.66714	6.62663	9.41488
Russia	1629.08655	1479.04443	1685.07059	1710.02862	1781.71976
Tajikistan	6.87224	2.43447	2.53788	2.95723	2.97337
Turkmenistan	59.81224	51.79648	58.11224	54.87094	64.97922
Ukraine	342.40330	245.53476	277.72662	298.13610	290.37960
Uzbekistan	127.11915	107.14910	104.31189	117.08917	123.17042
Middle East	1630.84828	1740.67670	1863.30803	1959.43279	2035.65203
Bahrain	29.90655	30.20964	30.66889	30.24887	32.20020
Iran	512.04895	562.57915	566.56347	594.46458	603.58639
Iraq	104.16652	112.59011	115.30014	119.95218	130.74167
Israel	68.74237	66.90525	72.53359	74.36900	80.35777
Jordan	19.29528	19.62522	20.68826	18.15282	16.85506
Kuwait	78.09866	82.23739	85.00289	100.46187	105.68435
Lebanon	14.65259	19.84527	18.92958	20.62933	16.44142
Oman	43.75088	46.03566	59.01355	53.68402	62.85282
Palestinian Territorie	3.01014	2.04248	2.27343	2.58611	3.00809
Qatar	63.50041	68.40773	77.58264	81.48292	99.16526
Saudi Arabia	421.63629	437.68518	506.59635	551.38946	582.67020
Syria	54.41043	61.62836	64.16208	63.19078	50.92176
United Arab Emirate	193.94115	208.79449	218.77768	228.66591	234.06030
Yemen	23.68806	22.09077	25.21549	20.15495	21.27855
Africa	1152.38261	1145.84918	1179.97238	1168.65561	1205.70337
Algeria	106.92487	113.99082	117.79596	122.13081	133.92130
Angola	23.08454	24.47161	29.81219	29.76215	31.61438
Benin	3.35844	4.50767	5.06911	5.21210	4.58059
Botswana	4.33554	4.32247	5.06081	4.66832	3.91875
Burkina Faso	1.38475	1.70254	1.73335	1.67560	1.40597
Burundi	0.35525	0.19940	0.19927	0.19399	0.31511
Cameroon	7.53987	8.30876	8.55748	8.06185	6.22371
Cape Verde	0.32451	0.37926	0.37989	0.38746	0.38569
Central African Repu	0.33991	0.34058	0.34103	0.33923	0.43504
Chad	0.26181	0.25406	0.25431	0.25735	0.26427
Comoros	0.11966	0.15095	0.13028	0.14973	0.15736
Congo (Brazzaville)	5.96083	6.46333	7.26377	6.83644	6.69106

Table: (Million Metric Tons)

	2008	2009	2010	2011	2012
Congo (Kinshasa)	2.73074	2.63361	3.40624	2.82656	2.48087
Cote dIvoire (IvoryCo	6.38742	6.51809	6.47912	6.80180	6.40300
Djibouti	1.70509	1.15975	1.16137	1.39205	1.79628
Egypt	181.29099	185.02267	186.13892	199.41975	206.29336
Equatorial Guinea	4.68116	5.40840	5.42677	5.12289	5.61439
Eritrea	0.72890	0.51372	0.68758	0.47479	0.73952
Ethiopia	6.42447	6.97507	6.45187	7.13430	8.21297
Gabon	4.67176	4.25937	4.79984	5.34958	5.43727
Gambia, The	0.37834	0.44356	0.48287	0.43482	0.47223
Ghana	7.38905	7.48618	9.08403	9.24750	9.09757
Guinea	1.34601	1.43346	1.43507	1.43187	1.38821
Guinea-Bissau	0.46167	0.40794	0.40843	0.41853	0.46006
Kenya	11.20102	11.75020	12.71571	13.14292	13.44644
Lesotho	0.23982	0.23462	0.55260	0.44846	0.27013
Liberia	0.69074	0.55232	0.53763	0.59391	0.54157
Libya	56.78157	57.99955	67.76705	40.68417	54.60030
Madagascar	2.81384	1.85917	1.88307	1.84041	2.88572
Malawi	1.19386	0.96045	0.97625	0.98819	1.91025
Mali	0.70006	0.69750	0.69890	0.74376	0.77393
Mauritania	2.75747	1.89251	1.89437	1.60836	2.40827
Mauritius	5.03529	4.47775	5.07744	4.87078	5.31722
Morocco	37.25215	41.98606	47.66703	42.91892	39.34854
Mozambique	2.37787	2.53643	2.55087	3.55343	4.78878
Namibia	3.29535	3.30397	3.13257	3.25900	3.71570
Niger	1.29303	1.20776	1.32263	1.30835	1.41080
Nigeria	99.15925	78.95595	79.37554	83.13075	86.39754
Reunion	2.82325	2.93520	2.93812	2.84177	2.77301
Rwanda	0.72452	0.76490	0.76180	0.80251	0.76927
Saint Helena	0.01355	0.00957	0.00958	0.01510	0.01208
Sao Tome and Princi	0.13523	0.13347	0.13512	0.13523	0.13784
Senegal	6.08381	5.88974	6.35380	6.22447	7.13889
Seychelles	1.02740	1.17180	1.05822	1.24344	1.30430
Sierra Leone	1.26054	1.39873	0.65750	1.43596	1.31122
Somalia	0.86754	0.81363	0.83739	0.75912	0.85576
South Africa	489.96991	477.55845	478.79399	471.51566	473.16475
Sudan and South Su	12.10186	18.12932	16.27519	19.40360	13.94309
Swaziland	1.03299	0.98085	0.98107	0.97373	0.93685
Tanzania	6.01478	6.57218	6.45844	7.10832	9.29534
Togo	2.74497	1.32946	2.37352	1.45133	1.62959
Tunisia	18.26525	18.79229	19.18401	20.12092	20.27262
Uganda	1.96576	3.27832	3.39642	3.40163	2.54774
Western Sahara	0.31460	0.26950	0.26964	0.26995	0.31605
Zambia	2.24980	1.95342	1.99751	2.56977	3.05444
Zimbabwe	7.80994	8.10083	8.77984	9.56224	10.11638
Asia & Oceania	11656.21057	12462.33965	13383.78325	14309.90416	14435.77070
Afghanistan	1.59156	6.40949	8.13356	8.03453	8.55174
American Samoa	0.66442	0.60258	0.60322	0.45063	0.60699

Table: (Million Metric Tons)

	2008	2009	2010	2011	2012
Australia	429.61476	434.75651	431.09043	426.45530	420.63306
Bangladesh	51.39788	55.93966	54.09136	59.20666	63.49702
Bhutan	0.28389	0.33163	0.35028	0.35642	0.32076
Brunei	10.61635	7.27333	8.45474	8.70558	8.67817
Burma (Myanmar)	14.84000	11.90408	11.91768	12.41227	13.34096
Cambodia	4.17976	4.08155	4.10625	4.61025	6.05478
China	6166.56551	6816.09505	7388.50234	8126.69441	8106.43005
Cook Islands	0.09059	0.07310	0.07320	0.07451	0.15033
Fiji	2.34417	1.35972	1.33253	1.37185	1.54298
French Polynesia	0.99214	1.06349	1.09766	1.07072	1.07072
Guam	1.77352	1.07054	2.66436	2.03090	1.77476
Hawaiian Trade Zone	--	--	--	--	--
Hong Kong	78.88333	89.55811	99.49079	94.30084	88.62533
India	1448.99101	1642.93336	1714.90686	1752.67507	1830.93846
Indonesia	370.19055	405.70127	431.09355	450.07670	456.21018
Japan	1216.25207	1104.91381	1177.28573	1200.26896	1259.05760
Kiribati	0.04369	0.06237	0.06243	0.05845	0.05845
Korea, North	69.19686	66.25519	64.62918	66.55914	67.00113
Korea, South	521.77008	524.43921	584.01825	650.45438	657.09293
Laos	1.41818	1.45311	1.52556	1.53238	1.62329
Macau	2.39395	1.79714	1.33923	1.63015	1.69382
Malaysia	171.31692	175.33034	194.03409	195.70131	198.78527
Maldives	0.88832	1.06180	1.06232	1.07488	1.12272
Mongolia	7.18562	7.66870	8.22899	8.38717	11.36478
Nauru	0.18592	0.18149	0.18158	0.16868	0.16868
Nepal	2.95019	3.27722	3.55222	3.75749	3.63807
New Caledonia	2.94877	2.95339	3.06679	3.17799	3.07132
New Zealand	40.73460	37.42024	37.47725	37.65567	37.88867
Niue	0.00544	0.00345	0.00345	0.00352	0.00352
Pakistan	136.31363	138.83281	143.20570	141.96773	146.88905
Papua New Guinea	4.54869	3.23463	3.28577	3.37716	3.38465
Philippines	74.42050	69.35667	78.17173	83.26524	83.94974
Samoa	0.17690	0.16833	0.16903	0.16153	0.16099
Singapore	155.24037	192.37832	191.04467	205.44210	207.96039
Solomon Islands	0.22975	0.19378	0.21658	0.21968	0.26602
Sri Lanka	12.43936	12.87535	12.97390	14.43257	15.23470
Taiwan	290.38297	259.55702	292.88104	311.34424	307.14694
Thailand	255.08546	267.88466	287.26884	293.36343	290.71715
Timor-Leste (East Ti	0.35200	0.19068	0.19096	0.32616	0.49633
Tonga	0.20155	0.18586	0.18614	0.18227	0.18884
U.S. Pacific Islands	0.29446	0.30074	0.35338	0.29622	0.28688
Vanuatu	0.11722	0.12478	0.12614	0.14983	0.16614
Vietnam	104.75456	109.81473	138.04764	135.08734	131.73148
Wake Island	1.34309	1.27036	1.28586	1.33184	1.29242
World	29644.60159	29435.61998	31154.83613	32154.98961	32310.28712

U.S. Energy Information Administration
Energy –Related Carbon Dioxide Emissions

International Energy Outlook 2010

Energy-Related Carbon Dioxide Emissions

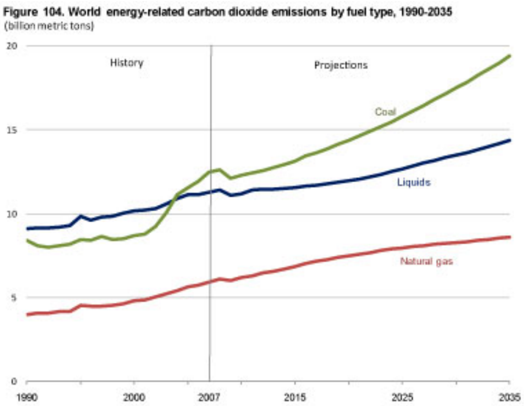
In 2007, non-OECD energy-related emissions of carbon dioxide exceeded OECD emissions by 17 percent. In the IEO2010 Reference case, energy-related carbon dioxide emissions from non-OECD countries in 2035 are about double those from OECD countries.

Overview

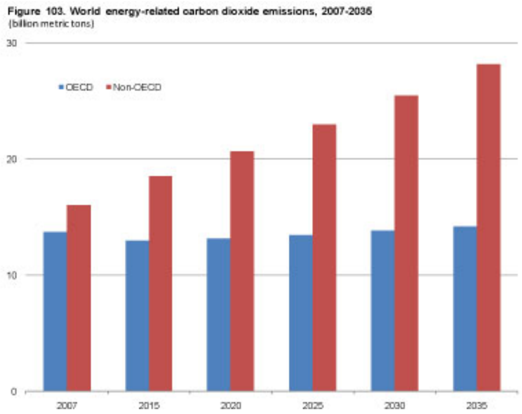
Because anthropogenic emissions of carbon dioxide result primarily from the combustion of fossil fuels, world energy use continues to be at the center of the climate change debate. In the *IEO2010* Reference case, world energy-related carbon dioxide emissions[29] grow from 29.7 billion metric tons in 2007 to 33.8 billion metric tons in 2020 and 42.4 billion metric tons in 2035 (Table 18).[30]

From 2006 to 2007, total energy-related carbon dioxide emissions from non-OECD countries grew by 4.9 percent, while emissions from OECD countries increased by 1.0 percent. The increase in OECD countries' carbon dioxide emissions is estimated to have been reversed in 2008 and 2009, as fossil fuel demand contracted during the global recession that began in 2008 and continued through 2009. In 2015, annual emissions from non-OECD countries exceed those from OECD countries by 43 percent in the Reference case (Figure 103). Over the 28-year projection period from 2007 to 2035, total carbon dioxide emissions from non-OECD countries increase by an average of 2.0 percent per year—20 times the rate of increase for OECD countries (0.1 percent per year). By 2035, energy-related carbon dioxide emissions in non-OECD countries (28.2 billion metric tons) are almost twice the level of those in OECD countries (14.2 billion metric tons).

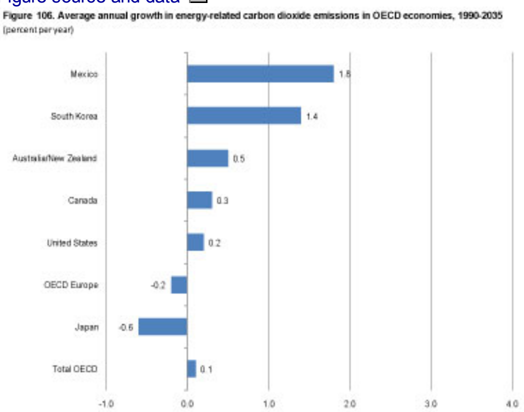
The *IEO2010* Reference case projections are, to the extent possible, based on existing laws and policies. Projections for carbon dioxide emissions may change significantly if laws and policies aimed at reducing greenhouse gas emissions are changed or new ones are introduced. In addition, beyond energy-related carbon dioxide there are other gases and sources that contribute to greenhouse gas emissions.



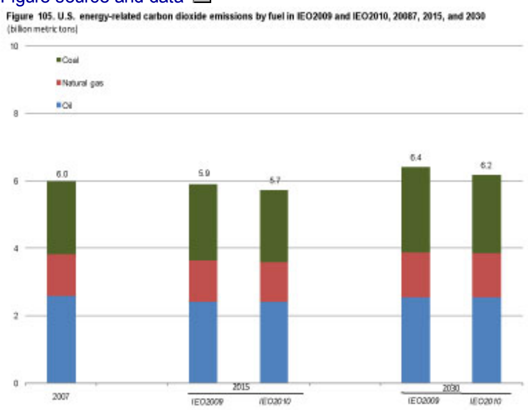
Click to enlarge »
Figure source and data



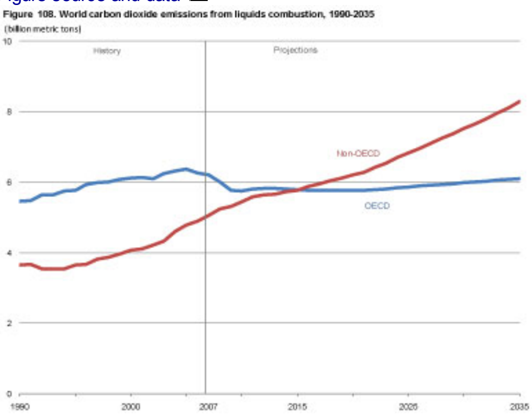
Click to enlarge »
Figure source and data



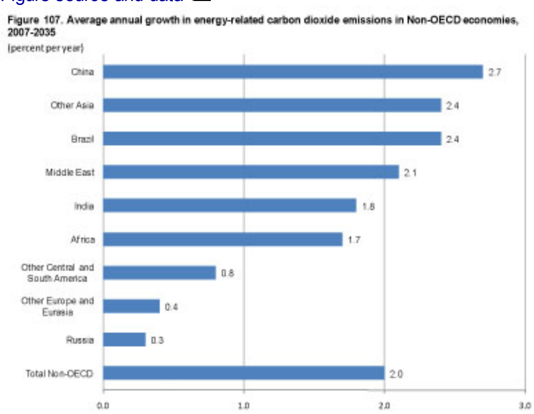
Click to enlarge »
Figure source and data



Click to enlarge »
Figure source and data



Click to enlarge »
Figure source and data

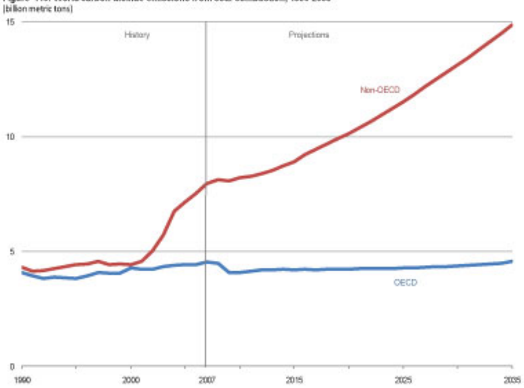


Click to enlarge »
Figure source and data

The relative contributions of different fossil fuels to total energy-related carbon dioxide emissions have changed over time. In 1990, carbon dioxide emissions associated with liquid fuels made up an estimated 42 percent of the world total; in 2007, their share was 38 percent; and in 2035 it is 34 percent in the Reference case (Figure 104). Carbon dioxide emissions from natural gas, which accounted for less than 19 percent of the total in 1990, increased to 20 percent of the 2007 total. From 2007 to 2035 their share of the total is relatively stable, in a range of 20 to 22 percent.

Coal's share of world carbon dioxide emissions, which grew from 39 percent in 1990 to 42 percent in 2007, increases to almost 46 percent by 2035. Coal is the most carbon-intensive of the fossil fuels, and it is the fastest-growing carbon-emitting energy source in the Reference case, reflecting its important role in the energy mix of

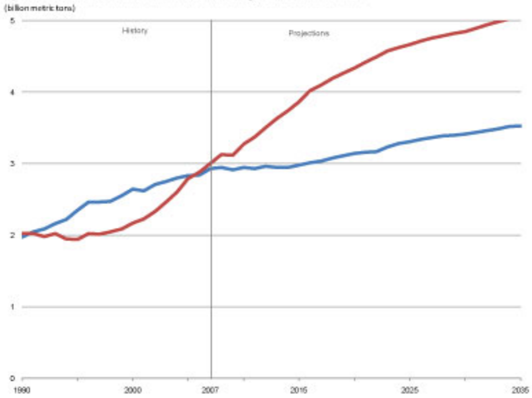
Figure 110. World carbon dioxide emissions from coal combustion, 1990-2035



Click to enlarge »

Figure source and data

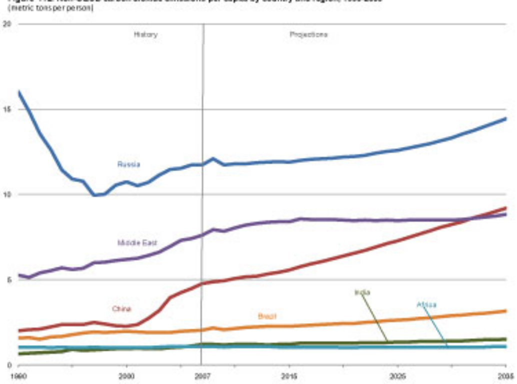
Figure 109. World carbon dioxide emissions from natural gas combustion, 1990-2035



Click to enlarge »

Figure source and data

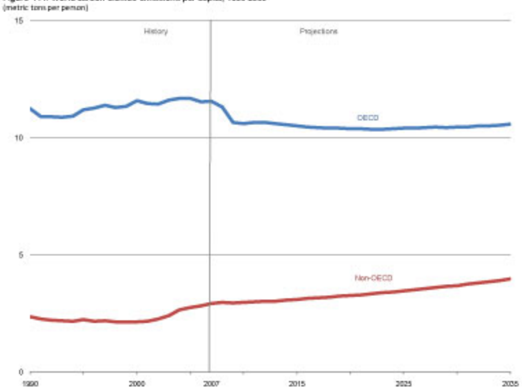
Figure 112. Non-OECD carbon dioxide emissions per capita by country and region, 1990-2035



Click to enlarge »

Figure source and data

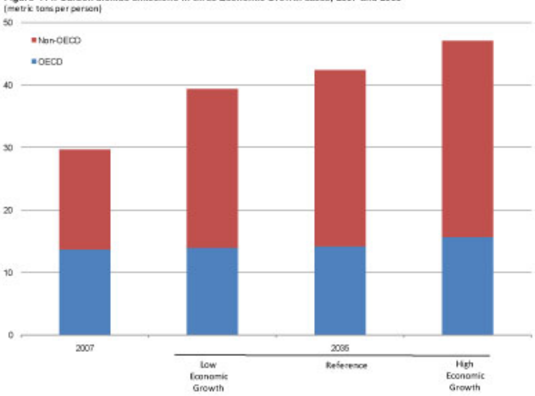
Figure 111. World carbon dioxide emissions per capita, 1990-2035



Click to enlarge »

Figure source and data

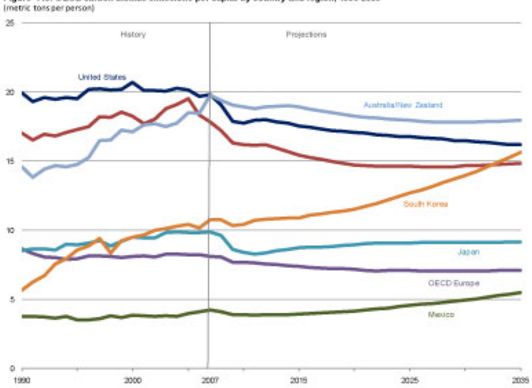
Figure 114. Carbon dioxide emissions in three Economic Growth cases, 2007 and 2035



Click to enlarge »

Figure source and data

Figure 113. OECD carbon dioxide emissions per capita by country and region, 1990-2035



Click to enlarge »

Figure source and data

non-OECD countries—especially, China and India. In 1990, China and India together accounted for 13 percent of world carbon dioxide emissions; by 2007 their combined share had risen to 26 percent, largely because of their strong economic growth and increasing use of coal to provide energy for that growth. In 2035, carbon dioxide emissions from China and India combined account for 37 percent of the world total, with China alone responsible for 31 percent. The projected emissions from coal would be much lower if carbon capture and storage became economical (see "Will carbon capture and storage reduce the world's carbon dioxide emissions?").

In December 2009, the fifteenth session of the Conference of Parties to the United Nations Framework Convention on Climate Change (COP-15) was held in Copenhagen, Denmark. Although COP-15 did not produce a legally binding agreement to cut emissions, key developed and developing countries negotiated a Copenhagen Accord that was noted by the COP in its final session. Under the accord, a process was established for countries to enter specific mitigation pledges by January 31, 2010. Table 19 includes a list of the pledges that were submitted.

The emissions mitigation pledges submitted by countries pursuant to the Copenhagen Accord fall into two general categories: absolute reductions and intensity reductions. Absolute reductions reduce greenhouse gas emissions independent of economic or material output. Japan, Russia, the European Union, the United States, and Brazil have announced absolute reduction goals, which are expressed as percentage reductions below historical base-year amounts. (For example, Japan has announced its goal to reduce carbon dioxide emissions to 25 percent below 1990 levels by 2020.) China and India have announced intensity reduction goals, which typically are expressed as reductions in emissions per unit of output as measured by GDP. (For example, China has announced its intention to reduce its carbon emissions intensity by 2020 to a level that is 40 to 45 percent below its emissions intensity in 2005.)

In addition to voluntary reduction goals, there was a pledge from developed countries at COP-15 for $30 billion in added resources in the 2010-2012 time frame to help developing countries reduce emissions, preserve and enhance forests, and adapt to climate change [1]. There was a further goal of mobilizing $100 billion per year in public and private finance by 2020 to address the needs of developing countries [2].

Emissions by region

In the *IEO2010* Reference case, world energy-related carbon dioxide emissions increase by an average of 1.3 percent per year from 2007 to 2035 (see Table 18). For OECD countries, annual increases in carbon dioxide emissions average 0.1 percent over the 28-year period. The annual increases are not uniform, however. OECD carbon dioxide emissions in the Reference case decline from 13.7 billion metric tons in 2007 to 12.8 billion metric tons in 2010, then rise to 13.5 billion metric tons in 2025 and 14.2 billion metric tons in 2035.[31]

The average annual rate of increase in carbon dioxide emissions from OECD countries from 2007 to 2035 is 0.1 percent, which is one-tenth of the actual rate of increase from 1990 to 2007 (1.0 percent per year). Projections of U.S. emissions have been declining in recent *IEOs*. In the *IEO2009* Reference case, the projection for U.S. emissions growth was 9 percent from 2006 to 2030. In the *IEO2010* Reference case, U.S. energy-related carbon dioxide emissions grow by 5 percent from 2006 to 2030. As a result, the projection for U.S. emissions in 2030 is 3.7 percent lower in *IEO2010* than it was in *IEO2009* (Figure 105).

The highest rate of increase in annual emissions of carbon dioxide among OECD countries in the *IEO2010* Reference case is for Mexico, at 1.8 percent per year (Figure 106). Mexico is among the least industrialized of the OECD economies. South Korea (1.4 percent per year) is the only OECD country other than Mexico for which average emissions growth exceeds 1 percent per year. The GDP growth rate for Mexico in *IEO2010* (3.5 percent per year) is the highest among OECD countries, and it is more than a percentage point higher than South Korea's annual GDP growth rate of 2.4 percent.

Japan's energy-related carbon dioxide emissions *decline* in the Reference case by an average of 0.6 percent per year from 2007 to 2035, and OECD Europe's emissions decline by 0.2 percent per year. They are the only regions with declining emissions over the period, and because their combined 2007 emissions are 41 percent of the OECD total, they have a mitigating effect on emissions growth for the OECD region as a whole.

For non-OECD countries, total energy-related carbon dioxide emissions increase by an average of 2.0 percent per year from 2007 to 2035 (Figure 107). The highest rate among non-OECD countries is for China, at 2.7 percent annually from 2007 to 2035, reflecting the country's strong economic growth and heavy reliance on fossil fuels, especially coal. The lowest rate among non-OECD countries is for Russia, at 0.3 percent per year. Russia is expected to expand its reliance on nuclear power to fuel electricity generation, and a decline in its population is likely to slow its overall rate of increase in energy demand. Additionally, retirement of old, inefficient Soviet-era equipment is expected to continue.

Emissions by fuel

When 2007 carbon dioxide emissions are analyzed by fossil fuel, coal is the largest source (12.5 billion metric tons), followed by liquid fuels (11.3 billion metric tons) and natural gas (5.9 billion metric tons). World carbon dioxide emissions from the consumption of liquid fuels increase by 27.5 percent, or an average of 0.9 percent per year, from 2007 to 2035, with all the increase coming from non-OECD countries. Total carbon dioxide emissions from liquid fuel use in OECD countries decline in the early years of the projection and remain just below 2007 levels in 2035 (Figure 108).[32] China has the highest rate of growth in carbon dioxide emissions from liquid fuel use, at 2.9 percent per year, corresponding to its growing demand for liquid fuels in the transportation and industrial sectors. Although the United States remains the largest source of petroleum-related carbon dioxide emissions throughout the period, with 2.6 billion metric tons in 2035, China comes close with 2.2 billion metric tons in 2035.

Global carbon dioxide emissions from natural gas combustion worldwide increase by 45 percent, or an average of 1.3 percent per year, to 8.6 billion metric tons in 2035, with the increase for OECD countries averaging 0.7 percent per year and the increase for non-OECD countries averaging 1.9 percent per year (Figure 109). Again, China shows the most rapid growth of emissions in the Reference case, averaging 5.0 percent annually. However, China's emissions from natural gas combustion were only 0.1 billion metric tons in 2007, and in 2035 they total only 0.5 billion metric tons—equivalent to 4 percent of China's total energy-related emissions and 6 percent of the world's total emissions from natural gas combustion. The much lower growth rate in U.S. emissions from natural gas use, averaging 0.3 percent per year, still results in 1.3 billion metric tons of emissions in 2035, which is almost triple the amount from China in 2035.

World carbon dioxide emissions from coal combustion increase by 56 percent, or 1.6 percent per year on average, from 12.5 billion metric tons in 2007 to 19.4 billion metric tons in 2035. Total coal-related emissions from non-OECD countries were already greater than those from OECD countries in 1990, and in 2035 they are more than 3 times the OECD total (Figure 110), in large part as a result of increases in coal use by China and India.

China accounts for 78 percent of the total increase in the world's coal-related carbon dioxide emissions from 2007 to 2035, and India accounts for 7 percent. For China alone, coal-related emissions grow by an average of 2.6 percent annually, from 5.2 billion metric tons in 2007 to 10.6 billion metric tons (or 55 percent of the world total) in 2035. India's carbon dioxide emissions from coal combustion total 1.4 billion metric tons in 2035, accounting for more than 7 percent of the world total. In the United States—the world's other major coal consumer—coal-related carbon dioxide emissions rise more slowly, by 0.3 percent per year, to 2.4 billion metric tons (12 percent of the world total) in 2035.

Factors influencing trends in energy-related carbon dioxide emissions

Two key measures provide useful indications of trends in energy-related emissions:

- The *carbon intensity of energy supply* is a measure of the amount of carbon dioxide associated with each unit of energy used. It directly links changes in carbon dioxide emissions levels with changes in energy usage. Carbon emissions vary by energy source, with coal being the most carbon-intensive fuel, followed by oil and natural gas. Nuclear power and some renewable energy sources (i.e., solar and wind) do not generate carbon dioxide emissions. As changes in the fuel mix alter the share of total energy demand met by more carbon-intensive fuels relative to less carbon-intensive or "carbon-free" energy sources, overall carbon intensity changes. Over time, declining carbon intensity can offset increasing energy consumption to some extent. If energy consumption increased and carbon intensity declined at the same rate, carbon dioxide emissions would remain constant.
- The *energy intensity of economic activity* is a measure of energy consumption per unit of economic activity as measured by GDP. It relates changes in energy consumption to changes in economic activity. As a country's energy intensity changes, so does the influence of a given level of economic activity on carbon dioxide emissions. Increased energy use and economic growth generally occur together, although the degree to which they are linked varies across regions and stages of economic development.

As with carbon intensity, regional energy intensities do not necessarily remain constant over time. The rate at which the energy efficiency of an economy's capital stock (vehicles, appliances, manufacturing equipment, etc.) increases affects trends in energy intensity. New stock is often more energy efficient than the older equipment it replaces. In addition to the availability of more energy-efficient technologies, the rate of efficiency improvement is also determined by changes in the price of energy relative to prices for other goods and services, and by investment in research and development. These factors in combination can produce changes in regional energy intensities, with corresponding effects on expectations for future levels of energy consumption, fuel mix, and carbon dioxide emissions.

Structural shifts in national economies also can lead to changes in energy intensity when the shares of economic output attributable to energy-intensive and non-energy- intensive industries change. For example, iron, steel, and cement are among the most energy-intensive industries, and countries whose economies rely heavily on production from those industries tend to have high energy intensities. When their economies shift toward less energy-intensive activities, their national energy intensities may decline. Other influences on regional energy intensity trends include changes in consumer tastes and preferences, climate, taxation, the availability of energy supply, government regulations, and the structure of energy markets themselves.

The Kaya decomposition of emissions trends

The Kaya Identity provides an intuitive approach to the interpretation of historical trends and future projections of energy-related carbon dioxide emissions. It is used to describe the relationship among the factors that influence trends in energy-related carbon dioxide emissions:

$CO_2 = (CO_2 / E) \times (E / GDP) \times (GDP / POP) \times POP$.

The identity links total energy-related carbon dioxide emissions (CO_2) to energy (E), the level of economic activity as measured by gross domestic product (GDP), and population size (POP). Conveniently, the percentage rate of change in carbon emission levels over time approximates the sum of the percentage rate of change across the four components. The first two components on the right-hand side of the equation represent the carbon dioxide intensity of energy supply (CO_2/E) and the energy intensity of economic activity (E/GDP). When they are multiplied together, the resulting measure is carbon dioxide emissions per dollar of GDP (CO_2/GDP)—i.e., the carbon intensity of the economy, which is another common measure used in analysis. Economic output (GDP) is decomposed into output per capita (GDP/POP) and population (POP). At any point in time, the level of energy-related carbon dioxide emissions can be seen as the product of the four Kaya Identity components—energy intensity, carbon dioxide intensity of energy supply, output per capita, and population.[33]

Using 2007 data as examples, world energy-related carbon dioxide emissions totaled 29.7 billion metric tons in that year, world energy consumption totaled 495 quadrillion Btu, world GDP totaled $63.1 trillion, and the total world population was 6,665 million. Using those figures in the Kaya equation yields the following: 60.1 metric tons of carbon dioxide per billion Btu of energy (CO_2/E), 7.8 thousand Btu of energy per dollar of GDP (E/GDP), and $9,552 of income per person (GDP/POP).

Of the four Kaya components, policymakers are most actively concerned with energy intensity of economic output (E/GDP) and carbon dioxide intensity of the energy supply ($CO_{2/E}$), because they correspond to the policy levers most available to them. Reducing growth in per-capita output would also have a mitigating influence on emissions, but governments generally pursue policies to increase rather than reduce output per capita to advance objectives other than greenhouse gas mitigation. Some countries, such as China, have policies related directly to limiting population growth, but most countries pursue policies that only indirectly influence population growth.

Table 20 shows absolute regional Kaya Identity values for selected years and average annual rates of change for three 15-year periods: (1) an historical period from 1990 to 2005, (2) a period from 2005 to 2020, and (3) the final period of the *IEO2010* projection from 2020 to 2035.[34] The three periods show distinctive patterns of emissions growth and underlying Kaya factors.

Both OECD and non-OECD economies have experienced or are expected to experience declines in energy intensity. These are the only values that are consistently negative across all time periods at the aggregate level. In the historical period, only OECD Asia showed a rise in energy intensity, reflecting an increase in the energy intensity of Japan's economy. However, Japan has the lowest energy intensity among all the fully industrialized OECD economies.

Carbon intensity varies across time and regions, but in no case does it change as much as energy intensity does. Over the 1990-2005 period, the largest annual decline worldwide (0.7 percent) is for non-OECD Europe and Eurasia, where much of the old energy infrastructure was shut down and replaced after the fall of the Soviet Union. The next largest annual decline (0.6 percent) occurred in OECD Europe, where coal consumption fell from 17.7 quadrillion Btu in 1990 to 12.9 quadrillion Btu in 2005 and was replaced by natural gas consumption, which increased from 11.2 quadrillion Btu in 1990 to 19.8 quadrillion Btu in 2005. In many regions, including North America, the carbon intensity of energy supply remained largely unchanged from 1990 to 2005. For the entire world, carbon intensity declined by only 0.1 percent annually from 1990 to 2005, compared with a 1.5-percent average annual decline in energy intensity.

Over the period from 2005 to 2020, carbon intensity declines in the *IEO2010* Reference case in every part of the world. While explicit carbon policies, such as the caps in OECD Europe, are not included in the model, analysts' judgment regarding, for example, nuclear power have taken those policies into account.[35] In other areas, declining carbon intensity is the result of policies such as renewable portfolio standards and other approaches to promote alternatives to fossil fuels. From 2020 to 2035, there is a slight decrease in carbon intensity of energy supply in OECD economies and a slight increase in non-OECD economies, so that there is virtually no change on a worldwide basis in the absence of additional policies to stem emissions growth, which are not included in the Reference case.

For non-OECD countries, increases in output per capita, coupled with even moderate population growth, overwhelm the improvements in energy and carbon intensity. For example, the combined decrease in carbon intensity and energy intensity in non-OECD economies averages 3.0 percent per year from 2005 to 2020. With output per capita rising by 4.3 percent per year and population growing by 1.2 percent per year, however, the net increase in non-OECD carbon dioxide emissions is 2.3

percent per year.[36] Over the same period, the combined decrease (improvement) in carbon intensity and energy intensity in OECD economies averages 2.1 percent per year—lower than in non-OECD economies—but because OECD output per capita increases by 1.4 percent per year and population growth averages 0.5 percent per year, the net result is that OECD carbon dioxide emissions decline by an average of 0.2 percent per year.

Emissions per capita

Another measure of carbon dioxide intensity is emissions per person. Carbon dioxide emissions per capita in OECD economies are significantly higher than in non-OECD economies (Figure 111). Among non-OECD countries, China has the highest percentage increase in carbon dioxide emissions per capita in the Reference case, from 4.7 metric tons per person in 2007 to 9.2 metric tons per person in 2035 (Table 21 and Figure 112)—an average annual increase of 2.4 percent. Russia has the highest level of emissions per capita among non-OECD economies in 2035, at 14.4 metric tons per person. By country grouping, the lowest levels of emissions per capita are in India and Africa. India's emissions per capita increase from 1.2 metric tons in 2007 to 1.5 metric tons in 2035, and Africa's emissions per capita increase from about 1.0 metric ton in 2007 to 1.1 metric tons in 2035.[37]

OECD countries have higher levels of carbon dioxide emissions per capita, in part because of their higher levels of income and fossil fuel use per person. In the Reference case, U.S. emissions per capita fall from 19.8 metric tons in 2007 to 16.2 metric tons in 2035 but remain among the highest, second only to the Australia/New Zealand region (Figure 113). Canada's emissions per capita fall from 17.8 metric tons to 14.8 metric tons over the same period. In Mexico, emissions per capita increase from about 4 metric tons in 2007 (the lowest level among OECD countries) to 5.5 metric tons in 2035, which still is the lowest among the OECD countries reported separately in *IEO2010*.[38]

Income per capita is the most important determinant of carbon dioxide emissions per capita, but other factors also affect the calculation. For example, climate is important, because in general more energy is used for heating per capita in colder climates than in warmer climates. Similarly, population density is important, because densely populated countries use less energy for transportation per capita than do more sparsely populated countries. For example, Canada has both a relatively cold climate and low population density, and its carbon dioxide emissions in 2007 are estimated at 17.8 metric tons per capita, whereas Japan has a more temperate climate and a much higher population density, and its emissions in 2007 are estimated at 9.9 metric tons per capita (44 percent lower than in Canada). Japan's income per capita, by comparison, was only 15 percent lower than Canada's in 2007.

Alternative Economic Growth cases

In *IEO2010*, economic growth is the most significant factor analyzed that underlies the projections for growth in energy-related carbon dioxide emissions in the mid-term, as the world continues to rely on fossil fuels for most of its energy use. Accordingly, projections of world carbon dioxide emissions are lower in the Low Economic Growth case and higher in the High Economic Growth case than in the Reference case.

In 2035, total energy-related carbon dioxide emissions worldwide (Figure 114) range from a projected 39.3 billion metric tons in the Low Economic Growth case to 47.1 billion metric tons in the High Economic Growth case—19.7 percent higher than projected in the Low Economic Growth case. The projections for emissions by fuel show similar variations across the cases.

In the High Economic Growth case, world carbon dioxide emissions increase by an average of 1.7 percent annually from 2007 to 2035, as compared with 1.3 percent in the Reference case. For OECD countries, the projected average increase in the High Economic Growth case is 0.5 percent per year; for non-OECD countries, the average is 2.4 percent per year. In the Low Economic Growth case, world carbon dioxide emissions increase by 1.0 percent per year from 2007 to 2035, with averages of -0.1 percent per year for OECD countries and 1.6 percent per year for non-OECD countries (compared with 0.1 percent and 2.0 percent, respectively, in the Reference case).

Footnotes

29 In *IEO2010*, energy-related carbon dioxide emissions are defined as emissions related to the combustion of fossil fuels (liquid fuels, natural gas, and coal) and those associated with petroleum feedstocks. Emissions from the flaring of natural gas are not included.

30 In keeping with current international practice, *IEO2010* presents data on greenhouse gas emissions in billion metric tons carbon dioxide equivalent. The data can be converted to carbon equivalent units by multiplying by 12/44.

31 For factors underlying the trends, see discussion below on carbon and energy intensity and the Kaya Identity.

32 The *IEO2010* estimate for U.S. carbon dioxide emissions from liquids combustion, taken from EIA's *Annual Energy Outlook 2010*, does not include emissions from biofuels. However, due to modeling limitations, *IEO2010* does include carbon dioxide emissions from biofuels combustion outside the United States. In the *IEO2010* Reference case, biofuels make up 1.5 percent of total world liquids consumption outside the United States by 2035. These non-U.S. biofuels add about 0.2 billion metric tons to total world carbon dioxide emissions.

33 In other analyses, EIA has combined output per capita and population as GDP, simplifying the right side of the equation to three components: *GDP*, *E*/*GDP* and *C*/*E*. However, because rates of output and population growth can differ dramatically across countries and regions, this analysis uses the more detailed equation. See U.S. Energy Information Administration, *Emissions of Greenhouse Gases in the United States 2008*, DOE/EIA-0573(2008) (Washington, DC, December 2009), p. 3, web site www.eia.gov/oiaf/1605/ggrpt/pdf/0573(2008).pdf.

34 See Appendix J for a complete regional listing of Kaya Identity components.

35 Greenhouse gas emissions caps in Europe are not explicitly included in the *IEO2010* analysis for the following reasons: (1) greenhouse gases other than energy-related carbon dioxide are included in the caps, but they are not modeled in *IEO2010*; (2) the regional composition of the European Union differs from the OECD Europe region modeled in *IEO2010*; (3) the European Union Emissions Trading System includes offsets that involve countries outside the European Union; and (4) the *IEO2010* Reference case extends to 2035 and therefore would require further assumptions regarding emissions caps beyond the period covered under the Emissions Trading System.

36 Simply summing the rates of change over time often introduces an error factor of 0.1 to 0.2 percentage points.

37 These values do not include positive carbon flux (emissions) from deforestation.

38 Because Turkey is an OECD country with per-capita income lower than Mexico's, this may mean lower per-capita emissions. EIA does not project Turkey's emissions separately.

References

[1] Summary information is taken largely from Pew Center on Global Climate Change, "Copenhagen Climate Conference - COP 15" (December 21, 2009), web site www.pewclimate.org/copenhagen/cop15 .

[2] United Nations Framework Convention on Climate Change, *Report of the Conference of the Parties on Its Fifteenth Session*, FCCC/CP/2009/11/Add.1 (March 30, 2010), "Addendum: Decisions Adopted by the Conference of the Parties," p. 5, web site http://unfccc.int/resource/docs/2009/cop15/eng/11a01.pdf .

EPA Table ES-3

http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2014-Chapter-Executive-Summary.pdf

Executive Summary

An emissions inventory that identifies and quantifies a country's primary anthropogenic[1] sources and sinks of greenhouse gases is essential for addressing climate change. This inventory adheres to both (1) a comprehensive and detailed set of methodologies for estimating sources and sinks of anthropogenic greenhouse gases, and (2) a common and consistent mechanism that enables Parties to the United Nations Framework Convention on Climate Change (UNFCCC) to compare the relative contribution of different emission sources and greenhouse gases to climate change.

In 1992, the United States signed and ratified the UNFCCC. As stated in Article 2 of the UNFCCC, "The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."[2]

Parties to the Convention, by ratifying, "shall develop, periodically update, publish and make available…national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, using comparable methodologies…"[3] The United States views this report as an opportunity to fulfill these commitments.

This chapter summarizes the latest information on U.S. anthropogenic greenhouse gas emission trends from 1990 through 2012. To ensure that the U.S. emissions inventory is comparable to those of other UNFCCC Parties, the estimates presented here were calculated using methodologies consistent with those recommended in the Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (IPCC/UNEP/OECD/IEA 1997), the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (IPCC 2000), and the *IPCC Good Practice Guidance for Land Use, Land-Use Change, and Forestry* (IPCC 2003). Additionally, the U.S. emission inventory has continued to incorporate new methodologies and data from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2006). The use of the most recently published calculation methodologies by the IPCC, as contained in the 2006 IPCC Guidelines, is considered to improve the rigor and accuracy of this inventory and is fully in line with the prior IPCC guidance. The structure of this report is consistent with the UNFCCC guidelines for inventory reporting.[4] For most

[1] The term "anthropogenic," in this context, refers to greenhouse gas emissions and removals that are a direct result of human activities or are the result of natural processes that have been affected by human activities (IPCC/UNEP/OECD/IEA 1997).

[2] Article 2 of the Framework Convention on Climate Change published by the UNEP/WMO Information Unit on Climate Change. See <http://unfccc.int>.

[3] Article 4(1)(a) of the United Nations Framework Convention on Climate Change (also identified in Article 12). Subsequent decisions by the Conference of the Parties elaborated the role of Annex I Parties in preparing national inventories. See <http://unfccc.int>.

[4] See <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

Note that emissions from U.S. territories are calculated separately due to a lack of specific consumption data for the individual end-use sectors. Figure ES-6, Figure ES-7, and Table ES-3 summarize CO_2 emissions from fossil fuel combustion by end-use sector.

Table ES-3: CO_2 Emissions from Fossil Fuel Combustion by Fuel Consuming End-Use Sector (Tg or million metric tons CO_2 Eq.)

End-Use Sector	1990	2005	2008	2009	2010	2011	2012
Transportation	**1,497.0**	**1,896.5**	**1,821.2**	**1,752.2**	**1,769.5**	**1,752.1**	**1,743.4**
Combustion	1,494.0	1,891.7	1,816.5	1,747.7	1,765.0	1,747.9	1,739.5
Electricity	3.0	4.7	4.7	4.5	4.5	4.3	3.9
Industrial	**1,531.8**	**1,564.6**	**1,501.4**	**1,329.5**	**1,416.6**	**1,393.6**	**1,367.1**
Combustion	845.1	827.6	804.1	727.5	775.6	768.7	774.2
Electricity	686.7	737.0	697.3	602.0	641.1	624.9	592.9
Residential	**931.4**	**1,214.7**	**1,189.2**	**1,122.9**	**1,175.2**	**1,115.9**	**1,014.3**
Combustion	338.3	357.9	346.2	336.4	334.8	324.9	288.9
Electricity	593.0	856.7	842.9	786.5	840.4	791.0	725.5
Commercial	**757.0**	**1,027.2**	**1,040.8**	**977.4**	**993.9**	**959.8**	**897.9**
Combustion	219.0	223.5	224.7	223.9	220.7	221.5	197.4
Electricity	538.0	803.7	816.0	753.5	773.3	738.3	700.4
U.S. Territories[a]	**27.9**	**50.0**	**41.0**	**43.8**	**49.6**	**49.6**	**49.6**
Total	**4,745.1**	**5,752.9**	**5,593.4**	**5,225.7**	**5,404.9**	**5,271.1**	**5,072.3**
Electricity Generation	**1,820.8**	**2,402.1**	**2,360.9**	**2,146.4**	**2,259.2**	**2,158.5**	**2,022.7**

Note: Totals may not sum due to independent rounding. Combustion-related emissions from electricity generation are allocated based on aggregate national electricity consumption by each end-use sector.
[a] Fuel consumption by U.S. territories (i.e., American Samoa, Guam, Puerto Rico, U.S. Virgin Islands, Wake Island, and other U.S. Pacific Islands) is included in this report.

Transportation End-Use Sector. When electricity-related emissions are distributed to economic end-use sectors, transportation activities accounted for 34.4 percent of U.S. CO_2 emissions from fossil fuel combustion in 2012. The largest sources of transportation greenhouse gases in 2012 were passenger cars (43.1 percent); light duty trucks, which include sport utility vehicles, pickup trucks, and minivans (18.4 percent), freight trucks (21.9 percent), commercial aircraft (6.2 percent), rail (2.5 percent), and ships and boats (2.2 percent). These figures include direct emissions from fossil fuel combustion used in transportation and emissions from non-energy use (i.e. lubricants) used in transportation, as well as HFC emissions from mobile air conditioners and refrigerated transport allocated to these vehicle types.

In terms of the overall trend, from 1990 to 2012, total transportation emissions rose by 18 percent due, in large part, to increased demand for travel with limited gains in fuel efficiency over the same time period. The number of vehicle miles traveled by light-duty motor vehicles (passenger cars and light-duty trucks) increased 35 percent from 1990 to 2012, as a result of a confluence of factors including population growth, economic growth, urban sprawl, and low fuel prices during the beginning of this period. Almost all of the energy consumed for transportation was supplied by petroleum-based products, with more than half being related to gasoline consumption in automobiles and other highway vehicles. Other fuel uses, especially diesel fuel for freight trucks and jet fuel for aircraft, accounted for the remainder. The primary driver of transportation-related emissions was CO_2 from fossil fuel combustion, which increased by 16 percent from 1990 to 2012. This rise in CO_2 emissions, combined with an increase in HFCs from close to zero emissions in 1990 to 72.9 Tg CO_2 Eq. in 2012, led to an increase in overall emissions from transportation activities of 18 percent.

Industrial End-Use Sector. Industrial CO_2 emissions, resulting both directly from the combustion of fossil fuels and indirectly from the generation of electricity that is consumed by industry, accounted for 27 percent of CO_2 from fossil fuel combustion in 2012. Approximately 57 percent of these emissions resulted from direct fossil fuel combustion to produce steam and/or heat for industrial processes. The remaining emissions resulted from consuming electricity for motors, electric furnaces, ovens, lighting, and other applications. In contrast to the other end-use sectors, emissions from industry have steadily declined since 1990. This decline is due to structural changes in the U.S. economy (i.e., shifts from a manufacturing-based to a service-based economy), fuel switching, and efficiency improvements.

MOVES (Motor Vehicle Emission Simulator) information

Modeling and Inventories

MOVES (Motor Vehicle Emission Simulator)

EPA's Office of Transportation and Air Quality (OTAQ) has developed the MOtor Vehicle Emission Simulator (MOVES). This emission modeling system estimates emissions for mobile sources covering a broad range of pollutants and allows multiple scale analysis.

MOVES2014. MOVES2014 is the latest version of MOVES and includes the benefits of the Tier 3 rule as well the impacts of other EPA rulemakings promulgated since the last MOVES release, new emissions data, and new features that users have requested. MOVES2014 also includes the NONROAD2008 model, allowing for modeling of both on-road and nonroad mobile sources within the MOVES platform.

EPA has released an updated version of the original release of MOVES2014 that fixes some user reported issues. All MOVES2014 users should replace the July release of MOVES2014 with this one. Changes included in this MOVES2014 October Release are documented here. We have also updated a tool for modeling LEV standards available on the Tools page.

- General Information about MOVES2014
- MOVES2014 User Documents and Tools
- Downloading MOVES2014

If you need to use an earlier version of MOVES go to MOVES2010b and Previous MOVES Versions and Documentation

Please find the latest guidance on Using MOVES for State Implementation Plans (SIP) and Transportation Conformity here:

- Using MOVES2014 for SIP and conformity purposes

For further information:

- MOVES Technical Reports. These technical reports document the data and analysis used to develop MOVES.
- MOVES Training Sessions.
- Federal Advisory Committee Act (FACA) MOVES Model Review Work Group. This work group is focused on providing EPA with stakeholder input on MOVES.
- NONROAD2008 Model Documentation. These technical reports document the data and analysis used to develop NONROAD2008, which has been incorporated into MOVES2014.
- MOVES staff email: mobile@epa.gov.
- Updates and news on EPA mobile source emission models: Listserv Information

General Information about MOVES2014

NOTE: You will need Adobe Acrobat Reader, available as a free download, to view some of the files on this page. See EPA's PDF page to learn more about PDF, and for a link to the free Acrobat Reader.

- MOVES2014 Questions and Answers (PDF) (5 pp, 175K, EPA-420-F-14-049, July 2014) This document highlights the differences between MOVES2014 and earlier versions of MOVES and explains EPA policy on using MOVES2014 in State Implementation Plans and Transportation Conformity Analyses.
- MOVES2014 Overview for Experienced MOVES Users (PDF) (6 pp, 121K, EPA-420-B-14-059, July 2014) Provides a brief overview of the major functional changes in MOVES2014.
- Announcement of MOVES2014 October Release (PDF) (8 pp, 116K, EPA-420-B-14-094 October 2014)

MOVES2014 User Documents and Tools

- MOVES2014 User Guide (PDF) (247 pp, 14.4MB, EPA-420-B-14-055, July 2014) Walks users through various MOVES examples and provides an overview of menu items and options.
- MOVES2014 User Interface Reference Manual (PDF) (51 pp, 436K, EPA-420-B-14-057, July 2014) Provides details on using the MOVES interface, commands and menu options.
- MOVES2014 Software Design Reference Manual (PDF) (89 pp, 1.1MB, EPA-420-B-14-056, December 2014) Provides background on configuring and installing MOVES and describes MOVES code structure.
- MOVES2014 Module Reference (October 2014) Provides step-by-step algorithms for MOVES calculations and cross references for MOVES modules and database tables.
- Tools for MOVES. Tools designed to help users develop inputs for MOVES2014 and post-process the output.

Downloading MOVES2014

- Download MOVES2014 October Release Installer (ZIP) (68.2MB, May 2015) The October 2014 release of MOVES2014 is an updated model that replaces the July 2014 release and fixes some user reported issues as described here. The May 2015 installation package automates configuration of MOVES for Java 8 as needed, and includes updated nonroad (December 2014) and onroad (March 2015) post-processing scripts. **After downloading and unzipping the ZIP file, run MOVES2014-Setup-20150504.exe and follow the instructions to complete the MOVES2014 installation**.
NOTE: The May 2015 installation package is simply an updated installation package that may resolve some installation problems. It is not a new version of MOVES2014, and it is not necessary to download and install this installation package if you already have a working version of the MOVES2014 October release.

- Download new nonroad post-processing scripts (ZIP) (8.38K, December 2014). This zip file contains new nonroad post-processing scripts that fix an error that may cause incorrect results in the processing of nonroad output. Instructions for replacing the scripts are available in the ZIP file. MOVES users who have used the MOVES installer dated December 2014-or-later already have these scripts and do not need to download this file.

- Download new onroad post-processing scripts (ZIP) (6.37K, March 2015). This zip file contains new onroad post-processing scripts that fix problems that may lead to error messages or ambiguous results in the processing of onroad output. Instructions for replacing the scripts are available in the ZIP file. MOVES users who have used the MOVES installation package dated March 2015-or-later already have these scripts and do not need to download this file.

Using MOVES2014 for SIP and Conformity Purposes (also see MOVES2014 Questions & Answers)

- **Federal Register Notice of Availability: Official Release of MOVES2014 Motor Vehicle Emissions Model for Emissions Inventories in SIPs and Transportation Conformity (PDF)** (5 pp, 230K, published October 7, 2014)
  This notice approves the use of MOVES2014 in official SIP submissions and starts a two-year grace period before MOVES20104 is required to be used in new regional emissions analyses for transportation conformity determinations outside of California. For transportation conformity questions, contact: Astrid Larsen at 734-214-4812 or larsen.astrid@epa.gov. For SIP questions, contact Rudy Kapichak at 734-214-4574 or kapichak.rudolph@epa.gov.

- Policy Guidance on the Use of MOVES2014 and Subsequent Minor Revisions for State Implementation Plan Development, Transportation Conformity, and Other Purposes (PDF) (18 pp, 230K, EPA-420-B-14-008, July 2014)
  This document describes how and when to use the MOVES2014 for SIP development, transportation conformity, general conformity, and other purposes.

- MOVES2014 Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity (PDF) (62 pp, 690K, EPA-420-B-15-007, January 2015)
  This document provides guidance on appropriate input assumptions and sources of data for the use of MOVES2014 in SIP submissions and regional emissions analyses for transportation conformity purposes.

- For further information on transportation conformity and SIPs, see the following website: http://www.epa.gov/otaq/stateresources/

Last updated on 5/5/2015

National Highway Traffic Safety Administration's
Corporate Average Fuel Economy (CAFÉ)

CAFE - Fuel Economy

Corporate Average Fuel Economy (CAFE)

First enacted by Congress in 1975, the purpose of CAFE is to reduce energy consumption by increasing the fuel economy of cars and light trucks. NHTSA has recently set standards to increase CAFE levels rapidly over the next several years, which will improve our nation's energy security and save consumers money at the pump. This site contains an immense amount of information about the CAFE program including a CAFE overview, rulemaking actions, fleet characteristics data, compliance activities, summaries of manufacturers' fuel economy performances since 1978, and related studies.

LATEST NEWS

Proposed Rule Alternative Fuel Badging and Consumer Information

NHTSA is proposing to require badges, labels and owner's manual information for new passenger cars, low-speed vehicles (LSVs) and light-duty trucks rated at not more than 8,500 pounds gross vehicle weight, in order to increase consumer awareness regarding the use and benefits of alternative fuels.

This proposed rule would implement specific statutory mandates that manufacturers be required to: Identify each vehicle capable of running on an alternative fuel by means of a permanent and prominent display affixed to the exterior of the vehicle; add proposed text describing the capabilities and benefits of using alternative fuels to the owners' manuals provided for alternative fuel vehicles; and identify each vehicle that is capable of running on an alternative fuel by means of a label in the fuel filler compartment.

- View or download a copy of the proposed rule
- Please submit any comments on or before April 21, 2014, to docket number: NHTSA-2010-0134

Phase 2 of the DOT and EPA Fuel Efficiency and GHG Emission Program for Medium- and Heavy-Duty Vehicles announced

President Obama directs the National Highway Traffic Safety Administration (NHTSA) and the Environmental Protection Agency (EPA) to develop and issue the next phase ("Phase 2") of medium- and heavy-duty vehicle fuel efficiency and greenhouse gas (GHG) standards by March 2016. Under this timeline, the agencies are expected to issue a Notice of Proposed Rulemaking (NPRM) by March 2015. This second round of fuel efficiency standards will build on the first-ever standards for medium- and heavy-duty vehicles (model years 2014 through 2018).

- **Dec. 1, 2014 -- MEETING ANNOUNCEMENT**: Technical Research Workshop supporting EPA and NHTSA Phase 2 Standards for MD/HD Greenhouse Gas and Fuel Efficiency, Dec. 10-11, at Southwest Research Institute (SwRI) in San Antonio, Texas
- **FACT SHEET --** Opportunity For All: Improving the Fuel Efficiency of American Trucks - Bolstering Energy Security, Cutting Carbon Pollution, Saving Money and Supporting Manufacturing Innovation
- **WHITE HOUSE REPORT --** Improving the Fuel Efficiency of American Trucks
- **JULY 16, 2014:** Notice of Intent to Prepare an Environmental Impact Statement | Cover Letter
- More information on "Phase 1" is below

Phase 1 of Fuel Efficiency and GHG Emission Program for Medium- and Heavy-Duty Trucks, MYs 2014-2018

Technical Amendments

Partial Withdrawal of Heavy-Duty Engine and Vehicle, and Nonroad Technical Amendments

Heavy-Duty Engine and Vehicle, and Nonroad Technical Amendments

Final Rule

Final rule

NHTSA Consumer Research on Fuel Economy, GHG and Alternative Fuels

Read the final reports and webinar presentation for focus groups and online surveys NHTSA conducted to inform development of a consumer education campaign.

- Focus Groups Details and Results
- Online Survey Details and Results
- Webinar Materials on Research

Requests for Product Plan Info

NHTSA periodically requests future product plan information from auto manufacturers to help the agency in its CAFE rulemaking analyses.

- Current and past product plan requests

Summary of Fuel Economy Performance

- December 2014 Summary of Fuel Economy Performance
- Flexible Fuel Credits (2003-2013)
- Summary of CAFE fines (Updated August 2014)
- CAFE Credit Status for Models Year 2008 through 2012
- New Passenger Car Fleet Characteristics
- Domestic Passenger Car Fleet Characteristics
- Imported Passenger Car Fleet Characteristics
- Light Truck Fleet Characteristics
- 2WD Light Truck Fleet Characteristics
- 4WD Light Truck Fleet Characteristics
- Asian Imported Passenger Car Fleet Characteristics
- European Imported Passenger Car Fleet Characteristics
- Historical Passenger Car Fleet Characteristics

- Correcting Amendments for Base Tire Definition
- Final Regulatory Impact Analysis
- Read the Aug. 9, 2011, News Release
- Fact Sheet
- **NEPA Process**
- Environmental Impact Statements (FEIS & DEIS)
- **Notice of Proposed Rulemaking**
- Fact Sheet
- Correction Notice for Notice of Proposed Rulemaking
- Notice of Proposed Rulemaking
- Draft Regulatory Impact Analysis
- NHTSA Study: Factors and Considerations for Establishing a Fuel Efficiency Regulatory Improvement Program for Commercial Medium- and Heavy-Duty Vehicles
- Notice of Public Hearings for Proposal on Nov. 15 & 18
- NAS Study: Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles
- Read the News Release

NHTSA Holds Workshop on Vehicle Mass-Size-Safety

NHTSA conducted a workshop on May 13-14 on issues related to fuel economy, vehicle mass reduction and the effects of vehicle mass and size on vehicle safety.

- Workshop Reports and Presentations
- Recap of February 2011 Workshop

DOT and EPA Establish CAFE and GHG Emissions Standards for Model Years 2017 and Beyond

Following the direction set by President Obama on May 21, 2010, NHTSA and EPA have issued joint Final Rules for Corporate Average Fuel Economy and Greenhouse Gas emissions regulations for model years 2017 and beyond, that will help address our country's dependence on imported oil, save consumers money at the pump, and reduce emissions of greenhouse gases that contribute to global climate change.

- Read the Aug. 28, 2012, News Release
- Final Rule (Federal Register version)
- Correction Notice for Final Rule, Part 536 (Oct. 18, 2012)
- Final Regulatory Impact Analysis (FRIA)
- Joint Technical Support Document (TSD)
- Environmental Impact Statements: Final (July 2012) & Draft (Nov. 2011)
- Fact Sheet
- CAFE Compliance and Effects Modeling System: The Volpe Model
- Other NHTSA Research Supporting the Final Rule
- Transcripts for Public Hearings in Detroit, Philadelphia, and San Francisco
- Documents Associated with the Dec. 2011 Proposal
- Documents Leading Up to the Proposal

DOT and EPA Unveil New Fuel Economy Labels

NHTSA and EPA have jointly issued a final rule establishing new requirements for a fuel economy and environment label that will be posted on the window sticker of all new automobiles sold in the U.S. The redesigned label provides expanded information to American consumers about new vehicle fuel economy and fuel consumption, greenhouse gas and smog-forming emissions, and projected fuel costs and savings, and also includes a smartphone interactive code that permits direct access to additional web resources. Click the link below for more information.

- Complete Information on the New Label

New Fuel Efficiency Program Announced

At the direction of President Obama on May 21, 2010, NHTSA and EPA are taking the next steps to improve fuel efficiency and reduce greenhouse gas (GHG) emissions from mobile sources.

- Notice of Intent to Prepare an Environmental Impact Statement
- Read the Presidential Memorandum
- Fact Sheet
- Stakeholder Commitment Letters

Joint Rulemaking to Establish CAFE and GHG Emissions Standards, MY 2012-2016

There is a critically important need for our country to address global climate change and to reduce oil consumption. In this context, DOT and EPA worked in coordination to establish standards for CAFE and emissions of greenhouse gases (GHG) for Model Years 2012-2016.

- Final Rule
- Notice of Proposed Rulemaking (NPRM)
- Environmental Impact Statements (Final and Draft)

Average Fuel Economy Standards, Passenger Cars and Light Trucks, MY 2011-2015

Proposes substantial increases in CAFE standards for passenger cars and light trucks that would enhance energy security by improving fuel economy. Since carbon dioxide (CO2) is the natural by-product of the combustion of fuel, the increased standards would also address climate change by reducing tailpipe emissions of CO2. Those emissions represent 97 percent of the total greenhouse gas emissions from motor vehicles. Implementation of the new standards would dramatically add to the billions of barrels of fuel already saved since the beginning of the CAFE program in 1975.

- Final Environmental Impact Statement
- NHTSA Public Hearing on the CAFE DEIS
- Draft Environmental Impact Statement

View All

Average Fuel Economy Standards, Passenger Cars and Light Trucks, MY 2011

NHTSA estimates that the MY 2011 standards will raise the industry-wide combined average to 27.3 mpg, save 887 million gallons of fuel over the lifetime of the MY 2011 cars and light trucks, and reduce CO2 emissions by 8.3 million metric tons during that period.

- Final Rule
- Final Regulatory Impact Analysis

Light Truck Fuel Economy Standard Rulemaking, MY 2008-2011

This final rule reforms the structure of the CAFE program for light trucks and establishes higher CAFE standards for model year (MY) 2008-2011 light trucks. Manufacturers may comply with CAFE standards established under the reformed structure (Reformed CAFE) or with standards established in the traditional way (Unreformed CAFE) during a transition period of MYs 2008-2010. In MY 2011, all manufacturers will be required to comply with a Reformed CAFE standard. Under Reformed CAFE, fuel economy standards are restructured so they are based on a measure of vehicle size called "footprint," the product of multiplying a vehicle's wheelbase by its track width. A target level of fuel economy is established for each increment in footprint. Smaller footprint light trucks have higher targets and larger ones, lower targets.

- New Light Truck Economy Standards to Save 10.7 Billion Gallons of Fuel
- Final Rule
- Final Environmental Assessment
- Final Regulatory Impact Analysis

Rules

FMVSS	Part	Details	Actions
	49 CFR Parts 523, 533 and 537	**Light Truck Average Fuel Economy Standards, Model Years 2008-2011** This final rule reforms the structure of the corporate average fuel economy (CAFE) program for light trucks and establishes higher CAFE standards for model year (MY) 2008-2011 light trucks. Reforming the CAFE program will enable it to achieve larger fuel savings, while enhancing safety and preventing adverse economic consequences.	Final rule Final Environmental Assessment Final Regulatory Impact Analysis
	49 CFR Parts 523, 531, 534, 536, 537	**Average Fuel Economy Standards, Passenger Cars and Light Trucks, Model Years 2011-2015** Proposes substantial increases in the Corporate Average Fuel Economy (CAFE) standards for passenger cars and light trucks that would enhance energy security by improving fuel economy. Since the carbon dioxide (CO2) emitted from the tailpipes of new motor vehicles is the natural by-product of the combustion of fuel, the increased standards would also address climate change by reducing tailpipe emissions of CO2. Those emissions represent 97 percent of the total greenhouse gas emissions from motor vehicles. Implementation of the new standards would dramatically add to the billions of barrels of fuel already saved since the beginning of the CAFE program in 1975.	Supplemental Scoping Notice Draft Environmental Impact Statement, Appendix C Draft Environmental Impact Statement, Appendix B Request for Product Plan Information Draft Environmental Impact Statement, Appendix A Draft Environmental Impact Statement Preliminary Regulatory Impact Analysis Notice of Proposed Rulemaking (NPRM)
	49 CFR Part 533	**Reforming the Automobile Fuel Economy Standards Program** This document seeks comment on various issues relating to the corporate average fuel economy (CAFE) program. In particular, this document seeks comments relating to possible enhancements to the program that will assist in furthering fuel conservation while protecting motor vehicle safety and the economic vitality of the auto industry. The agency is particularly interested in improvements to the structure of the CAFE program authorized under current statutory authority. The focus of this document is to solicit comments on the structure of the CAFE program, not the stringency level for a future CAFE standard.	Request for Comments Advance Notice of Proposed Rulemaking
	49 CFR Part 538	**Automobile Fuel Economy Manufacturing Incentives for Alternative Fueled Vehicles** This final rule extends the incentive created by the Alternative Motor Fuels Act of 1988 (AMFA) to encourage the continued production of motor vehicles capable of operating on alternative fuels for four additional model years covering model years (MY) 2005 to MY 2008. Under the special procedures for calculating the fuel economy of those vehicles contained in AMFA, alternative and dual fueled vehicles are assigned a higher fuel economy value for CAFE purposes, which can result in manufacturers earning credits for their fleets. The final rule limits the maximum amount of credit that may be applied to any manufacturers' fleet to 0.9 mpg per fleet during MY 2005 - MY 2008.	Final Rule
	49 CFR Part 538	**Under 49 CFR Part 538, Automotive Fuel Economy Manufacturing Incentives for Alternative Fuel Vehicles** To provide an incentive for the production of vehicles that can operate on certain alternative fuels as well as on regular petroleum fuels, Congress established a special procedure for calculating the fuel economy of those vehicles for determining compliance with the Corporate Average Fuel Economy standards.	Notice of proposed rulemaking (NPRM)
		Draft Environmental Assessment The draft environmental assessment evaluates the potential environmental impacts associated with NHTSA's proposed action to set Corporate Average Fuel Economy Standards for model year 2008-2011 light trucks. This document describes the environment and resources that might be affected by the proposed light truck CAFE standards for model years 2008-2011, and assesses estimated impacts of alternative actions.	Draft of the Evironmental Assessment proposed action to set CAFE standards for model year 2008-2011 light trucks
	NHTSA: 49 CFR Parts 531, 533, and 537; EPA: 40 CFR Parts 86 and 600	**Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and CAFE Standards** EPA and NHTSA are issuing this joint proposal to establish a National Program consisting of new standards for light-duty vehicles that will reduce greenhouse gas emissions and improve fuel economy. EPA is proposing greenhouse gas emissions standards under the Clean Air Act, and NHTSA is proposing Corporate Average Fuel Economy standards under the Energy Policy and Conservation Act, as amended. These standards apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016, and represent a harmonized and consistent National Program. Under the National Program, automobile manufacturers would be able to build a single light-duty national fleet that satisfies all requirements under both programs while ensuring that consumers still have a full range of vehicle choices.	Draft Environmental Impact Statement Notice of Intent Preliminary Regulatory Impact Analysis Draft Joint Technical Support Document Notice of Proposed Rulemaking
		Nissan North America, Inc. Petition for Exemption from Two-Fleet Rule Affecting Compliance with Passenger Automobile Fuel Economy Standards Nissan filed a petition requesting exemption from the two fleet rule for the 2006-2010 model years. The two fleet rule, which is contained in the CAFE statute, requires that a manufacturer divide its passenger automobiles into two fleets, a domestically-manufactured fleet and a non-domestically manufactured fleet, and ensure that each fleet separately meets the CAFE standards for passenger automobiles. The CAFE statute requires NHTSA to grant such a petition unless it finds that doing so would result in reduced employment in the U.S. related to motor vehicle manufacturing. NHTSA's analysis does not support a finding that granting the petition would reduce automotive manufacturing employment in the United States. Accordingly, in this notice, NHTSA is granting Nissan's petition.	Grant of petition for exemption from two-fleet rule

	49 CFR Parts 523, 531, 533, 534, 536 and 537	**Average Fuel Economy Standards, Passenger Cars and Light Trucks, Model Year 2011** NHTSA estimates that the MY 2011 standards will raise the industry-wide combined average to 27.3 mpg, save 887 million gallons of fuel over the lifetime of the MY 2011 cars and light trucks, and reduce CO2 emissions by 8.3 million metric tons during that period.	Final Regulatory Impact Analysis Final Rule, Record of Decision
	49 CFR Part 533	**Light Truck Average Fuel Economy Standards, Model Years 2005-2007** This final rule established the average fuel economy standards for light trucks that will be manufactured in the 2005-2007 model years (MYs). Chapter 329 of Title 49 of the United States Code requires the issuance of these standards. The standards for all light trucks manufactured by a manufacturer is set at 21.0 mpg for MY 2005, 21.6 mpg for MY 2006, and 22.2 mpg for MY 2007. This rule is effective May 5, 2003.	Final Environmental Assessment Final Economic Assessment Final Rule

Page 1 of 1

Highway Traffic Noise

The Audible Landscape

Acknowledgements

A REPRINT OF THE AUDIBLE LANDSCAPE:
A MANUAL FOR HIGHWAY NOISE AND LAND USE

Prepared for:

U.S. Department of Transportation
Federal Highway Administration
Offices of Research and Development
November 1974

Reprinted August 1976

Acknowledgements

This manual was prepared by Urban Systems Research and Engineering, Inc. of Cambridge, Mass., under the direction of Mr. Bert K. Collins. Dr. Eugene Chen of the Federal Highway Administration (FHWA) served as project manager. Technical and policy assistance was provided by Mr. Harter M. Rupert of FHWA Office of Environmental Policy.

Continue on to Contents

Contacts

For more information, please contact:

FHWA Headquarters

Mark Ferroni
Phone: 202-366-3233

Adam Alexander
Phone: 202-366-1473

FHWA Resource Center

Mary Ann Rondinella
Phone: 720-963-3207

Michael Roberts

Phone: 404-562-3928

Updated: 07/14/2011

HEP Home | Planning | Environment | Real Estate

Contacts

For more information, please contact:

FHWA Headquarters

Mark Ferroni
Phone: 202-366-3233

Adam Alexander
Phone: 202-366-1473

FHWA Resource Center

Mary Ann Rondinella
Phone: 720-963-3207

Michael Roberts

Entering the Quiet Zone: Noise Compatible Land Use Planning

Acknowledgements

Continue on to Contents

Prepared by
Texas Southern University
Center for Transportation Training and Research
3100 Cleburne Avenue
Houston, Texas 77004

Prepared for
Federal Highway Administration
U.S. Department of Transportation
Washington, D.C. 20590

May 2002

Purpose
This brochure has been developed to provide information to elected officials, planners, developers, and the interested public about the problem of highway traffic noise and effective responses to that problem. This report: 1) summarizes the general nature of the problem, 2) provides examples of Noise Compatible Land Use strategies either constructed or planned, and 3) encourages a proactive posture by local decision makers, developers and citizens to share in and actively influence land use next to highways.

Acknowledgements
Special thanks are offered to the City of Eugene (Oregon) Planning Department and the owners of Quail Run and Camelot Village subdivisions in Eugene, Oregon. We appreciate their time and contribution.

Continue on to Contents

Phone: 404-562-3928

Updated: 07/14/2011