APPENDIX C

LEVEL OF SERVICE ANALYSIS

Contents:
LOS Computations for Mainline
Turning Movement Sketches
LOS Computations at Intersections

PROJECT SCOPING REPORT

CODDINGTON ROAD
(COUNTY ROUTE 119)

DANBY TOWN LINE TO CITY OF ITHACA LINE

TOWN OF ITHACA
TOMPKINS COUNTY, NEW YORK

NYSDOT PIN 3753.24

DECEMBER 2005

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	S.P.W.
Agency/Co.	Dewberry-Goodkind, Inc
Date Performed	8/16/05
Analysis Time Period	AM Peak
Highway	Coddington Road
From/To	700' s/o Updike-825' n/o EKing
Jurisdiction	Tompkins County
Analysis Year	2004
Description	Coddington Road Improvements project

Input Data

Highway class	Class 2				
Shoulder width	0.3	m	Peak-hour factor, PHF	0.73	
Lane width	3.1	m	% Trucks and buses	18	%
Segment length	1.0	km	% Recreational vehicles	4	%
Terrain type	Rolling		% No-passing zones	82	%
Grade: Length		km	Access points/km	23	/km
Up/down		%			

Two-way hourly volume, V 160 veh/h
Directional split 60 / 40 %

Average Travel Speed

Grade adjustment factor, fG	0.71	
PCE for trucks, ET	2.5	
PCE for RVs, ER	1.1	
Heavy-vehicle adjustment factor,	0.785	
Two-way flow rate,(note-1) vp	393	pc/h
Highest directional split proportion (note-2)	236	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	km/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	75.6	km/h
Adj. for lane and shoulder width, fLS	8.5	km/h
Adj. for access points, fA	15.3	km/h
Free-flow speed, FFS	51.8	km/h
Adjustment for no-passing zones, fnp	6.3	km/h
Average travel speed, ATS	40.5	km/h

Percent Time-Spent-Following

Grade adjustment factor, fG	0.77	
PCE for trucks, ET	1.8	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.874	
Two-way flow rate,(note-1) vp	326	pc/h
Highest directional split proportion (note-2)	196	
Base percent time-spent-following, BPTSF	24.9	%
Adj.for directional distribution and no-passing zones, fd/np	22.2	
Percent time-spent-following, PTSF	47.1	%

Level of Service and Other Performance Measures

Level of service, LOS	B	
Volume to capacity ratio, v/c	0.12	
Peak 15-min vehicle-kilometers of travel, VkmT15	55	veh-km
Peak-hour vehicle-kilometers of travel, VkmT60	160	veh-km
Peak 15-min total travel time, TT15	1.4	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	S.P.W.
Agency/Co.	Dewberry-Goodkind, Inc
Date Performed	8/16/2005
Analysis Time Period	PM Peak
Highway	Coddington Road
From/To	700' s/o Updike-825' n/o EKing
Jurisdiction	Tompkins County
Analysis Year	2004
Description	Coddington Road Improvements project

Input Data

Highway class	Class 2				
Shoulder width	0.3	m	Peak-hour factor, PHF	0.77	
Lane width	3.1	m	% Trucks and buses	18	%
Segment length	1.0	km	% Recreational vehicles	4	%
Terrain type	Rolling		% No-passing zones	82	%
Grade: Length		km	Access points/km	23	/km
Up/down		%			

Two-way hourly volume, V 99 veh/h
Directional split 60 / 40 %

Average Travel Speed

Grade adjustment factor, fG	0.71	
PCE for trucks, ET	2.5	
PCE for RVs, ER	1.1	
Heavy-vehicle adjustment factor,	0.785	
Two-way flow rate,(note-1) vp	231	pc/h
Highest directional split proportion (note-2)	139	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	km/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	75.6	km/h
Adj. for lane and shoulder width, fLS	8.5	km/h
Adj. for access points, fA	15.3	km/h
Free-flow speed, FFS	51.8	km/h
Adjustment for no-passing zones, fnp	4.7	km/h
Average travel speed, ATS	44.2	km/h

Percent Time-Spent-Following

Grade adjustment factor, fG	0.77	
PCE for trucks, ET	1.8	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.874	
Two-way flow rate,(note-1) vp	191	pc/h
Highest directional split proportion (note-2)	115	
Base percent time-spent-following, BPTSF	15.5	%
Adj.for directional distribution and no-passing zones, fd/np	23.2	
Percent time-spent-following, PTSF	38.7	%

Level of Service and Other Performance Measures

Level of service, LOS	A	
Volume to capacity ratio, v/c	0.07	
Peak 15-min vehicle-kilometers of travel, VkmT15	32	veh-km
Peak-hour vehicle-kilometers of travel, VkmT60	99	veh-km
Peak 15-min total travel time, TT15	0.7	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	S.P.W.
Agency/Co.	Dewberry-Goodkind, Inc
Date Performed	8/16/2005
Analysis Time Period	AM Peak
Highway	Coddington Road
From/To	700' s/o Updike-825' n/o EKing
Jurisdiction	Tompkins County
Analysis Year	2027
Description	Coddington Road Improvements project

Input Data

Highway class	Class 2				
Shoulder width	1.2	m	Peak-hour factor, PHF	0.73	
Lane width	3.3	m	% Trucks and buses	18	%
Segment length	1.0	km	% Recreational vehicles	4	%
Terrain type	Rolling		% No-passing zones	82	%
Grade: Length		km	Access points/km	23	/km
Up/down		%			

Two-way hourly volume, V 178 veh/h
Directional split 60 / 40 %

Average Travel Speed

Grade adjustment factor, fG	0.71	
PCE for trucks, ET	2.5	
PCE for RVs, ER	1.1	
Heavy-vehicle adjustment factor,	0.785	
Two-way flow rate,(note-1) vp	438	pc/h
Highest directional split proportion (note-2)	263	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	km/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	75.6	km/h
Adj. for lane and shoulder width, fLS	2.8	km/h
Adj. for access points, fA	15.3	km/h
Free-flow speed, FFS	57.5	km/h
Adjustment for no-passing zones, fnp	6.2	km/h
Average travel speed, ATS	45.7	km/h

Percent Time-Spent-Following

Grade adjustment factor, fG	0.77	
PCE for trucks, ET	1.8	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.874	
Two-way flow rate,(note-1) vp	362	pc/h
Highest directional split proportion (note-2)	217	
Base percent time-spent-following, BPTSF	27.3	%
Adj.for directional distribution and no-passing zones, fd/np	21.9	
Percent time-spent-following, PTSF	49.1	%

Level of Service and Other Performance Measures

Level of service, LOS	B	
Volume to capacity ratio, v/c	0.14	
Peak 15-min vehicle-kilometers of travel, VkmT15	61	veh-km
Peak-hour vehicle-kilometers of travel, VkmT60	178	veh-km
Peak 15-min total travel time, TT15	1.3	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	S.P.W.
Agency/Co.	Dewberry-Goodkind, Inc
Date Performed	8/16/2005
Analysis Time Period	PM Peak
Highway	Coddington Road
From/To	700' s/o Updike-825' n/o EKing
Jurisdiction	Tompkins County
Analysis Year	2027
Description	Coddington Road Improvements project

Input Data

Highway class	Class 2				
Shoulder width	1.2	m	Peak-hour factor, PHF	0.77	
Lane width	3.3	m	% Trucks and buses	18	%
Segment length	1.0	km	% Recreational vehicles	4	%
Terrain type	Rolling		% No-passing zones	82	%
Grade: Length		km	Access points/km	23	/km
Up/down		%			

Two-way hourly volume, V 110 veh/h
Directional split 60 / 40 %

Average Travel Speed

Grade adjustment factor, fG	0.71	
PCE for trucks, ET	2.5	
PCE for RVs, ER	1.1	
Heavy-vehicle adjustment factor,	0.785	
Two-way flow rate,(note-1) vp	256	pc/h
Highest directional split proportion (note-2)	154	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	km/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	75.6	km/h
Adj. for lane and shoulder width, fLS	2.8	km/h
Adj. for access points, fA	15.3	km/h
Free-flow speed, FFS	57.5	km/h
Adjustment for no-passing zones, fnp	4.9	km/h
Average travel speed, ATS	49.3	km/h

Percent Time-Spent-Following

Grade adjustment factor, fG	0.77	
PCE for trucks, ET	1.8	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.874	
Two-way flow rate,(note-1) vp	212	pc/h
Highest directional split proportion (note-2)	127	
Base percent time-spent-following, BPTSF	17.0	%
Adj.for directional distribution and no-passing zones, fd/np	23.1	
Percent time-spent-following, PTSF	40.1	%

Level of Service and Other Performance Measures

Level of service, LOS	B	
Volume to capacity ratio, v/c	0.08	
Peak 15-min vehicle-kilometers of travel, VkmT15	36	veh-km
Peak-hour vehicle-kilometers of travel, VkmT60	110	veh-km
Peak 15-min total travel time, TT15	0.7	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	S.P.W.
Agency/Co.	Dewberry-Goodkind, Inc
Date Performed	8/16/2005
Analysis Time Period	AM Peak
Highway	Coddington Road
From/To	305' s/o Juniper - Pennsyl. Av
Jurisdiction	Tompkins County
Analysis Year	2004
Description	Coddington Road Improvements project

Input Data

Highway class	Class 2				
Shoulder width	0.3	m	Peak-hour factor, PHF	0.65	
Lane width	3.4	m	% Trucks and buses	18	%
Segment length	1.0	km	% Recreational vehicles	4	%
Terrain type	Rolling		% No-passing zones	100	%
Grade: Length		km	Access points/km	24	/km
Up/down		%			

Two-way hourly volume, V 254 veh/h
Directional split 60 / 40 %

Average Travel Speed

Grade adjustment factor, fG	0.93	
PCE for trucks, ET	1.9	
PCE for RVs, ER	1.1	
Heavy-vehicle adjustment factor,	0.858	
Two-way flow rate,(note-1) vp	490	pc/h
Highest directional split proportion (note-2)	294	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	km/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	70.0	km/h
Adj. for lane and shoulder width, fLS	7.5	km/h
Adj. for access points, fA	16.0	km/h
Free-flow speed, FFS	46.5	km/h
Adjustment for no-passing zones, fnp	6.8	km/h
Average travel speed, ATS	33.6	km/h

Percent Time-Spent-Following

Grade adjustment factor, fG	0.77	
PCE for trucks, ET	1.8	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.874	
Two-way flow rate,(note-1) vp	581	pc/h
Highest directional split proportion (note-2)	349	
Base percent time-spent-following, BPTSF	40.0	%
Adj.for directional distribution and no-passing zones, fd/np	20.8	
Percent time-spent-following, PTSF	60.8	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.15	
Peak 15-min vehicle-kilometers of travel, VkmT15	98	veh-km
Peak-hour vehicle-kilometers of travel, VkmT60	254	veh-km
Peak 15-min total travel time, TT15	2.9	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	S.P.W.
Agency/Co.	Dewberry-Goodkind, Inc
Date Performed	8/16/2005
Analysis Time Period	PM Peak
Highway	Coddington Road
From/To	305' s/o Juniper - Pennsyl. Av
Jurisdiction	Tompkins County
Analysis Year	2004
Description	Coddington Road Improvements project

Input Data

Highway class	Class 2				
Shoulder width	0.3	m	Peak-hour factor, PHF	0.82	
Lane width	3.4	m	% Trucks and buses	18	%
Segment length	1.0	km	% Recreational vehicles	4	%
Terrain type	Rolling		% No-passing zones	100	%
Grade: Length		km	Access points/km	24	/km
Up/down		%			

Two-way hourly volume, V	115		veh/h
Directional split	60	/ 40	%

Average Travel Speed

Grade adjustment factor, fG	0.71	
PCE for trucks, ET	2.5	
PCE for RVs, ER	1.1	
Heavy-vehicle adjustment factor,	0.785	
Two-way flow rate,(note-1) vp	252	pc/h
Highest directional split proportion (note-2)	151	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	km/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	70.0	km/h
Adj. for lane and shoulder width, fLS	7.5	km/h
Adj. for access points, fA	16.0	km/h
Free-flow speed, FFS	46.5	km/h
Adjustment for no-passing zones, fnp	6.0	km/h
Average travel speed, ATS	37.3	km/h

Percent Time-Spent-Following

Grade adjustment factor, fG	0.77	
PCE for trucks, ET	1.8	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.874	
Two-way flow rate,(note-1) vp	208	pc/h
Highest directional split proportion (note-2)	125	
Base percent time-spent-following, BPTSF	16.7	%
Adj.for directional distribution and no-passing zones, fd/np	23.6	
Percent time-spent-following, PTSF	40.3	%

Level of Service and Other Performance Measures

Level of service, LOS	B	
Volume to capacity ratio, v/c	0.08	
Peak 15-min vehicle-kilometers of travel, VkmT15	35	veh-km
Peak-hour vehicle-kilometers of travel, VkmT60	115	veh-km
Peak 15-min total travel time, TT15	0.9	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	S.P.W.
Agency/Co.	Dewberry-Goodkind, Inc
Date Performed	8/16/2005
Analysis Time Period	AM Peak
Highway	Coddington Road
From/To	305' s/o Juniper - Pennsyl. Av
Jurisdiction	Tompkins County
Analysis Year	2027
Description	Coddington Road Improvements project

Input Data

Highway class	Class 2				
Shoulder width	1.2	m	Peak-hour factor, PHF	0.65	
Lane width	3.3	m	% Trucks and buses	18	%
Segment length	1.0	km	% Recreational vehicles	4	%
Terrain type	Rolling		% No-passing zones	100	%
Grade: Length		km	Access points/km	24	/km
Up/down		%			

Two-way hourly volume, V 283 veh/h
Directional split 60 / 40 %

Average Travel Speed

Grade adjustment factor, fG	0.93	
PCE for trucks, ET	1.9	
PCE for RVs, ER	1.1	
Heavy-vehicle adjustment factor,	0.858	
Two-way flow rate,(note-1) vp	546	pc/h
Highest directional split proportion (note-2)	328	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	km/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	70.0	km/h
Adj. for lane and shoulder width, fLS	2.8	km/h
Adj. for access points, fA	16.0	km/h
Free-flow speed, FFS	51.2	km/h
Adjustment for no-passing zones, fnp	6.5	km/h
Average travel speed, ATS	37.9	km/h

Percent Time-Spent-Following

Grade adjustment factor, fG	0.94	
PCE for trucks, ET	1.5	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.917	
Two-way flow rate,(note-1) vp	505	pc/h
Highest directional split proportion (note-2)	303	
Base percent time-spent-following, BPTSF	35.8	%
Adj.for directional distribution and no-passing zones, fd/np	21.4	
Percent time-spent-following, PTSF	57.3	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.17	
Peak 15-min vehicle-kilometers of travel, VkmT15	109	veh-km
Peak-hour vehicle-kilometers of travel, VkmT60	283	veh-km
Peak 15-min total travel time, TT15	2.9	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	S.P.W.
Agency/Co.	Dewberry-Goodkind, Inc
Date Performed	8/16/2005
Analysis Time Period	PM Peak
Highway	Coddington Road
From/To	305' s/o Juniper - Pennsyl. Av
Jurisdiction	Tompkins County
Analysis Year	2027
Description	Coddington Road Improvements project

Input Data

Highway class	Class 2				
Shoulder width	1.2	m	Peak-hour factor, PHF	0.82	
Lane width	3.3	m	% Trucks and buses	18	%
Segment length	4.8	km	% Recreational vehicles	4	%
Terrain type	Rolling		% No-passing zones	100	%
Grade: Length		km	Access points/km	24	/km
Up/down		%			

Two-way hourly volume, V 128 veh/h
Directional split 60 / 40 %

Average Travel Speed

Grade adjustment factor, fG	0.71	
PCE for trucks, ET	2.5	
PCE for RVs, ER	1.1	
Heavy-vehicle adjustment factor,	0.785	
Two-way flow rate,(note-1) vp	280	pc/h
Highest directional split proportion (note-2)	168	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	km/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	70.0	km/h
Adj. for lane and shoulder width, fLS	2.8	km/h
Adj. for access points, fA	16.0	km/h
Free-flow speed, FFS	51.2	km/h
Adjustment for no-passing zones, fnp	6.3	km/h
Average travel speed, ATS	41.4	km/h

Percent Time-Spent-Following

Grade adjustment factor, fG	0.77	
PCE for trucks, ET	1.8	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.874	
Two-way flow rate,(note-1) vp	232	pc/h
Highest directional split proportion (note-2)	139	
Base percent time-spent-following, BPTSF	18.4	%
Adj.for directional distribution and no-passing zones, fd/np	23.5	
Percent time-spent-following, PTSF	41.9	%

Level of Service and Other Performance Measures

Level of service, LOS	B	
Volume to capacity ratio, v/c	0.09	
Peak 15-min vehicle-kilometers of travel, VkmT15	187	veh-km
Peak-hour vehicle-kilometers of travel, VkmT60	614	veh-km
Peak 15-min total travel time, TT15	4.5	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.