The Oregon Green Light CVO Project

Individual Test Plans

by

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ACKNOWLEDGMENTS

The Green Light Commercial Vehicle Operations Project is an operational test, consistent with the goals set forth by the USDOT for Intelligent Transportation Systems (ITS).

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This document has been prepared as part of a contract between Oregon Department of Transportation (ODOT) and Oregon State University Transportation Research Institute (OSU - TRI). This contract is part of the first increment of funding from FHWA to ODOT. It is anticipated that OSU=s contract will be extended as further increments of funding become available. This Individual Test Plans document (dated 10/31/96) was approved by the Green Light Evaluation Steering Committee at a meeting held 10/11/96. Revisions to the document may be necessary as the project evolves. Revisions will be incorporated on a quarterly basis.

We are indebted to Nancy Brickman and Judith Gray of Oregon State University for their work in preparing and revising several drafts of this document.

DISCLAIMER

This Plan has been prepared in both Word Perfect 6.1 and Microsoft Word 6.0, and has been distributed electronically to interested parties. The appearance of the document produced from an electronic copy may differ from that intended by the authors. A definitive hard copy of the Plan may may be obtained from the first author at the address shown on the front cover.

1. EXECUTIVE SUMMARY

PURPOSE AND SCOPE

The Oregon AGreen Light≅ CVO Individual Test Plans provides the detailed methodology to be used in the technical evaluation for the first phase of the Oregon Green Light CVO project. This document provides the detail for each of the tests required to achieve the objectives identified in the Evaluation Plan (see Document GLEV9601 [ref. 1]).

Chapter Two provides an overview of the Goals, Objectives, Measures and Hypotheses for the evaluation. Chapter Three provides the details for each of the tests required. Chapter Four addresses Quality Assurance, and, Chapter Five describes test management.

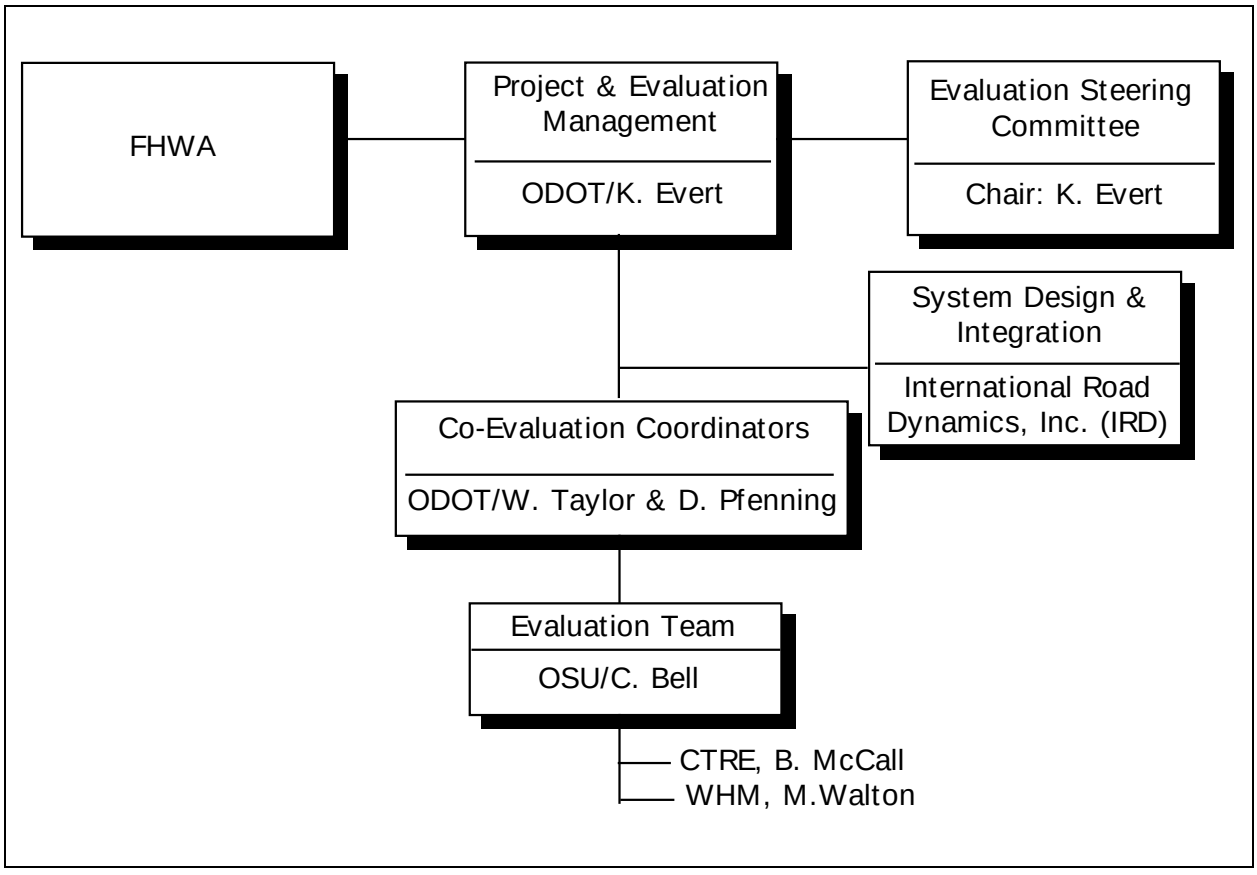
MANAGEMENT AND RESPONSIBILITY

The independent evaluation of the Oregon AGreen Light≅ CVO project is being conducted by Oregon State University Transportation Research Institute (OSU-TRI) with Chris A. Bell, Ph.D., P.E. as the principal investigator. OSU-TRI is teamed with the Center for Transportation Research and Education (CTRE) at Iowa State University, through a subcontract. Bill McCall, is the lead person for CTRE. WHM Transportation Engineering Consultants, Inc. is the third member of the evaluation team; C.M. Walton, Ph.D., P.E. is their lead person. Exhibits 1-1 and 1-2 illustrate areas of responsibility for the evaluators and also show the other partners in the project.

EXHIBIT 1-1
Team Partners and Roles

Partner	Role
FHWA	Oversight and Advisory
Oregon DOT (IRD)	System Design and Development, Program Management, Software Evaluation of System Workability
Oregon State University Transportation Research Institute (OSU-TRI)	Lead contractor for Evaluation. Coordinate Development and execution of the Evaluation Plan and Individual Test Plans.
Iowa State University (ISU) Center for Transportation Research and Education (CTRE)	Subcontractor for Evaluation. Assist and advise lead contractor.
WHM	Consultant. Assess Institutional and Interoperability Issues.

EXHIBIT 1-2
General Organizational Structure



2. DETAILED TEST PLAN

EVALUATION OVERVIEW

The tests conducted will address the five goals of the evaluation (see ref. [1]):

- Safety
- Productivity
- User Acceptance
- Mainstreaming Issues
- Non-Technical Interoperability Issues

The objectives associated with each goal are given below.

Safety

Three areas will be addressed, consistent with the following objectives:

1.1 Determine change in safety compliance with the Federal Motor Carrier Safety Regulations (FMCSR)

1.2 Determine change in truck behavior due to the Road Weather Information System (RWIS)

1.3 Determine change in truck behavior due to the Downhill Speed Information System (DSIS)

Productivity

Six areas will be addressed, consistent with the following objectives:

2.1 Determine changes in tax administration costs

2.2 Determine changes in tax evasion

2.3 Determine changes in vehicles processed at each site

2.4 Determine productivity to motor carriers

2.5 Determine impacts on energy

2.6 Determine the ability of vision technology to support 100 percent electronic screening

service.

User Acceptance

Two areas will be addressed, consistent with the following objectives:

3.1 Assess Motor Carrier Acceptance

3.2 Assess Agency Acceptance

Mainstreaming Issues

Two areas will be addressed, consistent with the following objectives:

4.1 Document regional & national issues as they arise and assess the impacts to Green Light for customers & provider.

4.2 Document approaches attempted to solve regional and national issues as they arise, and final resolutions.

Non-Technical Interoperability Issues

Two areas will be addressed, consistent with the following objectives:

5.1 Document non-technical issues as they arise for customers & provider.

5.2 Document approaches attempted to solve non-technical issues as they arise, and final resolutions.

HYPOTHESES AND ASSUMPTIONS TO BE TESTED

Hypotheses and assumptions are provided with the corresponding objectives in Exhibit 2-1.

EXHIBIT 2-1
Hypotheses and Assumptions with Federal Motor Carrier Safety Regulations

Objective	Measure	Hypothesis / Assumption	Leader
1.1 Determine change in safety compliance with the Federal Motor Carrier Safety Regulations	1.1.1 Proportion of compliant (with FMCSR) trucks / carriers of total inspected and total processed per month.	The proportion of compliant trucks will eventually increase.	OSU-TRI
	1.1.2 Proportion of non-compliant (with FMCSR) trucks-carriers of total inspected and total processed per month.	The proportion of non-compliant trucks will eventually decrease.	OSU-TRI
1.2 Determine change in truck behavior due to the Road Weather Information System	1.2.1 Ratio of mean speed in inclement weather to that in Agood≅ weather, before & after installation.	Truck speeds will decrease in inclement weather.	OSU-TRI
	1.2.2 Ratio of accidents before & after installation if sufficient data exists.	Accident risk will decrease with better information available on weather conditions.	OSU-TRI
1.3 Determine change in truck behavior due to the Downhill Speed Information System	1.3.1 Ratio of mean speed on downhill sections, before & after installation.	Mean speeds will decrease.	OSU-TRI
	1.3.2 Ratio of accidents before & after installation if sufficient data exists.	Accidents will decrease.	OSU-TRI
	1.3.3 Comparison of mean speeds with advisory speeds	Mean speeds will converge towards advisory speeds.	OSU-TRI
2.1 Determine changes in tax administration costs	2.1.1 Determine the change in the resources required in the collection process, i.e., *hardware, software, staff etc.*	Tax collection will become more automatic and costs reduced (refer to the 1994 Green Light Document).	CTRE
	2.1.2 Determine the change in the resources required in the auditing process (government and carrier).	Audit process will become more automatic.	CTRE
2.2 Determine changes in tax evasion	2.2.1 Determine changes in highway use tax revenues collected & why.	Oregon Green Light will support changes.	CTRE
2.3 Determine changes in vehicles processed at each site	2.3.1 Compare total vehicles pro- cessed (cleared & not-cleared).	Number processed will increase.	CTRE
	2.3.2 Compare no. of interruptions per shift & total time.	Interruptions will decrease.	CTRE
	2.3.3 Observe system availability.	Availability will be approximately 95%.	CTRE
2.4 Determine productivity to motor carriers	2.4.1 Compare truck flow on the mainline before & after installation.	Truck flow will increase.	CTRE
	2.4.2 Determine average delay times before & after pre-clearance.	Delay times will decrease.	CTRE
2.5 Determine impacts on energy	2.5.1 Estimate changes in fuel use before	Fuel consumption will decrease.	CTRE

	and after pre-clearance using I-75 experience.		
2.6 Determine the ability of vision technology to support 100 percent electronic screening service	2.6.1 Evaluate the accuracy of the vision system by comparison of vision readout with actual plate numbers.	Vision system will be accurate at least 90% of the time.	OSU-TRI CTRE
3.1 Assess motor carrier acceptance	3.1.1 Determine attitude towards electronic screening, including perceived impacts.	The majority of carriers will have a positive attitude.	OSU-TRI WHM
	3.1.2 Determine attitude towards new services, e.g., select carriers-vehicles for inspection based on inspection and compliance status.	The majority of carriers will have a positive attitude.	OSU-TRI WHM
	3.1.3 Evaluate motor carrier acceptance of mainline electronic screening.	Carriers will demonstrate acceptace by installing transponders.	OSU-TRI WHM
3.2 Assess agency acceptance	3.2.1 Determine agency attitude towards electronic screening, including perceived impacts.	The majority of agency personnel will have a positive attitude.	OSU-TRI WHM
	3.2.2 Determine agency attitude towards new services, e.g., select carriers-vehicles for inspection based on inspection and compliance status.	The majority of agency personnel will have a positive attitude.	OSU-TRI WHM
4.1 Document regional and national mainstreaming issues	4.1.1 Identify, assess and document pertinent regional and national issues (e.g. IOU, HELP, CVISN, ITS Systems Architecture, DSRC) and assess the impacts to Green Light for customers and providers.	Knowledge of pertinent regional and national issues will increases the effectiveness of the Green Light program.	WHM CTRE
4.2 Document approaches attempted to solve mainstreaming issues and final resolutions	4.2.1 Document approaches attempted to solve regional and national mainstreaming issues as they arise, and final resolutions.	Participaton in pertinent regional and national issues will contribute to the effectiveness of the Green Light program.	WHM
5.1 Document non-technical interoperability issues	5.1.1 Identify, assess and document pertinent non-technical interoperability issues as they arise for customers and providers.	Knowledge of pertinent non-technical issues will increases the effectiveness of the Green Light program.	WHM
5.2 Document approaches attempted to solve interoperability issues and final resolutions	5.2.1 Document approaches attempted to solve non-technical interoperability issues as they arise, and final resolutions.	Documentation of participation in, and approaches used to resolve pertinent non-technical issues will contribute to the effectiveness of the Green Light program.	WHM

EVALUATION TECHNICAL APPROACH

The evaluation technical approach will include the following elements:

- Experiment design
- Data collection
- Data reduction
- Statistical analysis
- Test report

These elements are addressed in the next chapter where individual test plans are summarized.

PRIVACY CONSIDERATIONS

It is understood that some of the information being sought for this test may be considered sensitive by the participants. By the same token, information regarding credential applications and vehicle registrations, and survey and interview responses from individual motor carrier representatives are critical to the success of the data collection and analysis efforts. Consequently, it is important that, wherever possible, data be presented without reference to individuals or specific motor carriers. In the event any singular reference is deemed a critical component of the information to be presented, the evaluator will seek the consent of the individual and/or organization from which the data originated. The information will be published only if this consent has been granted.

3. DETAILED TEST PLAN FOR EACH HYPOTHESIS

This chapter provides details for each of the tests needed for the measures identified in Chapter Two for each hypothesis. The details are provided in tabular form addressing the following items:

- **Test Description**
- **Pre-Test Activities**
- **Test Conduct Activities**
- **Post-Test Activities**

In Appendix A, Exhibits A1.1.1 through A1.1.4 address measures 1.1.1 through 1.1.4; exhibits A1.2.1 and A1.2.2 address measure 1.2.1 and 1.2.2; and so on, with one exhibit per measure.

Exhibit 3-1 reviews data requirements for each test.

EXHIBIT 3-1
Data Requirements

Measure/Test	Data Required	Data Sources
1.1.1 No. of compliant (w/ FMCSR) trucks/carriers of total inspected and total processed per month	Level I, II, and III inspection results from fixed sites in Oregon with supplemental results from Washington, California, and Idaho.	State inspection databases from Oregon, Washington, California, and Idaho. Oregon weigh master=s database.
1.1.2 Proportion of non-compliant (w/ FMCSR) trucks/carriers of total inspected and total processed per month	Level I, II, and III inspection results from fixed sites in Oregon with supplemental results from Washington, California, and Idaho.	State inspection databases from Oregon, Washington, California, and Idaho. Oregon weigh master=s database.
1.2.1 Ratio of mean speed in inclement weather to that in Agood≅ weather, before & after installation	Speed and traffic flow data in the vicinity of RWIS technology.	State transportation databases.
1.2.2 Ratio of accidents before & after installation	Accident records in the vicinity of RWIS technology.	State accident records.
1.3.1 Ratio of mean speed on downhill sections, before & after installation	Speed and traffic flow data in the vicinity of DSIS.	State transportation databases, DSIS database.
1.3.2 Ratio of accidents before & after installation	Accident records in the vicinity of DSIS technology.	State accident records.
1.3.3 Comparison of mean speeds with advisory speeds	Speed and traffic flow data in the vicinity of DSIS.	State transportation databases, DSIS database.
2.1.1 Determine change in the resources required in the collection process	Current and future practices for collecting road use revenues for Oregon.	Current policy procedure manuals, interviews with Oregon staff, various ODOT reports, and revenue collection implementation plans.
2.1.2 Determine the change in the resources required in the auditing process	Current and future practices for auditing the collection of road use revenue.	Current policy procedure manuals, interviews with Oregon staff, various ODOT reports, and revenue audit implementation plans.
2.2.1 Determine change in weight-distance taxation revenue & why	Reports on road use revenue evasion in Oregon and planned road use revenue collection and audit processes.	Reports that may identify estimated magnitude and methods of revenue evasions in Oregon. Interviews with Oregon staff and future plans for revenue collection and audit processes.
2.3.1 Compare total vehicles processed (cleared & not-cleared)	No. of trucks processed at weigh stations, inspection results at green light locations.	Oregon vehicle monitoring database, Oregon weigh master=s database, state inspection database.
2.3.2 Compare No. of interruptions per shift & total time of interruption	No. of trucks processed, no. of closures due to full queue, length of each closure.	State weigh master=s database, state weigh station operator=s log.
2.3.3 Observe system availability	No. of complete and incompletetransactions at each weigh station.	System performance records, observations of system at weigh stations.
2.4.1 Compare truck flow on the mainline before & after installation	No. of trucks expected to be processed, actually processed, and the number available to be processed at each weigh station.	States vehicle monitoring database, states weigh station database, commercial vehicle inspection database.
2.4.2 Determine average delay times before	Records and results of previous	Results from previous research,

& after pre-clearance	delay time studies. Verification to substantiate results at selected weigh stations.	on-site observation.
2.5.1 Estimate changes in fuel use before and after pre-clearance using I-75 experience	Records and results of previous delay time studies. Verification to substantiate results at selected weigh stations.	Results from previous research, on-site observation.
2.6.1 Evaluate the accuracy of the vision system by comparison of vision readout with actual plate numbers	Records from the state supervisory computer and on-site observation.	Output of vision LPR=s and on-site observaton records.
3.1.1 Determine attitude towards electronic screening, including perceived impacts	Behavioral and attitudinal data from the motor carrier.	Questionnaire survey and interview results.
3.1.2 Determine attitude to new services	Behavioral and attitudinal data from the motor carrier.	Questionnaire survey and interview results.
3.1.3 Evaluate motor carrier acceptance of mainline electronic screening	Numbers of transponders installed.	State records.
3.2.1 Determine agency attitude towards electronic screening, including perceived impacts	Behavioral and attitudinal data from the agency.	Questionnaire survey and interview results.
3.2.2 Determine agency attitude towards new services, e.g., select carriers-vehicles for inspection based on inspection and compliance ststus.	Behavioral and attitudinal data from the agency.	Questionnaire survey and interview results.
4.1.1 Identify, assess and document pertinent regional and national issues (e.g. IOU, HELP, CVISN, ITS Systems Architecture, DSRC) and assess the impacts to Green Light for customers and providers	Information on pertinent regional and national issues.	Regional and national program reports. Minutes of meetings. Results of interviews with state and private sector personnel.
4.2.1 Document approaches attempted to solve regional and national mainstreaming issues as they arise, and final resolutions	Documentation of study processes and reports.	Documentation of study processes and reports. Minutes of meetings. Results of interviews with state and private sector personnel.
5.1.1 Identify, assess and document pertinent non-technical interoperability issues as they arise for customers and providers	Documentation of study processes and reports.	Documentation of study processes and reports. Minutes of meetings. Results of interviews with state and private sector personnel.
5.2.1 Document approaches attempted to solve non-technical interoperability issues as they arise, and final resolutions	Documentation of study processes and reports.	Documentation of study processes and reports. Minutes of meetings. Results of interviews with state and private sector personnel.

4. QUALITY ASSURANCE SCHEME

A comprehensive quality assurance approach for the pre-test and post-test activities will be used in the Green Light project. These procedures will ensure that all evaluation activities are appropriately conducted, analyzed, recorded, and documented. The primary focus of quality control are in the following areas:

OSU will conduct the evaluation work according to the Evaluation Plan and Individual Test Plans, and will coordinate the activities of the evaluation team. All deliverables specified herein will be prepared in a timely matter.

OSU will be responsible for the collection, handling, storing, distribution, and analysis of the data according to the procedures defined in the individual test plan data management section.

OSU will periodically brief the Steering Committee on evaluation plans, progress, and current status at regularly scheduled meeting throughout the entire life-cycle of the operational test.

Booz-Allen/OSU will provide an interim report to the Steering Committee during operational test.

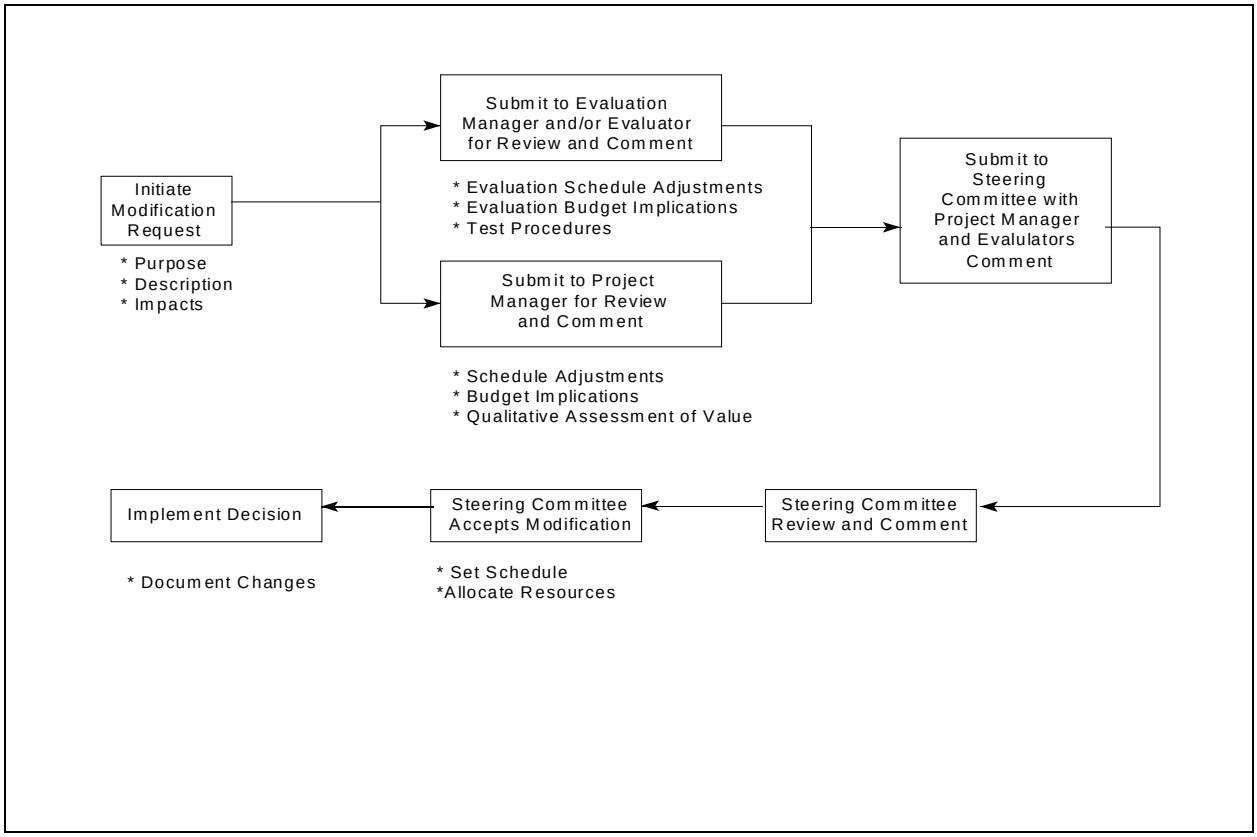
Booz-Allen/OSU will prepare deliverables for review by all Steering Committee members before submitting for final approval.

CONFIGURATION CONTROL

The importance of maintaining proper configuration control strategies is not only vital to the success of the project, but also to the success of the evaluation. This control applies to system software and hardware as well as evaluation documents. Any modifications made should follow this process before being implemented. It is not intended to inhibit changes, but to provide a consistent means for documenting and implementing any changes that are deemed necessary to the operational test. Thus, no change in the scope or procedures of this operational test should be made without being approved through the process defined in exhibit.

Documents generated during the course of the evaluation will use a numbering scheme that will facilitate their tracking and management. Each document will be numbered as GLEV96XX, where XX refers to the sequence the documents are generated.

EXHIBIT 4-1
Configuration Control



DATA MANAGEMENT

The responsibilities for the management of the data collected for evaluation primarily resides with the evaluators. However, it is necessary to train the users in proper data recording to ensure consistency and validity. The following sections define procedures that will be used for all data management.

Data Review and Verification

The data collection efforts of the participants will be regularly monitored and reviewed to ensure the quality of their data. User logs will be periodically collected and reviewed. Any procedural errors or problems identified throughout this review will require immediate corrective action or clarification by the Evaluators.

Survey questionnaires will be tracked and cataloged to ensure timely and appropriate responses. Each completed survey will be reviewed when received and follow-up will be made if necessary for clarification purposes only.

Data Collection and Document Design

The data collection documents-user logs, survey questionnaires, and personal interview summaries will be developed using well established techniques and procedures that have been widely recognized and are successful consumer research and behavioral pattern studies. These documents will be trial tested. The documents will be mapped with the individual evaluation measures and objectives to ensure complete and appropriate coverage.

Data Maintenance and Security

While there are no obvious security or liability issues related to the type of data being collected, there is good reason to believe that the individual carriers and agencies might have some proprietary concerns about access and distribution of their individual databases and documents. Each participant will be assured during the training period that the evaluators will

guarantee the confidentiality and restricted distribution of any information they provide.

All the data and survey comments of any one participant will be blended with other participants= information and any individual identity lost in this process. In addition, prior approval by a participant will obtained before any individual or identifying remarks will be included in any document.

The evaluation databases and documents will be controlled by the Evaluators during the entire evaluation process. Each participant will be instructed and asked to maintain appropriate back-up hard copy and computer files of all records until the evaluator has received and reviewed each record.

When received, it is the responsibility of the Evaluator to maintain adequate hard copy and computer back-up records to ensure the integrity and availability of all evaluation records. Final disposal of all records will be at the direction of the TAC and FHWA.

5. TEST MANAGEMENT

DETAILED TEST SCHEDULE

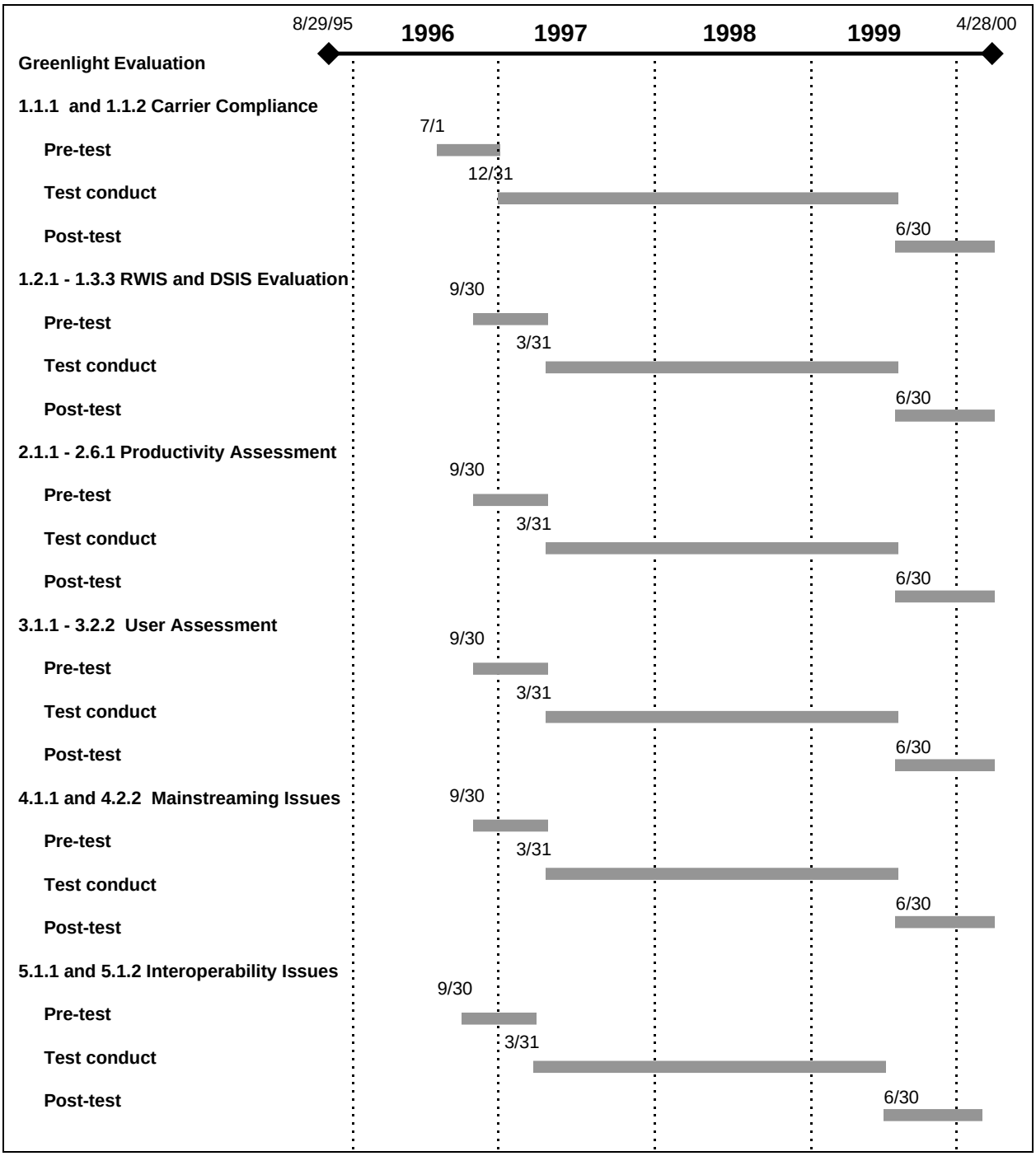
Exhibit 5-1 shows a general evaluation schedule for the project. Note that this shows the Aevaluation of Green Light elements≅ proceeding for 10 months, through April 1997. The evaluation will continue through April 2000 as part of subsequent phases of the Green Light project. The data collection done in the initial stages will primarily establish a baseline with which to compare future data. Exhibit 5-2 shows a general schedule for each group of tests for the entire project.

EXHIBIT 5-1
Evaluation Schedule through Phase I Funding

Task	1995				1996												1997			
	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A
1. Mobilization																				
2. Evaluation Plan								❺					❹							
3. Individual Test Plans													❺	❹						
4. Evaluate Green Light Elements																				
5. Team Meetings						✠	✠		✠	✠			✠	✠			✠	✠		✠
6. Quarterly Reports				M			M			M			M			M			M	M
7. Interim Report a. Draft														❿					❺	
b. Final																				❹

❺ Draft ❿ Status
M At the end of each quarter ❹ Final

EXHIBIT 5-2
Evaluation Schedule



DETAILED COST BREAKDOWN

A detailed cost breakdown for the conduct of the individual tests, and preparation of the associated reports is shown in Exhibit 5-3. This budget is for the initial phase of funding. Additional budgets will be developed for continuing evaluation of the Green Light project.

EXHIBIT 5-3
Detailed Budget Estimate for Evaluation Tests - Phase I

1. Oregon State University			$ 98,468
C.A. Bell, 720 hrs @	$ 42.50	$ 30,600	
Payroll expenses @ 32%		$ 9,792	
Grad Student, 1000 hrs @	$ 12.50	$ 12,500	
Undergrad Student, 250 hrs @	$ 9.00	$ 2,250	
Payroll expenses @ 8%		$ 1,180	
Tuition, 3 terms @	$ 1,635	$ 4,905	
Supplies and services		$ 3,800	
Travel and expenses		$ 6,000	
Overhead @ 41.5% (excluding tuition)		$ 27,441	
2. Center for Transportation Research & Education -Subcontractor			$ 83,686
B. McCall, 30% for 1 yr.		$ 22,700	
Payroll expenses @ 30.9%		$ 7,014	
Motor carrier specialist, 20% for 1 yr. $		$ 7,277	
Payroll expenses @ 30.9%		$ 2,249	
Secretary/account clerk, 15% for 12 mos.		$ 4,140	
Payroll expenses @ 39.45%		$ 1,633	
Supplies and services		$ 4,101	
Travel and expenses		$ 9,500	
Overhead @ 44%		$ 25,072	
3. WHM Transportation Engineering - Consultant			$ 18,000
C.M. Walton, 100 hrs @ (includes travel time)	$ 120	$ 12,000	
Travel and expenses		$ 6,000	
Subtotal			$ 200,154
4. Indirect Costs to OSU for Consultant @ 41.5%[1]			$ 7,470
TOTAL			**$ 207,624**

[1] Full overhead for ITC subcontract will be paid during Task 2

6. REFERENCES

1. Bell, C.A., B. McCall, and, C.M. Walton, AThe Oregon >Green Light= CVO Project, Evaluation Plan AGLEV9601, Oregon State University, Transportation Research Institute, September 1996.

APPENDIX A

DETAILED TEST PLANS

Exhibit A1.1.1
Test Scheme for Measure 1.1.1

Measure	Title: *Proportion of compliant trucks/carriers (with FMCSR) of total inspected and total processed per month*
Hypothesis	The proportion of compliant trucks will eventually increase.
Test Description	Data collection efforts will concentrate on two sources: 1) State weigh masters database, and 2) the state inspection database. The weigh masters database will be used to collect data on the volume of trucks at various weigh sites as well as the frequency and type of violations related to size and weight citations. The state inspection database will be used to record total number of inspections by weigh station, as well as the type of violation, i.e., driver out-of-service violations, and vehicle out-of-service violations. The data will be collected before the installation of Green Light technology to establish a benchmark. The same data will be collected after Green Light installation and compared with the benchmark data set to determine improvements in violation rates.
Pre-Test Activities	1. Collect samples of data to determine the quality of data and appropriate methods of collection. 2. Determine the necessary time frame to be used for the establishment of violation rate benchmarks prior to Green Light implementation. 3. Identify the locations (i.e., weigh sites, inspection sites, etc) from where the data should be collected.
Test Conduct Activities	Participants: Transportation Research Institute (Chris Bell, Paul Montagne) John Larch, ODOT DMV Motor Carrier Services Harry Eubanks, ODOT Motor Carrier Branch Procedures: For each weigh station selected for the study, the following steps will be conducted: 1. Collect hard copy of monthly weigh masters= operational summaries and inspection reports for the time frame determined in establishment of benchmark for each weigh site. 2. Record the number of trucks that were processed at each of the weigh sites for 24 months prior to Green Light implementation. 3. Record the number of compliant (in-service) trucks during the same time frame to determine ratio of compliant trucks to total processed for each weigh station. 4. Repeat steps following installation of Green Light technologies for the duration of the evaluation period.
Post-Test Activities	1. Analysis of data using EXCEL or comparable spreadsheet software, including statistical tests of validity. 2. Summarize findings in tabular format. 3. Archive all records. 4. Completion of test report

Exhibit A1.1.2
Test Scheme for Measure 1.1.2

Measure	Title: *Proportion of non-compliant (with FMCSR) trucks/carriers of total inspected and processed per month*
Hypothesis	The proportion of non-compliant trucks will eventually decrease.
Test Description	Data collection efforts will concentrate on two sources: 1) the state weigh masters database, and 2) the state inspection database. The weigh masters database will be used to collect data on the volume of trucks at various weigh sites as well as the frequency and type of violations related to size and weight citations. The state inspection database will be used to record total number of inspections by weigh station, as well as the type of violation, i.e., driver out-of-service violations, and vehicle out-of-service violations. The data will be collected before the installation of Green Light technology at various weigh sites to establish a benchmark. The same data will be collected after Green Light installation and compared with the benchmark data set to determine improvements in violation rates.
Pre-Test Activities	1. Collect samples of data to determine the quality of data and appropriate methods of collection. 2. Determine the necessary time frame to be used for the establishment of violation rate benchmarks prior to Green Light implementation. 3. Identify the locations (i.e., weigh sites, inspection sites, etc.) from where the data should be collected.
Test Conduct Activities	Participants: Transportation Research Institute (Chris Bell, Paul Montagne) John Larch, ODOT DMV Motor Carrier Services Harry Eubanks, ODOT Motor Carrier Branch Procedures: For each weigh station selected for the study, the following steps will be conducted: 1. Collect hard copy of monthly weigh masters= operational summaries and inspection reports for the time frame determined in establishment of benchmark. 2. Record the number of trucks that were processed at each of the weigh sites for 24 months prior to Green Light implementation. 3. Record the number of non-compliant (in-service) trucks during the same time frame to determine ratio of compliant trucks to total processed for each weigh site. 4. Repeat steps following installation of Green Light technologies for the duration of the evaluation period.
Post-Test Activities	1. Analysis of data using EXCEL or comparable spreadsheet software, including statistical tests of validity. 2. Summarize findings in tabular format. 3. Archive all records. 4. Completion of test report

Exhibit A1.2.1
Test Scheme for Measure 1.2.1

Measure	Title: *Ratio of mean speed in inclement weather to that in Agood≅ weather, before and after Green Light implementation*
Hypothesis	Truck speeds will decrease in inclement weather.
Test Description	Data utilized in this test will be collected from the state transportation records that record speed and traffic flow data from around the state. Data will consist of mean speed for CMVs in the vicinity of the RWIS technology. In the case of trucks carrying transponders, records will be collected by carrier and examined before and after the implementation of the transponder on-board the truck.
Pre-Test Activities	1. Collect samples of data to determine the quality of data and appropriate methods of collection. 2. Determine the necessary time frame to be used for the establishment of mean speed bench marks prior to Green Light implementation. 3. Identify the locations (i.e., mileage markers) from where the data should be collected.
Test Conduct Activities	Participants: Transportation Research Institute (Chris Bell, Paul Montagne) Participating Motor Carriers ODOT Traffic Division Procedures: For each RWIS location, the following steps will be conducted: 1. Collect hard copy of transportation records for the time frame determined in establishment of benchmark. 2. Record any available speed data in the vicinity of the RWIS technology for 24 months prior to Green Light implementation. 3. Repeat steps following installation of RWIS technology for the duration of the evaluation period.
Post-Test Activities	1. Analysis of data using EXCEL or comparable spreadsheet software, including statistical tests of validity. 2. Summarize findings in tabular format. 3. Archive all records. 4. Completion of test report

Exhibit A1.2.2
Test Scheme for Measure 1.2.2

Measure	Title: *Ratio of accidents before and after installation of RWIS system*
Hypothesis	Accident risk will decrease with better information available on weather conditions.
Test Description	Data utilized in this test will be collected from the state DMV accident records. Data will consist of accidents involving CMVs in the vicinity of the RWIS technology as determined by mileage markers. In the case of trucks carrying transponders, accident records will be collected by carrier and examined before and after the implementation of the transponder on-board the truck.
Pre-Test Activities	1. Collect samples of data to determine the quality of data and appropriate methods of collection. 2. Determine the necessary time frame to be used for the establishment of mean speed bench marks prior to Green Light implementation. 3. Identify the locations (i.e., mileage markers) from where the data should be collected.
Test Conduct Activities	Participants: Transportation Research Institute (Chris Bell, Paul Montagne) Troy Costales, ODOT Accident Data Unit Jack Shepard, ODOT Accident Data Unit Participating Motor Carriers Procedures: For each RWIS location, the following steps will be conducted: 1. Collect hard copy of accident records for the time frame determined in establishment of benchmark. 2. Record accidents involving CMVs in the vicinity of the RWIS technology for 24 months prior to Green Light implementation. 3. Repeat steps following installation of RWIS technology for the duration of the evaluation period.
Post-Test Activities	1. Analysis of data using EXCEL or comparable spreadsheet software, including statistical tests of validity. 2. Summarize findings in tabular format. 3. Archive all records. 4. Completion of test report

Exhibit A1.3.1
Test Scheme for Measure 1.3.1

Measure	Title: *Ratio of mean speed on downhill sections, before and after installation of DSIS system*
Hypothesis	Mean speeds will decrease.
Test Description	Data utilized in this test will be collected directly from the DSIS system for a period of one month to establish the benchmark. During this testing period, no feedback will be given to trucks passing the DSIS technology. The process will be repeated while the DSIS is fully operational for a one month period. During this time, feedback will be given to passing CMVs. Data will be examined to determine significant changes.
Pre-Test Activities	1. Negotiating and coordinating with the contractor for initiation of test period. 2. Determine the necessary time frame to be used for the establishment of mean speed benchmarks prior to initializing feedback to CMVs. 3. Determine necessary means of collecting and transferring data for analysis by the researchers. 4. Calibration of the DSIS system to insure accuracy and precision during the testing period.
Test Conduct Activities	Participants: Transportation Research Institute (Chris Bell, Paul Montagne) Ken Evert, ODOT Motor Carrier Operations International Road Dynamics, DSIS Developers Procedures: 1. Collect speed data daily for one month prior to full implementation of DSIS for establishment of benchmark. 2. Repeat following full implementation of DSIS technology for the duration of the evaluation period.
Post-Test Activities	1. Analysis of data using EXCEL or comparable spreadsheet software, including statistical tests of validity. 2. Summarize findings in tabular format. 3. Archive all records. 4. Completion of test report

Exhibit A1.3.2
Test Scheme for Measure 1.3.2

Measure	Title: *Ratio of accidents before and after installation of DSIS system*
Hypothesis	Accidents will decrease.
Test Description	Data utilized in this test will be collected from the state DMV accident records. Data will consist of accidents involving CMVs in the vicinity of the DSIS technology as determined by mileage makers immediately before and for a period following the location of the DSIS message board. In the case of trucks carrying transponders, specific accident records for these participating carriers will be utilized. In addition, examination of escape ramp usage will be monitored before and after DSIS installation.
Pre-Test Activities	1. Collect samples of data to determine the quality of data and appropriate methods of collection. 2. Determine the necessary time frame to be used for the establishment of mean speed bench marks prior to Green Light implementation. 3. Identify the locations (i.e., mileage markers) from where the data should be collected.
Test Conduct Activities	Participants: Transportation Research Institute (Chris Bell, Paul Montagne) Troy Costales, ODOT Accident Data Unit Jack Sheppard, ODOT Accident Data Unit Procedures: For each DSIS location, the following steps will be conducted: 1. Collect hard copy of accident records for the time frame determined in establishment of benchmark. 2. Record accidents involving CMVs in the vicinity of the DSIS technology for 24 months prior to Green Light implementation. 3. Repeat steps following installation of DSIS technology for the duration of the evaluation period.
Post-Test Activities	1. Analysis of data using EXCEL or comparable spreadsheet software, including statistical tests of validity. 2. Summarize findings in tabular format. 3. Archive all records. 4. Completion of test report

Exhibit A1.3.3
Test Scheme for Measure 1.3.3

Measure	Title: *Comparison of mean speeds with advisory speeds*
Hypothesis	Mean speeds will converge towards advisory speeds.
Test Description	Data utilized in this test will be collected directly from the DSIS system for a period of one month to establish the benchmark. During this testing period, feedback will be given to trucks passing the DSIS technology. Researchers will record the advisory speed as dictated by DSIS as well as the actual speed of the CMV at a predetermined point.
Pre-Test Activities	1. Negotiate and coordinate with the contractor for initiation of test period. 2. Determine the necessary time frame to be used for the establishment of mean speed benchmarks prior to initializing feedback to CMVs. 3. Determine the point(s) at which the actual truck speed will be recorded. 4. Determine necessary means of collecting and transferring data for analysis by the researchers. 5. Calibration of the DSIS system to insure accuracy and precision during the testing period.
Test Conduct Activities	Participants: Transportation Research Institute (Chris Bell, Paul Montagne) Ken Evert, ODOT Motor Carrier Operations International Road Dynamics, DSIS Developers Procedures: 1. Collect speed data daily for one month prior to full implementation of DSIS for establishment of benchmark. 2. Repeat following full implementation of DSIS technology for the duration of the evaluation period.
Post-Test Activities	1. Analysis of data using EXCEL or comparable spreadsheet software, including statistical tests of validity. 2. Summarize findings in tabular format. 3. Archive all records. 4. Completion of test report

Exhibit A2.1.1
Test Scheme for Measure 2.1.1

Measure	Title: *Determine the change in the resources required to collect road use revenues*. (Reference *Strategic Plan IVHS/CVO in Oregon*, Appendix B: Oregon IVHS/CVO Cost-Benefit Analysis, July 1993, prepared by the Oregon Department of Transportation, Transportation Development Branch, Transportation Building, Salem, Oregon for the Oregon Department of Transportation and Oregon Public Utility Commission)
Hypothesis	Tax collection will become more automatic and costs reduced.
Test Description	Process maps will be prepared to 1) establish the current resources required to collect road use revenues and 2) establish the resources required to collect road use revenues when Oregon Green Light is in place. The process map depicting current practices will be developed using current Policy and Procedures Manuals, interviews with Oregon staff, and reports such as the Motor Carrier Services Transaction Processing Project Phase II, Final Report prepared by PRODATA, Inc. dated March 9, 1993 and Oregon Weight-Mile Tax Study, dated February, 1996, prepared by Cambridge Systematics, Inc. and SYDEC, Inc., prepared for the Oregon Legislative Revenue Office, Oregon Public Utilities Commission, and Oregon Department of Transportation. The process map depicting the planned road use revenue collection processes when Oregon Green Light is in place will be developed using interviews with Oregon staff and planned road use revenue collection implementation plans. Process event costs and total costs, including staff, facilities, equipment, and overhead, for both the current process and the planned process will be developed using Oregon rates. The cost of collecting road use revenues using current practice will be compared with the cost of collecting road use revenues using the planned process. The evaluation will be conducted based on full implementation of Green Light, Phases I, II, and III.
Pre-Test Activity	1. Finalize the Oregon team members participating in road use revenue collection process mapping and developing process event costs. 2. Obtain copies of all manuals and reports applying to road use revenue collection.
Test Conduct Activities	Participants: Gregg Dal Ponte, Oregon Motor Carrier Transportation Branch Center for Transportation Research & Education (Bill McCall) Others 1. Develop and finalize process maps. 2. Develop and finalize process event costs and total process costs. 3. Compare and determine the change in the resources required to collect road use revenues.
Post-Test Activities	1. Archive all records. 2. Draft and finalize test report

Exhibit A2.1.2
Test Scheme for Measure 2.1.2

Measure	Title: *Determine the change in the resources required to audit the results of collection of road use revenues*. (Reference *Strategic Plan IVHS/CVO in Oregon*, Appendix B: Oregon IVHS/CVO Cost-Benefit Analysis, July 1993, prepared by the Oregon Department of Transportation, Transportation Development Branch, Transportation Building, Salem, Oregon for the Oregon Department of Transportation and Oregon Public Utility Commission.)
Hypothesis	Audit process will become more automatic.
Test Description	Process maps will be prepared to 1) establish the current resources required to audit the results of the collection of road use revenues and 2) establish the resources required to audit the results of the collection of road use revenues when Oregon Green Light is in place. The process map depicting current practices will be developed using current Policy and Procedures Manuals, interviews with Oregon staff, and reports such as the Oregon Weight-Mile Tax Study, dated February, 1996, prepared by Cambridge Systematics, Inc. and SYDEC, Inc., prepared for the Oregon Legislative Revenue Office, Oregon Public Utilities Commission, and Oregon Department of Transportation. The process map depicting the planned audit processes when Oregon Green Light is in place will be developed using interviews with Oregon staff and the planned road use revenue audit implementation plans. Process event costs and total costs, including staff, facilities, equipment, and overhead, for both the current process and the planned process will be developed using Oregon rates. The cost of auditing the results of collecting road use revenues using current practice will be compared with the cost of auditing the results of collecting road use revenues using the planned process. The evaluation will be conducted based on full implementation of Green Light, Phases I, II, and III.
Pre-Test Activities	1. Finalize the Oregon team members participating in road use revenue audit process mapping and developing process event costs. 2. Obtain copies of all manuals and reports applying to road use revenue collection.
Test Conduct Activities	Participants: Gregg Dal Ponte, Oregon Motor Carrier Transportation Branch Center for Transportation Research & Education (Bill McCall) Others 1. Develop and finalize process maps. 2. Develop and finalize process event costs and total process costs. 3. Compare and determine the change in the resources required to collect road use revenues.
Post-Test Activities	1. Archive all records. 2. Draft and finalize test report.

Exhibit A2.2.1
Test Scheme for Measure 2.2.1

Measure	Title: *Determine the expected change in road use revenue collections and why*. (Reference *Strategic Plan IVHS/CVO in Oregon*, Appendix B: Oregon IVHS/CVO Cost-Benefit Analysis, July 1993, prepared by the Oregon Department of Transportation, Transportation Development Branch, Transportation Building, Salem, Oregon for the Oregon Department of Transportation and Oregon Public Utility Commission.)
Hypothesis	Oregon Green Light will support changes.
Test Description	Observations will focus on three sources: 1) current reports, such as the Oregon Weight-Mile Tax Study, dated February, 1996, prepared by Cambridge Systematics, Inc. and SYDEC, Inc., prepared for the Oregon Legislative Revenue Office, Oregon Public Utilities Commission, and Oregon Department of Transportation to identify the estimated magnitude of evasion rate and the methods of evasion, 2) interviews with Oregon staff regarding evasion and methods of evasion, and 3) the planned road use revenue collection and audit processes. The methods of evasion will be identified and the estimated magnitude of evasion will be obtained from current reports. A matrix will be prepared displaying the method of evasion and the estimated rate of evasion. Interviews, either in a team or individual environment, will be held to established consensus regarding the validity of the methods of evasion and the rate of evasion. The methods of evasion will be compared to the planned road use revenue collect and audit processes. Process events dealing with the methods of evasion will be identified. Based on the expected effectiveness of the planned road use revenue collection and audit process events dealing with the methods of evasion, an estimate of the impact on collection will be made. Test documentation will be provided enabling Oregon to monitor the planned road use revenue collection and audit processes and measure the change in collection. The evaluation will be conducted based on full implementation of Green Light, Phases I, II, and III.
Pre-Test Activity	1. Finalize the Oregon team members participating in road use revenue collection and audit processes and dealing with road use revenue evasion. 2. Obtain copies of all reports dealing with road use revenue evasion.
Test Conduct Activities	Participants: Gregg Dal Ponte, Oregon Motor Carrier Transportation Branch Center for Transportation Research & Education (Bill McCall) Others 1. Develop and finalize the matrix of method of evasion and estimated magnitude. 2. Identify and finalize the relationship between the planned road use revenue collection and audit processes and methods of evasion. 3. Develop and finalize an estimate of the change in road use revenue collected.
Post-Test	1. Archive all records.

Activities	2. Draft and finalize test report

Exhibit A2.3.1
Test Scheme for Measure 2.3.1

Measure	Title: *Compare total vehicles processed (cleared and not cleared)*
Hypothesis	The number of trucks processed will eventually increase.
Test Description	Data collection will consist of examination of three sources: 1) The states= vehicle monitoring database, 2) The state weigh station database, and 3) The state=s commercial vehicle inspection database. The vehicle monitoring database will be used to establish the population of trucks expected at the processing point. The weigh station database will be used to establish the population of commercial vehicles processed at each of the processing points. The state=s commercial vehicle inspection data base will used to establish the total number of commercial vehicles arriving at the processing point, and whether they were inspected or cleared to proceed. The data will be collected before the installation of Green Light technology at various sites to establish a benchmark. The same data will be collected after the installation of Green Light and compared with the benchmark data set to determine improvements of commercial vehicle processing. In addition, a weigh station and port of entry simulation program may be used to predict the impact of partial and full roadside vehicle identification. The simulation program will include trucks and may include cars.
Pre-Test Activities	1. Establish data collection team. 2. Collect samples of data from the databases to determine the availability and quality of the data. 3. Determine the necessary time frame to be used for the establishment of the vehicle processing rate benchmarks prior to the implementation of Green Light. 4. Identify locations (weigh stations) from where data can be collected. 5. Develop and validate the simulation program. This activity includes collecting data to validate the simulation program 6. Test the simulation program.
Test Conduct Activities	Participants: Transportation Research Institute (Chris Bell, Paul Montagne) Center for Transportation Research & Education (Bill McCall, Dennis Kroeger) ODOT, Motor Carrier Branch Procedures: For each weigh station selected for the study, the following steps will be conducted: 1. Collect and electronic copy operational monthly summaries of the number of commercial vehicles processed to determine a benchmark. 2. Record the number of commercial vehicles that were processed and cleared at each of the weigh stations for 24 months prior to installation of Green Light. 3. Record the number of commercial vehicles that processed and not cleared at each of the weigh stations. 4. Repeat each of these steps following installation of Green Light technologies for the duration of the evaluation period. 5. Run the simulation program
Post-Test Activities	1. Analyze the data and output from the simulation program. 2. Summarize findings. 3. Archive all records. 4. Draft and finalize test report.

Exhibit A2.3.2
Test Scheme for Measure 2.3.2

Measure	Title: Compare number of interruptions (open/closed) per shift and total time of interruptions
Hypothesis	The number of interruptions will decrease.
Test Description	Data collection will consist of examination of two sources: 1) the state=s weigh station database, and 2) the weigh station=s operator=s log. The weigh station database will be used to collect data on the volume of commercial vehicles processed through each of the weigh stations. The station=s operator=s log will be used to record the total number of times the weigh station is closed due to a full queue, and the length of time for each closure. The data will be collected before the installation of Green Light technologies at various sites to establish a benchmark. The same data will be collected after the installation of Green Light and compared with the benchmark data set to make comparisons of commercial vehicle processing. In addition, a weigh station and port of entry simulation program may be used to predict the impact of partial and full roadside vehicle identification. The simulation program will include trucks and may include cars.
Pre-Test Activities	1. Establish data collection team. 2. Develop data collection forms. 3. Pilot test collection forms. 4. Identify high traffic volume weigh stations from which data can be collected. 5. Determine the number of vehicles processed per unit of time at the selected weigh stations to determine a benchmark prior to implementation of Green Light. 6. Develop and validate the simulation program. This activity includes collecting data to validate the simulation program 7. Test the simulation program.
Test Conduct Activities	Participants: Center for Transportation Research & Education (Bill McCall, Dennis Kroeger) ODOT, Motor Carrier Branch Procedures: For each weigh station selected for the study, the following steps will be conducted: 1. Record both the number and length of time of all interruptions due to a full queue during the shifts prior to the installation of Green Light. Collect paper copy and/or electronic operational monthly summaries of any interruptions to commercial vehicle processing to determine a benchmark. 2. Repeat Step 1 following installation of Green Light technologies for the duration of the evaluation period. 3. Run the simulation program.
Post-Test Activities	1. Analyze the data and output from the simulation program. 2. Summarize findings in tabular format. 3. Archive all records. 4. Draft and finalize test report.

Exhibit A2.3.3
Test Scheme for Measure 2.3.3

Measure	Title: *Observe System Availability*
Hypothesis	The system availability will be approximately 95%.
Test Description	Data collection will consist of examination of two sources: 1) The system=s performance records, and 2) Observation of system. Records will be collected on the number of attempted and completed transactions at each of the weigh stations, and the number of incomplete transactions. The system will be observed at various times to determine availability. The data will be collected after the implementation of Phase I and II and after the implementation of Phase III. Data collection on all types of transactions will be obtained from Aend to end≅ on the total system as defined in the Functional Architecture dated 9-25-96. In addition, a simulation program may be used to predict the impact of partial and full roadside vehicle identification on system availability.
Pre-Test Activities	1. Establish data collection team. 2. Identify system records and reports that provide transaction activity. 3. Pilot test to confirm the availability of the transaction data and appropriate methods file transfer. 4. Identify high volume traffic weigh stations from which types of transaction data can be collected. 5. Establish acceptable success rate of completed transactions, (i.e., 95% reliability.) 6. Test the simulation program.
Test Conduct Activities	Participants: Center for Transportation Research & Education (Bill McCall, Dennis Kroeger) ODOT, Motor Carrier Branch IRD-System Designers Procedures: For each weigh station selected for the study, the following steps will be conducted: 1. Obtain the number of attempted, completed and incomplete transactions and anomalies during an established time frame and the length of time the system is unavailable from the system performance records. Collect transaction data after Phases I and II are implemented and after Phase III is implemented. 2. Repeat each of these steps following implementation of Green Light for the duration of the evaluation period. Run the simulation program
Post-Test Activities	1. Analyze the data and output for the simulation program. 2. Document solutions to problems. 3. Summarize findings in tabular format. 4. Archive all records. 5. Draft and finalize test report.

Exhibit A2.4.1
Test Scheme for Measure 2.4.1

Measure	Title: *Compare truck flow on the mainline before and after installation* (This measure is the same as 2.3.1)
Hypothesis	Truck flow will increase.
Test Description	Data collection will consist of examination of three sources: 1) The states= vehicle monitoring database, 2) The state weigh station database, and 3) The state=s commercial vehicle inspection database. The vehicle monitoring database will be used to establish the population of trucks expected at the processing point. The weigh station database will be used to establish the population of commercial vehicles processed at each of the processing points. The state=s commercial vehicle inspection data base will used to establish the total number of commercial vehicles arriving at the processing point, and whether they were inspected or cleared to proceed. The data will be collected before the installation of Green Light technology at various sites to establish a benchmark. The same data will be collected after the installation of Green Light and compared with the benchmark data set to determine improvements of commercial vehicle processing. In addition, a weigh station and port of entry simulation program may be used to predict the impact of partial and full roadside vehicle identification. The simulation program will include trucks and may include cars.
Pre-Test Activities	1. Establish data collection team. 2. Collect samples of data from the databases to determine the availability and quality of the data. 3. Determine the necessary time frame to be used for the establishment of the vehicle processing rate benchmarks prior to the implementation of Green Light. 4. Identify locations (weigh stations) from where data can be collected. 5. Develop and validate the simulation program. This activity includes collecting data to validate the simulation program 6. Test the simulation program.
Test Conduct Activities	Participants: Transportation Research Institute (Chris Bell, Paul Montagne) Center for Transportation Research & Education (Bill McCall, Dennis Kroeger) ODOT, Motor Carrier Branch Procedures: For each weigh station selected for the study, the following steps will be conducted: 1. Collect and electronic copy operational monthly summaries of the number of commercial vehicles processed to determine a benchmark. 2. Record the number of commercial vehicles that were processed and cleared at each of the weigh stations for 24 months prior to installation of Green Light. 3. Record the number of commercial vehicles that processed and not cleared at each of the weigh stations. 4. Repeat each of these steps following installation of Green Light technologies for the duration of the evaluation period. 5. Run the simulation program
Post-Test Activities	1. Analyze the data and output from the simulation program. 2. Summarize findings in tabular format. 3. Archive all records. 4. Draft and finalize test report.

Exhibit A2.4.2
Test Scheme for Measure 2.4.2

Measure	Title: *Determine average delay times before and after pre-clearance*
Hypothesis	Delay times will decrease.
Test Description	Data collection will consist of examination of two sources: 1) Results gained from previous research and 2) On-site observations and verification. Records and results will be obtained from previous research on delay times of commercial vehicles at weigh stations. Observations will also be made at selected weigh stations to substantiate that the results of previous research are transferable to the Green Light Field Operational Test. Observations will include data collection and analysis using the same methodology as the previous research. In addition, a weigh station and port of entry simulation program may be used to predict the impact of partial and full roadside vehicle identification. The simulation program will include trucks and may include cars.
Pre-Test Activities	1. Establish data collection team. 2. Obtain copies of all reports from previous research and data collection methods. 3. Identify similar weigh station design types from previous research which are applicable to Oregon. 4. Test the simulation program.
Test Conduct Activities	Participants: Center for Transportation Research & Education (Bill McCall, Dennis Kroeger) ODOT, Motor Carrier Branch Procedures: For each weigh station selected for the study, the following steps will be conducted: 1. Collect data using the same methodology as previous research. 2. Run the simulation program
Post-Test Activities	1. Analyze the data and output from the simulation program. 2. Summarize findings in tabular format. 3. Archive all records. 4. Draft and finalize test report.

Exhibit A2.5.1
Test Scheme for Measure 2.5.1

Measure	Title: *Estimate changes in fuel use before and after pre-clearance, using experiences from previous research*
Hypothesis	Delay times will decrease.
Test Description	Data collection will consist of examination of two sources: 1) Results gained from previous research and 2) On-site observations and verification. Records and results will be obtained from previous research on changes in fuel usage of commercial vehicles, before and after installation pre-clearance. Observations will be made at selected weigh stations to substantiate that the results of the previous research are transferable to the Green Light Field Operational Test. Observations will be made using the same methodology as the previous research.
Pre-Test Activities	1. Establish data collection team. 2. Obtain copies of all reports of previous research and data collection methods. 3. Identify similar weigh station design types from previous research which are applicable to Oregon.
Test Conduct Activities	Participants: Center for Transportation Research & Education (Bill McCall, Dennis Kroeger) ODOT, Motor Carrier Branch Procedures: For each weigh station selected for the study, the following steps will be conducted: 1. Collect data using the same methodology as previous research.
Post-Test Activities	1. Analyze data using appropriate software to determine statistical validity. 2. Archive all records. 3. Draft and finalize test report.

Exhibit A2.6.1
Test Scheme for Measure 2.6.1

Measure	Title: *Evaluate the accuracy of the vision system by comparison of vision readout with actual plate numbers*
Hypothesis	The proportion of compliant trucks will eventually increase
Test Description	The data utilized in this test will come from two sources: 1) on-site observation of commercial vehicle license plates and 2) output of license plate reader (LPR) records from the state supervisory computer. For each site evaluated, actual plate numbers will be entered into a log and then compared to the output from the LPR. Comparisons will be made under a variety of physical conditions, i.e., rain, fog, bright sunlight, in order to determine read rates under varying circumstances.
Pre-Test Activity	1. Determine the type and accuracy of LPR data that can be collected from the state supervisory computer. 2. Identify the locations where the test will be conducted. 3. Determine the amount of data needed for the evaluation at each site. 4. Establish the data collection team.
Test Conduct Activities	Participants: Transportation Research Institute (Chris Bell, Paul Montagne) Ken Evert, ODOT Motor Carrier Operations Procedures: For each weigh station selected for the study, the following steps will be conducted: 1. Log actual plate numbers of CMVs at predetermined locations under a variety of physical conditions. 2. Collect LPR output from the state supervisory computer
Post-Test Activities	1. Analyze the data and determine degrees of accuracy under various conditions. 2. Summarize findings in tabular format. 3. Archive all records. 4. Draft and finalize report.

Exhibit A3.1.1
Test Scheme for Measure 3.1.1

Measure	Title: *Determine attitude toward electronic screening, including perceived impacts*.
Hypothesis	The majority of motor carrriers will have a positive attitude.
Test Description	This test will use a questionnaire survey to determine user attitudes toward electronic screening and its perceived impacts on the motor carrier. The target population will include both drivers and owners. The questionnaire will be filled out by a representative portion of the total motor carrier population in attempts to limit any sampling error. The questionnaire may be supplemented by on-site interviews.
Pre-Test Activity	1. Design the questionnaire survey including a draft that will be reviewed by steering committee members. 2. Define the target population e.g. interstate vs. intrastate. 3. Determine methods of sampling the target population and how the survey will be distributed and collected. 4.Determine the size of the sample required in order to make accurate inferences.
Test Conduct Activities	Participants: Transportation Research Institute (Chris Bell, Paul Montagne) C.M. Walton, WHM Transportation Engineering Consultants, Inc. 1. Distribute the questionnaire survey and conduct interviews if necessary. 2. Collect the survey and tabulate for analysis.
Post-Test Activities	1. Analyze data using appropriate software to determine statistical validity. 2. Archive all records. 3. Draft and finalize test report.

Exhibit A3.1.2
Test Scheme for Measure 3.1.2

Measure	Title: *Determine attitude towards new services, e.g., select carriers-vehicles for inspection based on inspection and compliance status.*
Hypothesis	The majority of motor carrriers will have a positive attitude.
Test Description	This test will use a questionnaire survey to determine user attitudes towards new services such as the RWIS and DSIS technologies and EDI. The target population will include both drivers and owners. The questionnaire will be filled out by a representative portion of the total motor carrier population in attempts to limit any sampling error. The questionnaire may be supplemented by on-site interviews.
Pre-Test Activity	1. Design the questionnaire survey including a draft that will be reviewed by steering committee members. 2. Define the target population e.g. interstate vs. intrastate. 3. Determine methods of sampling the target population and how the survey will be distributed and collected. 4.Determine the size of the sample required in order to make accurate inferences.
Test Conduct Activities	Participants: Transportation Research Institute (Chris Bell, Paul Montagne) C.M. Walton, WHM Transportation Engineering Consultants, Inc. 1. Distribute the questionnaire survey and conduct interviews if necessary. 2. Collect the survey and tabulate for analysis.
Post-Test Activities	1. Analyze data using appropriate software to determine statistical validity. 2. Archive all records. 3. Draft and finalize test report.

Exhibit A3.1.3
Test Scheme for Measure 3.1.3

Measure	Title: *Evaluate motor carrier acceptance of mainline electronic screening*
Hypothesis	Carriers will demonstrate acceptace by installing transponders.
Test Description	This test will use state records to track demand for transponders used by motor carriers.
Pre-Test Activity	1. Determine availability of transponder usage data from within ODOT
Test Conduct Activities	Participants: Transportation Research Institute (Chris Bell, Paul Montagne) C.M. Walton, WHM Transportation Engineering Consultants, Inc. Ken Evert, ODOT Motor Carrier Operations 1. Track transponder usage by motor carrier over the course of the evaluation period.
Post-Test Activities	1. Analyze data using appropriate software to determine statistical validity. 2. Archive all records. 3. Draft and finalize test report.

Exhibit A3.2.1
Test Scheme for Measure 3.2.1

Measure	Title: *Determine agency attitude towards electronic screening, including perceived impacts*
Hypothesis	The majority of agency personnel will have a positive attitude.
Test Description	This test will use a questionnaire survey to determine agency attitudes toward electronic screening and its perceived impacts on ODOT. The target population will include various levels of personnel within ODOT. The questionnaire will be filled out by a representative portion of the total population in attempts to limit any sampling error. The questionnaire may be supplemented by on-site interviews.
Pre-Test Activity	1. Design the questionnaire survey. 2. Define the target population. 3. Determine methods of sampling the target population and how the survey will be distributed and collected. 4. Determine the size of the sample required in order to make accurate inferences.
Test Conduct Activities	Participants: Transportation Research Institute (Chris Bell, Paul Montagne) C.M. Walton, WHM Transportation Engineering Consultants, Inc. 1. Distribute the questionnaire survey. 2. Collect the survey and tabulate for analysis.
Post-Test Activities	1. Analyze data using appropriate software to determine statistical validity. 2. Archive all records. 3. Draft and finalize test report.

Exhibit A3.2.2
Test Scheme for Measure 3.2.2

Measure	Title: *Determine agency attitudes towards new services*
Hypothesis	The majority of agency personnel will have a positive attitude.
Test Description	This test will use a questionnaire survey to determine user attitudes towards new services such as the RWIS and DSIS technologies and EDI. The target population will include both drivers and owners. The questionnaire will be filled out by a representative portion of the total motor carrier population in attempts to limit any sampling error. The questionnaire may be supplemented by on-site interviews.
Pre-Test Activity	1. Design the questionnaire survey. 2. Define the target population. 3. Determine methods of sampling the target population and how the survey will be distributed and collected. 4. Determine the size of the sample required in order to make accurate inferences.
Test Conduct Activities	Participants: Transportation Research Institute (Chris Bell, Paul Montagne) C.M. Walton, WHM Transportation Engineering Consultants, Inc. 1. Distribute the questionnaire survey. 2. Collect the survey and tabulate for analysis.
Post-Test Activities	1. Analyze data using appropriate software to determine statistical validity. 2. Archive all records. 3. Draft and finalize test report.

Exhibit A4.1.1
Test Scheme for Measure 4.1.1

Measure	Title:*Identify, assess and document pertinent regional and national issues (e.g. IOU, HELP, CVISN, ITS Systems Architecture, DSRC) and assess the impacts to Green Light for customers and providers*
Hypothesis	Knowledge of pertinent regional and national issues will increases the effectiveness of the Green Light program.
Test Description	Data collection will focus in two areas 1) interviews with state and private sector participants and 2) documents developed during the project. A guide for interviews will be prepared to focus the interviews on such questions as 1) what institutional and legal impediments did the project participants encounter while establishing the project team (partnership) and deploying Green Light, 2) where in the life cycle of the operational test did these impediments occur, 3) what were the causes of these impediments and how were they overcome, and 4) what lessons were learned in dealing with these impediments that can be applied to other deployments of ITS products and services. Initial interviews will be conducted on site. Follow up interviews, either on site or by telephone, will be conducted as necessary. The results of the interviews will be analyzed. The method of analysis and reporting will be based on the model developed for the Federal Highway Administration by the Volpe National Transportation Systems Center , IVHS Institutional Issues and Case Studies dated April 1994 (DOT-VNTSC-FHWA-94-15 and FHWA-SA-94-061). Documents such as minutes resulting from meetings associated either directly or indirectly with Green Light, agreements among participants (owners, providers, and users) and news and journal articles will be collected and cataloged according to issue and summarized. The summary will include a description of the issue, the solution, and the lesson learned.
Pre-Test Activity	1. Prepare a directory of participants that will be interviewed. 2. Finalize the interview guide. 3. Conduct a interview to test the interview guide. 4. Collect, catalog, and summarize existing documents.
Test Conduct Activities	Participants: Gregg Dal Ponte, Oregon Motor Carrier Transportation Branch C.M. Walton, WHM Transportation Engineering Consultants, Inc. 1. Establish the interview schedule and conduct interviews. 2. Conduct follow up interviews. 3. Analyze the results of the interviews. 4. Continue to collect catalog, and summarize documents.
Post-Test Activities	1. Archive all records. 2. Draft and finalize test report

Exhibit A4.2.1
Test Scheme for Measure 4.2.1

Measure	Title:*Document approaches attempted to solve regional and national mainstreaming issues as they arise, and final resolutions.*
Hypothesis	Participaton in pertinent regional and national issues will contribute to the effectiveness of the Green Light program.
Test Description	For each of the regional and national issues identified for which resolution is deemed appropriate, a strategy document will be prepared. The strategy document will describe the issue in detail including the definition, key components, primary and secondary considerations, key stakeholders and their vested interest, alternative resolution approaches, evaluation criteria, evaluation of alternatives, priority of alternatives, costs and benefits, and an implementation plan with resources and schedule.
Pre-Test Activity	Each issue will be discussed with the Evaluation Team members. The strategy document will be presented to the team with their input into all aspects with primary attention on evaluation criteria and priority rating.
Test Conduct Activities	Participants: C.M. Walton, WHM Transportation Engineering Consultants, Inc. 1. Listing of national and regional issues. 2. Priority ranking of issues. 3. Develop a schedule for each issue. 4. Preparation of strategy document. 5. Implementation of alternative solutions for identified issues.
Post-Test Activities	1. Documentation of approach and resolution for each issue. 2. Archive the records for future reference.

Exhibit A5.1.1
Test Scheme for Measure 5.1.1

Measure	Title: *Identify, assess and document pertinent non-technical interoperability issues for customers and providers*
Hypothesis	Knowledge of pertinent non-technical issues will increases the effectiveness of the Green Light program.
Test Description	Begin with the identification of the range of non-technical issues having a bearing on the Green Light program. To be consistent with the approach to regional and national issues interview with key stakeholders and actual experiences as they unfold will be the basis for identifying non-technical issues pertinent to the success of the program. The analysis procedures and outcomes will be unique to the character of the issue. Documentation will be provided for each of the issues examined.
Pre-Test Activity	1. As in the prior case of regional and national issues, a director of key stakeholders pertinent to the program in general and for the specific issues will be created. 2. For interviewing, a survey instrument will be prepared and tested using members of the evaluation team or steering committee. 3. Final instrument will be prepared following the pre-test. 4. Preparation of an implementation plan.
Test Conduct Activities	Participants: C.M. Walton, WHM Transportation Engineering Consultants, Inc. 1. Identification of pertinent non-technical issues. 2. Priority ranking of issues. 3. Implementation of the data collection plan for selected issues. 4. Preparation of a strategy document for each selected issue.
Post-Test Activities	1. Documentation of each selected issue. 2. Archive the records for future reference.

Exhibit A5.2.1
Test Scheme for Measure 5.2.1

Measure	Title: *Document approaches attempted to solve non-technical interoperability issues as they arise, and final resolutions*
Hypothesis	Documentation of participation in, and approaches used to resolve pertinent non-technical issues will contribute to the effectiveness of the Green Light program.
Test Description	For each of the non-technical issues identified for which resolution is deemed appropriate, a strategy document will be prepared. The strategy document will describe the issue in detail including definition, key components, primary and secondary considerations, key stakeholders and their vested interest, alternative resolution approaches, evaluation criteria, evaluation of alternatives, priority of alternatives, costs and benefits, and an implementation plan with resources and schedule.
Pre-Test Activity	Each issue will be discussed with the evaluation team members. The strategy document will be presented to the team with their input into all aspects with primary attention on evaluation criteria and priority rating.
Test Conduct Activities	Participants: C.M. Walton, WHM Transportation Engineering Consultants, Inc. 1. Listing of non-technical issues. 2. Priority ranking of issues. 3. Develop a schedule for each issue. 4. Preparation of strategy document. 5. Implementation of alternative solutions for identified issues.
Post-Test Activities	1. Documentation of approach and resolution for each issue. 2. Archive the records for future reference.