INTERNATIONAL ROAD DYNAMICS INC.

LTPP SPS PHASE II

WEIGH-IN-MOTION SITE ACCEPTABILITY ASSESSMENT REPORT

VIRGINIA SPS-1
LTPP ID 510100
JANUARY 24, 2005
CLIN 1001 TASK ORDER 1

CONTRACT NO. DTFH61-05-D-00001

U.S. Department of Transportation
Federal Highway Administration

LONG TERM Pavement PERFORMANCE

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1.0 EXECUTIVE SUMMARY

The proposed Virginia SPS-1 Weigh-in-Motion (WIM) site was visited on January 9th thru 12th, 2005, and a site acceptability assessment was performed. The site is located on US-29 at Mile Post 12.8 near the town of Danville, county of Pittslyvania. It is proposed to install a Weigh-in-Motion system for the SB outside lane approximately 200 feet upstream of the SPS-1 pavement test section. Based upon our site evaluation criteria, our discussions with the State, and lane closure considerations, it is recommended that a minimum 400 foot continuously reinforced 12 inch thick Portland Cement Concrete (PCC) slab be installed. Once installed it is recommended this slab be blanket ground with a minimum 36" blanket grinder and instrumented with Bending Plate technology. The rebar in and around the WIM location will need to be lowered to a minimum 5 ½ inches below the surface of the roadway so as to accommodate the Bending Plate installation and drainage.

The site is located on a straightaway atop a short rise with no curves immediately before or after the WIM location. The area 800 feet in advance and 200 feet trailing the proposed WIM location is relatively flat. Vehicles track smoothly through this area at speeds between 60 through 70 MPH. Traffic flow is light to medium on this four lane roadway.

The existing pavement at this location consists of 12 inches of Asphalt Concrete (AC). Both the approach and departure pavement are in good condition with no noticeable distress conditions. There is a slight bump (transverse paving joint) 500 feet upstream of the proposed WIM location. This will need to be ground smooth at the same time as the proposed PCC slab.

There is currently no power or telephone service available at the proposed WIM controller cabinet location; however, the State can provide power from an existing service drop located 475 feet away.

2.0 EXISTING ROADWAY

2.1 PAVEMENT AND GEOMETRICS

The two southbound lanes are each 12 feet wide with 10 foot wide shoulders. The horizontal alignment is tangent with minimal grade (positive 0.275%). Although there is a +2% grade 800 feet in advance and -2% grade 200 feet trailing the proposed WIM location, such grade changes are short in length and have no effect on the trucks passing through the site. In regard to cross slope, the two lanes slope 2% away from the median.

2.2 PCC WIM SLAB

There is currently no PCC slab installed at this location. It is recommended that a minimum 400 foot continuously reinforced 12 inch thick PCC slab be installed and ground with a minimum 36” blanket grinder prior to instrumentation with Bending Plate technology. The rebar in and around the WIM location will need to be lowered to a minimum 5 ½ inches below the surface of the roadway so as to accommodate the Bending Plate installation and drainage. A PCC slab should also be installed on the inside lane as well as the inside and outside shoulders, so as to minimize the area where we will have a concrete to asphalt joint.

2.3 OBSERVED TRAFFIC OPERATING CHARACTERISTICS

The light to medium traffic flow exhibited good lane discipline, staying well within the lane and shoulder line markings. Traffic is free flowing at all times with speeds between 60 and 70 MPH (posted speed limit is 65 MPH for all vehicles). There are no signals or merging in the WIM site vicinity. Trucks are “cruising” through the site at constant speeds. In that there are no on/off locations between WIM site and SPS site, the truck traffic composition at the WIM site is the same as that at the SPS site.

3.0 SITE CONFORMANCE TO EVALUATION CRITERIA

3.1 PAVEMENT TYPE AND CONDITION- REQUIRES ATTENTION

The AC approach and departure pavements appear to be structurally sound with no evidence of distress. There is currently no PCC slab installed at this location. It is recommended that a minimum 400 foot continuously reinforced 12 inch PCC slab be installed and ground with a minimum 36" blanket grinder prior to instrumentation with Bending Plate technology. The rebar in and around the WIM location will need to be lowered to 5 ½ inches below the surface of the roadway so as to accommodate the Bending Plate installation and drainage. A PCC slab should be installed on the inside lane as well as both inside and outside shoulders so as to minimize the area where we will have a concrete to asphalt joint. This will meet FHWA's recommendation and preference that the WIM system scales be installed in PCC with 325 feet of structurally sound and smooth pavement prior to, and 75 feet of structurally sound and smooth pavement beyond the WIM scale area.

3.2 OBSERVED PAVEMENT SMOOTHNESS- REQUIRES ATTENTION

The AC approach and departure pavements appear to be quite smooth. It is noted that there is a slight bump (transverse paving joint) 500 feet upstream of the WIM. This can recognized both visually and in the ride through this area. There is also some degree of both suspension and body motion dynamics when observing trucks approaching and passing through this area. This will need to be corrected when grinding is scheduled for the proposed PCC slab.

3.3 ANALYSIS OF PAVEMENT PROFILE DATA- REQUIRES ATTENTION

There is currently no PCC slab installed at this location. Once the slab has been installed and ground, profiling will need to be performed and the data will need to be analyzed

3.4 ROADWAY GEOMETRICS- PASS

The grade is minimal and the lane in which the sensors are to be installed is 12 feet wide. The pavement cross slope is adequate for proper roadway drainage.

3.5 TRAFFIC OPERATING CHARACTERISTICS- PASS

The general traffic pattern is free flowing with good lane discipline. There are no interchanges or signals affecting traffic flow. The truck traffic is cruising through the site and staying within the lane lines.

3.6 TRUCK TRAFFIC COMPARISON BETWEEN WIM AND TEST SITE- PASS

There are no exit/entrance locations between the WIM site and the SPS-1 pavement test sections.

3.7 POTENTIAL WIM INTERFERENCE SOURCES- PASS

There are no sources of potential interference in and around the proposed WIM system location.

3.8 ACCESS TO POWER AND PHONE SERVICES- PASS

The State will run power and telephone service to the proposed WIM controller cabinet location from an existing service point 450 feet upstream of the proposed site.

3.9 EQUIPMENT INSTALLATION CAPABILITY- PASS

There are adequate locations for the WIM controller cabinet on either side of the roadway. There is good visibility from the proposed WIM controller cabinet of the sensors and the approaching vehicles. There is adequate room adjacent to the cabinet location for service facilities. Overall site drainage is adequate and there is no foreseen potential for ponding or flooding at the cabinet or at the pullboxes. There is adequate topography for scale pit drainage and there is the ability to provide safe clearance in the work zone from live traffic during installation of the WIM system.

3.10 POTENTIAL TRAFFIC CONTROL / WORK ZONE SAFETY ISSUES- PASS

The traffic control should go smoothly, given the good approaching sight distance, the lack of nearby intersections or interchanges, and the ability to move traffic's left wheels onto the adjacent lane's shoulder. No other work zone safety problems are foreseen at this location.

3.11 TRUCK CIRCUIT – PASS

The test truck round trip circuit route is 12.8 miles and the turnaround locations are easily accessed and maneuvered. The estimated lap time is 17 minutes.

The nearest usable NB truck turnaround location is the VA726 Exit, a distance of 2.4 miles North of the WIM site. The nearest usable SB turnaround location is the 41 to 360 Halifax Exit, a distance of 3.5 miles South of the WIM site.

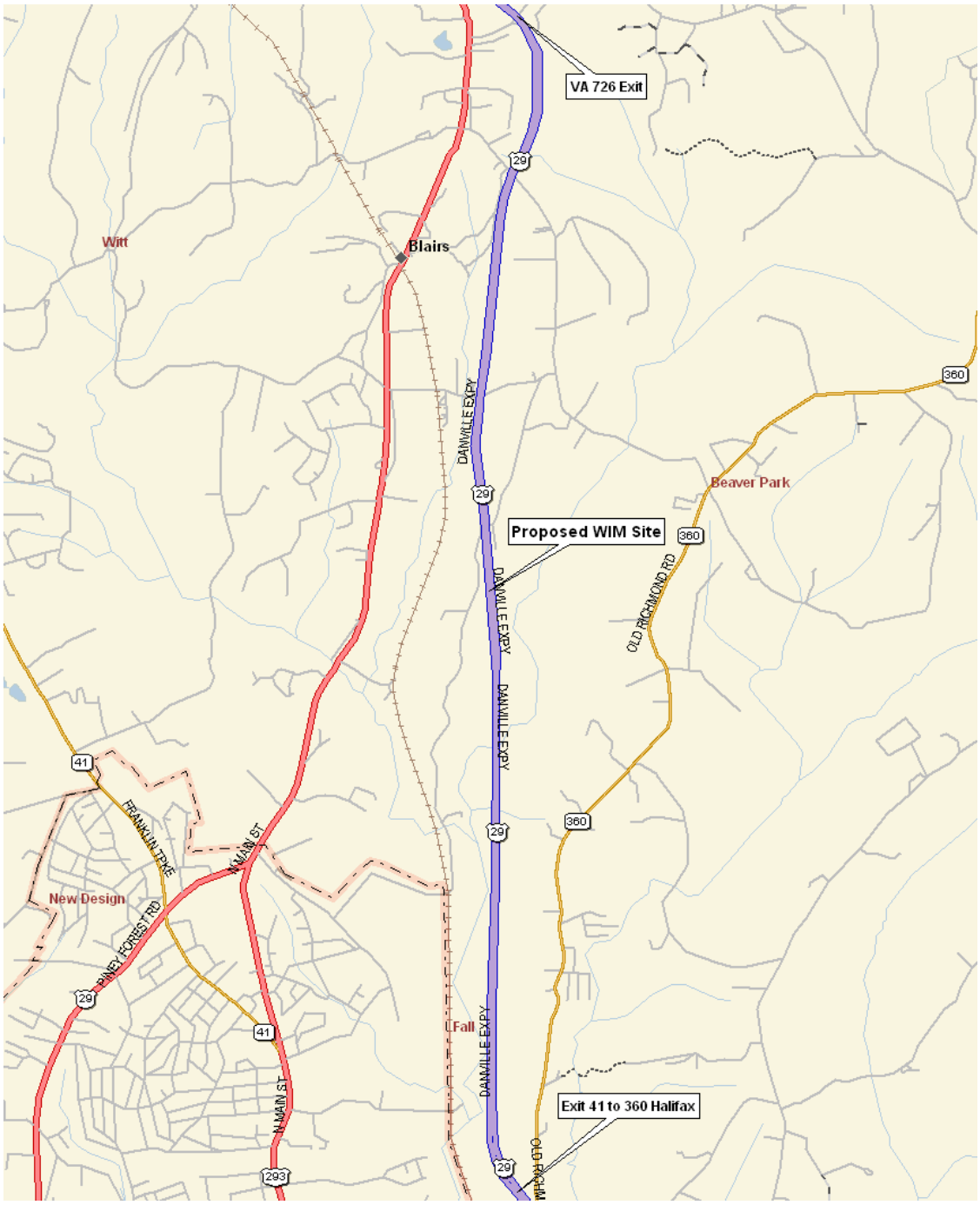

Figure 1: Truck Circuit Map

3.12 RECOMMENDATIONS ON SITE ACCEPTANCE / CORRECTIVE ACTIONS

It is recommended that a minimum 400 foot continuously reinforced 12 inch thick PCC slab be installed and ground with a minimum 36" Blanket Grinder prior to instrumentation with Bending Plate technology. The rebar in and around the WIM location will need to be lowered to 5 ½ inches below the surface of the roadway so as to accommodate the Bending Plate installation and drainage. Conduit to accommodate AC power and telephone services can also be roughed in at this time so as to make a cleaner installation with minimal saw cuts.

It is noted that there is a slight bump (transverse paving joint) 500 feet upstream of the WIM. This will need to be ground at the same time as the proposed PCC slab

The Bending Plate Weigh Pads should be installed 75 feet from the end of the proposed 400 foot PCC slab. This would put the sensors within 100 feet from the proposed cabinet location.

4.0 TRAFFIC DATA REVIEW

Vehicle distributions of all trucks (FHWA Class 4 and higher)
(Not Available)

Vehicle distributions for heavy trucks (FHWA Class 6 and higher)
(Not Available)

Volume of trucks comprising of 10 % or more of truck population
(Not Available)

Volume of trucks comprising 10 % or more of heavy truck population
(Not Available)

After discussions with the State and the RSC, it has been determined that current traffic data containing the above mentioned information is not available. The State has not had a continuous classification program at this location for quite some time and the RSC has verified that no meaningful class data from this site has been collected.

The Virginia Department of Transportation Web Site lists Annual Average Daily Traffic at this location to be 9400 and the Average Daily Truck Traffic to be 1504. This information is based on portable studies that the State performs on an annual basis. Based upon observations during our site visit it should be noted that the majority of the truck traffic at this location is Class 9. We recommend using class 9 vehicles for the calibration after the installation has been completed.

5.0 PAVEMENT PROFILE EVALUATION

5.1 INTRODUCTION

There is currently no PCC slab installed at this location. Once the slab has been installed and ground, profiling will need to be performed and the data will need to be analyzed at that time.

6.0 PROPOSED WIM SITE- INFORMATION

6.1 LOCATION – US-29 MP 12.8

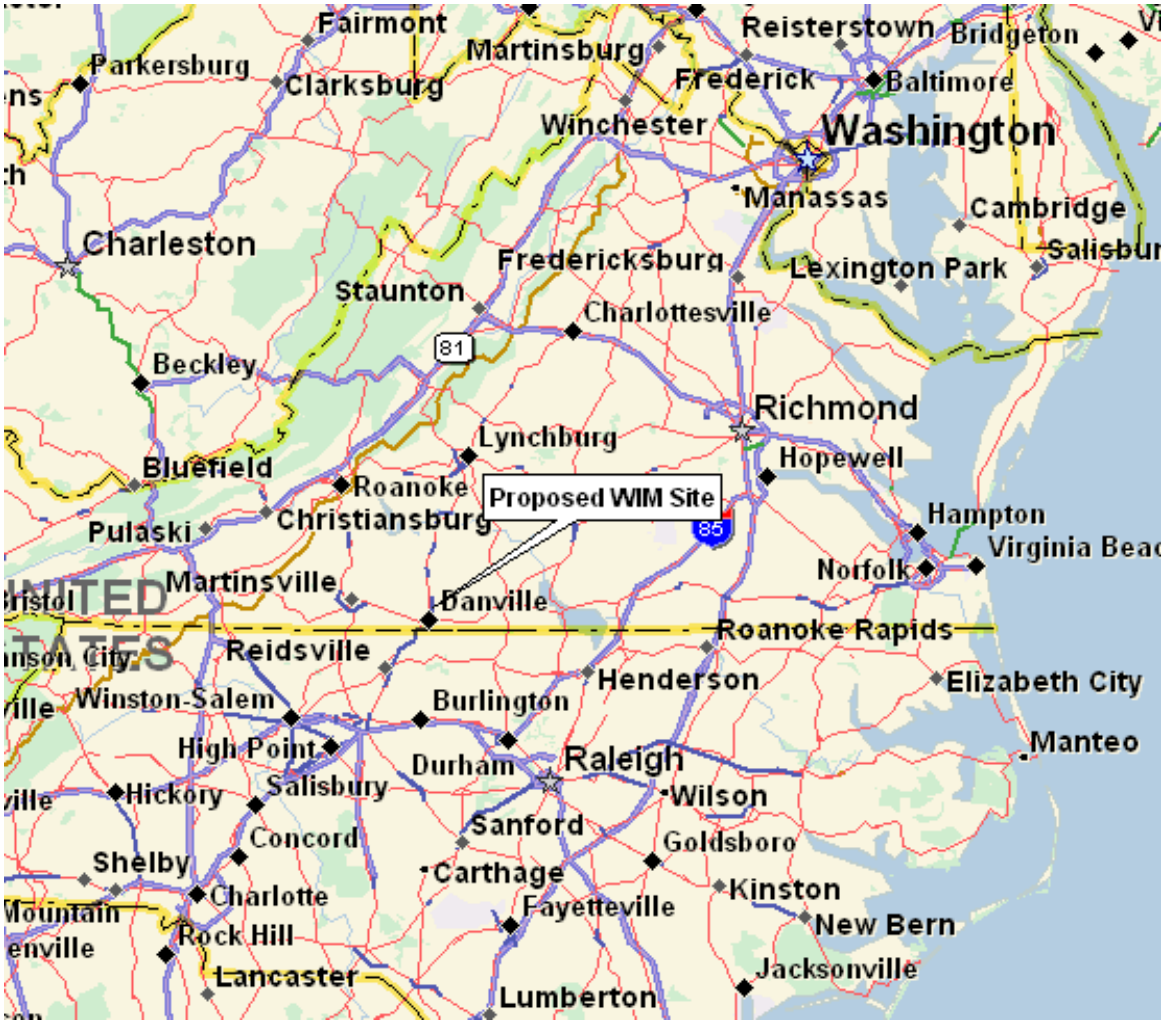

Figure 8: Map of US-29 WIM Site

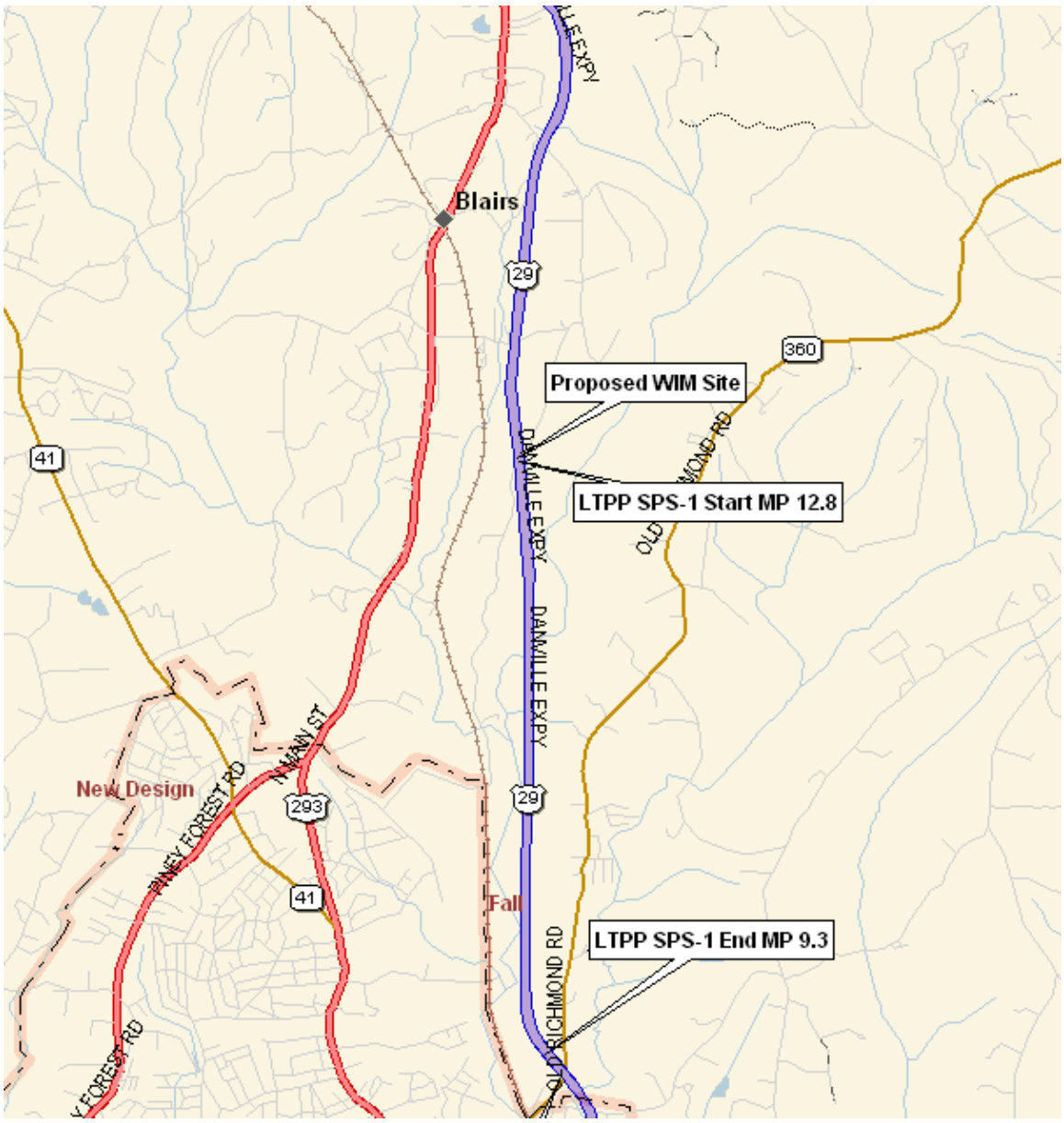

Figure 9: Map of US-29 WIM Site at Milepost 12.8

The LTPP SPS-1 test sections, approximately 160 miles from Richmond, are located in the southbound outside lane of US-29 between mileposts 9.3 and 12.8, just north of US-360 near the town of Danville.

The proposed site for the WIM system installation is located at milepost 12.8, 200 feet north of the first test section in the SPS-1 experiment, with scales to be installed in the SB outside lane. The controller cabinet and solar power array from the abandoned traffic data collection system is still present and is located 500 feet north of the proposed site.

7.0 RECOMMENDED WIM TECHNOLOGY

Based upon the site conditions and discussions with the State, the bending plate technology is recommended for use at this site. It will fit the performance expectations of the State, and accommodate installation and future maintenance that fit into VDOT's lane closure plans.

Kistler was ruled out as a result of past experiences that VDOT has had with similar sensor technology.

Single Load Cell was ruled out due to installation restrictions caused by the continuous reinforcing within the proposed PCC slab.

7.1 RECOMMENDED LOCATION AND LAYOUT FOR THE WIM SYSTEM

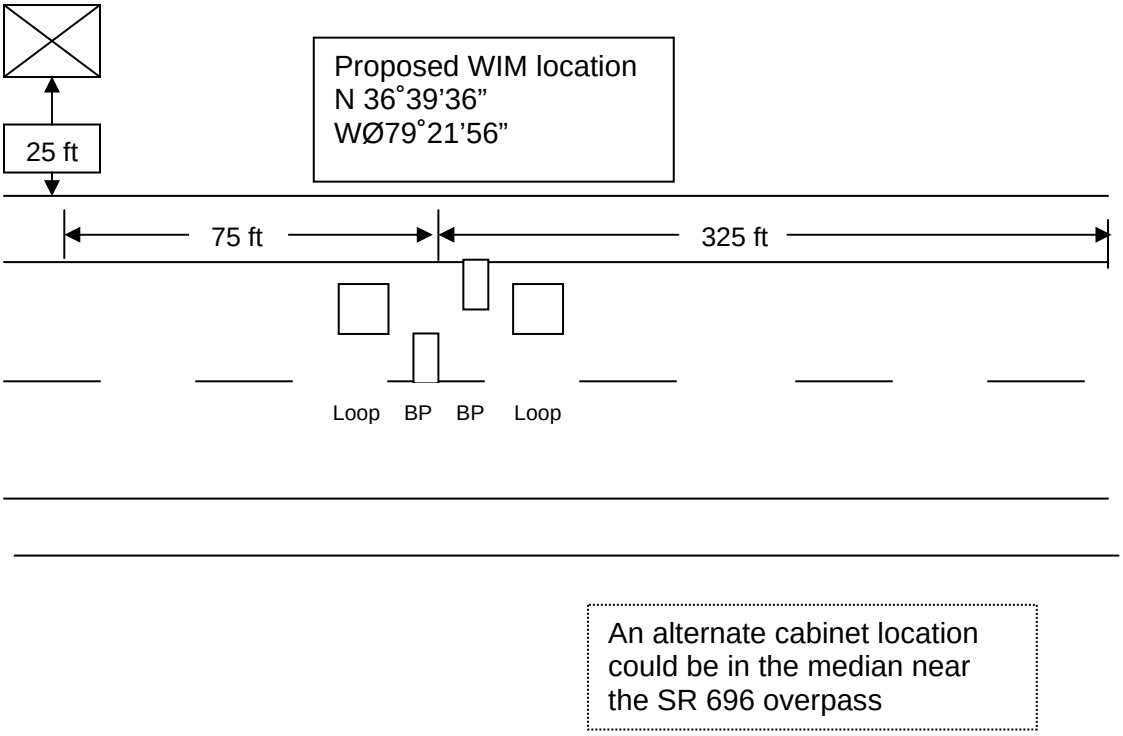

Figure 10: Proposed WIM Site Layout

A.0 COORDINATION DETAILS

Task Order #1, which authorized the CLIN 1001 "Determine Acceptability of Proposed Site" for the Virginia SPS-1 Site (LTPP ID 510100), was issued on January 3, 2005.

Contacts were made with interested parties as follows:

- Contracting Officer's Technical Representative (COTR)
  - Debbie Walker – FHWA-LTPP ph: 202-493-3068
  - Initial contact made January 3, 2005

- State Highway Agency (SHA)
  - Richard Bush – SHA/VDOT ph: 804-786-7006
  - Tom Schinkel – SHA/VDOT
  - Initial contact made January 3, 2005

- LTPP Regional Support Contractor (RSC)
  - Basel Abukhater – RSC/Stantec ph: 716-632-0804
  - Initial contact made January 3, 2005

- FHWA Division Office

Lorenzo Casanova
  - Lorenzo Casanova– FHWA Div Rep ph: 804-775-3362
  - Initial contact made January 3, 2005

The "Pre-Visit Handout Guide" was distributed on January 3, 2005, to the following individuals:

- Richard Bush
- Debbie Walker

The site evaluation was performed on January 9-12, 2005, by Roy Czinku (IRD).

A briefing session was held at 10:00 AM on January 11, 2005 at the proposed WIM site. Roy Czinku, Richard Bush, Tom Schinkel, and H.D. French were all in attendance for this meeting.

INTERNATIONAL ROAD DYNAMICS INC.

LTPP SPS PHASE II

WEIGH-IN-MOTION SITE ACCEPTABILITY PRE-VISIT HANDOUT GUIDE

VIRGINIA SPS-1
LTPP ID 510100

Date: January 3, 2005

CONTRACT NO. DTFH61-05-D-00001

U.S. Department of Transportation
Federal Highway Administration

LONG TERM PAVEMENT PERFORMANCE

B.0 PRE-VISIT HANDOUT GUIDE

B.1 SCHEDULE

a. Briefing session
   i. Meeting is scheduled for 10:00 a.m. on January 11, 2005, on-site at SPS-1, Danville located on US-29 Milepost 12.8
b. Site visit
   i. January 9, 2005 thru January 12, 2005

B.2 BRIEFING SESSION FEBRUARY 23, 2005, POINTS OF CONTACT, PHONE NO.S

a. Contracting Officer's Technical Representative (COTR)
   i. Debbie Walker – FHWA-LTPP ph: 202-493-3068
b. State Highway Agency (SHA)
   i. Tom Winkelman – SHA/IDOT ph: 804-786-7006
   ii. Ramon Taylor – SHA/IDOT
c. LTPP Regional Support Contractor (RSC)
   i. Basel Abukhater – RSC/Stantec ph: 716-632-0804
d. FHWA Division Office
   i. Pal Choudry – FHWA Div Rep ph: 217-492-4637

B.3 INFORMATION REQUESTS

a. From COTR
   i. FHWA Division contact person
   ii. New pavement profile from RSC if recent profile data unavailable
b. From RSC
   i. SHA contact person
   ii. SPS roadway section layouts (plan view and/or stationing or mileposts)
   iii. Recent pavement profile data
c. From SHA
   i. As-built info on roadway at proposed site
      1. Pavement cross section and structural section
      2. Alignment and grade
      3. Any utilities located in WIM install work area
   ii. Location and general availability of power and phone services, service providers, service provider contacts and phone numbers (may be beneficial if power and phone utility reps be requested to participate in briefing session and/or site visit)
   iii. Will SHA agree to extend power and phone services from existing available access points to demarcation points near planned controller cabinet location?
   iv. If existing roadway pavement is AC or inadequate PCC will SHA consider replacement with 400' PCC slab if recommended per site assessment?

v. What permits will be needed to install equipment and what are procedures and time frames for obtainment?
vi. Required cabinet clear zone from edge of traveled way?
vii. If no detour routing available at proposed site (or three or more adjacent lanes), will SHA permit shifting inside lane traffic partially onto inside shoulder to provide safe clearance during installation in outside lane?
viii. Historic truck traffic data?

B.4 SITE LOCATION INFORMATION

a. Proposed WIM site
   i. US-29 Mile Post 12.8 SB Outside Lane
b. Briefing session location
   i. On-site at proposed WIM location
c. Nearest major airport
   i. Richmond International Airport

Distribution --- COTR, RSC, SHA, FHWA Division, Site Assessment Team

INTERNATIONAL ROAD DYNAMICS INC.

LTPP SPS PHASE II

WEIGH-IN-MOTION SITE ACCEPTABILITY

SITE VISIT EVALUATION FORM

VIRGINIA SPS-1
LTPP ID 510100

Date of Site Visit: January 9-12, 2005

CONTRACT NO. DTFH61-05-D-00001

U.S. Department of Transportation
Federal Highway Administration

LONG TERM Pavement PERFORMANCE

C.0 SITE EVALUATION FORM

- ☑ Site Evaluation Forms
- ☑ Graph paper and note paper
- ☐ Clipboard
- ☑ Pens & pencils
- ☐ Small stapler
- ☑ Digital camera, with PC cable
- ☑ GPS receiver
- ☑ Notebook PC
- ☑ Calculator
- ☑ Cell phone
- ☑ Site Pre-visit Handout Guide
- ☑ Metal tape measure (25 ft.)
- ☑ Measuring wheel (ft.) and/or 100 ft. rag tape
- ☐ Folding rule (6 foot)
- ☐ Hand level
- ☐ Small torpedo level
- ☑ Keel markers
- ☐ Spray can white paint
- ☑ String Line
- ☑ Line Level
- ☑ Hammer and Concrete Nails
- ☐ _____

Request furnish on-site by Highway Agency:

- ☐ Spray can white paint
- ☐ Lath, 4 ft.
- ☐ Hammer
- ☐ Misc. small tools
- ☑ Keys for known Agency service cabinets
  Note: Key for existing cabinet is a standard Type II

Proper attire for field work and expected weather:

- ☑ Durable shoes
- ☑ Cold weather layering
- ☐ Rain gear
- ☐ _____

Safety equipment per State Highway Agency requirements:

- ☑ Hard hat
- ☑ Safety vest – type Hi-Vis Safety Yellow
- ☐ Other required equipment _____

C.1 PROPOSED WIM LOCATION

Proposed WIM Site Location – 4 Lane Roadway (2 Lanes each Direction)

Route US 29 Mile Post 12.8 Direction SB Lane Driving .

Proximity to applicable SPS test section 200 feet upstream of SPS-1 Test Section (510100)

C.1.1 EXISTING ROADWAY SURROUNDING THE PROPOSED WIM SITE

Type Pavement Asphalt

Lane Width 12 feet Thickness 12 inches

Observed Structural Soundness Good

Observed Smoothness Good

Outside NB Shoulder Type Asphalt Width 10 feet

Outside NB Shoulder Condition Good

Inside NB Shoulder Type Asphalt Width 10 feet

Inside NB Shoulder Condition Good

C.1.2 PAVEMENT 325' PRIOR AND 75' FOLLOWING WIM SCALE LOCATION

Type Asphalt Structural Soundness N/A concrete pad to be installed
Smoothness N/A concrete pad to be installed

Thickness 12 inches Jointed or Continuous Jointed Concrete (15 ft joints)

Notes/Comments on Pavement
This was a pre CLIN 1 trip to assist the state with selecting location for WIM. The state will be installing a concrete pad at this location in the near future. There is a slight bump 450 feet upstream of the proposed WIM location (transverse paving joint). The concrete pad and asphalt area 400-600 feet from the proposed WIM location will need grinding. Evaluation of this concrete pad will be performed after installation and grinding are completed.

C.1.3 ROADWAY GEOMETRICS

Horizontal Alignment No curves immediately before or after WIM

Grade Uphill grade which levels out 800 feet upstream of proposed WIM location

Cross-slope 2% Lane width 12 feet

C.1.4 OBSERVED TRAFFIC OPERATING CHARACTERISTICS

Passing, merging, not following lane lines? None - Good Lane Discipline

Stop and go traffic, congestion periods? None - Free Flowing at all Times

Traffic signals or interchanges affecting traffic flow? None – nearest exit two miles away

Other adverse traffic flow conditions? None

Truck traffic at "cruising" speed and no lugging? No Lugging noticed during site inspection

Truck traffic staying within lane lines? Yes, site located on a straight away

Observed truck suspension or body motion dynamics? Site needs grinding after install of concrete pad

Truck traffic composition same at WIM site and SPS site? Yes

Truck traffic on/off locations between WIM site and SPS site? None

Notes/Comments on Geometrics and/or Traffic Operating Characteristics
The proposed WIM location is on a flat, level area at the top of a rise. Trucks are not lugging as they approach the proposed WIM location. The proposed WIM location is approximately 200 feet in advance of the SPS-1 Test Section. SR 695 overpass runs over the roadway just upstream of the proposed WIM site. There is no access to SR 695 from US-29.

C.1.5 ACCESS TO UTILITY SERVICES

Potential source(s) for power Existing – 475 feet upstream of proposed WIM location

Potential source(s) for telephone Existing – 475 feet away from proposed WIM location

C.1.6 EQUIPMENT INSTALLATION CAPABILITY

Adequate location for controller cabinet? Yes, approximately 100 feet from WIM sensors behind existing guard rail within median

Distance from edge of traveled way to cabinet 25 feet Off Roadway, 75 feet upstream of WIM

Visibility from cabinet of sensors and approaching vehicles? Very Good

Adequate location for service facilities? Yes

Adequate drainage for scale pits? Yes

Adequate roadway and overall site drainage? Yes

Potential for ponding or flooding at cabinet or pullboxes? None

Potential for traffic control problems during installation? None

Ability to provide safe clearance in work zone from live traffic via:

- ☑ OK from State Agency to use opposite shoulder for traffic shift
- ☐ Multiple Adjacent Lanes

Notes/Comments on Equipment Installation Capability

None, everything checks out on equipment installation capability.

C.1.7 POTENTIAL WIM SENSOR/EQUIPMENT INTERFERENCE SOURCES

Overhead power lines? None Adjacent railroad? None

Note: there is an overpass 100 ft upstream of proposed WIM location. This will not interfere with the installation

C.1.8 CONDITIONS FOR USE OF TEST TRUCKS FOR CALIBRATION AND EVALUATIONS

Direction NB - Nearest usable truck turnaround location:

Exit VA726 Distance from WIM 2.4 Miles

Direction SB - Nearest usable truck turnaround location:

Exit 41 to 360 Halifax Distance from WIM 3.5 Miles

Circuit travel distance 12.8 Miles Estimated lap time 15 Minutes

Potential circuit route restrictions? None, very good access

Identification and location of certified static scales:

Name Danville Rock Quarry Contact Jeff Foust

Address 200 Quarry Access Rd. Danville, VA

Phone 434-799-6743 Hours 8:00 am – 5:00 pm

Cost per initial weighing rock charge Cost per additional weighing None

Notes/Comments on Test Truck Circuit and Static Weighing Facility

Foust Trucking is located next to Danville Quarry. Initial rock charge approx. $75.00. Foust has 5 axle (class 9) tractor trailer trucks with air ride suspension that we could use for calibration. The majority of truck traffic on US29 is class 9.

D.0 SHEET 17

Sheet 17	*STATE_CODE	LTPP
LTPP Traffic Data	*SPS PROJECT ID	510100
WIM SITE INVENTORY	*SPS WIM ID	SPS-1

1.* ROUTE US-29 MILEPOST 12.8 LTPP DIRECTION - N S E W

2.* WIM SITE DESCRIPTION - Grade < 1 % Sag vertical Y / N
Nearest SPS section upstream of the site 510100
Distance from sensor to nearest upstream SPS Section 200 ft

3.* LANE CONFIGURATION
Lanes in LTPP direction 2 Lanes SB Lane width 12 ft

Median -
1 – painted
2 – physical barrier
→ 3 – grass
4 – none

Shoulder -
→ 1 – curb and gutter
2 – paved AC
3 – paved PCC
4 – unpaved
5 – none

Shoulder width 10 ft

4.* PAVEMENT TYPE 12 inch AC

8. RAMPS OR INTERSECTIONS
Intersection/driveway within 300 m upstream of sensor location Y / N - distance No
Intersection/driveway within 300 m downstream of sensor location Y / N- distance No
Is shoulder routinely used for turns or passing? Y / N No

Form completed by Roy Czinku - IRD Date Jan 12, 2005

E.0 PHOTOGRAPHS

E.1.1 SPS TEST SECTION MARKER

E.1.2 GENERAL SITE VIEW OF PROPOSED WIM SITE

E.1.3 GENERAL SITE VIEW OF WIM SITE FROM SHOULDER

E.1.4 DOWNSTREAM VIEW OF ROADWAY

E.1.5 UPSTREAM VIEW OF ROADWAY AND LEADING EDGE OF SLAB

E.1.6 TRANSVERSE PAVING JOINT

E.1.7 RECOMMENDED SCALE LOCATION

E.1.8 RECOMMENDED CABINET LOCATION

E.1.9 POTENTIAL POWER SERVICE

E.1.10 EXISTING TELEPHONE SERVICE

E.1.11 EXISTING WIM CABINET

E.1.12 EXISTING WIM ARRAY