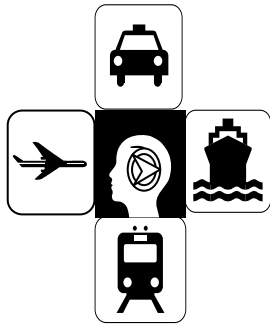


# JERSEY DOT'S

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## Tech Brief

### Laboratory Information Management System (LIMS)

FHWA-NJ-2004-010

April 2008

#### SUMMARY

Currently, most material test results at NJDOT are applied on a micro scale and paper-filed. To integrate the operational functionality of material data filing, processing, and transfer, a computerized local/remote Intranet network management system was developed. The NJDOT LIMS (Laboratory Information Management System) is an integrated material laboratory testing result report system. A pilot scale intranet-based information management system was developed, installed, tested, and is currently being evaluated by NJDOT. This system consists of three major components: (a) database; (b) administrative management interface; and (c) database-driven web application. These three parts comprise an Intranet web application with which users can create reports, store testing results, and retrieve, display, and transfer information among the NJDOT Materials Bureau in Trenton and regional and field offices through the NJDOT network. LIMS standardizes data entry procedures, defines performance evaluation measures, certifies material test data, analyzes the relationships between test data and actual material performance, streamlines the project closeout process, and generates summary reports. The LIMS System is an efficient, effective, and user-friendly one.

#### SQL Database

The SQL database provides all administrative information about projects, contractors, suppliers, material mix designs, personnel, laboratories, and field offices. The system administrator of NJDOT LIMS uses the Administrative Management Interface to input all administrative information. The Administrative Management Interface is a Microsoft Access 2000 application, named 'Lims\_2000\_Admin.mdb'. This application has functional data entry/retrieval forms linked to the SQL database. Using these forms at the supervisor level, the system administrator can initialize specific records on projects, contractors, and suppliers; enter material mix design data; and enter User ID for authorized users. The SQL database also stores test results for concrete, soils, and asphalt samples.

#### Administrative Management Interface

The Main Menu of the Administrative Management Interface provides access to the administrative program functions that allow updating of system information. . Figure 1 shows this main menu. Clicking on any of the option buttons will take the user to the corresponding function.

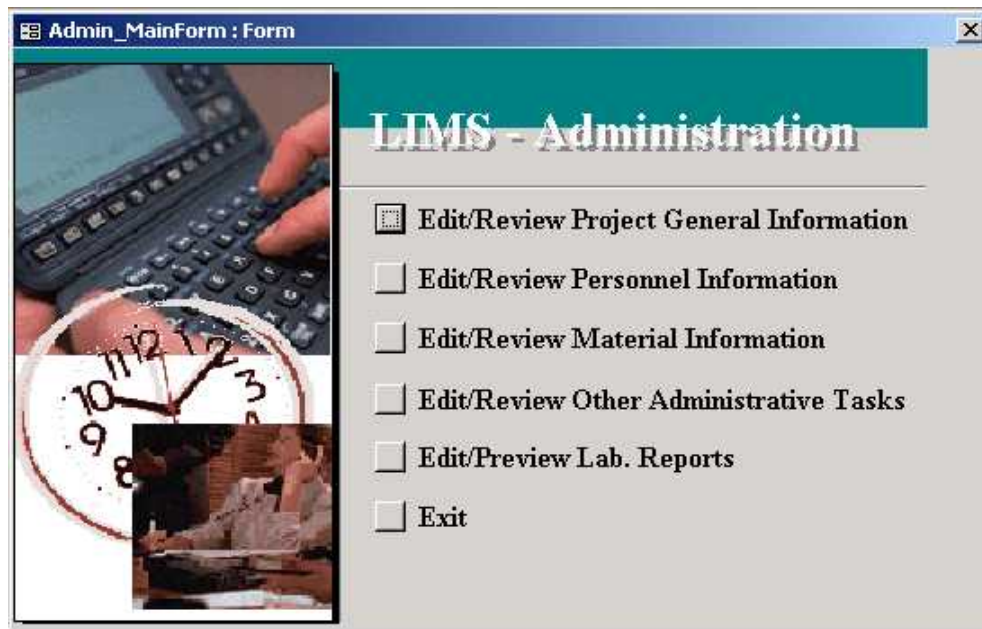


Figure 1. Main Menu of LIMS Administration Management Interface

### LIMS Intranet Application

By LIMS design, the data entry can be done manually (basic information initialization), automatically (calculated and transferred results), or be triggered (data downloading) by another device. Each sampling process has its own logical life from beginning to end. All data entry forms in LIMS were created according to their sampling logic, and data fields and form layout were standardized. Figure 2 shows a sample web page of the LB201-CY General Information form for concrete cylinder material. Figure 3 shows the related Trenton Central Lab test data form, and Figure 4 displays a sample of the LB201-CY Full Report.

Field Office Forms | Centra Lab. Forms | Full Report Preview | Main Selection Board

LB-201-CY 8/98 NEW JERSEY DEPARTMENT OF TRANSPORTATION Bureau of Materials, Trenton dc  
Construction Maintenance 10/10/2001 5:22:39 PM

### PORTLAND CEMENT CONCRETE CYLINDER - INSPECTION/TESTING

Project	Route 4 Section 2AE & Route 17 sections 2P & 3G		Region	North Region
Project IDs	DP Number	11111111	UPC Number	
	Federal No.	STP-NH-56(145)		
Contractor	ANSELM&DECICCO, 23 Hill Street, Newark, NJ			
Supplier	BLUE CIRCLE MATERIALS INC	Location	ALL PLANTS	
Dates Made	Cyts.	9/29/2001	Rpt.	10/10/2000 (+)
Proposed Use (Type of Constr.)			Type of Mixing	AS PREVIOUS
Total C.M. Placed			Age to Be Tested	28
Class of Concrete	A SLG70/	A (+)	Lot No.	12 (+)
	Item No.			
Cement Source and Type	AS APPROVED/NEWCEM 70/30 CL A		Pay Item Qty.	
Fine Agg. Source/Location	AMBOY AGGREGATES, SOUTH AMBOY, NJ		LIMS Mix ID:	49
Coarse Agg. Source/Location	BLUE CIRCLE, HAMBURG, NJ			
Exact Location of Pour				

(+) Field entry required!  
Units: Metric

Tester(s) Business data entry  
(First Middle LastName)

Current Report: (Original)

Save  
Delete  
Reset

Figure 2. LB201-CY General Information Form

LB201 Form Centra Lab. Section - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://laptopang/NJDOT\_Lims/LB201/LB201\_CV\_CentraLab.asp

General Information | Field Office Forms | Full Report Preview | Main Selection Board

LB-201-CY 8/98 **PORTLAND CEMENT CONCRETE CYLINDER - INSPECTION/TESTING** (Trenton Lab.) Bureau of Materials, Trenton 46  
Report ID: Form(LB-201-CY\_DP(11111111)\_RptDate(11/12/2000)\_22B\_R0 2:47:57 PM

(Original) Date Rec'd in Lab 2/11/2001 Date Tested 2/15/2001 Age Tested 28

Centra Lab. Testing Results	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Report to
Seal No. 1	3543532						ANSELM&DECICCO 23 Hill Street, Newark, NJ
Seal No. 2	2352335						
Lab Serial No. 1	800858T						Trenton Centra Lab. Bureau of Materials ATT: Tang, Chi
2	800859T						
Cylinder Diameter 1	4						Notes Complies
Cylinder Diameter 2	4						
Maximum Load - Lbs. Force 1							Pay Adjustment <input checked="" type="checkbox"/> Non Adjustment <input type="checkbox"/>
Maximum Load - Lbs. Force 2							
Compressive Strength - PSI 1	6,380.0						Save Reset (Click to Sign) (Back to top)
(AASHTO T-22) 2	*7,500.0						
Avg. Compressive Strength - PSI	6,380.0						
Type of Break (Go Forward)							
Avg. Compressive Strength - Lot	6,380.0	Std. Dev.= 2.00	Q= 3.177	PPA= 2.00			

Remarks: Cylinder Curing Temperature (First 24 hours)

Testers: fhgf

Reviewed By: Dennis Carlson (Click to Sign)

Other Comments: (Selecting...)

Title: Management

Local intranet

Figure 3. LB201-CY Trenton Lab Form

General Information | Field Office Forms | Region Lab. Forms | Main Selection Board | Print Version

LB-201-CY 8/98 **NEW JERSEY DEPARTMENT OF TRANSPORTATION** NJIT Construction Office  
**Construction & Maintenance** TANG  
**PORTLAND CEMENT CONCRETE CYLINDER - INSPECTION/TESTING** 5/5/2008 3:05:26 PM

Project	Route 4 Section 2AE & Route 17 sections 2P & 3G		Region: North Region			
Project IDs	DP Number: 11111111	UPC Number: 0909099	Federal No: STP-NH-56(145)			
Contractor	ANSELM & DECICCO, 23 Hill Street, Newark, NJ					
Supplier	American Concrete, NEWARK, NJ					
Dates Made	Cyls. 3/4/2002	Rpt. 9/8/2000				
Proposed Use (Type of Construction)	Cement Concrete	Type of Mixing: TRANSIT				
Total C.Y. Placed	3.8	Age to Be Tested: 28				
Class of Concrete	AAE(H/E)	(Class Used: A)	Lot No. 1			
Cement Source and Type	ESSROC TYPE II		Item No. 2			
Fine Agg. Source and Location	AMBOY AGGREGATES BLENDED SAND(TYPE C, MT, S, OR R)		Pay Item Quantity: 1			
Crse Agg. Source and Location	MILLINGTON QUARRY, MILLINGTON, NJ		Mix ID: 26			
Exact Location of Pour	DFGSDGSDGSDGSDGSDG		Mix SN: N00007			
Time Loaded			Report to ATT: Wilson, Michael A. c/o Full Report Constr. Engr. Trenton Lab. Bureau of Materials ANSELM & DECICCO 23 Hill Street, Newark, NJ American Concrete, NEWARK, NJ			
Time Start to Discharge						
Time Discharge Complete			Notes			
Mixing Revs / Total Revs						
Total Water Plant & Jobsite (Gal)			Cases to Notify: * Average strength takes the higher value when value differences are equal to or greater than 600 psi. * 10% below class design strength * Below retest limit			
Maximum Water Allowable (Gal)						
Sample From (Truck No.)			Pay Adjustment Item <input type="checkbox"/> Non Pay Adjustment Item <input checked="" type="checkbox"/>			
Air Test By (AASHTO T-152)						
Slump Test By (AASHTO T-119)						
Cylinders Molded By (AASHTO T-23)						
Quantity Represented (C.Y.)						
Quantity Rejected (C.Y.)						
Seal No. 1	43566	43677	43557	34578	34567	45633
Seal No. 2	34556	35455	23467	32456	33234	34533
Slump (inches)						
Air Temp. (°F)						
Conc. Temp. (°F) (ASTM C-1064)						
E.A. Content (%Coor.)						
Water Cement Ratio (W/C)						
A.E. Admixture Dosage:	W.R. GRACE - DARAVAIR 1000			oz/CY		
Chemical Admixture #1 & Dosage	W.R. GRACE - WRDAHYCOL			oz/CY		
Chemical Admixture #2 & Dosage				oz/CY		
Chemical Admixture #3 & Dosage				oz/CY		
Plant Inspector						
Date Rec'd in Lab		Date Tested		Age Tested		
Lab Serial No. 1	400259N	400261N	400263N	400265N	400267N	400269N
Lab Serial No. 2	400260N	400262N	400264N	400266N	400268N	400270N
Cylinder Diameter 1						
Cylinder Diameter 2						
Maximum Load - Lbs. Force 1						
Maximum Load - Lbs. Force 2						
Compressive Strength (PSI)						
(AASHTO T-22)						
Avg. Compressive Strength (PSI)						
Type of Break						
Avg. Compressive Strength - Lot		Std. Dev. =	Q =	PPA =		

Remarks: Cylinder Curing Temperature (First 24 hours)

Field Office Tester(s):

Field Office Reviewer:

Region Lab. Tester(s):

Region Lab. Reviewer:

Figure 4. LB201-CY Full Report

It is the integrated design of the sampling cycles that makes LIMS a flexible and reliable information management system. The pilot scale LIMS currently contains all the forms for three major construction materials (concrete, soil, and asphalt concrete) plus the closeout forms required by FHWA.

All of the required forms for the purpose of closeout have been incorporated into the LIMS System. This feature will help users to process closeouts of projects effectively and efficiently. Figure 5 shows a close out form (Form LB96) that is used to prepare a computer generated closeout letter sent to FHWA. Figure 6 shows an Exceptions of Failures Report which is attached to the close out letter to FHWA.

Close Out Forms | Exceptions Failures | Print Version

LB-96

James Weinstein  
COMMISSIONER

Federal Highway Administrator  
840 Bear Tavern Road  
Suite 310  
West Trenton, NJ 08628

DEPARTMENT OF TRANSPORTATION  
BUREAU OF MATERIALS ENGINEERING & TESTING  
P.O. Box 607  
TRENTON, NJ 08625-0607

IN REPLY PLEASE REFER TO:

Project: Route 4 Section 2AE & Route 17 sections 2P & 3G  
FP#: STP-NH-56(145)  
County:   
Region: North Region  
Date:

This is to certify that:

The results of the tests on acceptance samples for the referenced project indicate that the materials incorporated in the construction work and the construction operations controlled by sampling and testing were in conformity with the approved plans and specifications, and that such results compare favorably with the results of the independent assurance sampling and testing.

Exceptions to the plans and specifications concerning materials are explained on the back hereof.

Chief, Bureau of Materials  
Engineering and Testing

Figure 5. LB96 Close-out Form

## EXCEPTIONS OR FAILURES

(Attachment to LB-96 Close Out Letter)

The following materials (items) failed to comply with NJDOT Plans and Specifications.  
Corrective action was taken by the Resident Engineer and /or Resident Materials Engineer

<u>Item No.</u>	<u>Lot No.</u>	<u>Description</u>	<u>Comments</u>
101	15	wall (BM)	Penalized as per Spec.
		No More Records Exist!	

**Figure 6. LB96 Exceptions or Failures Report**

### WHAT ARE THE BENIFITS OF LIMS?

LIMS can significantly reduce paper-work and provides the capability to store relevant materials data and retrieve it rapidly. It also shortens the time between project completion and final closeout as mandated by the Federal Highway Administration for federally funded projects. LIMS and its concept have a great potential to be adopted by other transportation agencies for management of materials and laboratory test data.

#### FOR MORE INFORMATION CONTACT:

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UNIVERSITY:	New Jersey Institute of Technology
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E-mail	Meegoda@NJIT.edu

A final report is available online at: <http://www.state.nj.us/transportation/refdata/research/>

If you would like a copy of the full report, please FAX the NJDOT, Bureau of Research, Technology Transfer Group at (609) 530-3722 or send an email to [Research.Bureau@dot.state.nj.us](mailto:Research.Bureau@dot.state.nj.us) and ask for:

### ***Laboratory Information Management System (LIMS)***

NJDOT Research Report No: FHWA-NJ-2004-010