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NJDOT Transportation Data User Survey

FINAL REPORT

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In cooperation with

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16. Abstract

The New Jersey Straight Line Diagrams (SLD) is the main reference for the State's centerline roadway inventory. SLD was initially designed as a planning tool, but it has become a standard information platform for many other purposes within and outside NJDOT, including engineering and maintenance. The extensive and versatile use of SLD both within and outside NJDOT requires a thoughtful approach in developing future SLD enhancements. The objective of this study, initiated by NJDOT's Bureau of Transportation Data Development (BTDD), is to ascertain the SLD user needs and provide inputs for an educated decision about future improvements of SLD. The main part of the project was to survey SLD users throughout New Jersey about their use of SLD, satisfaction with the SLD data products and tools, and ideas about system enhancements. The survey questionnaire was designed using the input from interviews with major users of SLD. The survey was conducted online using an interactive internet survey questionnaire and was available for 3 months, August to October 2009. About 240 responses were received from engineers, planners, private consultants, and freight operators. The responses were overwhelmingly positive regarding the usefulness of SLD and the quality of its data. Responses were used to formulate recommendations for future improvements. The most desirable improvements can be classified into four areas: boost the search engine, use a collaborative approach to collect and update data, introduce GIS capability, and expand the scope of data. The correlation between users' affiliation and their responses is also investigated on two main groups: NJDOT users and users outside of NJDOT.

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EXECUTIVE SUMMARY

This project was undertaken in response to Task Order 235, “NJDOT Transportation Data User Survey,” from the Bureau of Transportation Data Development (BTDD). The BTDD’s current master database, Straight Line Diagram (SLD), provides roadway information for approximately 12,000 centerline miles of Interstate, U.S., New Jersey, and County routes. Since its initiation in 1995, SLD has been through many upgrades and enhancements. As a result, SLD has become a unique and important tool for engineers, planners, policy makers, law enforcement agencies, and universities throughout the State of New Jersey on both the state and local levels. The application of this tool in multiple disciplines, from maintenance, pavement, and planning to traffic monitoring and safety, presents challenges and opportunities for future SLD enhancements. To better understand the SLD user needs and expectations in terms of the SLD’s information content and functionality, BTDD initiated this project to survey SLD users. The user survey feedback will help BTDD make educated decisions about future improvements. The survey questionnaire was designed after comprehensive interviews with NJDOT, metropolitan planning organizations (MPOs), and county staff during a 2-month period. The survey was launched online in August 2009 and continued until the end of October 2009. A total of 241 survey responses were received. The respondents included engineers, planners, and freight operators from both the public and private sectors. They represent SLD users from NJDOT, MPOs, county and municipal engineering and planning offices, police departments, and private companies in transportation planning, engineering, and operations. Although the comments and feedback were numerous and somewhat varied, the evaluation has revealed some common work fields that BTDD can use to enhance the SLD product. This information is presented as recommendations throughout this report. These recommendations on future improvements are classified in four primary areas: boost search engine, collaborate with locals, introduce GIS capability, and enhance and update data fields. Finally, the correlation between users’ affiliation and their responses was also taken into account considering two main the SLD user groups: NJDOT users and users outside of NJDOT.

BACKGROUND AND OBJECTIVES

Background

The New Jersey Department of Transportation (NJDOT) provides transportation data to many public- and private-sector entities, both internal and external. These include the NJDOT bureaus (planning, design, construction, safety, maintenance, etc.), the U.S. Department of Transportation (USDOT) and the Federal Highway Administration (FHWA), Metropolitan Planning Organizations (MPOs) (including North Jersey Transportation Planning Authority [NJTPA], South Jersey Transportation Planning Organization [SJTPO], and Delaware Valley Regional Planning Commission [DVRPC]), local governments (their planning and engineering offices), local and state police departments, consulting firms, developers, tourism offices, advertising agencies, trucking companies, and various others. Part of the BTDD's annual work program is to collect, verify, and make available much of this information on behalf of the NJDOT. This is accomplished through development, maintenance, and distribution of the roadway inventory, traffic count, and Straight Line Diagram (SLD) database components of the bureau's annual program.

The BTDD's current master database, SLD, contains 170 attributes for 38,000 miles of public roads in New Jersey. As roadways are maintained and reconstructed, follow-up inventory of these roadways is required in order to maintain the accuracy of the published information. BTDD also maintains the database file structure and provides software enhancement to the database applications to ensure compliance with the FHWA and to keep up to date with trends in the industry.

Objectives

The research objectives of this study were the following:

- Solicit feedback from public- and private-sector users of NJDOT data to better understand their needs as customers of BTDD.
- Assess the user needs for SLD and Roadway Inventory data (internal and external to NJDOT). It is necessary to examine who the customers of the data are, what data are most valuable to these users, and what improvements may be made to better present the data.
- Determine the data elements that are most essential for agencies to conduct business in New Jersey, the level of data accuracy necessary to meet NJDOT goals, and the need for scheduling periodic updates to the data and software

applications. This will enable BTDD to better allocate internal resources and optimize the plans for development and growth of NJDOT with respect to the data.

- Evaluate the suitable forms of data presentation and dissemination for different user groups. BTDD needs to empower users to convert data into their useful formats and disseminate the data in the most convenient way.
- Develop recommendations to BTDD for establishing new bureau standards, practices, and policies for managing SLD and Roadway Inventory data assets for NJDOT and external users.

INTRODUCTION

The Rutgers-CAIT and New Jersey Institute of Technology (NJIT) team responded to BTDD request for “NJDOT Transportation Data User Survey” and compiled and evaluated the SLD user needs by conducting interviews and launching an online user survey. To meet the project objectives and design the survey questionnaire efficiently, the research team held a series of meetings with the focus group of established (and frequent) SLD users from different bureaus of NJDOT, MPOs, and counties. These meetings focused on the following issues:

- What is the main use of SLD in your profession?
- Do SLD data fulfill your needs?
- How do you rate data accuracy in SLD?
- Which data fields are most used?
- Which data formats are most used?
- What is your main request for improving and enhancing the SLD data and the software capabilities?

The user responses demonstrate how SLD, as a multidisciplinary tool, serves a wide range of professions. Despite a wide range of answers to each question, common areas of interest have emerged. To an extent, the survey responses also served to confirm those common areas. These common areas are defined in this report to provide focal points for future SLD enhancements.

The outcomes of the meetings helped the research team design the survey questionnaire. The goal was to design a “to the point” questionnaire in a way that would encourage survey takers to participate. As a result, a concise, succinct, and easy-to-understand questionnaire was developed. However, additional comment boxes were provided for almost all questions for users who wanted to elaborate more on their answers and to share their ideas. Several drafts of questionnaires were designed. After BTDD approval, the survey was launched in August 2009 and continued till the end of October 2009.

This report first evaluates responses to each question and presents recommendations for improvements to SLD. Then, it describes how all recommendations obtained in focus group meetings and the survey were classified into four main categories. Finally, it prioritizes the recommendations based upon survey participants’ characteristics, meeting findings, and users’ requested enhancements.

SUMMARY OF WORK PERFORMED

As previously discussed, several meetings with frequent SLD users in various bureaus of NJDOT, MPOs, and counties were held to help the research team design the survey questionnaire. The feedback obtained in these meetings was used primarily to identify the areas of inquiry that the survey should focus on, as well as types of questions that a typical SLD user should be asked. After several drafts and refinements, the final questionnaire was a combination of binary and multiple-choice questions, with comment spaces where responders could elaborate on their answers. The final questionnaire is shown in Appendix A.

The survey website was hosted at NJIT and advertised on the NJDOT's Internet and intranet homepages. Posters announcing the survey and inviting users to take part were also displayed in NJDOT Main Office Building (MOB) and Engineering and Operations (E&O) lobbies. Postcards were also mailed with the 2009 SLD CD-ROMs to inform users about the survey and invite them to participate. In addition, emails with the survey announcement and invitation were sent to staff members of NJDOT, MPOs, counties, and private companies that use SLD. A total of 241 users responded to the online survey. This report presents the evaluation of responses for each question, along with the recommendations made by the research team. The report also presents its approach to how BTDD can classify the recommendations, which should help BTDD in developing the most effective plan for future SLD enhancements.

QUESTIONNAIRE EVALUATIONS

Question 1

Findings

Question 1: What do you use the SLD for? (Check all that apply)

- ❑ Look up specific information (e.g., traffic volumes, signs, traffic signals, number of lanes, guiderail, railroad, waterways)
- ❑ Identify a location on a roadway.
- ❑ Manipulate data and integrate it with other NJDOT Transportation Management Systems (e.g., bridge, congestion, pavement, drainage, or safety databases)
- ❑ Other/Please comment

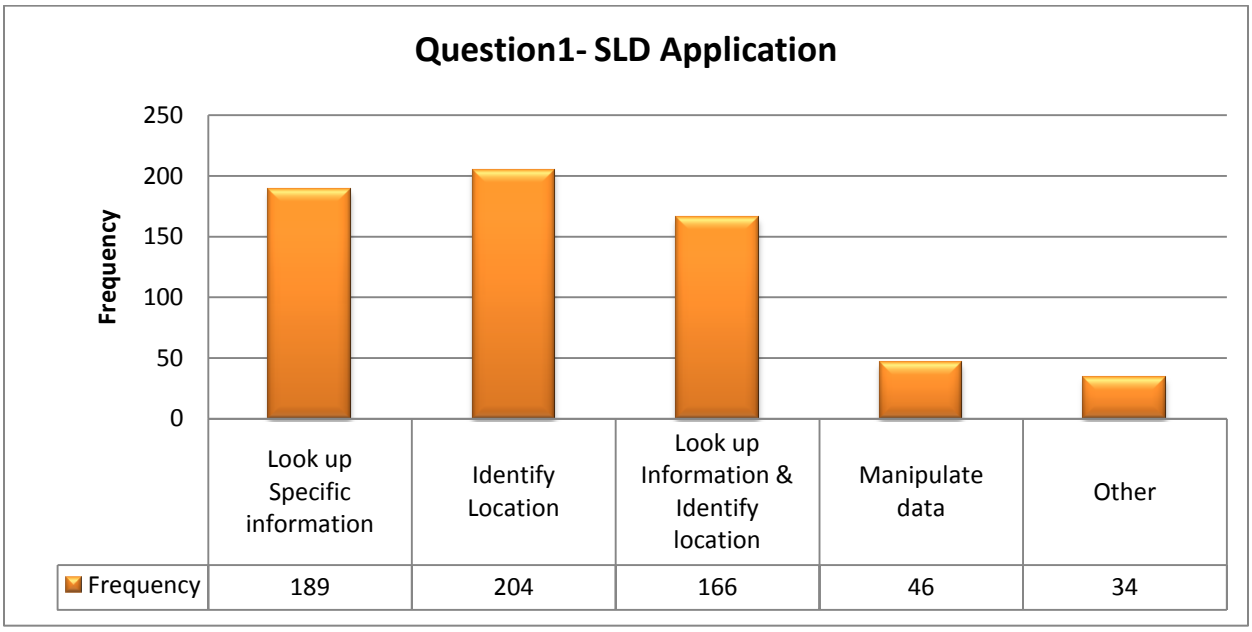


Figure 1: SLD Application Responses (Question 1)

Figure 1 shows the types applications for which SLD is used. The figure shows that SLD is mostly used to "identify a location" on a roadway (204 positive respondents out of 241) followed closely by "look up specific information" such as traffic volumes (189 positive respondents out of 241). These two options were also reported as the most frequently used features of SLD by interviewees at the meetings. The survey respondents left 39 comments. The majority of these comments (11 out of 39) dealt with using SLD for examining jurisdiction and right of way (ROW). The BTDD staff confirmed

that the jurisdiction and ROW declaration, along with the roadway's location identification, are among the most requested data by users. Interviews and the survey questionnaire also confirmed that many users desire historical information and inventory data. In fact, 3 out of the 39 survey comments included a request for such data. Interviewed and surveyed users also requested having such data in PDF.

Other comments that can be categorized under "look up specific information" focused on roadway traffic control information, including speed, traffic volume (6 out of 39 comments), location of bridges (3 out of 39 comments), location of electrical facility (2 out of 39 comments), and roadway physical information such as median and direction (2 out of 39 comments).

Recommendations

It is recommended that BTDD concentrate more effort on working with local authorities (municipalities and counties) to keep the information for local and county roadways in SLD accurate and up to date. In meetings and in survey responses, users noted that the roadway jurisdiction defined in SLD is inconsistent with the "ground truth" that is often recorded in local roadway databases and files. Eliminating this discrepancy can lessen the burden of the BTDD staff, who frequently receive questions from users regarding this issue.

In addition, participants expressed that the previous version of SLD contained inventory data that was removed from the new SLD PDF version. The reestablishment of this field in the SLD PDF version would provide a quick and easy "fix" and demonstrate an immediate response by BTDD to surveyed user needs.

Lesson learned: Define and present data fields used frequently.

Question 2

Findings

Question 2: What format of SLD do you use most often? (Check one)

- ❍ PDF Format (online or on CD-ROM)
- ❍ MS Access/other database format
- ❍ Printed paper copy

Please provide additional comments

If "MS Access/other database" is selected; **Are the data standards or business practices implemented in other databases or MIS that you use incompatible with the SLD?**

(e.g., network segmentation, continuity of SRI and milepost data along the road centerlines, referencing of local and express roadways, street naming conventions, etc.)

- ❍ Yes
- ❍ No

If "Yes"; **Please explain:**

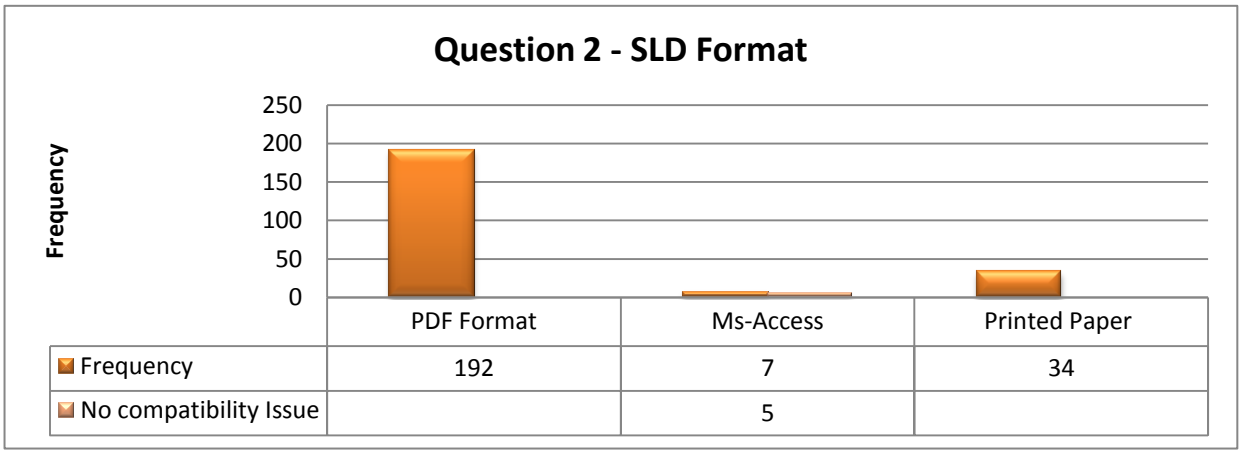


Figure 2: SLD Format Responses (Question 2)

Figure 2 shows the formats in which SLD is most used. Almost 80% of users use the PDF version (192 out of 241 respondents). The second preference is printed copy (34 out of 241 respondents). The printed copy preference was underscored by 12 of the 27 users who left comments in the comment box of this question. The use of printed copy of SLD was mentioned in the interviews, as well. Different bureaus of NJDOT (e.g., Structural, Drainage, Safety, etc.) prefer the printed copy because they consider it easy to use. The printed copy could also be used as a quick reference in the field. One

comment was raised regarding inaccurate address-reference of centerlines of SLD as compared to correct information in county's databases.

Recommendations

The question itself actually educated some of the surveyed users that SLD is also available in a database format. The comments revealed that some NJDOT staff were not aware of the SLD database version. Some of the users expressed interest in using this format in the future. However, they were not aware that they needed specific authorization to access the database. It is recommended that BTDD provide a few training sessions for frequent users of SLD at NJDOT and inform the users through the NJDOT Internet or intranet website about SLD capabilities and recent updates. Such a training session should be offered at regular intervals. Although this approach may increase BTDD workload, it may provide a more dynamic information exchange with frequent users of SLD, and this exchange may ultimately help BTDD update SLD information in local and county levels.

Lesson learned: Provide a responsive process to inform users on all SLD capabilities, and present them with all SLD functionalities.

Question 3

Findings

Question 3: Have you ever encountered a data accuracy problem with the SLD data (e.g., an error or data discrepancy between the observed field data and data recorded in the SLD)?

❍ Yes

❍ No

If "Yes" **,Please describe the problem(s).**

a. Do you report the data problems to NJDOT Bureau of Transportation Data Development?

❍ Yes

❍ No

If "Yes";

b. How do you report the data problems to NJDOT Bureau of Transportation Data Development? (Check all that apply)

❑ Make a phone call

❑ Send an email

❑ Fill out the online form

❑ Other - Please explain

If "No";

c. Would you report data problems if a user-friendly reporting tool was available within the application?

❍ Yes

❍ No

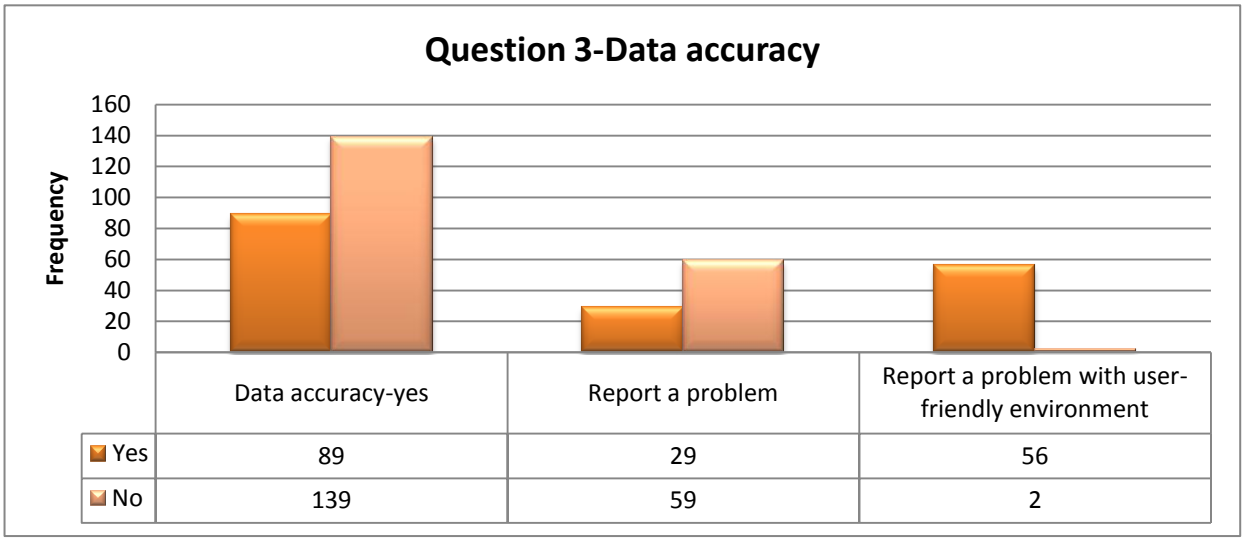


Figure 3: SLD Data Accuracy (Question 3)

Figure 3 shows the distribution of potential data accuracy problems. The figure shows that the majority of the survey participants (approximately 58%, or 139 out of 241) do not believe that there is problem with data accuracy. However, about 37% of surveyed users (89 out of 241) indicated concerns about the SLD data accuracy, and a significant number of those with concerns (29 out of 89) reported their concerns to BTDD. In addition, for the 76 users who provided comments during the survey concerning data accuracy, the most problematic issues identified were as follows:

- Traffic Signal Locations—the signals are not located correctly or are mislabeled (13 out of 76 comments),
- Street Names—the names are labeled incorrectly (23 out of 76 comments),
- Speed limit—the speed limit is incorrect (12 out of 76 comments),
- Incorrect bridge locations (5 out of 76 comments),
- Inaccurate milepost for railroads, intersections, etc. (7 out of 76 comments),
- Incorrect municipality border (6 out of 76 comments), and
- Incorrect intersection leg name (2 out of 76 comments).

In the second part of the question, reporting a problem to BTDD, 59 out of 88 people who had data accuracy issues did not report a problem. Out of 29 participants who reported a problem, 7 participants informed BTDD by phone; 11 of them sent an email; and 9 filled out the online form. It was observed from both the survey responses and the interviews that not many users were aware of the existence of the online form. Another way of reporting data errors or inaccuracies observed commonly by NJDOT employees is reporting to the BTDD staff in person.

All participants who chose the “No” option in the first part of question (are you reporting a problem?) were willing to report the problem if a user-friendly procedure were available.

Recommendations

One participant from a county believes that NJDOT isn’t interested in working on county road accuracy. This belief was also recorded during the interviews with the MPOs and county personnel. Considering this perception, it is recommended that BTDD maintain regular communication and exchange of information and data with county and local authorities. It is also recommended that this be done periodically in established timeframes (e.g., on a quarterly or semi-annual basis) so that the users know when to expect the updated product. Finally, the frequency and protocol for updating the SLD

need to be determined and publicized. If this is done correctly, then the SLD product will become a standard for the local-level data. The local users will understand that the BTDD, through SLD, strives to meet their data needs. One NJDOT staff member who is a frequent user of SLD provided a list of requests related to this question. The list is provided in Appendix B.

Lesson learned: Establish a user-friendly, interactive tool to report problems. This can be a tool within the SLD application, in addition to the already existing online form.

Question 4

Findings

Question 4: Please rate how well the data quality is addressed in the SLD (e.g., the correction of erroneous data or the addition of missing data).

- ❍ Poorly
- ❍ Somewhat Satisfactory
- ❍ Satisfactory
- ❍ Exceptionally

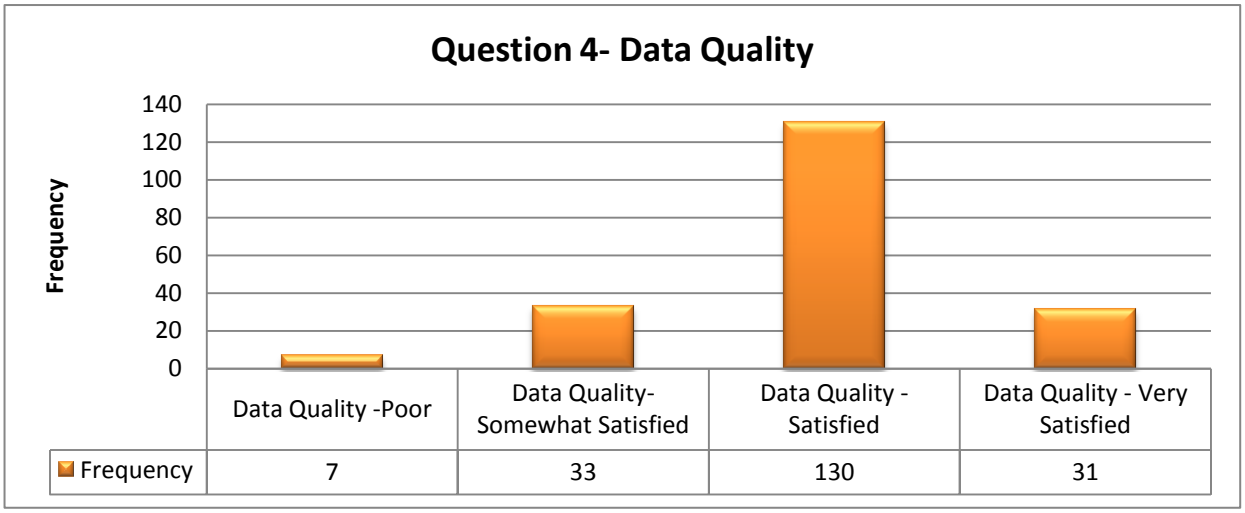


Figure 4: SLD Data Quality (Question 4)

Figure 4 shows the distribution of survey respondents' answers regarding the data quality. The figure shows that 67% of the participants ([130 + 31]/241) expressed their satisfaction with the SLD data quality. The comments revealed that some users were frustrated because their requests for data corrections were not acted upon, or at least there was a perceived unresponsiveness because there was a lack of corrective notification provided. Furthermore, some of the participants who complained that their comments were never reflected in SLD (3 out of 31) lost confidence and stopped reporting problems to BTDD.

Recommendations

It is recommended that BTDD announce to the user committee that the SLD product is updated annually. This will alleviate the problem of some users believing that SLD is updated periodically throughout the year, a misconception due mainly to the fact that SLD is available online and current culture expects online versions to be updated more frequently. This clarification is essential for some users who report problems.

It is recommended that SLD show the year in which each field is updated. This will allow users to determine how much they can rely on timeliness and accuracy of data.

Lesson learned: Provide a feedback mechanism that acknowledges a receipt of users' comments, as well as inform users when comments are taken into consideration and acted upon (corrected or not).

Question 5

Findings

Question 5: Do you have a need to run your own queries with the SLD database files?

❍ Yes

❍ No

Please provide additional comments;

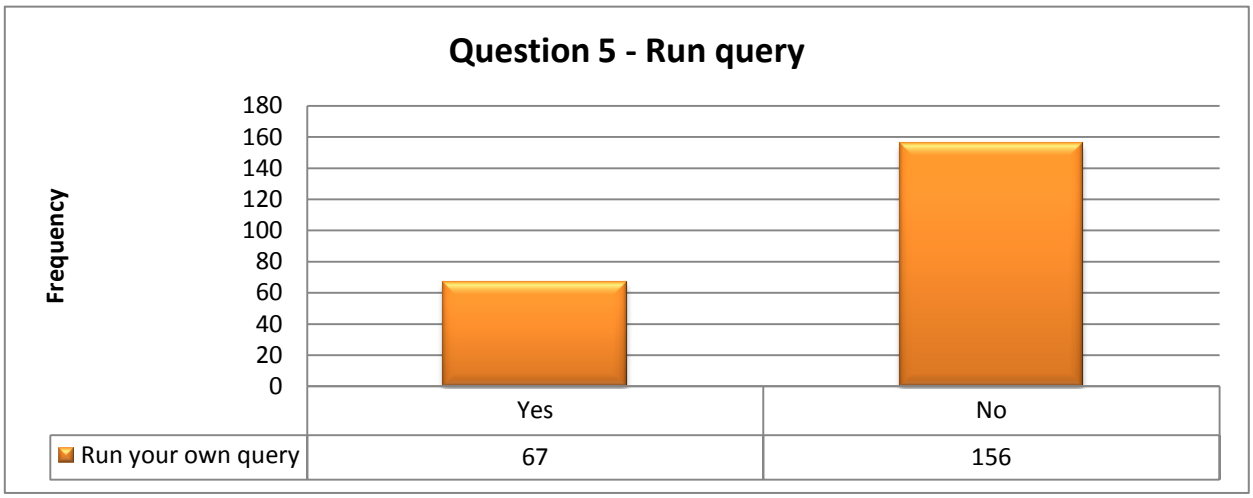


Figure 5: Run your own query (Question 5)

Figure 5 shows the survey respondents' answers regarding the need for customizing the search by users running their own queries. The results show that approximately 65% of surveyed users (156 out of 241) have no need to run a specific query. However, since most participants do not have access to the SLD database, the prevalence of the "no" response was to be expected. Deriving from the comments left by those respondents who indicated that they wished to run a query (the "yes" box), some participants were referring to the SLD PDF version query by mistake. From 25 comments posted on this question, eight participants asked for more clarification.

Recommendations

A review of 25 comments revealed that the question may not have been well formulated or that the participants did not know that running customized queries was possible.

Question 6

Findings

Question 6: Do you find that SLD meets your current needs? (Check Yes or No)

❍ Yes

❍ No

Please define what other data you would like to see in the SLD database:

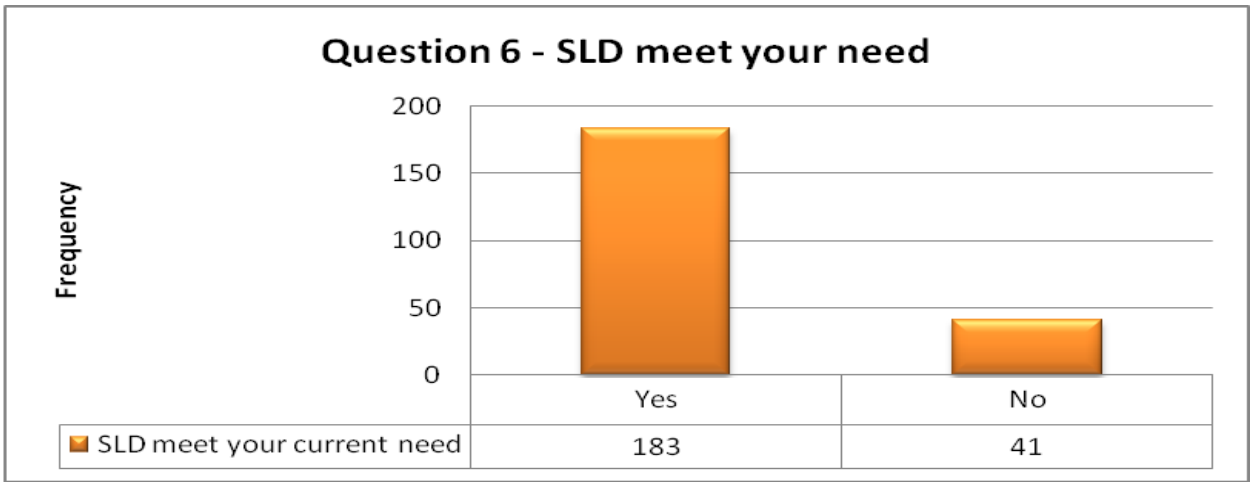


Figure 6: SLD meet your needs (Question 6)

Figure 6 shows the survey participants' response as to whether their current needs and expectations are met with the SLD project. An overwhelming number of participants (183 out of 241) indicated that the SLD product satisfies their needs, and 41 indicated that it does not meet their needs.

Out of the 41 participants who stated that SLD does not meet their needs, 36 provided the following clarifications as to what they would like that SLD does not currently provide:

- Information on the most recent construction and maintenance projects and when the route name changed (4 out of 36),
- ROW information (4 out of 36),
- Access to the SLD database (4 out of 36),
- Information on terrain type of roadway (2 out of 36),
- Sidewalk information (2 out of 36), and

- Updated traffic count data with more visibility (2 out of 36).

One respondent also commented that the zoom command ought to stay on the user-defined scale and not change to the default scale each time the user flips the page.

Note that some of these comments have already been encountered in Question 1.

Recommendations

It is impressive that 76% of participants express satisfaction with the SLD product, largely attributed to the efforts of the BTDD staff. Nevertheless, 24 out of 41 participants (59%) who indicated their affiliations when completing the survey (the survey allowed for anonymous responses) and expressed their dissatisfactions are among local agencies, private consultants, and academia. This statistic shows that BTDD needs to focus more on the needs of SLD users outside of NJDOT in order to improve the overall level of user satisfaction.

Lesson learned: Establish an inclusive relationship with SLD users within and outside of NJDOT.

Question 7

Findings

Question 7: Are you satisfied with the layout/design of the PDF pages?

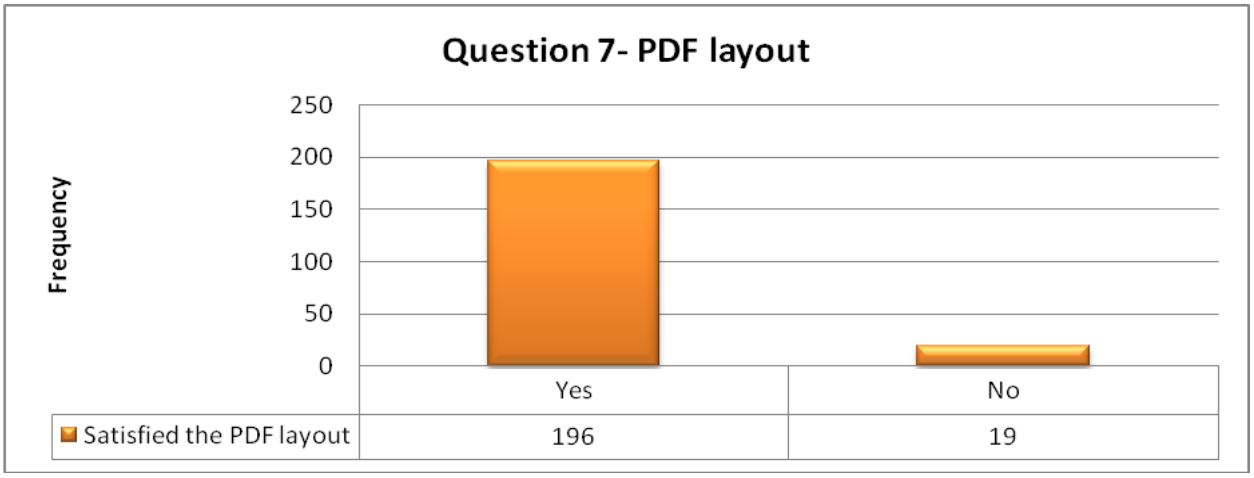
- ❍ Yes
- ❍ No
- ❍ I do not use PDF version of SLD

a. How satisfied are you with the hyperlinks provided to navigate between the pages of the SLD PDF application?

- ❍ Poorly
- ❍ Somewhat Satisfactory
- ❍ Satisfactory
- ❍ Exceptionally

If "No";

What kind of user interface improvements in the SLD software application(s) would you like to see?



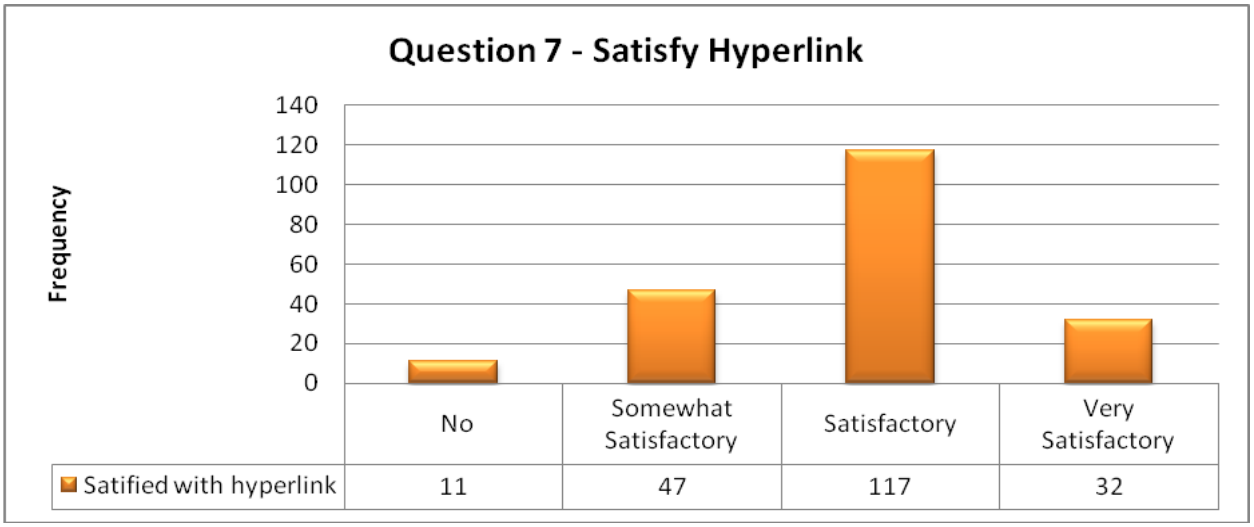


Figure 7: Satisfaction with PDF layout and the hyperlink (Question 7)

Figure 7 shows the satisfaction of the surveyed users with the layout of the SLD PDF application and the hyperlinks provided in the PDF for easier navigation. The figure shows that 81% of participants (196 out of 241) are satisfied with the SLD PDF format layout, and 62% ([117 + 32]/241) are pleased with new hyperlinks providing navigation between routes.

There were a total of eight comments. Three comments suggested that SLD be developed in a GIS environment. This means that it should be compatible with NJDOT GIS systems. One comment requested that the hyperlink feature be expanded to include the 600 series routes.

Recommendations

The survey results confirm the findings from the focus group meetings with the smaller sample of SLD users. The development of SLD in a GIS environment was requested in several meetings held with NJDOT, MPOs, and county planners and engineers. BTDD did consider developing this feature in the past; however, the development of the GIS version did not take place. The survey results indicate that it is prudent to reexamine this decision.

Lesson learned: Enhance the SLD PDF format and develop SLD in a GIS environment considering users' requirements.

Question 8

Findings

Question 8: NJDOT Bureau of Transportation Data Development produces and distributes the SLD CD-ROM every year. Do you find the SLD CD-ROM useful?

- ○ Yes
- ○ No
- ○ I do not receive the SLD CD-ROM

If "No" then show:

Please tell us why not:

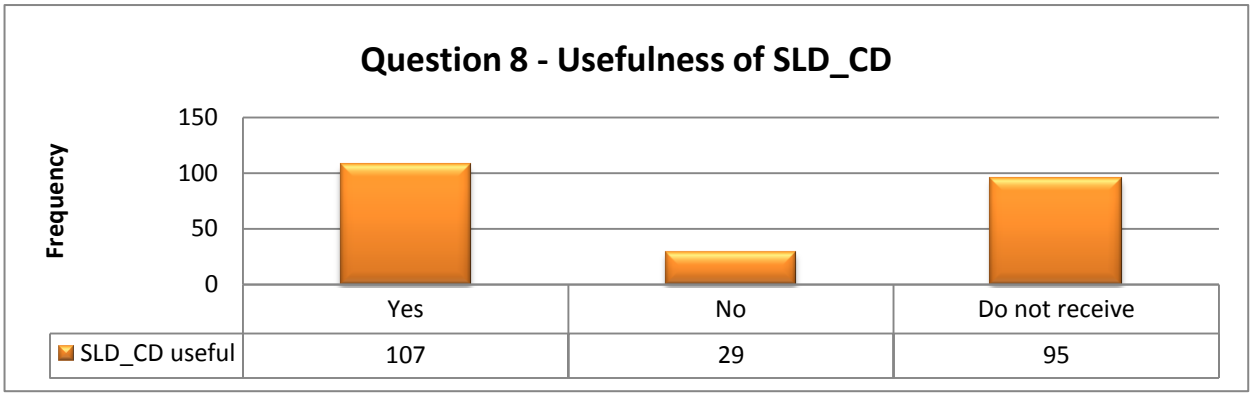


Figure 8: The effectiveness of the SLD CD (Question 8)

Figure 8 shows the users' assessment of the SLD CD-ROM's usefulness. The figure shows that approximately 44% of the surveyed users (107 out of 241) believe that the distribution of the SLD CD is useful. This is a strong showing if we take into account that almost 40% of the participants indicated that they had not received the SLD CD. Some of the users install the SLD application on their desktops to make use of some features that are not available online. Additionally, the application runs faster if it is installed on a computer's hard drive.

Also, 12% of the participants (29 out of 241) who indicated that having the SLD CD was not helpful expressed their interest in an online version of SLD (24 out of 29).

Of the 23 comments for this question, the majority stated that an online version of SLD is easy to use and easy to access. Also, there is a mistaken belief that SLD online is updated regularly, not annually. It is recommended that BTDD clarifies this as soon as possible.

Recommendations

The current procedure for updating the list of the SLD CD recipients strongly needs to be reviewed and revised, so that all interested users receive the CD in a timely manner. The survey comment that the CD isn't distributed efficiently needs to be addressed.

Lesson learned: Reexamine the list of the SLD CD recipients and the procedure for the SLD CD distribution.

Question 9

Findings

Question 9: Do you use any of the following applications?

- ❑ Video Log
- ❑ Photo Book
- ❑ SLD Query Builder

Please comment on your use/satisfaction/suggestions/ideas related to any (or all) of the above products

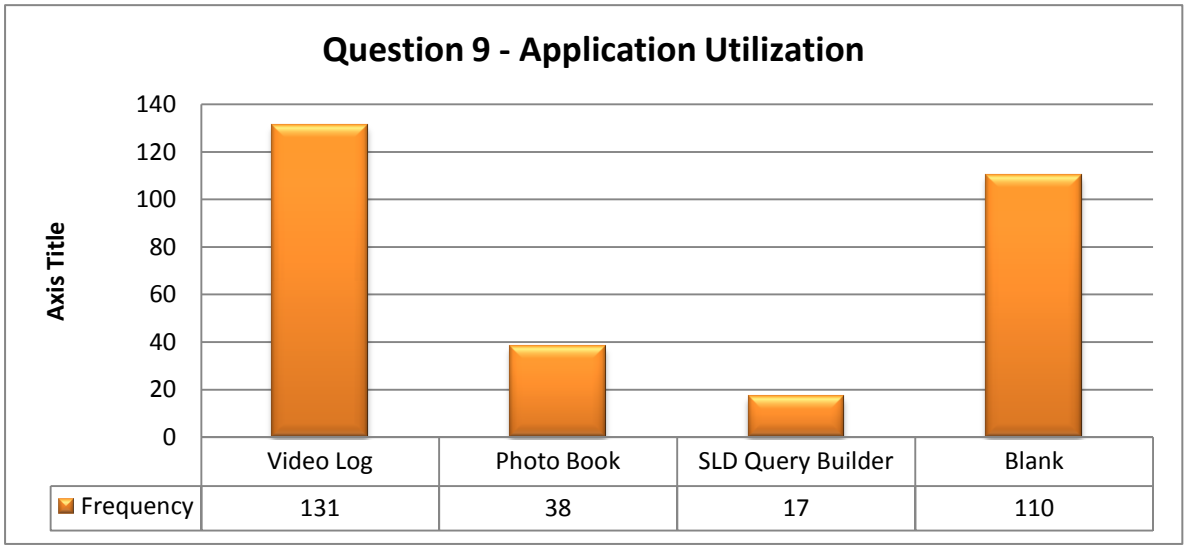


Figure 9: Use of other applications (Question 9)

Figure 9 shows the acceptance of other means of distributing the SLD data. Many respondents (131 out of 241) used the video log. Based on the respondents' comments, many participants (12 out of 52 comments) found the video log most useful when it is updated often.

However, a considerable number of participants (110 out of 241) have not had any access to these applications. Of the 52 comments left on this question, 21 indicated that they are not familiar with these applications or that they do not have the privileges to use them. Video log, for example, is only available to users within NJDOT through the NJDOT intranet.

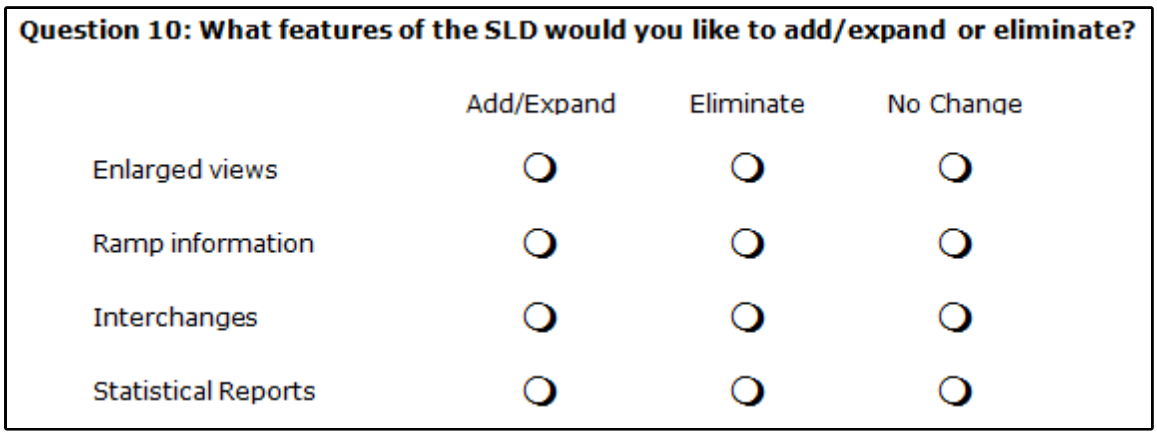
Recommendations

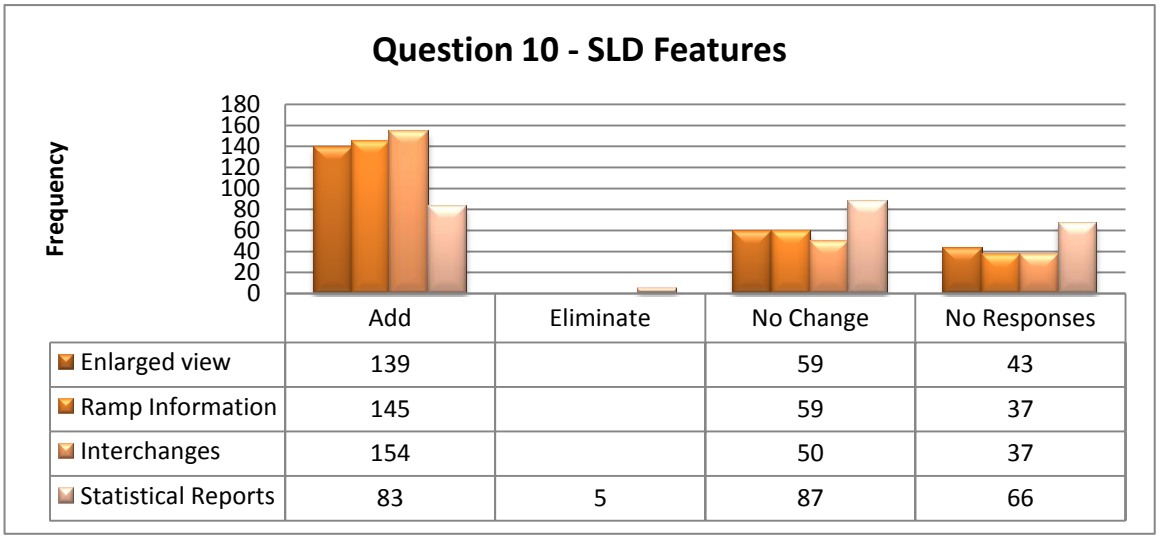
Since most participants in the survey and in the focus group meetings expressed their satisfaction with, and the usefulness of, the video log, it is recommended to link the video log to the SLD online application (or even CD-ROM application if possible) and update both routinely. If this recommendation is not practical for every route, it is suggested to limit this capability to key points such as intersections, interchanges, and railroad crossings.

Lesson learned: Establish a connection between other applications used for obtaining the information and SLD.

Question 10

Findings





	Add	Eliminate	No Change	No Responses
Enlarged view	139		59	43
Ramp Information	145		59	37
Interchanges	154		50	37
Statistical Reports	83	5	87	66

Figure 10: SLD features (Question 10)

Figure 10 shows the distribution of responses regarding the need to add, modify, or eliminate certain features of the SLD application. About 58% of participants (139 out of 241) wanted to see added/expanded enlarged views, 60% (145 out of 241) wanted to see added/expanded ramp information, and 64% (154 out of 241) wanted to see added/expanded interchange information. The recommendation to add/expand statistical reports received relatively less support (35%, or 84 out of 241).

Thirty-three comments were left in the comment box dedicated to this question. The comments related to updating the annual average daily traffic (AADT) and providing information on ROW, sidewalk, and jurisdiction boundary. Some of these comments reiterated responses to previous questions.

Recommendations

The survey results and the user interviews indicate much interest in having SLD include more details about intersections, ramps, and interchanges, such as the number of intersection legs, ramp exit numbers, and the number of dedicated left or right lanes at intersections in each direction. BTDD should assemble such data and make them available in future versions of the SLD product.

Lesson learned: Expand data fields to include more operational level and traffic engineering details.

Question 11

Findings

Question 11: Which of the following enhancements to the SLD do you wish to see?

- ❑ Direct access to SLD database via Internet
- ❑ Ability to download SLD data in MS Excel/MS Access or other Database format
- ❑ Customizable data views in the PDF application's user interface
- ❑ A GIS interface
- ❑ Additional data fields (e.g., number of legs at intersection, truck route classification, number of lanes on ramps, local road name) - Please describe:
- ❑ Modification or removal of existing data fields - Please describe:
- ❑ Standardization and unification of the data referencing and formatting between SLD and other databases/ transportation management systems maintained by NJDOT
- ❑ Other enhancements - Please describe:

Figure 11: SLD Enhancements (Question 11)

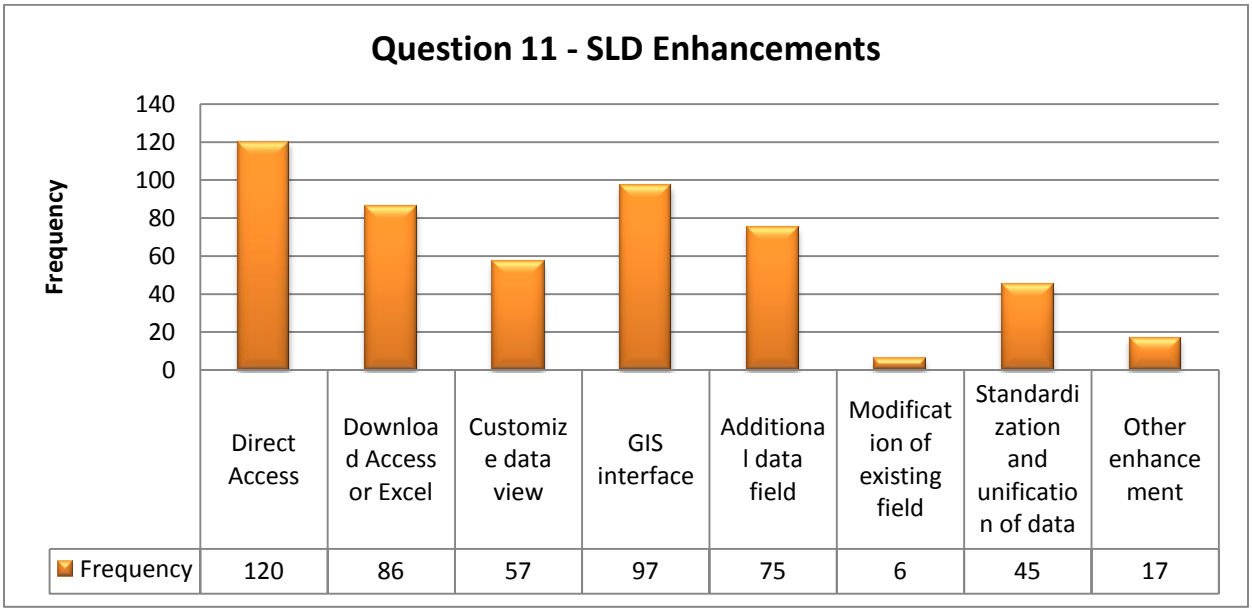


Figure 11 shows the distribution of the survey responses related to proposed SLD enhancements. A considerable number of participants expressed interest in accessing the SLD database via the Internet (120 out of 241, or 50%), followed closely by developing a GIS interface for the SLD application (97 out of 241, or 40%). Surveyed users also presented their interest in downloading the SLD Access/Excel database (86 out of 241, or 36%).

Fifty-seven comments were left in the comment box. They mostly concentrated on introducing additional data fields in SLD. In addition to the fields mentioned in the previous questions— such as sidewalk information, bridge number, updated traffic count, local road names, and ROW—users identified the following data fields as desired additions to the SLD dataset:

- Interchange and ramp information, such as number of lanes, AADT, ramp name, and traffic signal off ramps (11 out of 57 comments);
- Intersection data, such as number of legs and lane configuration at intersections (6 out of 57 comments); and
- Truck data, such as weigh-in-motion (WIM) station location and counts, average annual daily truck traffic (AADTT), and truck route classification or prohibition (6 out of 57 comments).

Other comments on data maintenance suggested the following:

- Adding landmarks and
- Adding AADT for each direction.

A comment was left regarding the compatibility of the Internet version of SLD with Apple Safari web browser. More SLD enhancements were proposed by one NJDOT staff member in the Bureau of System Planning, and these proposed enhancements are provided in Appendix B.

Recommendations

Based on the feedback from surveyed users, as well as users interviewed in focus group meetings, the research team recommends posting SLD in database format via the SLD website. BTDD already provides this service (access to the SLD database) to NJDOT staff and to consultants who provide services to NJDOT. The extension of this service (or capability) to the public will address many users' suggestions and eliminate the need for BTDD to provide the dataset on a case-by-case basis.

Although the previous BTDD attempt to develop a GIS interface for SLD was unsuccessful because of various difficulties, the research team strongly recommends reviving this effort. Most transportation planning and analysis tools that were developed recently have GIS capabilities; therefore, it will be beneficial for SLD users if they can integrate SLD with other tools they are using.

Lesson learned: Enhance SLD capabilities by providing a GIS interface and database accessibility via the Internet.

Question 12

Findings

Question 12: Please share any other ideas or suggestions you may have for improving the SLD application. We are very interested in hearing your thoughts on how we can make the SLD best serve your needs.

Forty-one comments were left in the comment box for this question. Most of them reiterate or expand upon comments left in previous questions. New suggestions include the following:

- Obtain seasonal traffic volumes, particularly for shore points.
- Establish an inclusive standard for naming streets and roads and for determining attributes of a road that merges two or more routes (e.g., US Routes 1 & 9). This issue was also identified during an interview with NJDOT's Bureau of Freight Services, with an example of a route defined as a truck route that shares a roadway with another route with truck restrictions. The issue to be resolved is, what are the correct attributes for the shared stretch of road?
- Navigate SLD not only by route number, but also with geographic map.

SUMMARY OF RECOMMENDATIONS

The proposed recommendations are classified into four categories:

- Boost the search engine,
- Collaborate with local authorities,
- Develop GIS capabilities, and
- Enhance and update data fields.

This classification can assist BTDD with selecting the most practical approach in meeting users' needs in the short and long term. Some enhancements, such as developing GIS capability in SLD, will require extra time and budget, while others can be addressed more promptly by establishing public access to the SLD database. The four categories are addressed in turn.

Boost Search Engine

SLD is mostly used to identify locations and obtain new information. Therefore, any improvement in the search tool, allowing users to quickly locate the information they are looking for, is a priority. The following recommendations are made to improve the search capability:

- Search by route number, name, and selection on the map.
- Provide a more user-friendly search tool.
- Provide comprehensive navigation linkages (e.g., hyperlinks) between routes.

Collaborate with Local Authorities

Throughout the study, one of the most frequent comments dealt with compiling local data to enhance the SLD data accuracy and scope. To accomplish this, regular dialogue and collaboration among the NJDOT, MPOs, counties, and municipalities are needed. The research team proposes establishing a working group consisting of these stakeholders to meet on a quarterly or semi-annual basis and provide NJDOT with the most accurate and up-to-date information from the local level. These meetings would not only promote data accuracy, but also address new requirements and future enhancements. The following objectives could be pursued and met during these meetings:

- Eliminate the discrepancy between the road name in SLD and the actual observed roadway name. Examples of this problem can be observed in Appendix C. These discrepancies were identified by the Delaware Valley Regional Planning Commission (DVRPC) staff.
- Eliminate the discrepancy resulting from a change in the centerline alignment. When the roadway centerline alignment changes (e.g., after building a bypass) and the mileposts are not adjusted, a discrepancy occurs. It would be beneficial to institute a process to correct mileposts. Locals can help BTDD address this issue.
- Add more data fields that are required by locals, including roadway or roadside objects, such as locations of fire hydrants and inlets.

The exchange of data can also be established as a regular process.

Develop GIS Capabilities

There is a strong interest in developing the GIS interface for SLD. This interest was observed in many comments by survey participants and in the interviews. Because most new transportation planning applications can present and evaluate geospatial data, adding this feature to SLD is almost a must. The recommendations section for Question 11 provides more evidence for this recommendation.

Enhance and Update Data Fields

Because SLD is used in many ways and has evolved over time, a few new data fields should be added. The following recommendations are derived from the interviews and the survey results:

1. Intersections/interchanges/ramps
    - Add more detailed information on major and minor roads.
    - Identify the number of legs at intersections.
    - Show the exact location of ramps and the number of lanes on the ramps.
    - Include the information about acceleration and deceleration lanes along with their length at the interchanges.
2. Freight
    - Show truck restrictions. Truck access level should be made available as a link attribute. Possible values for the truck restriction attribute are Blue

Route, New Jersey Access Network, National Network, restricted, and so forth.

- In addition to the total vehicle AADT, show the AADTT, truck volume, or classification count either as a part of SLD or as a database linked to SLD.
- Indicate the exact locations of WIM stations by the primary or secondary direction mileposts.

3. Data view and accessibility
    - Develop a customized data view in the PDF application. It is recommended that BTDD develop a user-friendly environment to access the SLD data fields and provide training to the users.
    - Establish an interactive tool for downloading and uploading the information. Users should be able to easily download data from the SLD database. Enable the custodians of information to upload the data to BTDD. The data will be evaluated by BTDD for inclusion in SLD. Provide the data custodian who uploaded the data with a feedback as to what was done with the data.
4. Data compatibility
    - Transform SLD into an enterprise database. Standardize data formats and referencing conventions between different NJDOT databases and management information systems. Firmly position and establish SLD as the cornerstone of this enterprise Management Information System (MIS), and provide dynamic links to other NJDOT databases and MIS. This would ensure that all users use and reference the data in the same way.
    - Standardize road/street names based on the E9-1-1 guidebook. This would provide consistency between SLD and local roadway databases. It would also allow integration and interaction of SLD with other MIS using common road referencing system and conventions.
    - Standardize the Standard Route Identification (SRI) and milepost referencing and segmentation. This would be very useful in streamlining data integration between SLD and other databases and MISs within and outside of NJDOT (e.g., MPO systems).
    - Provide training in using SLD. The training can be provided in person, or web-based tools can be developed.

EVALUATION OF PARTICIPANT RESPONSES WITH RESPECT TO THEIR AFFILIATION

Out of 241 participants in the survey, 111 left information about their affiliations. Sixty of them were affiliated with various bureaus within NJDOT, and the rest (51) were employed in the private sector, academia, and county and municipal governments. The response to each question was analyzed considering the affiliation of participants. For this purpose, users were classified in two main groups:

- Users within NJDOT and
- Users outside of NJDOT (i.e., non-NJDOT users).

The two groups were compared. The responses to questions 1, 2, 4, 5, 7, and 10 for the above two groups showed the same trend as that in the original statistical analysis of the same questions. The responses to the remaining questions led to some interesting findings, showing the correlation between the user needs and their affiliation. The following sections first summarize the most critical issues for both groups and then rank the recommendations according to each group's priorities.

Data Accuracy and Accessibility

There were distinctive response trends between the two user groups for data accuracy, which was the subject of Question 3. Two-thirds of NJDOT survey participants (40 out of 60, or 67%) expressed that data accuracy in SLD was not a major issue. This percentage is significantly higher than the raw aggregate response of 59% (65 out of 111). In contrast, 57% of non-NJDOT participants (29 out of 51) stated that data accuracy was an issue, and only 37% of non-NJDOT participants (19 out of 51) had no problem with data accuracy. This figure clearly indicates that non-NJDOT users encounter significantly more problems with the SLD data accuracy.

Interestingly, NJDOT users expect more from SLD than non-NJDOT users in terms of maintaining their needs, according to the Question 6 responses. In the survey, 28% of NJDOT users (17 out of 60) believed that SLD did not meet their requirements, compared to 17% (19 out of 111) of all combined participants.

In regard to other applications used as SLD auxiliary applications, 83% of NJDOT users (50 out of 60) use video log, while 80% of non-NJDOT users (41 out of 51) do not use video log, mainly because it is not available to them. Therefore, it is clear that this question mainly caters to NJDOT users simply because of video log access.

In regard to the SLD CD-ROM, 53% of NJDOT users (32 out of 60) expressed their support for having the SLD CD-ROM, while only 35% of non-NJDOT users (18 out of 51) expressed such support. Only 49% of non-NJDOT users (25 out of 51) received the SLD CD-ROM. This figure, supporting the SLD CD-ROM, is different when all participants are included in analysis (44% of the surveyed users, or 107 out of 241).

Future Enhancement (Database Access and GIS Feature)

Responses to Question 11, which concerned future enhancements, were compared between the two groups. These results were evaluated against the aggregate responses for Question 11. Sixty-two percent of non-NJDOT users (32 out of 51) stated their interest in having access to the SLD database via the Internet, which is 12% more than the findings presented in Question 11(50%). However, NJDOT users are not interested in accessing the data via the Internet.

Both groups clearly want the GIS feature. In responses to Question 11, the percentages of users in each group supporting GIS are similar to the percentage of users in the aggregate group supporting GIS (40%) (with a slightly more requests among non-NJDOT users).

Recommendation Prioritization

Any enhancement should be followed by a post-evaluation to assess the effect on the SLD data quality, accuracy, and user friendliness. In addition, BTDD should establish a mechanism for gaining user feedback at all times to provide BTDD with more knowledge for future improvements.

Based on survey findings and the cost and duration of enhancement developments, the recommendations are prioritized in the following order.

<u>Short term</u>

1. Enhance access to the SLD database: Make SLD available in a database format in addition to the SLD-PDF version. Enable users to download the database via the Internet.
2. Provide training: Develop a workshop for NJDOT staff to familiarize them with SLD. Develop a training video demonstrating the SLD system functionality. Post the video on the Internet or distribute it on CD-ROMs. Use the video to familiarize non-NJDOT users with new improvements and updates.

3. Collaborate with local government users: Establish an annual or bi-annual meeting with MPOs and counties to improve the data accuracy and expand the scope of data on the local level.
4. Customize data views: Establish a user-friendly tool to show users how to tailor viewable data fields in the PDF format.

Medium to long term

1. Implement the SLD web portal in a GIS environment: Implement SLD within a GIS environment to search and display the data in both database and GIS formats. Decide which GIS software will interface with SLD, and decide how to support this application within the NJDOT information technology environment.
2. Enhance data fields: Establish a set of periodic meetings with different bureaus of NJDOT and local government users to compile local data and provide a link to other NJDOT MIS systems.
3. Update data fields: Establish a secure protocol and system to provide flexible access to upload and download the updated data.
4. Establish compatibility with other applications: Establish links between the SLD database and the video log.
5. Enhance search capabilities: Develop an advanced tool to search the SLD data in geospatial and database format.

SUMMARY AND CONCLUSION

The NJDOT Transportation Data User Survey was initiated by the Bureau of Transportation Data Development with the objective of gaining a better understanding of SLD users' needs, interests, challenges, and ideas to improve the SLD capabilities. The survey responses will be used to direct further developments and improvements in the SLD system. Five major tasks were executed to reach the study objectives:

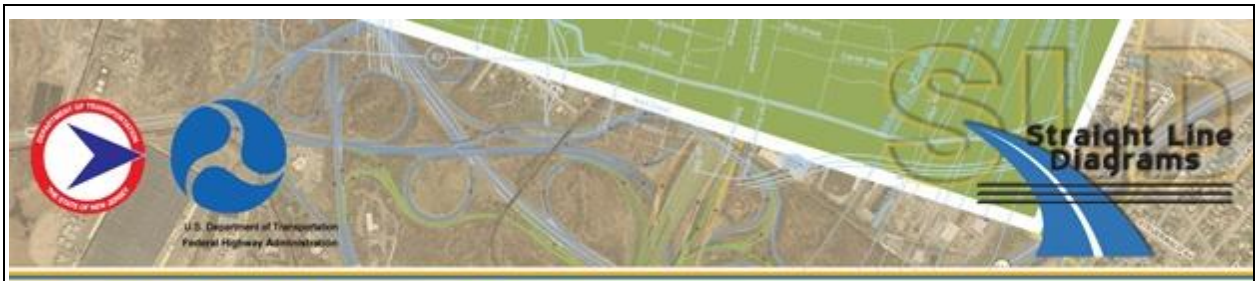
- Generate the survey participant list,
- Design the survey,
- Deploy the survey,
- Process the data, and
- Write the final report.

A series of interviews were conducted with the key users of SLD. These interviews identified the most common problems and areas of improvement. The responses helped the research team design a multiple-choice survey questionnaire. After obtaining BTDD approval, the research team launched the survey online for approximately 3 months. To inform SLD users about the survey, announcements were posted on the NJDOT website (Internet and intranet), posted in NJDOT MOB and E&O lobbies, and emailed to SLD frequent users. The most imperative work fields—including data accuracy, accessibility, availability, and user's opinion on future improvements—were evaluated. A total of 241 people filled out the survey online. Although a wide range of comments were received for each question, common areas have been identified. Most users expressed their satisfactions with the SLD data quality and accuracy. However, there is a perceived need to enhance data accuracy at the local level. While some participants were satisfied with the existing data fields, some requested data field enhancements in specific areas (e.g., ramps and intersection). The survey and interview findings also revealed that some advanced the SLD features are unfamiliar to even frequent users. Therefore, any upgrades to the SLD capabilities have to be followed by training or other suitable outreach techniques to educate users. In addition, a systematic user feedback mechanism should be developed to define and prioritize future enhancements.

Possible correlations between user responses and their affiliations were also analyzed. The analysis revealed that data accuracy is a more significant issue for non-NJDOT users than it is for users within NJDOT. In addition, users within NJDOT expect more from SLD to meet their requirements. Non-NJDOT users still identified SLD shortcomings in meeting their needs, but on a much smaller scale than NJDOT users.

Non-NJDOT users also expressed more interest in having access to the SLD database via the Internet. Both NJDOT and non-NJDOT users expressed their interest in having the SLD GIS upgrade.

APPENDIX A: SLD USER SURVEY QUESTIONNAIRE



Straight Line Diagram User Survey

Dear User of the New Jersey Straight Line Diagram (SLD):

In a continuous effort to improve the New Jersey SLD, the NJDOT Bureau of Transportation Data Development is inviting you to take part in the SLD User Survey. The survey is independently conducted by NJIT and Rutgers, The State University of New Jersey. The survey should take no more than 5 minutes to fill out. Your feedback is very important to us and will be used to identify the key improvement areas for the SLD data products and services. Your participation in the survey is greatly appreciated.

If you have any questions or would like to get more information about the survey, please contact the NJIT Research Team at dimitrijevic@njit.edu or call Mr. Branislav Dimitrijevic at 973-596-6463.

Please use the provided comment text boxes to leave any comments related to questions.

Q1: What do you use the SLD for? (Check all that apply)

- ❑ Look up specific information (e.g., traffic volumes, signs, traffic signals, number of lanes, guiderail, railroad, waterways)
- ❑ Identify a location on a roadway.
- ❑ Manipulate data and integrate it with other NJDOT Transportation Management Systems (e.g., bridge, congestion, pavement, drainage, or safety databases)
- ❑ Other/Please comment

Q2: What format of SLD do you use most often? (check one)

- ❍ PDF Format (online or on CD-ROM)
- ❍ MS Access/other database format

❍ Printed paper copy

Please provide additional comments in the textbox below:

If "MS Access/other database" is selected then show:

a. Are the data standards or business practices implemented in other databases or MIS that you use incompatible with the SLD?

(e.g., network segmentation, continuity of SRI and milepost data along the road centerlines, referencing of local and express roadways, street naming conventions, etc.)

❍ Yes

❍ No

If "Yes" is selected then show:
Please explain:

Q3: Have you ever encountered a data accuracy problem with the SLD data (e.g., an error or data discrepancy between the observed field data and data recorded in the SLD)?

❍ Yes

❍ No

If "Yes" then show:

Please describe the problem(s).

a. Do you report the data problems to NJDOT Bureau of Transportation Data Development?

❍ Yes

❍ No

If "Yes" then show:

b. How do you report the data problems to NJDOT Bureau of Transportation Data Development? (Check all that apply)

❑ Make a phone call

❑ Send an email

❑ Fill out the online form

❑ Other - Please explain

If "No" then show:

c. Would you report data problems if a user-friendly reporting tool was available within the application?

- ❍ Yes
- ❍ No

Q4: Please rate how well the data quality is addressed in the SLD (e.g., the correction of erroneous data or the addition of missing data).

- ❍ Poorly
- ❍ Somewhat Satisfactory
- ❍ Satisfactory
- ❍ Exceptionally

Q5: Do you have a need to run your own queries with the SLD database files?

- ❍ Yes
- ❍ No

Please provide additional comments in the textbox below

Q6: Do you find that SLD meets your current needs? (Check Yes or No)

- ❍ Yes
- ❍ No

Please define what other data you would like to see in the SLD database:

Q7: Are you satisfied with the layout/design of the PDF pages?

- ❍ Yes
- ❍ No
- ❍ I do not use PDF version of SLD

If "Yes" or "No" then show:

a. How satisfied are you with the hyperlinks provided to navigate between the pages of the SLD PDF application?

- ❍ Poorly
- ❍ Somewhat Satisfactory
- ❍ Satisfactory
- ❍ Exceptionally

If "No" then show:

b. What kind of user interface improvements in the SLD software application(s) would you like to see?

Q8: NJDOT Bureau of Transportation Data Development produces and distributes the SLD CD-ROM every year. Do you find the SLD CD-ROM useful?

- ❍ Yes
- ❍ No
- ❍ I do not receive the SLD CD-ROM

If "No" then show:

Please tell us why not:

If "... not receive the SLD CD-ROM" then show:

If you wish to receive the SLD CD-ROM in the future, please send an e-mail to the Bureau of Data Development and request to be added to the mailing list. Make sure to include your name and mailing address in the e-mail.

Q9: Do you use any of the following applications?

- ❑ Video Log
- ❑ Photo Book
- ❑ SLD Query Builder

Please comment on your use/satisfaction/suggestions/ideas related to any (or all) of the above products in the textbox below:

Q10: What features of the SLD would you like to add/expand or eliminate?

	Add/Expand	Eliminate	No Change
Enlarged views	❍	❍	❍

Ramp information	❍	❍	❍
Interchanges	❍	❍	❍
Statistical Reports	❍	❍	❍

Q11: Which of the following enhancements to the SLD do you wish to see?

- ❑ Direct access to SLD database via Internet
- ❑ Ability to download SLD data in MS Excel/MS Access or other Database format
- ❑ Customizable data views in the PDF application's user interface
- ❑ A GIS interface
- ❑ Additional data fields (e.g., number of legs at intersection, truck route classification, number of lanes on ramps, local road name) - Please describe in the textbox below:

- ❑ Modification or removal of existing data fields - Please describe in the textbox below:

- ❑ Standardization and unification of the data referencing and formatting between SLD and other databases/transportation management systems maintained by NJDOT
- ❑ Other enhancements - Please describe in the textbox below:

Q12: Please use the textbox below to share any other ideas or suggestions you may have for improving the SLD application. We are very interested in hearing your thoughts on how we can make the SLD best serve your needs.

If we can contact you to discuss your responses, please provide your contact information in the fields below:

Name:

Title:

Agency/Company:

Email:

Phone: (10 digits)

RUTGERS
Center for Advanced Infrastructure and Transportation

NJIT
New Jersey's Science & Technology University

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APPENDIX B: NJDOT USER'S COMMENT

Q3. Data Accuracy Problems

SLD Intersection File

Corrections are needed to identify outdated or incorrect or missing cross route numbers. Cross routes along state routes and other routes intersecting state routes should be the highest priority.

Corrections are needed to match cross routes at traffic signals where one route indicates a signalized intersection and the other route does not. Intersections involving state routes should have the highest priority. Many of these may be due to old inventory on non-state routes.

Corrections are needed where a cross route that is a county route has a suffix in its SRI and route code but that suffix is not given for the cross route on the record for the state route.

SLD Lanes and Roadway Width Files

Provide error checks to identify locations where the number of roadway width divided by the numbers of lanes is less than 10 feet. The errors are likely to occur in transition areas.

SLD Median Width and Median Type Files

Provide additional data detail for median width with variable median width such as minimum/maximum values or within specified ranges.

Provide a cross-check to identify data errors such as a median without a median width and a median width without a median. The errors are likely to occur in transition areas.

Additional Reverse Direction Roadways

Provide additional reverse direction roadways where the two directions of roadway used different streets or go through different intersections. Some such locations are as follows:

US 206, Newton, Sussex County
NJ 35, Red Bank, Monmouth County
US 40 at US 322, Hamilton Twp., Atlantic County
US 202, Morristown, Morris County
NJ 28, Plainfield, Union County
NJ 47 at NJ 347, Cumberland County

US 130 Burlington City/Township

Updated Inventory for Authority Roadways

Provide up-to-date or recent roadway inventory for the Authority Roadways (NJTPK, GSP, ACE and PIP).

Q11. SLD Enhancements

SLD Intersection File

Provide cross route SRI and MP for at least all signalized intersection state route record and records with cross routes that are state routes (rt_sym 1, 2 or 3).

Provide records for ramps off state routes with signalized intersections.

SLD Lanes and Roadway Width Files

Provide number of lanes and roadway widths in each direction on undivided roadways.

SLD Lane and Lane Configurations at Intersections

Provide the numbers of lanes and lane configurations of through and turning movements for each lane. Lane lengths should be measured to the .01 of a mile.

Traffic Count Data

Correcting Errors in Summary AADT Traffic Count Files, Databases and Web Site Postings

Verify that AADTs are consistent with individual count sheet AADTs.

For one-way roadways and for roadways where counts are taken only in one direction, verify if AADTs are one way or two way and not doubled or halved.

For dualized roadways with double sets of lanes in each direction, verify that reported counts are inner, outer, or total combined roadway and that the inner or outer roadway data are not used for the entire roadway.

Verify that traffic volumes for ramps or service roads are not used for the mainline roadway.

Verify that hourly and partial day counts are not used as AADTs for the entire roadway.

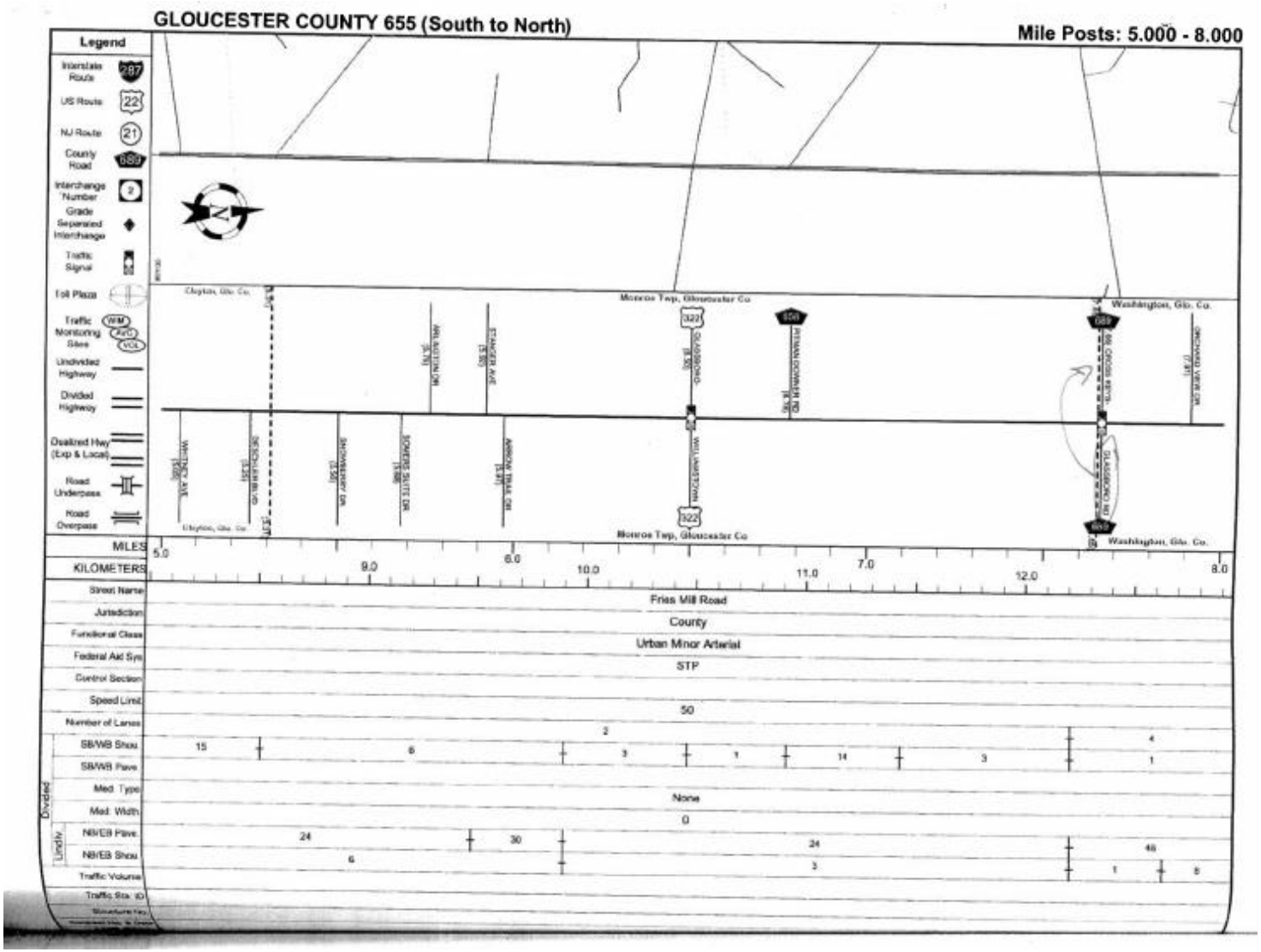
Verify that SRI and MP are typed correctly and represent proper county/municipal location.

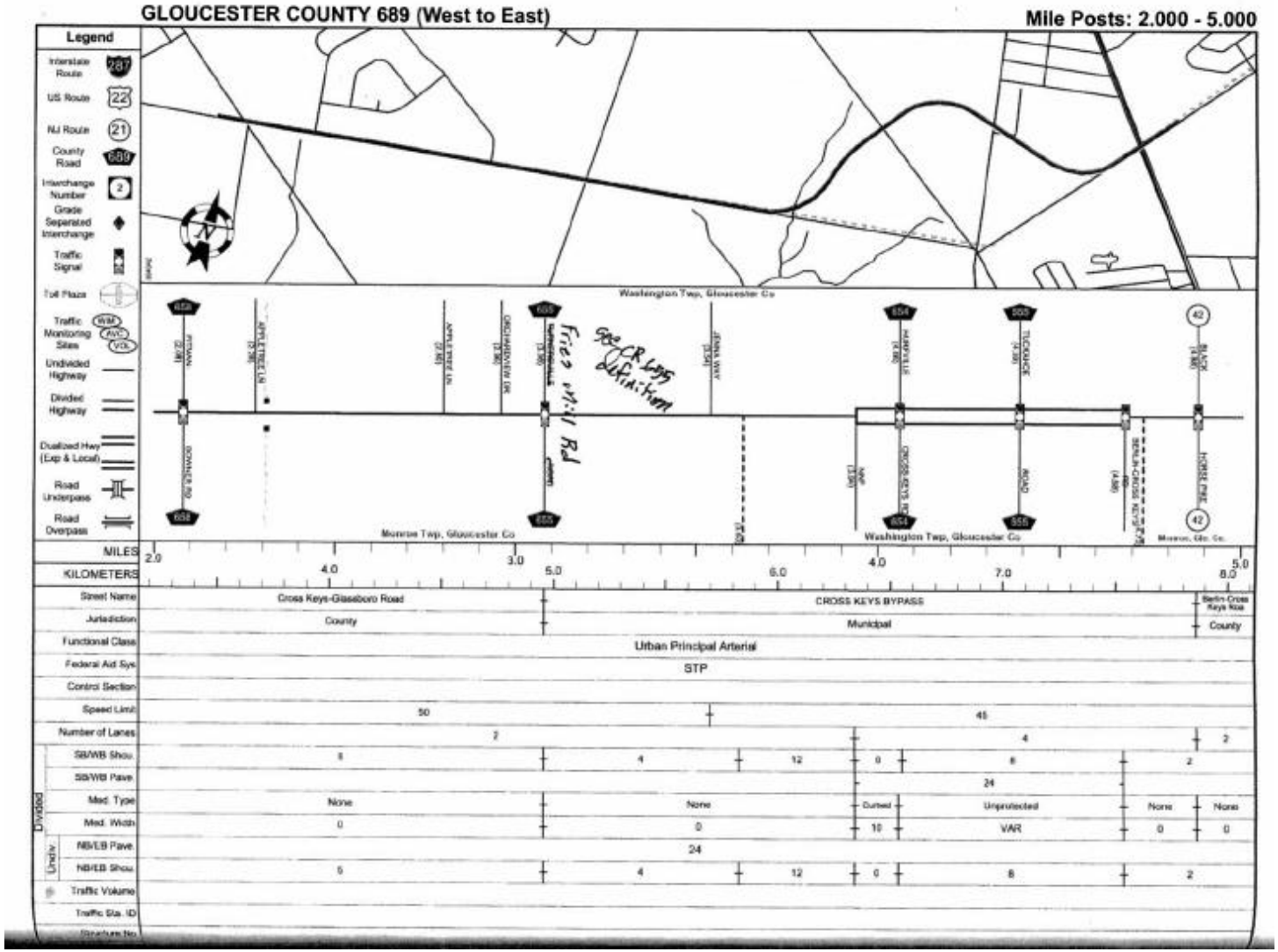
If mileposts are coded as “0” because it hasn’t been determined, and a location description is given, code count to milepost within range or provide a comments with the begin and end mileposts of the segment the count is within.

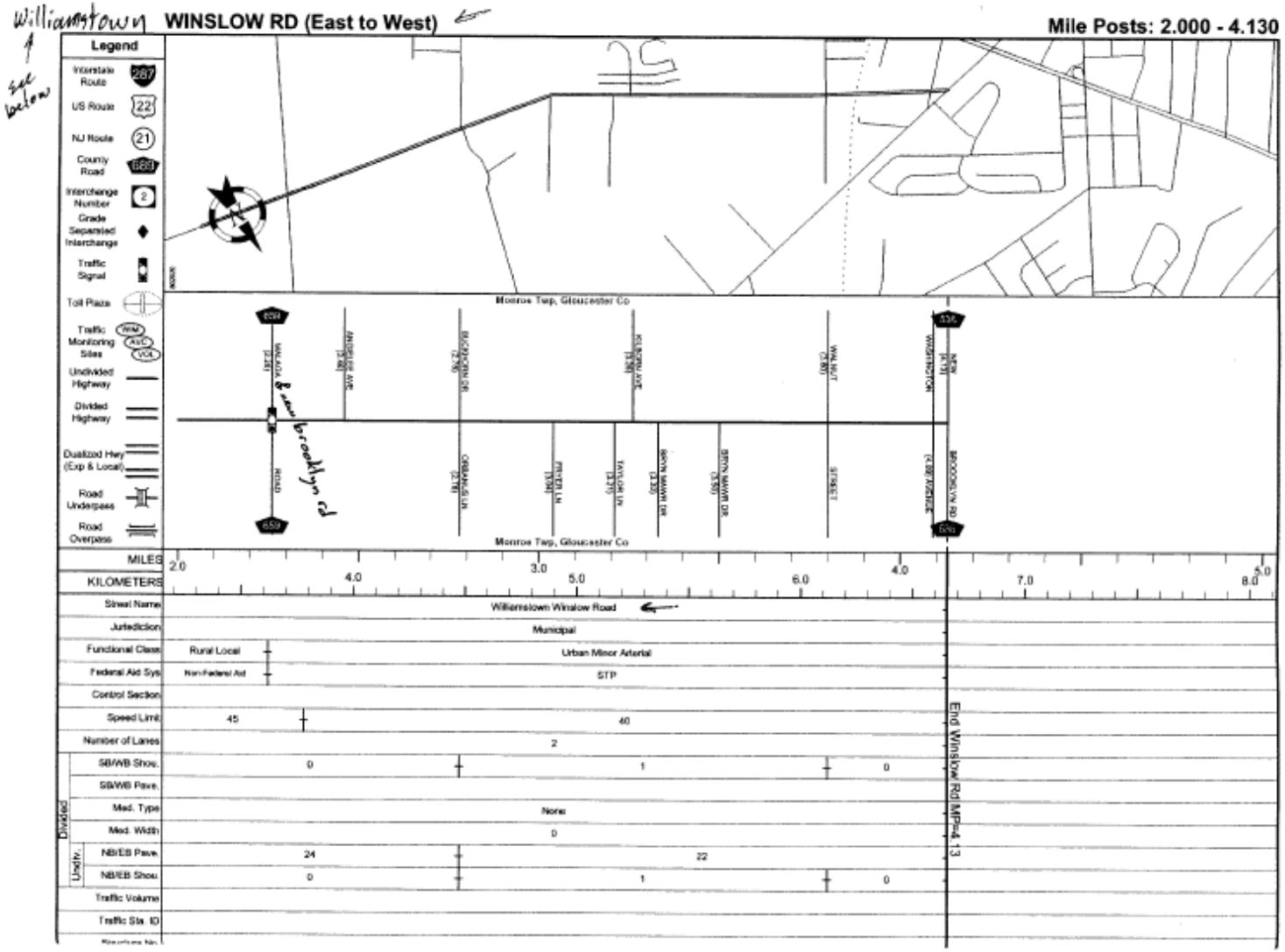
To distinguish between actual counts at the very start of the route and counts with undetermined mileposts, code actual counts at the beginning of the route at 0.01 instead of 0 and/or code undermined locations to some code or leave blank.

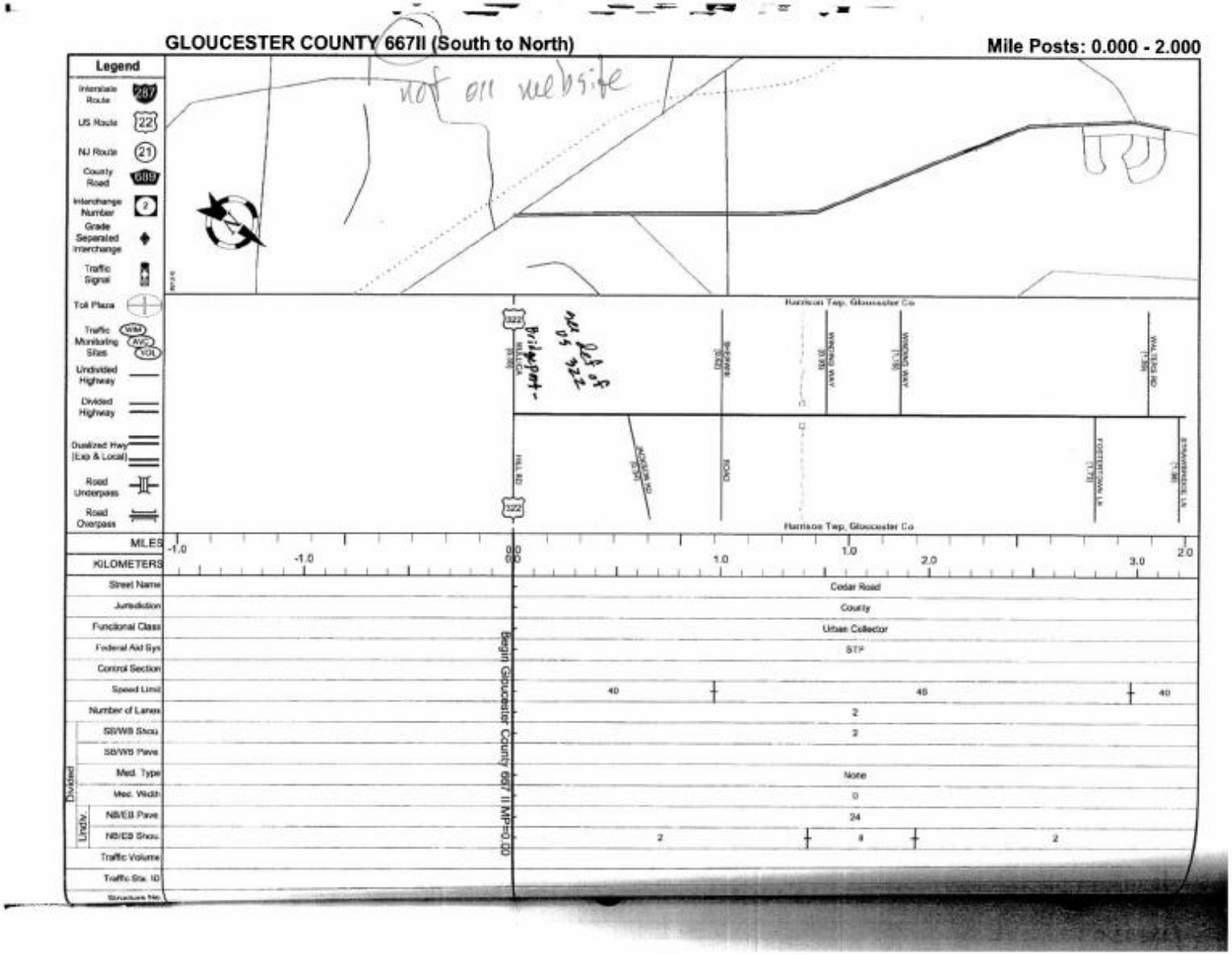
If SRIs and/or mileposts have changed on roadway, revise the SRI and milepost for count.

APPENDIX C: DVRPC NOTES




GLOUCESTER COUNTY 689 (West to East)
Mile Posts: 2.000 - 5.000
Legend
Interstate Route
US Route
NJ Route
County Road
Interchange Number
Grade Seperated Interchange
Traffic Signal
Toll Plaza
Traffic Monitoring Sites
Undivided Highway
Divided Highway
Dualized Hwy (Exp & Local)
Road Underpass
Road Overpass
Washington Twp, Gloucester Co
Monroe Twp, Gloucester Co
Washington Twp, Gloucester Co
MILES
KILOMETERS
Street Name
Jurisdiction
Functional Class
Federal Aid Sys
Control Section
Speed Limit
Number of Lanes
SB/WB Shou
SB/WB Pave
Med. Type
Med. Width
NB/EB Pave
NB/EB Shou
Traffic Volume
Traffic Sta. ID
Structure No
Divided
Undiv
Cross Keys-Glassboro Road
CROSS KEYS BYPASS
County
Municipal
Urban Principal Arterial
STP
50
45
None
Curbed
Unprotected
VAR


Williamstown
see below
WINSLOW RD (East to West)
Mile Posts: 2.000 - 4.130
Legend
Interstate Route
US Route
NJ Route
County Road
Interchange Number
Grade Separated Interchange
Traffic Signal
Toll Plaza
Traffic Monitoring Sites
Undivided Highway
Divided Highway
Dualized Hwy (Exp & Local)
Road Underpass
Road Overpass
Monroe Twp, Gloucester Co
Monroe Twp, Gloucester Co
MILES
KILOMETERS
Street Name
Jurisdiction
Functional Class
Federal Aid Sys
Control Section
Speed Limit
Number of Lanes
SB/WB Shou.
SB/WB Pave.
Med. Type
Med. Width
NB/EB Pave.
NB/EB Shou.
Traffic Volume
Traffic Sta. ID
Divided
Undiv.
Williamstown Winslow Road
Municipal
Rural Local
Urban Minor Arterial
Non-Federal Aid
STP
45
40
2
0
1
0
None
0
24
22
0
1
0
End Winslow Rd MP=4.13


GLOUCESTER COUNTY 667II (South to North)
Mile Posts: 0.000 - 2.000
Legend
Interstate Route
US Route
NJ Route
County Road
Interchange Number
Grade Separated Interchange
Traffic Signal
Toll Plaza
Traffic Monitoring Sites
Undivided Highway
Divided Highway
Dualized Hwy (Exp & Local)
Road Underpass
Road Overpass
Harrison Twp, Gloucester Co
MILES
KILOMETERS
Street Name
Jurisdiction
Functional Class
Federal Aid Sys
Control Section
Speed Limit
Number of Lanes
SB/WB Shou
SB/WB Pave
Med. Type
Med. Width
NB/EB Pave
NB/EB Shou
Traffic Volume
Traffic Sta. ID
Structure No
Divided
Undiv.
Cedar Road
County
Urban Collector
STP
None
Begin Gloucester County 667 II MP=0.00