Migrating to an SQL Environment: Scope of Work

February 6, 2012

Scope of Work / Request for Proposal

This document represents the LCDOT decision to pursue a monolithic enterprise file structure in accordance with Design Option #1 (diagrammed below), in which the application "talks" directly to SQL; and security, active projects and versioned projects all have an SQL location. A taskforce was formed at LCDOT, and said taskforce created, reviewed and modified this document iteratively to bring it to its current state, ready for use as the basis for and RFQ.

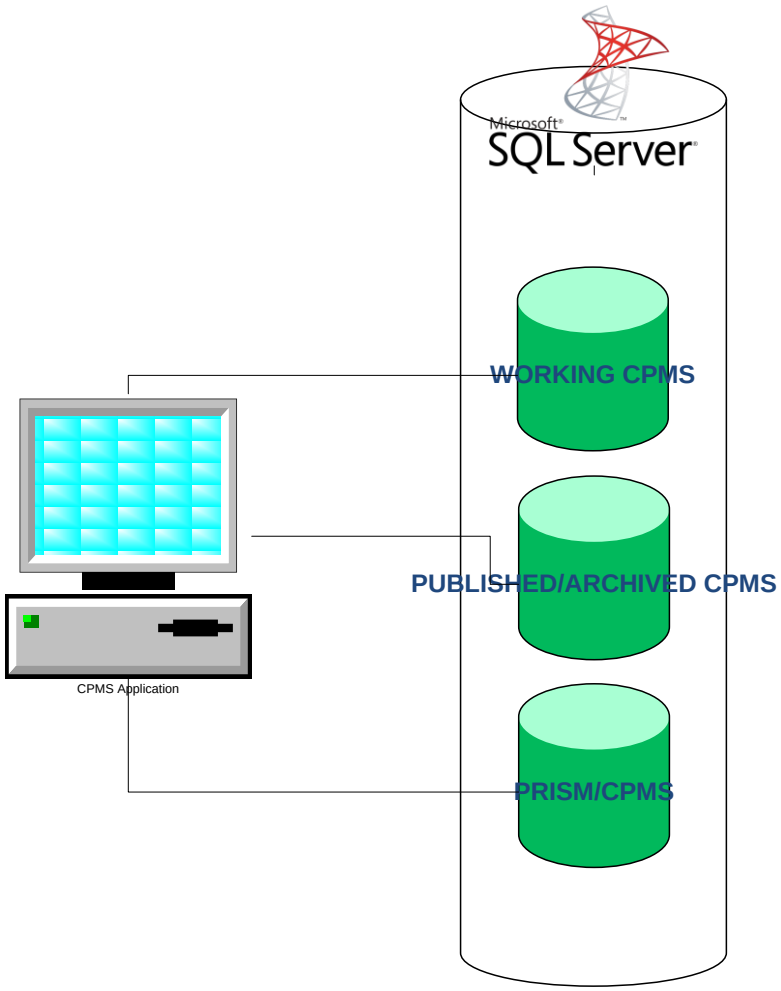

Figure 1. Design Option #1, which is a typical enterprise application.

A. Migrating to an SQL Environment

In the context of data integrity, we are desirous to (1) move to an SQL environment, which represents a more modern, more robust environment for back-end database management (i.e., an enterprise-based model), and (2) take this opportunity to add certain functionality to the

program, revise certain features of the program and remove unnecessary features of the program.

1. **Database.** The database shall be reconfigured to the most current, commercially-available version of Microsoft (MS) SQL (ASIDE: SQL Server2012 is rumored to be released in mid-2012).

2. **Operating System Compatibility.** The client application must be compatible with both Windows XP *and* Windows 7.

3. **Program Structure.** CPMS shall have an SQL account, and individual user accounts will be established in the program environment.

4. **Graphical User Interface (GUI).** The graphical user interface (GUI) shall be written in the Microsoft.net environment.

B. Versioning

The many versions of CPMS must able to be "versioned." This requirement is easy to accomplish when using the current CPMS version written in MS Access. Versioned data are each separate MS Access databases which are capable of being used for comparison-type reports and which are retrievable [for future reference], but the SQL environment operates on just one active database and does not, at the surface, have provisions for this type of versioning (i.e., assigning a version and a date to a given dataset at a specified point in time).

What LCDOT requires is functionality similar to that of the current CPMS interface, in which we may create and/or modify the "working" version into a versioned state, from which we can prepare comparison-type reports on two distinct versions, representing two different points in time.

The following major, "named" versions occur every year and represent something very specific. These include: (1) the Annual Update version, (2) the 5-Year Update version and (3) the Budget Submittal version. There will be many, many Periodic Update versions within in a given County Fiscal Year and many iterative versions [of short duration] as we endeavor to financially balance the database, in order to ultimately arrive at versions (1), (2) and (3) above. The various Periodic Update versions also are used to input the various stages of the Budget process after the submittal is made: CAO recommendation, joint County Board Committee recommendation, and final County Board action.

(Obviously, there can be no worry of accidental overwriting or deletion of data.)

Concepts / Definitions:

The monolithic structure will exist with three versions: (1) the working version, (2) the published version and (3) the PRISM/CPMS version.

The **working version** is another name for the current, in-progress version. This is the version which is being worked on *now*, being revised with changes to project phase costs, dates and the like. Only those LCDOT staff with full read-write privileges will have access to this version. Typically, the Manager of Capital Programming will make the decision as to when a given working version is in a state ready to be made the published version.

The **published version** is the version which may be accessed by all. It cannot be overwritten. The published version will contain the most-recently published version as well as all previously published versions. [Typically, a published version is a financially-balanced version, though there have been (and likely will be) exceptions to this rule.]

The **PRISM/CPMS version** will essentially be a duplicate of the published version, EXCEPT THAT it will only contain the *most-recently* published version. The purpose of the PRISM/CPMS version is to provide a location for PRISM to "point to" in order to refresh and update its data (for project management purposes).

We must retain the ability to run comparision-type reports comparing different versions of the capital program using a filing system with distinct, unique versions, each representing a given dataset at a specified point in time. This requires that all project records have a version field (YYYY-Na) containing a "year" prefix and a version number. The structure of the existing database will change, and we will need to convert selected historical Access files to the new SQL database file structure. Versioning can be accomplished from the CPMS file information.

C. PRISM Update Status

PRISM, our project management system, is currently in its third incarnation/third generation at LCDOT. The system was designed to monitor current LCDOT road projects, tracking timelines and status. Just as PRISM II had been referred to simply as "PRISM," PRISM III will also be referred to "PRISM" at LCDOT. LCDOT contracted with OpenText (a programming consulting firm) to upgrade PRISM II (to PRISM III), using MS Project Server 2010, MS Project Professional 2010 and MS SharePoint 2010 as its basis.

Any interfacing between CPMS and PRISM is performed at LCDOT, with programming by Dustin Smothers (LCDOT's Technology Manager) and OpenText. The **CPMS/PRISM Interface Report**, which is published five times per year by LCDOT's Engineer of Design, is the primary deliverable. The interface (consisting of small blocks of programming code: subroutines and modules) "points" to key data fields in the CPMS database (such as key date fields–see the discussion of these date fields in Section D of this document). This functionality must be retained in PRISM; therefore, database design must be considered in conjunction with the integration.

D. Dates in CPMS and in PRISM

The taskforce held a discussion focusing on the "date" fields used in CPMS and those used in PRISM. The taskforce had hoped to come to some meaningful conclusion regarding which of these fields must be retained in the re-tooled version of CPMS (and which could be removed without diminishing the program's effectiveness). This may or may not become a key theme in the re-development of the program. In fact, its importance (or lack thereof) may only become apparent in the actual SQL programming stage.

These stand-alone dates come together and have some collective meaning in the CPMS/PRISM Interface Report. ASIDE: Refer to the discussion of the use of the Phase Analysis Report, which is a closely-related idea, found later in this document under the heading, *Functionality to be Enhanced and/or Revised in CPMS*. For reference, the CPMS date fields are:

1. Original Program Date (shown on all tabs and in the Project Management Tab)
2. Current Program Date (General Tab)
3. Funds Available Date (General Tab)
4. CPMS Construction Cost Date (General Tab)
5. Base Construction Cost Date (General Tab)
6. Plan Available Date (Project Management Tab would be from PRISM Interface but is not used)
7. Available Letting Date (Project Management Tab would be from PRISM Interface but is not used)

…and the PRISM date fields are:

1. Original Program Date (pulled from CPMS by a PRISM Interface)
2. Current Program Date (pulled from CPMS by a PRISM Interface)
3. Funds Available Date (pulled from CPMS)
4. Available Letting Date (defined as the earliest let date that can be achieved based on the project plan)
5. Construction Cost Estimate Date
6. ROW Cost Estimate Date
7. Preliminary Engineering Cost Estimate Date
8. Design Engineering Cost Estimate Date
9. ROW Appropriation Date
10. Plan Available Date (not terribly useful; it is simply the date at the end of a particular project's Gantt Chart)

E. Functionality to be Added to CPMS

1. **Archiving.** LCDOT desires the ability to specify select date ranges for which to archive data, so that they can be easily referenced at some future point [without worry of accidental overwriting or deletion of data].

2. **Backward Compatibility.** In addition to reviewing the hard-copy (i.e., "paper") documentation from previous versions, LCDOT desires the ability to launch old database versions and old versions of the Excel financials. The consensus of the taskforce is that we require the ability to launch databases up to 2 years old (that should be sufficient). This suggests that the need for *conversion techniques* (subroutines?), as the data shall

all be in one SQL file. NOTE: Certain reports (both Crystal Reports and Excel-based reports) compare data from new and old files, hence the need for this functionality.

3. **New PIN Screen.** A "new PIN" screen" is needed. This screen would prompt the user through the necessary fields to be populated, ensuring that all critical fields are populated. (NOTE: If the user is merely *updating* an existing PIN, a different "update screen" would be invoked.)

4. **Completeness of Project List in Project Web Access.** We are desirous to add a field that would indicate whether a given PIN has been accessed by Project Web Access (LCDOT acronym: PRISM) in order to create a project in Project Web Access. This would serve as a check to ensure that all necessary projects that should be in Project Web Access have been included. Recommended name for this field: PWA.

5. **Time Value of Money, i.e., Using Escalated Construction Dollars.** If we are going to account for the time value of money for our Challenge Bond projects (and possibly other larger projects) by putting in a construction dollar amount tied to a certain year, there needs to be field indicating the effective year of the construction cost estimate (i.e., the County Fiscal Year to which a given cost estimate is inflated). This is different from the existing CPMS Construction Cost Date (#4 from the table above) or Base Construction Cost Date (#5 from the table above), which are just the dates upon which changes were made.

6. **Tracking LCDOT Design Department's Workload.** One of the Design Department's performance review metrics requires a *manual* count of the projects in CPMS for which Phase II is to be done in-house. We are desirous to automate this count **if reasonably achievable**. We are also desirous to extend this to include (a) all projects to be let at LCDOT, (b) all projects for which the Design Department will project manage the consultant performing Phase II and (c) those Phase I projects that the Design Department is managing (normally handled by LCDOT's Planning Department, but there have been a few exceptions to this rule). This may tie into functionality of the Phase Analysis Report (see Section F-3).

7. **Federal Funding Report.** We are desirous to have a report showing those projects which have federal funds programmed against Phase I, Phase II, ROW, Construction and/or Phase III. Included in this report would be those projects LCDOT wishes to tag as "federally-eligible," i.e., those being processed in such a manner so as not to preclude them from federal funding.

8. **Sort / Sub-Sort Reconfiguration.** Currently, when the user sorts on Work Type, the PINs are listed (sub-sorted) in ascending PIN order. We would prefer that the default sub-sort be alphabetical, by Route (and to apply this to all data sorts).

F. Functionality to be Enhanced and/or Revised in CPMS

1. **Reporting.** All existing reports shall remain intact, essentially unaffected by the migration to SQL (including Crystal Reports and Excel-based reports). However, the desire is for financial reports to be consolidated into fewer reports, eliminating redundancies between reports. Additionally, the remaining reports should include input screens which would prompt the user through the necessary fields to be populated, ensuring that all critical fields are populated.

   The reports contained in the Excel "financial" (which are currently launched from the Access database) should also mimic the *Consolidated Bond Funding Report*; meaning that budget figures and cash figures should be contained in the same tab (i.e., same report).

   Most likely, the change in the database (SQL) and database structure would require the remapping of all CPMS Crystal-based reports.

2. **GIS Tab.** LCDOT's IGS Department maintains a GIS-based intranet mapping application containing mass amounts of data regarding the County Highway system (e.g., jurisdictions, traffic signal locations, inventory, drainage locations, bike path locations, railroads, political districts, parcels, etc). IGS staff create exhibits (for use in the published 5-Year Program document) from CPMS project data by making queries *directly from the Access database*. We are desirous for the CPMS software to provide a warning when any of the following changes are made at the PIN-level: (1) PIN, (2) Route, (3) From or (4) To, as the GIS field would then need to be updated! Input by IGS staff *directly into the database* must appear in GIS tab, but the GIS tab itself would only be used for viewing purposes only (i.e., no data entry into the GIS tab itself).

Figure 1. Geography-Based Data in CPMS (the GIS Tab)

Field	Tab Entered/Modified	Entry Method	Tab Displayed	Data Type
Route	General/All	User/Pulldown	All	Alphanumeric
From	General	User	General	Alphanumeric
To	General	User	General	Alphanumeric
MP1	General	User	General/GIS	number
MP2	General	User	General/GIS	number
Miles	General	User OR Calc	General	number
Line/Point	GIS	User	GIS	Line/Point
GIS Label	GIS	User	GIS	Alphanumeric
Omit FY01-FY06	GIS	User	GIS	Yes/No
Municipality	Political	User/Pulldown	Political, General	Alphanumeric
IL House District	Political	User/Pulldown	Political	Alphanumeric
Impact Fee District	Political	User/Pulldown	Political	Alphanumeric
County Board District	Political	User/Pulldown	Political, General	Alphanumeric
IL Senate District	Political	User/Pulldown	Political	Alphanumeric
Congressional District	Political	User/Pulldown	Political	Alphanumeric

IGS staff currently map CPMS data for (1) the 5-Year Program and for (2) creating maps of specific construction projects using the following data:

- FC (tbl02_ProjCosts) – $ or *
- FUND (tbl02_ProjCosts) – cb, mft, mt or st
- PHASE (tbl02_ProjCosts) – C, P, R, D or L
- ProgramStart (tbl00_FileInfo)
- FY0 – FY7 (tbl02_ProjCosts)
- PIN (key)
- lsg_id (tbl07_GIS)
- MP1(tbl07_GIS)
- MP2 (tbl07_GIS)
- Point (tbl07_GIS)
- GIS label (tbl07_GIS)
- We no longer use the "Omit Fy*X*" fields.

GIS staff currently populate/modify the GIS data for projects when preparing maps for the 5-Year Program document, so GIS information can only be assumed to be accurate for the data corresponding to the published document.

3. **Phase Analysis Report.** The Phase Analysis Report (a project progress-tracking tool) is currently not being used by LCDOT staff, since it has never been fully field-tested. In the course of this migration to SQL, we need to re-visit the Phase Analysis Report and verify that it is functioning properly. Its original intent was to at least crudely answer the question of whether a given project on-pace to meet its programmed letting date (Program Date). We are seeking your guidance as to how to make fullest use of this tool in the context of this migration to an SQL environment.

4. **Multi-User Environment.** Confirm that migration to an SQL environment would mitigate multi-user environment issues previously discussed by telephone.

5. **Database Auto-Refresh.** Confirm that migration to an SQL environment would mitigate the auto-refresh issues previously discussed by telephone (i.e., automatically refreshing the database at a specified periodicity).

G. Functionality that is Obsolete and Can be Dropped from CPMS

1. Tab: **GENERAL TAB:**
   Data field to be removed: **MP1 (ft), MP2 (ft), FAS, Project Manager, Project Status**

2. Tab: **PROJECT MANAGEMENT TAB:**
   Data field to be removed: **(drop this entire tab EXCEPT FOR the "Original Date," "Plan Available Date" and "Available Let Date" fields, which must be moved to another tab)**

3. Tab: **POLITICAL TAB:**
   Data field to be removed: **(drop this entire tab)**

H. Other Matters

1. **Equipment.** The existing equipment at LCDOT is more than sufficient to support the proposed migration to SQL. LCDOT shall supply all pertinent details (server specs, memory, processor speed, etc.), of said existing equipment to Victor Teglasi.

2. **Legal.** The existing CPMS Licensing Agreement provides Lake County with a non-exclusive right to the CPMS source code. Lake County retains the unrestricted right to use/modify the CPMS source code as it so wishes (for its own use), using either its "in-house" staff or another consultant (besides Victor Teglasi/ Capital Program Management Associates). In the past, Victor Teglasi has provided Mark Tulach (LCDOT's Manager of Capital Programming) and Mary O'Driscoll (LCDOT's GIS Supervisor) with updated source code upon request. The current licensing agreement would continue to apply to any future upgrades to CPMS. As such, LCDOT would be entitled to receive periodic updates of the source code.

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