

VALUE ENGINEERING MANAGEMENT SYSTEM

Final Report

Submitted to
Nevada Department of Transportation

By
Alexander Paz., PE
Associate Professor
Director, Transportation Research Center
University of Nevada, Las Vegas

June, 2014.

Note: This report contains sensitive information related to system login and security and hence is only intended for the system user and the associated IT administrators. This report is not intended for other distribution purposes.

TABLE OF CONTENTS

LIST OF FIGURES	3
EXECUTIVE SUMMARY	5
CHAPTER 1	7
PROJECT OVERVIEW	7
INTRODUCTION.....	7
PROJECT APPROACH	8
CHAPTER 2	12
VALUE ENGINEERING INSTALLATION	12
OVERVIEW	12
Step 1 Import Database to MS SQL server	12
Step 2 Import Web Application to IIS server	14
Step 3 Edit connection strings to connect Web Application to its database.....	15
ADDITIONAL INFORMATION	16
CHAPTER 3	18
VALUE ENGINEERING USERS GUIDE.....	18
DESCRIPTION AND LOCATION.....	18
VALUE ENGINEERING USERS	18
REGISTERING AND CREATION OF NEW PROJECT.....	20
GENERATING IDEAS	23
MAINTAINING DIVISION DATA	24
PROJECT REPORT.....	24
CHAPTER 4	26
SYSTEM DESCRIPTION	26
QUALITY CONTROL AND RISK MANAGEMENT	52
APPENDICES	53
APPENDIX A	53
SYSTEM DOCUMENTATION	53
APPENDIX B.....	56
DIAGRAM REPORT	56

LIST OF FIGURES

FIGURE 1	Importing veusers data file.....	13
FIGURE 2	Changing access rights for the database.	14
FIGURE 3	Registering to the Value Engineering application.	20
FIGURE 4	Creation of new project.....	21
FIGURE 5	Phases in value enginnering job plan.....	22
FIGURE 6	Value engineering website page.	26
FIGURE 7	Register to create new account.	27
FIGURE 8	Recover username	27
FIGURE 9	Recover password.	28
FIGURE 10	Website layout – logged in (Home Menu).....	28
FIGURE 11	Home menu - project “Project 0”	29
FIGURE 12	Project 0 Browse Details for “Project 0”	29
FIGURE 13	Editing the project general information.	30
FIGURE 14	Associated divisions with “Project 0”	30
FIGURE 15	Value engineering creation of new job.	31
FIGURE 16	Value engineering job plan for project 0. Phase 1: Selection.	31
FIGURE 17	Phase 2: Investigation.....	32
FIGURE 18	Phase 2: Investigation; Section 1 // General.....	32
FIGURE 19	Phase 2: Investigation; Section 2 // Specification.	33
FIGURE 20	Phase 2: Investigation; Section 3 // Engineering.....	33
FIGURE 21	Phase 2: Investigation; Section 4 // Methods.	34
FIGURE 22	Phase 2: Investigation; Section 5 // Materials.	34
FIGURE 23	Phase 2: Investigation; Section 6 // Maintenance.....	35
FIGURE 24	Phase 2: Investigation; Section 7 // Function and Worth.	35
FIGURE 25	Phase 3: Information.	36
FIGURE 26	Phase 4: Speculation.....	36
FIGURE 27	Phase 5: Idea Generation.	37
FIGURE 28	Phase 5: Idea Generation (to add idea).	37
FIGURE 29	Phase 6: Evaluation.	38
FIGURE 30	Phase 7: Development.	38
FIGURE 31	Phase 8: Presentation.	39
FIGURE 32	Phase 9: Implementation.	39
FIGURE 33	Phase 10: Audit.	40
FIGURE 34	Value Engineering Ideas.	40
FIGURE 35	Value Engineering Ideas for “Project 0”.	41
FIGURE 36	Idea Generation for “Project 0”.....	41
FIGURE 37	Idea Generation “Project 0” (Bridge Division).	42
FIGURE 38	Summary of Idea Generation for “Project 0”.....	42
FIGURE 39	Selected Ideas for “Project 0”.	43
FIGURE 40	Recommendation for “Project 0”.	43
FIGURE 41	Pending Ideas for “Project 0”.	44
FIGURE 42	Approved Ideas for “Project 0”.....	44
FIGURE 43	Value Engineering Reports.	45
FIGURE 44	Initiate Report for “Project 0”	45

FIGURE 45	Value Engineering Project Files.....	46
FIGURE 46	Project Files for “Project 0”	46
FIGURE 47	Add new project file.....	47
FIGURE 48	Value Engineering Past Projects.	47
FIGURE 49	Administrator options.....	48
FIGURE 50	Current user information.	48
FIGURE 51	Current active projects.	49
FIGURE 52	Search for projects.....	49
FIGURE 53	Browse current SMTP email accounts.	50
FIGURE 54	Editing SMTP email accounts.....	50
FIGURE 55	SMTP Account Details.....	51
FIGURE 56	Deleting SMTP email account.	51
FIGURE 57	Entity relationship diagram of value engineering.	54
FIGURE 58	Entity relationship diagram.	55

EXECUTIVE SUMMARY

The Nevada Department of Transportation conducts a myriad of Value Engineering (VE)/Value Analysis studies every year to add value to projects or reduce project costs. Although the law requires conducting Value Engineering on projects that cost in excess of \$50 million, the new web-based system for VE, implemented by this project, will enable NDOT Value Engineering coordinator to conduct, with very minimal resources, VE analysis on projects that are below the \$50 million threshold. Typically, the high-value projects account for about 1/3rd of the overall project spending. The other 2/3rd of the resources are usually spent on projects that fall below the \$50 million threshold set by federal guidelines. It is strongly recommended that VE analysis be conducted on projects that cost over \$50 million as well as on projects that cost between \$10 million and \$50 million to maximize limited resources. This will result in a cultural change that can potentially save the department millions of dollars or add value to projects that will result in savings in the long term.

The VE analysis is a multidisciplinary team effort that involves a number of steps and a group of team members. Some steps require subjective analysis and opinions. Other steps are very quantitative and require significant amounts of data. In addition, the VE analysis process is affected by the characteristics of each project and experience and background of each team member. The proposed web-based VE system provides multiple levels of security based on user access and assigned privileges. The system is expected to help developing internal staff capabilities to save the department thousands of dollars every year.

The proposed web-based system will help avoid duplication of work, significantly minimize the amount of time needed to conduct a Value Engineering study, and will enable for an easy storage and retrieval of information. NDOT project managers not stationed at the headquarters will have full access to utilize the new system effectively without having to travel

for the VE process and be away from office for almost one week each time. In addition, once a VE is conducted at the various stages of a project, the system will enable the VE coordinator to open a previous VE study and modify or update it if needed. This can save significant amount of time and resources as the data from the previous study can be easily used as the starting point of an updated study.

The new web-based system incorporates the major elements of the FHWA's recommended Value Engineering Job Plan and provides to the VE coordinator a greater flexibility to customize the VE process as needed on a project-by-project basis. The in-built automated approval process is a very useful feature that will save time. The web-based VE tool will help NDOT achieve greater savings as the NDOT VE coordinator will be able to conduct VE studies on a variety of projects in a relatively short period of time.

CHAPTER 1

PROJECT OVERVIEW

INTRODUCTION

Value Engineering (VE) is a methodical process that seeks to add value to a project or minimize the associated costs. The process can be conducted at various stages of the project, including pre-construction, construction, and after implementation. Federal regulations and the Transportation Authorization Bills require state department of transportation to conduct specific analyses on projects to add value or reduce project costs to help allocate resources efficiently and maximize limited dollars.

The process is usually a weeklong undertaking that involves multiple project managers and various subject area experts. The current process is cumbersome, manual, and extremely time consuming, requiring valuable time of at least six project managers from key divisions of the Nevada Department of Transportation (NDOT). This represents additional workload for project managers and a significant time commitment to conduct VEs. The long paper-based process costs are significant when consultants conduct such VEs due to the complicated, and outdated paper-based process.

NDOT retained the services of the University of Nevada, Las Vegas (UNLV) team to implement an automated system to support VE activities. A state-of-the-art web-based Value Engineering framework and system was implemented to automate and reduce the time commitment from project managers. The system allows that most information be provided through a web-browser and the corresponding results be available immediately. This results in time savings, less errors, reducing the costs of conducting VEs, and will help build internal NDOT staff capabilities to efficiently conduct VE, saving NDOT millions of dollars on projects.

PROJECT APPROACH

The UNLV team worked collaboratively with NDOT throughout the various stages of the project to ensure that the tasks were accomplished as agreed. Initially the scope of work was focused on providing recommendations about how to implement a web-based system to conduct VE analysis. However, during the initial discussions with NDOT, it was decided to focus on the implementation so as to obtain a product that could be improved over time based on experience and feedback obtained by conducting VE studies using the proposed web-based system. The UNLV team is committed to continue providing technical support to NDOT to ensure that the web-based system meets the expected results.

NDOT provided copies of previous Value Engineering studies to UNLV to review the format of the studies and analyzed the data and factors used in the Value Engineering studies. The provided studies included projects such as Interchange Design, Highway Widening, and Construction of New Highway. The variety of projects provided the UNLV team a clear understanding of the complexities and variations in the type of Value Engineering studies. The UNLV team conducted literature review of the Value Engineering Job Plan recommended by the Federal Highway Administration (FHWA) to incorporate it within the web-based system. For the purposes of this project, the following major divisions were included in the VE Framework. In addition, web-based system provides the VE coordinator the ability to add, delete, or modify a division as needed.

- a. Design
- b. Traffic Operations
- c. Environmental
- d. Construction
- e. Safety

- f. Location
- g. HMPS and TIS
- h. Hydraulics
- i. Project Management
- j. Planning
- k. Bridge
- l. Materials
- m. Districts

As a starting point, the following key factors were used for some of the major strategic divisions of the agency.

Bridge:

- Number of Bridges
- SD Bridges
- FO Bridges
- Length
- Width
- Number of Lanes
- Sufficiency Rating
- Lane Width
- Structure Type
- Issues and Problems

Safety:

- Historical Fatalities

- Historical Injuries
- Proposed Counter Measures
- Accident Rate
- Fatality, Injury and PDO Cost Savings
- Issues and Concerns

Design:

- Radius of Curve
- Super elevation
- Number of Lanes
- Lane Width
- Fore Slope
- Back Slope
- Sight Distance

Traffic Operations:

- Existing Level of Service
- Travel Times Reliability
- Hours of Delay
- ITS Infrastructure

These factors are not all-inclusive, the system includes a myriad of other factors from other divisions, such as hydraulics, environmental, planning, construction, maintenance, and many other divisions that can be viewed after logging.

As the project progressed, the UNLV and NDOT team met regularly to discuss the various flow charts, steps, and tools used in the project. Various in-person meetings were held

with Chief of Performance Analysis division and Mr. Dale Lindsey of NDOT to discuss the progress and the steps taken towards implementation of the system and the associated deliverables at the various phases of the project. This final report includes:

- System installation,
- Users manual,
- System description, and
- System documentation.

Detailed descriptions of the above documents is provided in the following chapters of this report.

CHAPTER 2

VALUE ENGINEERING INSTALLATION

OVERVIEW

The Value Engineering (VE) web application installation tested and conducted on Windows 2008 R2 × 64 server, and MS SQL (Microsoft Structure Query Language) server 2012/ 2010, vs 2013. An overview of steps to install the Value Engineering web application are as follows:

Step 1- Import database to MS SQL server.

Step 2- Import Web Application to IIS (Internet Information Services) server.

Step 3- Edit connection strings to connect Web Application to its database.

Step 1 Import Database to MS SQL server

The import uses two .sql (structured query language) files to generate each database: veusers.sql and veapp.sql. The veusers.sql file is used for website registration and authorization. The veapp.sql is used to maintain the data associated with actual VE application. These two scripts are run on 2008 MS SQL server to generate the database or data. However, the prerequisite to generate data is to create the database with the same name as the .sql filename. To do so, create the database with same name, then click on ‘open file’. Open the .sql file (veusers.sql) and select the database. Click ‘execute’. Verify that the sql script executes without errors. Step 1 should be repeated for the second file, veapp.sql. See Figure 1.

```

Microsoft SQL Server Management Studio
File Edit View Query Project Debug Tools Window Community Help
New Query Execute
Object Explorer
Connect
veusers (sa (67))
CSDemo
DataSelect
Fd_Auth
Fd_Interface1
files_website
fueltaxables1
performance
pmapp
pnusers
PoliceProject
ReportServer
ReportServerTempDB
TestCSA
TestGeo
TestGeoAD
TestGeoFME
TestGeoVersioned
testing
teste
VRAGIMENT38
veusers
Security
Server Objects
Replication
Output
veusers (sa (67))
USE [veusers]
GO
***** Object: Table [dbo].[webpages_Roles] Script Date: 07/13/2014 20:16:06 *****
SET ANSI_NULLS ON
GO
SET QUOTED_IDENTIFIER ON
GO
CREATE TABLE [dbo].[webpages_Roles] (
    [RoleId] [int] IDENTITY(1,1) NOT NULL,
    [RoleName] [nvarchar](256) NOT NULL,
    PRIMARY KEY CLUSTERED
    (
        [RoleId] ASC
    ) WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF, ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
    (
        [RoleName] ASC
    ) WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF, ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
) GO
***** Object: Table [dbo].[webpages_OAuthMembership] Script Date: 07/13/2014 20:16:06 *****
SET ANSI_NULLS ON
Connected. (1/1) (local) (10.50 RTM) sa (67) veusers 00:00:00 0 rows

```

FIGURE 1 Importing veusers data file.

To change access rights for the database, create a new username and password (or use an existing one) for the two databases. See Figure 2 for an example using username: velogin, and password: Passw0rd to access the database. Expand the database in the object folder (e.g. vusers), expand “Security” and right-click on “Users”. Select “New User”. Lastly, data reader and data writer properties are selected. Repeat this process for the veapp database.

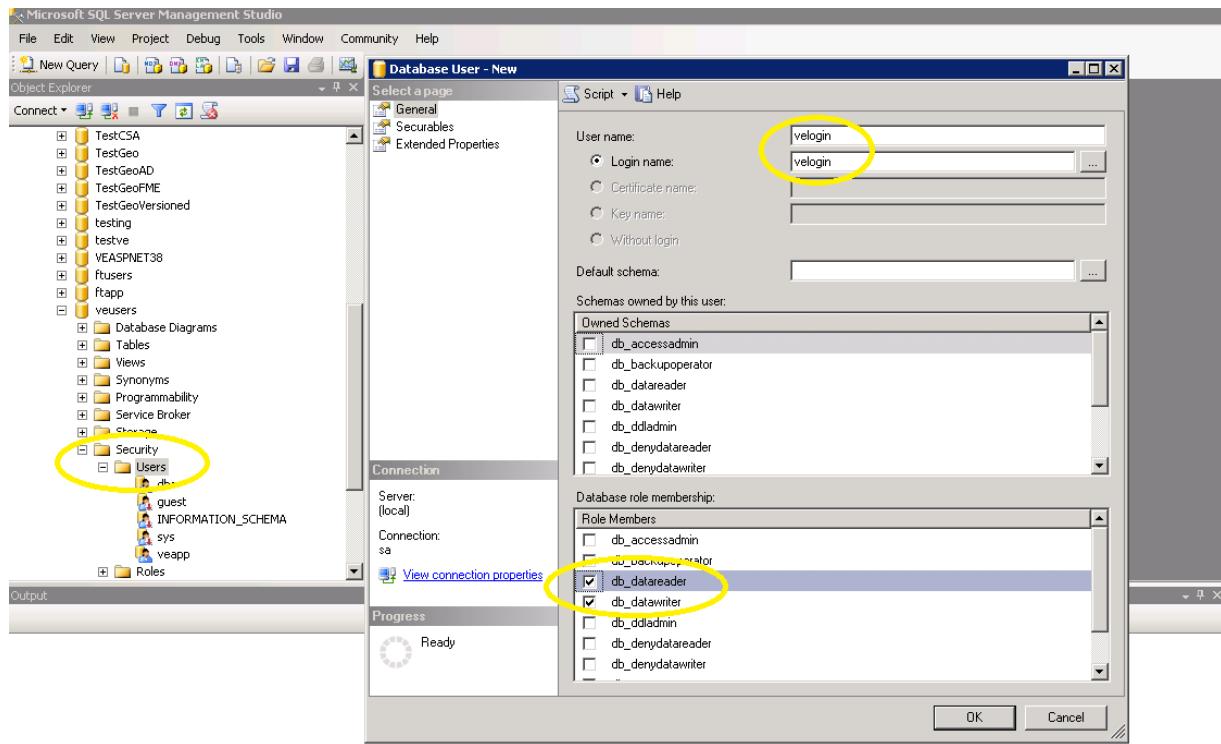


FIGURE 2 Changing access rights for the database.

Step 2 Import Web Application to IIS server

Use the following steps to import the ValueEngineering.zip web deploy package into IIS default website pool:

1. Open the IIS Manager by clicking Start > Run and typing “**inetmgr**”.
2. In IIS Manager, expand the Server node and Sites node. Select the Default Web Site.
NOTE: install the application in a different folder than the “Default web site”. It is installed in the Default Web Site pool in the test environment.
3. In the right-hand Actions pane, click the “**Import Application...**” link to launch the packaging wizard.
4. Select the package *ValueEngineering.zip*.
5. In the ‘Install an Application Package’ dialog, all the application files are shown.

6. On the Parameters page, enter a new application name if desired and enter a SQL connection string. (the connection string can be entered afterwards as described below).
7. Click Next to install the package.
8. The Summary page will provide a high-level overview of some items that were installed from the package. The Details tab will specify the exact addition.

After these steps, a pop-up screen will show that the application requires APS.NET v4.0 Application Pool. If prompted to change to ASP.NET v4.0, click ‘YES’.

Step 3 Edit connection strings to connect Web Application to its database

This step describes editing connection strings to connect Web Application to database at backend. It is specific to server/database and it could be a remote server or local. Deployment process was demonstrated using the local server with user: *velogin* and password: *Passw0rd*.

The connection strings can be edited using the following two options:

1. Edit directly in IIS explorer by clicking on the website. Choose option for CONNECTION STRINGS.
2. Open the web.config file in the website root folder, and replace the “`<connectionStrings>`” tags using below code. The values that are in bold are adapted to this user (Catalog, User ID and Password). For example, the database created in the earlier steps of veusers and veapp are used. This is the resulting connection string in the user web.config file.

```

<connectionStrings>

    <add connectionString="Data Source=(local);Initial Catalog=veusers;Integrated
Security=False;User Id=velogin;Password=Passw0rd;MultipleActiveResultSets=True"
name="DefaultConnection" providerName="System.Data.SqlClient" />

    <add
connectionString="metadata=res://*/Models.VEASPNET38Model.csdl|res://*/Models.VEAS
PNET38Model.ssdl|res://*/Models.VEASPNET38Model.msl;provider=System.Data.SqlClient;
provider connection string="data source=(local);initial catalog=veapp;integrated
security=False;User
Id=velogin;Password=Passw0rd;MultipleActiveResultSets=True;App=EntityFramework";
name="VEDB38Entities" providerName="System.Data.EntityClient" />

</connectionStrings>

```

After performing the connection strings edit, the Web Application website should be functional and ready for access.

ADDITIONAL INFORMATION

By default, the following account has been created and should be used by the system administrator to provide access to manager or regular users (manager users can provide access to regular users, refer to manual) and to setup the SMTP (Simple Mail Transfer Protocol) email settings. The “**admin**” (password: “**NDOTpassword**”) account cannot be deleted and it is the maximum privilege to access web application.

Upon deployment, the individual assigned for the “admin” account must do the following:

- Change Admin password (from Manage Account window, link at the bottom right of the web application)
- Fill out the SMTP settings form (from web application menu). This is to allow the application to send emails

- Fill out the Value Engineering URL text box (In the same window as SMTP settings).

This is to provide a correct link to users to reset password

- Change the Admin account email address (from Edit User Information window, link from Manage Account window). If the admin password is lost, it can be recovered via email.

There is a user manual for this Web Application to be provided to the end user

CHAPTER 3

VALUE ENGINEERING USERS GUIDE

DESCRIPTION AND LOCATION

The VE Application is a Data Collaboration Tool designed to allow groups of people to share information and assist throughout the VE process. The backend is mostly supported by an MS SQL Database, which contains the information about the projects. The frontend the user interface (UI) is a web-based application developed with ASP.NET and Visual Basic. It allows the user(s) to enter information about the projects. The VE Application will be deployed as a web-based process on Windows Server 2008. The application was developed using the technologies such as ASP.NET, MVC, Visual Basic, MS SQL, HTML/CSS, JavaScript, and jQuery.

VALUE ENGINEERING USERS

There are four types of users for the Value Engineering application. They are:

1. The VE Manager

- a) User Id: “vemanager”.
- b) In charge of administrative rights associated with the application and its users.
- c) Creates a project indicating which division(s) will be involved and provides general information about its nature.
- d) Updates information associated with each stage/phase of the project.
- e) Processes ideas for the project.
- f) Creates the project report.
- g) View and edit data associated w/each Division for the project.
- h) Finalize/close the project.

- i) Ability to reopen closed projects or create new projects based on previously closed ones

2. The Division Lead

- a) In charge of maintaining data associated with his/her Division.
- b) Access to data for his/her Division.
- c) 14 Divisions currently supported by the division lead:
 - Bridge
 - Construction
 - Design
 - Environmental
 - HPMS & TI
 - Hydraulics
 - Location
 - Maintenance and Asset Management
 - Project Management
 - Materials
 - Operations
 - Planning
 - Right of Way
 - Safety

3. The Project Director

- a) In charge of approving/declining ideas.
- b) Recommends ideas for a project.

- c) Access to data for ideas.

REGISTERING AND CREATION OF NEW PROJECT

Figure 3 shows the main web page of the Value Engineering application. To access registration, click on the “Register” link. Upon successful creation of a new account, the user will wait until the VE Manager grants the appropriate level of access. No access to any functions of the VE application is provided in the meantime.

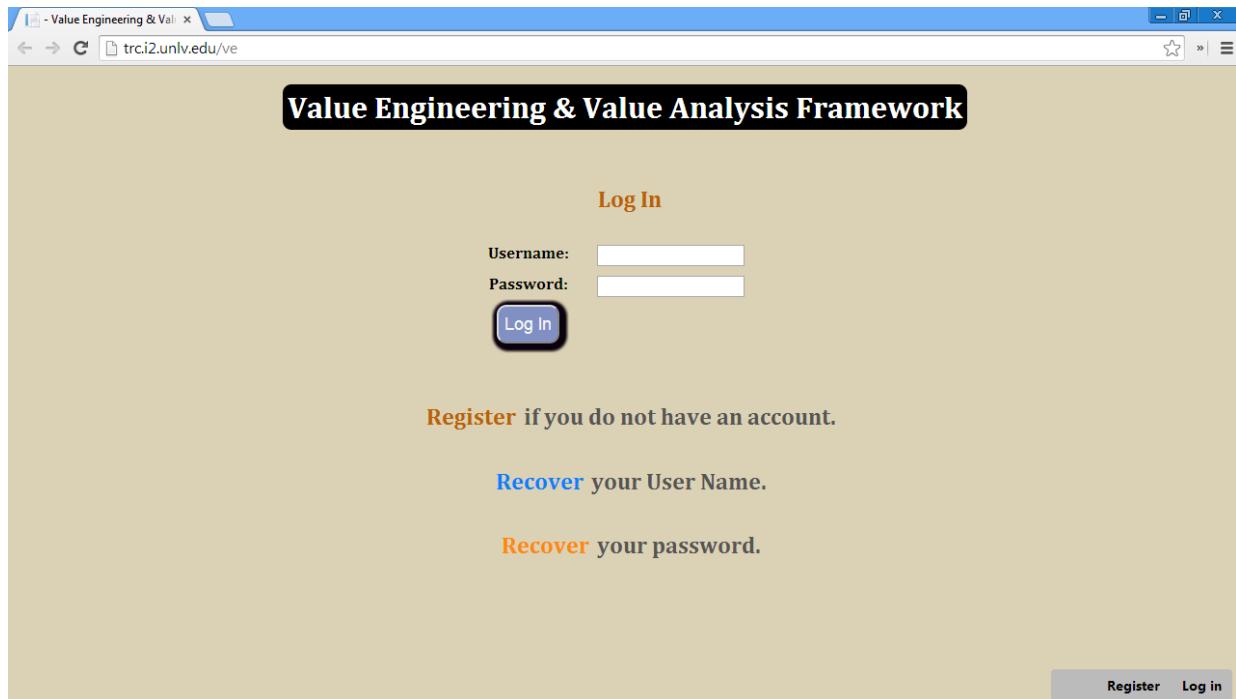


FIGURE 3 Registering to the Value Engineering application.

Once registration is complete, a VE Manager can create a project as shown in Figure 4. The manager will specify the divisions associated with the project and maintain the data associated with the stages/phases of the project. The screen to create a Project can be accessed by clicking on the “Create New Project” button always present at the top of the web application’s page. Use the following steps:

1. Create project by providing project name, description of the project, selecting the Division(s) that will be involved in the project, and providing a physical location for the project. This can be either an actual address or a street intersection.

The screenshot shows a web-based application for creating a new project. At the top, there's a navigation bar with links for Home Report, Create New Project Project Files, VE Job Plan Past Projects, Ideas, and Administrator Options. Below the navigation is a main form titled "Project Creation". It has two text input fields: "Title" and "Description". Under "Divisions required in project", there's a note "(At least one division is required)" and two buttons: "Select All" and "Clear All". A list of divisions follows, each preceded by a small checkbox: Bridge Construction, Design, District Manager Engineer, Environmental, HPMS & TIS, Hydraulics, Location, Maintenance & Asset Management, Materials, Operations, Planning, Project Management, Right of Way, and Safety. Below this is a "Location" section with a text input field containing "Intersection" and a note "Input provided will auto-fill text box". There's also a link "OR enter Physical Address in text box". At the bottom right of the form are "Next" and "Cancel" buttons. The bottom left corner of the page footer says "© 2014 - Value Engineering". The bottom right corner shows a user greeting "Hello, admin!" and a "Log Off" link.

FIGURE 4 Creation of new project.

2. Identify the Division(s) Lead(s) by either choosing from existing (registered) lead(s) for the division(s) or providing a valid email address for the person to be invited to participate. The invitee will then have to register with the website at which point he/she will be assigned as the Lead for the specific Division. Once the Division(s) Lead(s) has been assigned, the Administrator/VE Manager can begin to work on the VE Job Plan.

The VE Manager is responsible for maintaining the data associated with the Project “Phases”. Each project undergoes ten phases through its lifetime as shown in Figure 5 and each phase screenshots are shown in chapter 3 system description. They are:

- a) Selection
- b) Investigation
- c) Information
- d) Speculation
- e) Idea Generation
- f) Idea Evaluation
- g) Idea Development
- h) Idea Presentation
- i) Idea Implementation
- j) Audit

The screenshot shows a web-based application for managing value engineering projects. The title bar indicates the current screen is 'Selection (1/9) - Value Eng.' and the URL is 'trc.i2.unlv.edu/VE/VejpSelection/Edit/1'. The main content area is titled 'Value Engineering & Value Analysis Framework' and displays the 'Selection (1/9)' phase for a project named 'project0'. On the left, a vertical sidebar lists ten phases: Selection, Investigation, Information, Speculation, Idea Generation, Evaluation, Development, Presentation, Implementation, and Audit. The 'Selection' phase is highlighted. The main workspace contains three text input fields: 'What is to be studied?' (empty), 'Who is best able to study?' (empty), and 'What must be known to start study?' (empty). At the bottom, there are buttons for 'Previous Phase', 'Save', and 'Next Phase'. A 'Division Data' section on the right shows a single entry for 'Bridge'. The bottom navigation bar includes links for 'Home', 'Create New Project', 'VE Job Plan', 'Ideas', 'Report', 'Project Files', 'Past Projects', and 'Administrator Options'. A user 'Hello, admin!' is logged in.

FIGURE 5 Phases in value enginnering job plan.

The screen to access a project's VE Job Plan can be accessed by clicking on the "VE Job Plan" button always present at the top of the web application's page. Upon the selection of a

specific project, the “Selection” Phase edit screen will be displayed. The screen to edit any of the phases can be accessed by clicking on its respective button on the left-hand panel of the main VE Job Plan Page. The buttons on the right-hand panel of the main VE Job Plan Page allow the user to view the data for any division involved in the project. This data will be displayed in a separate window that is opened when the ‘Division’ button is clicked. Within the window, buttons are provided to edit and/or add data to the Division.

GENERATING IDEAS

For any project, the VE Manager can generate ideas; select specific ideas from all project ideas, recommend ideas from the selected ideas, and choose ideas to suggest for approval by the Director from recommended ideas. The main menu for ideas can be reached when the “Ideas” button is clicked, which is always present at the top of the web application page. After choosing a project, all the options for its ideas will be displayed. The user can navigate to a particular function by clicking on the appropriate button. The VE Manager can generate ideas for any division involved in the project. The screen to generate an idea can be displayed when a specific division button is clicked. These buttons are located in the middle of the page.

As VE Manager, the users have access to the Summary of Ideas view. This allows them to generate, select, & recommend ideas. They can also view individual idea details from this page. Managers can access the Selected Ideas view, where the user has the additional ability to either update or view the details for a selected idea and recommend selected ideas.

In the VE Manager’s Recommended Ideas view, the user is able to update or view the details for a selected idea and select recommended ideas for approval. In the Ideas Pending Approval view, the user has the ability to view the details for a selected idea and submit a request through email to the VE Director for approval of selected idea(s).

MAINTAINING DIVISION DATA

Division Leads are responsible for the maintenance of their division's data. To update division data, the user should choose the "Current Projects" button from the main menu at the top of the web application page. The update screen will appear when any project is chosen. To edit or delete an idea for a division, the user should click on the "Idea Generation" button from the main menu at the top of the web application page. Upon choosing a project (by clicking on its button), the list of ideas for a project will appear and division data can be maintained. Evaluation of an idea is also important to maintain data. To evaluate an idea for a division, choose the "Idea Evaluation" button from the main menu page.

After selecting a project (by clicking on its button), the evaluation screen will appear. The Division Lead can rank/rate any ideas for a project in which the division is involved. The possible rank values are:

- 1: High Value
- 2: Medium to High Value
- 3: Medium Value
- 4: Low to Medium Value
- 5: Low Value

PROJECT REPORT

The VE Manager can create a report for a project based on all the input data provided by him/her and the Division Leads. The manager can provide additional/external data, upload appendix files, and upload a user-edited version of the report to be saved as part of the project's DB record. To create a report for a project, the user should choose the "Report" button from the main menu at the top of the web application page. The report will be generated as an MS word file that the user

can print and/or save in a similar format. There are two possible versions of a Project’s Report: i) one generated by the VE application and ii) one custom edited by a user and uploaded to the project’s DB record.

It is important to note that any (and all) changes made to the custom edited report will not be reflected by the project’s DB record. Therefore, changes to data fields tracked by the project’s DB record can be updated by the VE application itself (through its specific user interface) and thus cannot be extracted from the custom edited report. All changes should be made through the VE application’s functions. The VE Manager can generate the report, which is generated by the VE application any time prior to the project closure. Once a project is finalized, its report(s) can be accessed by clicking on the “Past Projects” button from the main menu at the top of the web application page. There are two “types” of files that can be added to a project’s DB record “Additional Files” and “Appendix Files”. Additional Files are those that will be used for discussion/reference during the project’s “Active” stages. There is no limit to the number of files that can be added to the project’s DB record (unless space is unavailable). “Appendix Files” are part of the final Report. There is a limit of ten such files per project. To add a file to a project, the user should click on the “Project Files” button from the main menu at the top of the web application page.

UPDATING USER INFORMATION

Users may update his/her information by clicking on “userid” at the bottom right hand corner of any page. Through this function, users can revise passwords, name information and email addresses.

CHAPTER 4

SYSTEM DESCRIPTION

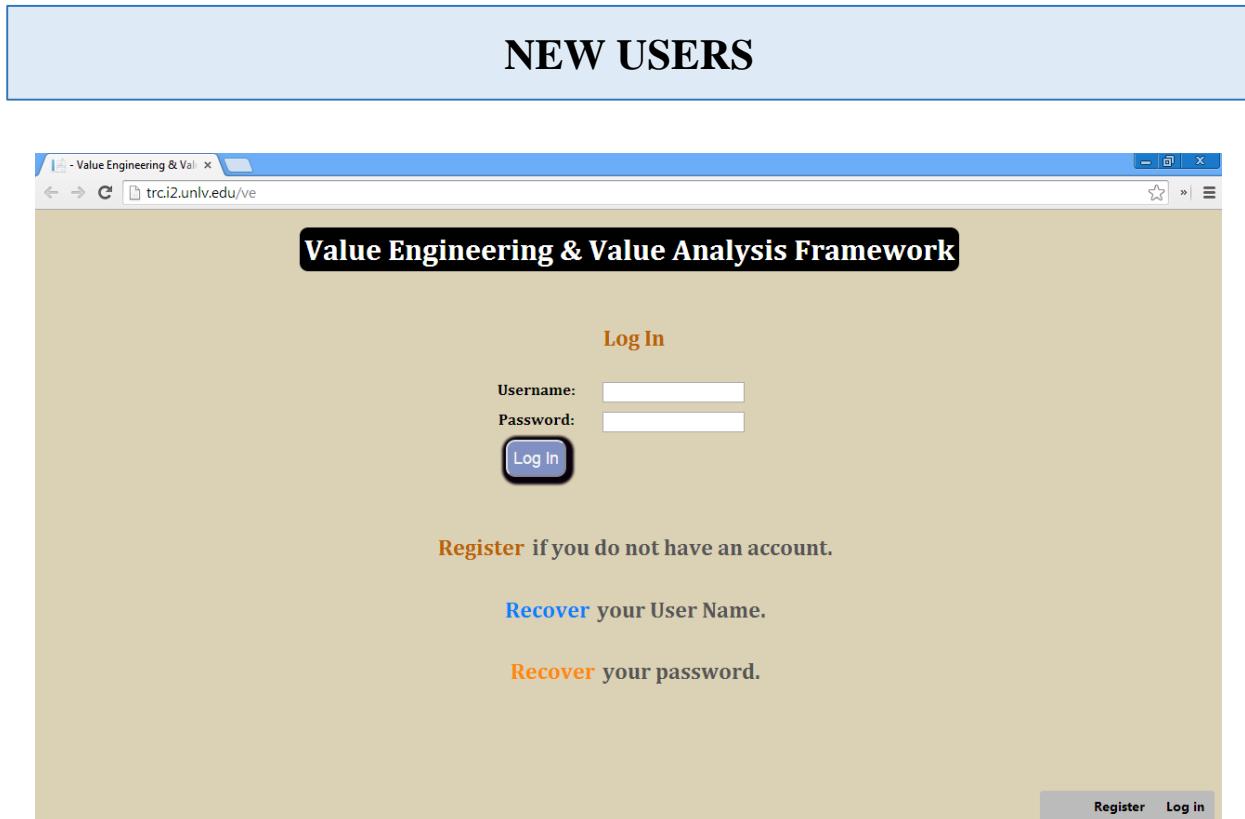


FIGURE 6 Value engineering website page.

The screenshot shows a web browser window with the title bar "Register - Value Engineering & Value Analysis Framework". The address bar displays the URL "trci2.unlv.edu/VE/Account/Register". The main content area has a header "Value Engineering & Value Analysis Framework" and a sub-header "Register. Create a new account.". Below this, there are four input fields labeled "User name", "Email Address", "Password", and "Confirm password", each with a corresponding text input box. A "Register" button is located below the password fields. At the bottom right of the page, there are "Register" and "Log in" links.

FIGURE 7 Register to create new account.

The screenshot shows a web browser window with the title bar "Recover User Name - Value Engineering & Value Analysis Framework". The address bar displays the URL "trci2.unlv.edu/VE/Account/RecoverUserName". The main content area has a header "Value Engineering & Value Analysis Framework" and a sub-header "Recover User Name". It displays a message "Please provide a valid Email Address" above an input field. A "Recover User name" button is located below the input field. A "Return to Login Page" link is at the bottom left. At the bottom right, there are "Register" and "Log in" links.

FIGURE 8 Recover username.

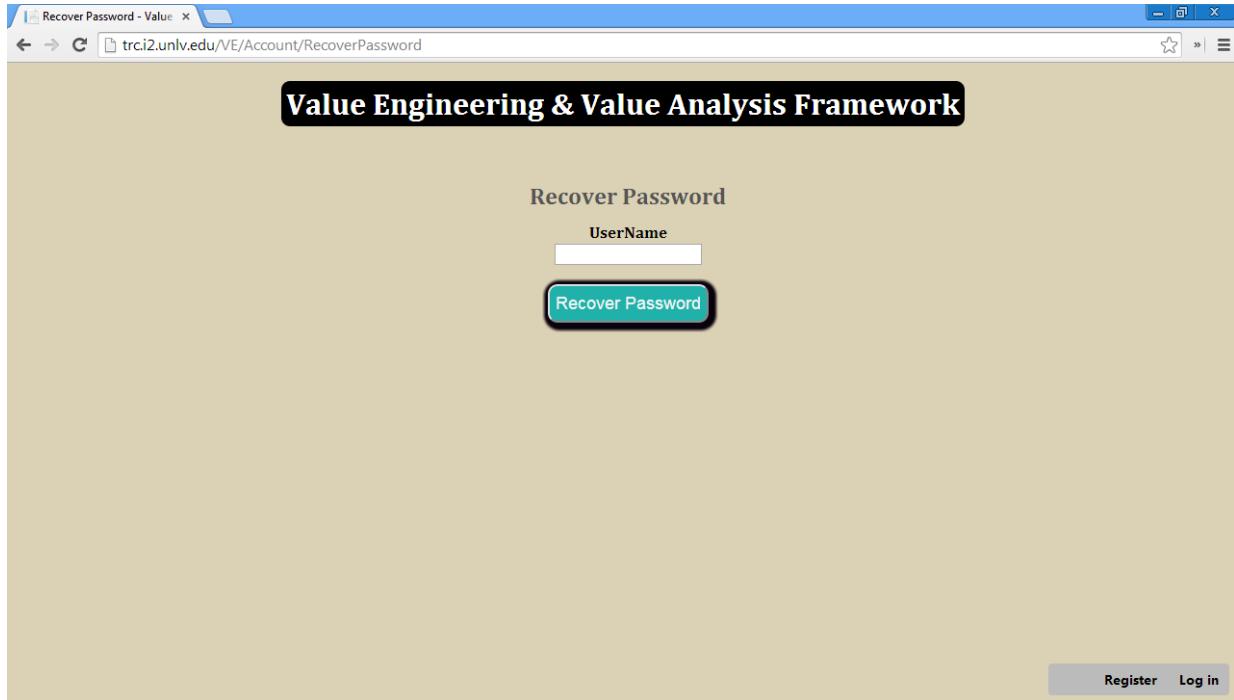


FIGURE 9 Recover password.

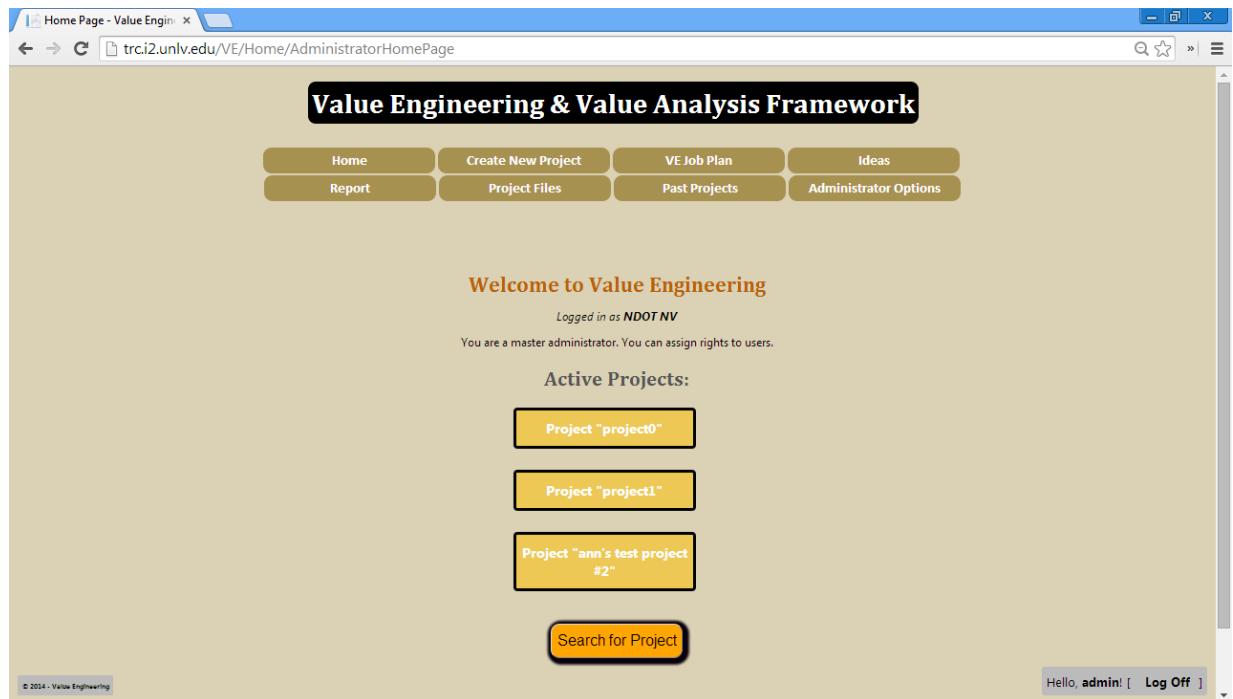


FIGURE 10 Website layout – logged in (Home Menu).

ACCESSING PROJECTS

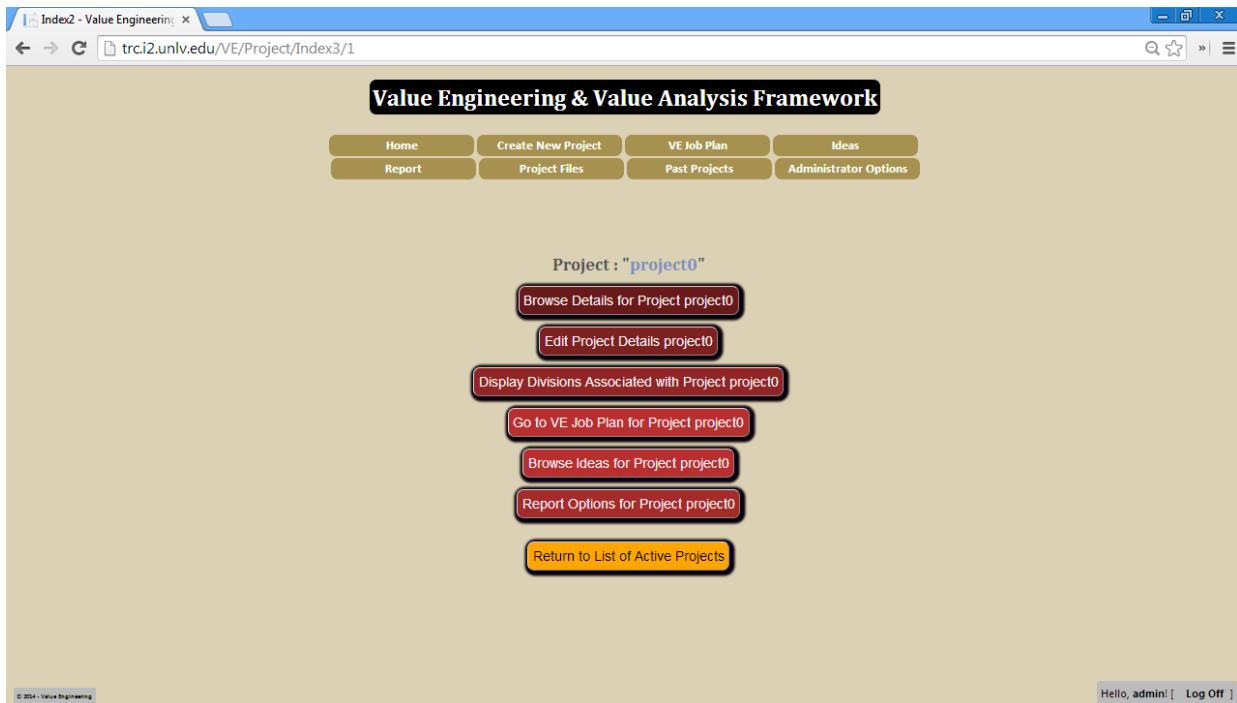


FIGURE 11 Home menu - project “Project 0”.

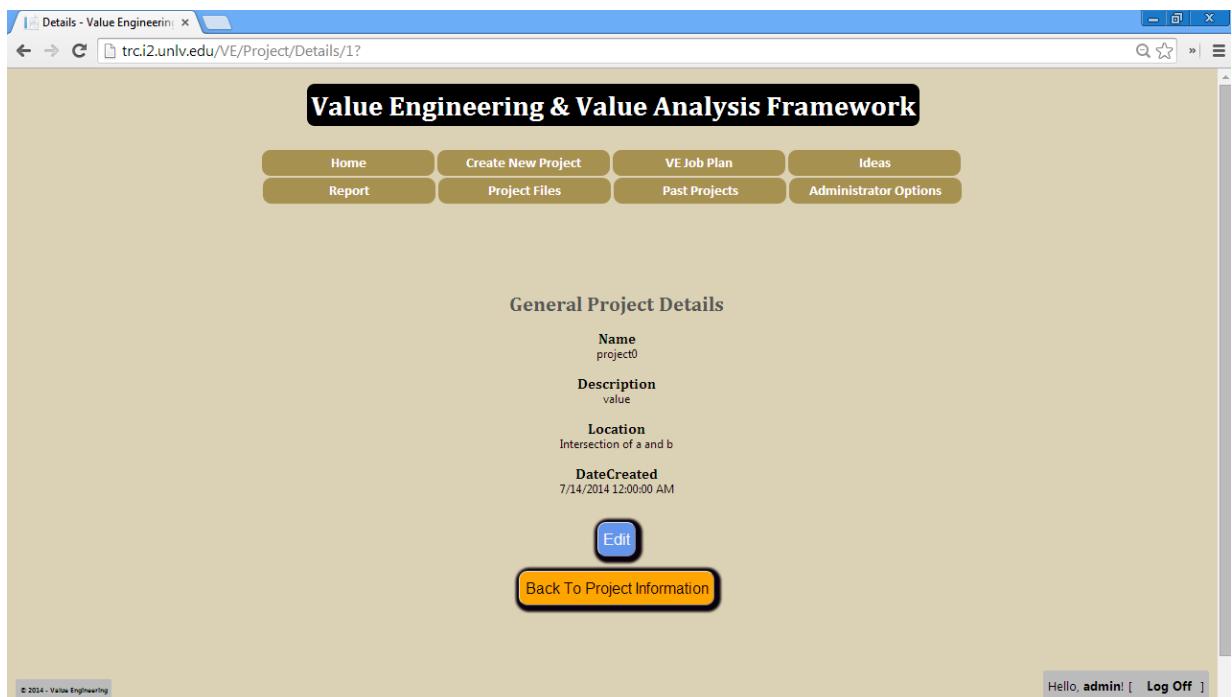


FIGURE 12 Project 0 Browse Details for “Project 0”.

Edit Project General Information

Name
project0

Description
value

Location
Intersection of a and b

Please "Save" any changes before leaving this page

Save

Back To Project Information

FIGURE 13 Editing the project general information.

Division Name	User Name	Name	Email Address
Bridge Division	t_n	diego@unlv-ti.com	

Other Divisions to Add

Select All Select None

- Construction
- Design
- District Manager Engineer
- Environmental
- HPMS & TIS
- Hydraulics
- Location
- Maintenance & Asset Management
- Materials
- Operations
- Planning
- Project Management
- Right of Way
- Safety

Add Selected Divisions

Back To Project Information

FIGURE 14 Associated divisions with “Project 0”.

Project Creation

Title
Description

Divisions required in project
(At least one division is required)

- Select All
- Clear All
- Bridge
- Construction
- Design
- District Manager Engineer
- Environmental
- HFMIS & TIS
- Hydraulics
- Location
- Maintenance & Asset Management
- Materials
- Operations
- Planning
- Project Management
- Right of Way
- Safety

Location
Intersection
OR enter Physical Address in text box

Next

FIGURE 15 Value engineering creation of new job.

PHASES

Value Engineering & Value Analysis Framework

Phase

- Selection
- Investigation
- Information
- Speculation
- Idea Generation
- Evaluation
- Development
- Presentation
- Implementation
- Audit

Division Data

Bridge

Selection (1/9)
Project : "project0"

What is to be studied?

Who is best able to study?

What must be known to start study?

Previous Phase Save Next Phase

FIGURE 16 Value engineering job plan for project 0. Phase 1: Selection.

The screenshot shows the 'Value Engineering & Value Analysis Framework' application. At the top, there's a navigation bar with links for Home, Create New Project, VE Job Plan, Ideas, and Administrator Options. Below the navigation bar, a sidebar on the left lists the investigation phases: Selection, Investigation, Information, Speculation, Idea Generation, Evaluation, Development, Presentation, Implementation, and Audit. A central column displays the 'Investigation Phase Check List' for project "project0". It includes a title, a dropdown menu for choosing the investigation phase section (with options like General, Specifications, Engineering & Design, Methods & Processes, Materials, Maintenance, and Function & Worth), and buttons for Previous Phase and Next Phase. On the right side, there's a 'Division Data' section labeled 'Bridge'. At the bottom, there are copyright information, a log off button, and a back-to-VE Job Plan link.

FIGURE 17 Phase 2: Investigation.

This screenshot shows the 'Value Engineering & Value Analysis Framework' application, specifically the 'General' section of the 'Investigation (2/9)' page. The interface is similar to Figure 17, with a navigation bar, a sidebar for phases, and a central content area. The content area displays the 'Investigation (2/9) : General Section (1/7)' for project "project0". It contains three large text input fields with placeholder text: 'What does it Accomplish?', 'How does it relate to other systems?', and 'Are functional requirements understood?'. Below these fields are buttons for Previous Section, Save, Next Section, and Back to VE Job Plan. The right side features a 'Division Data' section labeled 'Bridge'. The bottom includes standard footer elements like copyright and log off.

FIGURE 18 Phase 2: Investigation; Section 1 // General.

Investigation (2/9) - Value x trc.i2.unlv.edu/VE/VejpInvestigation/Edit/1?sectionToEdit=Specifications

Value Engineering & Value Analysis Framework

- [Home Report](#)
- [Create New Project](#)
- [VE Job Plan](#)
- [Past Projects](#)
- [Help](#)
- [Administrator Options](#)

Division Data [Logout](#)

Phase: Selection [Print](#)

Investigation (2/9) : Specifications Section (2/7)
Project: "project"

Are specifications required?

On a modification of specifications simplicity design and construction?

Are there any specifications required?

Are all performance and environmental requirements fully met?

Has all specification been interpreted correctly?

What are the design's characteristics?

Are there any design or process improvements?

[Previous Section](#) [Save](#) [Next Section](#)

[Save & Go To Job Plan](#)

© 2014 - Value Engineering [Web admin](#) | [Log Off](#)

FIGURE 19 Phase 2: Investigation; Section 2 // Specification.

Investigation (2/9) - Value x trc.i2.unlv.edu/VE/VejpInvestigation/Edit/1?sectionToEdit=Engineering

Value Engineering & Value Analysis Framework

- [Home Report](#)
- [Create New Project](#)
- [VE Job Plan](#)
- [Past Projects](#)
- [Help](#)
- [Administrator Options](#)

Division Data [Logout](#)

Phase: Selection [Print](#)

Investigation (2/9) : Engineering Section (3/7)
Project: "project"

What defined the requirements?

Does the design meet or exceed those set forth in the Concept Design?

Other alternatives were considered during the design?

Are any changes to the design planned?

Do the drawings reflect those of the art?

What is the design life?

What are the Life Cycle Costs?

[Previous Section](#) [Save](#) [Next Section](#)

[Save & Go To Job Plan](#)

© 2014 - Value Engineering [Web admin](#) | [Log Off](#)

FIGURE 20 Phase 2: Investigation; Section 3 // Engineering.

Value Engineering & Value Analysis Framework

Phase

- Selection
- Investigation
- Information
- Speculation
- Idea Generation
- Evaluation
- Development
- Presentation
- Implementation
- Audit

Division Data

Bridge

Investigation (2/9) : Methods Section (4/7)
Project : "project"

Can functions be combined, simplified or eliminated?

How is construction performed and why?

Are high-cost areas or items identified?

What is the schedule?

Previous Section Save Next Section Back to VE Job Plan

Hello, admin [Log Off]

FIGURE 21 Phase 2: Investigation; Section 4 // Methods.

Value Engineering & Value Analysis Framework

Phase

- Selection
- Investigation
- Information
- Speculation
- Idea Generation
- Evaluation
- Development
- Presentation
- Implementation
- Audit

Division Data

Bridge

Investigation (2/9) : Materials Section (5/7)
Project : "project"

Are special materials specified?

Were alternative materials considered?

Are the specified materials hazardous or difficult to handle?

Are there new materials that may perform the same function?

Previous Section Save Next Section Back to VE Job Plan

Hello, admin [Log Off]

FIGURE 22 Phase 2: Investigation; Section 5 // Materials.

Investigation (2/9) - Value x

[trc.i2.unlv.edu/VE/VejpInvestigation/Edit/1?sectionToEdit=Maintenance](#) Search

Value Engineering & Value Analysis Framework

[Home](#) [Create New Project](#) [VE Job Plan](#) [Ideas](#)
[Report](#) [Project Files](#) [Past Projects](#) [Administrator Options](#)

Phase

- Selection
- Investigation
- Information
- Speculation
- Idea Generation
- Evaluation
- Development
- Presentation
- Implementation
- Audit

Investigation (2/9) : Maintenance Section (6/7)

Project : "project0"

Has the Maintenance Division been consulted?

What is normal maintenance?

[Previous Section](#) [Save](#) [Next Section](#)
[Back to VE Job Plan](#)

Hello, admin! [Log Off]

FIGURE 23 Phase 2: Investigation; Section 6 // Maintenance.

Investigation (2/9) - Value x

[trc.i2.unlv.edu/VE/VejpInvestigation/Edit/1?sectionToEdit=Worth](#) Search

Value Engineering & Value Analysis Framework

[Home](#) [Create New Project](#) [VE Job Plan](#) [Ideas](#)
[Report](#) [Project Files](#) [Past Projects](#) [Administrator Options](#)

Phase

- Selection
- Investigation
- Information
- Speculation
- Idea Generation
- Evaluation
- Development
- Presentation
- Implementation
- Audit

Investigation (2/9) : Function and Worth Section (7/7)

Project : "project0"

Has a worth been established for each function?

Has a target cost been determined for each function?

Has target cost been determined for each function?

Are key necessary features captured?

Can a function be eliminated entirely or partially?

Does it cost more than its worth?

Has all high and low necessary cost ranges been identified?

Are further 10% margins on costs visible?

[Previous Section](#) [Save](#) [Next Section](#)
[Back to VE Job Plan](#)

Hello, admin! [Log Off]

FIGURE 24 Phase 2: Investigation; Section 7 // Function and Worth.

Information (3/9) - Value | x
trci2.unlv.edu/VE/VejpInformation/TableOfItems/1

Value Engineering & Value Analysis Framework

Home
Create New Project
VE Job Plan
Ideas

Report
Project Files
Past Projects
Administrator Options

Phase
Division Data

Selection
Bridge

Investigation

Information

Speculation

Idea Generation

Evaluation

Development

Presentation

Implementation

Audit

Information (3/9)
 Project : "project0"

Information Phase - Function Analysis
 Project: project0
 Function:

Item No.	Description	Function Verb	Function Noun	Initial Dollars Cost	Initial Dollars % of Total	Initial Dollars Worth/Save	Update

Add Item to information

Previous Phase
Save
Next Phase

Hello, admin! [Log Off]

FIGURE 25 Phase 3: Information.

Speculation (4/9) - Value | x
trci2.unlv.edu/VE/VejpSpeculation/Edit/1

Value Engineering & Value Analysis Framework

Home
Create New Project
VE Job Plan
Ideas

Report
Project Files
Past Projects
Administrator Options

Phase
Division Data

Selection
Bridge

Investigation

Information

Speculation

Idea Generation

Evaluation

Development

Presentation

Implementation

Audit

Speculation (4/9)
 Project : "project0"

What else will perform the function?

Where else may function be done?

How else may function be done?

Previous Phase
Save
Next Phase

Hello, admin! [Log Off]

FIGURE 26 Phase 4: Speculation.

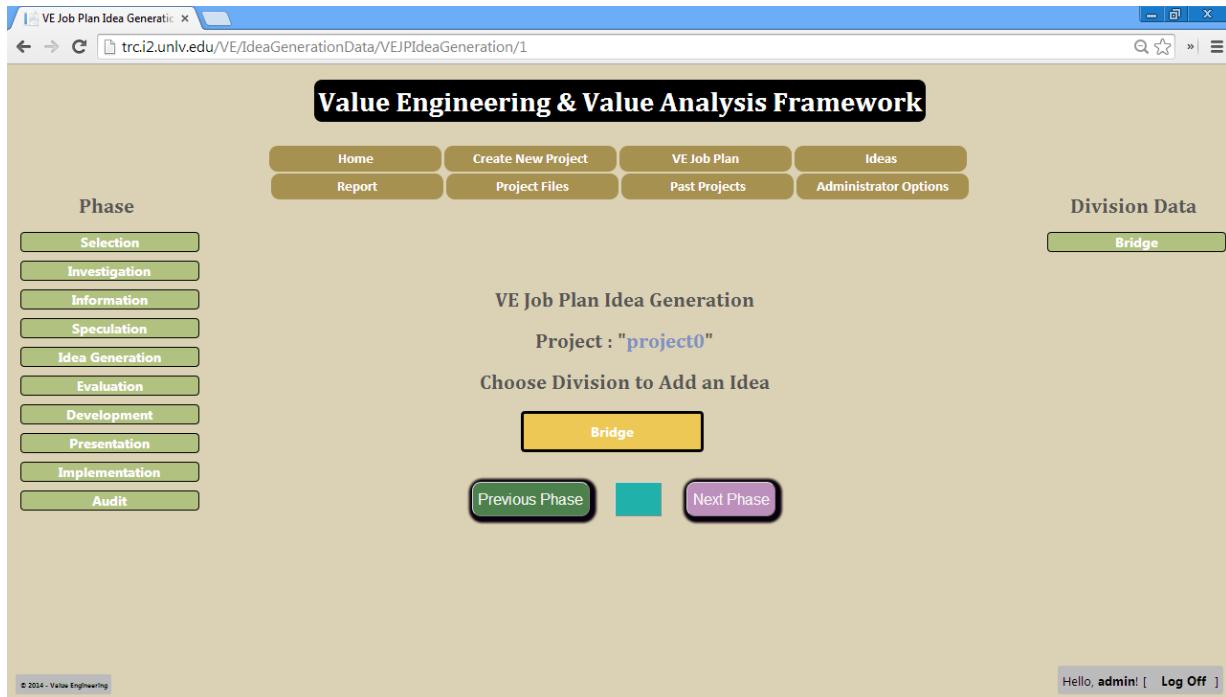


FIGURE 27 Phase 5: Idea Generation.

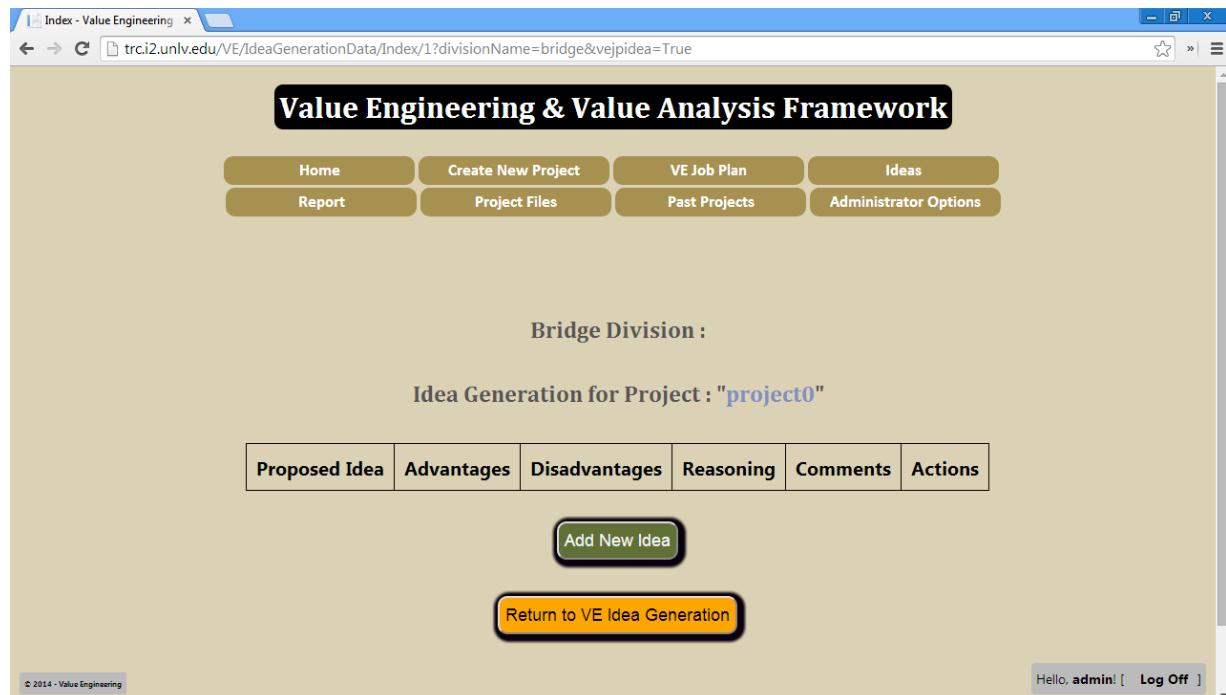


FIGURE 28 Phase 5: Idea Generation (to add idea).

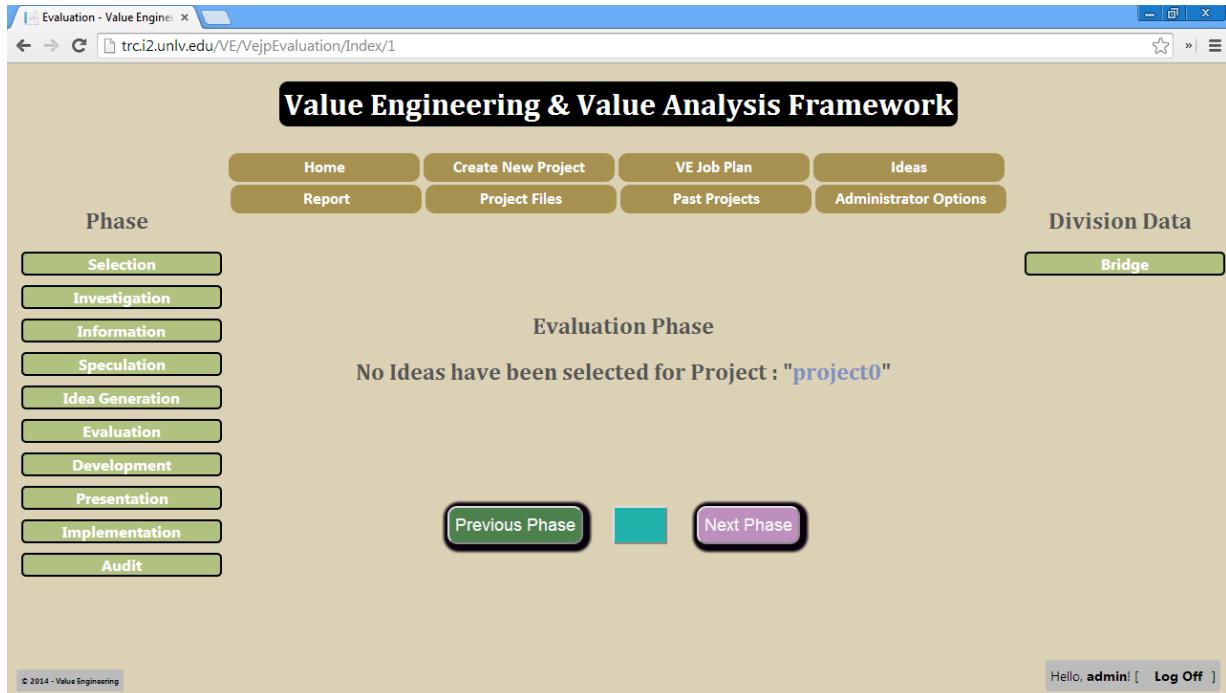


FIGURE 29 Phase 6: Evaluation.

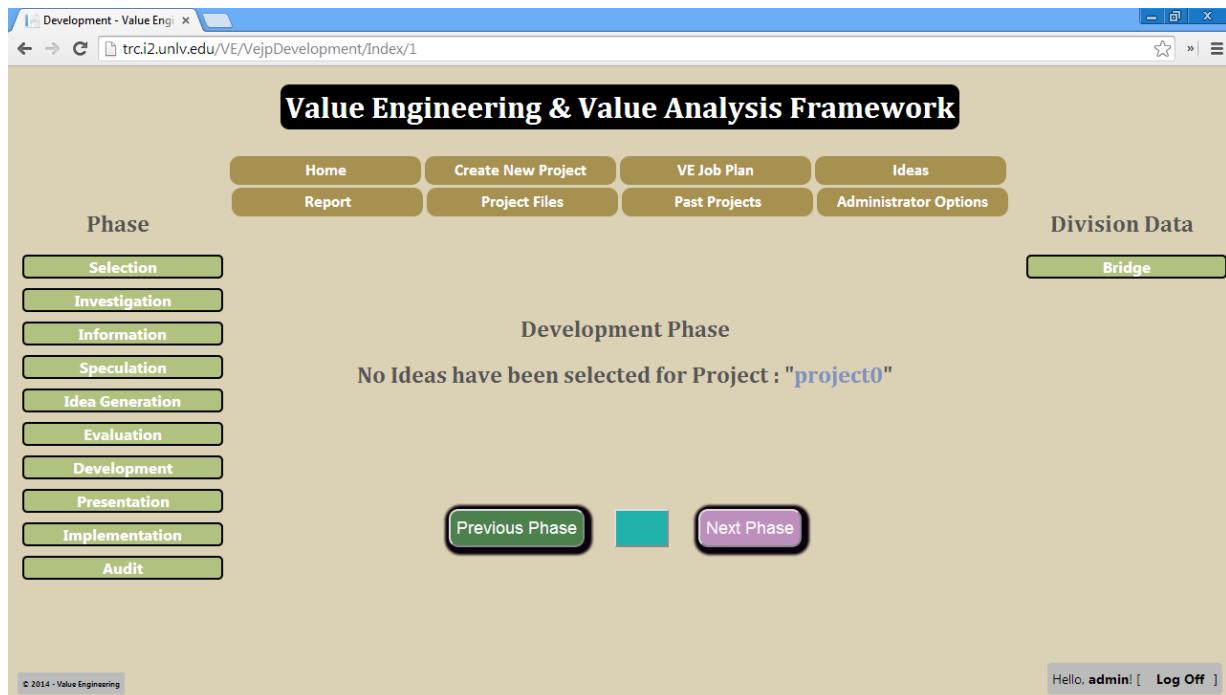


FIGURE 30 Phase 7: Development.

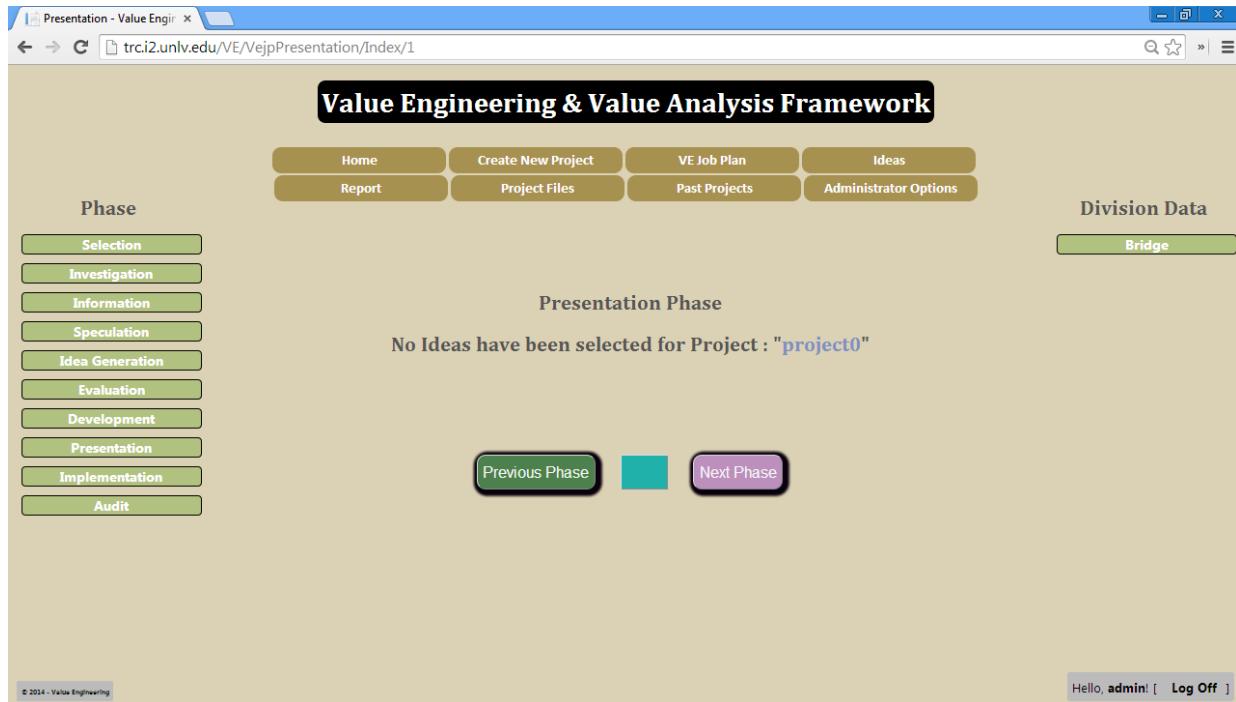


FIGURE 31 Phase 8: Presentation.

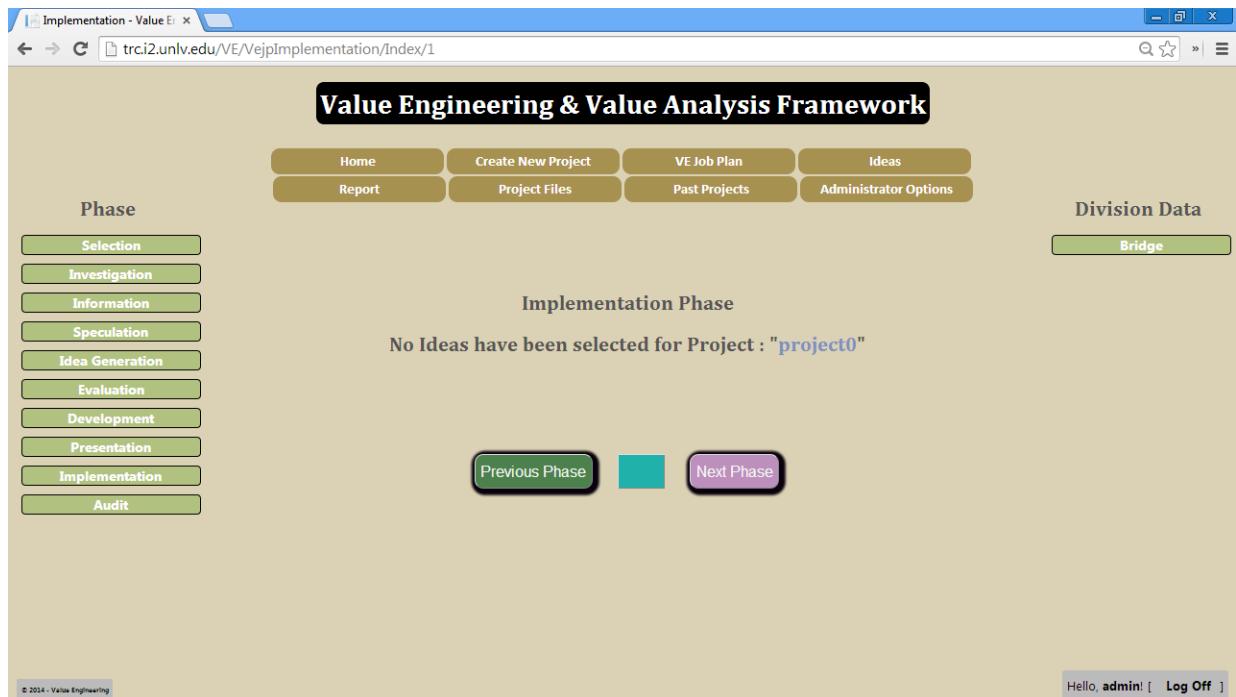


FIGURE 32 Phase 9: Implementation.

The screenshot shows a web-based application titled "Value Engineering & Value Analysis Framework". The main title bar says "Audit (9/9) - Value Enginee". The URL in the address bar is "trc.i2.unlv.edu/VE/VejpAudit/Edit/1". The page has a header with "Value Engineering & Value Analysis Framework" and a navigation menu with "Home", "Create New Project", "VE Job Plan", "Ideas", "Report", "Project Files", "Past Projects", and "Administrator Options". On the left, there's a vertical sidebar titled "Phase" with a list of steps: Selection, Investigation, Information, Speculation, Idea Generation, Evaluation, Development, Presentation, Implementation, and Audit. The "Audit" button is highlighted. On the right, there's a section titled "Division Data" with a "Bridge" button. The main content area is titled "Audit (9/9)" and "Project : 'project0'". It contains four large text input fields with the following questions: "Did the new way work?", "What did it cost?", "What was saved?", and "Did the change meet expectations?". Below these fields are three buttons: "Previous Phase", "Save", and "Next Phase". At the bottom right, there's a "Hello, admin! [Log Off]" message.

FIGURE 33 Phase 10: Audit.

IDEAS

The screenshot shows a web-based application titled "Value Engineering & Value Analysis Framework". The main title bar says "Projects - Value Engineering". The URL in the address bar is "trc.i2.unlv.edu/VE/Project/IdeasByProject". The page has a header with "Value Engineering & Value Analysis Framework" and a navigation menu with "Home", "Create New Project", "VE Job Plan", "Ideas", "Report", "Project Files", "Past Projects", and "Administrator Options". The main content area is titled "See Ideas for:". Below this, there are four yellow rectangular buttons, each labeled with a project name: "Project 'project0'", "Project 'project1'", "Project 'Ann's test project'", and "Project 'ann's test project #2'". At the bottom right, there's a "Hello, admin! [Log Off]" message.

FIGURE 34 Value Engineering Ideas.

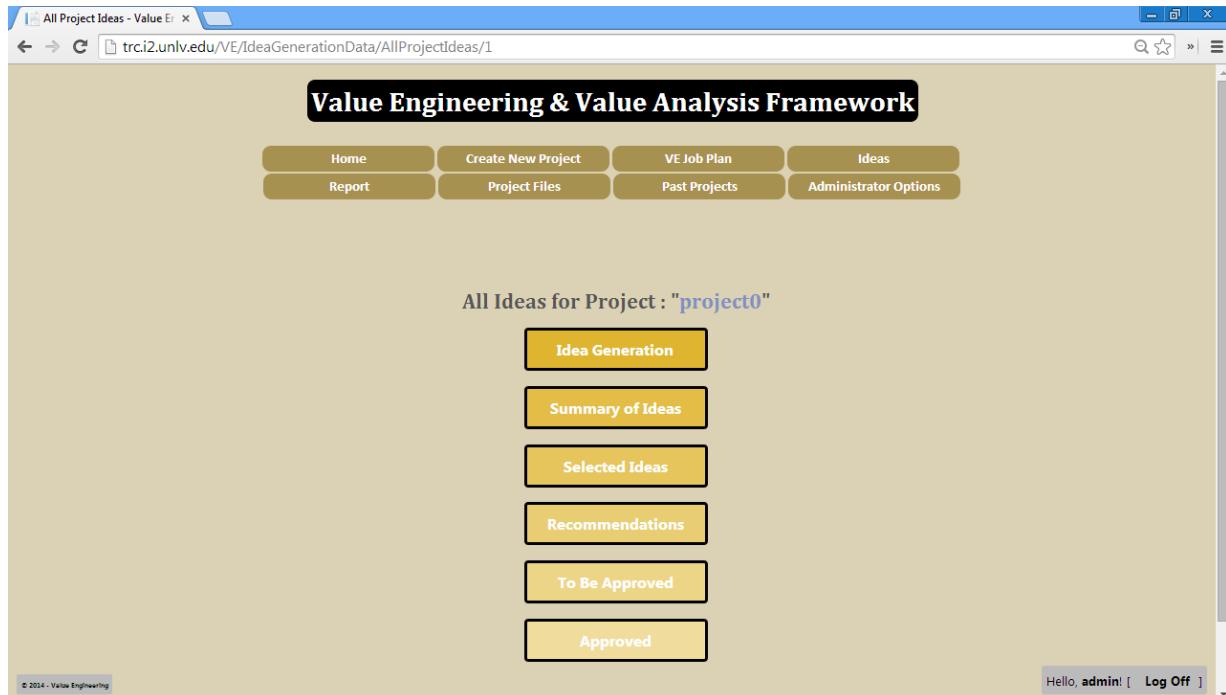


FIGURE 35 Value Engineering Ideas for “Project 0”.

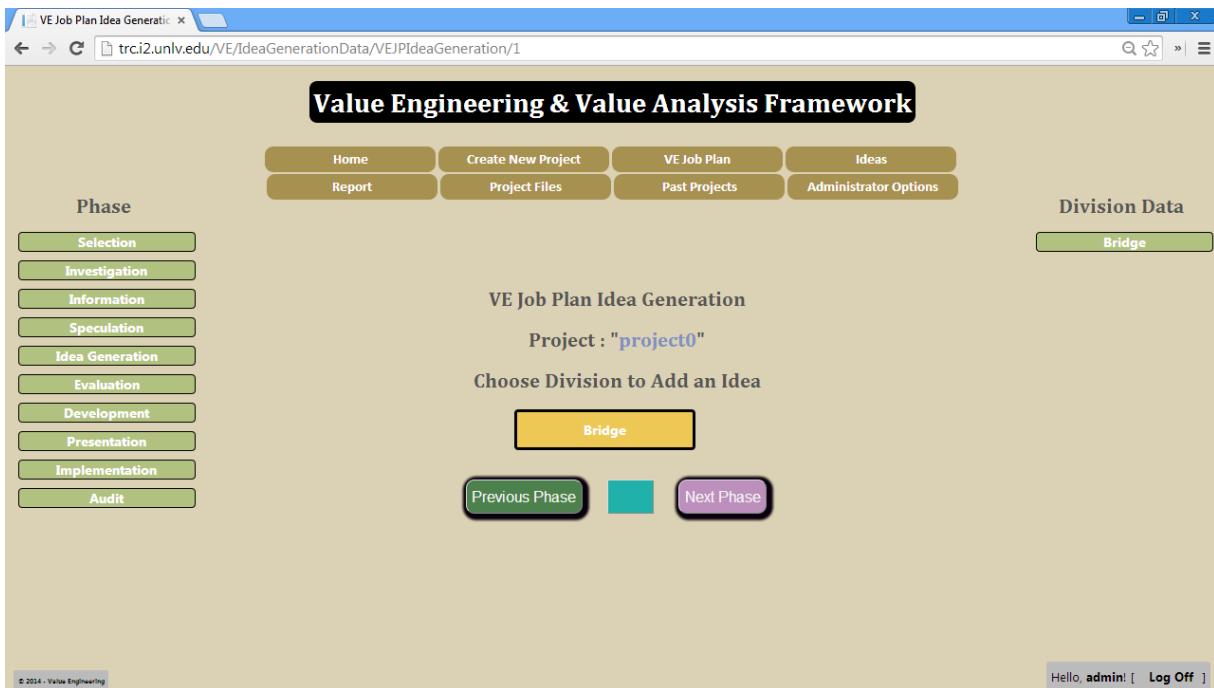


FIGURE 36 Idea Generation for “Project 0”.

The screenshot shows a web browser window titled "Index - Value Engineering". The URL is "trci2.unlv.edu/VE/IdeaGenerationData/Index/1?divisionName=bridge&vejpidea=True". The main title is "Value Engineering & Value Analysis Framework". Below it is a navigation menu with tabs: Home, Report, Create New Project, Project Files, VE Job Plan, Past Projects, Ideas, Administrator Options. The main content area is titled "Bridge Division : Idea Generation for Project : 'project0'". It features a table with columns: Proposed Idea, Advantages, Disadvantages, Reasoning, Comments, Actions. Below the table are two buttons: "Add New Idea" and "Return to VE Idea Generation". At the bottom left is a copyright notice "© 2014 - Value Engineering" and at the bottom right is a log-off link "Hello, admin! [Log Off]".

FIGURE 37 Idea Generation “Project 0” (Bridge Division).

The screenshot shows a web browser window titled "Selected Ideas - Value Eng". The URL is "trci2.unlv.edu/VE/IdeaGenerationData/SummaryOfProjectIdeas/1". The main title is "Value Engineering & Value Analysis Framework". Below it is a navigation menu with tabs: Home, Report, Create New Project, Project Files, VE Job Plan, Past Projects, Ideas, Administrator Options. On the left, there are four green buttons: "Generate Ideas", "Select Ideas", "Recommend Ideas", and "Return to Project Ideas". The main content area is titled "Summary of Ideas for Project : 'project0'". It features a table with two sections: "Creative Phase Creative Idea Listing" and "Judgement Phase Idea Evaluation". The "Creative Phase" section has columns: No., Creative Idea, Advantages, Disadvantages, Reasoning. The "Judgement Phase" section has columns: Comments, Select Idea, Average Rating, DETAILS. Below the table is a "Rating Key : 1 - High, 3 - Medium, 5 - Low". At the bottom left is a copyright notice "© 2014 - Value Engineering" and at the bottom right is a log-off link "Hello, admin! [Log Off]".

FIGURE 38 Summary of Idea Generation for “Project 0”.

The screenshot shows a web browser window titled "Selected Ideas - Value Eng". The URL is "trc.i2.unlv.edu/VE/IdeaGenerationData/SelectedProjectIdeas/1". The main title is "Value Engineering & Value Analysis Framework". A navigation menu at the top includes "Home", "Create New Project", "VE Job Plan", "Ideas", "Report", "Project Files", "Past Projects", and "Administrator Options". On the left, there are four buttons: "Generate Ideas", "Select Ideas", "Recommend Ideas", and "Return to Project Ideas". The central area displays a table titled "Selected Ideas for 'project0' Project" with columns: No., Creative Idea, Comments, Rating, Recommend, and DETAILS. Below the table is a note: "Rating Key : 1 - High, 3 - Medium, 5 - Low". At the bottom right, it says "Hello, admin! [Log Off]".

FIGURE 39 Selected Ideas for “Project 0”.

The screenshot shows a web browser window titled "Selected Ideas - Value Eng". The URL is "trc.i2.unlv.edu/VE/IdeaGenerationData/AllProjectRecommendations/1". The main title is "Value Engineering & Value Analysis Framework". A navigation menu at the top includes "Home", "Create New Project", "VE Job Plan", "Ideas", "Report", "Project Files", "Past Projects", and "Administrator Options". On the left, there are four buttons: "Generate Ideas", "Select Ideas", "Recommend Ideas", and "Return to Project Ideas". The central area displays two tables. The first table is titled "All Recommendations for 'project0' Project" with columns: No., Recommendation, Select, and DETAILS. The second table is titled "Selected Recommendations for 'project0' Project" with columns: No., Recommendation, and Approval Status. At the bottom right, it says "Hello, admin! [Log Off]".

FIGURE 40 Recommendation for “Project 0”.

The screenshot shows a web browser window titled "Ideas Approve - Value Eng". The URL is "trci2.unlv.edu/VE/IdeaGenerationData/IdeasToBeApproved/". The main title is "Value Engineering & Value Analysis Framework". A navigation bar at the top includes "Home", "Report", "Create New Project", "Project Files", "VE Job Plan", "Past Projects", "Ideas", and "Administrator Options". On the left, there are four green buttons: "Generate Ideas", "Select Ideas", "Recommend Ideas", and "Return to Project Ideas". The central area is titled "Recommended Ideas Pending Approval for 'project0' Project". It features a table with columns "No.", "Recommended Idea", "Action", and "Current Approval Status". At the bottom right, it says "Hello, admin! [Log Off]".

FIGURE 41 Pending Ideas for “Project 0”.

The screenshot shows a web browser window titled "Approved Ideas - Value Eng". The URL is "trci2.unlv.edu/VE/IdeaGenerationData/IdeasApproved/". The main title is "Value Engineering & Value Analysis Framework". A navigation bar at the top includes "Home", "Report", "Create New Project", "Project Files", "VE Job Plan", "Past Projects", "Ideas", and "Administrator Options". On the left, there are four green buttons: "Generate Ideas", "Select Ideas", "Recommend Ideas", and "Return to Project Ideas". The central area is titled "Approved Ideas for 'project0' Project". It features a table with columns "No.", "Idea", and "Action". At the bottom right, it says "Hello, admin! [Log Off]".

FIGURE 42 Approved Ideas for “Project 0”.



FIGURE 43 Value Engineering Reports.

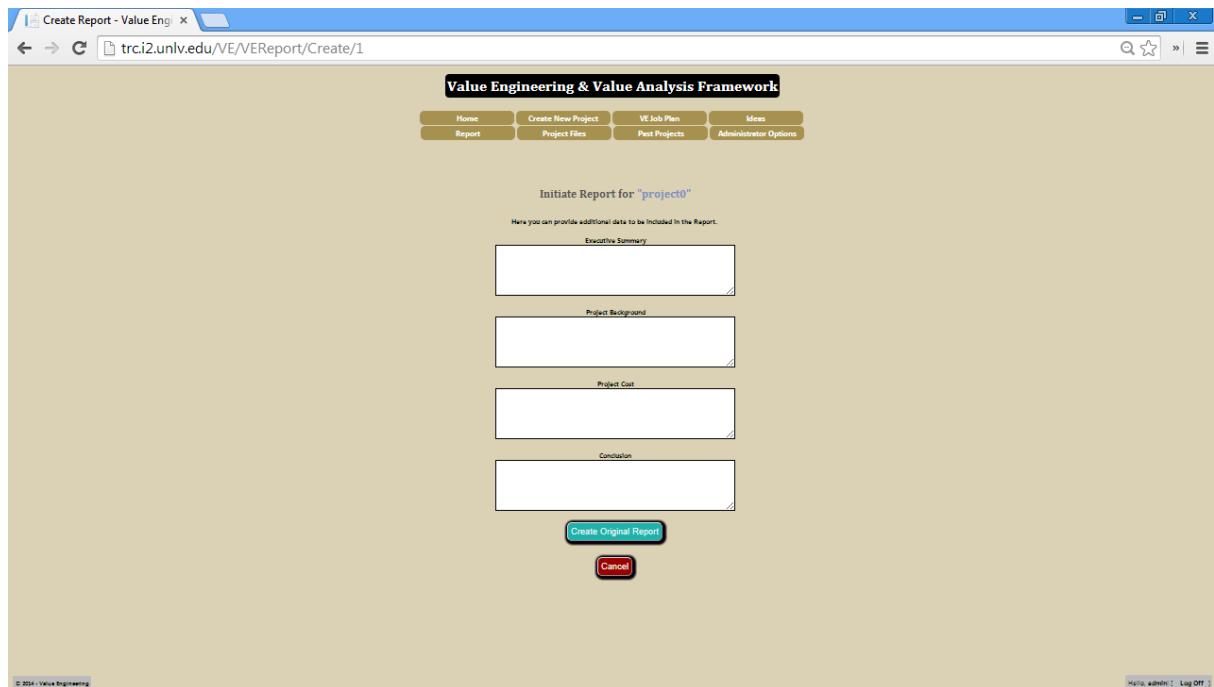


FIGURE 44 Initiate Report for “Project 0”.

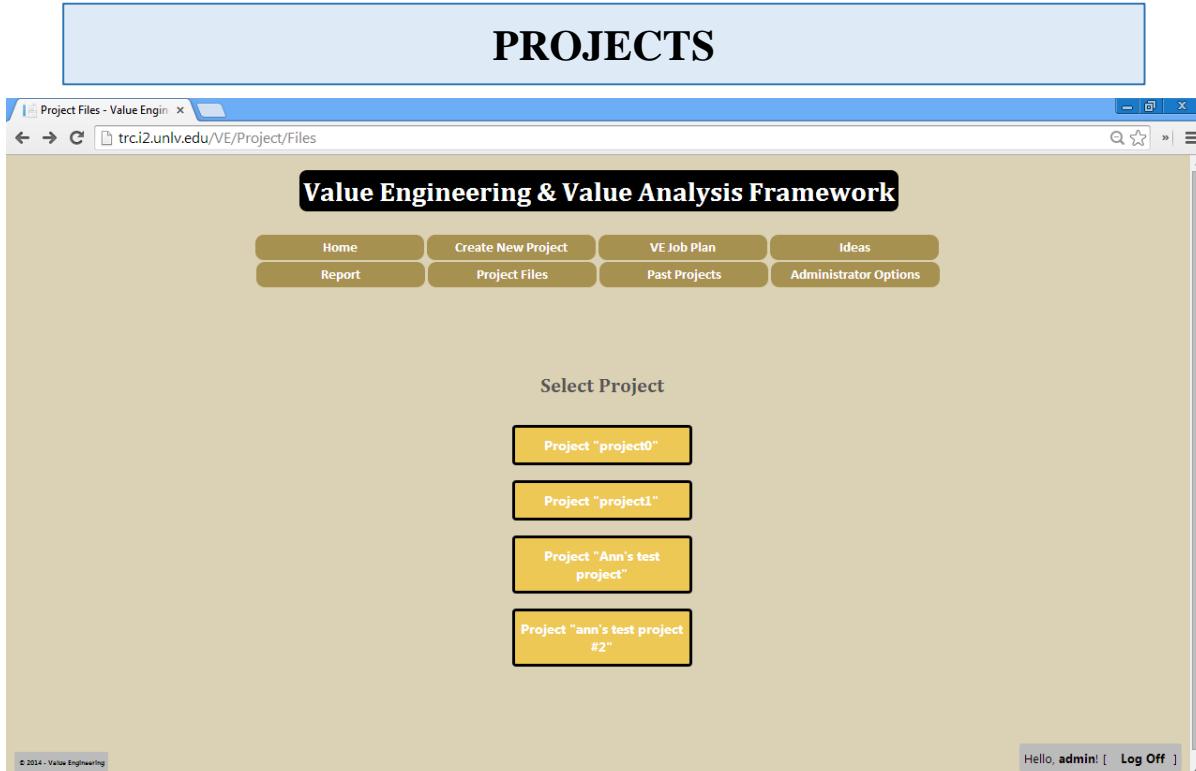


FIGURE 45 Value Engineering Project Files.

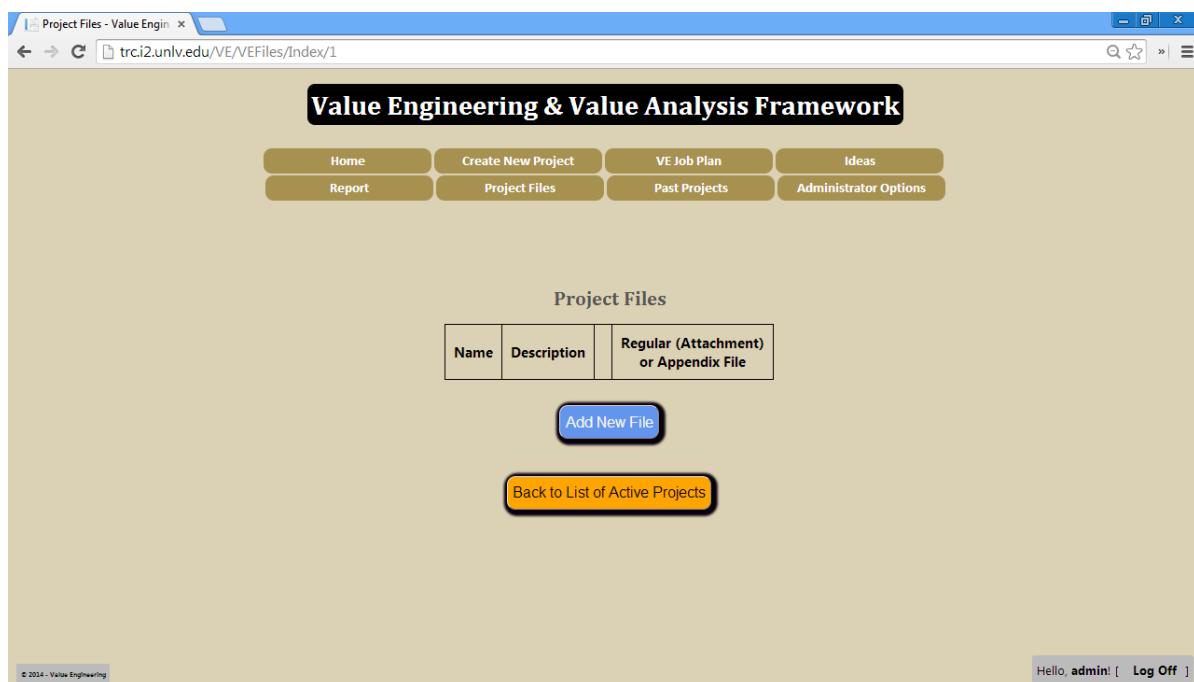


FIGURE 46 Project Files for “Project 0”.

The screenshot shows a web browser window titled "Add New Project File - Val" with the URL "trci2.unlv.edu/VE/VEFiles/AddFile/1?". The main title is "Value Engineering & Value Analysis Framework". The navigation menu includes "Home", "Report", "Create New Project", "Project Files", "VE Job Plan", "Past Projects", "Ideas", and "Administrator Options". The main content area is titled "Add a New Project File (Regular or Appendix)". It features a "Description" text area, a dropdown menu set to "Regular File (Attachment)", a "Choose File" button with the message "No file chosen", and an "Add File" button. Below these is a "Back to List" link. The footer includes copyright information "© 2014 - Value Engineering" and a log-off link "Hello, admin! [Log Off]."

FIGURE 47 Add new project file.

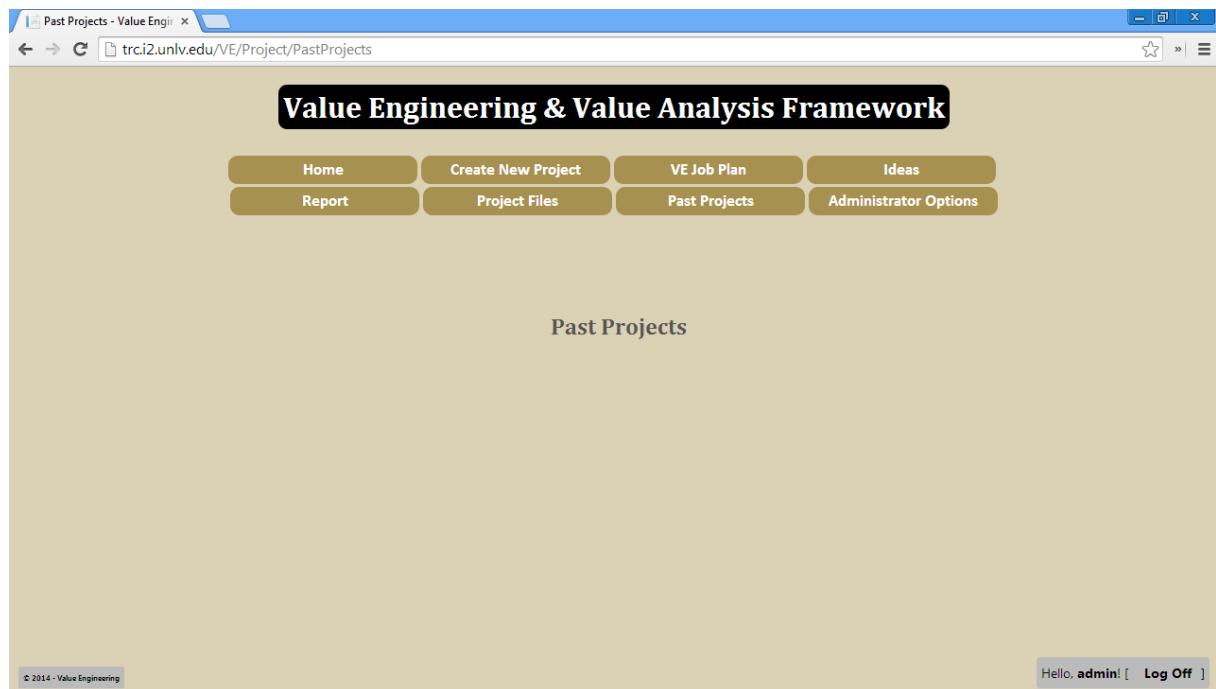


FIGURE 48 Value Engineering Past Projects.

ADMINISTRATOR OPTIONS

The screenshot shows a web browser window titled "Edit Project General Info" with the URL "trci2.unlv.edu/VE/Project/AdministratorOptions". The page has a header "Value Engineering & Value Analysis Framework" and a navigation menu with tabs: Home, Create New Project, VE Job Plan, Ideas, Report, Project Files, Past Projects, and Administrator Options. Below the menu, there are four main sections: "Browse Current User Information" with a "Browse" button, "Browse Current Active Projects" with a "Browse" button, "Search for Project(s) (Active or Closed)" with a "Search" button, and "Browse Current SMPT Email Account Information" with a "Browse" button. A copyright notice "© 2014 - Value Engineering" is at the bottom left, and a log-off link "Hello, admin! [Log Off]" is at the bottom right.

FIGURE 49 Administrator options.

The screenshot shows a web browser window titled "user Rights - Value Engine" with the URL "trci2.unlv.edu/VE/VEAUser/CurrentRights?". The page has a header "Value Engineering & Value Analysis Framework" and a navigation menu with tabs: Home, Create New Project, VE Job Plan, Ideas, Report, Project Files, Past Projects, and Administrator Options. Below the menu, there is a section titled "User Rights" containing a table with six rows of user information. The table columns are: User Name, First Name, Last Name, Email Address, Access Level, and Actions. The actions column contains three buttons: "Update Rights" (highlighted in green), "See User Details", and "Delete". The users listed are: aconlin (Ann Conlin, Super Administrator), aconlinbr (Ann - bridge lead, Bridge), aconlinsf (Ann - Safety Lead, Safety), aconlinrem (Ann - VE manager, VE Manager), ak755 (Ali Khan, Super Administrator), and t (t, n, diego@franco-technologies.com, Bridge). At the bottom of the table is a "Back to Administrator Options" button, and at the bottom right is a log-off link "Hello, admin! [Log Off]".

FIGURE 50 Current user information.

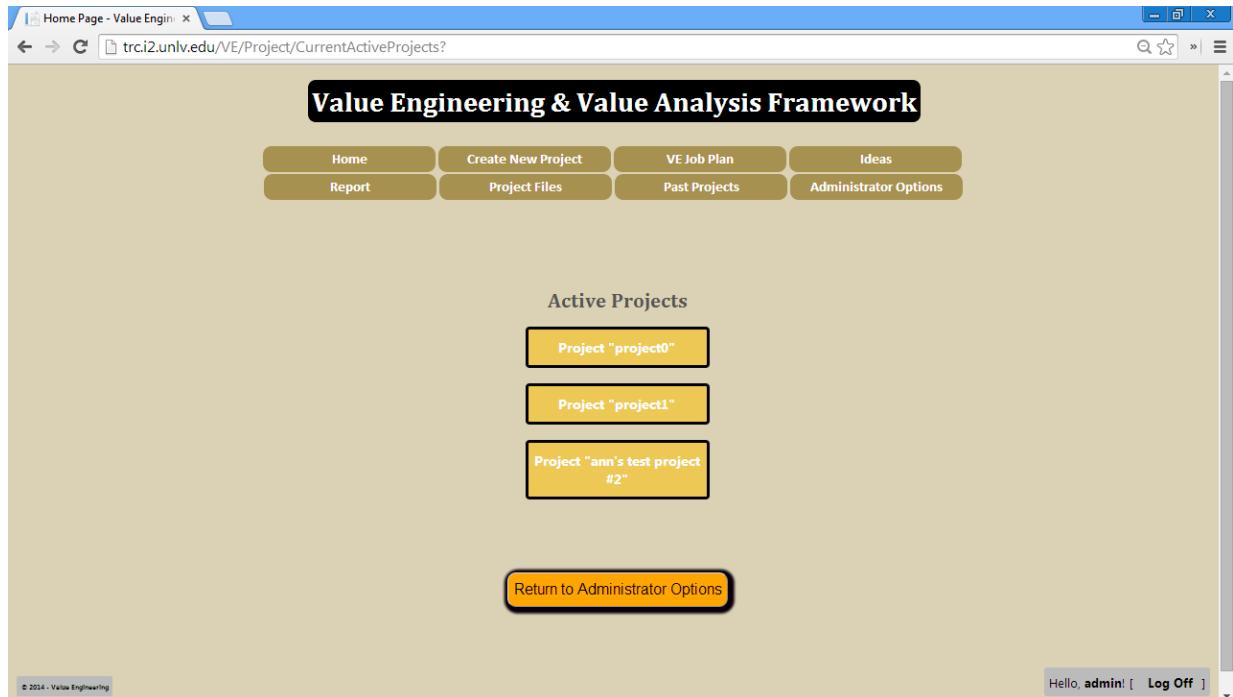


FIGURE 51 Current active projects.

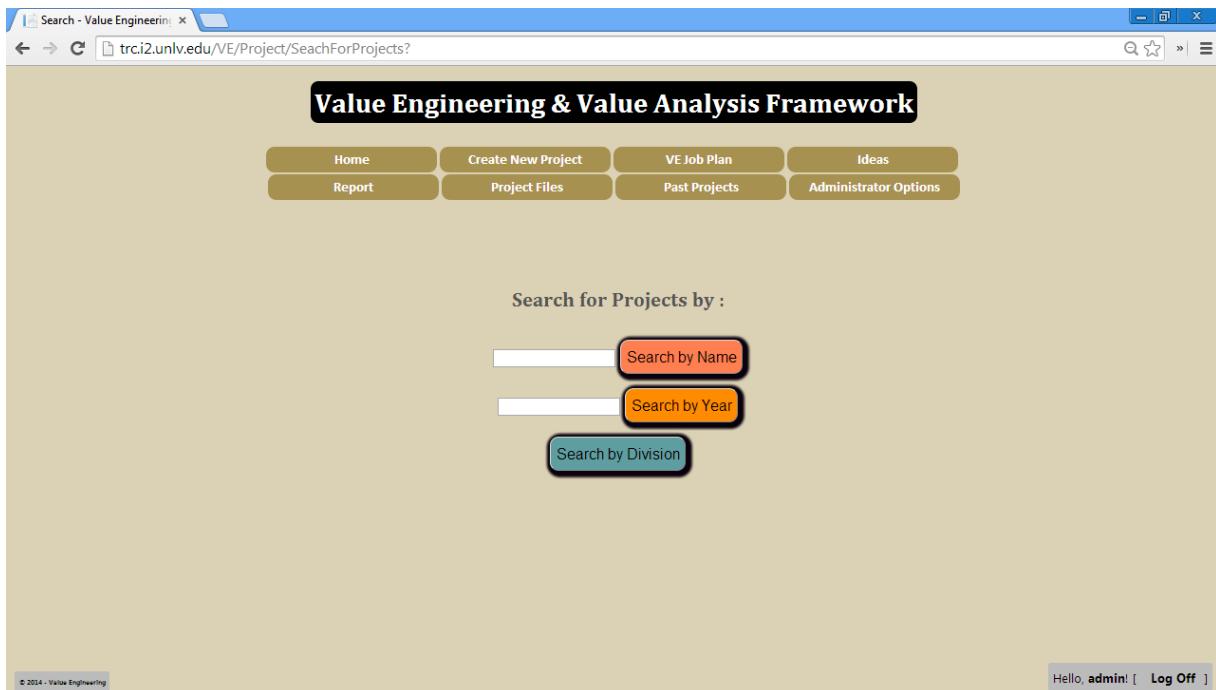


FIGURE 52 Search for projects.

The screenshot shows a web browser window titled "Index - Value Engineering". The URL is "trc.i2.unlv.edu/VE/SMTPSettings/Index?". The page has a header "Value Engineering & Value Analysis Framework" with a navigation menu: Home, Create New Project, VE Job Plan, Ideas, Report, Project Files, Past Projects, and Administrator Options.

The main content area is titled "SMTP Email Account(s)". It displays a table of two accounts:

Name	Port	Enable SSL?	Default Account?	Account User Name	Account Password	Account Options
smtp.ndot.com	587	Yes	Yes	ndot@ndot.com	ndotpassword	Edit Details Delete
smtp.ndot.nv.com	587	No	No	ndotsecondary@ndot.com	ndotpassword	Edit Set as Default Details Delete

Below the table is a button "Add New SMTP Email Account". At the bottom right, it says "Hello, admin! [Log Off]".

FIGURE 53 Browse current SMTP email accounts.

The screenshot shows a web browser window titled "Edit - Value Engineering". The URL is "trc.i2.unlv.edu/VE/SMTPSettings/Edit/3?". The page has a header "Value Engineering & Value Analysis Framework" with a navigation menu: Home, Create New Project, VE Job Plan, Ideas, Report, Project Files, Past Projects, and Administrator Options.

The main content area is titled "Edit SMTP Email Account". It contains the following fields:

- Host Name: smtp.ndot.com
- Port: 587
- SSL Enabled? (Click if Yes):
- Default Account? (Click if Yes):
- User Name: ndot@ndot.com
- Password: ndotpassword

At the bottom are buttons for "Save" (green), "Cancel" (red), and "Back to List" (black).

FIGURE 54 Editing SMTP email accounts.

The screenshot shows a web browser window titled "Details - Value Engineering" with the URL "trci2.unlv.edu/VE/SMTPSettings/Details/3?". The main title is "Value Engineering & Value Analysis Framework". Below it is a navigation bar with buttons for "Home", "Report", "Create New Project", "Project Files", "VE Job Plan", "Past Projects", "Ideas", and "Administrator Options". The main content area is titled "SMTP Email Account Details" and contains a table with the following data:

Host Name	smtp.ndot.com
Port	587
SSL Enabled?	Yes
Default Email Account	Yes
User Name	ndot@ndot.com
Password	ndotpassword

Below the table are two buttons: "Edit Account" (blue rounded rectangle) and "Back to List" (orange rounded rectangle). At the bottom right of the page is a log-in status bar: "Hello, admin! [Log Off]".

FIGURE 55 SMTP Account Details.

The screenshot shows a web browser window titled "Delete - Value Engineering" with the URL "trci2.unlv.edu/VE/SMTPSettings/Delete/3?". The main title is "Value Engineering & Value Analysis Framework". Below it is a navigation bar with buttons for "Home", "Report", "Create New Project", "Project Files", "VE Job Plan", "Past Projects", "Ideas", and "Administrator Options". The main content area is titled "Delete" and contains the message "Are you sure you want to delete this SMPT Email Account?". Below this is a table with the same data as Figure 55:

Host Name	smtp.ndot.com
Port	587
SSL Enabled?	✓
User Name	ndot@ndot.com
Password	ndotpassword

At the bottom are two buttons: "Delete" (orange rounded rectangle) and "Cancel" (yellow rounded rectangle). At the bottom right of the page is a log-in status bar: "Hello, admin! [Log Off]".

FIGURE 56 Deleting SMTP email account.

QUALITY CONTROL AND RISK MANAGEMENT

Throughout the project, stringent quality control protocols were put in place. The quality control protocols included conducting quality control at every step of the process to ensure the system was functioning as intended. As part of the quality control process, regular meetings were held with the NDOT Performance Analysis Division Chief and the Value Engineering coordinator to seek feedback and input as the project progressed.

APPENDICES
APPENDIX A
SYSTEM DOCUMENTATION



FIGURE 57 Entity relationship diagram of value engineering.

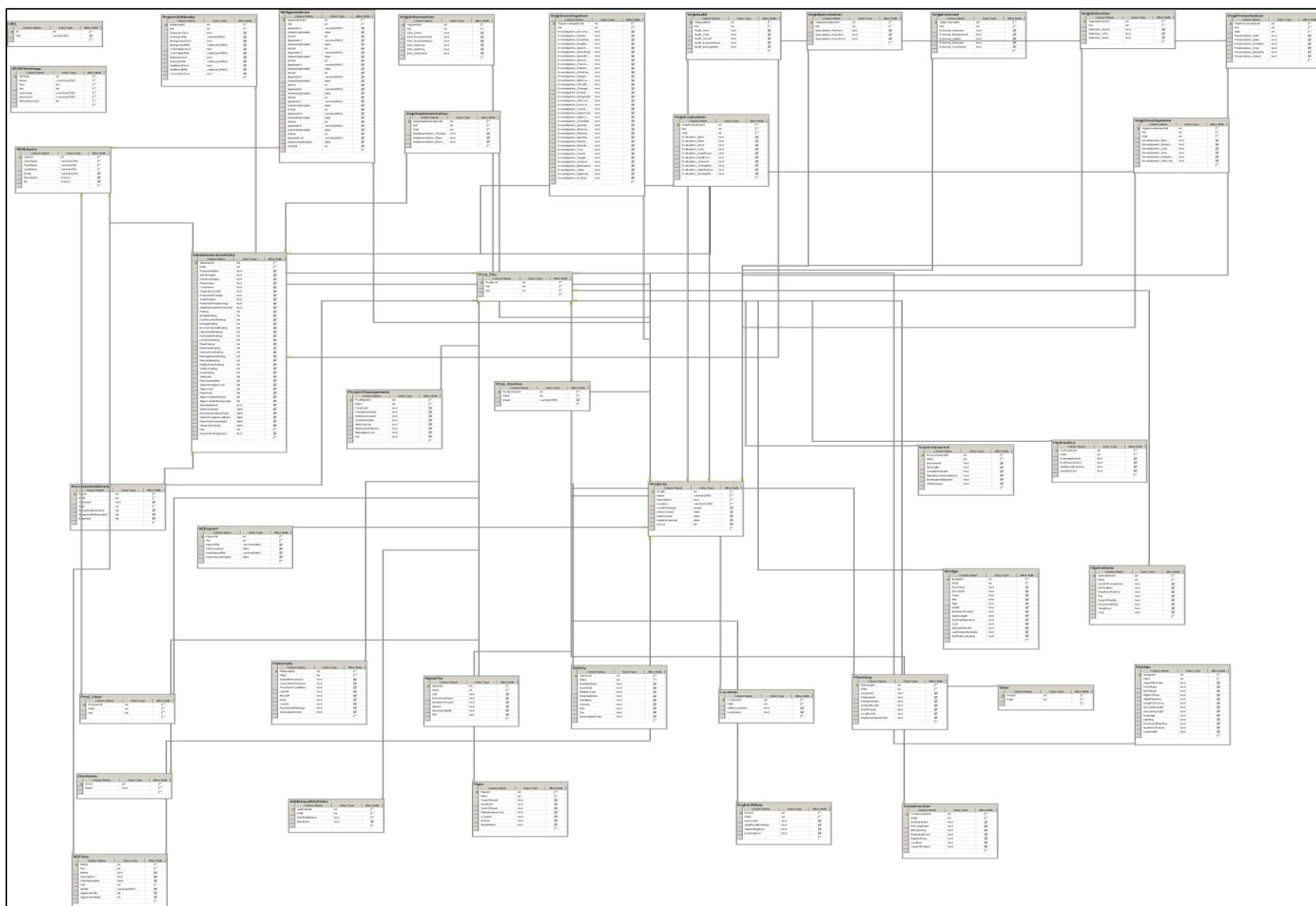


FIGURE 58 Entity relationship diagram.

APPENDIX B

DIAGRAM REPORT

Server	(local)
Author	UNLV - TRC
Created	13 August 2014 11:55
File Path	X:\Users\JeremyO\Documents\My Database Documentation\Value Engineering Document-2014-08-13T11-55-32.docx

Table of Contents	57
 (local)	59
 User databases	61
 veapp Database	62
 Tables	65
 [dbo].[AdditionalDivData].....	66
 [dbo].[Bridge]	67
 [dbo].[Construction].....	69
 [dbo].[Design]	71
 [dbo].[Divisions]	73
 [dbo].[Dme]	74
 [dbo].[Environmental]	75
 [dbo].[HpmsTis]	77
 [dbo].[Hydraulics].....	79
 [dbo].[IdeaGenerationData]	81
 [dbo].[Location]	85
 [dbo].[Mam]	86
 [dbo].[Materials]	88
 [dbo].[Operations]	90
 [dbo].[Planning]	92
 [dbo].[Proj_Div]	94
 [dbo].[Proj_Invitee]	95
 [dbo].[Proj_User]	96
 [dbo].[ProjectManagement]	97
 [dbo].[Projects]	99
 [dbo].[Recommendations]	100
 [dbo].[ReportAddenda]	102
 [dbo].[RightOfWay]	104
 [dbo].[Safety]	105
 [dbo].[SMTPSettings]	107
 [dbo].[URL]	108
 [dbo].[VEAppendices]	109
 [dbo].[VEAUsers]	112
 [dbo].[VEFiles]	113
 [dbo].[VejpAudit]	115
 [dbo].[VejpDevelopment]	116
 [dbo].[VejpEvaluation]	118
 [dbo].[VejpExternal]	120
 [dbo].[VejpImplementation]	121
 [dbo].[VejpInformation]	123
 [dbo].[VejpInvestigation]	125
 [dbo].[VejpPresentation]	128
 [dbo].[VejpSelection]	130
 [dbo].[VejpSpeculation]	131
 [dbo].[VEReport]	132

 Users.....	133
 apps	134
 apps_	135
 veapp.....	136
 Database Roles	137
 db_accessadmin	137
 db_backupoperator.....	137
 db_datareader.....	138
 db_datawriter.....	138
 db_ddladmin	139
 db_denydatareader	139
 db_denydatawriter	140
 db_owner	140
 db_securityadmin	140
 public	141
 veusers Database.....	142
 Tables	145
 [dbo].[UserProfile].....	146
 [dbo].[webpages_Membership]	147
 [dbo].[webpages_OAuthMembership].....	149
 [dbo].[webpages_Roles]	150
 [dbo].[webpages_UsersInRoles]	151
 Users.....	153
 apps	154
 apps_	155
 veapp.....	156
 Database Roles	157
 db_accessadmin	157
 db_backupoperator.....	157
 db_datareader.....	158
 db_datawriter	158
 db_ddladmin	159
 db_denydatareader	159
 db_denydatawriter	160
 db_owner	160
 db_securityadmin	160
 public	160

☰ (local)
Value Engineering

Databases(2)

- veapp
- veusers

Server Properties

Property	Value
Product	Microsoft SQL Server
Version	10.50.1617.0
Language	English (United States)
Platform	NT x64
Edition	Standard Edition (64-bit)
Processors	64
OS Version	6.1 (7601)
Physical Memory	262124
Is Clustered	False
Root Directory	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQL
Collation	SQL_Latin1_General_CI_AS

Server Settings

Property	Value
Default backup file path	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQL\Backup
Recovery Interval (minutes)	0
Default index fill factor	0
Default backup media retention	0
Compress Backup	False

Advanced Server Settings

Property	Value
Full text upgrade option	2
Locks	0
Nested triggers enabled	True
Allow triggers to fire others	True
Default language	English
Network packet size	4096
Default fulltext language LCID	1033
Two-digit year cutoff	2049
Remote login timeout	20
Cursor threshold	-1
Max text replication size	65536
Parallelism cost threshold	5
Scan for startup procs	False
Transform noise words	False
Blocked process threshold	0
Filestream access level	False
Optimize for ad hoc workloads	False

 **User databases**

Value Engineering

Databases(2)

-  veapp
-  veusers

veapp Database
Value Engineering

Database Properties

Property	Value
SQL Server Version	SQL Server 2008
Compatibility Level	SQL Server 2008
Database Encryption Enabled	False
Last backup time	-
Last log backup time	-
Creation date	Jul 14 2014
Users	7
Database size	4.25 MB
Unallocated space	0.34 MB

Database Options

Property	Value
Compatibility Level	100
Database collation	SQL_Latin1_General_CI_AS
Restrict access	MULTI_USER
Is read-only	False
Auto close	False
Auto shrink	False
Database status	ONLINE
In standby	False
Cleanly shutdown	False
Supplemental logging enabled	False
Snapshot isolation state	OFF
Read committed snapshot on	False
Recovery model	FULL
Page verify option	CHECKSUM
Auto create statistics	True
Auto update statistics	True
Auto update statistics asynchronously	False
ANSI NULL default	False
ANSI NULL enabled	False
ANSI padding enabled	False
ANSI warnings enabled	False
Arithmetic abort enabled	False
Concatenating NULL yields NULL	False
Numeric roundabort enabled	False
Quoted Identifier On	False
Recursive triggers enabled	False
Close cursors on commit	False
Local cursors by default	False
Fulltext enabled	True
Trustworthy	False
Database chaining	False
Forced parameterization	False
Master key encrypted by server	False
Published	False
Subscribed	False
Merge published	False
Is distribution database	False
Sync with backup	False
Service broker GUID	6e9d2138-5a25-412c-9091-2411bdd5595b
Service broker enabled	False
Log reuse wait	NOTHING
Date correlation	False

CDC enabled	False
Encrypted	False
Honor broker priority	False
Database owner	sa

Files

Name	Type	Size	File Name
veapp	Data	3.0 0 MB	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\veapp.mdf
veapp_lo g	Log	1.2 5 MB	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\veapp_log.ld f

Tables
Value Engineering

Objects

Name
dbo.AdditionalDivData
dbo.Bridge
dbo.Construction
dbo.Design
dbo.Divisions
dbo.Dme
dbo.Environmental
dbo.HpmsTis
dbo.Hydraulics
dbo.IdeaGenerationData
dbo.Location
dbo.Mam
dbo.Materials
dbo.Operations
dbo.Planning
dbo.Proj_Div
dbo.Proj_Invitee
dbo.Proj_User
dbo.ProjectManagement
dbo.Projects
dbo.Recommendations
dbo.ReportAddenda
dbo.RightOfWay
dbo.Safety
dbo.SMTPSettings
dbo.URL
dbo.VEAppendices
dbo.VEAUsers
dbo.VEFiles
dbo.VejpAudit
dbo.VejpDevelopment
dbo.VejpEvaluation
dbo.VejpExternal
dbo.VejpImplementation
dbo.VejpInformation
dbo.VejpInvestigation
dbo.VejpPresentation
dbo.VejpSelection
dbo.VejpSpeculation
dbo.VEReport

[dbo].[AdditionalDivData]

Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	AddDataId	int	4	False	1 - 1
	PdId	int	4	False	
	NewFieldName	text	max	False	
	NewData	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.AdditionalDivData	AddDataId	True

Foreign Keys

Name	Update	Delete	Columns
AD_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```

CREATE TABLE [dbo].[AdditionalDivData]
(
    [AddDataId] [int] NOT NULL IDENTITY(1, 1),
    [PdId] [int] NOT NULL,
    [NewFieldName] [text] COLLATE SQL_Latin1_General_CI_AS NOT NULL,
    [NewData] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[AdditionalDivData] ADD CONSTRAINT [PK_dbo.AdditionalDivData] PRIMARY KEY
CLUSTERED ([AddDataId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[AdditionalDivData] ADD CONSTRAINT [AD_FK_PD] FOREIGN KEY ([PdId]) REFERENCES
[dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Proj_Div]

[dbo].[Bridge]	
Value Engineering	

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	BridgeId	int	4	False	1 - 1
	PdId	int	4	False	
	FuncObso	text	max	True	
	StructDef	text	max	True	
	Type	text	max	True	
	Nhs	text	max	True	
	Age	text	max	True	
	Width	text	max	True	
	NumberOfLanes	text	max	True	
	SpanLength	text	max	True	
	VerticalClearance	text	max	True	
	Cost	text	max	True	
	SeismicRetrofit	text	max	True	
	LastInspectionDate	text	max	True	
	SufficiencyRating	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Bridge	BridgeId	True

Foreign Keys

Name	Update	Delete	Columns
BR_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```
CREATE TABLE [dbo].[Bridge]
(
[BridgeId] [int] NOT NULL IDENTITY(1, 1),
[PdId] [int] NOT NULL,
[FuncObso] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[StructDef] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Type] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Nhs] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Age] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Width] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[NumberOfLanes] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[SpanLength] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[VerticalClearance] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
```

```
[Cost] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[SeismicRetrofit] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[LastInspectionDate] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[SufficiencyRating] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[Bridge] ADD CONSTRAINT [PK_dbo.Bridge] PRIMARY KEY CLUSTERED ([BridgeId]) ON
[PRIMARY]
GO
ALTER TABLE [dbo].[Bridge] ADD CONSTRAINT [BR_FK_PD] FOREIGN KEY ([PdId]) REFERENCES
[dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO
```

Uses

[dbo].[Proj_Div]

[dbo].[Construction]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	ConstructionId	int	4	False	1 - 1
	PdId	int	4	False	
	EstStartDate	text	max	True	
	EstCompDate	text	max	True	
	BidOpening	text	max	True	
	EstimatedCost	text	max	True	
	RightOfWay	text	max	True	
	Location	text	max	True	
	TypeOfProject	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Construction	ConstructionId	True

Foreign Keys

Name	Update	Delete	Columns
CO_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```

CREATE TABLE [dbo].[Construction]
(
[ConstructionId] [int] NOT NULL IDENTITY(1, 1),
[PdId] [int] NOT NULL,
[EstStartDate] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[EstCompDate] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[BidOpening] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[EstimatedCost] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[RightOfWay] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Location] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[TypeOfProject] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE ON [PRIMARY]
GO
ALTER TABLE [dbo].[Construction] ADD CONSTRAINT [PK_dbo.Construction] PRIMARY KEY CLUSTERED
([ConstructionId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Construction] ADD CONSTRAINT [CO_FK_PD] FOREIGN KEY ([PdId]) REFERENCES
[dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Proj_Div]

[dbo].[Design]	
Value Engineering	

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	DesignId	int	4	False	1 - 1
	PdId	int	4	False	
	SuperElevRate	text	max	True	
	ForeSlope	text	max	True	
	BackSlope	text	max	True	
	RightOfWay	text	max	True	
	SightDistance	text	max	True	
	LengthOfCurve	text	max	True	
	AccLaneLength	text	max	True	
	DecLaneLength	text	max	True	
	Drainage	text	max	True	
	Lighting	text	max	True	
	PavementMarking	text	max	True	
	NumberOfLanes	text	max	True	
	LaneWidth	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Design	DesignId	True

Foreign Keys

Name	Update	Delete	Columns
DE_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```
CREATE TABLE [dbo].[Design]
(
[DesignId] [int] NOT NULL IDENTITY(1, 1),
[PdId] [int] NOT NULL,
[SuperElevRate] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[ForeSlope] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[BackSlope] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[RightOfWay] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[SightDistance] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[LengthOfCurve] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[AccLaneLength] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[DecLaneLength] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Drainage] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
```

```
[Lighting] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[PavementMarking] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[NumberOfLanes] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[LaneWidth] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[Design] ADD CONSTRAINT [PK_dbo.Design] PRIMARY KEY CLUSTERED ([DesignId]) ON
[PRIMARY]
GO
ALTER TABLE [dbo].[Design] ADD CONSTRAINT [DE_FK_PD] FOREIGN KEY ([PdId]) REFERENCES
[dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO
```

Uses

[dbo].[Proj_Div]

[\[dbo\].\[Divisions\]](#)
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	DivId	int	4	False	1 - 1
	Name	text	max	False	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Divisions	DivId	True

SQL Script

```

CREATE TABLE [dbo].[Divisions]
(
    [DivId] [int] NOT NULL IDENTITY(1, 1),
    [Name] [text] COLLATE SQL_Latin1_General_CI_AS NOT NULL
) ON [PRIMARY] TEXTIMAGE ON [PRIMARY]
GO
ALTER TABLE [dbo].[Divisions] ADD CONSTRAINT [PK_dbo.Divisions] PRIMARY KEY CLUSTERED ([DivId])
ON [PRIMARY]
GO

```

[dbo].[Dme]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	DmeId	int	4	False	1 - 1
	PdId	int	4	False	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Dme	DmeId	True

Foreign Keys

Name	Update	Delete	Columns
DME_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```

CREATE TABLE [dbo].[Dme]
(
[DmeId] [int] NOT NULL IDENTITY(1, 1),
[PdId] [int] NOT NULL
) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Dme] ADD CONSTRAINT [PK_dbo.Dme] PRIMARY KEY CLUSTERED ([DmeId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Dme] ADD CONSTRAINT [DME_FK_PD] FOREIGN KEY ([PdId]) REFERENCES [dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Proj_Div]

 [dbo].[Environmental]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
 C	EnvironmentalId	int	4	False	1 - 1
 D	PdId	int	4	False	
	Documents	text	max	True	
	AirQuality	text	max	True	
	CompletionDate	text	max	True	
	NepaRecommendations	text	max	True	
	EndangeredSpecies	text	max	True	
	OtherIssues	text	max	True	

Indexes

Key	Name	Columns	Unique
 C	PK_dbo.Environmental	EnvironmentalId	True

Foreign Keys

Name	Update	Delete	Columns
EN_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```

CREATE TABLE [dbo].[Environmental]
(
[EnvironmentalId] [int] NOT NULL IDENTITY(1, 1),
[PdId] [int] NOT NULL,
[Documents] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[AirQuality] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[CompletionDate] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[NepaRecommendations] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[EndangeredSpecies] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[OtherIssues] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[Environmental] ADD CONSTRAINT [PK_dbo.Environmental] PRIMARY KEY CLUSTERED
([EnvironmentalId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Environmental] ADD CONSTRAINT [EN_FK_PD] FOREIGN KEY ([PdId]) REFERENCES
[dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Proj_Div]

[dbo].[HpmsTis]	
Value Engineering	

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	HpmsId	int	4	False	1 - 1
	PdId	int	4	False	
	Adt	text	max	True	
	FunctionalClass	text	max	True	
	NumberOfLanes	text	max	True	
	Speed	text	max	True	
	DirectionalSplit	text	max	True	
	Phf	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.HpmsTis	HpmsId	True

Foreign Keys

Name	Update	Delete	Columns
HP_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```

CREATE TABLE [dbo].[HpmsTis]
(
[HpmsId] [int] NOT NULL IDENTITY(1, 1),
[PdId] [int] NOT NULL,
[Adt] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[FunctionalClass] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[NumberOfLanes] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Speed] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[DirectionalSplit] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Phf] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[HpmsTis] ADD CONSTRAINT [PK_dbo.HpmsTis] PRIMARY KEY CLUSTERED ([HpmsId]) ON
[PRIMARY]
GO
ALTER TABLE [dbo].[HpmsTis] ADD CONSTRAINT [HP_FK_PD] FOREIGN KEY ([PdId]) REFERENCES
[dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Proj_Div]

[dbo].[Hydraulics]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	HydraulicsId	int	4	False	1 - 1
	PdId	int	4	False	
	DrainageIssues	text	max	True	
	ExistingCulverts	text	max	True	
	AdditionalCulverts	text	max	True	
	DesignStorm	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Hydraulics	HydraulicsId	True

Foreign Keys

Name	Update	Delete	Columns
HY_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```

CREATE TABLE [dbo].[Hydraulics]
(
[HydraulicsId] [int] NOT NULL IDENTITY(1, 1),
[PdId] [int] NOT NULL,
[DrainageIssues] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[ExistingCulverts] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[AdditionalCulverts] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[DesignStorm] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE ON [PRIMARY]
GO
ALTER TABLE [dbo].[Hydraulics] ADD CONSTRAINT [PK_dbo.Hydraulics] PRIMARY KEY CLUSTERED
([HydraulicsId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Hydraulics] ADD CONSTRAINT [HY_FK_PD] FOREIGN KEY ([PdId]) REFERENCES
[dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Proj_Div]

[dbo].[IdeaGenerationData] Value Engineering					
Columns					
Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	IdeaGenId	int	4	False	1 - 1
	PdId	int	4	False	
	ProposedIdea	text	max	True	
	Advantages	text	max	True	
	Disadvantages	text	max	True	
	Reasoning	text	max	True	
	Comments	text	max	True	
	OriginalConcept	text	max	True	
	ProposedChange	text	max	True	
	Justification	text	max	True	
	PotentialTotalSavings	text	max	True	
	ImplementationPotential	text	max	True	
	Rating	int	4	True	
	BridgeRating	int	4	True	
	ConstructionRating	int	4	True	
	DesignRating	int	4	True	
	EnvironmentalRating	int	4	True	
	HpmsandiRating	int	4	True	
	HydraulicsRating	int	4	True	
	LocationRating	int	4	True	
	MamRating	int	4	True	
	MaterialsRating	int	4	True	
	OperationsRating	int	4	True	
	ManagementRating	int	4	True	
	PlanningRating	int	4	True	
	RightofwayRating	int	4	True	
	SafetyRating	int	4	True	
	DmeRating	int	4	True	
	Selected	bit	1	True	
	Recommended	bit	1	True	
	SelectForApproval	bit	1	True	
	Approved	bit	1	True	
	Rejected	bit	1	True	
	ApprovedAsWritten	bit	1	True	
	ApprovedAsAmmended	bit	1	True	
	Ammendment	text	max	True	
	SelectionDate	date	3	True	
	RecommendationDate	date	3	True	

	SelectForApprovalDate	date	3	True		
	DirectorProcessDate	date	3	True		
	GenerationDate	date	3	True		
	Uid	int	4	False		
	ReasonForRejection	text	max	True		

Indexes

Key	Name	Columns	Unique
	PK_dbo.IdeaGenerationData	IdeaGenId	True

Check Constraints

Name	On Column	Constraint
PK_dbo.CK_BridgeRating	BridgeRating	([BridgeRating]>=(1) AND [BridgeRating]<=(5))
PK_dbo.CK_ConstructionRating	ConstructionRating	([ConstructionRating]>=(1) AND [ConstructionRating]<=(5))
PK_dbo.CK_DesignRating	DesignRating	([DesignRating]>=(1) AND [DesignRating]<=(5))
PK_dbo.CK_DmeRating	DmeRating	([DmeRating]>=(1) AND [DmeRating]<=(5))
PK_dbo.CK_EnvironmentalRating	EnvironmentalRating	([EnvironmentalRating]>=(1) AND [EnvironmentalRating]<=(5))
PK_dbo.CK_HpmsandtiRating	HpmsandtiRating	([HpmsandtiRating]>=(1) AND [HpmsandtiRating]<=(5))
PK_dbo.CK_HydraulicsRating	HydraulicsRating	([HydraulicsRating]>=(1) AND [HydraulicsRating]<=(5))
PK_dbo.CK_LocationRating	LocationRating	([LocationRating]>=(1) AND [LocationRating]<=(5))
PK_dbo.CK_MamRating	MamRating	([MamRating]>=(1) AND [MamRating]<=(5))
PK_dbo.CK_ManagementRating	ManagementRating	([ManagementRating]>=(1) AND [ManagementRating]<=(5))
PK_dbo.CK_MaterialsRating	MaterialsRating	([MaterialsRating]>=(1) AND [MaterialsRating]<=(5))
PK_dbo.CK_OperationsRating	OperationsRating	([OperationsRating]>=(1) AND [OperationsRating]<=(5))
PK_dbo.CK_PlanningRating	PlanningRating	([PlanningRating]>=(1) AND [PlanningRating]<=(5))
PK_dbo.CK_RightofwayRating	RightofwayRating	([RightofwayRating]>=(1) AND [RightofwayRating]<=(5))
PK_dbo.CK_SafetyRating	SafetyRating	([SafetyRating]>=(1) AND [SafetyRating]<=(5))

Foreign Keys

Name	Update	Delete	Columns
IG_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]
IG_FK_VEAUSERS	Cascade	Cascade	Uid->[dbo].[VEAUsers].[UserId]

SQL Script

```

CREATE TABLE [dbo].[IdeaGenerationData]
(
[IdeaGenId] [int] NOT NULL IDENTITY(1, 1),
[PdId] [int] NOT NULL,
[ProposedIdea] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Advantages] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Disadvantages] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Reasoning] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Comments] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[OriginalConcept] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[ProposedChange] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Justification] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[PotentialTotalSavings] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[ImplementationPotential] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Rating] [int] NULL,
[BridgeRating] [int] NULL,
[ConstructionRating] [int] NULL,
[DesignRating] [int] NULL,
[EnvironmentalRating] [int] NULL,
[HrmsandtiRating] [int] NULL,
[HydraulicsRating] [int] NULL,
[LocationRating] [int] NULL,
[MamRating] [int] NULL,
[MaterialsRating] [int] NULL,
[OperationsRating] [int] NULL,
[ManagementRating] [int] NULL,
[PlanningRating] [int] NULL,
[RightofwayRating] [int] NULL,
[SafetyRating] [int] NULL,
[DmeRating] [int] NULL,
[Selected] [bit] NULL,
[Recommended] [bit] NULL,
[SelectForApproval] [bit] NULL,
[Approved] [bit] NULL,
[Rejected] [bit] NULL,
[ApprovedAsWritten] [bit] NULL,
[ApprovedAsAmended] [bit] NULL,
[Ammendment] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[SelectionDate] [date] NULL,
[RecommendationDate] [date] NULL,
[SelectForApprovalDate] [date] NULL,
[DirectorProcessDate] [date] NULL,
[GenerationDate] [date] NULL,
[Uid] [int] NOT NULL,
[ReasonForRejection] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [PK_dbo.CK_BridgeRating] CHECK (([BridgeRating]>=(1) AND [BridgeRating]<=(5)))
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [PK_dbo.CK_ConstructionRating] CHECK (([ConstructionRating]>=(1) AND [ConstructionRating]<=(5)))
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [PK_dbo.CK_DesignRating] CHECK (([DesignRating]>=(1) AND [DesignRating]<=(5)))
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [PK_dbo.CK_DmeRating] CHECK (([DmeRating]>=(1) AND [DmeRating]<=(5)))

```

```

GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [PK_dbo.CK_EnvironmentalRating] CHECK
(([EnvironmentalRating]>=(1) AND [EnvironmentalRating]<=(5)))
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [PK_dbo.CK_HpmsandtiRating] CHECK
(([HpmsandtiRating]>=(1) AND [HpmsandtiRating]<=(5)))
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [PK_dbo.CK_HydraulicsRating] CHECK
(([HydraulicsRating]>=(1) AND [HydraulicsRating]<=(5)))
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [PK_dbo.CK_LocationRating] CHECK
(([LocationRating]>=(1) AND [LocationRating]<=(5)))
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [PK_dbo.CK_MamRating] CHECK ([Mam-
Rating]>=(1) AND [MamRating]<=(5)))
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [PK_dbo.CK_ManagementRating] CHECK
(([ManagementRating]>=(1) AND [ManagementRating]<=(5)))
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [PK_dbo.CK_MaterialsRating] CHECK
(([MaterialsRating]>=(1) AND [MaterialsRating]<=(5)))
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [PK_dbo.CK_OperationsRating] CHECK
(([OperationsRating]>=(1) AND [OperationsRating]<=(5)))
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [PK_dbo.CK_PlanningRating] CHECK
(([PlanningRating]>=(1) AND [PlanningRating]<=(5)))
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [PK_dbo.CK_RightofwayRating] CHECK
(([RightofwayRating]>=(1) AND [RightofwayRating]<=(5)))
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [PK_dbo.CK_SafetyRating] CHECK ([Safety-
Rating]>=(1) AND [SafetyRating]<=(5)))
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [PK_dbo.IdeaGenerationData] PRIMARY KEY
CLUSTERED ([IdeaGenId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [IG_FK_PD] FOREIGN KEY ([PdId]) REFERENCES
[dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO
ALTER TABLE [dbo].[IdeaGenerationData] ADD CONSTRAINT [IG_FK_VEAUSERS] FOREIGN KEY ([Uid])
REFERENCES [dbo].[VEAUsers] ([UserId]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Proj_Div]
 [dbo].[VEAUsers]

[dbo].[Location]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	LocationId	int	4	False	1 - 1
	PdID	int	4	False	
	UtilityLocations	text	max	True	
	Landmarks	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Location	LocationId	True

Foreign Keys

Name	Update	Delete	Columns
LO_FK_PD	Cascade	Cascade	PdID->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```

CREATE TABLE [dbo].[Location]
(
[LocationId] [int] NOT NULL IDENTITY(1, 1),
[PdID] [int] NOT NULL,
[UtilityLocations] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Landmarks] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[Location] ADD CONSTRAINT [PK_dbo.Location] PRIMARY KEY CLUSTERED ([LocationId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Location] ADD CONSTRAINT [LO_FK_PD] FOREIGN KEY ([PdID]) REFERENCES [dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Proj_Div]

[dbo].[Mam]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	MamId	int	4	False	1 - 1
	PdId	int	4	False	
	TypeOfAsset	text	max	True	
	AssetLife	text	max	True	
	CostOfAsset	text	max	True	
	MaintenanceCost	text	max	True	
	Location	text	max	True	
	District	text	max	True	
	AssetName	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Mam	MamId	True

Foreign Keys

Name	Update	Delete	Columns
MA_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```

CREATE TABLE [dbo].[Mam]
(
[MamId] [int] NOT NULL IDENTITY(1, 1),
[PdId] [int] NOT NULL,
[TypeOfAsset] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[AssetLife] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[CostOfAsset] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[MaintenanceCost] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Location] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[District] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[AssetName] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE ON [PRIMARY]
GO
ALTER TABLE [dbo].[Mam] ADD CONSTRAINT [PK_dbo.Mam] PRIMARY KEY CLUSTERED ([MamId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Mam] ADD CONSTRAINT [MA_FK_PD] FOREIGN KEY ([PdId]) REFERENCES [dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Proj_Div]

[dbo].[Materials]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	MaterialsId	int	4	False	1 - 1
	PdId	int	4	False	
	AsphaltPavement	text	max	True	
	ConcretePavement	text	max	True	
	PavementCondition	text	max	True	
	Last3R	text	max	True	
	Next3R	text	max	True	
	Ruts	text	max	True	
	Cracks	text	max	True	
	PavementMarkings	text	max	True	
	AssociatedCosts	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Materials	MaterialsId	True

Foreign Keys

Name	Update	Delete	Columns
MT_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```

CREATE TABLE [dbo].[Materials]
(
[MaterialsId] [int] NOT NULL IDENTITY(1, 1),
[PdId] [int] NOT NULL,
[AsphaltPavement] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[ConcretePavement] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[PavementCondition] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Last3R] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Next3R] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Ruts] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Cracks] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[PavementMarkings] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[AssociatedCosts] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[Materials] ADD CONSTRAINT [PK_dbo.Materials] PRIMARY KEY CLUSTERED
([MaterialsId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Materials] ADD CONSTRAINT [MT_FK_PD] FOREIGN KEY ([PdId]) REFERENCES

```

```
[dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE  
GO
```

Uses

[dbo].[Proj_Div]

[dbo].[Operations]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	OperationsId	int	4	False	1 - 1
	PdId	int	4	False	
	LevelOfCongestion	text	max	True	
	ItsFacilities	text	max	True	
	WeatherStations	text	max	True	
	Fsp	text	max	True	
	TypeOfFacility	text	max	True	
	FunctionalClass	text	max	True	
	TargetLos	text	max	True	
	Cost	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Operations	OperationsId	True

Foreign Keys

Name	Update	Delete	Columns
OP_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```

CREATE TABLE [dbo].[Operations]
(
[OperationsId] [int] NOT NULL IDENTITY(1, 1),
[PdId] [int] NOT NULL,
[LevelOfCongestion] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[ItsFacilities] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[WeatherStations] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Fsp] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[TypeOfFacility] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[FunctionalClass] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[TargetLos] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Cost] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[Operations] ADD CONSTRAINT [PK_dbo.Operations] PRIMARY KEY CLUSTERED
([OperationsId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Operations] ADD CONSTRAINT [OP_FK_PD] FOREIGN KEY ([PdId]) REFERENCES
[dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Proj_Div]

	[dbo].[Planning]
Value Engineering	

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	PlanningId	int	4	False	1 - 1
	PdId	int	4	False	
	LongTerm	text	max	True	
	XStipListed	text	max	True	
	InitiationDate	text	max	True	
	FederalFunds	text	max	True	
	StateFunds	text	max	True	
	LocalFunds	text	max	True	
	ImplementationDate	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Planning	PlanningId	True

Foreign Keys

Name	Update	Delete	Columns
PL_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```

CREATE TABLE [dbo].[Planning]
(
[PlanningId] [int] NOT NULL IDENTITY(1, 1),
[PdId] [int] NOT NULL,
[LongTerm] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[XStipListed] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[InitiationDate] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[FederalFunds] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[StateFunds] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[LocalFunds] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[ImplementationDate] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE ON [PRIMARY]
GO
ALTER TABLE [dbo].[Planning] ADD CONSTRAINT [PK_dbo.Planning] PRIMARY KEY CLUSTERED ([PlanningId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Planning] ADD CONSTRAINT [PL_FK_PD] FOREIGN KEY ([PdId]) REFERENCES [dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Proj_Div]

[dbo].[Proj_Div]	
Value Engineering	

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	ProjDivId	int	4	False	1 - 1
	Pid	int	4	False	
	Did	int	4	False	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Proj_Div	ProjDivId	True

Foreign Keys

Name	Update	Delete	Columns
PD_FK_DIVISIONS	Cascade	Cascade	Did->[dbo].[Divisions].[DivId]
PD_FK_PROJECTS	Cascade	Cascade	Pid->[dbo].[Projects].[ProjID]

SQL Script

```

CREATE TABLE [dbo].[Proj_Div]
(
[ProjDivId] [int] NOT NULL IDENTITY(1, 1),
[Pid] [int] NOT NULL,
[Did] [int] NOT NULL
) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Proj_Div] ADD CONSTRAINT [PK_dbo.Proj_Div] PRIMARY KEY CLUSTERED ([ProjDivId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Proj_Div] ADD CONSTRAINT [PD_FK_DIVISIONS] FOREIGN KEY ([Did]) REFERENCES [dbo].[Divisions] ([DivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO
ALTER TABLE [dbo].[Proj_Div] ADD CONSTRAINT [PD_FK_PROJECTS] FOREIGN KEY ([Pid]) REFERENCES [dbo].[Projects] ([ProjID]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Divisions]
 [dbo].[Projects]

[dbo].[Proj_Invitee]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	ProjInviteeId	int	4	False	1 - 1
	PdId	int	4	False	
	Email	varchar(255)	255	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Proj_Invitee	ProjInviteeId	True

Foreign Keys

Name	Update	Delete	Columns
PI_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```

CREATE TABLE [dbo].[Proj_Invitee]
(
[ProjInviteeId] [int] NOT NULL IDENTITY(1, 1),
[PdId] [int] NOT NULL,
[Email] [varchar] (255) COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Proj_Invitee] ADD CONSTRAINT [PK_dbo.Proj_Invitee] PRIMARY KEY CLUSTERED
([ProjInviteeId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Proj_Invitee] ADD CONSTRAINT [PI_FK_PD] FOREIGN KEY ([PdId]) REFERENCES
[dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Proj_Div]

[dbo].[Proj_User]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	ProjUserId	int	4	False	1 - 1
	PdId	int	4	False	
	Uid	int	4	False	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Proj_User	ProjUserId	True

Foreign Keys

Name	Update	Delete	Columns
PU_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]
PU_FK_VEAUSERS	Cascade	Cascade	Uid->[dbo].[VEAUsers].[UserId]

SQL Script

```

CREATE TABLE [dbo].[Proj_User]
(
[ProjUserId] [int] NOT NULL IDENTITY(1, 1),
[PdId] [int] NOT NULL,
[Uid] [int] NOT NULL
) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Proj_User] ADD CONSTRAINT [PK_dbo.Proj_User] PRIMARY KEY CLUSTERED ([ProjUserId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Proj_User] ADD CONSTRAINT [PU_FK_PD] FOREIGN KEY ([PdId]) REFERENCES [dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO
ALTER TABLE [dbo].[Proj_User] ADD CONSTRAINT [PU_FK_VEAUSERS] FOREIGN KEY ([Uid]) REFERENCES [dbo].[VEAUsers] ([UserId]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Proj_Div]
[dbo].[VEAUsers]

[dbo].[ProjectManagement]

Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	ProjMgmtId	int	4	False	1 - 1
	PdId	int	4	False	
	TotalCost	text	max	True	
	CompletionDate	text	max	True	
	RiskAssessment	text	max	True	
	CostEstimates	text	max	True	
	Alternatives	text	max	True	
	MethodOfDelivery	text	max	True	
	NepaApproval	text	max	True	
	Pel	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.ProjectManagement	ProjMgmtId	True

Foreign Keys

Name	Update	Delete	Columns
PM_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```

CREATE TABLE [dbo].[ProjectManagement]
(
[ProjMgmtId] [int] NOT NULL IDENTITY(1, 1),
[PdId] [int] NOT NULL,
[TotalCost] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[CompletionDate] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[RiskAssessment] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[CostEstimates] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Alternatives] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[MethodOfDelivery] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[NepaApproval] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Pel] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[ProjectManagement] ADD CONSTRAINT [PK_dbo.ProjectManagement] PRIMARY KEY
CLUSTERED ([ProjMgmtId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[ProjectManagement] ADD CONSTRAINT [PM_FK_PD] FOREIGN KEY ([PdId]) REFERENCES
[dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Proj_Div]

[dbo].[Projects]	
Value Engineering	

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	ProjID	int	4	False	1 - 1
	Name	varchar(255)	255	False	
	Description	text	max	False	
	Location	varchar(1000)	1000	False	
	LocationImage	image	max	True	
	DateCreated	date	3	True	
	DateClosed	date	3	True	
	DateReOpened	date	3	True	
	Active	bit	1	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Projects	ProjID	True
	UC_dbo.Projects	Name	True

SQL Script

```

CREATE TABLE [dbo].[Projects]
(
[ProjID] [int] NOT NULL IDENTITY(1, 1),
[Name] [varchar] (255) COLLATE SQL_Latin1_General_CI_AS NOT NULL,
[Description] [text] COLLATE SQL_Latin1_General_CI_AS NOT NULL,
[Location] [varchar] (1000) COLLATE SQL_Latin1_General_CI_AS NOT NULL,
[LocationImage] [image] NULL,
[DateCreated] [date] NULL,
[DateClosed] [date] NULL,
[DateReOpened] [date] NULL,
[Active] [bit] NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[Projects] ADD CONSTRAINT [PK_dbo.Projects] PRIMARY KEY CLUSTERED ([ProjID])
ON [PRIMARY]
GO
ALTER TABLE [dbo].[Projects] ADD CONSTRAINT [UC_dbo.Projects] UNIQUE NONCLUSTERED ([Name]) ON
[PRIMARY]
GO

```

[dbo].[Recommendations]

Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	RecId	int	4	False	1 - 1
	PdId	int	4	False	
	Comment	text	max	True	
	IGid	int	4	False	
	AcceptedAsWritten	bit	1	True	
	AcceptedAsAmended	bit	1	True	
	Rejected	bit	1	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Recommendations	RecId	True

Foreign Keys

Name	Update	Delete	Columns
RC_FK_IGD	Cascade	Cascade	IGid->[dbo].[IdeaGenerationData].[IdeaGenId]
RC_FK_PD			PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```

CREATE TABLE [dbo].[Recommendations]
(
    [RecId] [int] NOT NULL IDENTITY(1, 1),
    [PdId] [int] NOT NULL,
    [Comment] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
    [IGid] [int] NOT NULL,
    [AcceptedAsWritten] [bit] NULL,
    [AcceptedAsAmended] [bit] NULL,
    [Rejected] [bit] NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[Recommendations] ADD CONSTRAINT [PK_dbo.Recommendations] PRIMARY KEY CLUSTERED
([RecId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[Recommendations] ADD CONSTRAINT [RC_FK_IGD] FOREIGN KEY ([IGid]) REFERENCES
[dbo].[IdeaGenerationData] ([IdeaGenId]) ON DELETE CASCADE ON UPDATE CASCADE
GO
ALTER TABLE [dbo].[Recommendations] ADD CONSTRAINT [RC_FK_PD] FOREIGN KEY ([PdId]) REFERENCES
[dbo].[Proj_Div] ([ProjDivId])
GO

```

Uses

[dbo].[IdeaGenerationData]
[dbo].[Proj_Div]

☰ [dbo].[ReportAddenda]

Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	AddendaId	int	4	False	1 - 1
	Pid	int	4	False	
	SummaryText	text	max	True	
	SummaryFile	varchar(max)	max	True	
	BackgroundText	text	max	True	
	BackgroundFile	varbinary(max)	max	True	
	CostTablesText	text	max	True	
	CostTablesFile	varbinary(max)	max	True	
	EstimateText	text	max	True	
	EstimateFile	varbinary(max)	max	True	
	AdditionalText	text	max	True	
	AdditionalFile	varbinary(max)	max	True	
	ConclusionText	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.ReportAddenda	AddendaId	True

Foreign Keys

Name	Update	Delete	Columns
RA_FK_PD	Cascade	Cascade	Pid->[dbo].[Projects].[ProjID]

SQL Script

```
CREATE TABLE [dbo].[ReportAddenda]
(
[AddendaId] [int] NOT NULL IDENTITY(1, 1),
[Pid] [int] NOT NULL,
[SummaryText] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[SummaryFile] [varchar] (max) COLLATE SQL_Latin1_General_CI_AS NULL,
[BackgroundText] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[BackgroundFile] [varbinary] (max) NULL,
[CostTablesText] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[CostTablesFile] [varbinary] (max) NULL,
[EstimateText] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[EstimateFile] [varbinary] (max) NULL,
[AdditionalText] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[AdditionalFile] [varbinary] (max) NULL,
[ConclusionText] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
```

```
GO  
ALTER TABLE [dbo].[ReportAddenda] ADD CONSTRAINT [PK_dbo.ReportAddenda] PRIMARY KEY CLUSTERED  
([AddendaId]) ON [PRIMARY]  
GO  
ALTER TABLE [dbo].[ReportAddenda] ADD CONSTRAINT [RA_FK_PD] FOREIGN KEY ([Pid]) REFERENCES  
[dbo].[Projects] ([ProjID]) ON DELETE CASCADE ON UPDATE CASCADE  
GO
```

Uses

[dbo].[Projects]

[dbo].[RightOfWay]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	RowId	int	4	False	1 - 1
	PdId	int	4	False	
	RowCosts	text	max	True	
	AdditionalRowReq	text	max	True	
	ImpendingRow	text	max	True	
	ExistingRow	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.RightOfWay	RowId	True

Foreign Keys

Name	Update	Delete	Columns
RO_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```

CREATE TABLE [dbo].[RightOfWay]
(
[RowId] [int] NOT NULL IDENTITY(1, 1),
[PdId] [int] NOT NULL,
[RowCosts] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[AdditionalRowReq] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[ImpendingRow] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[ExistingRow] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE ON [PRIMARY]
GO
ALTER TABLE [dbo].[RightOfWay] ADD CONSTRAINT [PK_dbo.RightOfWay] PRIMARY KEY CLUSTERED ([RowId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[RightOfWay] ADD CONSTRAINT [RO_FK_PD] FOREIGN KEY ([PdId]) REFERENCES [dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Proj_Div]

[dbo].[Safety]	
Value Engineering	

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	SafetyId	int	4	False	1 - 1
	PdId	int	4	False	
	RumbleStrips	text	max	True	
	Guardrail	text	max	True	
	MedianType	text	max	True	
	StopSightDist	text	max	True	
	Fatalities	text	max	True	
	Injuries	text	max	True	
	Pdo	text	max	True	
	Dui	text	max	True	
	AssociatedCosts	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.Safety	SafetyId	True

Foreign Keys

Name	Update	Delete	Columns
SA_FK_PD	Cascade	Cascade	PdId->[dbo].[Proj_Div].[ProjDivId]

SQL Script

```

CREATE TABLE [dbo].[Safety]
(
    [SafetyId] [int] NOT NULL IDENTITY(1, 1),
    [PdId] [int] NOT NULL,
    [RumbleStrips] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
    [Guardrail] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
    [MedianType] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
    [StopSightDist] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
    [Fatalities] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
    [Injuries] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
    [Pdo] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
    [Dui] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
    [AssociatedCosts] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[Safety] ADD CONSTRAINT [PK_dbo.Safety] PRIMARY KEY CLUSTERED ([SafetyId]) ON
[PRIMARY]
GO
ALTER TABLE [dbo].[Safety] ADD CONSTRAINT [SA_FK_PD] FOREIGN KEY ([PdId]) REFERENCES

```

```
[dbo].[Proj_Div] ([ProjDivId]) ON DELETE CASCADE ON UPDATE CASCADE  
GO
```

Uses

[dbo].[Proj_Div]

[dbo].[SMTPSettings]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	SMTPId	int	4	False	1 - 1
	Name	nvarchar(255)	510	False	
	Port	int	4	False	
	SSL	bit	1	False	
	username	nvarchar(255)	510	False	
	password	nvarchar(255)	510	False	
	defaultaccount	bit	1	False	

Indexes

Key	Name	Columns	Unique
	PK_dbo.SMTPSettings	SMTPId	True

SQL Script

```

CREATE TABLE [dbo].[SMTPSettings]
(
[SMTPId] [int] NOT NULL IDENTITY(1, 1),
[Name] [nvarchar] (255) COLLATE SQL_Latin1_General_CI_AS NOT NULL,
[Port] [int] NOT NULL,
[SSL] [bit] NOT NULL,
[username] [nvarchar] (255) COLLATE SQL_Latin1_General_CI_AS NOT NULL,
[password] [nvarchar] (255) COLLATE SQL_Latin1_General_CI_AS NOT NULL,
[defaultaccount] [bit] NOT NULL
) ON [PRIMARY]
GO
ALTER TABLE [dbo].[SMTPSettings] ADD CONSTRAINT [PK_dbo.SMTPSettings] PRIMARY KEY CLUSTERED
([SMTPId]) ON [PRIMARY]
GO

```

 [dbo].[URL]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls
	Id	int	4	False
	URL	varchar(50)	50	True

Indexes

Key	Name	Columns	Unique
	PK__URL__3214EC070425A276	Id	True

SQL Script

```
CREATE TABLE [dbo].[URL]
(
[Id] [int] NOT NULL,
[URL] [varchar] (50) COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY]
GO
ALTER TABLE [dbo].[URL] ADD CONSTRAINT [PK__URL__3214EC070425A276] PRIMARY KEY CLUSTERED ([Id])
ON [PRIMARY]
GO
```

 [dbo].[VEAppendices]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
 AppendicesId	AppendicesId	int	4	False	1 - 1
 Pid	Pid	int	4	False	
	Appendix1	varchar(max)	max	True	
	DateA1Uploaded	date	3	True	
 A1Uid	A1Uid	int	4	True	
	Appendix2	varchar(max)	max	True	
	DateA2Uploaded	date	3	True	
 A2Uid	A2Uid	int	4	True	
	Appendix3	varchar(max)	max	True	
	DateA3Uploaded	date	3	True	
 A3Uid	A3Uid	int	4	True	
	Appendix4	varchar(max)	max	True	
	DateA4Uploaded	date	3	True	
 A4Uid	A4Uid	int	4	True	
	Appendix5	varchar(max)	max	True	
	DateA5Uploaded	date	3	True	
 A5Uid	A5Uid	int	4	True	
	Appendix6	varchar(max)	max	True	
	DateA6Uploaded	date	3	True	
 A6Uid	A6Uid	int	4	True	
	Appendix7	varchar(max)	max	True	
	DateA7Uploaded	date	3	True	
 A7Uid	A7Uid	int	4	True	
	Appendix8	varchar(max)	max	True	
	DateA8Uploaded	date	3	True	
 A8Uid	A8Uid	int	4	True	
	Appendix9	varchar(max)	max	True	
	DateA9Uploaded	date	3	True	
 A9Uid	A9Uid	int	4	True	
	Appendix10	varchar(max)	max	True	
	DateA10Uploaded	date	3	True	
 A10Uid	A10Uid	int	4	True	

Indexes

Key	Name	Columns	Unique
 PK_dbo.VEAppendices	AppendicesId		True

Foreign Keys

Name	Update	Delete	Columns
VEA_FK_VEAUSERA10			A10Uid->[dbo].[VEAUsers].[UserId]
VEA_FK_VEAUSERA1			A1Uid->[dbo].[VEAUsers].[UserId]
VEA_FK_VEAUSERA2			A2Uid->[dbo].[VEAUsers].[UserId]
VEA_FK_VEAUSERA3			A3Uid->[dbo].[VEAUsers].[UserId]
VEA_FK_VEAUSERA4			A4Uid->[dbo].[VEAUsers].[UserId]
VEA_FK_VEAUSERA5			A5Uid->[dbo].[VEAUsers].[UserId]
VEA_FK_VEAUSERA6			A6Uid->[dbo].[VEAUsers].[UserId]
VEA_FK_VEAUSERA7			A7Uid->[dbo].[VEAUsers].[UserId]
VEA_FK_VEAUSERA8			A8Uid->[dbo].[VEAUsers].[UserId]
VEA_FK_VEAUSERA9			A9Uid->[dbo].[VEAUsers].[UserId]
VEA_FK_PD	Cascade	Cascade	Pid->[dbo].[Projects].[ProjID]

SQL Script

```

CREATE TABLE [dbo].[VEAppendices]
(
[AppendicesId] [int] NOT NULL IDENTITY(1, 1),
[Pid] [int] NOT NULL,
[Appendix1] [varchar] (max) COLLATE SQL_Latin1_General_CI_AS NULL,
[DateA1Uploaded] [date] NULL,
[A1Uid] [int] NULL,
[Appendix2] [varchar] (max) COLLATE SQL_Latin1_General_CI_AS NULL,
[DateA2Uploaded] [date] NULL,
[A2Uid] [int] NULL,
[Appendix3] [varchar] (max) COLLATE SQL_Latin1_General_CI_AS NULL,
[DateA3Uploaded] [date] NULL,
[A3Uid] [int] NULL,
[Appendix4] [varchar] (max) COLLATE SQL_Latin1_General_CI_AS NULL,
[DateA4Uploaded] [date] NULL,
[A4Uid] [int] NULL,
[Appendix5] [varchar] (max) COLLATE SQL_Latin1_General_CI_AS NULL,
[DateA5Uploaded] [date] NULL,
[A5Uid] [int] NULL,
[Appendix6] [varchar] (max) COLLATE SQL_Latin1_General_CI_AS NULL,
[DateA6Uploaded] [date] NULL,
[A6Uid] [int] NULL,
[Appendix7] [varchar] (max) COLLATE SQL_Latin1_General_CI_AS NULL,
[DateA7Uploaded] [date] NULL,
[A7Uid] [int] NULL,
[Appendix8] [varchar] (max) COLLATE SQL_Latin1_General_CI_AS NULL,
[DateA8Uploaded] [date] NULL,
[A8Uid] [int] NULL,
[Appendix9] [varchar] (max) COLLATE SQL_Latin1_General_CI_AS NULL,
[DateA9Uploaded] [date] NULL,
[A9Uid] [int] NULL,
[Appendix10] [varchar] (max) COLLATE SQL_Latin1_General_CI_AS NULL,
[DateA10Uploaded] [date] NULL,
[A10Uid] [int] NULL
) ON [PRIMARY] TEXTIMAGE ON [PRIMARY]
GO
ALTER TABLE [dbo].[VEAppendices] ADD CONSTRAINT [PK_dbo.VEAppendices] PRIMARY KEY CLUSTERED
([AppendicesId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[VEAppendices] ADD CONSTRAINT [VEA_FK_VEAUSERA10] FOREIGN KEY ([A10Uid])
REFERENCES [dbo].[VEAUsers] ([UserId])

```

```

GO
ALTER TABLE [dbo].[VEAppendices] ADD CONSTRAINT [VEA_FK_VEAUSERA1] FOREIGN KEY ([A1Uid])
REFERENCES [dbo].[VEAUsers] ([UserId])
GO
ALTER TABLE [dbo].[VEAppendices] ADD CONSTRAINT [VEA_FK_VEAUSERA2] FOREIGN KEY ([A2Uid])
REFERENCES [dbo].[VEAUsers] ([UserId])
GO
ALTER TABLE [dbo].[VEAppendices] ADD CONSTRAINT [VEA_FK_VEAUSERA3] FOREIGN KEY ([A3Uid])
REFERENCES [dbo].[VEAUsers] ([UserId])
GO
ALTER TABLE [dbo].[VEAppendices] ADD CONSTRAINT [VEA_FK_VEAUSERA4] FOREIGN KEY ([A4Uid])
REFERENCES [dbo].[VEAUsers] ([UserId])
GO
ALTER TABLE [dbo].[VEAppendices] ADD CONSTRAINT [VEA_FK_VEAUSERA5] FOREIGN KEY ([A5Uid])
REFERENCES [dbo].[VEAUsers] ([UserId])
GO
ALTER TABLE [dbo].[VEAppendices] ADD CONSTRAINT [VEA_FK_VEAUSERA6] FOREIGN KEY ([A6Uid])
REFERENCES [dbo].[VEAUsers] ([UserId])
GO
ALTER TABLE [dbo].[VEAppendices] ADD CONSTRAINT [VEA_FK_VEAUSERA7] FOREIGN KEY ([A7Uid])
REFERENCES [dbo].[VEAUsers] ([UserId])
GO
ALTER TABLE [dbo].[VEAppendices] ADD CONSTRAINT [VEA_FK_VEAUSERA8] FOREIGN KEY ([A8Uid])
REFERENCES [dbo].[VEAUsers] ([UserId])
GO
ALTER TABLE [dbo].[VEAppendices] ADD CONSTRAINT [VEA_FK_VEAUSERA9] FOREIGN KEY ([A9Uid])
REFERENCES [dbo].[VEAUsers] ([UserId])
GO
ALTER TABLE [dbo].[VEAppendices] ADD CONSTRAINT [VEA_FK_PD] FOREIGN KEY ([Pid]) REFERENCES
[dbo].[Projects] ([ProjID]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Projects]
 [dbo].[VEAUsers]

[dbo].[VEAUsers]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	UserId	int	4	False	1 - 1
	UserName	varchar(255)	255	False	
	FirstName	varchar(50)	50	False	
	LastName	varchar(50)	50	False	
	Email	varchar(255)	255	True	
	Permission	char(1)	1	True	
	SP	char(1)	1	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.VEAUsers	UserId	True

SQL Script

```

CREATE TABLE [dbo].[VEAUsers]
(
[UserId] [int] NOT NULL IDENTITY(1, 1),
[UserName] [varchar] (255) COLLATE SQL_Latin1_General_CI_AS NOT NULL,
[FirstName] [varchar] (50) COLLATE SQL_Latin1_General_CI_AS NOT NULL,
[LastName] [varchar] (50) COLLATE SQL_Latin1_General_CI_AS NOT NULL,
[Email] [varchar] (255) COLLATE SQL_Latin1_General_CI_AS NULL,
[Permission] [char] (1) COLLATE SQL_Latin1_General_CI_AS NULL,
[SP] [char] (1) COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY]
GO
ALTER TABLE [dbo].[VEAUsers] ADD CONSTRAINT [PK_dbo.VEAUsers] PRIMARY KEY CLUSTERED ([UserId])
ON [PRIMARY]
GO

```

 [dbo].[VEFiles]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
 C	FileId	int	4	False	1 - 1
 P	Pid	int	4	False	
	Name	text	max	True	
	Description	text	max	True	
	DateUploaded	date	3	True	
 U	Uid	int	4	False	
	VEFile	varchar(max)	max	True	
	AppendixFile	bit	1	True	
	AppendixFileNo	int	4	True	

Indexes

Key	Name	Columns	Unique
 C	PK_dbo.VEFiles	FileId	True

Foreign Keys

Name	Update	Delete	Columns
VEF_FK_PD	Cascade	Cascade	Pid->[dbo].[Projects].[ProjID]
VEF_FK_VEAUSERS			Uid->[dbo].[VEAUsers].[UserId]

SQL Script

```

CREATE TABLE [dbo].[VEFiles]
(
[FileId] [int] NOT NULL IDENTITY(1, 1),
[Pid] [int] NOT NULL,
[Name] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Description] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[DateUploaded] [date] NULL,
[Uid] [int] NOT NULL,
[VEFile] [varchar] (max) COLLATE SQL_Latin1_General_CI_AS NULL,
[AppendixFile] [bit] NULL,
[AppendixFileNo] [int] NULL
) ON [PRIMARY] TEXTIMAGE ON [PRIMARY]
GO
ALTER TABLE [dbo].[VEFiles] ADD CONSTRAINT [PK_dbo.VEFiles] PRIMARY KEY CLUSTERED ([FileId]) ON
[PRIMARY]
GO
ALTER TABLE [dbo].[VEFiles] ADD CONSTRAINT [VEF_FK_PD] FOREIGN KEY ([Pid]) REFERENCES
[dbo].[Projects] ([ProjID]) ON DELETE CASCADE ON UPDATE CASCADE
GO
ALTER TABLE [dbo].[VEFiles] ADD CONSTRAINT [VEF_FK_VEAUSERS] FOREIGN KEY ([Uid]) REFERENCES
[dbo].[VEAUsers] ([UserId])

```

GO

Uses

[dbo].[Projects]
[dbo].[VEAUsers]

[dbo].[VejpAudit]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	VejpAuditId	int	4	False	1 - 1
	Pid	int	4	False	
	Audit_Way	text	max	True	
	Audit_Cost	text	max	True	
	Audit_Saved	text	max	True	
	Audit_Expectations	text	max	True	
	Audit_Recognition	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.VejpAudit	VejpAuditId	True

Foreign Keys

Name	Update	Delete	Columns
VEJPAUDIT_FK_PROJECTS	Cascade	Cascade	Pid->[dbo].[Projects].[ProjID]

SQL Script

```

CREATE TABLE [dbo].[VejpAudit]
(
[VejpAuditId] [int] NOT NULL IDENTITY(1, 1),
[Pid] [int] NOT NULL,
[Audit_Way] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Audit_Cost] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Audit_Saved] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Audit_Expectations] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Audit_Recognition] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpAudit] ADD CONSTRAINT [PK_dbo.VejpAudit] PRIMARY KEY CLUSTERED ([VejpAuditId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpAudit] ADD CONSTRAINT [VEJPAUDIT_FK_PROJECTS] FOREIGN KEY ([Pid])
REFERENCES [dbo].[Projects] ([ProjID]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Projects]

[dbo].[VejpDevelopment]

Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	VejpDevelopmentId	int	4	False	1 - 1
	Pid	int	4	False	
	IGid	int	4	False	
	Development_New	text	max	True	
	Development_Disadvantages	text	max	True	
	Development_Cost	text	max	True	
	Development_Way	text	max	True	
	Development_Requirement	text	max	True	
	Development_Lifecycle	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.VejpDevelopment	VejpDevelopmentId	True

Foreign Keys

Name	Update	Delete	Columns
VEJPDEV_FK_IGD	Cascade	Cascade	IGid->[dbo].[IdeaGenerationData].[IdeaGenId]
VEJPDEV_FK_PROJECTS			Pid->[dbo].[Projects].[ProjID]

SQL Script

```

CREATE TABLE [dbo].[VejpDevelopment]
(
[VejpDevelopmentId] [int] NOT NULL IDENTITY(1, 1),
[Pid] [int] NOT NULL,
[IGid] [int] NOT NULL,
[Development_New] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Development_Disadvantages] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Development_Cost] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Development_Way] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Development_Requirement] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Development_Lifecycle] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpDevelopment] ADD CONSTRAINT [PK_dbo.VejpDevelopment] PRIMARY KEY CLUSTERED
([VejpDevelopmentId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpDevelopment] ADD CONSTRAINT [VEJPDEV_FK_IGD] FOREIGN KEY ([IGid])
REFERENCES [dbo].[IdeaGenerationData] ([IdeaGenId]) ON DELETE CASCADE ON UPDATE CASCADE
GO
ALTER TABLE [dbo].[VejpDevelopment] ADD CONSTRAINT [VEJPDEV_FK_PROJECTS] FOREIGN KEY ([Pid])
REFERENCES [dbo].[Projects] ([ProjID])

```

GO

Uses

[dbo].[IdeaGenerationData]
[dbo].[Projects]

[dbo].[VejpEvaluation]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	VejpEvaluationId	int	4	False	1 - 1
	Pid	int	4	False	
	IGid	int	4	False	
	Evaluation_Idea	text	max	True	
	Evaluation_Basic	text	max	True	
	Evaluation_Work	text	max	True	
	Evaluation_Cost	text	max	True	
	Evaluation_LeastExpensive	text	max	True	
	Evaluation_ModifyOrCombine	text	max	True	
	Evaluation_Chances	text	max	True	
	Evaluation_ChangeDegree	text	max	True	
	Evaluation_Satisfaction	text	max	True	
	Evaluation_SavingsPotential	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.VejpEvaluation	VejpEvaluationId	True

Foreign Keys

Name	Update	Delete	Columns
VEJPEVAL_FK_IGD	Cascade	Cascade	IGid->[dbo].[IdeaGenerationData].[IdeaGenId]
VEJPEVAL_FK_PROJECTS			Pid->[dbo].[Projects].[ProjID]

SQL Script

```

CREATE TABLE [dbo].[VejpEvaluation]
(
[VejpEvaluationId] [int] NOT NULL IDENTITY(1, 1),
[Pid] [int] NOT NULL,
[IGid] [int] NOT NULL,
[Evaluation_Idea] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Evaluation_Basic] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Evaluation_Work] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Evaluation_Cost] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Evaluation_LeastExpensive] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Evaluation_ModifyOrCombine] [text] COLLATE SQL_Latin1_General_CI_AS NULL,

```

```
[Evaluation_Chances] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Evaluation_ChangeDegree] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Evaluation_Satisfaction] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Evaluation_SavingsPotential] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpEvaluation] ADD CONSTRAINT [PK_dbo.VejpEvaluation] PRIMARY KEY CLUSTERED
([VejpEvaluationId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpEvaluation] ADD CONSTRAINT [VEJPEVAL_FK_IGD] FOREIGN KEY ([IGid])
REFERENCES [dbo].[IdeaGenerationData] ([IdeaGenId]) ON DELETE CASCADE ON UPDATE CASCADE
GO
ALTER TABLE [dbo].[VejpEvaluation] ADD CONSTRAINT [VEJPEVAL_FK_PROJECTS] FOREIGN KEY ([Pid])
REFERENCES [dbo].[Projects] ([ProjID])
GO
```

Uses

[dbo].[IdeaGenerationData]
[dbo].[Projects]

[dbo].[VejpExternal]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	VejpExternalId	int	4	False	1 - 1
	Pid	int	4	False	
	External_Summary	text	max	True	
	External_Background	text	max	True	
	External_Tables	text	max	True	
	External_Estimate	text	max	True	
	External_Conclusion	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.VejpExternal	VejpExternalId	True

Foreign Keys

Name	Update	Delete	Columns
VEJPEXT_FK_PROJECTS	Cascade	Cascade	Pid->[dbo].[Projects].[ProjID]

SQL Script

```

CREATE TABLE [dbo].[VejpExternal]
(
[VejpExternalId] [int] NOT NULL IDENTITY(1, 1),
[Pid] [int] NOT NULL,
[External_Summary] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[External_Background] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[External_Tables] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[External_Estimate] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[External_Conclusion] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpExternal] ADD CONSTRAINT [PK_dbo.VejpExternal] PRIMARY KEY CLUSTERED
([VejpExternalId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpExternal] ADD CONSTRAINT [VEJPEXT_FK_PROJECTS] FOREIGN KEY ([Pid])
REFERENCES [dbo].[Projects] ([ProjID]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Projects]

[dbo].[VejpImplementation]

Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	VejpImplementationId	int	4	False	1 - 1
	Pid	int	4	False	
	IGid	int	4	False	
	Implementation_Change	text	max	True	
	Implementation_Plans	text	max	True	
	Implementation_Resources	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.VejpImplementation	VejpImplementationId	True

Foreign Keys

Name	Update	Delete	Columns
VEJPIMPL_FK_IGD	Cascade	Cascade	IGid->[dbo].[IdeaGenerationData].[IdeaGenId]
VEJPIMPL_FK_PROJECTS			Pid->[dbo].[Projects].[ProjID]

SQL Script

```

CREATE TABLE [dbo].[VejpImplementation]
(
[VejpImplementationId] [int] NOT NULL IDENTITY(1, 1),
[Pid] [int] NOT NULL,
[IGid] [int] NOT NULL,
[Implementation_Change] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Implementation_Plans] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Implementation_Resources] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpImplementation] ADD CONSTRAINT [PK_dbo.VejpImplementation] PRIMARY KEY
CLUSTERED ([VejpImplementationId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpImplementation] ADD CONSTRAINT [VEJPIMPL_FK_IGD] FOREIGN KEY ([IGid])
REFERENCES [dbo].[IdeaGenerationData] ([IdeaGenId]) ON DELETE CASCADE ON UPDATE CASCADE
GO
ALTER TABLE [dbo].[VejpImplementation] ADD CONSTRAINT [VEJPIMPL_FK_PROJECTS] FOREIGN KEY ([Pid])
REFERENCES [dbo].[Projects] ([ProjID])
GO

```

Uses

[dbo].[IdeaGenerationData]
[dbo].[Projects]

[dbo].[VejpInformation]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	VejpInfoId	int	4	False	1 - 1
	Pid	int	4	False	
	Info_Descr	text	max	True	
	Info_FunctionVerb	text	max	True	
	Info_FunctionNoun	text	max	True	
	Info_InitCost	text	max	True	
	Info_InitPctg	text	max	True	
	Info_InitWorth	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.VejpInformation	VejpInfoId	True

Foreign Keys

Name	Update	Delete	Columns
VEJPINFO_FK_PROJECTS	Cascade	Cascade	Pid->[dbo].[Projects].[ProjID]

SQL Script

```

CREATE TABLE [dbo].[VejpInformation]
(
[VejpInfoId] [int] NOT NULL IDENTITY(1, 1),
[Pid] [int] NOT NULL,
[Info_Descr] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Info_FunctionVerb] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Info_FunctionNoun] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Info_InitCost] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Info_InitPctg] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Info_InitWorth] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpInformation] ADD CONSTRAINT [PK_dbo.VejpInformation] PRIMARY KEY CLUSTERED
([VejpInfoId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpInformation] ADD CONSTRAINT [VEJPINFO_FK_PROJECTS] FOREIGN KEY ([Pid])
REFERENCES [dbo].[Projects] ([ProjID]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Projects]

[dbo].[VejpInvestigation]

Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	VejpInvestigationId	int	4	False	
	Pid	int	4	False	
	Investigation_Accomplish	text	max	True	
	Investigation_Relate	text	max	True	
	Investigation_FuncReq	text	max	True	
	Investigation_RealisticSpecs	text	max	True	
	Investigation_SpecSimplify	text	max	True	
	Investigation_SpecsReq	text	max	True	
	Investigation_SpecsNecSuf	text	max	True	
	Investigation_SpecsInterpreted	text	max	True	
	Investigation_Characteristics	text	max	True	
	Investigation_PoliciesReviewed	text	max	True	
	Investigation_WhoReq	text	max	True	
	Investigation_DesignMeetExceed	text	max	True	
	Investigation_Alternatives-Considered	text	max	True	
	Investigation_WhyAlternatives-Rejected	text	max	True	
	Investigation_ChangesDesign-Planned	text	max	True	
	Investigation_DrawingsReflection	text	max	True	
	Investigation_DesignLife	text	max	True	
	Investigation_LifeCycleCosts	text	max	True	
	Investigation_FuncCombSimpElim	text	max	True	
	Investigation_Construction	text	max	True	
	Investigation_LaborCost	text	max	True	
	Investigation_HighCostAreas	text	max	True	
	Investigation_Schedule	text	max	True	
	Investigation_SpecialMaterials	text	max	True	
	Investigation_AlternativeMaterials	text	max	True	
	Investigation_MaterialsHandle	text	max	True	
	Investigation_NewMaterials	text	max	True	
	Investigation_Maintenance-Consulted	text	max	True	
	Investigation_NormalMaintenance	text	max	True	
	Investigation_Cost	text	max	True	
	Investigation_Worth	text	max	True	

	Investigation_TargetCost	text	max	True	
	Investigation_UnnecessaryFeatures	text	max	True	
	Investigation_Eliminated	text	max	True	
	Investigation_Value	text	max	True	
	Investigation_Highcost	text	max	True	
	Investigation_Further	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.VejpInvestigation	VejpInvestigationId	True

Foreign Keys

Name	Update	Delete	Columns
VEJPINV_FK_PROJECTS	Cascade	Cascade	Pid->[dbo].[Projects].[ProjID]

SQL Script

```

CREATE TABLE [dbo].[VejpInvestigation]
(
[VejpInvestigationId] [int] NOT NULL IDENTITY(1, 1),
[Pid] [int] NOT NULL,
[Investigation_Accomplish] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_Relate] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_FuncReq] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_RealisticSpecs] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_SpecSimplify] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_SpecsReq] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_SpecsNecSuf] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_SpecsInterpreted] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_Characteristics] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_PoliciesReviewed] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_WhoReq] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_DesignMeetExceed] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_AlternativesConsidered] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_WhyAlternativesRejected] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_ChangesDesignPlanned] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_DrawingsReflection] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_DesignLife] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_LifeCycleCosts] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_FuncCombSimpElim] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_Construction] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_LaborCost] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_HighCostAreas] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_Schedule] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_SpecialMaterials] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_AlternativeMaterials] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_MaterialsHandle] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_NewMaterials] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_MaintenanceConsulted] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_NormalMaintenance] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_Cost] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_Worth] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_TargetCost] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_UnnecessaryFeatures] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_Eliminated] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_Value] [text] COLLATE SQL_Latin1_General_CI_AS NULL,

```

```
[Investigation_Highcost] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Investigation_Further] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpInvestigation] ADD CONSTRAINT [PK_dbo.VejpInvestigation] PRIMARY KEY
CLUSTERED ([VejpInvestigationId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpInvestigation] ADD CONSTRAINT [VEJPINV FK PROJECTS] FOREIGN KEY ([Pid])
REFERENCES [dbo].[Projects] ([ProjID]) ON DELETE CASCADE ON UPDATE CASCADE
GO
```

Uses

[dbo].[Projects]

[dbo].[VejpPresentation]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	VejpPresentationId	int	4	False	1 - 1
	Pid	int	4	False	
	IGid	int	4	False	
	Presentation_Sold	text	max	True	
	Presentation_Idea	text	max	True	
	Presentation_Problem	text	max	True	
	Presentation_Way	text	max	True	
	Presentation_Benefits	text	max	True	
	Presentation_Idea2	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.VejpPresentation	VejpPresentationId	True

Foreign Keys

Name	Update	Delete	Columns
VEJPPRES_FK_IGD	Cascade	Cascade	IGid->[dbo].[IdeaGenerationData].[IdeaGenId]
VEJPPRES_FK_PROJECTS			Pid->[dbo].[Projects].[ProjID]

SQL Script

```

CREATE TABLE [dbo].[VejpPresentation]
(
[VejpPresentationId] [int] NOT NULL IDENTITY(1, 1),
[Pid] [int] NOT NULL,
[IGid] [int] NOT NULL,
[Presentation Sold] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Presentation_Idea] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Presentation_Problem] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Presentation_Way] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Presentation_Benefits] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Presentation_Idea2] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpPresentation] ADD CONSTRAINT [PK_dbo.VejpPresentation] PRIMARY KEY
CLUSTERED ([VejpPresentationId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpPresentation] ADD CONSTRAINT [VEJPPRES_FK_IGD] FOREIGN KEY ([IGid])
REFERENCES [dbo].[IdeaGenerationData] ([IdeaGenId]) ON DELETE CASCADE ON UPDATE CASCADE
GO
ALTER TABLE [dbo].[VejpPresentation] ADD CONSTRAINT [VEJPPRES_FK_PROJECTS] FOREIGN KEY ([Pid])
REFERENCES [dbo].[Projects] ([ProjID])

```

GO

Uses

[dbo].[IdeaGenerationData]
[dbo].[Projects]

[dbo].[VejpSelection]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	VejpSelectionId	int	4	False	1 - 1
	Pid	int	4	False	
	Selection_Study	text	max	True	
	Selection_Who	text	max	True	
	Selection_Start	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.VejpSelection	VejpSelectionId	True

Foreign Keys

Name	Update	Delete	Columns
VEJPSEL_FK_PROJECTS	Cascade	Cascade	Pid->[dbo].[Projects].[ProjID]

SQL Script

```

CREATE TABLE [dbo].[VejpSelection]
(
[VejpSelectionId] [int] NOT NULL IDENTITY(1, 1),
[Pid] [int] NOT NULL,
[Selection_Study] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Selection_Who] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Selection_Start] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpSelection] ADD CONSTRAINT [PK_dbo.VejpSelection] PRIMARY KEY CLUSTERED
([VejpSelectionId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpSelection] ADD CONSTRAINT [VEJPSEL FK PROJECTS] FOREIGN KEY ([Pid])
REFERENCES [dbo].[Projects] ([ProjID]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Projects]

[dbo].[VejpSpeculation]

Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	VejpSpeculationId	int	4	False	1 - 1
	Pid	int	4	False	
	Speculation_Perform	text	max	True	
	Speculation_Function	text	max	True	
	Speculation_Function2	text	max	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.VejpSpeculation	VejpSpeculationId	True

Foreign Keys

Name	Update	Delete	Columns
VEJPSPEC_FK_PROJECTS	Cascade	Cascade	Pid->[dbo].[Projects].[ProjID]

SQL Script

```

CREATE TABLE [dbo].[VejpSpeculation]
(
[VejpSpeculationId] [int] NOT NULL IDENTITY(1, 1),
[Pid] [int] NOT NULL,
[Speculation_Perform] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Speculation_Function] [text] COLLATE SQL_Latin1_General_CI_AS NULL,
[Speculation_Function2] [text] COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpSpeculation] ADD CONSTRAINT [PK_dbo.VejpSpeculation] PRIMARY KEY CLUSTERED
([VejpSpeculationId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[VejpSpeculation] ADD CONSTRAINT [VEJPSPEC FK PROJECTS] FOREIGN KEY ([Pid])
REFERENCES [dbo].[Projects] ([ProjID]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Projects]

[dbo].[VEReport]
Value Engineering

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	ReportId	int	4	False	1 - 1
	Pid	int	4	False	
	ReportFile	varchar(max)	max	True	
	DateCreated	date	3	True	
	UserReportFile	varchar(max)	max	True	
	DateUserUploaded	date	3	True	

Indexes

Key	Name	Columns	Unique
	PK_dbo.VEReport	ReportId	True

Foreign Keys

Name	Update	Delete	Columns
VER_FK_PD	Cascade	Cascade	Pid->[dbo].[Projects].[ProjID]

SQL Script

```

CREATE TABLE [dbo].[VEReport]
(
[ReportId] [int] NOT NULL IDENTITY(1, 1),
[Pid] [int] NOT NULL,
[ReportFile] [varchar] (max) COLLATE SQL_Latin1_General_CI_AS NULL,
[DateCreated] [date] NULL,
[UserReportFile] [varchar] (max) COLLATE SQL_Latin1_General_CI_AS NULL,
[DateUserUploaded] [date] NULL
) ON [PRIMARY] TEXTIMAGE ON [PRIMARY]
GO
ALTER TABLE [dbo].[VEReport] ADD CONSTRAINT [PK_dbo.VEReport] PRIMARY KEY CLUSTERED ([ReportId])
ON [PRIMARY]
GO
ALTER TABLE [dbo].[VEReport] ADD CONSTRAINT [VER_FK_PD] FOREIGN KEY ([Pid]) REFERENCES
[dbo].[Projects] ([ProjID]) ON DELETE CASCADE ON UPDATE CASCADE
GO

```

Uses

[dbo].[Projects]



Users

Value Engineering

Objects

Name
apps
apps_
veapp

 <i>apps</i>
Value Engineering

Properties

Property	Value
Type	SqlUser
Login Name	apps
Default Schema	dbo

Database Level Permissions

Type	Action
CONNECT	Grant

SQL Script

```
IF NOT EXISTS (SELECT * FROM master.dbo.syslogins WHERE loginname = N'apps')
CREATE LOGIN [apps] WITH PASSWORD = 'p@ssw0rd'
GO
CREATE USER [apps] FOR LOGIN [apps]
GO
```

 <i>apps_</i>
Value Engineering

Properties

Property	Value
Type	SqlUser
Login Name	apps_
Default Schema	dbo

Database Level Permissions

Type	Action
CONNECT	Grant

SQL Script

```
IF NOT EXISTS (SELECT * FROM master.dbo.syslogins WHERE loginname = N'apps_')
CREATE LOGIN [apps_] WITH PASSWORD = 'p@ssw0rd'
GO
CREATE USER [apps_] FOR LOGIN [apps_]
GO
```

 veapp
Value Engineering

Properties

Property	Value
Type	SqlUser
Login Name	veapp
Default Schema	dbo

Database Level Permissions

Type	Action
CONNECT	Grant

SQL Script

```
IF NOT EXISTS (SELECT * FROM master.dbo.syslogins WHERE loginname = N'veapp')
CREATE LOGIN [veapp] WITH PASSWORD = 'p@ssw0rd'
GO
CREATE USER [veapp] FOR LOGIN [veapp]
GO
```

 **Database Roles**
Value Engineering

Objects

Name
db_accessadmin
db_backupoperator
db_datareader
db_datawriter
db_ddladmin
db_denydatareader
db_denydatawriter
db_owner
db_securityadmin
public

 **db_accessadmin**
Value Engineering

Properties

Property	Value
Owner	dbo

 **db_backupoperator**
Value Engineering

Properties

Property	Value
Owner	dbo

 db_datareader
Value Engineering

Properties

Property	Value
Owner	dbo

Members

- apps
- apps_
- veapp

SQL Script

```
EXEC sp_addrolemember N'db_datareader', N'apps'  
GO  
EXEC sp_addrolemember N'db_datareader', N'apps_'  
GO  
EXEC sp_addrolemember N'db_datareader', N'veapp'  
GO
```

Uses

apps
apps_
veapp

 db_datawriter
Value Engineering

Properties

Property	Value
Owner	dbo

Members

- apps
- apps_
- veapp

SQL Script

```
EXEC sp_addrolemember N'db_datawriter', N'apps'  
GO  
EXEC sp_addrolemember N'db datawriter', N'apps '  
GO  
EXEC sp_addrolemember N'db datawriter', N'veapp'  
GO
```

Uses

apps
apps_
veapp

 db_ddladmin
Value Engineering

Properties

Property	Value
Owner	dbo

 db_denydatareader
Value Engineering

Properties

Property	Value
Owner	dbo

 *db_denydatawriter*
Value Engineering

Properties

Property	Value
Owner	dbo

 *db_owner*
Value Engineering

Properties

Property	Value
Owner	dbo

 *db_securityadmin*
Value Engineering

Properties

Property	Value
Owner	dbo

 <i>public</i>
Value Engineering

Properties

Property	Value
Owner	dbo

veusers Database
Value Engineering

Database Properties

Property	Value
SQL Server Version	SQL Server 2008
Compatibility Level	SQL Server 2008
Database Encryption Enabled	False
Last backup time	-
Last log backup time	-
Creation date	Jul 14 2014
Users	7
Database size	4.00 MB
Unallocated space	1.77 MB

Database Options

Property	Value
Compatibility Level	100
Database collation	SQL_Latin1_General_CI_AS
Restrict access	MULTI_USER
Is read-only	False
Auto close	False
Auto shrink	False
Database status	ONLINE
In standby	False
Cleanly shutdown	False
Supplemental logging enabled	False
Snapshot isolation state	OFF
Read committed snapshot on	False
Recovery model	FULL
Page verify option	CHECKSUM
Auto create statistics	True
Auto update statistics	True
Auto update statistics asynchronously	False
ANSI NULL default	False
ANSI NULL enabled	False
ANSI padding enabled	False
ANSI warnings enabled	False
Arithmetic abort enabled	False
Concatenating NULL yields NULL	False
Numeric roundabort enabled	False
Quoted Identifier On	False
Recursive triggers enabled	False
Close cursors on commit	False
Local cursors by default	False
Fulltext enabled	True
Trustworthy	False
Database chaining	False
Forced parameterization	False
Master key encrypted by server	False
Published	False
Subscribed	False
Merge published	False
Is distribution database	False
Sync with backup	False
Service broker GUID	187bc937-d2b5-4dde-8d72-c3aa14321985
Service broker enabled	False
Log reuse wait	NOTHING
Date correlation	False

CDC enabled	False
Encrypted	False
Honor broker priority	False
Database owner	sa

Files

Name	Type	Size	File Name
veusers	Data	3.0 0 MB	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\veusers.mdf
veusers_log	Log	1.0 0 MB	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\veusers_log.ldf

Tables
Value Engineering

Objects

Name
dbo.UserProfile
User profile
dbo.webpages_Membership
Membership
dbo.webpages_OAuthMembership
Owin Authorization
dbo.webpages_Roles
Roles
dbo.webpages_UsersInRoles
Users in roles

[dbo].[UserProfile]

Value Engineering

MS_Description

User profile

Properties

Property	Value
Collation	SQL_Latin1_General_CI_AS
Row Count (~)	8
Created	1:53:46 PM Monday, July 14, 2014
Last Modified	1:53:46 PM Monday, July 14, 2014

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	UserId	int	4	False	1 - 1
	UserName	nvarchar(max)	max	False	
	EmailAddress	nvarchar(max)	max	True	

Indexes

Key	Name	Columns	Unique
	PK__UserProf__1788CC4C0DAF0CB0	UserId	True

SQL Script

```

CREATE TABLE [dbo].[UserProfile]
(
    [UserId] [int] NOT NULL IDENTITY(1, 1),
    [UserName] [nvarchar] (max) COLLATE SQL_Latin1_General_CI_AS NOT NULL,
    [EmailAddress] [nvarchar] (max) COLLATE SQL_Latin1_General_CI_AS NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
ALTER TABLE [dbo].[UserProfile] ADD CONSTRAINT [PK__UserProf__1788CC4C0DAF0CB0] PRIMARY KEY
CLUSTERED ([UserId]) ON [PRIMARY]
GO
EXEC sp_addextendedproperty N'MS_Description', N'User profile', 'SCHEMA', N'dbo', 'TABLE',
N'UserProfile', NULL, NULL
GO

```

[dbo].[webpages_Membership]
Value Engineering

MS_Description

Membership

Properties

Property	Value
Collation	SQL_Latin1_General_CI_AS
Row Count (~)	8
Created	1:53:46 PM Monday, July 14, 2014
Last Modified	1:53:46 PM Monday, July 14, 2014

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Default
	UserId	int	4	False	
	CreateDate	datetime	8	True	
	ConfirmationToken	nvarchar(128)	256	True	
	IsConfirmed	bit	1	True	((0))
	LastPasswordFailureDate	datetime	8	True	
	PasswordFailuresSinceLast-Success	int	4	False	((0))
	Password	nvarchar(128)	256	False	
	PasswordChangedDate	datetime	8	True	
	PasswordSalt	nvarchar(128)	256	False	
	PasswordVerificationToken	nvarchar(128)	256	True	
	PasswordVerificationToken-ExpirationDate	datetime	8	True	

Indexes

Key	Name	Columns	Unique
	PK_webpages_1788CC4C09DE7BCC	UserId	True

SQL Script

```
CREATE TABLE [dbo].[webpages_Membership]
(
[UserId] [int] NOT NULL,
[CreateDate] [datetime] NULL,
```

```
[ConfirmationToken] [nvarchar] (128) COLLATE SQL_Latin1_General_CI_AS NULL,
[IsConfirmed] [bit] NULL CONSTRAINT [DF_webpages__IsCon_1367E606] DEFAULT ((0)),
[LastPasswordFailureDate] [datetime] NULL,
[PasswordFailuresSinceLastSuccess] [int] NOT NULL CONSTRAINT [DF_webpages_Passw_145C0A3F]
DEFAULT ((0)),
[Password] [nvarchar] (128) COLLATE SQL_Latin1_General_CI_AS NOT NULL,
[PasswordChangedDate] [datetime] NULL,
[PasswordSalt] [nvarchar] (128) COLLATE SQL_Latin1_General_CI_AS NOT NULL,
[PasswordVerificationToken] [nvarchar] (128) COLLATE SQL_Latin1_General_CI_AS NULL,
[PasswordVerificationTokenExpirationDate] [datetime] NULL
) ON [PRIMARY]
GO
ALTER TABLE [dbo].[webpages_Membership] ADD CONSTRAINT [PK_webpages_1788CC4C09DE7BCC] PRIMARY
KEY CLUSTERED ([UserId]) ON [PRIMARY]
GO
EXEC sp_addextendedproperty N'MS_Description', N'Membership', 'SCHEMA', N'dbo', 'TABLE',
N'webpages_Membership', NULL, NULL
GO
```

[dbo].[webpages_OAuthMembership]
Value Engineering

MS_Description

Owin Authorization

Properties

Property	Value
Collation	SQL_Latin1_General_CI_AS
Row Count (~)	0
Created	1:53:46 PM Monday, July 14, 2014
Last Modified	1:53:46 PM Monday, July 14, 2014

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls
	Provider	nvarchar(30)	60	False
	ProviderUserId	nvarchar(100)	200	False
	UserId	int	4	False

Indexes

Key	Name	Columns	Unique
	PK_webpages_F53FC0ED060DEAE8	Provider, ProviderUserId	True

SQL Script

```

CREATE TABLE [dbo].[webpages_OAuthMembership]
(
[Provider] [nvarchar] (30) COLLATE SQL_Latin1_General_CI_AS NOT NULL,
[ProviderUserId] [nvarchar] (100) COLLATE SQL_Latin1_General_CI_AS NOT NULL,
[UserId] [int] NOT NULL
) ON [PRIMARY]
GO
ALTER TABLE [dbo].[webpages_OAuthMembership] ADD CONSTRAINT [PK_webpages_F53FC0ED060DEAE8]
PRIMARY KEY CLUSTERED ([Provider], [ProviderUserId]) ON [PRIMARY]
GO
EXEC sp_addextendedproperty N'MS_Description', N'Owin Authorization', 'SCHEMA', N'dbo', 'TABLE',
N'webpages_OAuthMembership', NULL, NULL
GO

```

[dbo].[webpages_Roles]
Value Engineering

MS_Description

Roles

Properties

Property	Value
Collation	SQL_Latin1_General_CI_AS
Row Count (~)	0
Created	1:53:46 PM Monday, July 14, 2014
Last Modified	1:53:46 PM Monday, July 14, 2014

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls	Identity
	RoleId	int	4	False	1 - 1
	RoleName	nvarchar(256)	512	False	

Indexes

Key	Name	Columns	Unique
	PK__webpages__8AFACE1A7F60ED59	RoleId	True
	UQ__webpages__8A2B6160023D5A04	RoleName	True

SQL Script

```

CREATE TABLE [dbo].[webpages_Roles]
(
[RoleId] [int] NOT NULL IDENTITY(1, 1),
[RoleName] [nvarchar](256) COLLATE SQL_Latin1_General_CI_AS NOT NULL
) ON [PRIMARY]
GO
ALTER TABLE [dbo].[webpages_Roles] ADD CONSTRAINT [PK_webpages_8AFACE1A7F60ED59] PRIMARY KEY
CLUSTERED ([RoleId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[webpages_Roles] ADD CONSTRAINT [UQ_webpages_8A2B6160023D5A04] UNIQUE
NONCLUSTERED ([RoleName]) ON [PRIMARY]
GO
EXEC sp_addextendedproperty N'MS_Description', N'Roles', 'SCHEMA', N'dbo', 'TABLE', N'webpages_Roles', NULL, NULL
GO

```

[dbo].[webpages_UsersInRoles]
Value Engineering

MS_Description

Users in roles

Properties

Property	Value
Row Count (~)	0
Created	1:53:46 PM Monday, July 14, 2014
Last Modified	1:53:46 PM Monday, July 14, 2014

Columns

Key	Name	Data Type	Max Length (Bytes)	Allow Nulls
	UserId	int	4	False
	RoleId	int	4	False

Indexes

Key	Name	Columns	Unique
	PK_webpages_AF2760AD117F9D94	UserId,RoleId	True

Foreign Keys

Name	Columns
fk_RoleId	RoleId->[dbo].[webpages_Roles].[RoleId]
fk_UserId	UserId->[dbo].[UserProfile].[UserId]

SQL Script

```

CREATE TABLE [dbo].[webpages_UsersInRoles]
(
[UserId] [int] NOT NULL,
[RoleId] [int] NOT NULL
) ON [PRIMARY]
GO
ALTER TABLE [dbo].[webpages_UsersInRoles] ADD CONSTRAINT [PK_webpages_AF2760AD117F9D94] PRIMARY
KEY CLUSTERED ([UserId], [RoleId]) ON [PRIMARY]
GO
ALTER TABLE [dbo].[webpages_UsersInRoles] ADD CONSTRAINT [fk_RoleId] FOREIGN KEY ([RoleId])
REFERENCES [dbo].[webpages_Roles] ([RoleId])
GO
ALTER TABLE [dbo].[webpages_UsersInRoles] ADD CONSTRAINT [fk_UserId] FOREIGN KEY ([UserId])
REFERENCES [dbo].[UserProfile] ([UserId])

```

```
GO
EXEC sp_addextendedproperty N'MS_Description', N'Users in roles', 'SCHEMA', N'dbo', 'TABLE',
N'webpages_UsersInRoles', NULL, NULL
GO
```



Users

Value Engineering

Objects

Name
apps
apps_
veapp

 <i>apps</i>
Value Engineering

Properties

Property	Value
Type	SqlUser
Login Name	apps
Default Schema	dbo

Database Level Permissions

Type	Action
CONNECT	Grant

SQL Script

```
IF NOT EXISTS (SELECT * FROM master.dbo.syslogins WHERE loginname = N'apps')
CREATE LOGIN [apps] WITH PASSWORD = 'p@ssw0rd'
GO
CREATE USER [apps] FOR LOGIN [apps]
GO
```

 <i>apps_</i>
Value Engineering

Properties

Property	Value
Type	SqlUser
Login Name	apps_
Default Schema	dbo

Database Level Permissions

Type	Action
CONNECT	Grant

SQL Script

```
IF NOT EXISTS (SELECT * FROM master.dbo.syslogins WHERE loginname = N'apps_')
CREATE LOGIN [apps_] WITH PASSWORD = 'p@ssw0rd'
GO
CREATE USER [apps_] FOR LOGIN [apps_]
GO
```

 veapp
Value Engineering

Properties

Property	Value
Type	SqlUser
Login Name	veapp
Default Schema	dbo

Database Level Permissions

Type	Action
CONNECT	Grant

SQL Script

```
IF NOT EXISTS (SELECT * FROM master.dbo.syslogins WHERE loginname = N'veapp')
CREATE LOGIN [veapp] WITH PASSWORD = 'p@ssw0rd'
GO
CREATE USER [veapp] FOR LOGIN [veapp]
GO
```

 Database Roles
Value Engineering

Objects

Name

db_accessadmin
db_backupoperator
db_datareader
db_datawriter
db_ddladmin
db_denydatareader
db_denydatawriter
db_owner
db_securityadmin
public

 db_accessadmin
Value Engineering

Properties

Property	Value
Owner	dbo

 db_backupoperator
Value Engineering

Properties

Property	Value
Owner	dbo

 *db_datareader*

Value Engineering

Properties

Property	Value
Owner	dbo

Members

- apps
- apps_
- veapp

SQL Script

```
EXEC sp_addrolemember N'db_datareader', N'apps'  
GO  
EXEC sp_addrolemember N'db_datareader', N'apps_'  
GO  
EXEC sp_addrolemember N'db_datareader', N'veapp'  
GO
```

Uses

apps
apps_
veapp

 *db_datawriter*

Value Engineering

Properties

Property	Value
Owner	dbo

Members

- apps
- apps_
- veapp

SQL Script

```
EXEC sp_addrolemember N'db_datawriter', N'apps'  
GO  
EXEC sp_addrolemember N'db datawriter', N'apps '  
GO  
EXEC sp_addrolemember N'db datawriter', N'veapp'  
GO
```

Uses

apps
apps_
veapp

 db_ddladmin
Value Engineering

Properties

Property	Value
Owner	dbo

 db_denydatareader
Value Engineering

Properties

Property	Value
Owner	dbo

 *db_denydatawriter*
Value Engineering

Properties

Property	Value
Owner	dbo

 *db_owner*
Value Engineering

Properties

Property	Value
Owner	dbo

 *db_securityadmin*
Value Engineering

Properties

Property	Value
Owner	dbo

 *public*
Value Engineering

Properties

Property	Value
Owner	dbo