

Democracy Suite[®] C# Automated Code Review Process

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CHAPTER 1: STYLECOP OVERVIEW

The Dominion Voting Systems' (DVS) Software Development group has selected StyleCop (current version 4.7) as the code standard for C# development.

This document provides the installation and configuration procedures for StyleCop and other necessary tools in a manner consistent with DVS. Also covered in this document is running StyleCop on included source code, with sample screen shots of what correct and incorrect code results look like.

NOTE: See *Appendix A StyleCop Violation Test Code* for running the StyleCop Violation test code through the process.

CHAPTER 2: CONFIGURE A NEW REVIEW ENVIRONMENT

The StyleCop automated review base system requirements are the same as required for building DVS C#.NET products. Therefore, the same machine or the same baseline VM may be used to configure the automated review environment.

This document first gives a brief overview of the build process, followed by details of the steps involved.

2.1 Overview

1. Procure virtual machine or physical computer.
The minimum system requirements are:
 - a 64bit machine
 - at least 2GB RAM
 - 100 GB free disk space (after system setup).
2. Install Windows 10 or Windows Server 2016.
3. Install Visual Studio 2015 Professional or .NET Framework v4.
4. Create the directory structure for the source code and third party downloads.
5. Copy the source code delivery into the build directory.
6. Download the third party tools and DLLs.
7. Install the third party tools and DLLs.
8. Copy the third party DLLs where they are needed for the build.
9. Run StyleCop on the designated source files to perform the review.
10. View the reports containing the results of the review process output.

CHAPTER 3: CREATE DIRECTORY STRUCTURES

Use the procedure below to create the following directory structures:

- Source code
- Logs
- Tools
- Downloads

NOTE: Replace *@ProjectName* with the project you are reviewing.

1. Create the directory **Builds** at the root of the *C:* drive.
2. Create the directory **@ProjectName** in *C:\Builds*.
3. Within the *C:\Builds\@ProjectName* directory, create the following folders:
 - **Logs**
 - **Downloads**
 - **ReviewReports**

When completed you will have the following folders:

- *C:\Builds\@ProjectName\Logs*
- *C:\Builds\@ProjectName\Downloads*
- *C:\Builds\@ProjectName\ReviewReports*

CHAPTER 4: COPY SOURCE CODE DELIVERY TO THE BUILD DIRECTORY

Determine if there is an existing Source directory under *C:\Builds\@ProjectName*. If so, rename or remove it. When replacing source code to be evaluated, rerun the procedure in Chapter 7 *Copy Third Party DLLs for Review*.

Unzip the source code delivery into the *C:\Builds\@ProjectName* directory, without creating an additional folder for the contents. After doing this, the build batch files should be in *C:\Builds\@ProjectName*, and the source code should be in *C:\Builds\@ProjectName\Source*.

CHAPTER 5: DOWNLOAD THIRD PARTY TOOLS AND DLLS

5.1 Microsoft Build Extension Pack

1. Go to <http://msbuildextensionpack.codeplex.com/>.
2. Click the **Downloads** tab on the page toolbar. (Navigate to the Downloads section of the web site.)
3. Download the file MSBuild Extension Pack October 2013.zip. Save the file to *C:\Builds\@ProjectName\Downloads*.

NOTE: Some web browsers, such as Internet Explorer 7 and 8, may change spaces in the names of downloaded files to underscores. If this occurs, rename the downloaded file to match the name given here.

4. Extract the zip file MSBuild Extension Pack October 2013.zip by right-clicking **Extract All** to the current folder. When asked, choose the default paths for extraction.
5. Move into the extracted folder and extract the file MSBuild Extension Pack 4.0.8.0.zip. Move into the extracted folder and extract the last file, MSBuild Extension Pack 4.0.8.0 Binaries.zip. The full extracted path should look like the following:

C:\Builds\@ProjectName\Downloads\MSBuild Extension Pack October 2013\MSBuild Extension Pack 4.0.8.0\MSBuild Extension Pack 4.0.8.0 Binaries

5.2 StyleCop

1. Go to <https://stylecop.codeplex.com/>.
2. Click the **Downloads** tab on the page toolbar. (Navigate to the Downloads section of the web site.)
3. Look in the current downloads section or in the **Other Downloads** box to find the latest 4.7.x.y version. At the time of this writing it is StyleCop-4.7.49.0.msi.
4. Save this file to *C:\Builds\@ProjectName\Downloads*.

CHAPTER 6: INSTALL THIRD PARTY TOOLS AND DLLS

6.1 StyleCorp

1. Start the installer: `C:\Builds\@ProjectName\Downloads\StyleCop-4.7.x.y.msi`.
2. Click **Next**.

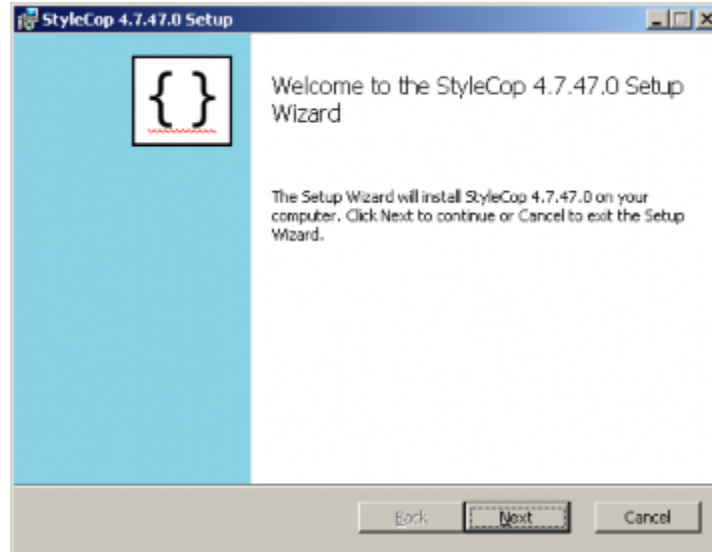


Figure 6-1: Setup Wizard screen

3. Agree to the license and click **Next**.

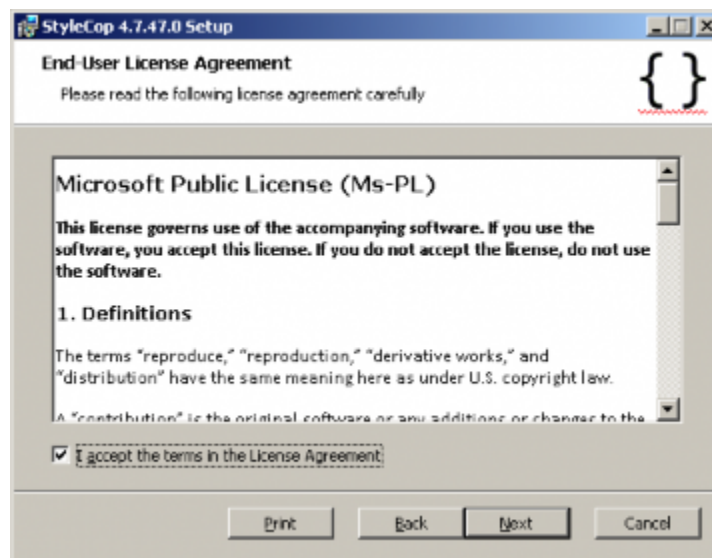


Figure 6-2: End-User License Agreement screen

4. Leave the defaults as-is and click **Next**.

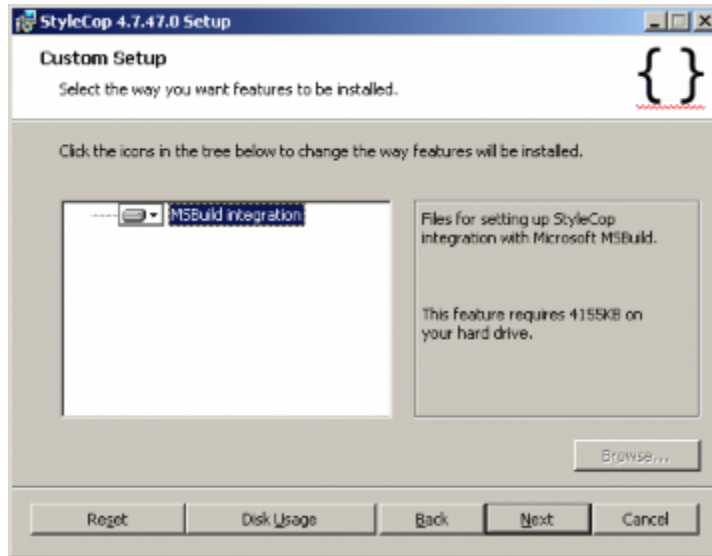


Figure 6-3: Custom Setup screen

5. Click **Install** to start the the installation.

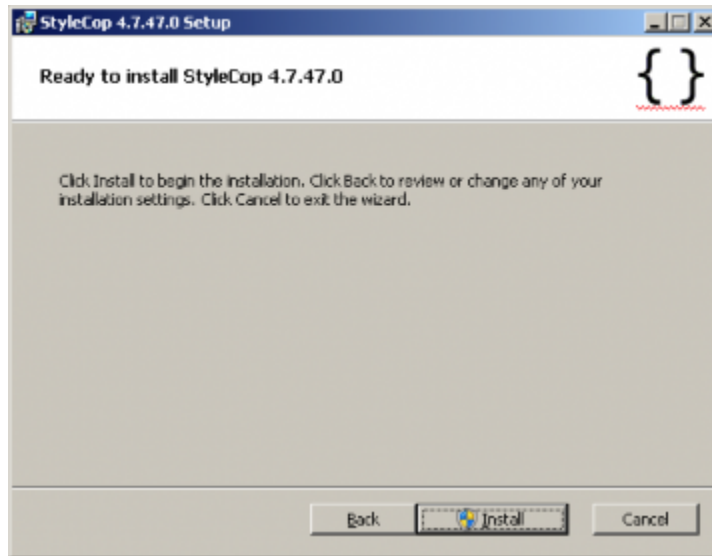


Figure 6-4: Install screen

6. When the installation is complete, click **Finish**.

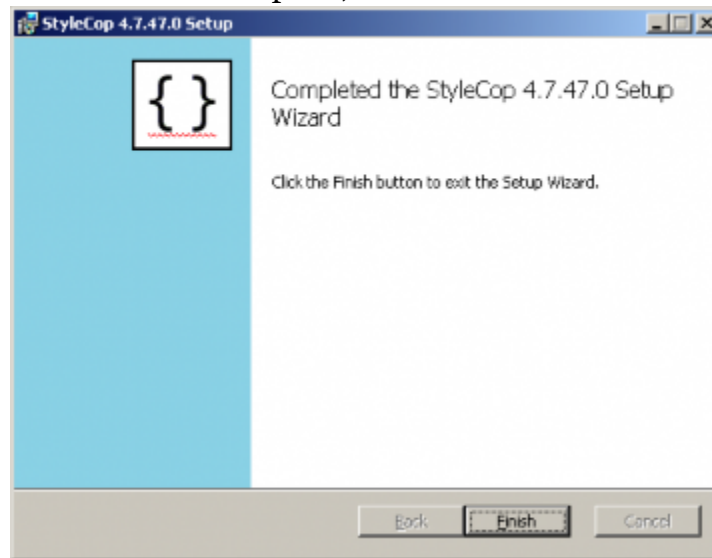


Figure 6-5: Completed Setup Wizard screen

CHAPTER 7: COPY THIRD PARTY DLLS FOR REVIEW

Run the Windows Command file from the Project root. Right-click the following file and click **Run as administrator**:

C:\Builds\@ProjectName\COPY3rdPartyDllsForReview.bat.

This copies all of the MSBuild Extension Pack files to the correct location for running the review. Run as administrator since the command file copies one of the required MSBuild Extension Pack integration files to the Program Files folder where StyleCop was installed.

7.1 Third Party Packages after Installation Steps

7.1.1 MSBuild Extension Pack

- C:\Builds\@ProjectName\Source\BuildTools\ExtensionPack\4.0*.*
- C:\Program Files (x86)\StyleCop 4.7\MSBuild.ExtensionPack.StyleCop.dll

7.1.2 StyleCop 4.7

- C:\Program Files (x86)\StyleCop 4.7*.*

7.2 Final BuildTools Folder/File Tree

NOTE: Folder names are italicized.

- *BuildTools*
 - StyleCop.build.proj
 - StyleCop.xsl
 - *ExtensionPack*
 - *4.0
 - Interop.COMAdmin.dll
 - Interop.IWshRuntimeLibrary.dll
 - Ionic.Zip.dll
 - MSBuild.ExtensionPack.BizTalk.dll
 - MSBuild.ExtensionPack.BizTalk.pdb
 - MSBuild.ExtensionPack.dll
 - MSBuild.ExtensionPack.dll.config

- MSBuild.ExtensionPack.Git.dll
- MSBuild.ExtensionPack.Git.pdb
- MSBuild.ExtensionPack.Iis7.dll
- MSBuild.ExtensionPack.Iis7.pdb
- MSBuild.ExtensionPack.Loggers.dll
- MSBuild.ExtensionPack.Loggers.pdb
- MSBuild.ExtensionPack.pdb
- MSBuild.ExtensionPack.Sql2005.dll
- MSBuild.ExtensionPack.Sql2005.pdb
- MSBuild.ExtensionPack.Sql2008.dll
- MSBuild.ExtensionPack.Sql2008.pdb
- MSBuild.ExtensionPack.Sql2012.dll
- MSBuild.ExtensionPack.Sql2012.pdb
- MSBuild.ExtensionPack.Sql2014.dll
- MSBuild.ExtensionPack.Sql2014.pdb
- MSBuild.ExtensionPack.StyleCop.dll
- MSBuild.ExtensionPack.StyleCop.pdb
- MSBuild.ExtensionPack.Sync.dll
- MSBuild.ExtensionPack.Sync.pdb
- MSBuild.ExtensionPack.TaskFactory.Dlr.dll
- MSBuild.ExtensionPack.TaskFactory.Dlr.pdb
- MSBuild.ExtensionPack.TaskFactory.PowerShell.dll
- MSBuild.ExtensionPack.TaskFactory.PowerShell.pdb
- MSBuild.ExtensionPack.tasks
- MSBuild.ExtensionPack.Tfs.dll
- MSBuild.ExtensionPack.Tfs.pdb
- MSBuild.ExtensionPack.Tfs2010.dll
- MSBuild.ExtensionPack.Tfs2010.pdb
- MSBuild.ExtensionPack.Tfs2012.dll
- MSBuild.ExtensionPack.Tfs2012.pdb
- MSBuild.ExtensionPack.Tfs2013.dll
- MSBuild.ExtensionPack.Tfs2013.pdb

- MSBuild.ExtensionPack.Tfs2013.xml
- MSBuild.ExtensionPack.VersionNumber.targets
- MSBuild.ExtensionPack.WindowsVirtualPC.dll
- MSBuild.ExtensionPack.WindowsVirtualPC.pdb

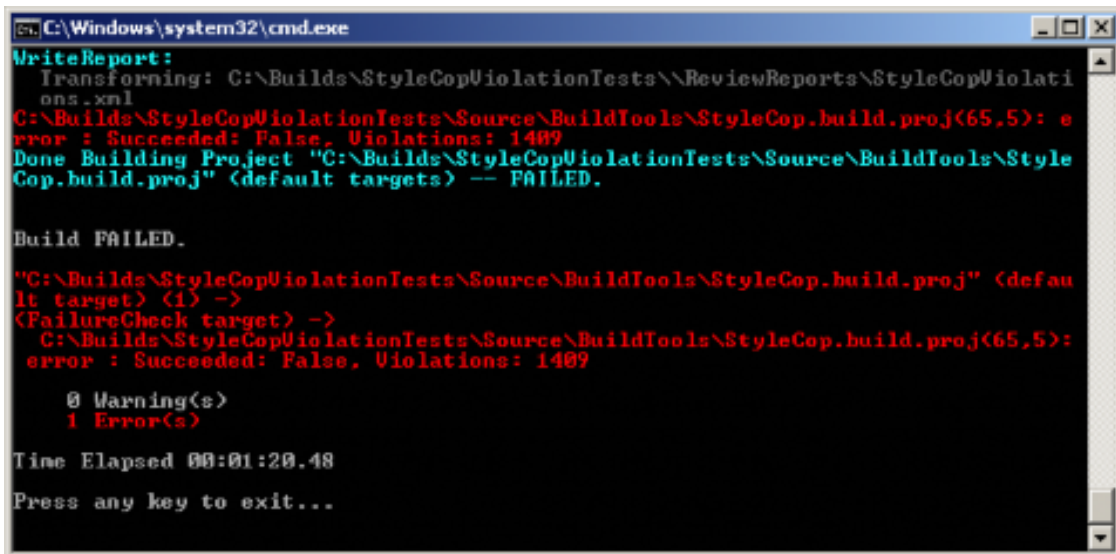
CHAPTER 8: PERFORM SOURCE CODE REVIEW WITH STYLECOP

Review *Appendix A StyleCop Violation Test Code* to verify that the changes to the Settings.StyleCop file are as described there.

Run the Windows Command file from the Project root:
`C:\Builds\@ProjectName\RunSourceReview.bat.`

The review has now been performed, and the violations files, as well as the reports are in the ReviewReports folder for analysis. In addition, if violations were found, the command window tells you if the review has failed and how many violations are present.

An example of a failed review is found below:



```
C:\Windows\system32\cmd.exe
Write Report:
  Transforming: C:\Builds\StyleCopViolationTests\ReviewReports\StyleCopViolations.xml
C:\Builds\StyleCopViolationTests\Source\BuildTools\StyleCop.build.proj(65,5): error : Succeeded: False, Violations: 1489
Done Building Project "C:\Builds\StyleCopViolationTests\Source\BuildTools\StyleCop.build.proj" (default targets) -- FAILED.

Build FAILED.

"C:\Builds\StyleCopViolationTests\Source\BuildTools\StyleCop.build.proj" (default target) (1) ->
<FailureCheck target> ->
  C:\Builds\StyleCopViolationTests\Source\BuildTools\StyleCop.build.proj(65,5): error : Succeeded: False, Violations: 1489

    0 Warning(s)
    1 Error(s)

Time Elapsed 00:01:20.48
Press any key to exit...
```

Figure 8-1: Failed review example.

APPENDIX A: STYLECOP VIOLATION TEST CODE

A.1 Source Changes

DVS uses slightly modified, but publicly available test code created to provide a set of negative test cases to show that StyleCop is indeed catching violations of the coding standard. The test code is provided based on an MIT license and is available for download at the following:

<https://code.google.com/p/dxcorecommunityplugins/>

It was created for the same purpose, but to prove that StyleCop was performing as expected from a Visual Studio plug-in called CodeRush. DVS had fixed minor issues in the source where the code did not fail as expected, due to expected use from the plug-in vs. a command line runner using StyleCop via MSBuild. A full listing of the changes follows:

- Copied Source\CR StyleCop.TestCode\Properties\CR StyleCop.TestCode.XML Source\CR StyleCop.TestCode\DocumentationRules
- Source\CR StyleCop.TestCode\Documentation\SA1642TestCode.cs - Changed constructor summary description to successfully trigger error.
- Source\CR StyleCop.TestCode\Documentation\SA1646TestCode.cs - Changed path of include file to find it locally for XPath search since project context is not available.
- Removed the SA1124 suppression attribute from the Readability\SA1123TestCode.cs file. This is because SA1123 is a rule that states to not use regions inside of blocks of code. SA1124 is a rule that says to not use regions at all regardless of location in the source file. When the suppression is removed, the 1123 test code file is identified under the SA1124 rule violations section of the violations report.

NOTE: In order to trigger only the 1123 rule, 1124 cannot be enabled. So we can test one or the other, but not both at the same time as 1124 encompasses 1123, and we will always have 1124 enabled.

A.2 StyleCop Default Setting Changes

In addition to the previous updates to the violation test source code, the default installation of StyleCop has a few rules turned off by default, and DVS enables them. Also, since DVS verifies that the Company name is in the header of all source files and that the copyright information is correct, these need to be added to the Settings.StyleCop file. DVS provides the updated file, but the following are the necessary changes using the StyleCop Settings Editor on a new installation:

1. Enable the following rules under the **Documentation** section of the **Rules**

tab:

- Element Documentation\SA1609: PropertyDocumentationMustHaveValue
- Element Documentation\SA1610: PropertyDocumentationMustHaveValueText
- Element Documentation\SA1628: DocumentationTextMustBeginWithACapitalLetter
- Element Documentation\SA1629: DocumentationTextMustEndWithAPeriod
- Element Documentation\SA1632: DocumentationTextMustMeetMinimumCharacterLength
- File Headers\SA1639: FileHeader-MustHaveSummary



Figure A-1: Enabling documentation rules

2. Enable the following rule under the **Readability** section of the **Rules** tab:
 - Regions\SA1124: Do Not Use

- Regions

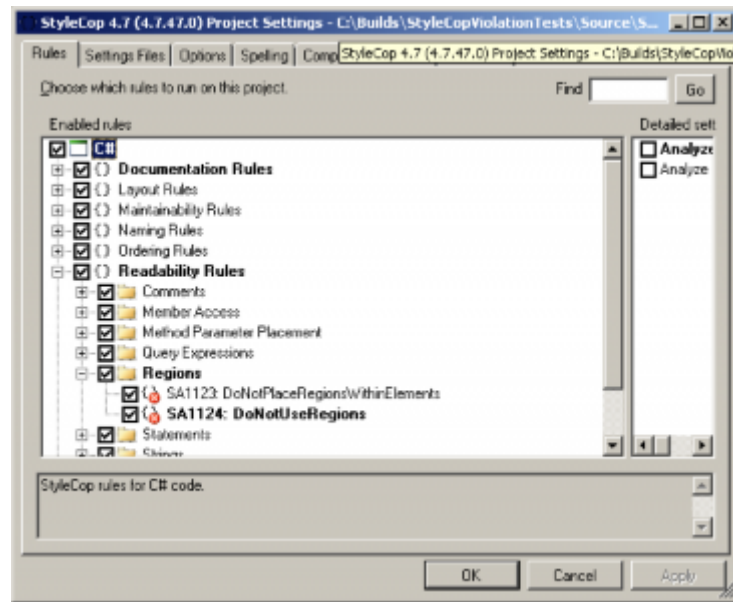


Figure A-2: Enabling readability rules

3. Disable the following rule under the **Detailed Settings** section of the **Rules** tab:
 - Analyze designer files

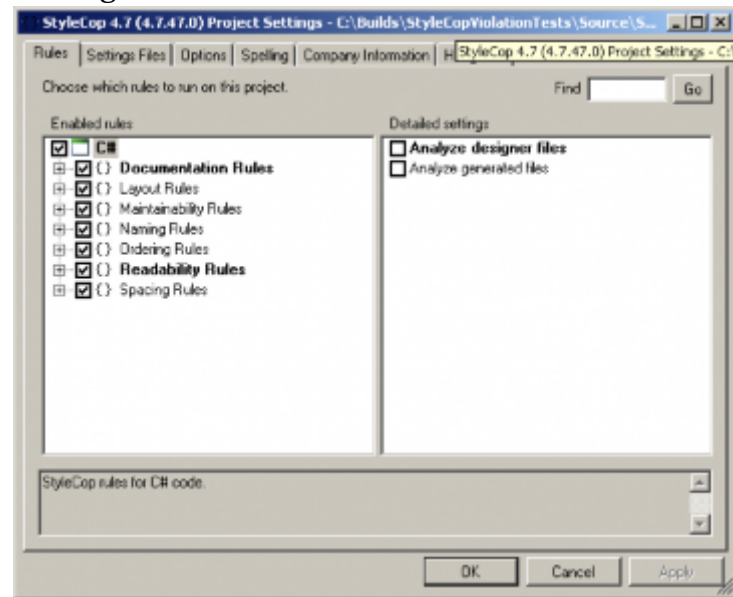


Figure A-3: Disabling rules

NOTE: This setting should be enabled only to verify StyleCop's violation operation against the test code.

4. Disable this feature before running it against production source code since it generates errors related to the copyright date if you do not.

5. Go to the **Company Information** tab:

- Select the checkbox to enable this feature
- Set Company Name as **ACME**
- Set Copyright as **Copyright (c) 2011. All rights reserved.**

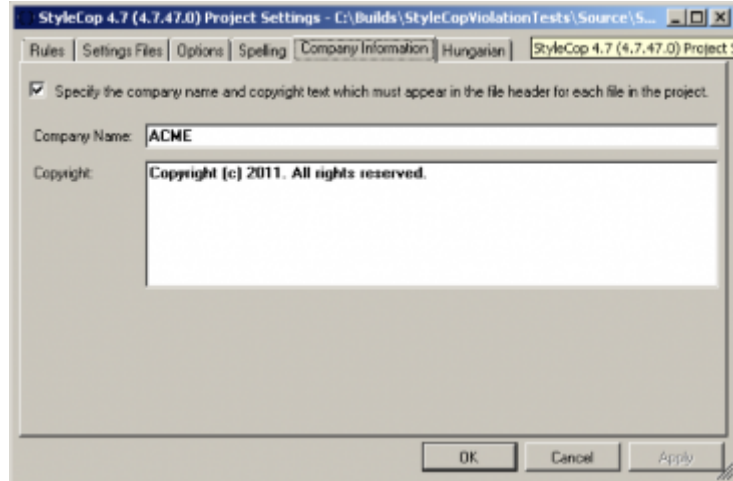


Figure A-4: Setting company information

NOTE: All non-default settings are bolded in the Settings Editor interface.

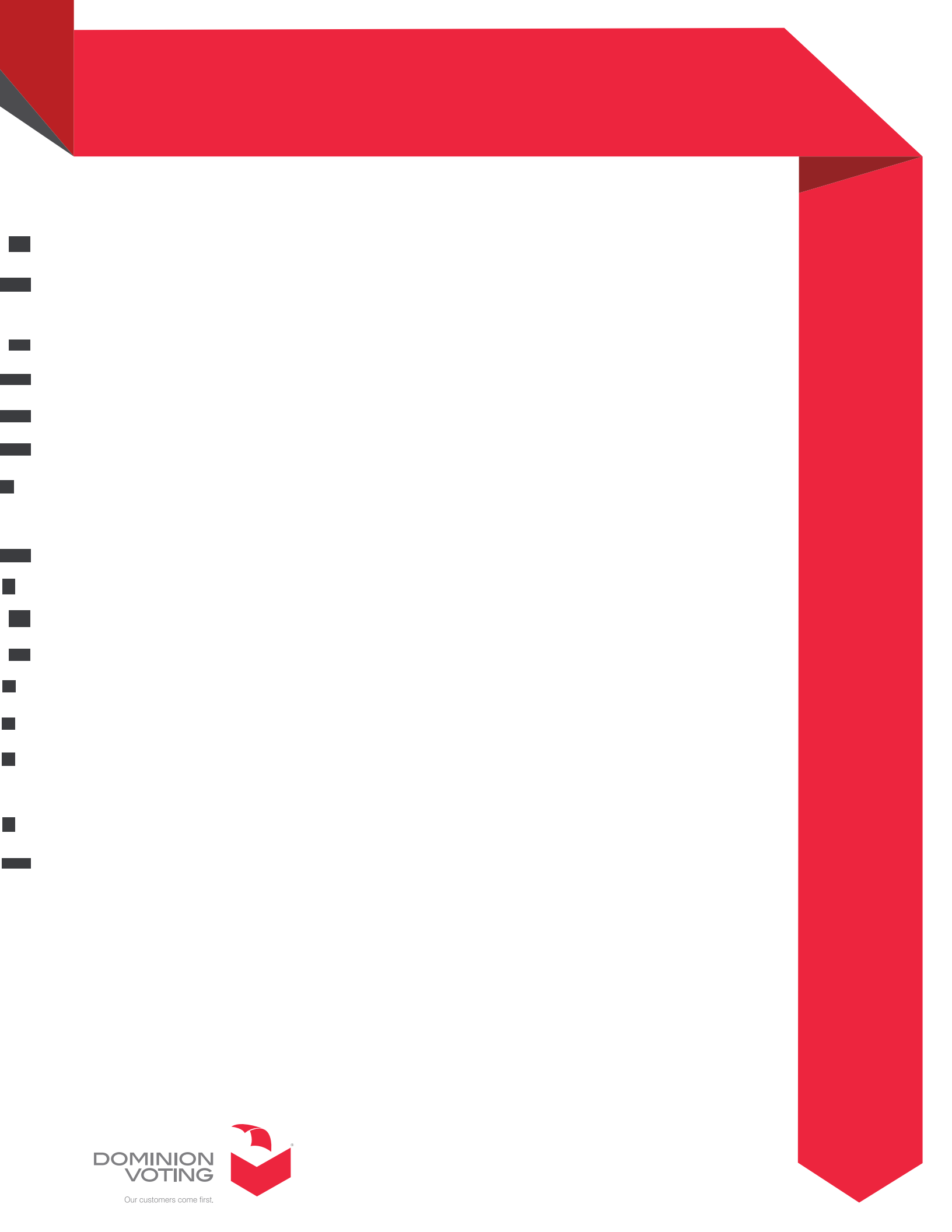
REVISION HISTORY

Rev.	Date	Author	Summary
2	05-30-2019	brian.fitzsimmons	Content revisions throughout document to address TDP discrepancies.
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