Altair S-CONCRETE 2021.1

Multistory Designer Reference Guide

Contents

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Altair Data Analytics Products

December 17, 2021

Overview

S-CONCRETE Enterprise edition (also called **Multistory Designer**), is a software solution that enables the communication between an ETABS® model's data and S-CONCRETE, allowing users to design reinforced concrete Columns, Beams and Walls efficiently. Multistory Designer provides the means to run interactive design/code checks on all concrete structural elements contained imported from an ETABS® model, and generate a single comprehensive concrete design report.

Supported Objects

The application supports the following ETABS® modeling elements.

Two-Node Linear Members

ETABS® Columns

ETABS® members designated as Column objects can be imported and designed as S-CONCRETE Columns. Only Rectangular, Square and Circular cross-sections are supported at this time.

ETABS® Beams

ETABS® members designated as Beam objects can be imported and designed as S-CONCRETE Beams. Only Rectangular cross-sections are supported at this time.

ETABS® Braces

ETABS® members designated as Brace objects can be imported and designed as S-CONCRETE Columns and/or Beams as specified by the user in the application. Only Rectangular beam sections and Rectangular, Square and Circular Column cross-sections are supported at this time.

Three/Four Node Area Objects

ETABS® Piers

ETABS® vertical shell elements designated as Pier objects can be imported and designed as S-CONCRETE Columns and/or Walls as specified by the user in the application. Only Rectangular Pier cross-sections are supported at this time.

ETABS® Spandrels

ETABS® vertical shell elements designated as Spandrel objects can be imported and designed as S-CONCRETE Beams. Only Rectangular Spandrel cross-sections are supported at this time.

Floor/Story

ETABS® Story labelling system is integrated into the application. This provides the capability for the user to Group elements by a single Story/Floor or a user-selected list of Stories/Floors within the application to facilitate the creation of S-CONCRETE files that will be run in Batch to perform the concrete code check/design. Member lengths, by ETABS® Story, are imported and utilized in the design for Columns, Braces and Walls. These lengths can be included in the slenderness calculations for the members.

Load Combinations

S-CONCRETE requires Ultimate/Factored loads for design. The user needs to perform the ETABS® analysis with the desired Load Combinations and then import a selected list of Combos at the time the ETABS® model and the results data are read into the application. ETABS® Analysis forces for all active output stations are imported and utilized in the design/code checks, and there is no ability to filter output stations at this time. However, the user can control output stations within ETABS® as an attempt to obtain the required design forces on the members for the S-CONCRETE design. Analysis forces for all active degrees of freedom are imported and mapped to the S-CONCRETE section for design.

Data Filters

The application supports the Filtering of ETABS® member data during the Import Model process. For Linear Members, a filter for ETABS® Section Names can be utilized to limit the sections imported for the S-CONCRETE operation. Similarly, for Wall Piers and Spandrel objects, a filter for Pier and Spandrel Names can be set during the model import process. As mentioned in the Load Combinations section above, there is also a Filter for ETABS® Load Combos. These filters allow the user to control which elements of the analysis model and which forces are used by the application.

The ETABS® Import Utility

In order to use the S-CONCRETE Enterprise Multistore Designer, you first need to export your ETABS® model and analysis results to a Microsoft Access Database file. This procedure requires Microsoft Access 2010 or greater to be installed on the computer that is running ETABS®. The detailed steps to perform the Export are shown as follows:

Export a model to Access Database file in ETABS® 2015, 2016, V17 and V18

1. Go to File > Export > ETABS® Database Tables to Access …

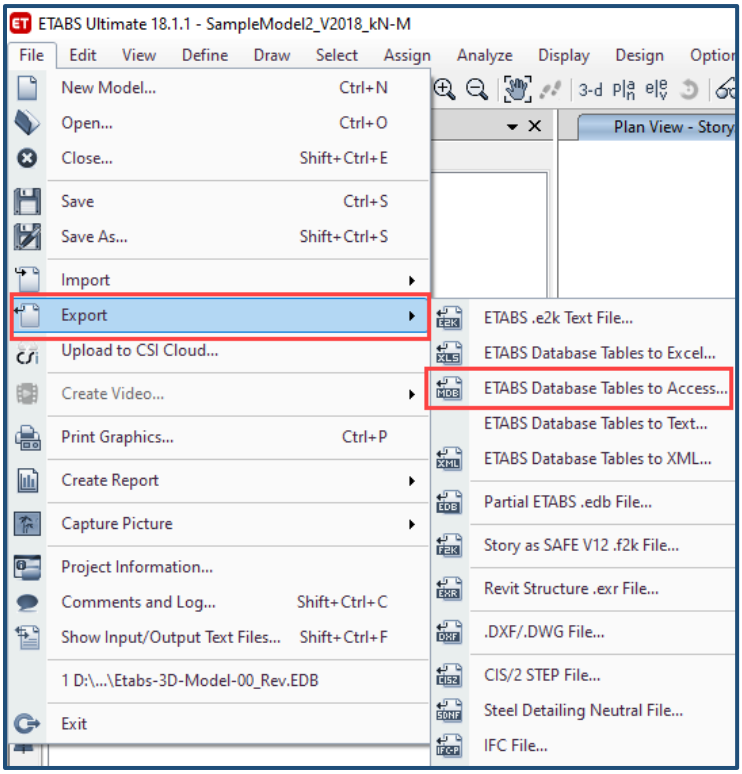


Figure 1. Export to Access Database File

2. To the right of the "Choose Tables for Export to Access", you have the 'Select Load Patterns…', 'Select Load Cases…', and 'Select Combos…' options.,

Figure 2. Choose Tables for Export to Access dialog box in ETABS®

3. Select "Clear All" in Load Patterns and Load Cases sections, and select the Load Combinations you want to Export and use for Design in the Load Combinations section. Then click OK.

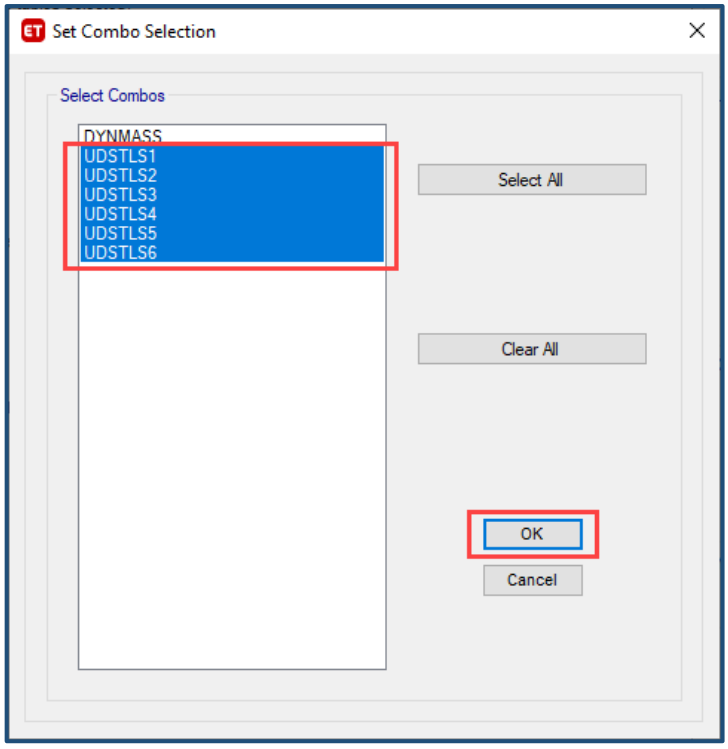


Figure 3. Choose Load Combinations to Export in ETABS®

In the "Choose Tables for Export to Access", check the "MODEL DEFINITION" object and all of the sub-objects will be automatically selected. In the "ANALYSIS RESULTS" object, expand "Results" and select the Frame and Wall results you want to export. You only need to select the options for Column, Beam and Frame forces in 'Frame Output', and Pier and Spandrel forces in the 'Wall Output' section as shown below. Then, click OK.

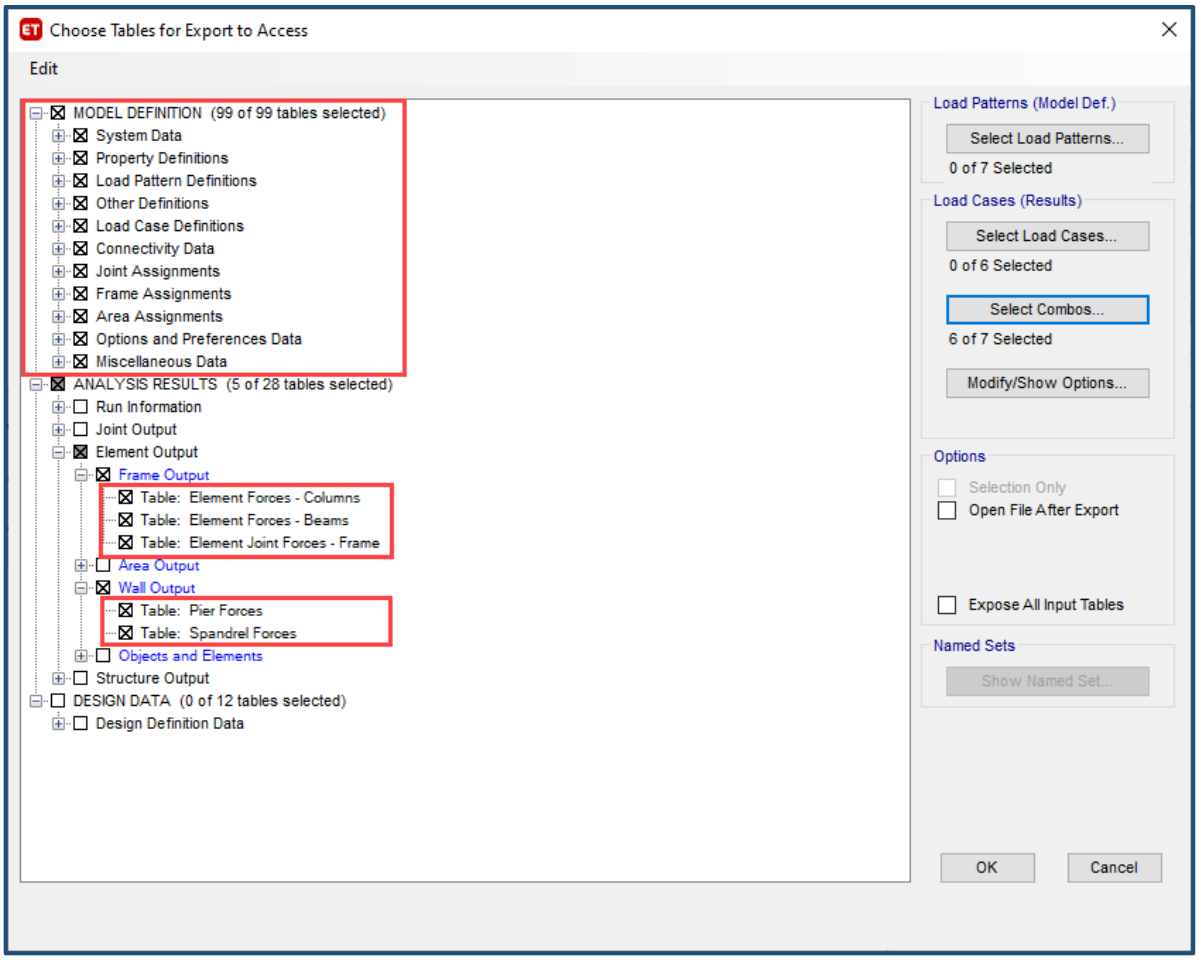


Figure 4. Choose Members to Export in ETABS®

The "Choose Export Units" dialog box will appear. In this dialog box, select "Length Unit" as "m" (Meters) or "ft" (Feet). Select "Force Unit" as "kN" or "Kip". Select "Temperature Unit" as "C" or "F". These are the only length and force unit combinations that are supported at this time. Then click OK.

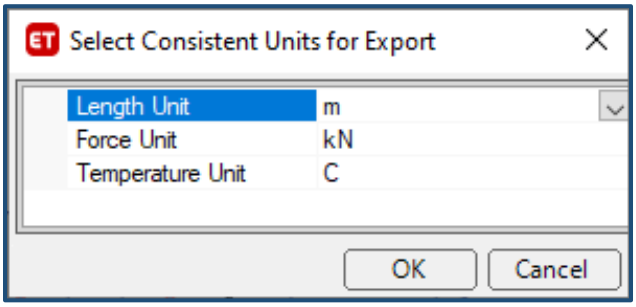


Figure 5. Choose Export Units in ETABS®

The program supports:

- Metric Units of Meter, kN, and C
- Imperial Units of Feet, Kip, and F.

Note: The "Choose Tables for Export to Access" dialog box shown in Figure 4 will close once the export is complete. **Do not close it or click 'OK' again. It could stop the export process.**

Good to know: users are able to create their own 'Named Sets' of tables for Export to streamline the process. Please find below an example using ETABS®v18.

ETABS® Named Sets can be defined via the Define Main Menu (as shown in Figure 6), or via the Model Explorer Tables Tab, as Table Sets (see Figure 7). Named Sets could be established in an ETABS® Template (starter) file which could then be used to create models.

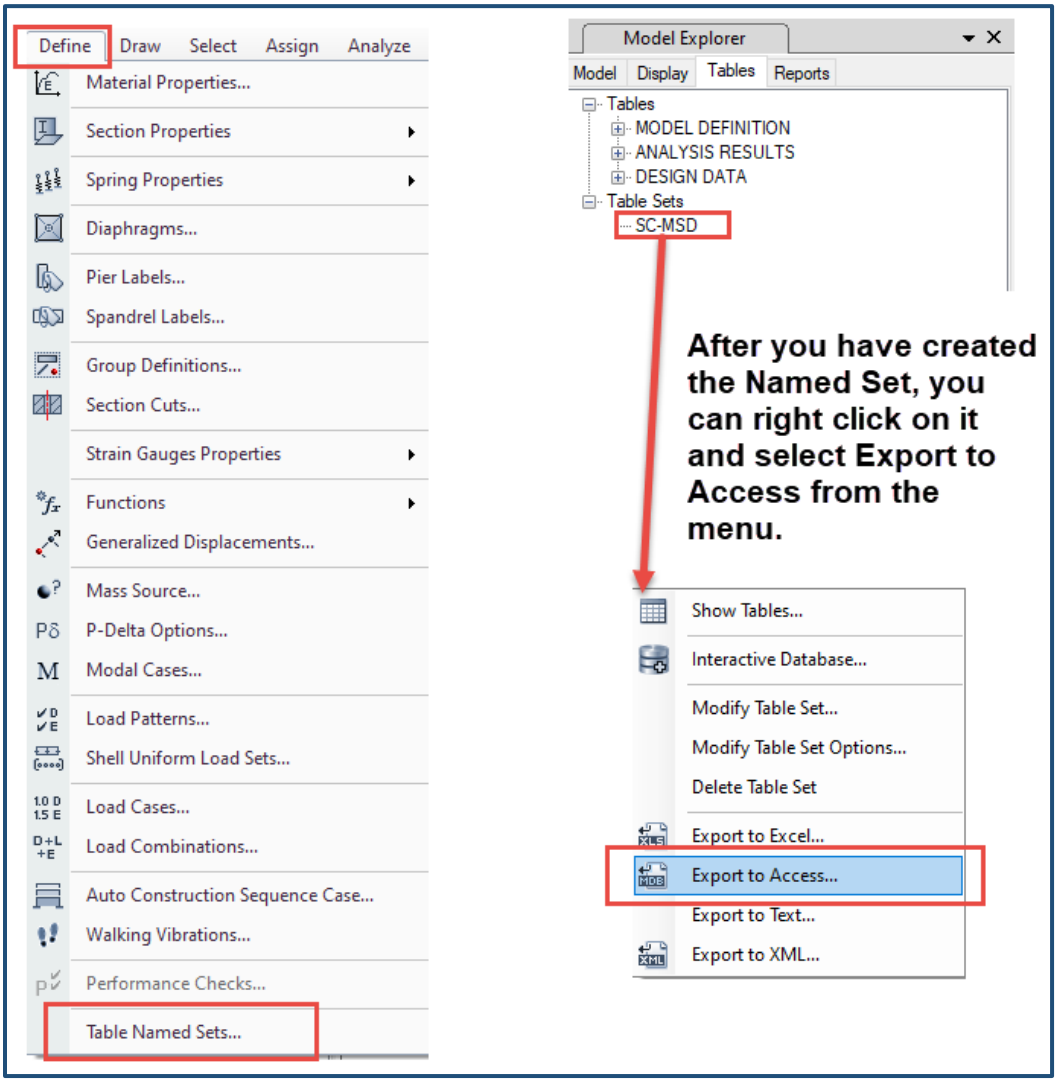


Figure 6. Creating ETABS® Named Sets

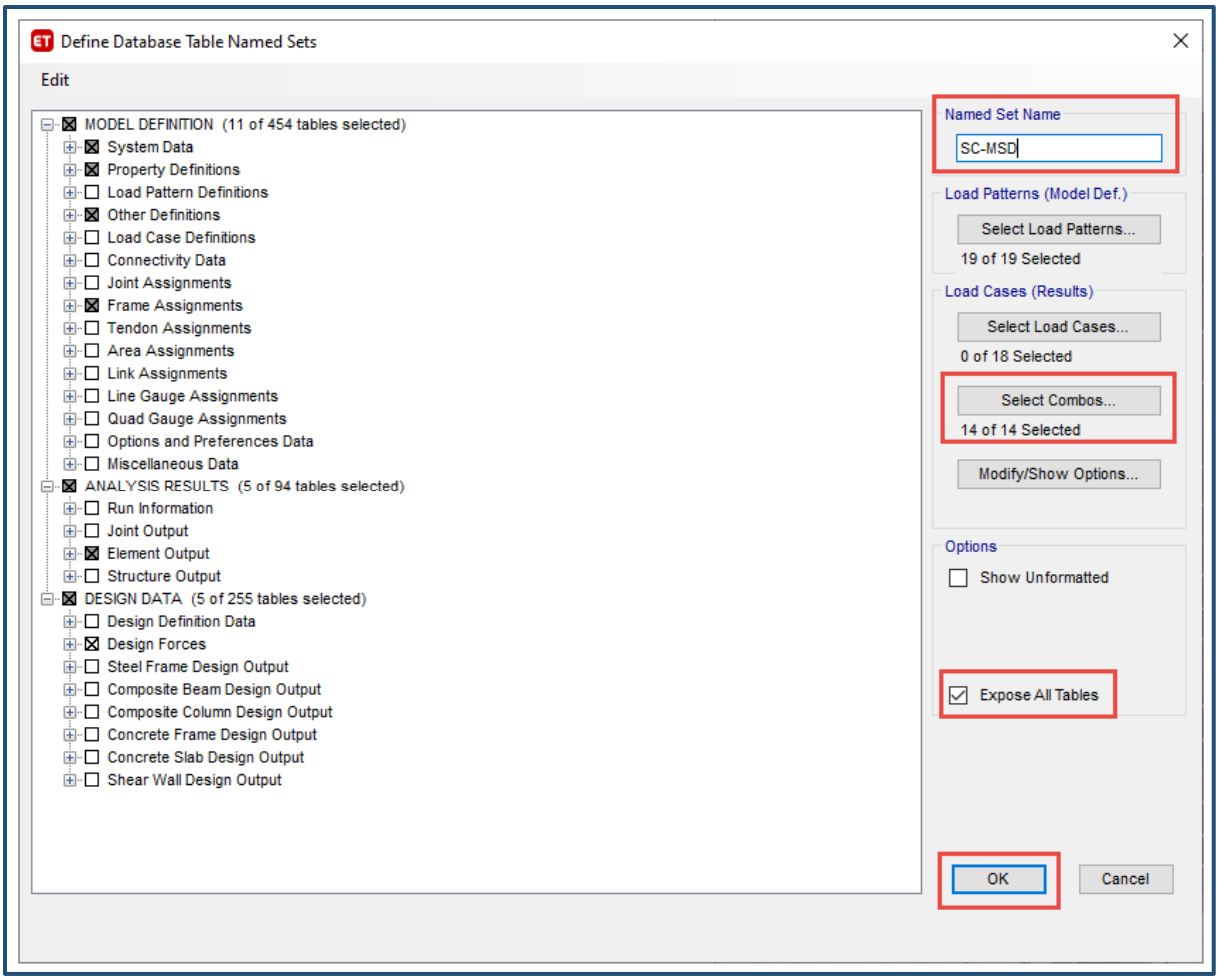


Figure 7. Named Sets Selection

ETABS® defined Named Sets can also be used in the Automatic Tabular Export of Data option in the ***Set Load Cases to Run*** feature. This method automatically includes pre-defined Named Sets in the export file created by ETABS®.

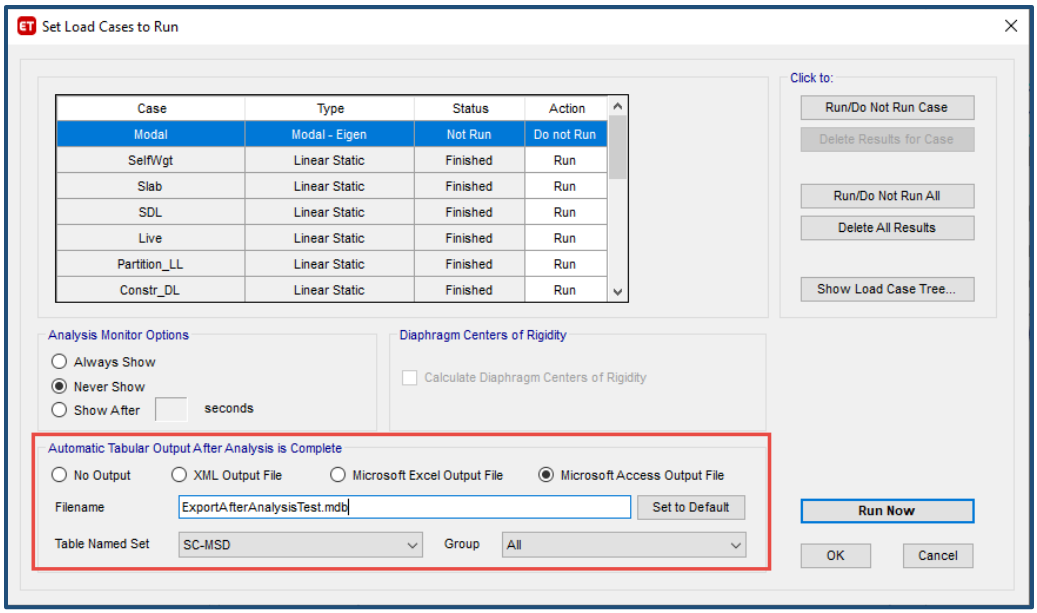


Figure 8. Automatic Tabular Export of Data for a set of Load Cases

Tables required when exporting to Access Database file in ETABS® V17 and V18 are shown in Table 1:

ETABS® v17	ETABS® v18
Model Definition	**Model Definition**
Frame Assignments - Sections	Frame Assignments - Summary
Frame Assignments - Summary	Frame Section Property Definitions - Concrete Circle
Frame Sections	Frame Section Property Definitions - Concrete Rectangular
Group Assignments	Frame Section Property Definitions - Summary
Material Properties - Concrete	Group Assignments
Material Properties - Summary	Material Properties - Basic Mechanical Properties
Pier Section Properties	Material Properties - Concrete Data
Program Control	Pier Section Properties
Spandrel Section Properties	Program Control
Story Data	Spandrel Section Properties
-	Story Definitions
Analysis Results	**Analysis Results**
Beam Forces	Element Forces - Beams
Brace Forces	Element Forces - Braces
Column Forces	Element Forces - Columns
Pier Forces	Pier Forces
Spandrel Forces	Spandrel Forces
Design Data	**Design Data**
Beam Design Forces	Design Forces - Beams
Brace Design Forces	Design Forces - Braces
Column Design Forces	Design Forces - Columns
Pier Design Forces	Design Forces - Piers
Spandrel Design Forces	Design Forces - Spandrels

Table 1. Tables from ETABS® required by the Multistory Designer

S-CONCRETE Enterprise Multistory Designer for ETABS® Application

Sample Model-2: Steps to get a successful run in the Multistory Designer Application

The 'SampleModel2' is a mid-rise building containing a concrete core modelled as vertical shell elements that also includes coupling (link) beams, reinforced concrete columns on the exterior and outrigger walls, connecting the walls to exterior columns at the top. Some of the core walls have ETABS® Pier labels, and the outrigger walls are modelled with shell elements that have ETABS® Spandrel labels.

The model will be used to demonstrate concrete column, beam and wall design using the Multistory Designer for ETABS® application.

Sample Model-2 Overview

Below is a brief summary of some of the features contained in the sample model, which are supported by the application.

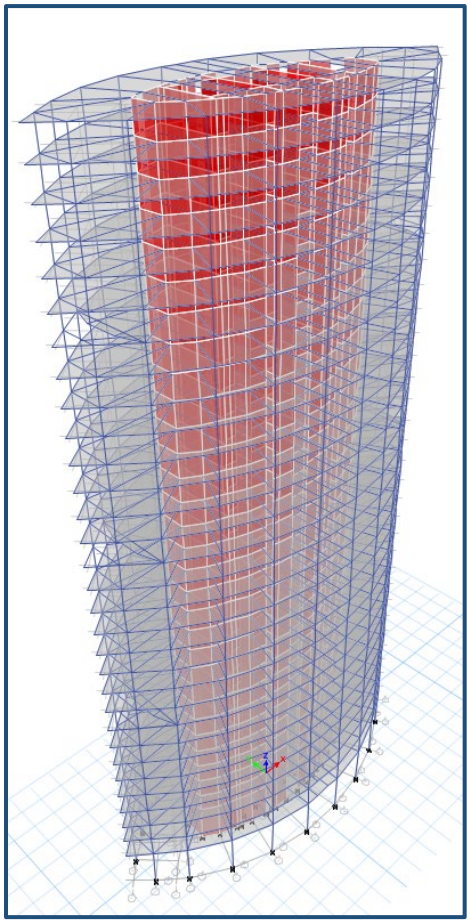


Figure 9. 3D model view in ETABS® 2016

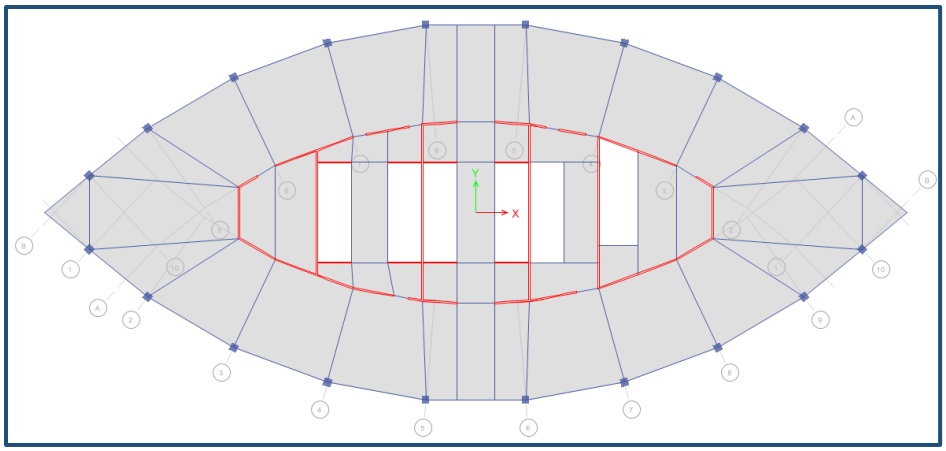


Figure 10. Plan view of Typical Floor in ETABS® 2016

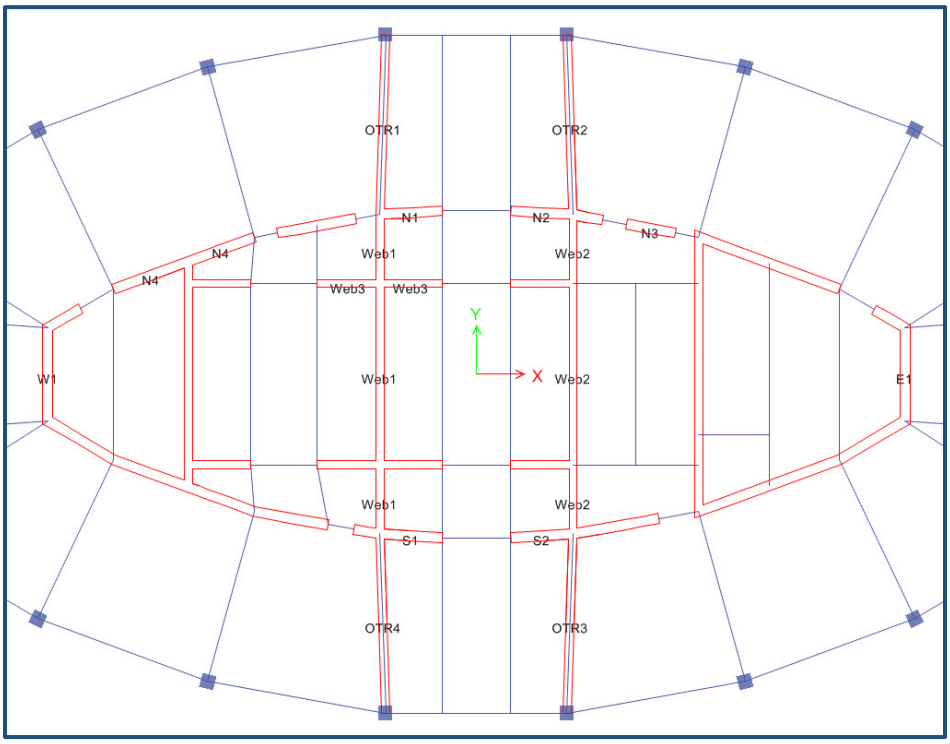


Figure 11. Plan view of Core showing ETABS® Wall Pier and Spandrel Labels

Importing the ETABS® Export Data (MDB) into the Multistory Designer Application

Below is a summary of the steps required to Import the ETABS® MDB into the application.

First, open Multistory Designer: Select from the S-CONCRETE application (in the main menu), and go to Run > S-CONCRETE Multistory Designer. The Import Options window will open, as shown in Figure 12.

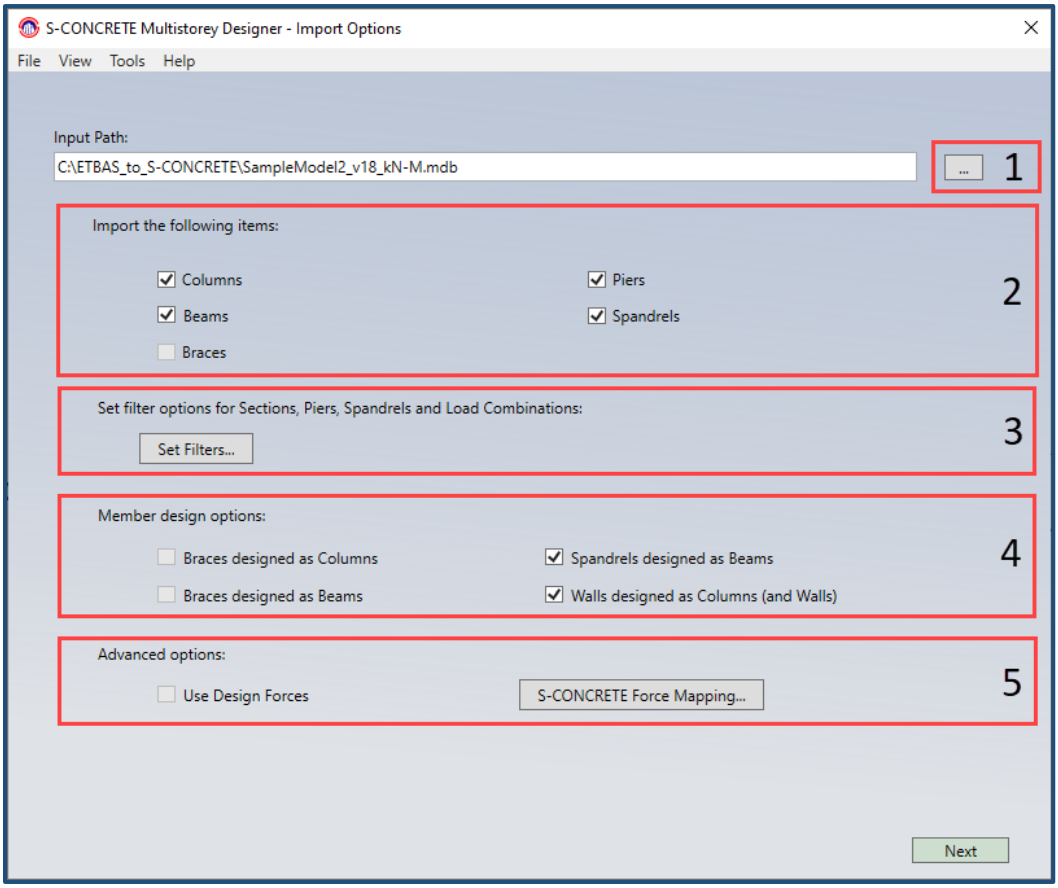


Figure 12. Main Import Window

1. Enter the name of the ETABS® MDB file or select the Ellipse (browse) button to open the ETABS® MDB file that was previously Exported.
2. Filter (by unchecking) the ETABS® objects you want to Import for Concrete Design. The objects initially checked have geometry and forces available.
3. Filter the elements by Section Name and the Load Combinations to be imported. (See Figure 13 for more details.)
4. Choose how ETABS® Brace, Wall and Spandrel elements are designated in S-Concrete for design.
5. Set ETABS® Member Local Axis results to S-Concrete Section Coordinate System. The defaults should work in most cases.

Referring to Figure 13, the Filter Options allow the user to select specific ETABS® Section Names, Pier and Spandrel Labels, and Load Combinations to be imported for Concrete Design.

In this example, we choose to filter out the Steel members and some floor framing beams that are not relevant at this time in the design.

The numbers in parentheses after the Section Labels indicate how many elements, of each item, is contained in the model.

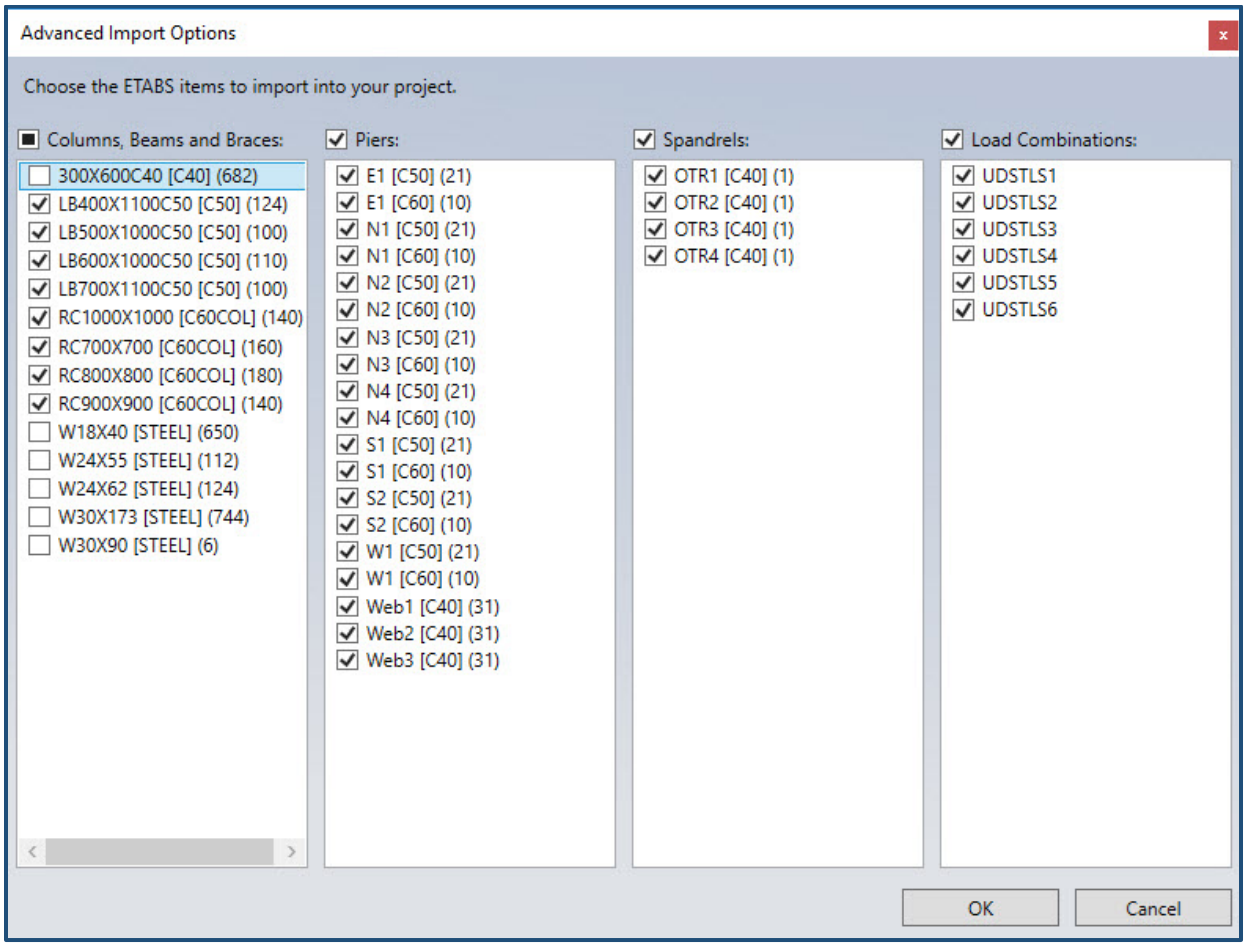


Figure 13. Model and Member Force Filter Options

Force Mapping from ETABS® to S-CONCRETE

1. Select the section of interest to see the mapping options: Columns, Beams or Walls.
2. Specify the source/forces that come from ETABS® .
3. User can opt to ignore forces if desired before performing the design.
4. Option to Flip the sign from positive to negative is available if required by the user.

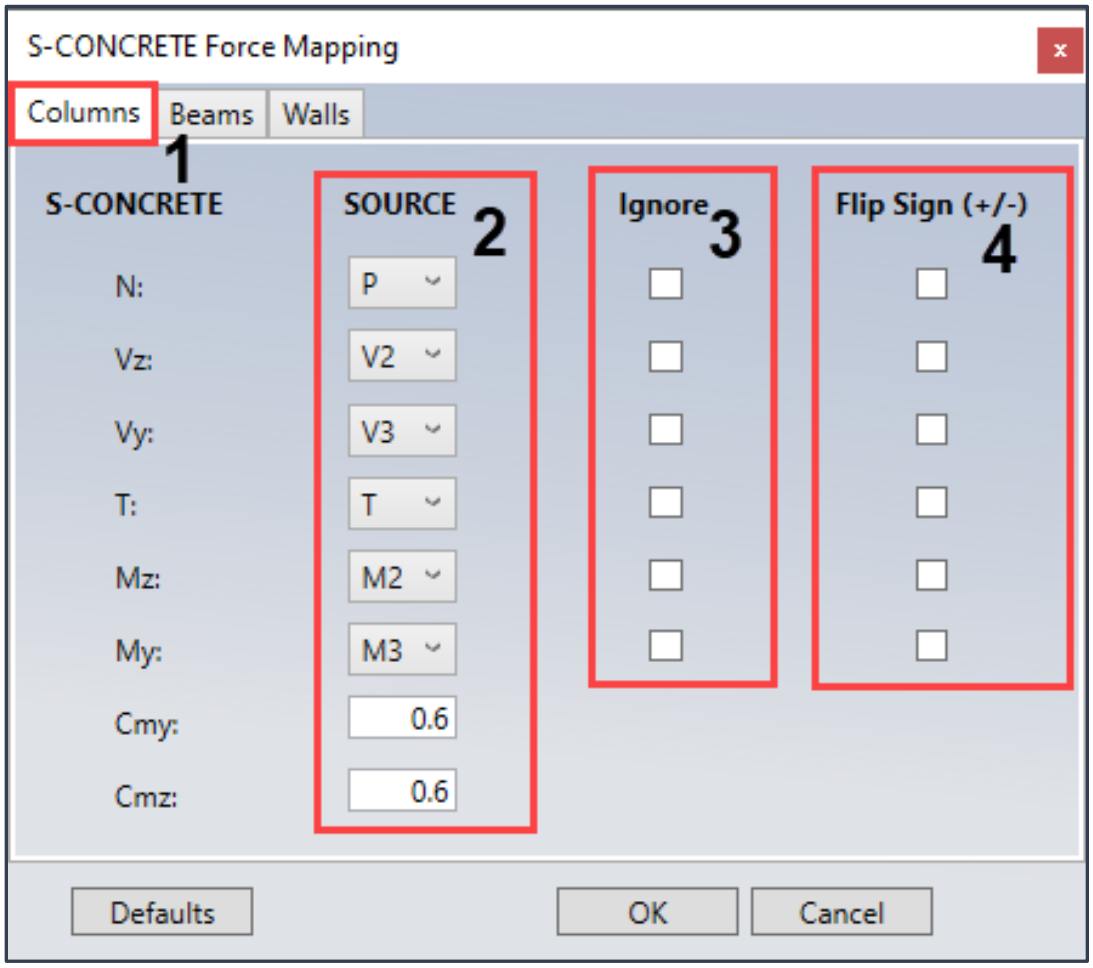


Figure 14. Advanced S CONCRETE Force Mapping Option

Specifying the Initial Reinforcement

After the model geometry and analysis forces are imported, the user may now specify the Design Code, Bar Type, initial reinforcement percentages, rebar material properties and concrete cover to be used in the preliminary evaluation of the members.

Figure 15 shows the design parameters available for Columns, Beams and Walls. The parameters specified in this screen apply to all elements in the model, so it would be practical to establish the minimum reinforcement that you want for all members. In proceeding steps, you will be able to see the initial DCR's

of each the sections, based on maximum forces from the analysis, and then further customize reinforcement for members exceeding the preliminary capacity requirements.

When you have completed specifying the initial concrete design parameters, click the "Apply Design Standards to All Sections" button to proceed. You may come back to this screen, revise the parameters and click the button to re-calculate the reinforcement for all members at any time.

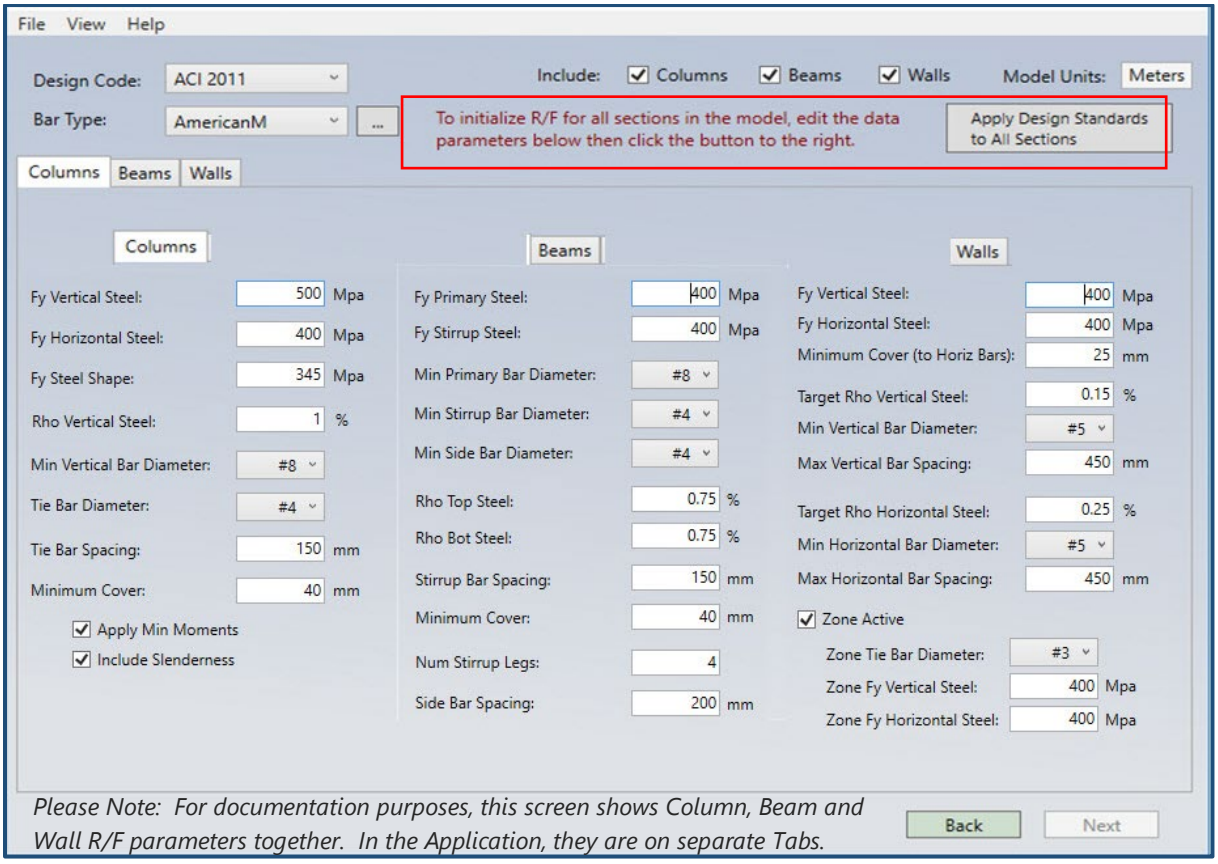


Figure 15. Initial Concrete Reinforcement Parameter Specifications

Reviewing Initial Results and Modifying Reinforcement for Section Groups

At this point, Multistory Designer has calculated the initial reinforcement for all sections, determined the maximum forces from the user's selected Load Combinations and performed some preliminary capacity checks and reported DCR's (Demand Capacity Ratios). For Columns and Walls, the DCR's are calculated for axial tension and compression, using simple "short" column formulas. For Beams, the DCR's are calculated for strong axis bending for the positive and negative moments. Figure 16 is a screenshot example of these results. Results are also available in tabular form to allow for sorting and Excel exporting (via CSV file format) for further review.

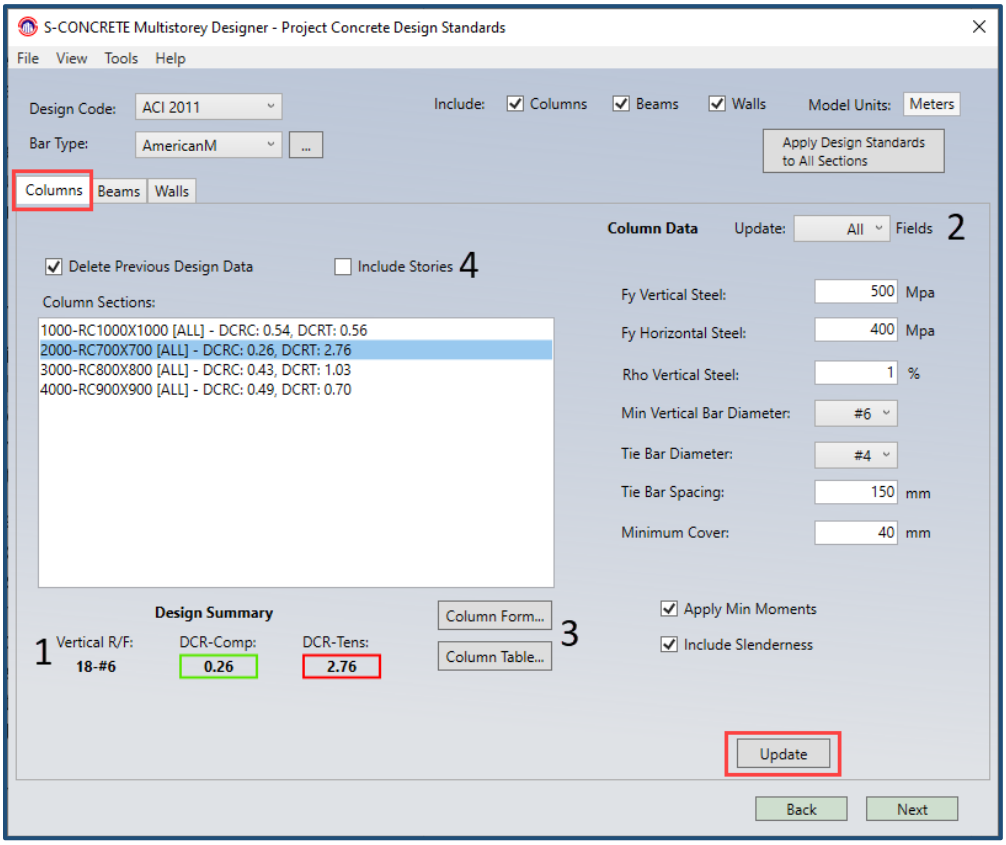


Figure 16. Concrete Column DCR Summary with User R/F Override Tools

Looking at Figure 16, as you click each section in the Column Sections list, the Design Summary results (**Area 1**) for that section are displayed, and the parameters in **Area 2** are updated for the selected section.

This screen can be used to override the fields shown in Area 1, for one or more selected sections. This action will force an update of the reinforcement and a re-calculation of the capacities (DCR). Simply make the changes and click the Update button at the bottom of the screen. Also, use the Update Fields picklist at the top of Area 2 to activate checkboxes to allow update of only selected fields for each update operation.

Column Form and Column Table buttons in **Area 3** are discussed in the next section.

The "Include Stories" feature in Area 4 allows the user to further refine the section design groups that will eventually make up the S-Concrete files that are run in the Batch Utility. By default, the members for all ETABS® Stories which contain a unique section size (name) are grouped together in a single S-Concrete file. The "Include Stories" tool allows a user to further subdivide groups of members with the same Section Name by one of more ETABS® Stories. This would allow a user to specify different reinforcement requirements for a group of members that have the same cross-section along the height of the building. Creating custom groups "By Story" is discussed later in this document.

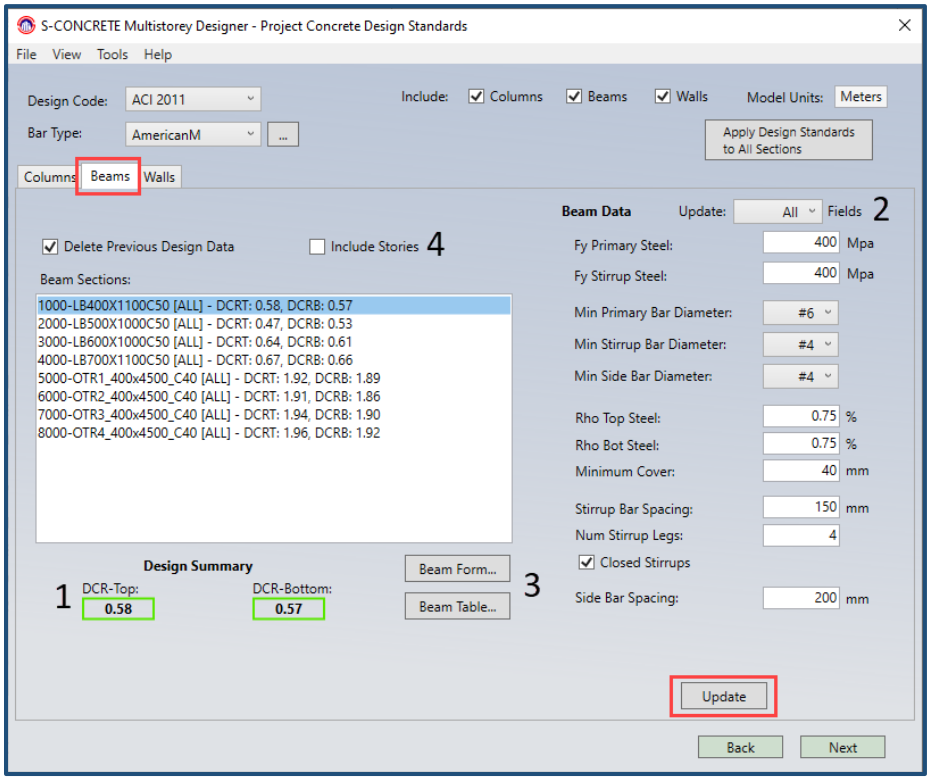


Figure 17. Concrete Beam DCR Summary with User R/F Override Tools

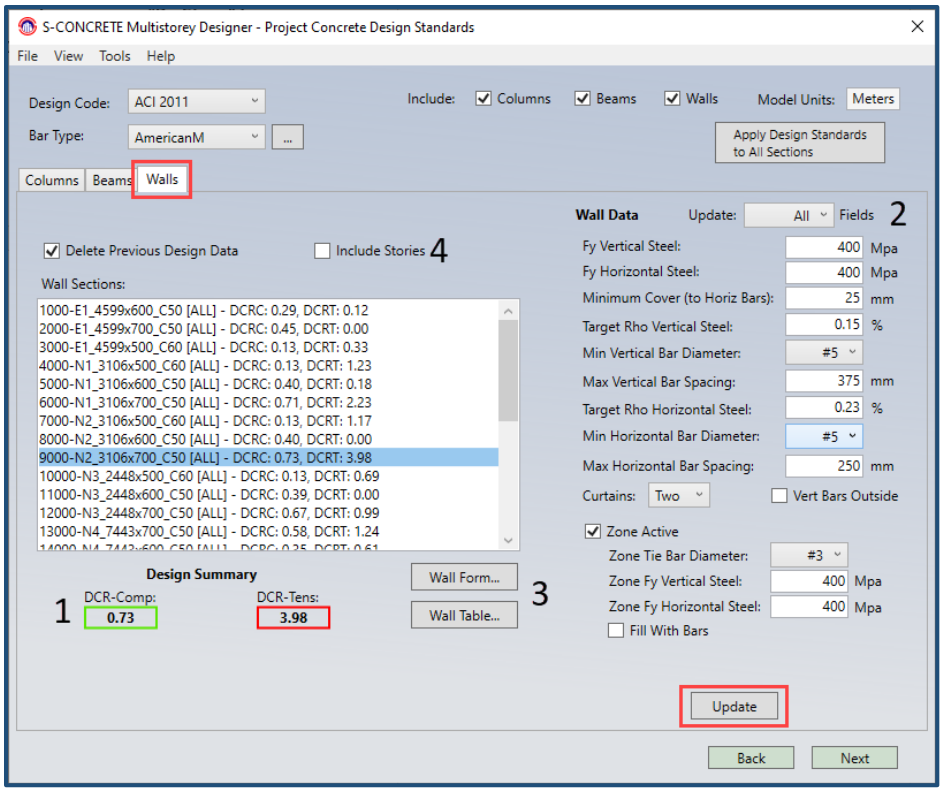


Figure 18. Concrete Wall DCR Summary with User R/F Override Tools

Reviewing Initial Results and Modifying Concrete and Reinforcing Data using the Table

The initial reinforcement data, as well as member capacities calculated via the Form in Figure 15, can be displayed in tabular form as partially shown in the screenshot as Figure 19 below. The output Table provides an efficient review of the initial results as well as the ability to override additional concrete design parameters that will eventually be used to create the S-CONCRETE files to run the Batch Utility. The File Menu "Export Data" option allows for exporting all data to a CSV file which can be opened in Microsoft Excel. While there is no Import to update the values at this time, a user can export or copy to Excel, make changes there, and copy and paste data to update the Table. Also, it should be noted that Section cross-section dimensions and material strength parameters can also be edited in the Table, overriding those values from the ETABS® model. After you make any changes to the values in this Table, make sure you click the "Apply" button to save them.

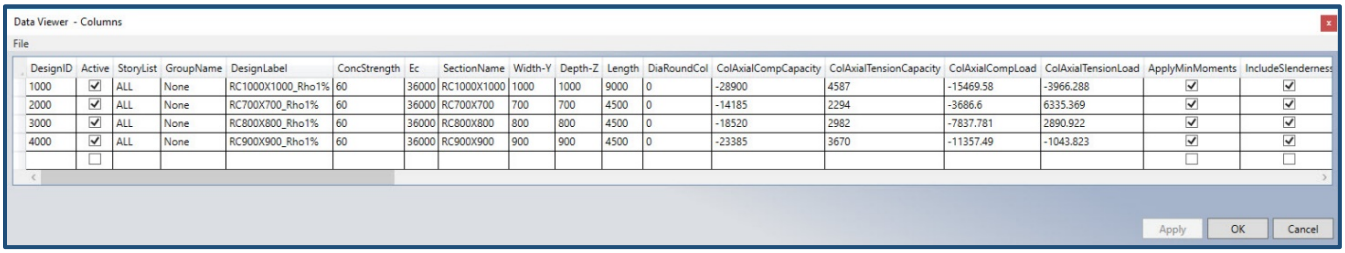


Figure 19. Concrete Column Design Data - Table View

Reviewing Initial Results and Modifying Concrete and Reinforcing Data using the Form

The initial reinforcement data, as well as member capacities calculated via the Form in Figure 15, can also be displayed in a highly interactive Form, as shown in the screenshot in Figure 20 below. Only the Column Form is shown here, but there are Forms for Beams and Walls with similar features. This Form allows the user to override any of the concrete geometry or reinforcement parameters shown for each individual design section in the model. The Form also has functions to create and open an S-CONCRETE file for any given section as well as run the Batch Utility for that section to obtain complete code check results available in S-CONCRETE which are displayed at the bottom of the Form.

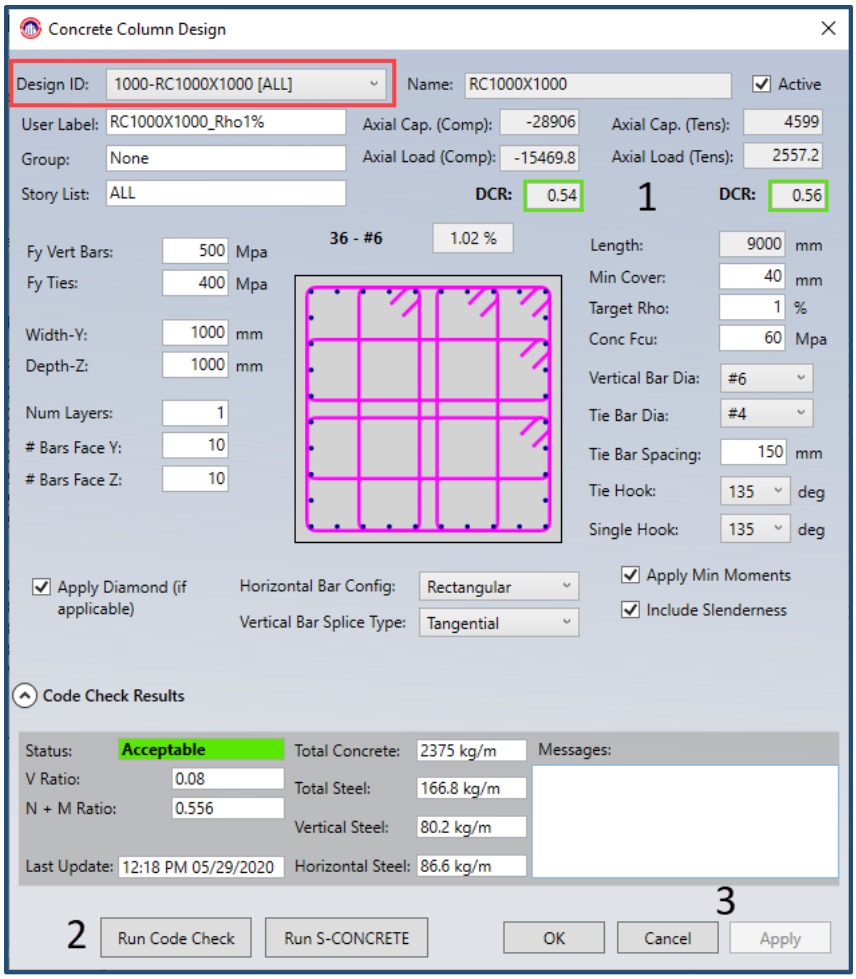


Figure 20 Concrete Column Design Data - Form View

As can be seen from Figure 20, the Concrete Design Data's Form View is highly interactive. It allows the user to customize the geometry and reinforcing data for each individual Design Section in the model.

To edit Section Data in this form, select a Design ID in the drop-down menu in the top-left corner of the form.

Area 1 contains all data fields that can be edited for the Section. If you change the cross-section dimensions, concrete/steel strength or the vertical reinforcing parameters, the Axial Capacities (DCR) should be re-calculated and the section image updated. All changes made here are stored in the main table and will be used in the S-Concrete Batch file Utility.

Area 2 has two features that make this Form very powerful. The "Run Code Check" button takes the input data from the Form and creates an S-Concrete file, runs the file in the background and reports the results in the Code Check Results area. This can be used to perform quick nearly "real-time" calls to S-Concrete's Code Check engine to give immediate feedback on your design. The "Run S-CONCRETE" button launches an instance of S-Concrete for the active Section with all member forces associated with this section, giving you the

ability to review the results and make quick (what-if) changes on the Section. Please note, any changes made in the S-Concrete session must be manually inputted in the Form to be saved for future use.

Area 3 of Figure 20 is for the confirmation of Field Changes. If you decide to modify any property of a particular section or group of sections, then you can use the 'Apply' button. It is possible to alter values, and either 'Cancel' or 'Apply' the changes, without closing the form

As shown in Figure 21, the Beams form has the 'Same Bar Size' option for top and bottom rebars. Users can change the primary row, while the remaining rows will all be updated with the selected size.

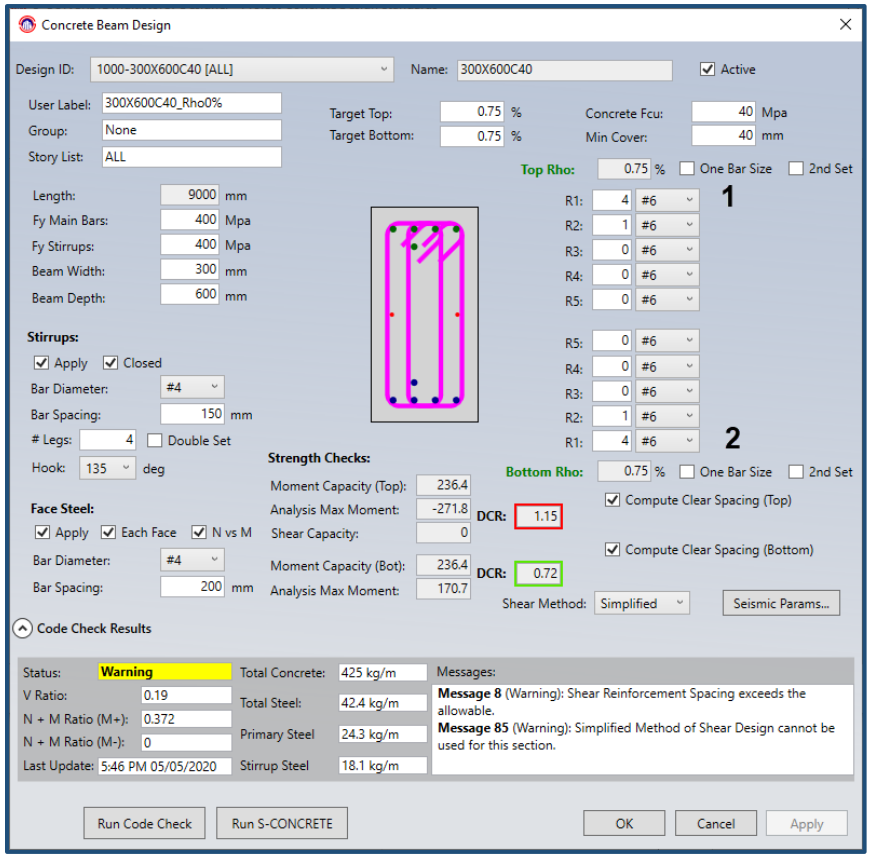


Figure 21. Beam Design Data - Form View

Creating S-CONCRETE Files and Running the S-CONCRETE Batch Utility

With the Initial Reinforcement set or modified with the functions described above, the next step is to Create the S-CONCRETE (SCO) files and run them through the S-CONCRETE Batch Utility to determine the Code Check adequacy of the sections using the specified reinforcement.

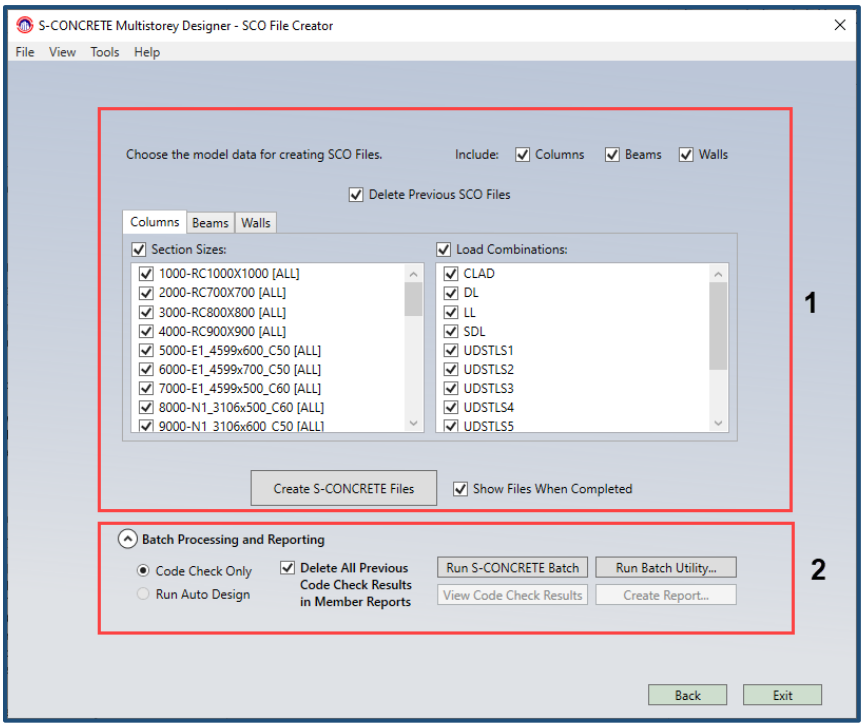


Figure 22. S CONCRETE File Creation and Batch-Run Feature

Area 1 of Figure 22, the SCO File Creator window displays the features that allow users to create S-CONCRETE (SCO) files for all or specific Columns, Beams and Walls with Loads as chosen by the user.

The SCO files are created and saved in a directory created by the application based on the original folder location of the ETABS® MDB file. Figure 23 shows the directory and files created for the Columns in this model. Files for each Member Type are stored in separate directories.

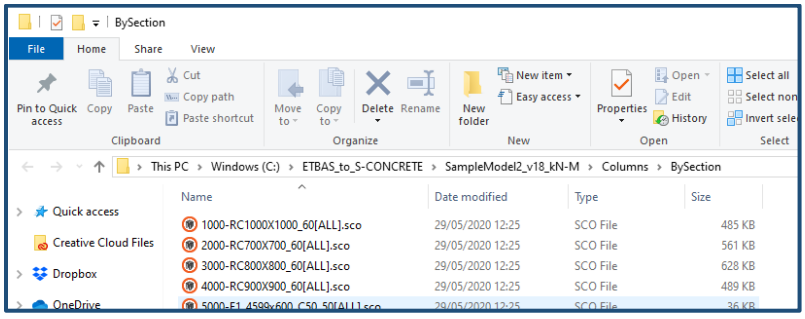


Figure 23. S-CONCRETE File Save Directory in User's Model Folder

Area 2 of Figure 22, the SCO File Creator window provides functions to run the S-CONCRETE Batch Utility for the SCO files created in Area 1. The Batch Utility runs in the background and displays a dialog box when finished. The Batch Utility is able to run different Member Types (Columns, Beams and Walls) in separate CPU Cores if the computer has a multi-core processor. This speeds up the overall run-time considerably for large models which have a large number of SCO files of each member type.

The Batch Utility is capable of running in "Code Check" mode, which means it will perform Code Checks for each SCO file based on the user's specified reinforcement and the analysis forces. The "Auto Design" is also available.

When clicking the 'Run Batch Utility' command the user can see the following window and options:

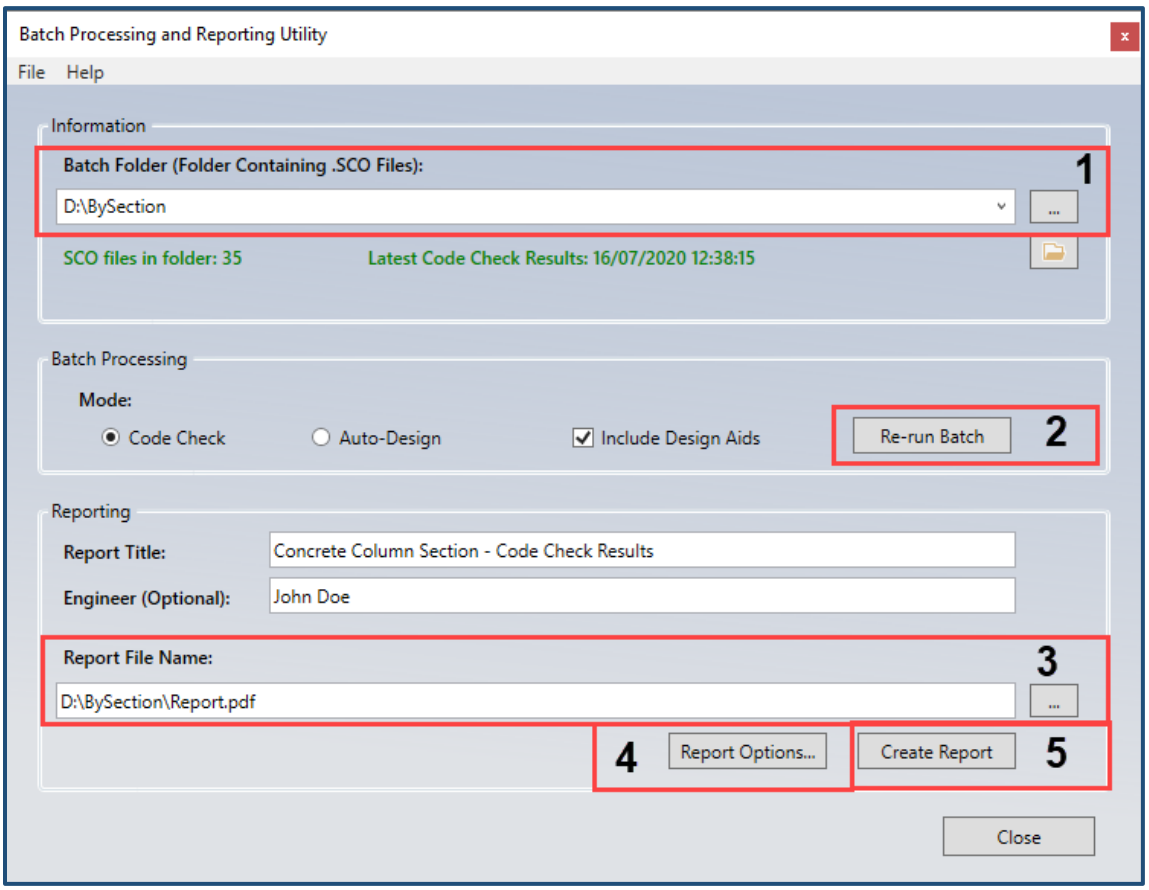


Figure 24. Batch Processing and Report Utility Window

Area 1 of Figure 24, navigate and open the generated folder containing the SCO files of interest. The user can choose the folder containing all SCO files for either Beams, Columns, or Walls. This example shows a total of 35 SCO files.

Area 2 of Figure 24, you can specify to re-run a batch process for the selected files after deciding to run a 'Code-Check' or 'Auto-Design'

Area 3 of Figure 24, specify the directory where the Report will be saved.

Area 4 of Figure 24, the user can filter information that is included or excluded in the report. Figure 25 below, shows the different filters available to the Report before clicking the 'Create Report' command.

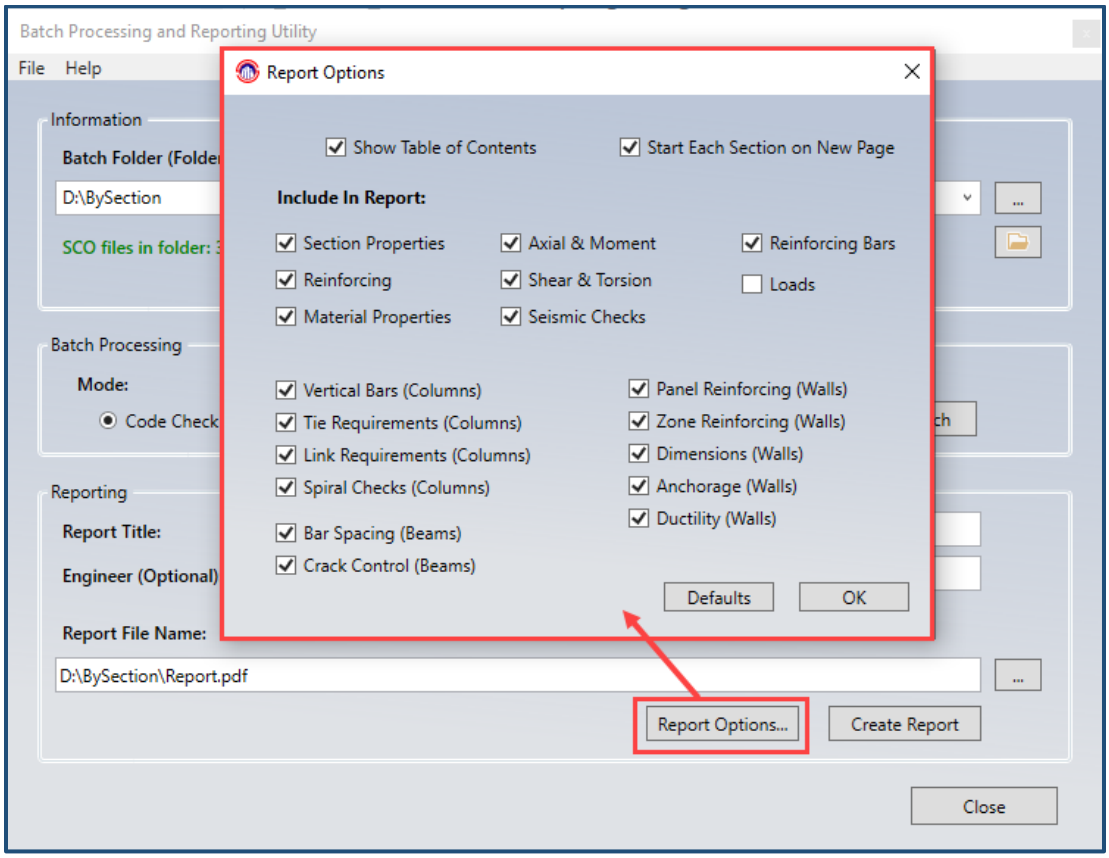
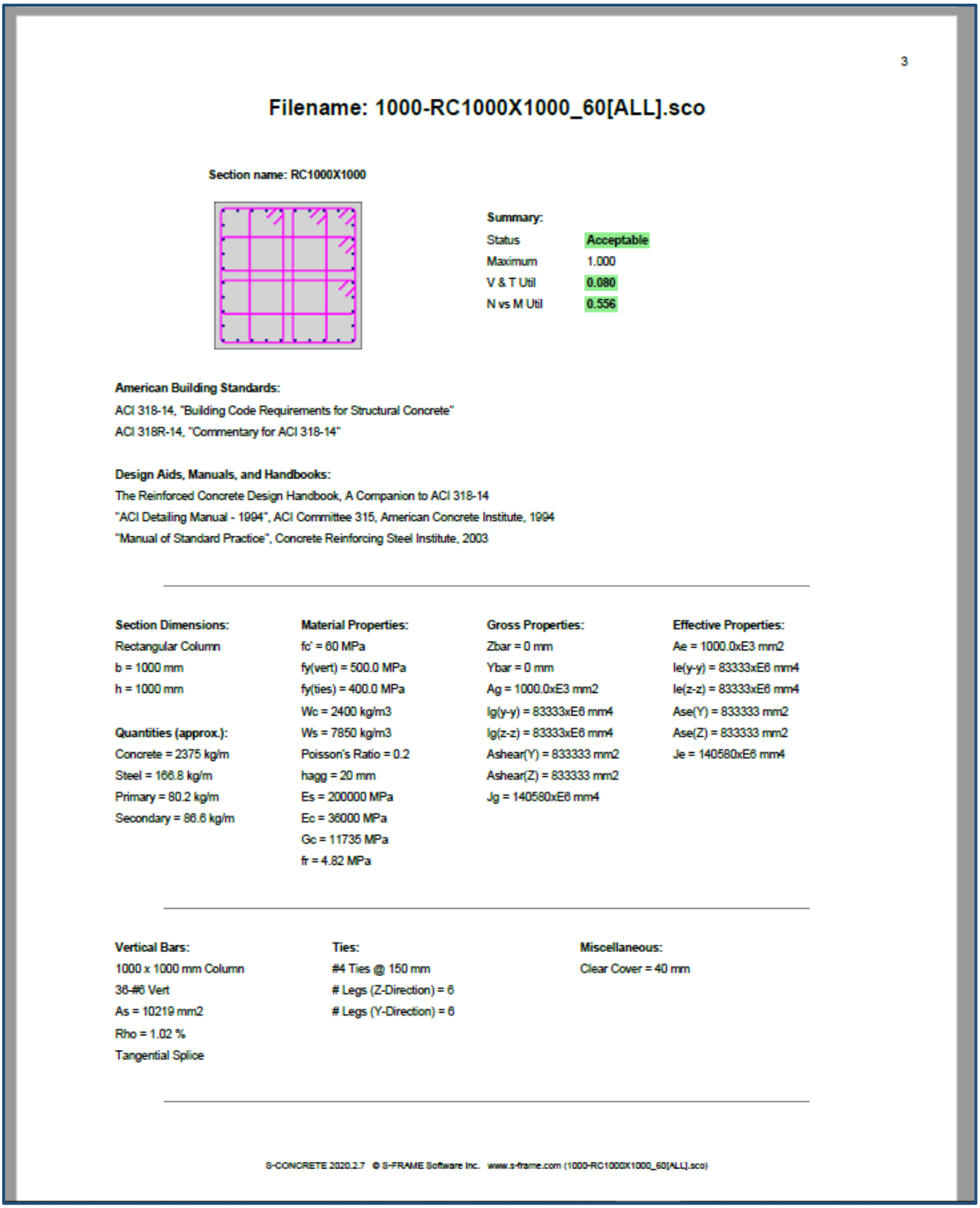


Figure 25. Available Options to print in the Report

Area 5 of Figure 24, create the PDF report. The report is very similar to the reports generated by S-CONCRETE, but the Multistory Designer report includes data for multiple concrete sections. Figures 26 & 27 shows a report example with hyperlinks to navigate throughout the report to find sections of interest quickly.

Table of Contents

Figure 26. Batch Processing Report Example – Column Table of Contents



3

Filename: 1000-RC1000X1000_60[ALL].sco

Section name: RC1000X1000

Summary:

Status	Acceptable
Maximum	1.000
V & T Util	0.080
N vs M Util	0.556

American Building Standards:
ACI 318-14, "Building Code Requirements for Structural Concrete"
ACI 318R-14, "Commentary for ACI 318-14"

Design Aids, Manuals, and Handbooks:
The Reinforced Concrete Design Handbook, A Companion to ACI 318-14
"ACI Detailing Manual - 1994", ACI Committee 315, American Concrete Institute, 1994
"Manual of Standard Practice", Concrete Reinforcing Steel Institute, 2003

Section Dimensions:
Rectangular Column
b = 1000 mm
h = 1000 mm

Quantities (approx.):
Concrete = 2375 kg/m
Steel = 166.8 kg/m
Primary = 80.2 kg/m
Secondary = 86.6 kg/m

Material Properties:
fc' = 60 MPa
fy(vert) = 500.0 MPa
fy(ties) = 400.0 MPa
Wc = 2400 kg/m3
Ws = 7850 kg/m3
Poisson's Ratio = 0.2
hagg = 20 mm
Es = 200000 MPa
Ec = 36000 MPa
Gc = 11735 MPa
fr = 4.82 MPa

Gross Properties:
Zbar = 0 mm
Ybar = 0 mm
Ag = 1000.0xE3 mm2
Ig(y-y) = 83333xE6 mm4
Ig(z-z) = 83333xE6 mm4
Ashear(Y) = 833333 mm2
Ashear(Z) = 833333 mm2
Jg = 140580xE6 mm4

Effective Properties:
Ae = 1000.0xE3 mm2
Ie(y-y) = 83333xE6 mm4
Ie(z-z) = 83333xE6 mm4
Ase(Y) = 833333 mm2
Ase(Z) = 833333 mm2
Je = 140580xE6 mm4

Vertical Bars:
1000 x 1000 mm Column
36-#6 Vert
As = 10219 mm2
Rho = 1.02 %
Tangential Splice

Ties:
#4 Ties @ 150 mm
Legs (Z-Direction) = 6
Legs (Y-Direction) = 6

Miscellaneous:
Clear Cover = 40 mm

S-CONCRETE 2020.2.7 © S-FRAME Software Inc. www.s-frame.com (1000-RC1000X1000_60[ALL].sco)

Figure 27. Batch Processing Report Example – A Column Section

Reviewing the Results from the S-CONCRETE Batch Utility

After the S-CONCRETE Batch Utility has been run, a selected portion of the results is read back into the application to allow users to review the results without opening S-CONCRETE for the individual files. There are three (3) main Tools to review the results, a Table view, PDF Report view, and within the member Design Data Form Tool that is shown in Figure 21. The Table and PDF Reports are available from buttons shown in the application dialog in Figure 22. The Design Data Form will display a limited detail of the Batch results. You can return to the main window shown in Figure 15 by using the View Menu and go to the Design Standards menu item.

A sample of the Reports from each of these Tools for Columns is shown below. The Reports generally show a summary of the member cross-section dimensions, input reinforcement, DCR ratios for Shear, Torsion and Moment, Warning Messages that would be part of the S-CONCRETE stand-alone application Results Report and concrete and steel quantities, per unit length of the member.

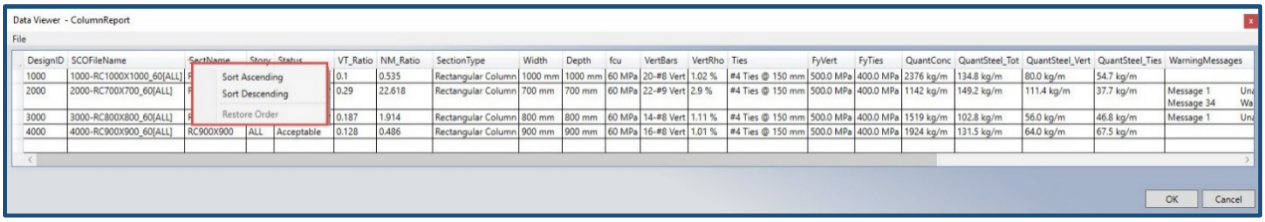
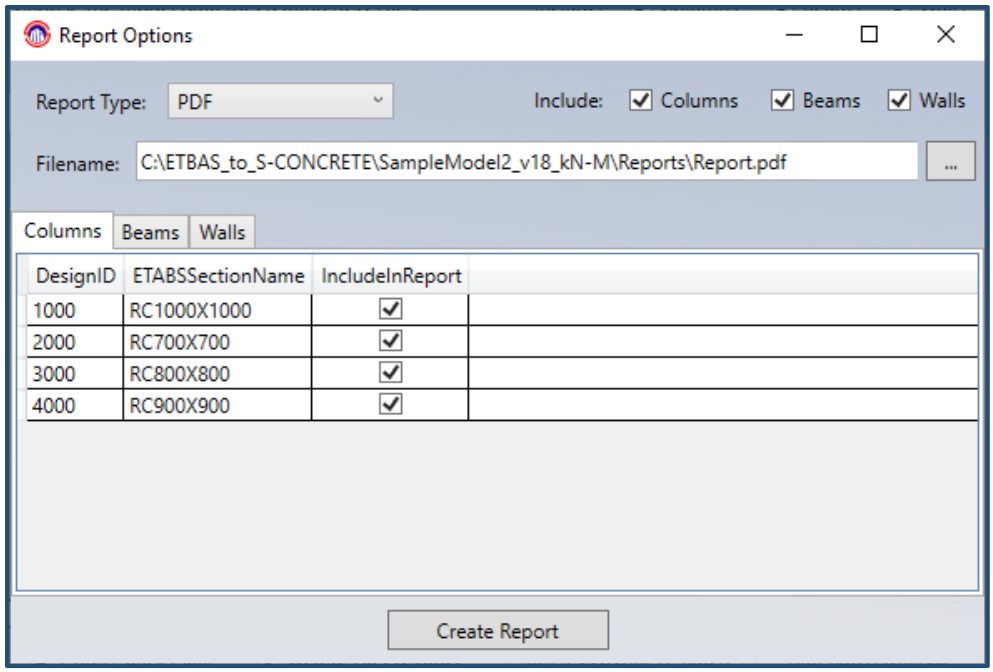


Figure 28. S CONCRETE Batch Utility Report for Columns – Table View



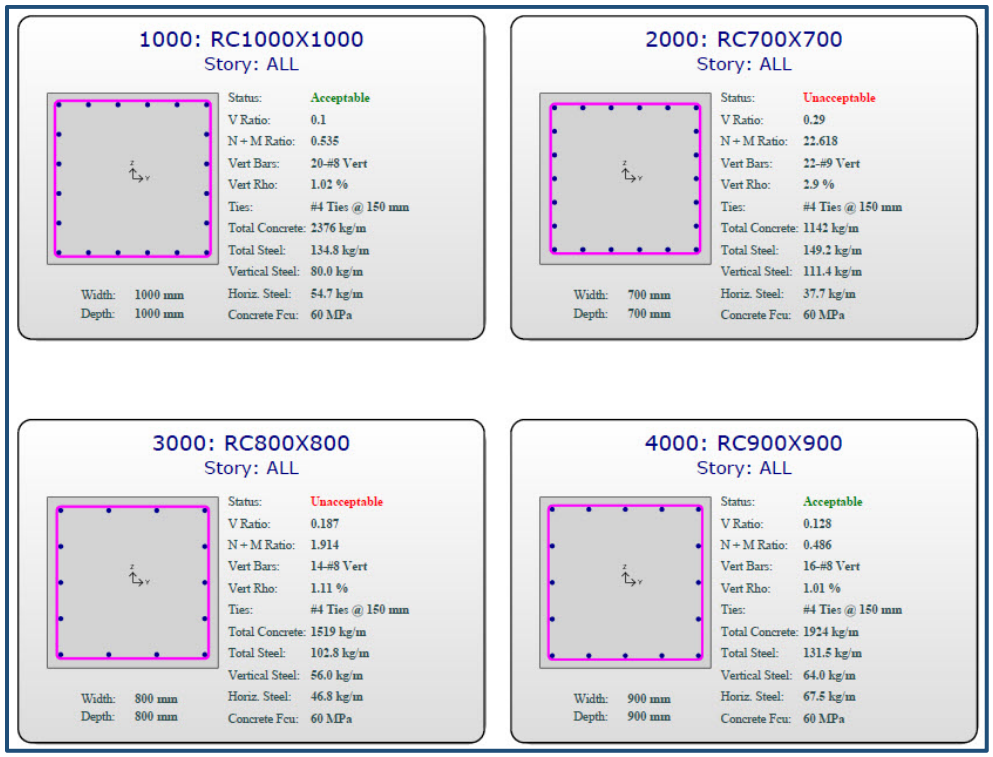


Figure 29. S CONCRETE Batch Utility Report for Columns – PDF Report Tool

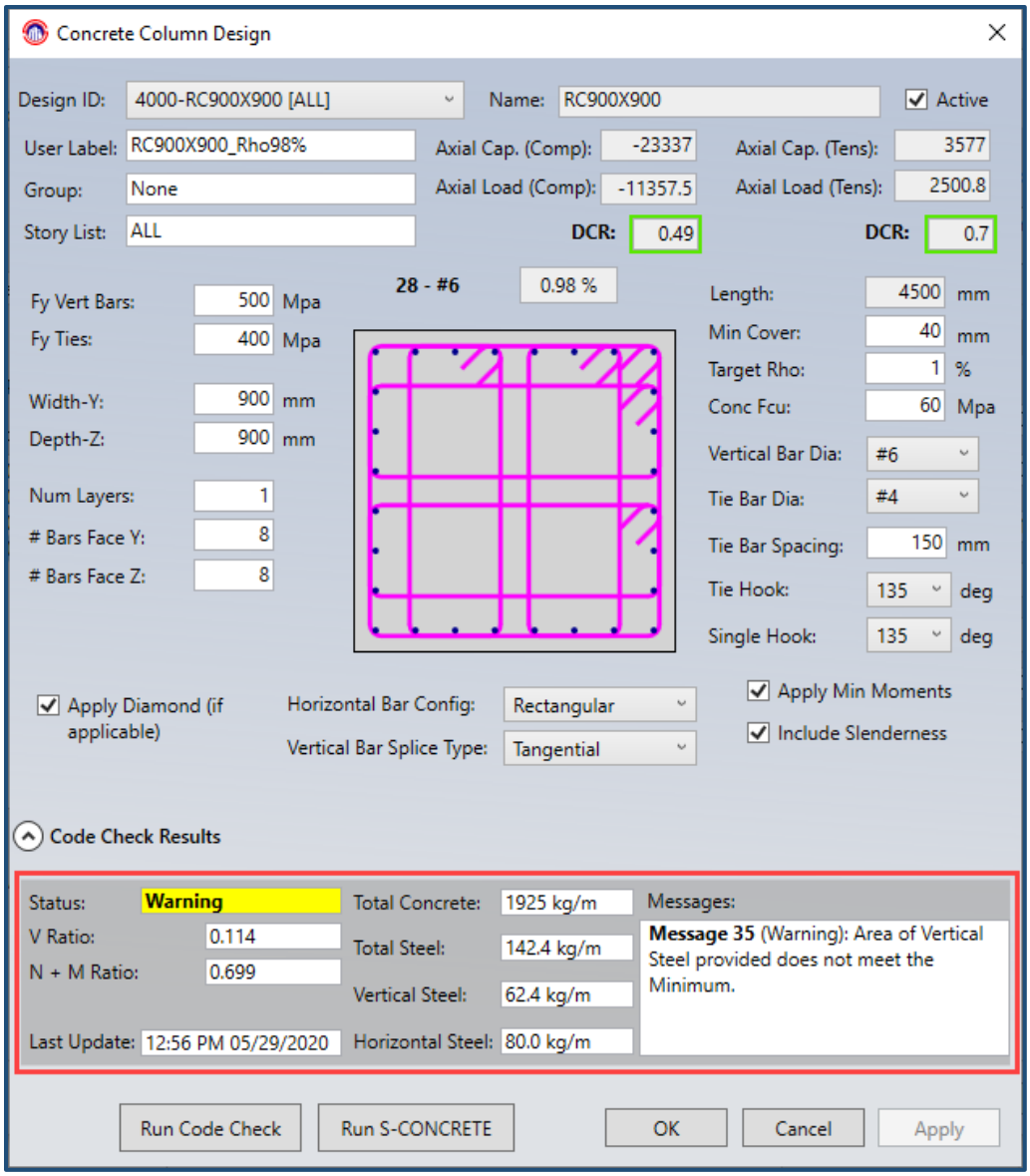


Figure 30. S CONCRETE Batch Utility Results for Columns – Design Data Form

Advanced Feature – Create Section Design/Group Data by using ETABS® Stories

The screenshots below show the steps to create SCO Files by a custom selection of ETABS® Stories or for each Story, for a selected Section in the model. The same tools are available for Beams and Walls.

Figure 31 shows how to activate the "Include Stories" feature in the R/F override window of the application. This tool allows a user to leverage the Story attribute, which is part of the ETABS® model to create custom SCO files to perform more detailed evaluations using the S-Concrete Batch Utility.

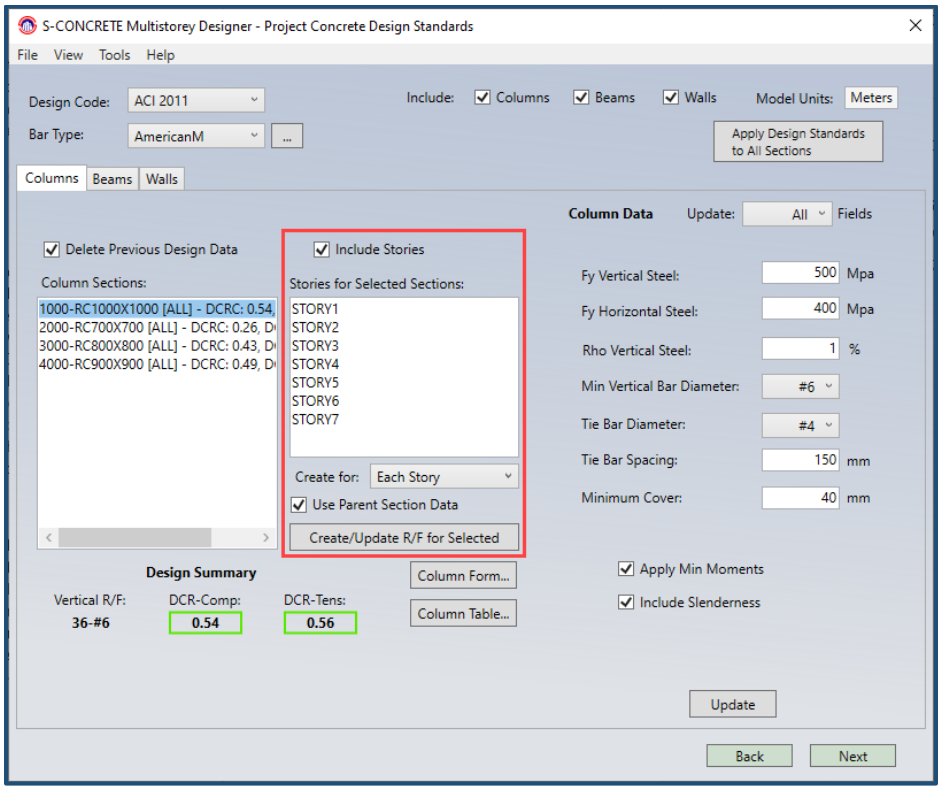


Figure 31. Create Section Groups by ETABS® Stories

As shown in Figure 31, users can create a custom design Group by selecting a Section and selecting the Stories to be contained in the Group, typing in a Group Name and then clicking the button "Create/Update R/F for Selected" to create the new Group. After the new Group is created, the DCR values are updated based on the analysis forces related to the members in this Group, allowing the user to update the reinforcement to satisfy the strength requirement for this group. This Design Group will be part of the set of SCO files to be evaluated in the S-CONCRETE Batch Utility.

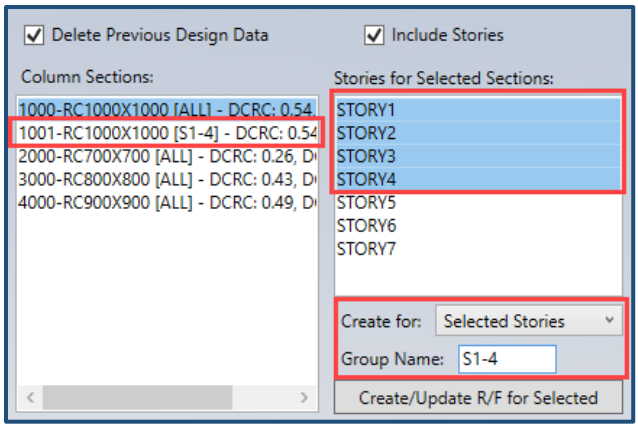


Figure 32. Create Custom Story Groups by Section

Users can select a single section and create individual SCO files for each Story that is associated with the ETABS® Section in the model (see Figure 32). This feature can be used to perform a Story-by-Story analysis of the members to determine the required reinforcement needed to satisfy the design.

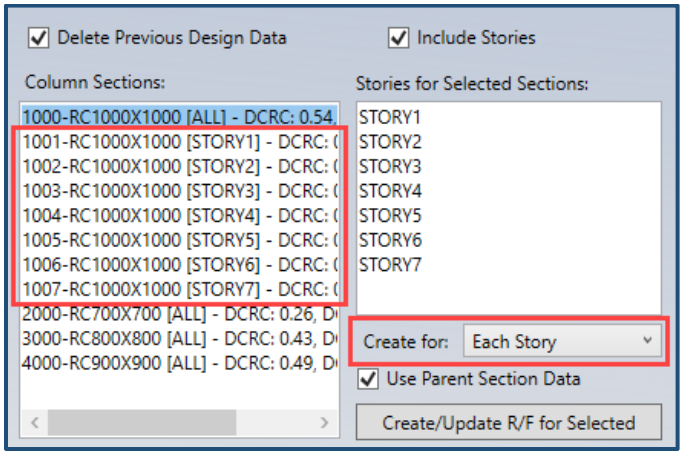


Figure 33. Create Story-by-Story Groups by Section

Advanced Feature – Creating HTML Results for each ETABS® Story with Schedule-like Report

The screenshots below show the steps to create an HTML Report when the SCO Files are created and run for each Story in the model, as described in Figure 22 shown above. The Report generated from this option displays the results in a schedule-like format, providing for a detailed review of grouped column, beam, or wall stacks.

To create the Column Report for the Model, edit the Report Tool data, as shown below. Update the Report Filename as desired to make the Report for Columns unique. Also, edit the "SectionNameForGroup" field to allow all columns with Section Names beginning with the letters "RC" to be grouped in the Report.

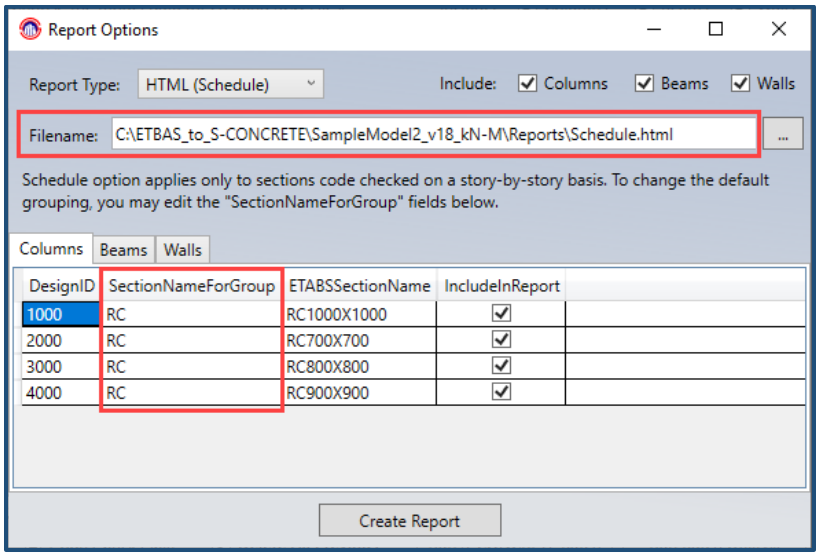


Figure 34. HTML Schedule Report Option for Columns

Database Name: SampleModel2_V2016_kN-M

Column Design Summary

Story	RC	
STORY31		Column: RC700X700 Status: **Warning** DCR:PM 0.24 VT 0.26 RC 700x700 (60 MPa) VertBars: 24-#9 Vert-3.16 % Ties: #4 Ties @ 150 mm
STORY30		Column: RC700X700 Status: **Unacceptable** DCR:PM 1.93 VT 0.25 RC 700x700 (60 MPa) VertBars: 24-#9 Vert-3.16 % Ties: #4 Ties @ 150 mm
STORY29		Column: RC700X700 Status: **Unacceptable** DCR:PM 1.2 VT 0.29 RC 700x700 (60 MPa) VertBars: 24-#9 Vert-3.16 % Ties: #4 Ties @ 150 mm
STORY28		Column: RC700X700 Status: **Warning** DCR:PM 0.76 VT 0.26 RC 700x700 (60 MPa) VertBars: 24-#9 Vert-3.16 % Ties: #4 Ties @ 150 mm
STORY27		Column: RC700X700 Status: **Warning** DCR:PM 0.69 VT 0.24 RC 700x700 (60 MPa) VertBars: 24-#9 Vert-3.16 % Ties: #4 Ties @ 150 mm
STORY26		Column: RC700X700 Status: **Warning** DCR:PM 0.62 VT 0.22 RC 700x700 (60 MPa) VertBars: 24-#9 Vert-3.16 % Ties: #4 Ties @ 150 mm
STORY25		Column: RC700X700 Status: **Warning** DCR:PM 0.55 VT 0.21 RC 700x700 (60 MPa) VertBars: 24-#9 Vert-3.16 % Ties: #4 Ties @ 150 mm
STORY24		Column: RC700X700 Status: **Warning** DCR:PM 0.48 VT 0.18 RC 700x700 (60 MPa) VertBars: 24-#9 Vert-3.16 % Ties: #4 Ties @ 150 mm
STORY23		Column: RC800X800 Status: **Unacceptable** DCR:PM 9999 VT 0.19 RC 800x800 (60 MPa) VertBars: 12-#8 Vert-0.96 % Ties: #4 Ties @ 150 mm
STORY22		Column: RC800X800 Status: **Unacceptable** DCR:PM 1.62 VT 0.16 RC 800x800 (60 MPa) VertBars: 12-#8 Vert-0.96 % Ties: #4 Ties @ 150 mm
STORY21		Column: RC800X800 Status: **Warning** DCR:PM 0.71 VT 0.16 RC 800x800 (60 MPa) VertBars: 12-#8 Vert-0.96 % Ties: #4 Ties @ 150 mm
STORY20		Column: RC800X800 Status: **Warning** DCR:PM 0.55 VT 0.15 RC 800x800 (60 MPa) VertBars: 12-#8 Vert-0.96 % Ties: #4 Ties @ 150 mm
STORY19		Column: RC800X800 Status: **Warning** DCR:PM 0.39 VT 0.16 RC 800x800 (60 MPa) VertBars: 12-#8 Vert-0.96 % Ties: #4 Ties @ 150 mm
STORY18		Column: RC800X800 Status: **Warning** DCR:PM 0.35 VT 0.14 RC 800x800 (60 MPa) VertBars: 12-#8 Vert-0.96 % Ties: #4 Ties @ 150 mm
STORY17		Column: RC800X800 Status: **Warning** DCR:PM 0.37 VT 0.13 RC 800x800 (60 MPa) VertBars: 12-#8 Vert-0.96 % Ties: #4 Ties @ 150 mm

Figure 35. Sample Output HTML Schedule Report for Columns

Similarly, to create the Beam Report for the Model, edit the Report Tool data, as shown below. Update the Report Filename as desired to make the Report for Beams unique. Also, edit the "SectionNameForGroup" field to allow all beams with Section Names beginning with the letters "LB", for the Link Beams and "OTR", for the Outrigger Wall/Beams to be grouped in the Report.

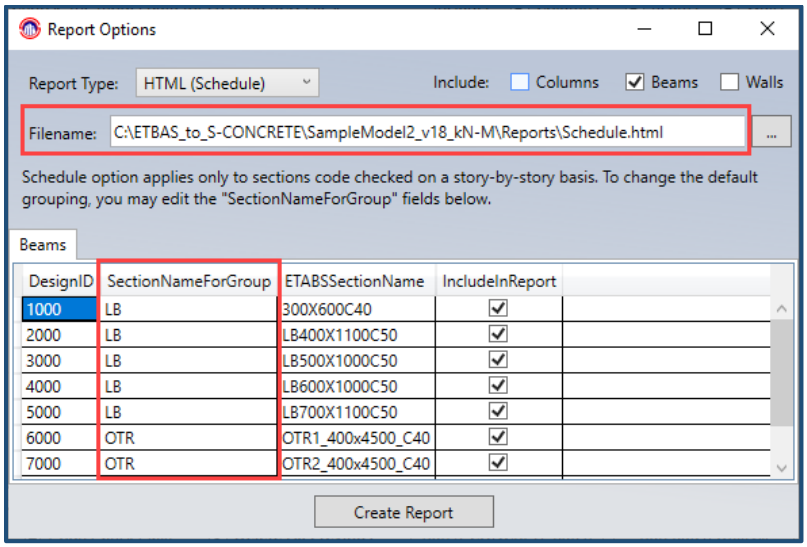


Figure 36. HTML Schedule Report Option for Beams

Database Name: SampleModel2_V2016_kN-M

Beam Design Summary

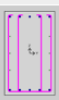
Story	LB		OTR	
STORY31		Beam: LB500X1000C50 Status: **Acceptable** DCR:PM(+) 0.69 PM(-) 0.62 VT 0.78 Beam 500 mm x 1000 mm (35 MPa)		Beam: OTR4_400x4500_C40 Status: **Unacceptable** DCR:PM(+) 1.28 PM(-) 0 VT 1.68 Beam 400 mm x 4500 mm (40 MPa)
STORY30		Beam: LB500X1000C50 Status: **Acceptable** DCR:PM(+) 0.64 PM(-) 0.62 VT 0.72 Beam 500 mm x 1000 mm (50 MPa)	N/A	
STORY29		Beam: LB500X1000C50 Status: **Acceptable** DCR:PM(+) 0.34 PM(-) 0.39 VT 0.41 Beam 500 mm x 1000 mm (50 MPa)	N/A	
STORY28		Beam: LB500X1000C50 Status: **Acceptable** DCR:PM(+) 0.32 PM(-) 0.37 VT 0.32 Beam 500 mm x 1000 mm (50 MPa)	N/A	
STORY27		Beam: LB500X1000C50 Status: **Acceptable** DCR:PM(+) 0.32 PM(-) 0.37 VT 0.32 Beam 500 mm x 1000 mm (50 MPa)	N/A	
STORY26		Beam: LB500X1000C50 Status: **Acceptable** DCR:PM(+) 0.35 PM(-) 0.39 VT 0.35 Beam 500 mm x 1000 mm (35 MPa)	N/A	
STORY25		Beam: LB500X1000C50 Status: **Acceptable** DCR:PM(+) 0.38 PM(-) 0.42 VT 0.34 Beam 500 mm x 1000 mm (50 MPa)	N/A	
STORY24		Beam: LB500X1000C50 Status: **Acceptable** DCR:PM(+) 0.41 PM(-) 0.46 VT 0.36 Beam 500 mm x 1000 mm (50 MPa)	N/A	
STORY23		Beam: LB500X1000C50 Status: **Acceptable** DCR:PM(+) 0.44 PM(-) 0.49 VT 0.39 Beam 500 mm x 1000 mm (50 MPa)	N/A	
STORY22		Beam: LB500X1000C50 Status: **Acceptable** DCR:PM(+) 0.48 PM(-) 0.52 VT 0.41 Beam 500 mm x 1000 mm (50 MPa)	N/A	
STORY21		Beam: LB600X1000C50 Status: **Acceptable** DCR:PM(+) 0.5 PM(-) 0.54 VT 0.45 Beam 600 mm x 1000 mm (50 MPa)	N/A	
STORY20		Beam: LB600X1000C50 Status: **Acceptable** DCR:PM(+) 0.54 PM(-) 0.58 VT 0.48 Beam 600 mm x 1000 mm (50 MPa)	N/A	
STORY19		Beam: LB600X1000C50 Status: **Acceptable** DCR:PM(+) 0.57 PM(-) 0.61 VT 0.5 Beam 600 mm x 1000 mm (50 MPa)	N/A	
STORY18		Beam: LB600X1000C50 Status: **Acceptable** DCR:PM(+) 0.6 PM(-) 0.64 VT 0.52 Beam 600 mm x 1000 mm (50 MPa)	N/A	
STORY17		Beam: LB600X1000C50 Status: **Acceptable** DCR:PM(+) 0.64 PM(-) 0.68 VT 0.55 Beam 600 mm x 1000 mm (50 MPa)	N/A	
STORY16		Beam: LB600X1000C50 Status: **Acceptable** DCR:PM(+) 0.67 PM(-) 0.71 VT 0.57 Beam 600 mm x 1000 mm (50 MPa)	N/A	

Figure 37. Sample Output HTML Schedule Report for Beams

Similarly, to create the Wall Report for the Model, edit the Report Tool data, as shown below. Update the Report Filename as desired to make the Report for Walls unique. Also, edit the "SectionNameForGroup" field to allow all walls with Section Names beginning with the letters that make up the unique wall/pier labels in the model so they will be grouped in the Report.

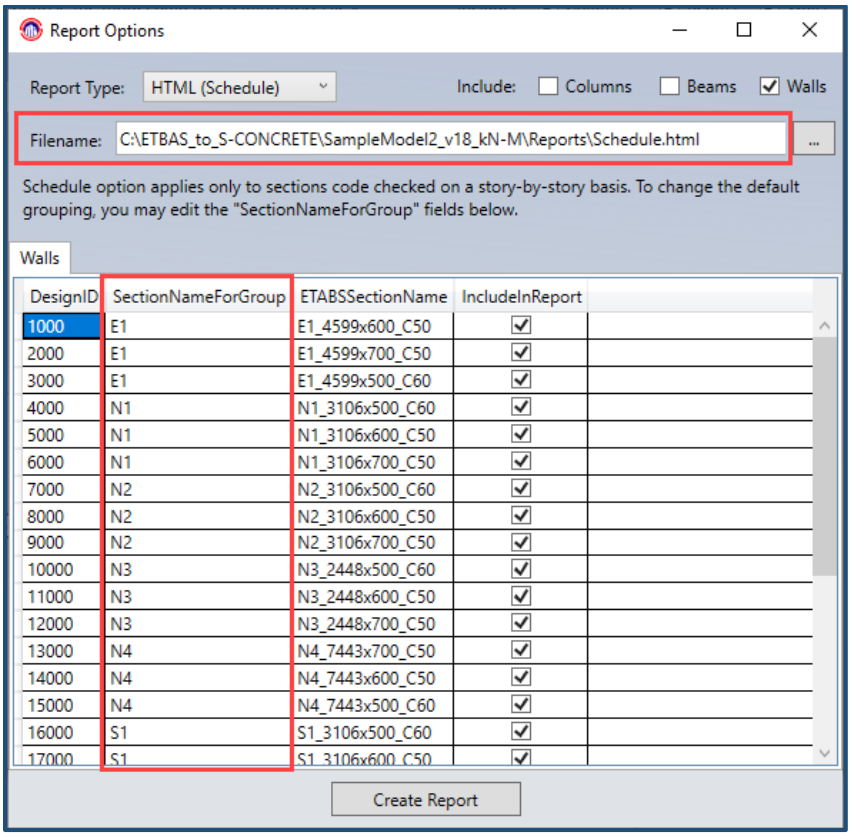


Figure 38. HTML Schedule Report Option for Walls

Database Name: SampleModel2_V2016_kN-M

Wall Design Summary

Story	E1	N1	N2	N3
STORY31	Wall: E1_4599x500_C60 Status: Unacceptable DCR:PM 2 V 0.78 Wall 4599x500 (60 MPa)	Wall: N1_3106x500_C60 Status: Unacceptable DCR:PM 1.23 V 0.25 Wall 3106x500 (60 MPa)	Wall: N2_3106x500_C60 Status: Unacceptable DCR:PM 1.49 V 0.24 Wall 3106x500 (60 MPa)	Wall: N3_2448x500_C60 Status: Unacceptable DCR:PM 1.13 V 0.21 Wall 2448x500 (60 MPa)
STORY30	Wall: E1_4599x500_C60 Status: Acceptable DCR:PM 0.76 V 0.18 Wall 4599x500 (60 MPa)	Wall: N1_3106x500_C60 Status: Acceptable DCR:PM 0.51 V 0.08 Wall 3106x500 (60 MPa)	Wall: N2_3106x500_C60 Status: Acceptable DCR:PM 0.63 V 0.08 Wall 3106x500 (60 MPa)	Wall: N3_2448x500_C60 Status: Acceptable DCR:PM 0.31 V 0.15 Wall 2448x500 (60 MPa)
STORY29	Wall: E1_4599x500_C60 Status: Acceptable DCR:PM 0.22 V 0.07 Wall 4599x500 (60 MPa)	Wall: N1_3106x500_C60 Status: Acceptable DCR:PM 0.5 V 0.13 Wall 3106x500 (60 MPa)	Wall: N2_3106x500_C60 Status: Acceptable DCR:PM 0.55 V 0.11 Wall 3106x500 (60 MPa)	Wall: N3_2448x500_C60 Status: Acceptable DCR:PM 0.26 V 0.11 Wall 2448x500 (60 MPa)
STORY28	Wall: E1_4599x500_C60 Status: Acceptable DCR:PM 0.14 V 0.06 Wall 4599x500 (60 MPa)	Wall: N1_3106x500_C60 Status: Acceptable DCR:PM 0.28 V 0.1 Wall 3106x500 (60 MPa)	Wall: N2_3106x500_C60 Status: Acceptable DCR:PM 0.31 V 0.1 Wall 3106x500 (60 MPa)	Wall: N3_2448x500_C60 Status: Acceptable DCR:PM 0.21 V 0.1 Wall 2448x500 (60 MPa)
STORY27	Wall: E1_4599x500_C60 Status: Acceptable DCR:PM 0.12 V 0.06 Wall 4599x500 (60 MPa)	Wall: N1_3106x500_C60 Status: Acceptable DCR:PM 0.22 V 0.1 Wall 3106x500 (60 MPa)	Wall: N2_3106x500_C60 Status: Acceptable DCR:PM 0.23 V 0.1 Wall 3106x500 (60 MPa)	Wall: N3_2448x500_C60 Status: Acceptable DCR:PM 0.19 V 0.1 Wall 2448x500 (60 MPa)
STORY26	Wall: E1_4599x500_C60 Status: Acceptable DCR:PM 0.1 V 0.07 Wall 4599x500 (60 MPa)	Wall: N1_3106x500_C60 Status: Acceptable DCR:PM 0.18 V 0.1 Wall 3106x500 (60 MPa)	Wall: N2_3106x500_C60 Status: Acceptable DCR:PM 0.18 V 0.1 Wall 3106x500 (60 MPa)	Wall: N3_2448x500_C60 Status: Acceptable DCR:PM 0.18 V 0.1 Wall 2448x500 (60 MPa)
STORY25	Wall: E1_4599x500_C60 Status: Acceptable DCR:PM 0.1 V 0.08 Wall 4599x500 (60 MPa)	Wall: N1_3106x500_C60 Status: Acceptable DCR:PM 0.16 V 0.1 Wall 3106x500 (60 MPa)	Wall: N2_3106x500_C60 Status: Acceptable DCR:PM 0.16 V 0.1 Wall 3106x500 (60 MPa)	Wall: N3_2448x500_C60 Status: Acceptable DCR:PM 0.17 V 0.11 Wall 2448x500 (60 MPa)
STORY24	Wall: E1_4599x500_C60 Status: Acceptable DCR:PM 0.11 V 0.09 Wall 4599x500 (60 MPa)	Wall: N1_3106x500_C60 Status: Acceptable DCR:PM 0.15 V 0.11 Wall 3106x500 (60 MPa)	Wall: N2_3106x500_C60 Status: Acceptable DCR:PM 0.15 V 0.11 Wall 3106x500 (60 MPa)	Wall: N3_2448x500_C60 Status: Acceptable DCR:PM 0.16 V 0.11 Wall 2448x500 (60 MPa)
STORY23	Wall: E1_4599x500_C60 Status: Acceptable DCR:PM 0.12 V 0.09 Wall 4599x500 (60 MPa)	Wall: N1_3106x500_C60 Status: Acceptable DCR:PM 0.14 V 0.11 Wall 3106x500 (60 MPa)	Wall: N2_3106x500_C60 Status: Acceptable DCR:PM 0.14 V 0.11 Wall 3106x500 (60 MPa)	Wall: N3_2448x500_C60 Status: Acceptable DCR:PM 0.16 V 0.12 Wall 2448x500 (60 MPa)
STORY22	Wall: E1_4599x500_C60 Status: Acceptable DCR:PM 0.13 V 0.1 Wall 4599x500 (60 MPa)	Wall: N1_3106x500_C60 Status: Acceptable DCR:PM 0.13 V 0.11 Wall 3106x500 (60 MPa)	Wall: N2_3106x500_C60 Status: Acceptable DCR:PM 0.13 V 0.11 Wall 3106x500 (60 MPa)	Wall: N3_2448x500_C60 Status: Acceptable DCR:PM 0.16 V 0.12 Wall 2448x500 (60 MPa)
STORY21	Wall: E1_4599x600_C50 Status: Warning DCR:PM 0.15 V 0.11 Wall 4599x600 (50 MPa)	Wall: N1_3106x600_C50 Status: Warning DCR:PM 0.15 V 0.12 Wall 3106x600 (50 MPa)	Wall: N2_3106x600_C50 Status: Warning DCR:PM 0.15 V 0.11 Wall 3106x600 (50 MPa)	Wall: N3_2448x600_C50 Status: Warning DCR:PM 0.17 V 0.13 Wall 2448x600 (50 MPa)
STORY20	Wall: E1_4599x600_C50 Status: Warning DCR:PM 0.16 V 0.12 Wall 4599x600 (50 MPa)	Wall: N1_3106x600_C50 Status: Warning DCR:PM 0.16 V 0.12 Wall 3106x600 (50 MPa)	Wall: N2_3106x600_C50 Status: Warning DCR:PM 0.16 V 0.12 Wall 3106x600 (50 MPa)	Wall: N3_2448x600_C50 Status: Warning DCR:PM 0.16 V 0.14 Wall 2448x600 (50 MPa)

Figure 39. Sample Output HTML Schedule Report for Walls