

**ANALYSIS AND DESIGN - BUILDING STRUCTURES**  
**PARTIAL LIST OF PROPRIETARY PARAMETRIC SOFTWARE TOOLS**  
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**1. NBSD Software Tools - Building Structures**

Material	Task	NBSD Software Tool	Code References	Reference Problem/ Description
All	Vertical Loads	<b>Gravity Loading (ASCE 7-05 Loading)</b> <b>Gravity Loading</b> Reduction in Roof and Floor Live Loads Rain Loading on Un-deflected Roof <b>Snow Loading</b> Snow Loading on Hip or Gable Roofs Snow Drift on Lower Roofs or Adjacent Buildings Snow Drift on Roof Projections	ASCE 7-05 Section 4.8, 4.9 IBC 09 Section 1611 ASCE 7-05 Section 7.4 - 7.10 " ASCE 7-05 Section 7.8	"Structural Load Determination Under 2006 IBC and ASCE 7-05" - Example 3.4.1 " Example 3.4.4 "Structural Load Determination Under 2006 IBC and ASCE 7-05" - Examples 4.1, 4.2 " Example 4.3 " Example 4.4
All	Lateral Loads	<b>Lateral Loading (ASCE 7-05 Loading)</b> <b>Wind Loading</b> Main Wind Force Resisting Systems - <b>Method 1</b> (Low Rise Buildings - Walls and Roof) Components and Cladding - <b>Method 1</b> (Low Rise Buildings - Walls and Roof) Main Wind Force Resisting Systems - <b>Method 2</b> (Low Rise Buildings Under 60 feet - Walls and Roof) Components and Cladding - <b>Method 2</b> (Low Rise Buildings Under 60 feet - Walls) (Low Rise Buildings Under 60 feet - Gable or Hip Roofs) (Low Rise Buildings Under 60 feet - Monoslope Roofs) Main Wind Force Resisting Systems - <b>Method 2</b> ( <u>No Height Limit</u> - Walls and Roof) Components and Cladding - <b>Method 2</b> ( <u>No Height Limit</u> - Walls and Roof) <b>Earthquake Loading</b> Determination of Seismic Design Category, $S_{DS}$ , $S_{D1}$ Simplified Procedure for Simple Bearing Wall System Base Shear, Vertical Force Distribution of Seismic Forces, Diaphragm Forces Determination of Horizontal Structural Irregularities (Torsional, Re-entrant Corner, Diaphragm Discontinuity Irregularity Checks)	ASCE 7-05 Section 6.4.1.1 " Section 6.4.1.2 " Section 6.5.12.2.2 " Section 6.5.12.4 " Section 6.5.12.2.2 " " " Section 6.5.12.2.1 " Section 6.5.12.4 ASCE 7-05 Section 11.4 " Section 12.14 " Section 12.18.1.1, 12.8.3, 12.10.1.1 " Table 12.3-1	"Structural Load Determination Under 2006 IBC and ASCE 7-05" - Example 5.1 " " Example 5.2 " " " " Example 5.3 " "Structural Load Determination Under 2006 IBC and ASCE 7-05" - Example 6.1 " Example 6.4 " Example 6.2, 6.4

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All	Lateral Loads	Determination of Vertical Structural Irregularities (Stiffness, Weight or Mass, Vertical Geometric, Weak Story Irregularity Checks)	" Table 12.3-2	" Example 6.2, 6.4	
		Permitted Analytical Procedures (According to Seismic Design Category and Building configuration)	" Tables 12.3-1 and 12.3-2	" Example 6.2	
		Story Drifts Checks	" Section 12.8.6, Table 12.12-1	" Example 6.4	
		P-Delta Effects Check	" Section 12.8.7	" Example 6.6	
		Seismic Demands on Non-structural Components (Building Parapet, etc)	" Section 13.3	" Example 6.6	
Steel	Analysis Tools	Approximate (Fast) Analysis of Braced Frames			
		Diagonal Braced Frame Chevron Braced Frame X Braced Frame	Determines Stiffness, Deflection, and Forces to members of 1-story frame systems.		
		<b>SAP2000</b> Pre and Post Processor for AISC 2-D Steel Frame Systems Description: <ul style="list-style-type: none"> <li>- Concentric/Eccentric Braced Frame configurations w/ relevant nodal response constraints;</li> <li>- Max 10 columns x 25 stories</li> <li>- Beam Tributary Trapezoidal Gravity Load distribution (DL, LL)</li> <li>- ASCE 7-05 Static (ELF) or Dynamic (ARS) Analysis</li> <li>- ASCE 7-05 Load Combinations</li> </ul>		Input Data by user is plotted on spreadsheet and used to create a <b>SAP2000</b> analytical model input file, which is imported from within the program and run; results for all nodes and elements are then extracted from program to be effectively displayed in tabular form and plotted on a Results spreadsheet (also showing relevant Input Data).	
	Design Tools	<b>Ordinary Concentric Braced Frame Systems (OCBF)</b>			
		OCBF Brace Design - HSS	AISC 341-05 Section 14	AISC 341-05 Example 3.1	
		OCBF Column Design	"	" Example 3.2	
		OCBF Beam Design	"	" Example 3.3	
		OCBF Brace-to-Beam/Column Connection Design - Welded	"	" Example 3.4	
		<b>Special Concentric Braced Frame Systems (SCBF)</b>			
		SCBF Brace Design - Pipe	AISC 341-05 Section 13	AISC 341-05 Example 3.6	
SCBF Brace Design - W Shape		"	" Example 3.7		
SCBF Column Design		"	" Example 3.8		
SCBF Beam Design - Inverted V		"	" Example 3.9		
SCBF Brace-to-Beam Connection Design - Welded	"	" Example 3.10			
SCBF Brace-to-Beam/Column Connection Design - Welded	"	" Example 3.11			
<b>Eccentric Braced Frame Systems (EBF)</b>					
EBF Link Design	AISC 341-05 Section 15	AISC 341-05 Example 3.14			
EBF Beam Outside of the Link Design	"	" Example 3.15			
EBF Brace Design	"	" Example 3.16			
EBF Column Design	"	" Example 3.17			
EBF Brace-to-Link Design	"	" Example 3.18			
EBF Brace-to-Beam/Column Design	"	" Example 3.19			

Project  
 Job No.  
 By AL  
 Date 8/13/2013  
 Sheet \_\_\_\_\_ of \_\_\_\_\_

**North Bay Seismic Design**  
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Material	Task	NBSD Software Tool	Code References	Reference Problem/ Description
Steel		<b>Special Moment Frame Systems (SMF)</b>		
		Story Drift and Stability Check	AISC 341-05 Section 9	AISC 341-05 Example 4.8
		SMF Column Design	"	" Example 4.9
		SMF Beam Design	"	" Example 4.10
		SMF Beam-Column Connection Design	"	" Example 4.11
		Gravity Column Splice Design in MR Frame	"	" Example 4.12
		SMF Column Splice Design	"	" Example 4.13
		<b>Other Systems Using R &gt; 3</b>		
		Diaphragm Chord and Collector Design	AISC 341-05, 360-05	AISC 341-05 Example 5.1
		Collector Connection Design	"	" Example 5.2
		<b>Miscellaneous Steel Design Tools</b>		
		Column Base Plate - AISC Steel Design Series Guide 1		
		Column Base Plate - w/ Small Moment	AISC 360-05	
		Column Base Plate - w/ Large Moment	"	
Concrete	Analysis Tools	Determination of Perforated Shear Wall Stiffness		Alan Williams SE Review Prob 1989 A-4, 1884 A-6
		Rigid Diaphragm Lateral and Torsional Loading to Walls		Alan Williams SE Review Prob 1989 A-4, 1887 A-4
		<b>SAP2000</b> Pre and Post Processors for 2-D Concrete Frame/Shear Wall Systems		Input Data by user is plotted on spreadsheet and used to create a <b>SAP2000</b> analytical model input file, which is imported from within the program and run; results for all nodes and elements are then extracted from program to be effectively displayed in tabular form and plotted on a Results spreadsheet (also showing relevant Input Data).
		Description: - Moment Resisting frame element / Shear Wall configurations w/ concrete cracking effects - Max 10 columns x 25 stories - Beam Tributary Trapezoidal Gravity Load distribution (DL, LL) - ASCE 7-05 Static (ELF) or Dynamic (ARS) Analysis - ASCE 7-05 Load Combinations		
	Design Tools	<b>RC Special Moment Resisting Frame</b>		
		Proportioning and Detailing of SMF Beams	ACI 318-08 Section 21.5	PCA Notes on ACI 318-05 Example 29.2
		Proportioning and Detailing of SMF Columns	ACI 318-08 Section 21.6	" Example 29.3
		Proportioning and Detailing of Exterior Beam-Column Connection	ACI 318-08 Section 21.7	" Example 29.4
		Proportioning and Detailing of Interior Beam-Column Connection	"	" Example 29.5
		<b>RC Shear Wall Design</b>		
		Proportioning and Detailing of Shear Walls W/O Boundary Elements	ACI 318-08 Section 11.10, 21.9	PCA Notes on ACI 318-05 Example 21.4
		Proportioning and Detailing of Shear Walls W/ Boundary Elements	ACI 318-08 Section 21.9	" Example 29.6
		<b>RC Strong Connections for Precast RC Frame - ACI 318-08</b>		
		Proportioning and Detailing of Strong Connections :	ACI 318-08 Section 21.8	PCA Notes on ACI 318-05 Example 29.7
		Beam-to-Beam Connection	"	"
		Column-to-Column Connection	"	"

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		Beam-Column Connection	"	"	
Concrete		<b>Design of Slab Column Connections</b>			
		Seismic Design of Slab-Column Connections	ACI 318-08 Section 11.12, 21.11	PCA Notes on ACI 318-05 Example 29.8	
		<b>Miscellaneous Concrete Design Tools</b>			
		Reinforced Concrete Capacity Evaluation :			
		RC Section Flexural Capacity		Numerous projects	
		RC Section Flexural Capacity - Working Stress		"	
		RC Section Shear Capacity		"	
		RC Corbel Seat Support Design	ACI 318-08 Section 11.8	Alan Williams SE Review Prob 1990 C-1	
		Concrete Stair Platform Design			
		<b>Foundations</b>			
	Single Spread Footing - Without Flexure	ACI 318-08 Sections 10.2, 10.14, 11.2, 11.4, 11.10, 11.11, 12.2, 15.4	Alan Williams SE Review Prob 1991 C-3		
	Single Spread Footing - With Eccentric Loading	ACI 318-08 Sections 11.2, 11.4, 11.10, 11.11, 11.14, 12.2, 15.4	"		
	Continuous Spread Footing (Stem Wall) Design	ACI 318-08 Sections 10.2, 11.4, 11.5, 17.6	Alan Williams SE Review Prob 1988 C-2		
	Mat Foundation Design	ACI 318-08 Sections 10.2, 10.5, 11.1, 11.2, 11.4, 11.10, 11.11, 11.14, 12.2, 15.4	Alan Williams SE Review Prob 1988 C-3		
		<b>Note:</b> Piled Foundation w/ Eccentric loading provided in Bridge foundation tools.			
Timber	Analysis Tools	Miscellaneous Analysis Tools			
		Timber Simple Span Loads and Deflection Checks		Misc projects	
		Multi-Story Shear Wall - Vertical Distribution of Shear Forces		"	
		Multi-Story Shear Wall - Vertical Distribution of Axial Forces		"	
	Design Tools	Miscellaneous Design Tools			
		Design of Members in Compression	NDS 2005	Misc projects	
		Design of Members in Flexure	"	"	
Design of Members Subjected to Combined Flexure and Axial Loads		"	"		
	Out-of-Plane Wall Anchorage	ASCE 12.11	"		