

Weight Comparison of New Moment Frame System
To Reduced Beam Section

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1 INTRODUCTION

For each Lateral Force Resisting System (LFRS) there is a section or member that is designed to be the “fuse” of the LFRS. This fuse is the section that is expected to yield and create ductility for the system. The increase in ductility allows for more economical designs that involve lighter sections in the LFRS design. One of the most common beam-to-column connections for steel moment frames that act as the fuse is the Reduced Beam Section (RBS) connection. When RBS connections are used, a circular section cut-out is made on both sides of the top and bottom flanges of the wide flange beam near the beam-to-column connection. The beam is then expected to yield at this reduced section. The draw-back to the RBS moment connection is that there are many checks that must be satisfied. The strong column-weak beam check forces the designer to call out heavier column shapes than are needed for column strength requirements. Also, when using the RBS connection, the designer must choose between specifying doubler plates and continuity plates that add a significant amount of labor or call out shapes that are heavy enough to satisfy the required panel zone stiffness.

A new moment frame system design is being developed by Dr. Paul Richards, a professor at Brigham Young University, with the intent of reducing the weight required in the moment frame design. The main weight reducing mechanism in this new design is the use of tapered beam sections. Lighter standard shapes will be specified with plates welded to the flanges. The plates will be widest near the beam-to-column connection and will taper off towards the middle

of the beam, allowing for more efficient use of material. The new design will also remove the need for the strong column-weak beam requirement and will not require doubler plates or continuity plates.

The main objective of this project is to break down the weight required for RBS designs and compare the weight of steel required to achieve a specified stiffness for the RBS design and the new design. By looking at a number of cases, the weight savings of the new design can be quantified.

2 LITERATURE REVIEW

Sumner, Emmett A., and Thomas M. Murray. "Behavior of Extended End-Plate Moment Connections Subject to Cyclic Loading." *Journal of Structural Engineering* 128.4 (2002): pp. 501-508

The report presents a study done on End-Plate moment connections under cyclic loading. Seven specimens, each with different End-Plate connections, were tested using a reaction frame and actuator. For each test, the rotations due to applied moments were recorded and plotted. The results show that these connections are suitable for moment frames. This report is pertinent to my project because it provides an example of analyzing a type of moment frame connection.

Roeder, Charles W. "Connection Performance for Seismic Design of Steel Moment Frames." *Journal of Structural Engineering* 128.4 (2002): pp. 517-525

As part of the SAC Steel Project, the Connection Performance Team has provided this report which summarizes the yield mechanisms and failure modes of three different moment frame connection systems. The paper reports that yield mechanisms and failure modes vary for the three connections summarized in the report. This report will help me to understand the yield mechanisms and failure modes for the connections, and the strategies that are used to balance them.

Jones, Scott L., Gary T. Fry, and Michael D. Engelhardt. "Experimental Evaluation of Cyclically Loaded Reduced Beam Section Moment Connections." *Journal of Structural Engineering* 128.4 (2002): pp. 441-451

This study is an experiment on the effects of panel zone strength, composite behavior with a concrete slab, and the beam web-to-column flange connection on Reduced Beam Section moment connection performance. Eight double-sided specimens were created and tested under cyclic loading. The specimens with very weak panel zones developed large total story drifts without strength degradation, but ultimately failed due to fracture. Shear studs should be avoided as a precaution against stress risers. This study pertains to my project because it is a guide on the performance of RBS connections, with which I will do most of comparisons with the new moment frame system.

Gilton, Chad S., and Chia-Ming Uang. "Cyclic Response and Design Recommendations of Weak-Axis Reduced Beam Section Moment Connections." *Journal of Structural Engineering* 128.4 (2002): pp. 452-463

In a study of previous weak-axis moment connection tests, it was found that the most common failure mode was brittle fracture that occurred near the edge of the beam flange groove weld due to large stress concentrations. In this study, two full-scale weak-axis moment connections using the Reduced Beam Section design were statically tested. A series of finite element analyses were used to better understand the behavior of these weak-axis RBS moment connections. The RBS was able to reduce the critical strain concentration by a factor of almost three compared to non-RBS specimens. The report will be helpful because it contains a recommended design procedure for weak-axis RBS connections.

Chi, Brandon, and Chia-Ming Uang. "Cyclic Response and Design Recommendations of Reduced Beam Section Moment Connections with Deep Columns." *Journal of Structural Engineering* 128.4 (2002): pp. 464-473

In order to control drift when designing moment frames, design engineers will often use deep columns. The study investigates the behavior of Reduced Beam Section moment connections with deep columns. Three full-scale specimens were tested after the beam to column connection was made with the column in the upright position to simulate field conditions. Twisting and out-of-plane bending of the column occurred as a result of Lateral-Torsional Buckling of the beam flanges. Lateral bracing near the RBS region is the most effective counter-measure. The design procedures laid out for using deep columns in RBS connections will be useful for any design examples incorporated in my spreadsheet that involve deep columns.

3 METHODS

3.1 Moment Frame Sub-Assembly

The analyses to compare the two moment frame systems were done using a model of the moment frame sub-assembly, or the moment frame “molecule”. This model is explained in “Seismic Design of Steel Special Moment Frames: A Guide for Practicing Engineers (NIST GCR 09-917-3)”. Figure 3-1 shows the freebody of the model.

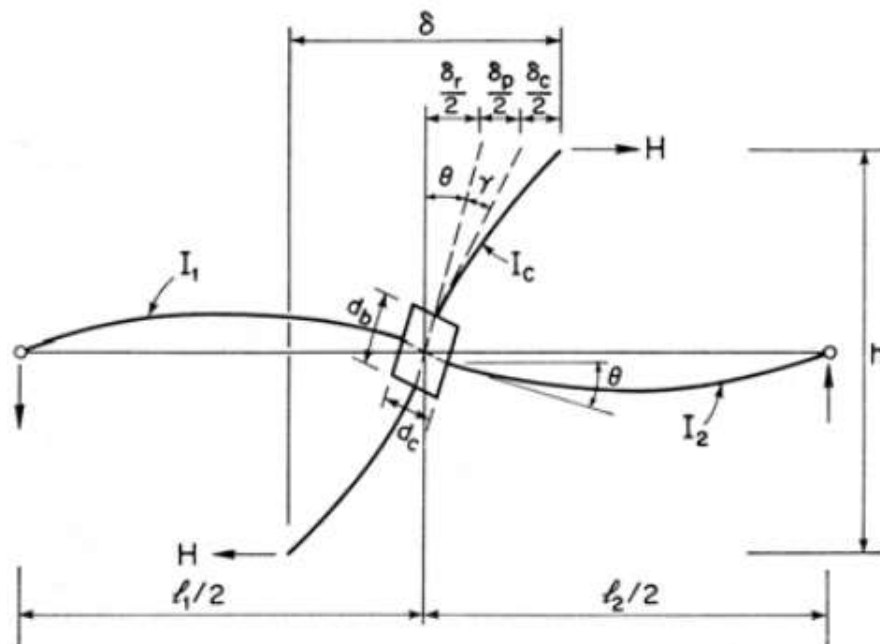


Figure 1: Freebody of Moment Frame Sub-Assembly

The model assumes points of inflections at beam mid-spans and column mid-heights. The equations for the contribution of story drift due to beam flexure (δ_r), column flexure (δ_c), and panel zone shear deformations (δ_p) are based on the freebody shown in Figure 1. These equations are found in NIST GCR 09-917-3 and are shown below as Equations 3-1, 3-2, and 3-3.

$$\delta_r = \frac{h^2 \left(1 - \frac{2d_c}{l_1 + l_2}\right)}{6E \left(\frac{l_1}{l_1 - d_c} + \frac{l_2}{l_2 - d_c}\right)} V_{col} \quad \text{Equation 3-1}$$

$$\delta_c = \frac{(h - d_b)^3}{12EI_c} V_{col} \quad \text{Equation 3-2}$$

$$\delta_p = \frac{(h - d_b) \left(\frac{h}{d_b} - 1\right)}{Gt_p d_c} V_{col} \quad \text{Equation 3-3}$$

V_{col} is the column shear force (kips), h is the story height (in), l_1 and l_2 are the beam spans (in), I_1 and I_2 are the beam moments of inertia (in^4), I_c is the column moment of inertia (in^4), d_b is the depth of the beam (in), d_c is the depth of the column (in), and t_p is the thickness of the joint panel zone (in). The sum of all three equations gives the total story drift. The stiffness of the moment frame molecule was determined by rearranging each of the three equations to equal V_{col}/δ (k/in).

3.2 RBS Design

The analyses to find steel weights for the RBS designs were done using the code written by Rudy Wright and Keith Newton, students at Brigham Young University, in their *RBS designer*(13) spreadsheet. The spreadsheet asks for the following inputs: required molecule stiffness, story height, bay width, a target column depth, and whether continuity plates or doubler plates are acceptable for the design. Clicking the “Optimize Design” button will then run the

code to find the lightest possible design to achieve the desired stiffness and pass all the checks as required by ANSI/AISC 358-10.

Starting with the existing code for the analysis, additional code was written to develop data for plots. The code loops through target column depths from W12 shapes to W36 shapes and records the design weight for each required stiffness from 10 k/in to 300 k/in. Sets of data tables were created for the following cases: both doubler and continuity plates allowed, only doubler plates allowed, only continuity plates allowed, and no plates allowed. Using these data tables, several different plots were created as presented in the Results section of this report.

3.3 New Design

Bahaar Taylor, a student at Brigham Young University, was responsible for the generation of the weight data for the new moment frame design. An analysis spreadsheet for the new design written by Bahaar was created to optimize the designs for the required stiffness's. Using the same loops through column depths and stiffness's, comparable data tables were created for the new moment frame design.

4 RESULTS

4.1 RBS Design

The first plots that were created show the total molecule design weight versus molecule stiffness. Figure 4-1, Figure 4-2, Figure 4-3, and Figure 4-4 show the plots for differing allowances of doubler plates and continuity plates for the geometry of 15 foot story heights and 30 foot bay lengths. Each line is for a different target column depth. In each plot, a general trend can be seen where the shallower column depths start off giving the optimum design weight for the lower target stiffness's, but the deeper column depths start becoming the optimum at higher stiffness's.

Figure 4-5 shows the total molecule design weight versus molecule stiffness for the lightest designs given each plate allowance case for the geometry of 15 foot story heights and 30 foot bay lengths. It can be seen that the addition of doubler plates can significantly lower the design weights at higher required stiffness's. Continuity plates have the same effect on the design weight, but to a lesser extent. While these plates allow for lighter moment frame designs, they can also significantly increase the cost. They both require extensive labor that involves significant amounts of welding. This increase of construction cost should be an item of consideration while comparing the design weights.

Height = 15ft, Length = 30ft, DP = Acceptable, CP = Acceptable

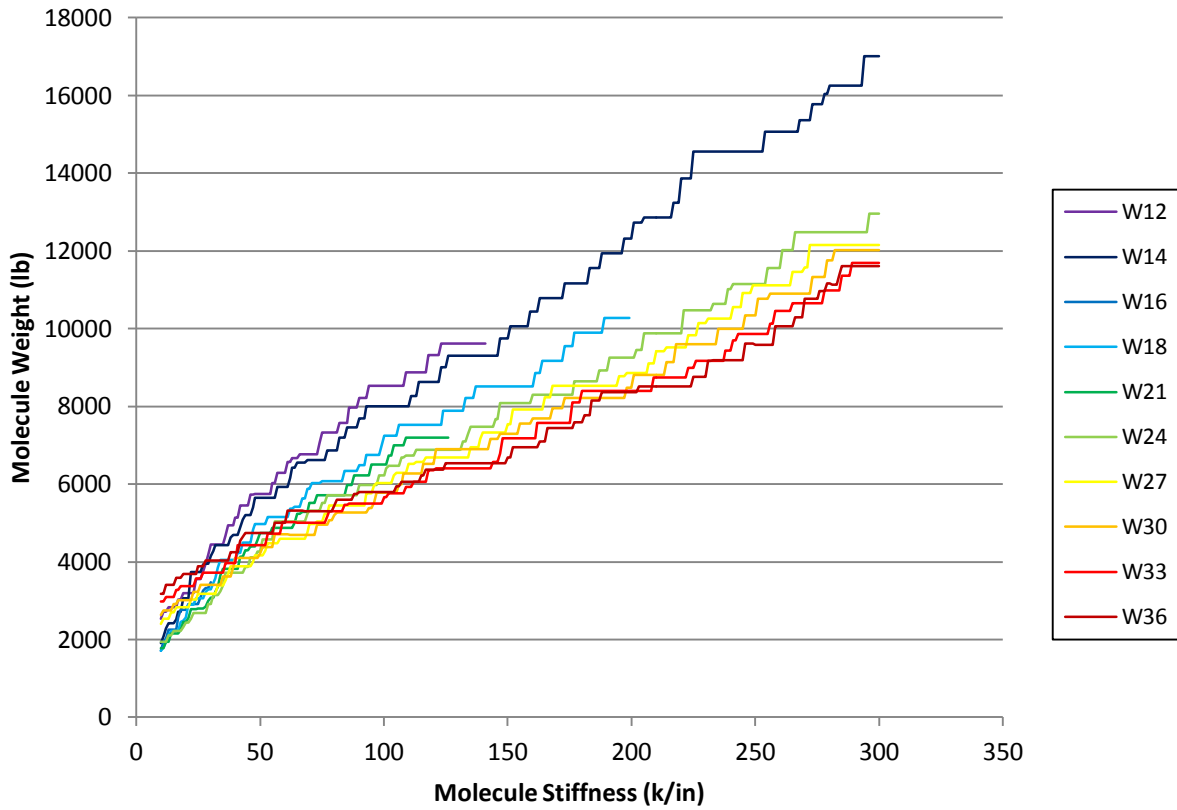


Figure 2: Molecule Weight vs. Molecule Stiffness for Both Plates Acceptable

Height = 15ft, Length = 30ft, DP = Not Acceptable, CP = Acceptable

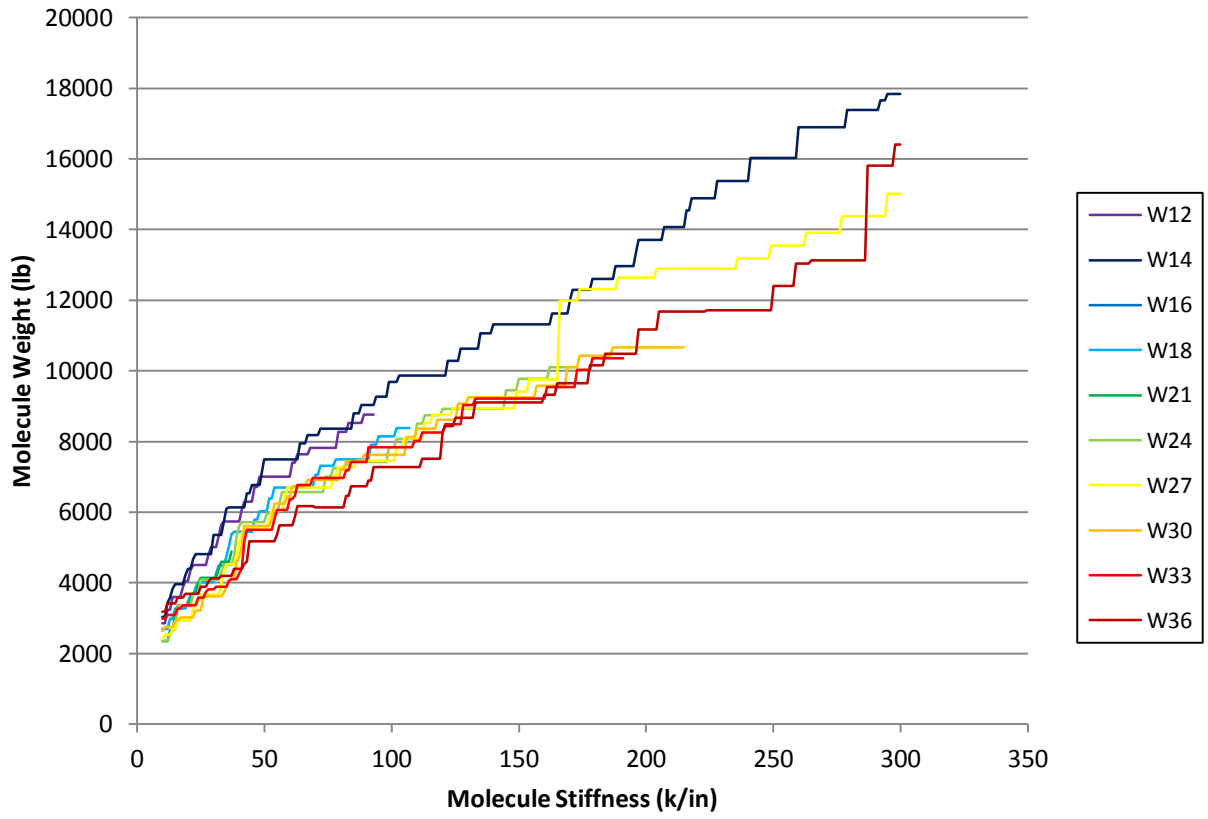


Figure 3: Molecule Weight vs. Molecule Stiffness for Continuity Plates Acceptable

Height = 15ft, Length = 30ft, DP = Acceptable, CP = Not Acceptable

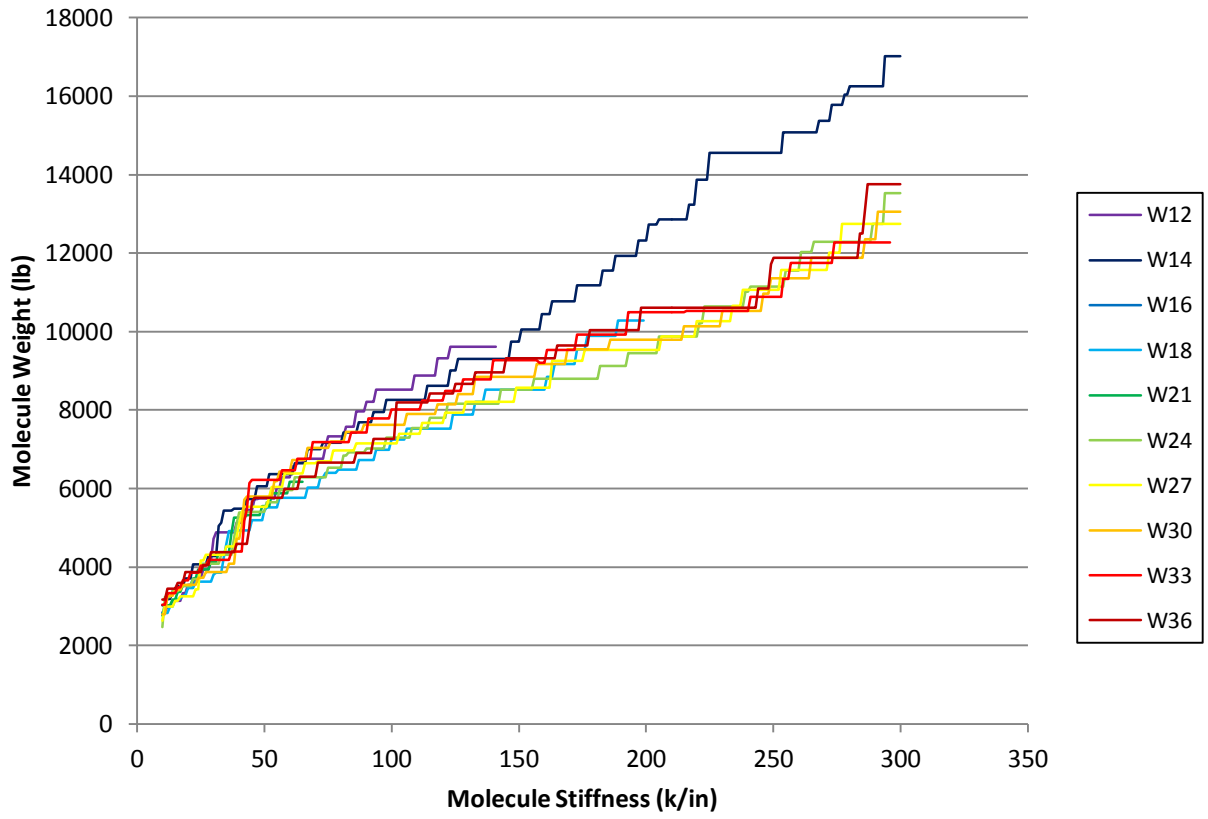


Figure 4: Molecule Weight vs. Molecule Stiffness for Doubler Plates Acceptable

Height = 15ft, Length = 30ft, DP = Not Acceptable, CP = Not Acceptable

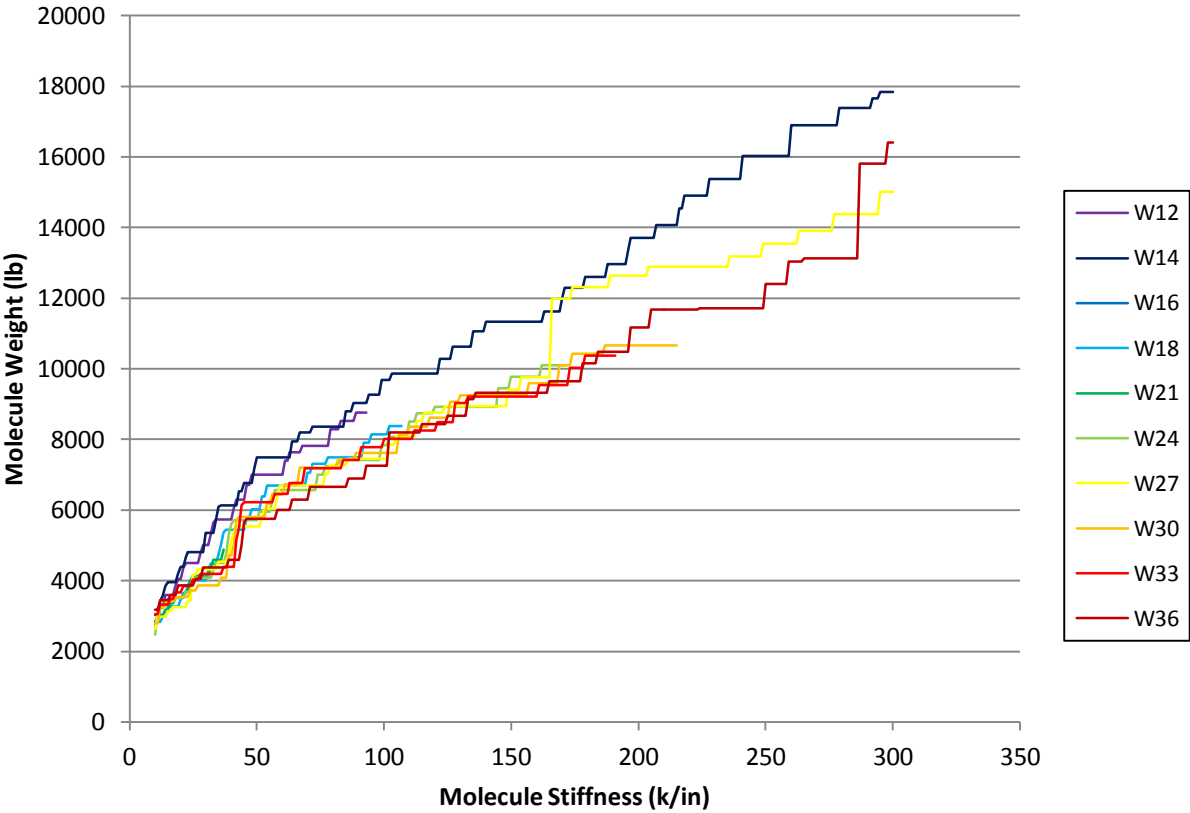


Figure 5: Molecule Weight vs. Molecule Stiffness for Both Plates Not Acceptable

Lightest Design: Height = 15ft, Length = 30ft

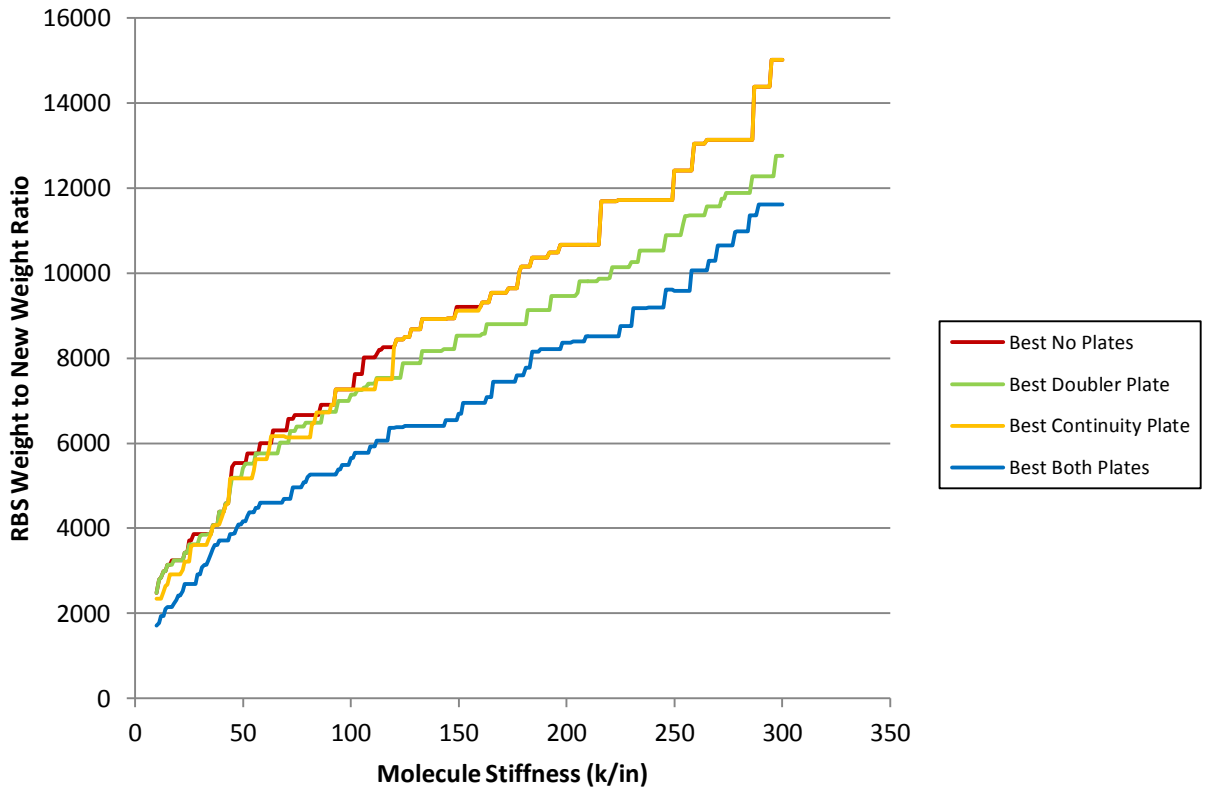


Figure 6: Lightest Design Weights for Each Case of Plate Allowance

The same plots were created for the geometry of 15 foot story heights and 25 foot bay lengths. Figure 4-6 shows the total molecule design weight versus molecule stiffness for the lightest designs given each plate allowance case for this geometry case. For both the geometry cases shown in Figures 4-5 and 4-6, the benefit in weight savings was much more significant when both plates were allowed together.

Lightest Design: Height = 15ft, Length = 25ft

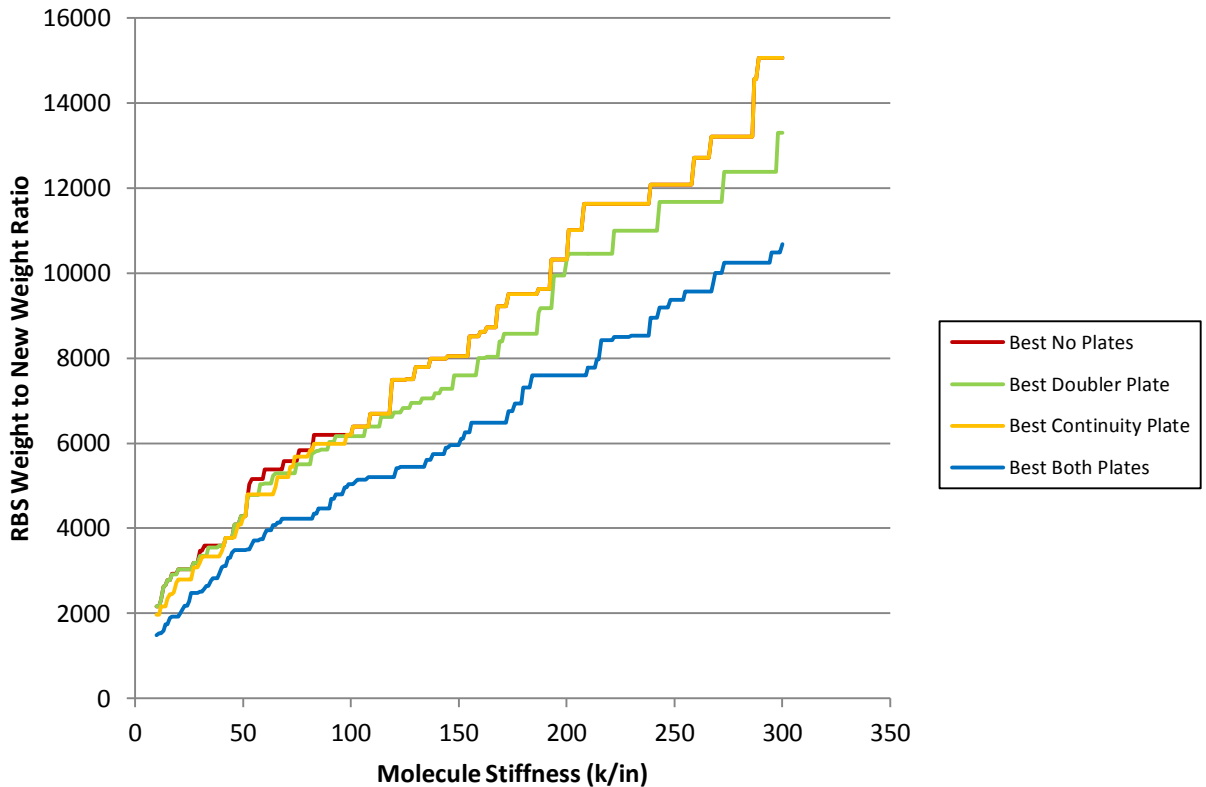


Figure 7: Lightest Design Weights for Each Case of Plate Allowance

The next series of plots that were created are the weight break-down plots. These plots show the weights of the beam, column, doubler plate, and continuity plate each divided by the total weight of the molecule. This shows the distribution of weight for each molecule design as the target stiffness is increased. Weight break-down plots were created for each target column depth for each of different cases of plate allowances. For each case of plate allowance, the lightest design for each target stiffness was recorded and weight-breakdown plots were created for these best designs and are shown in Figure 4-7, Figure 4-8, Figure 4-9, and Figure 4-10. For the geometry of 15 foot story heights and 30 foot bay lengths used for these figures, the beams are twice as long as the columns and would therefore be twice as heavy if the same member was

used for the beam and column. Allowing for both plates results in the beam and the column being about the same weight. The other cases result in a heavy column in comparison to the beam.

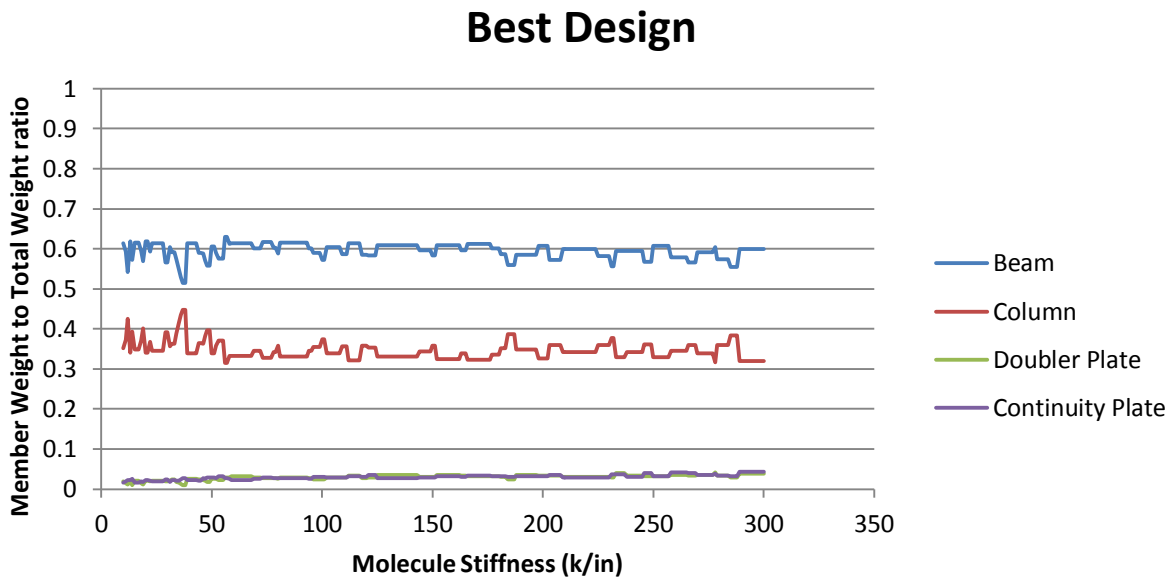


Figure 8: Weight Break-down for Both Plates Acceptable

Best Design

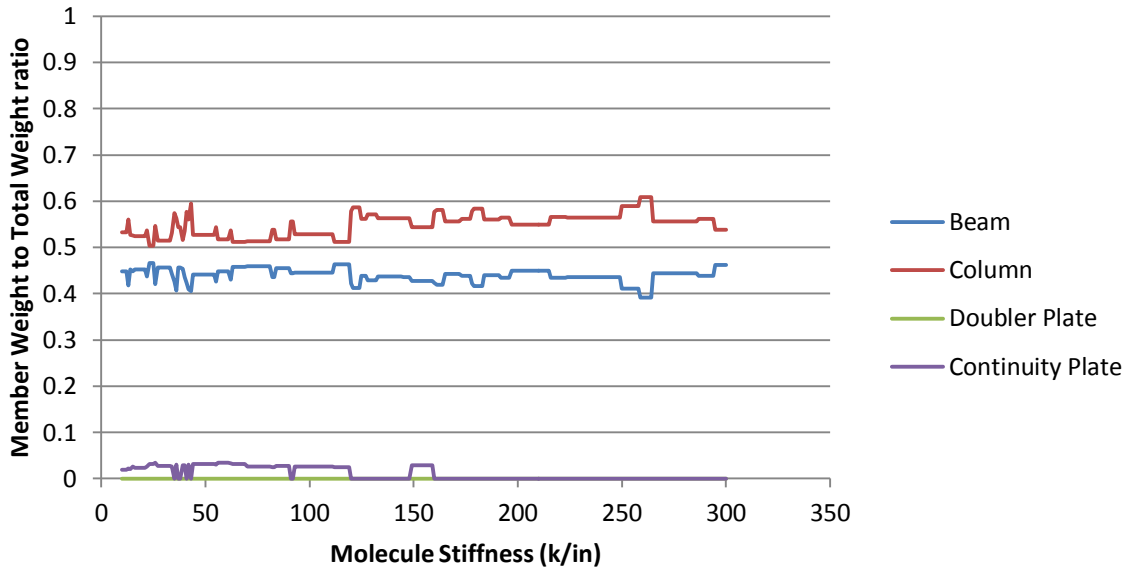


Figure 9: Weight Break-down for Continuity Plates Acceptable

Best Design

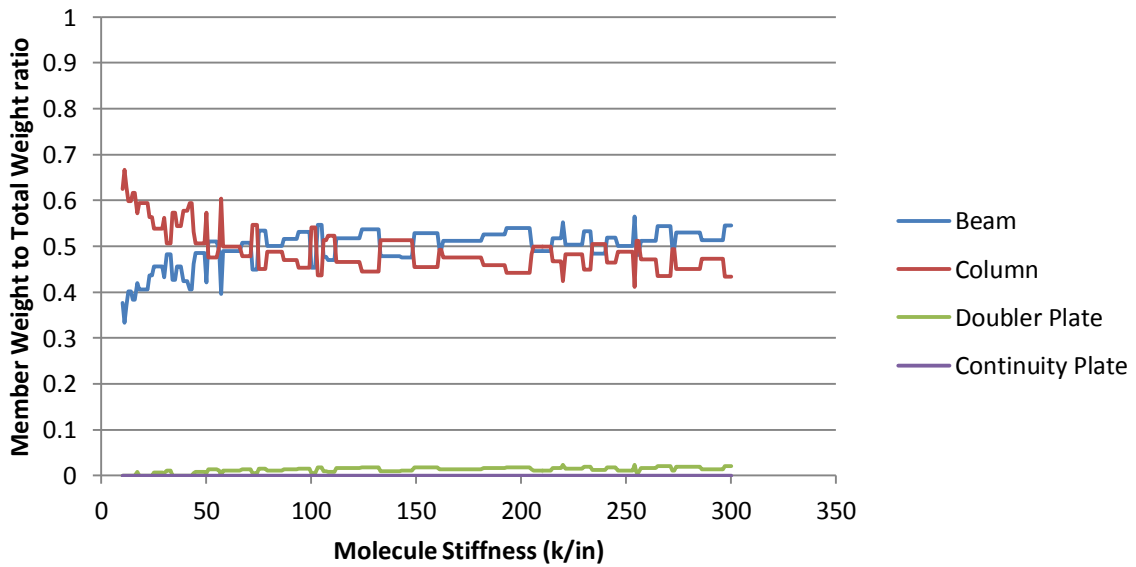


Figure 10: Weight Break-down for Doubler Plates Acceptable

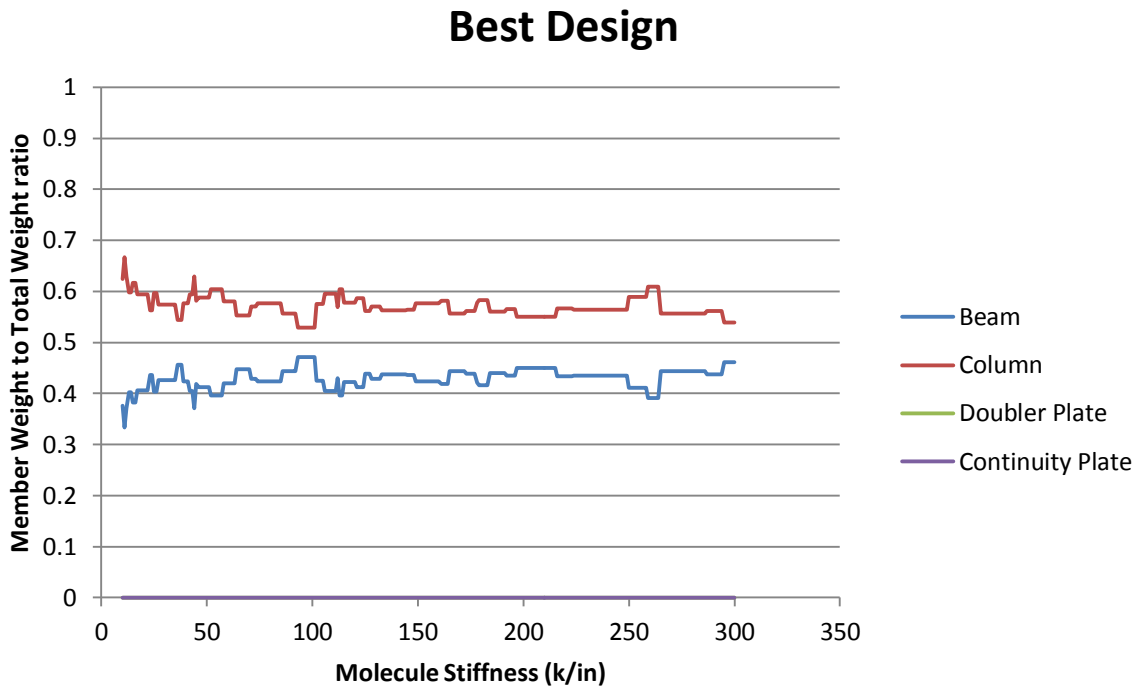


Figure 11: Weight Break-down for Both Plates Not Acceptable

4.2 Comparison of RBS and New Design

The final plots that were created were used to compare the weights needed for the RBS designs and new designs. Figure 4-11 shows a side-by-side comparison of the two designs for each target column depth and stiffness required. The plot shows the weight of the RBS design divided by the weight of the new design. Ratios that are greater than 1.0 indicate a lighter design weight for the new design.

Weight Comparison: Height = 15ft, Length = 30ft

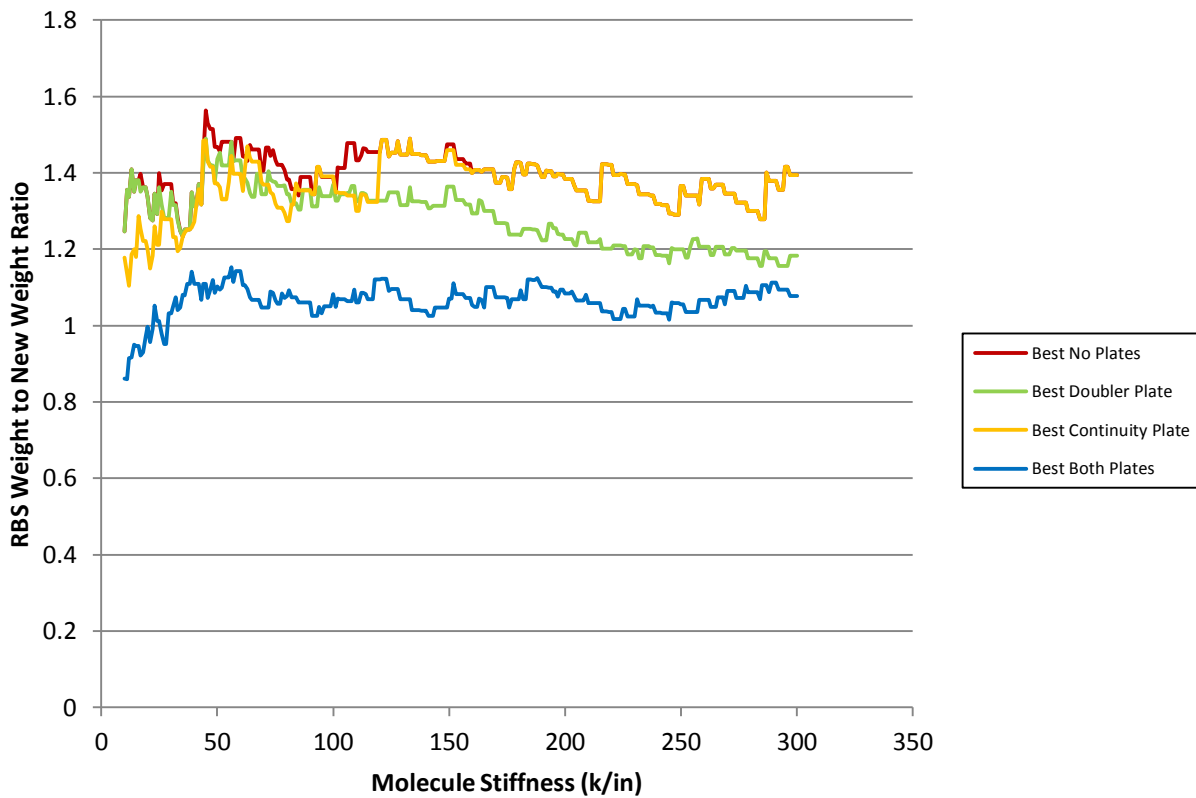


Figure 12: RBS Weight to New Weight Ratio vs Required Stiffness

For the case where both plates are allowable for the RBS design, which allows for the lightest RBS design, the new design is about 10 percent lighter than the RBS design for most of the range of stiffness's. However, those RBS designs may end up being very costly due to all the labor involved to install the doubler and continuity plates. The other cases of plate allowances show the new designs being about 20 to 50 percent lighter than the RBS design.

5 CONCLUSION

When designing a Reduced Beam Section connection for a moment frame, engineers are constrained to either use doubler plates and continuity plates to reduce their column and beam weights and still meet required stiffness and pass the required checks or to increase the sizes of their members. Both of the solutions are costly since the plates require extra labor for fabrication and welding in the field and heavier shapes mean more material cost and require the use of larger cranes to facilitate erection of the frames.

The new moment frame design allows for a solution that will create material weight savings. Comparing the new design to the lightest RBS designs that allowed the use of both doubler plates and continuity plates, the new design weights ended up being about 10 percent lighter on average. However, since the new design will no longer require the use of these plates, the other comparisons to the RBS designs without the use of plates may be better comparisons. In those cases, the new design weights were 20 to 50 percent lighter.

Future research can be done to explore the cost comparison of these two designs. The new design seeks to allow for the possibility of achieving the required stiffness's with less

welding and less material. Additionally, costs of moment frame repairs can be compared between the RBS designs and new design.

APPENDIX A.

RBS DESIGN TABLES

**Table 1: Lightest RBS Design Table for 15 ft Story Height
30 ft Bay Width, Both Plates Allowed**

Stiffness (k/in)	Beam	Column	Continuity Plate	Doubler Plate	Molecule Weight (lb)
10	W18X35	W18X40	1/2"	3/8"	1709
11	W18X35	W21X44	1/2"	1/4"	1769
12	W18X35	W24X55	1/2"	3/16"	1939
13	W18X40	W21X44	5/8"	3/8"	1941
14	W18X40	W24X55	5/8"	3/16"	2099
15	W21X44	W21X50	1/2"	3/8"	2148
16	W21X44	W21X50	1/2"	3/8"	2148
17	W21X44	W21X50	1/2"	3/8"	2148
18	W21X44	W24X55	1/2"	1/4"	2221
19	W21X44	W24X62	1/2"	3/16"	2317
20	W21X50	W24X55	5/8"	3/8"	2428
21	W21X50	W24X55	5/8"	3/8"	2428
22	W21X50	W24X62	5/8"	3/8"	2533
23	W24X55	W24X62	5/8"	3/8"	2689
24	W24X55	W24X62	5/8"	3/8"	2689
25	W24X55	W24X62	5/8"	3/8"	2689
26	W24X55	W24X62	5/8"	3/8"	2689
27	W24X55	W24X62	5/8"	3/8"	2689
28	W24X55	W24X62	5/8"	3/8"	2689
29	W24X55	W24X76	5/8"	3/8"	2915
30	W24X55	W24X76	5/8"	3/8"	2915
31	W24X62	W21X73	5/8"	1/2"	3076
32	W24X62	W24X76	5/8"	1/2"	3144
33	W24X62	W24X76	5/8"	1/2"	3144
34	W24X62	W24X84	5/8"	3/8"	3245
35	W24X62	W24X94	5/8"	3/8"	3395
36	W24X62	W27X102	5/8"	1/4"	3518
37	W24X62	W30X108	5/8"	3/16"	3615
38	W24X62	W30X108	5/8"	3/16"	3615
39	W24X76	W24X84	3/4"	5/8"	3718
40	W24X76	W24X84	3/4"	5/8"	3718
41	W24X76	W24X84	3/4"	5/8"	3718
42	W24X76	W24X84	3/4"	5/8"	3718
43	W24X76	W24X84	3/4"	5/8"	3718
44	W24X76	W24X94	3/4"	5/8"	3868
45	W24X76	W24X94	3/4"	5/8"	3868
46	W24X76	W27X94	3/4"	1/2"	3879
47	W24X76	W27X102	3/4"	1/2"	3999
48	W24X76	W30X108	3/4"	3/8"	4092
49	W24X76	W30X108	3/4"	3/8"	4092
50	W24X84	W27X94	7/8"	5/8"	4158
51	W24X84	W27X94	7/8"	5/8"	4158

52	W24X84	W27X102	7/8"	5/8"	4278
53	W24X84	W30X108	7/8"	1/2"	4376
54	W24X84	W30X108	7/8"	1/2"	4376
55	W24X84	W30X108	7/8"	1/2"	4376
56	W24X94	W27X94	7/8"	3/4"	4481
57	W24X94	W27X94	7/8"	3/4"	4481
58	W24X94	W27X102	7/8"	3/4"	4601
59	W27X94	W27X102	3/4"	3/4"	4598
60	W27X94	W27X102	3/4"	3/4"	4598
61	W27X94	W27X102	3/4"	3/4"	4598
62	W27X94	W27X102	3/4"	3/4"	4598
63	W27X94	W27X102	3/4"	3/4"	4598
64	W27X94	W27X102	3/4"	3/4"	4598
65	W27X94	W27X102	3/4"	3/4"	4598
66	W27X94	W27X102	3/4"	3/4"	4598
67	W27X94	W27X102	3/4"	3/4"	4598
68	W27X94	W27X102	3/4"	3/4"	4598
69	W27X94	W30X108	3/4"	5/8"	4695
70	W27X94	W30X108	3/4"	5/8"	4695
71	W27X94	W30X108	3/4"	5/8"	4695
72	W27X94	W30X108	3/4"	5/8"	4695
73	W27X102	W30X108	7/8"	5/8"	4956
74	W27X102	W30X108	7/8"	5/8"	4956
75	W27X102	W30X108	7/8"	5/8"	4956
76	W27X102	W30X108	7/8"	5/8"	4956
77	W27X102	W30X108	7/8"	5/8"	4956
78	W27X102	W30X116	7/8"	5/8"	5075
79	W27X102	W30X116	7/8"	5/8"	5075
80	W27X102	W30X124	7/8"	5/8"	5196
81	W30X108	W30X116	7/8"	5/8"	5269
82	W30X108	W30X116	7/8"	5/8"	5269
83	W30X108	W30X116	7/8"	5/8"	5269
84	W30X108	W30X116	7/8"	5/8"	5269
85	W30X108	W30X116	7/8"	5/8"	5269
86	W30X108	W30X116	7/8"	5/8"	5269
87	W30X108	W30X116	7/8"	5/8"	5269
88	W30X108	W30X116	7/8"	5/8"	5269
89	W30X108	W30X116	7/8"	5/8"	5269
90	W30X108	W30X116	7/8"	5/8"	5269
91	W30X108	W30X116	7/8"	5/8"	5269
92	W30X108	W30X116	7/8"	5/8"	5269
93	W30X108	W30X116	7/8"	5/8"	5269
94	W30X108	W30X124	7/8"	5/8"	5389
95	W30X108	W30X124	7/8"	5/8"	5389
96	W30X108	W33X130	7/8"	1/2"	5493
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98	W30X108	W33X130	7/8"	1/2"	5493
99	W30X108	W33X130	7/8"	1/2"	5493
100	W30X108	W33X141	7/8"	1/2"	5657
101	W30X108	W33X141	7/8"	1/2"	5657
102	W30X116	W33X130	7/8"	5/8"	5767
103	W30X116	W33X130	7/8"	5/8"	5767
104	W30X116	W33X130	7/8"	5/8"	5767
105	W30X116	W33X130	7/8"	5/8"	5767
106	W30X116	W33X130	7/8"	5/8"	5767

107	W30X116	W33X130	7/8"	5/8"	5767
108	W30X116	W33X130	7/8"	5/8"	5767
109	W30X116	W33X141	7/8"	5/8"	5931
110	W30X116	W33X141	7/8"	5/8"	5931
111	W30X116	W33X141	7/8"	5/8"	5931
112	W30X124	W33X130	1"	3/4"	6066
113	W30X124	W33X130	1"	3/4"	6066
114	W30X124	W33X130	1"	3/4"	6066
115	W30X124	W33X130	1"	3/4"	6066
116	W30X124	W33X130	1"	3/4"	6066
117	W30X124	W33X130	1"	3/4"	6066
118	W30X124	W33X152	1"	5/8"	6363
119	W30X124	W33X152	1"	5/8"	6363
120	W30X124	W33X152	1"	5/8"	6363
121	W30X124	W36X150	1"	5/8"	6372
122	W30X124	W36X150	1"	5/8"	6372
123	W30X124	W36X150	1"	5/8"	6372
124	W30X124	W36X150	1"	5/8"	6372
125	W33X130	W33X141	7/8"	3/4"	6406
126	W33X130	W33X141	7/8"	3/4"	6406
127	W33X130	W33X141	7/8"	3/4"	6406
128	W33X130	W33X141	7/8"	3/4"	6406
129	W33X130	W33X141	7/8"	3/4"	6406
130	W33X130	W33X141	7/8"	3/4"	6406
131	W33X130	W33X141	7/8"	3/4"	6406
132	W33X130	W33X141	7/8"	3/4"	6406
133	W33X130	W33X141	7/8"	3/4"	6406
134	W33X130	W33X141	7/8"	3/4"	6406
135	W33X130	W33X141	7/8"	3/4"	6406
136	W33X130	W33X141	7/8"	3/4"	6406
137	W33X130	W33X141	7/8"	3/4"	6406
138	W33X130	W33X141	7/8"	3/4"	6406
139	W33X130	W33X141	7/8"	3/4"	6406
140	W33X130	W33X141	7/8"	3/4"	6406
141	W33X130	W33X141	7/8"	3/4"	6406
142	W33X130	W33X141	7/8"	3/4"	6406
143	W33X130	W33X141	7/8"	3/4"	6406
144	W33X130	W36X150	7/8"	5/8"	6542
145	W33X130	W36X150	7/8"	5/8"	6542
146	W33X130	W36X150	7/8"	5/8"	6542
147	W33X130	W36X150	7/8"	5/8"	6542
148	W33X130	W36X150	7/8"	5/8"	6542
149	W33X130	W36X150	7/8"	5/8"	6542
150	W33X130	W36X160	7/8"	5/8"	6690
151	W33X130	W36X160	7/8"	5/8"	6690
152	W33X141	W36X150	1"	3/4"	6940
153	W33X141	W36X150	1"	3/4"	6940
154	W33X141	W36X150	1"	3/4"	6940
155	W33X141	W36X150	1"	3/4"	6940
156	W33X141	W36X150	1"	3/4"	6940
157	W33X141	W36X150	1"	3/4"	6940
158	W33X141	W36X150	1"	3/4"	6940
159	W33X141	W36X150	1"	3/4"	6940
160	W33X141	W36X150	1"	3/4"	6940
161	W33X141	W36X150	1"	3/4"	6940

162	W33X141	W36X150	1"	3/4"	6940
163	W33X141	W36X160	1"	3/4"	7089
164	W33X141	W36X160	1"	3/4"	7089
165	W33X141	W36X160	1"	3/4"	7089
166	W33X152	W36X160	1-1/8"	3/4"	7448
167	W33X152	W36X160	1-1/8"	3/4"	7448
168	W33X152	W36X160	1-1/8"	3/4"	7448
169	W33X152	W36X160	1-1/8"	3/4"	7448
170	W33X152	W36X160	1-1/8"	3/4"	7448
171	W33X152	W36X160	1-1/8"	3/4"	7448
172	W33X152	W36X160	1-1/8"	3/4"	7448
173	W33X152	W36X160	1-1/8"	3/4"	7448
174	W33X152	W36X160	1-1/8"	3/4"	7448
175	W33X152	W36X160	1-1/8"	3/4"	7448
176	W33X152	W36X160	1-1/8"	3/4"	7448
177	W33X152	W36X170	1-1/8"	3/4"	7598
178	W33X152	W36X170	1-1/8"	3/4"	7598
179	W33X152	W36X170	1-1/8"	3/4"	7598
180	W33X152	W36X170	1-1/8"	3/4"	7598
181	W33X152	W36X182	1-1/8"	3/4"	7778
182	W33X152	W36X182	1-1/8"	3/4"	7778
183	W33X152	W36X182	1-1/8"	3/4"	7778
184	W33X152	W36X210	1-1/8"	5/8"	8158
185	W33X152	W36X210	1-1/8"	5/8"	8158
186	W33X152	W36X210	1-1/8"	5/8"	8158
187	W33X152	W36X210	1-1/8"	5/8"	8158
188	W36X160	W30X191	1-1/8"	1"	8212
189	W36X160	W30X191	1-1/8"	1"	8212
190	W36X160	W30X191	1-1/8"	1"	8212
191	W36X160	W30X191	1-1/8"	1"	8212
192	W36X160	W30X191	1-1/8"	1"	8212
193	W36X160	W30X191	1-1/8"	1"	8212
194	W36X160	W30X191	1-1/8"	1"	8212
195	W36X160	W30X191	1-1/8"	1"	8212
196	W36X160	W30X191	1-1/8"	1"	8212
197	W36X160	W30X191	1-1/8"	1"	8212
198	W33X169	W36X182	1-1/4"	7/8"	8358
199	W33X169	W36X182	1-1/4"	7/8"	8358
200	W33X169	W36X182	1-1/4"	7/8"	8358
201	W33X169	W36X182	1-1/4"	7/8"	8358
202	W33X169	W36X182	1-1/4"	7/8"	8358
203	W36X160	W33X201	1-1/8"	7/8"	8396
204	W36X160	W33X201	1-1/8"	7/8"	8396
205	W36X160	W33X201	1-1/8"	7/8"	8396
206	W36X160	W33X201	1-1/8"	7/8"	8396
207	W36X160	W33X201	1-1/8"	7/8"	8396
208	W36X160	W33X201	1-1/8"	7/8"	8396
209	W36X170	W36X194	1-1/8"	3/4"	8517
210	W36X170	W36X194	1-1/8"	3/4"	8517
211	W36X170	W36X194	1-1/8"	3/4"	8517
212	W36X170	W36X194	1-1/8"	3/4"	8517
213	W36X170	W36X194	1-1/8"	3/4"	8517
214	W36X170	W36X194	1-1/8"	3/4"	8517
215	W36X170	W36X194	1-1/8"	3/4"	8517
216	W36X170	W36X194	1-1/8"	3/4"	8517

217	W36X170	W36X194	1-1/8"	3/4"	8517
218	W36X170	W36X194	1-1/8"	3/4"	8517
219	W36X170	W36X194	1-1/8"	3/4"	8517
220	W36X170	W36X194	1-1/8"	3/4"	8517
221	W36X170	W36X194	1-1/8"	3/4"	8517
222	W36X170	W36X194	1-1/8"	3/4"	8517
223	W36X170	W36X194	1-1/8"	3/4"	8517
224	W36X170	W36X194	1-1/8"	3/4"	8517
225	W36X170	W36X210	1-1/8"	3/4"	8758
226	W36X170	W36X210	1-1/8"	3/4"	8758
227	W36X170	W36X210	1-1/8"	3/4"	8758
228	W36X170	W36X210	1-1/8"	3/4"	8758
229	W36X170	W36X210	1-1/8"	3/4"	8758
230	W36X170	W36X210	1-1/8"	3/4"	8758
231	W36X170	W36X231	1-1/8"	3/4"	9168
232	W36X170	W36X231	1-1/8"	3/4"	9168
233	W36X182	W33X201	1-1/4"	1-1/8"	9172
234	W36X182	W33X201	1-1/4"	1-1/8"	9172
235	W36X182	W33X201	1-1/4"	1-1/8"	9172
236	W36X182	W33X201	1-1/4"	1-1/8"	9172
237	W36X182	W33X201	1-1/4"	1-1/8"	9172
238	W36X182	W36X210	1-1/4"	7/8"	9190
239	W36X182	W36X210	1-1/4"	7/8"	9190
240	W36X182	W36X210	1-1/4"	7/8"	9190
241	W36X182	W36X210	1-1/4"	7/8"	9190
242	W36X182	W36X210	1-1/4"	7/8"	9190
243	W36X182	W36X210	1-1/4"	7/8"	9190
244	W36X182	W36X210	1-1/4"	7/8"	9190
245	W36X182	W36X210	1-1/4"	7/8"	9190
246	W36X182	W36X231	1-1/4"	7/8"	9610
247	W36X182	W36X231	1-1/4"	7/8"	9610
248	W36X182	W36X231	1-1/4"	7/8"	9610
249	W36X182	W36X231	1-1/4"	7/8"	9610
250	W36X194	W36X210	1-3/8"	7/8"	9579
251	W36X194	W36X210	1-3/8"	7/8"	9579
252	W36X194	W36X210	1-3/8"	7/8"	9579
253	W36X194	W36X210	1-3/8"	7/8"	9579
254	W36X194	W36X210	1-3/8"	7/8"	9579
255	W36X194	W36X210	1-3/8"	7/8"	9579
256	W36X194	W36X210	1-3/8"	7/8"	9579
257	W36X194	W36X210	1-3/8"	7/8"	9579
258	W36X194	W36X231	1-3/8"	1"	10054
259	W36X194	W36X231	1-3/8"	1"	10054
260	W36X194	W36X231	1-3/8"	1"	10054
261	W36X194	W36X231	1-3/8"	1"	10054
262	W36X194	W36X231	1-3/8"	1"	10054
263	W36X194	W36X231	1-3/8"	1"	10054
264	W36X194	W36X231	1-3/8"	1"	10054
265	W36X194	W36X231	1-3/8"	1"	10054
266	W36X194	W36X247	1-3/8"	1"	10293
267	W36X194	W36X247	1-3/8"	1"	10293
268	W36X194	W36X247	1-3/8"	1"	10293
269	W36X194	W36X247	1-3/8"	1"	10293
270	W36X210	W33X241	1-3/8"	1-1/8"	10652
271	W36X210	W33X241	1-3/8"	1-1/8"	10652

272	W36X210	W33X241	1-3/8"	1-1/8"	10652
273	W36X210	W33X241	1-3/8"	1-1/8"	10652
274	W36X210	W33X241	1-3/8"	1-1/8"	10652
275	W36X210	W33X241	1-3/8"	1-1/8"	10652
276	W36X210	W33X241	1-3/8"	1-1/8"	10652
277	W36X210	W33X241	1-3/8"	1-1/8"	10652
278	W33X221	W36X231	1-3/8"	1-3/8"	10961
279	W36X210	W33X263	1-3/8"	1-1/8"	10977
280	W36X210	W33X263	1-3/8"	1-1/8"	10977
281	W36X210	W33X263	1-3/8"	1-1/8"	10977
282	W36X210	W33X263	1-3/8"	1-1/8"	10977
283	W36X210	W33X263	1-3/8"	1-1/8"	10977
284	W36X210	W33X263	1-3/8"	1-1/8"	10977
285	W36X210	W33X291	1-3/8"	1"	11356
286	W36X210	W33X291	1-3/8"	1"	11356
287	W36X210	W33X291	1-3/8"	1"	11356
288	W36X210	W33X291	1-3/8"	1"	11356
289	W36X232	W36X247	1-5/8"	1-1/4"	11604
290	W36X232	W36X247	1-5/8"	1-1/4"	11604
291	W36X232	W36X247	1-5/8"	1-1/4"	11604
292	W36X232	W36X247	1-5/8"	1-1/4"	11604
293	W36X232	W36X247	1-5/8"	1-1/4"	11604
294	W36X232	W36X247	1-5/8"	1-1/4"	11604
295	W36X232	W36X247	1-5/8"	1-1/4"	11604
296	W36X232	W36X247	1-5/8"	1-1/4"	11604
297	W36X232	W36X247	1-5/8"	1-1/4"	11604
298	W36X232	W36X247	1-5/8"	1-1/4"	11604
299	W36X232	W36X247	1-5/8"	1-1/4"	11604
300	W36X232	W36X247	1-5/8"	1-1/4"	11604

Table 2: Lightest RBS Design Table for 15 ft Story Height

30 ft Bay Width, Continuity Plates Allowed

Stiffness (k/in)	Beam	Column	Continuity Plate	Doubler Plate	Molecule Weight (lb)
10	W18X35	W21X83	1/2"	None	2339
11	W18X35	W21X83	1/2"	None	2339
12	W18X35	W21X83	1/2"	None	2339
13	W18X35	W24X94	1/2"	None	2515
14	W18X40	W21X93	5/8"	None	2650
15	W18X40	W24X94	5/8"	None	2678
16	W21X44	W27X102	1/2"	None	2918
17	W21X44	W27X102	1/2"	None	2918
18	W21X44	W27X102	1/2"	None	2918
19	W21X44	W27X102	1/2"	None	2918
20	W21X44	W27X102	1/2"	None	2918
21	W21X44	W27X102	1/2"	None	2918
22	W21X44	W30X108	1/2"	None	3020
23	W21X50	W30X108	5/8"	None	3220
24	W21X50	W30X108	5/8"	None	3220
25	W21X50	W30X108	5/8"	None	3220

26	W21X50	W33X130	5/8"	None	3572
27	W24X55	W30X124	5/8"	None	3610
28	W24X55	W30X124	5/8"	None	3610
29	W24X55	W30X124	5/8"	None	3610
30	W24X55	W30X124	5/8"	None	3610
31	W24X55	W30X124	5/8"	None	3610
32	W24X55	W30X124	5/8"	None	3610
33	W24X55	W30X124	5/8"	None	3610
34	W24X55	W30X132	5/8"	None	3729
35	W24X55	W30X148	None	None	3870
36	W24X55	W33X152	5/8"	None	4052
37	W24X62	W30X148	None	None	4080
38	W24X62	W30X148	None	None	4080
39	W24X62	W33X141	5/8"	None	4096
40	W24X62	W33X152	5/8"	None	4262
41	W24X62	W33X169	None	None	4395
42	W24X62	W36X170	5/8"	None	4546
43	W24X62	W36X182	None	None	4590
44	W24X76	W36X182	3/4"	None	5174
45	W24X76	W36X182	3/4"	None	5174
46	W24X76	W36X182	3/4"	None	5174
47	W24X76	W36X182	3/4"	None	5174
48	W24X76	W36X182	3/4"	None	5174
49	W24X76	W36X182	3/4"	None	5174
50	W24X76	W36X182	3/4"	None	5174
51	W24X76	W36X182	3/4"	None	5174
52	W24X76	W36X182	3/4"	None	5174
53	W24X76	W36X182	3/4"	None	5174
54	W24X76	W36X182	3/4"	None	5174
55	W24X76	W36X194	3/4"	None	5354
56	W24X84	W36X194	7/8"	None	5621
57	W24X84	W36X194	7/8"	None	5621
58	W24X84	W36X194	7/8"	None	5621
59	W24X84	W36X194	7/8"	None	5621
60	W24X84	W36X194	7/8"	None	5621
61	W24X84	W36X194	7/8"	None	5621
62	W24X84	W36X210	7/8"	None	5862
63	W24X94	W36X210	7/8"	None	6162
64	W24X94	W36X210	7/8"	None	6162
65	W24X94	W36X210	7/8"	None	6162
66	W24X94	W36X210	7/8"	None	6162
67	W24X94	W36X210	7/8"	None	6162
68	W24X94	W36X210	7/8"	None	6162
69	W24X94	W36X210	7/8"	None	6162
70	W27X94	W36X210	3/4"	None	6134
71	W27X94	W36X210	3/4"	None	6134
72	W27X94	W36X210	3/4"	None	6134
73	W27X94	W36X210	3/4"	None	6134
74	W27X94	W36X210	3/4"	None	6134
75	W27X94	W36X210	3/4"	None	6134
76	W27X94	W36X210	3/4"	None	6134
77	W27X94	W36X210	3/4"	None	6134
78	W27X94	W36X210	3/4"	None	6134
79	W27X94	W36X210	3/4"	None	6134
80	W27X94	W36X210	3/4"	None	6134

81	W27X94	W36X210	3/4"	None	6134
82	W27X94	W36X232	3/4"	None	6462
83	W27X94	W36X232	3/4"	None	6462
84	W27X102	W36X232	7/8"	None	6729
85	W27X102	W36X232	7/8"	None	6729
86	W27X102	W36X232	7/8"	None	6729
87	W27X102	W36X232	7/8"	None	6729
88	W27X102	W36X232	7/8"	None	6729
89	W27X102	W36X232	7/8"	None	6729
90	W27X102	W36X232	7/8"	None	6729
91	W27X102	W36X256	None	None	6900
92	W27X102	W36X256	None	None	6900
93	W30X108	W36X256	7/8"	None	7269
94	W30X108	W36X256	7/8"	None	7269
95	W30X108	W36X256	7/8"	None	7269
96	W30X108	W36X256	7/8"	None	7269
97	W30X108	W36X256	7/8"	None	7269
98	W30X108	W36X256	7/8"	None	7269
99	W30X108	W36X256	7/8"	None	7269
100	W30X108	W36X256	7/8"	None	7269
101	W30X108	W36X256	7/8"	None	7269
102	W30X108	W36X256	7/8"	None	7269
103	W30X108	W36X256	7/8"	None	7269
104	W30X108	W36X256	7/8"	None	7269
105	W30X108	W36X256	7/8"	None	7269
106	W30X108	W36X256	7/8"	None	7269
107	W30X108	W36X256	7/8"	None	7269
108	W30X108	W36X256	7/8"	None	7269
109	W30X108	W36X256	7/8"	None	7269
110	W30X108	W36X256	7/8"	None	7269
111	W30X108	W36X256	7/8"	None	7269
112	W30X116	W36X256	7/8"	None	7509
113	W30X116	W36X256	7/8"	None	7509
114	W30X116	W36X256	7/8"	None	7509
115	W30X116	W36X256	7/8"	None	7509
116	W30X116	W36X256	7/8"	None	7509
117	W30X116	W36X256	7/8"	None	7509
118	W30X116	W36X256	7/8"	None	7509
119	W30X116	W36X256	7/8"	None	7509
120	W30X116	W33X318	None	None	8250
121	W30X116	W36X330	None	None	8430
122	W30X116	W36X330	None	None	8430
123	W30X116	W36X330	None	None	8430
124	W30X116	W36X330	None	None	8430
125	W30X124	W33X318	None	None	8490
126	W30X124	W33X318	None	None	8490
127	W30X124	W33X318	None	None	8490
128	W30X124	W36X330	None	None	8670
129	W30X124	W36X330	None	None	8670
130	W30X124	W36X330	None	None	8670
131	W30X124	W36X330	None	None	8670
132	W30X124	W36X330	None	None	8670
133	W33X130	W24X335	None	None	8925
134	W33X130	W24X335	None	None	8925
135	W33X130	W24X335	None	None	8925

136	W33X130	W24X335	None	None	8925
137	W33X130	W24X335	None	None	8925
138	W33X130	W24X335	None	None	8925
139	W33X130	W24X335	None	None	8925
140	W33X130	W24X335	None	None	8925
141	W33X130	W24X335	None	None	8925
142	W33X130	W24X335	None	None	8925
143	W33X130	W24X335	None	None	8925
144	W33X130	W24X335	None	None	8925
145	W33X130	W27X336	None	None	8940
146	W33X130	W27X336	None	None	8940
147	W33X130	W27X336	None	None	8940
148	W33X130	W27X336	None	None	8940
149	W33X130	W36X330	7/8"	None	9113
150	W33X130	W36X330	7/8"	None	9113
151	W33X130	W36X330	7/8"	None	9113
152	W33X130	W36X330	7/8"	None	9113
153	W33X130	W36X330	7/8"	None	9113
154	W33X130	W36X330	7/8"	None	9113
155	W33X130	W36X330	7/8"	None	9113
156	W33X130	W36X330	7/8"	None	9113
157	W33X130	W36X330	7/8"	None	9113
158	W33X130	W36X330	7/8"	None	9113
159	W33X130	W36X330	7/8"	None	9113
160	W33X130	W33X354	None	None	9210
161	W33X130	W36X361	None	None	9315
162	W33X130	W36X361	None	None	9315
163	W33X130	W36X361	None	None	9315
164	W33X130	W36X361	None	None	9315
165	W33X141	W33X354	None	None	9540
166	W33X141	W33X354	None	None	9540
167	W33X141	W33X354	None	None	9540
168	W33X141	W33X354	None	None	9540
169	W33X141	W33X354	None	None	9540
170	W33X141	W33X354	None	None	9540
171	W33X141	W33X354	None	None	9540
172	W33X141	W33X354	None	None	9540
173	W33X141	W36X361	None	None	9645
174	W33X141	W36X361	None	None	9645
175	W33X141	W36X361	None	None	9645
176	W33X141	W36X361	None	None	9645
177	W33X141	W36X361	None	None	9645
178	W33X141	W33X387	None	None	10035
179	W33X141	W36X395	None	None	10155
180	W33X141	W36X395	None	None	10155
181	W33X141	W36X395	None	None	10155
182	W33X141	W36X395	None	None	10155
183	W33X141	W36X395	None	None	10155
184	W33X152	W33X387	None	None	10365
185	W33X152	W33X387	None	None	10365
186	W33X152	W33X387	None	None	10365
187	W33X152	W33X387	None	None	10365
188	W33X152	W33X387	None	None	10365
189	W33X152	W33X387	None	None	10365
190	W33X152	W33X387	None	None	10365

191	W33X152	W33X387	None	None	10365
192	W33X152	W36X395	None	None	10485
193	W33X152	W36X395	None	None	10485
194	W33X152	W36X395	None	None	10485
195	W33X152	W36X395	None	None	10485
196	W33X152	W36X395	None	None	10485
197	W36X160	W30X391	None	None	10665
198	W36X160	W30X391	None	None	10665
199	W36X160	W30X391	None	None	10665
200	W36X160	W30X391	None	None	10665
201	W36X160	W30X391	None	None	10665
202	W36X160	W30X391	None	None	10665
203	W36X160	W30X391	None	None	10665
204	W36X160	W30X391	None	None	10665
205	W36X160	W30X391	None	None	10665
206	W36X160	W30X391	None	None	10665
207	W36X160	W30X391	None	None	10665
208	W36X160	W30X391	None	None	10665
209	W36X160	W30X391	None	None	10665
210	W36X160	W30X391	None	None	10665
211	W36X160	W30X391	None	None	10665
212	W36X160	W30X391	None	None	10665
213	W36X160	W30X391	None	None	10665
214	W36X160	W30X391	None	None	10665
215	W36X160	W30X391	None	None	10665
216	W33X169	W36X441	None	None	11685
217	W33X169	W36X441	None	None	11685
218	W33X169	W36X441	None	None	11685
219	W33X169	W36X441	None	None	11685
220	W33X169	W36X441	None	None	11685
221	W33X169	W36X441	None	None	11685
222	W33X169	W36X441	None	None	11685
223	W33X169	W36X441	None	None	11685
224	W36X170	W36X441	None	None	11715
225	W36X170	W36X441	None	None	11715
226	W36X170	W36X441	None	None	11715
227	W36X170	W36X441	None	None	11715
228	W36X170	W36X441	None	None	11715
229	W36X170	W36X441	None	None	11715
230	W36X170	W36X441	None	None	11715
231	W36X170	W36X441	None	None	11715
232	W36X170	W36X441	None	None	11715
233	W36X170	W36X441	None	None	11715
234	W36X170	W36X441	None	None	11715
235	W36X170	W36X441	None	None	11715
236	W36X170	W36X441	None	None	11715
237	W36X170	W36X441	None	None	11715
238	W36X170	W36X441	None	None	11715
239	W36X170	W36X441	None	None	11715
240	W36X170	W36X441	None	None	11715
241	W36X170	W36X441	None	None	11715
242	W36X170	W36X441	None	None	11715
243	W36X170	W36X441	None	None	11715
244	W36X170	W36X441	None	None	11715
245	W36X170	W36X441	None	None	11715

246	W36X170	W36X441	None	None	11715
247	W36X170	W36X441	None	None	11715
248	W36X170	W36X441	None	None	11715
249	W36X170	W36X441	None	None	11715
250	W36X170	W36X487	None	None	12405
251	W36X170	W36X487	None	None	12405
252	W36X170	W36X487	None	None	12405
253	W36X170	W36X487	None	None	12405
254	W36X170	W36X487	None	None	12405
255	W36X170	W36X487	None	None	12405
256	W36X170	W36X487	None	None	12405
257	W36X170	W36X487	None	None	12405
258	W36X170	W36X487	None	None	12405
259	W36X170	W36X529	None	None	13035
260	W36X170	W36X529	None	None	13035
261	W36X170	W36X529	None	None	13035
262	W36X170	W36X529	None	None	13035
263	W36X170	W36X529	None	None	13035
264	W36X170	W36X529	None	None	13035
265	W36X194	W36X487	None	None	13125
266	W36X194	W36X487	None	None	13125
267	W36X194	W36X487	None	None	13125
268	W36X194	W36X487	None	None	13125
269	W36X194	W36X487	None	None	13125
270	W36X194	W36X487	None	None	13125
271	W36X194	W36X487	None	None	13125
272	W36X194	W36X487	None	None	13125
273	W36X194	W36X487	None	None	13125
274	W36X194	W36X487	None	None	13125
275	W36X194	W36X487	None	None	13125
276	W36X194	W36X487	None	None	13125
277	W36X194	W36X487	None	None	13125
278	W36X194	W36X487	None	None	13125
279	W36X194	W36X487	None	None	13125
280	W36X194	W36X487	None	None	13125
281	W36X194	W36X487	None	None	13125
282	W36X194	W36X487	None	None	13125
283	W36X194	W36X487	None	None	13125
284	W36X194	W36X487	None	None	13125
285	W36X194	W36X487	None	None	13125
286	W36X194	W36X487	None	None	13125
287	W36X210	W27X539	None	None	14385
288	W36X210	W27X539	None	None	14385
289	W36X210	W27X539	None	None	14385
290	W36X210	W27X539	None	None	14385
291	W36X210	W27X539	None	None	14385
292	W36X210	W27X539	None	None	14385
293	W36X210	W27X539	None	None	14385
294	W36X210	W27X539	None	None	14385
295	W36X231	W27X539	None	None	15015
296	W36X231	W27X539	None	None	15015
297	W36X231	W27X539	None	None	15015
298	W36X231	W27X539	None	None	15015
299	W36X231	W27X539	None	None	15015
300	W36X231	W27X539	None	None	15015

Table 3: Lightest RBS Design Table for 15 ft Story Height

30 ft Bay Width, Doubler Plates Allowed

Stiffness (k/in)	Beam	Column	Continuity Plate	Doubler Plate	Molecule Weight (lb)
10	W16X31	W24X103	None	None	2475
11	W16X31	W30X124	None	None	2790
12	W18X35	W18X119	None	None	2835
13	W18X40	W18X119	None	None	2985
14	W18X40	W18X119	None	None	2985
15	W18X40	W27X129	None	None	3135
16	W18X40	W27X129	None	None	3135
17	W21X44	W12X120	None	3/8"	3144
18	W21X44	W27X129	None	None	3255
19	W21X44	W27X129	None	None	3255
20	W21X44	W27X129	None	None	3255
21	W21X44	W27X129	None	None	3255
22	W21X44	W27X129	None	None	3255
23	W21X50	W27X129	None	None	3435
24	W21X50	W27X129	None	None	3435
25	W24X55	W18X130	None	3/16"	3621
26	W24X55	W18X130	None	3/16"	3621
27	W24X55	W18X130	None	3/16"	3621
28	W24X55	W18X130	None	3/16"	3621
29	W24X55	W18X130	None	3/16"	3621
30	W24X55	W18X143	None	3/16"	3816
31	W24X62	W18X130	None	3/8"	3853
32	W24X62	W18X130	None	3/8"	3853
33	W24X62	W18X130	None	3/8"	3853
34	W24X55	W30X148	None	None	3870
35	W24X55	W30X148	None	None	3870
36	W24X62	W30X148	None	None	4080
37	W24X62	W30X148	None	None	4080
38	W24X62	W30X148	None	None	4080
39	W24X62	W33X169	None	None	4395
40	W24X62	W33X169	None	None	4395
41	W24X62	W33X169	None	None	4395
42	W24X62	W36X182	None	None	4590
43	W24X62	W36X182	None	None	4590
44	W24X76	W18X175	None	1/4"	4933
45	W24X84	W18X175	None	3/8"	5188
46	W24X84	W18X175	None	3/8"	5188
47	W24X84	W18X175	None	3/8"	5188
48	W24X84	W18X175	None	3/8"	5188
49	W24X84	W18X175	None	3/8"	5188
50	W24X76	W24X207	None	3/16"	5414
51	W24X94	W18X175	None	5/8"	5517
52	W24X94	W18X175	None	5/8"	5517
53	W24X94	W18X175	None	5/8"	5517
54	W24X94	W18X175	None	5/8"	5517

55	W24X94	W18X175	None	5/8"	5517
56	W24X94	W18X192	None	1/2"	5758
57	W24X76	W36X232	None	None	5760
58	W27X94	W18X192	None	1/2"	5764
59	W27X94	W18X192	None	1/2"	5764
60	W27X94	W18X192	None	1/2"	5764
61	W27X94	W18X192	None	1/2"	5764
62	W27X94	W18X192	None	1/2"	5764
63	W27X94	W18X192	None	1/2"	5764
64	W27X94	W18X192	None	1/2"	5764
65	W27X94	W18X192	None	1/2"	5764
66	W27X94	W18X192	None	1/2"	5764
67	W27X102	W18X192	None	5/8"	6021
68	W27X102	W18X192	None	5/8"	6021
69	W27X102	W18X192	None	5/8"	6021
70	W27X102	W18X192	None	5/8"	6021
71	W27X102	W18X192	None	5/8"	6021
72	W27X94	W24X229	None	3/16"	6287
73	W27X94	W24X229	None	3/16"	6287
74	W27X94	W24X229	None	3/16"	6287
75	W27X114	W18X192	None	3/4"	6398
76	W27X114	W18X192	None	3/4"	6398
77	W27X114	W18X192	None	3/4"	6398
78	W27X114	W18X192	None	3/4"	6398
79	W30X108	W18X211	None	1/2"	6476
80	W30X108	W18X211	None	1/2"	6476
81	W30X108	W18X211	None	1/2"	6476
82	W30X108	W18X211	None	1/2"	6476
83	W30X108	W18X211	None	1/2"	6476
84	W30X108	W18X211	None	1/2"	6476
85	W30X108	W18X211	None	1/2"	6476
86	W30X108	W18X211	None	1/2"	6476
87	W30X116	W18X211	None	5/8"	6735
88	W30X116	W18X211	None	5/8"	6735
89	W30X116	W18X211	None	5/8"	6735
90	W30X116	W18X211	None	5/8"	6735
91	W30X116	W18X211	None	5/8"	6735
92	W30X116	W18X211	None	5/8"	6735
93	W30X116	W18X211	None	5/8"	6735
94	W30X124	W18X211	None	3/4"	6993
95	W30X124	W18X211	None	3/4"	6993
96	W30X124	W18X211	None	3/4"	6993
97	W30X124	W18X211	None	3/4"	6993
98	W30X124	W18X211	None	3/4"	6993
99	W30X124	W18X211	None	3/4"	6993
100	W30X108	W27X258	None	3/16"	7150
101	W30X108	W27X258	None	3/16"	7150
102	W30X108	W27X258	None	3/16"	7150
103	W30X132	W18X211	None	7/8"	7252
104	W30X132	W18X211	None	7/8"	7252
105	W30X132	W18X211	None	7/8"	7252
106	W30X116	W24X250	None	3/8"	7302
107	W30X116	W24X250	None	3/8"	7302
108	W30X116	W27X258	None	1/4"	7404
109	W30X116	W27X258	None	1/4"	7404

110	W30X116	W27X258	None	1/4"	7404
111	W30X116	W27X258	None	1/4"	7404
112	W33X130	W18X234	None	3/4"	7529
113	W33X130	W18X234	None	3/4"	7529
114	W33X130	W18X234	None	3/4"	7529
115	W33X130	W18X234	None	3/4"	7529
116	W33X130	W18X234	None	3/4"	7529
117	W33X130	W18X234	None	3/4"	7529
118	W33X130	W18X234	None	3/4"	7529
119	W33X130	W18X234	None	3/4"	7529
120	W33X130	W18X234	None	3/4"	7529
121	W33X130	W18X234	None	3/4"	7529
122	W33X130	W18X234	None	3/4"	7529
123	W33X130	W18X234	None	3/4"	7529
124	W33X141	W18X234	None	7/8"	7879
125	W33X141	W18X234	None	7/8"	7879
126	W33X141	W18X234	None	7/8"	7879
127	W33X141	W18X234	None	7/8"	7879
128	W33X141	W18X234	None	7/8"	7879
129	W33X141	W18X234	None	7/8"	7879
130	W33X141	W18X234	None	7/8"	7879
131	W33X141	W18X234	None	7/8"	7879
132	W33X141	W18X234	None	7/8"	7879
133	W33X130	W24X279	None	3/8"	8164
134	W33X130	W24X279	None	3/8"	8164
135	W33X130	W24X279	None	3/8"	8164
136	W33X130	W24X279	None	3/8"	8164
137	W33X130	W24X279	None	3/8"	8164
138	W33X130	W24X279	None	3/8"	8164
139	W33X130	W24X279	None	3/8"	8164
140	W33X130	W24X279	None	3/8"	8164
141	W33X130	W24X279	None	3/8"	8164
142	W33X130	W24X279	None	3/8"	8164
143	W33X130	W27X281	None	3/8"	8205
144	W33X130	W27X281	None	3/8"	8205
145	W33X130	W27X281	None	3/8"	8205
146	W33X130	W27X281	None	3/8"	8205
147	W33X130	W27X281	None	3/8"	8205
148	W33X130	W27X281	None	3/8"	8205
149	W36X150	W18X258	None	7/8"	8521
150	W36X150	W18X258	None	7/8"	8521
151	W36X150	W18X258	None	7/8"	8521
152	W36X150	W18X258	None	7/8"	8521
153	W36X150	W18X258	None	7/8"	8521
154	W36X150	W18X258	None	7/8"	8521
155	W36X150	W18X258	None	7/8"	8521
156	W36X150	W18X258	None	7/8"	8521
157	W36X150	W18X258	None	7/8"	8521
158	W36X150	W18X258	None	7/8"	8521
159	W36X150	W18X258	None	7/8"	8521
160	W36X150	W18X258	None	7/8"	8521
161	W33X141	W27X281	None	1/2"	8565
162	W33X141	W27X281	None	1/2"	8565
163	W36X150	W24X279	None	1/2"	8800
164	W36X150	W24X279	None	1/2"	8800

165	W36X150	W24X279	None	1/2"	8800
166	W36X150	W24X279	None	1/2"	8800
167	W36X150	W24X279	None	1/2"	8800
168	W36X150	W24X279	None	1/2"	8800
169	W36X150	W24X279	None	1/2"	8800
170	W36X150	W24X279	None	1/2"	8800
171	W36X150	W24X279	None	1/2"	8800
172	W36X150	W24X279	None	1/2"	8800
173	W36X150	W24X279	None	1/2"	8800
174	W36X150	W24X279	None	1/2"	8800
175	W36X150	W24X279	None	1/2"	8800
176	W36X150	W24X279	None	1/2"	8800
177	W36X150	W24X279	None	1/2"	8800
178	W36X150	W24X279	None	1/2"	8800
179	W36X150	W24X279	None	1/2"	8800
180	W36X150	W24X279	None	1/2"	8800
181	W36X150	W24X279	None	1/2"	8800
182	W36X160	W24X279	None	5/8"	9129
183	W36X160	W24X279	None	5/8"	9129
184	W36X160	W24X279	None	5/8"	9129
185	W36X160	W24X279	None	5/8"	9129
186	W36X160	W24X279	None	5/8"	9129
187	W36X160	W24X279	None	5/8"	9129
188	W36X160	W24X279	None	5/8"	9129
189	W36X160	W24X279	None	5/8"	9129
190	W36X160	W24X279	None	5/8"	9129
191	W36X160	W24X279	None	5/8"	9129
192	W36X160	W24X279	None	5/8"	9129
193	W36X170	W24X279	None	3/4"	9458
194	W36X170	W24X279	None	3/4"	9458
195	W36X170	W24X279	None	3/4"	9458
196	W36X170	W24X279	None	3/4"	9458
197	W36X170	W24X279	None	3/4"	9458
198	W36X170	W24X279	None	3/4"	9458
199	W36X170	W24X279	None	3/4"	9458
200	W36X170	W24X279	None	3/4"	9458
201	W36X170	W24X279	None	3/4"	9458
202	W36X170	W24X279	None	3/4"	9458
203	W36X170	W24X279	None	3/4"	9458
204	W36X170	W24X279	None	3/4"	9458
205	W36X160	W27X307	None	1/2"	9535
206	W36X160	W30X326	None	3/8"	9798
207	W36X160	W30X326	None	3/8"	9798
208	W36X160	W30X326	None	3/8"	9798
209	W36X160	W30X326	None	3/8"	9798
210	W36X160	W30X326	None	3/8"	9798
211	W36X160	W30X326	None	3/8"	9798
212	W36X160	W30X326	None	3/8"	9798
213	W36X160	W30X326	None	3/8"	9798
214	W36X160	W30X326	None	3/8"	9798
215	W36X170	W27X307	None	5/8"	9868
216	W36X170	W27X307	None	5/8"	9868
217	W36X170	W27X307	None	5/8"	9868
218	W36X170	W27X307	None	5/8"	9868
219	W36X170	W27X307	None	5/8"	9868

220	W36X182	W24X279	None	1"	9877
221	W36X170	W30X326	None	1/2"	10135
222	W36X170	W30X326	None	1/2"	10135
223	W36X170	W30X326	None	1/2"	10135
224	W36X170	W30X326	None	1/2"	10135
225	W36X170	W30X326	None	1/2"	10135
226	W36X170	W30X326	None	1/2"	10135
227	W36X170	W30X326	None	1/2"	10135
228	W36X170	W30X326	None	1/2"	10135
229	W36X170	W30X326	None	1/2"	10135
230	W36X182	W27X307	None	3/4"	10261
231	W36X182	W27X307	None	3/4"	10261
232	W36X182	W27X307	None	3/4"	10261
233	W36X182	W27X307	None	3/4"	10261
234	W36X170	W33X354	None	3/8"	10531
235	W36X170	W33X354	None	3/8"	10531
236	W36X170	W33X354	None	3/8"	10531
237	W36X170	W33X354	None	3/8"	10531
238	W36X170	W33X354	None	3/8"	10531
239	W36X170	W33X354	None	3/8"	10531
240	W36X170	W33X354	None	3/8"	10531
241	W36X182	W30X326	None	5/8"	10532
242	W36X182	W30X326	None	5/8"	10532
243	W36X182	W30X326	None	5/8"	10532
244	W36X182	W30X326	None	5/8"	10532
245	W36X182	W30X326	None	5/8"	10532
246	W36X182	W33X354	None	3/8"	10891
247	W36X182	W33X354	None	3/8"	10891
248	W36X182	W33X354	None	3/8"	10891
249	W36X182	W33X354	None	3/8"	10891
250	W36X182	W33X354	None	3/8"	10891
251	W36X182	W33X354	None	3/8"	10891
252	W36X182	W33X354	None	3/8"	10891
253	W36X182	W33X354	None	3/8"	10891
254	W36X210	W24X306	None	1-1/8"	11154
255	W36X182	W33X387	None	1/4"	11346
256	W36X182	W33X387	None	1/4"	11346
257	W36X194	W30X357	None	5/8"	11358
258	W36X194	W30X357	None	5/8"	11358
259	W36X194	W30X357	None	5/8"	11358
260	W36X194	W30X357	None	5/8"	11358
261	W36X194	W30X357	None	5/8"	11358
262	W36X194	W30X357	None	5/8"	11358
263	W36X194	W30X357	None	5/8"	11358
264	W36X194	W30X357	None	5/8"	11358
265	W36X210	W27X336	None	7/8"	11572
266	W36X210	W27X336	None	7/8"	11572
267	W36X210	W27X336	None	7/8"	11572
268	W36X210	W27X336	None	7/8"	11572
269	W36X210	W27X336	None	7/8"	11572
270	W36X210	W27X336	None	7/8"	11572
271	W36X210	W27X336	None	7/8"	11572
272	W36X194	W33X387	None	3/8"	11747
273	W36X194	W33X387	None	3/8"	11747
274	W36X210	W30X357	None	3/4"	11876

275	W36X210	W30X357	None	3/4"	11876
276	W36X210	W30X357	None	3/4"	11876
277	W36X210	W30X357	None	3/4"	11876
278	W36X210	W30X357	None	3/4"	11876
279	W36X210	W30X357	None	3/4"	11876
280	W36X210	W30X357	None	3/4"	11876
281	W36X210	W30X357	None	3/4"	11876
282	W36X210	W30X357	None	3/4"	11876
283	W36X210	W30X357	None	3/4"	11876
284	W36X210	W30X357	None	3/4"	11876
285	W36X210	W30X357	None	3/4"	11876
286	W36X210	W33X387	None	1/2"	12269
287	W36X210	W33X387	None	1/2"	12269
288	W36X210	W33X387	None	1/2"	12269
289	W36X210	W33X387	None	1/2"	12269
290	W36X210	W33X387	None	1/2"	12269
291	W36X210	W33X387	None	1/2"	12269
292	W36X210	W33X387	None	1/2"	12269
293	W36X210	W33X387	None	1/2"	12269
294	W36X210	W33X387	None	1/2"	12269
295	W36X210	W33X387	None	1/2"	12269
296	W36X210	W33X387	None	1/2"	12269
297	W36X232	W27X368	None	1"	12748
298	W36X232	W27X368	None	1"	12748
299	W36X232	W27X368	None	1"	12748
300	W36X232	W27X368	None	1"	12748

**Table 4: Lightest RBS Design Table for 15 ft Story Height
30 ft Bay Width, Both Plates Not Allowed**

Stiffness (k/in)	Beam	Column	Continuity Plate	Doubler Plate	Molecule Weight (lb)
10	W16X31	W24X103	None	None	2475
11	W16X31	W30X124	None	None	2790
12	W18X35	W18X119	None	None	2835
13	W18X40	W18X119	None	None	2985
14	W18X40	W18X119	None	None	2985
15	W18X40	W27X129	None	None	3135
16	W18X40	W27X129	None	None	3135
17	W21X44	W27X129	None	None	3255
18	W21X44	W27X129	None	None	3255
19	W21X44	W27X129	None	None	3255
20	W21X44	W27X129	None	None	3255
21	W21X44	W27X129	None	None	3255
22	W21X44	W27X129	None	None	3255
23	W21X50	W27X129	None	None	3435
24	W21X50	W27X129	None	None	3435
25	W21X50	W30X148	None	None	3720
26	W21X50	W30X148	None	None	3720
27	W24X55	W30X148	None	None	3870
28	W24X55	W30X148	None	None	3870

29	W24X55	W30X148	None	None	3870
30	W24X55	W30X148	None	None	3870
31	W24X55	W30X148	None	None	3870
32	W24X55	W30X148	None	None	3870
33	W24X55	W30X148	None	None	3870
34	W24X55	W30X148	None	None	3870
35	W24X55	W30X148	None	None	3870
36	W24X62	W30X148	None	None	4080
37	W24X62	W30X148	None	None	4080
38	W24X62	W30X148	None	None	4080
39	W24X62	W33X169	None	None	4395
40	W24X62	W33X169	None	None	4395
41	W24X62	W33X169	None	None	4395
42	W24X62	W36X182	None	None	4590
43	W24X62	W36X182	None	None	4590
44	W24X62	W36X210	None	None	5010
45	W24X76	W18X211	None	None	5445
46	W24X76	W27X217	None	None	5535
47	W24X76	W27X217	None	None	5535
48	W24X76	W27X217	None	None	5535
49	W24X76	W27X217	None	None	5535
50	W24X76	W27X217	None	None	5535
51	W24X76	W27X217	None	None	5535
52	W24X76	W36X232	None	None	5760
53	W24X76	W36X232	None	None	5760
54	W24X76	W36X232	None	None	5760
55	W24X76	W36X232	None	None	5760
56	W24X76	W36X232	None	None	5760
57	W24X76	W36X232	None	None	5760
58	W24X84	W36X232	None	None	6000
59	W24X84	W36X232	None	None	6000
60	W24X84	W36X232	None	None	6000
61	W24X84	W36X232	None	None	6000
62	W24X84	W36X232	None	None	6000
63	W24X84	W36X232	None	None	6000
64	W24X94	W36X232	None	None	6300
65	W24X94	W36X232	None	None	6300
66	W24X94	W36X232	None	None	6300
67	W24X94	W36X232	None	None	6300
68	W24X94	W36X232	None	None	6300
69	W24X94	W36X232	None	None	6300
70	W24X94	W36X232	None	None	6300
71	W27X94	W24X250	None	None	6570
72	W27X94	W24X250	None	None	6570
73	W27X94	W24X250	None	None	6570
74	W27X94	W36X256	None	None	6660
75	W27X94	W36X256	None	None	6660
76	W27X94	W36X256	None	None	6660
77	W27X94	W36X256	None	None	6660
78	W27X94	W36X256	None	None	6660
79	W27X94	W36X256	None	None	6660
80	W27X94	W36X256	None	None	6660
81	W27X94	W36X256	None	None	6660
82	W27X94	W36X256	None	None	6660
83	W27X94	W36X256	None	None	6660

84	W27X94	W36X256	None	None	6660
85	W27X94	W36X256	None	None	6660
86	W27X102	W36X256	None	None	6900
87	W27X102	W36X256	None	None	6900
88	W27X102	W36X256	None	None	6900
89	W27X102	W36X256	None	None	6900
90	W27X102	W36X256	None	None	6900
91	W27X102	W36X256	None	None	6900
92	W27X102	W36X256	None	None	6900
93	W27X114	W36X256	None	None	7260
94	W27X114	W36X256	None	None	7260
95	W27X114	W36X256	None	None	7260
96	W27X114	W36X256	None	None	7260
97	W27X114	W36X256	None	None	7260
98	W27X114	W36X256	None	None	7260
99	W27X114	W36X256	None	None	7260
100	W27X114	W36X256	None	None	7260
101	W27X114	W36X256	None	None	7260
102	W30X108	W30X292	None	None	7620
103	W30X108	W30X292	None	None	7620
104	W30X108	W30X292	None	None	7620
105	W30X108	W30X292	None	None	7620
106	W30X108	W33X318	None	None	8010
107	W30X108	W33X318	None	None	8010
108	W30X108	W33X318	None	None	8010
109	W30X108	W33X318	None	None	8010
110	W30X108	W33X318	None	None	8010
111	W30X108	W33X318	None	None	8010
112	W30X116	W27X307	None	None	8085
113	W30X108	W36X330	None	None	8190
114	W30X108	W36X330	None	None	8190
115	W30X116	W33X318	None	None	8250
116	W30X116	W33X318	None	None	8250
117	W30X116	W33X318	None	None	8250
118	W30X116	W33X318	None	None	8250
119	W30X116	W33X318	None	None	8250
120	W30X116	W33X318	None	None	8250
121	W30X116	W36X330	None	None	8430
122	W30X116	W36X330	None	None	8430
123	W30X116	W36X330	None	None	8430
124	W30X116	W36X330	None	None	8430
125	W30X124	W33X318	None	None	8490
126	W30X124	W33X318	None	None	8490
127	W30X124	W33X318	None	None	8490
128	W30X124	W36X330	None	None	8670
129	W30X124	W36X330	None	None	8670
130	W30X124	W36X330	None	None	8670
131	W30X124	W36X330	None	None	8670
132	W30X124	W36X330	None	None	8670
133	W33X130	W24X335	None	None	8925
134	W33X130	W24X335	None	None	8925
135	W33X130	W24X335	None	None	8925
136	W33X130	W24X335	None	None	8925
137	W33X130	W24X335	None	None	8925
138	W33X130	W24X335	None	None	8925

139	W33X130	W24X335	None	None	8925
140	W33X130	W24X335	None	None	8925
141	W33X130	W24X335	None	None	8925
142	W33X130	W24X335	None	None	8925
143	W33X130	W24X335	None	None	8925
144	W33X130	W24X335	None	None	8925
145	W33X130	W27X336	None	None	8940
146	W33X130	W27X336	None	None	8940
147	W33X130	W27X336	None	None	8940
148	W33X130	W27X336	None	None	8940
149	W33X130	W33X354	None	None	9210
150	W33X130	W33X354	None	None	9210
151	W33X130	W33X354	None	None	9210
152	W33X130	W33X354	None	None	9210
153	W33X130	W33X354	None	None	9210
154	W33X130	W33X354	None	None	9210
155	W33X130	W33X354	None	None	9210
156	W33X130	W33X354	None	None	9210
157	W33X130	W33X354	None	None	9210
158	W33X130	W33X354	None	None	9210
159	W33X130	W33X354	None	None	9210
160	W33X130	W33X354	None	None	9210
161	W33X130	W36X361	None	None	9315
162	W33X130	W36X361	None	None	9315
163	W33X130	W36X361	None	None	9315
164	W33X130	W36X361	None	None	9315
165	W33X141	W33X354	None	None	9540
166	W33X141	W33X354	None	None	9540
167	W33X141	W33X354	None	None	9540
168	W33X141	W33X354	None	None	9540
169	W33X141	W33X354	None	None	9540
170	W33X141	W33X354	None	None	9540
171	W33X141	W33X354	None	None	9540
172	W33X141	W33X354	None	None	9540
173	W33X141	W36X361	None	None	9645
174	W33X141	W36X361	None	None	9645
175	W33X141	W36X361	None	None	9645
176	W33X141	W36X361	None	None	9645
177	W33X141	W36X361	None	None	9645
178	W33X141	W33X387	None	None	10035
179	W33X141	W36X395	None	None	10155
180	W33X141	W36X395	None	None	10155
181	W33X141	W36X395	None	None	10155
182	W33X141	W36X395	None	None	10155
183	W33X141	W36X395	None	None	10155
184	W33X152	W33X387	None	None	10365
185	W33X152	W33X387	None	None	10365
186	W33X152	W33X387	None	None	10365
187	W33X152	W33X387	None	None	10365
188	W33X152	W33X387	None	None	10365
189	W33X152	W33X387	None	None	10365
190	W33X152	W33X387	None	None	10365
191	W33X152	W33X387	None	None	10365
192	W33X152	W36X395	None	None	10485
193	W33X152	W36X395	None	None	10485

194	W33X152	W36X395	None	None	10485
195	W33X152	W36X395	None	None	10485
196	W33X152	W36X395	None	None	10485
197	W36X160	W30X391	None	None	10665
198	W36X160	W30X391	None	None	10665
199	W36X160	W30X391	None	None	10665
200	W36X160	W30X391	None	None	10665
201	W36X160	W30X391	None	None	10665
202	W36X160	W30X391	None	None	10665
203	W36X160	W30X391	None	None	10665
204	W36X160	W30X391	None	None	10665
205	W36X160	W30X391	None	None	10665
206	W36X160	W30X391	None	None	10665
207	W36X160	W30X391	None	None	10665
208	W36X160	W30X391	None	None	10665
209	W36X160	W30X391	None	None	10665
210	W36X160	W30X391	None	None	10665
211	W36X160	W30X391	None	None	10665
212	W36X160	W30X391	None	None	10665
213	W36X160	W30X391	None	None	10665
214	W36X160	W30X391	None	None	10665
215	W36X160	W30X391	None	None	10665
216	W33X169	W36X441	None	None	11685
217	W33X169	W36X441	None	None	11685
218	W33X169	W36X441	None	None	11685
219	W33X169	W36X441	None	None	11685
220	W33X169	W36X441	None	None	11685
221	W33X169	W36X441	None	None	11685
222	W33X169	W36X441	None	None	11685
223	W33X169	W36X441	None	None	11685
224	W36X170	W36X441	None	None	11715
225	W36X170	W36X441	None	None	11715
226	W36X170	W36X441	None	None	11715
227	W36X170	W36X441	None	None	11715
228	W36X170	W36X441	None	None	11715
229	W36X170	W36X441	None	None	11715
230	W36X170	W36X441	None	None	11715
231	W36X170	W36X441	None	None	11715
232	W36X170	W36X441	None	None	11715
233	W36X170	W36X441	None	None	11715
234	W36X170	W36X441	None	None	11715
235	W36X170	W36X441	None	None	11715
236	W36X170	W36X441	None	None	11715
237	W36X170	W36X441	None	None	11715
238	W36X170	W36X441	None	None	11715
239	W36X170	W36X441	None	None	11715
240	W36X170	W36X441	None	None	11715
241	W36X170	W36X441	None	None	11715
242	W36X170	W36X441	None	None	11715
243	W36X170	W36X441	None	None	11715
244	W36X170	W36X441	None	None	11715
245	W36X170	W36X441	None	None	11715
246	W36X170	W36X441	None	None	11715
247	W36X170	W36X441	None	None	11715
248	W36X170	W36X441	None	None	11715

249	W36X170	W36X441	None	None	11715
250	W36X170	W36X487	None	None	12405
251	W36X170	W36X487	None	None	12405
252	W36X170	W36X487	None	None	12405
253	W36X170	W36X487	None	None	12405
254	W36X170	W36X487	None	None	12405
255	W36X170	W36X487	None	None	12405
256	W36X170	W36X487	None	None	12405
257	W36X170	W36X487	None	None	12405
258	W36X170	W36X487	None	None	12405
259	W36X170	W36X529	None	None	13035
260	W36X170	W36X529	None	None	13035
261	W36X170	W36X529	None	None	13035
262	W36X170	W36X529	None	None	13035
263	W36X170	W36X529	None	None	13035
264	W36X170	W36X529	None	None	13035
265	W36X194	W36X487	None	None	13125
266	W36X194	W36X487	None	None	13125
267	W36X194	W36X487	None	None	13125
268	W36X194	W36X487	None	None	13125
269	W36X194	W36X487	None	None	13125
270	W36X194	W36X487	None	None	13125
271	W36X194	W36X487	None	None	13125
272	W36X194	W36X487	None	None	13125
273	W36X194	W36X487	None	None	13125
274	W36X194	W36X487	None	None	13125
275	W36X194	W36X487	None	None	13125
276	W36X194	W36X487	None	None	13125
277	W36X194	W36X487	None	None	13125
278	W36X194	W36X487	None	None	13125
279	W36X194	W36X487	None	None	13125
280	W36X194	W36X487	None	None	13125
281	W36X194	W36X487	None	None	13125
282	W36X194	W36X487	None	None	13125
283	W36X194	W36X487	None	None	13125
284	W36X194	W36X487	None	None	13125
285	W36X194	W36X487	None	None	13125
286	W36X194	W36X487	None	None	13125
287	W36X210	W27X539	None	None	14385
288	W36X210	W27X539	None	None	14385
289	W36X210	W27X539	None	None	14385
290	W36X210	W27X539	None	None	14385
291	W36X210	W27X539	None	None	14385
292	W36X210	W27X539	None	None	14385
293	W36X210	W27X539	None	None	14385
294	W36X210	W27X539	None	None	14385
295	W36X231	W27X539	None	None	15015
296	W36X231	W27X539	None	None	15015
297	W36X231	W27X539	None	None	15015
298	W36X231	W27X539	None	None	15015
299	W36X231	W27X539	None	None	15015
300	W36X231	W27X539	None	None	15015

Table 5: Lightest RBS Design Table for 15 ft Story Height

25 ft Bay Width, Both Plates Allowed

Stiffness (k/in)	Beam	Column	Continuity Plate	Doubler Plate	Molecule Weight (lb)
10	W16X31	W21X44	1/2"	3/16"	1486
11	W18X35	W18X40	1/2"	3/8"	1534
12	W18X35	W18X40	1/2"	3/8"	1534
13	W18X35	W21X44	1/2"	1/4"	1594
14	W18X40	W21X44	5/8"	3/8"	1741
15	W18X40	W21X44	5/8"	3/8"	1741
16	W18X40	W24X55	5/8"	3/16"	1899
17	W21X44	W21X50	1/2"	3/8"	1928
18	W21X44	W21X50	1/2"	3/8"	1928
19	W21X44	W21X50	1/2"	3/8"	1928
20	W21X44	W21X50	1/2"	3/8"	1928
21	W21X44	W24X55	1/2"	1/4"	2001
22	W21X44	W24X62	1/2"	1/4"	2105
23	W21X50	W24X55	5/8"	3/8"	2178
24	W21X50	W24X55	5/8"	3/8"	2178
25	W21X50	W24X62	5/8"	3/8"	2283
26	W21X57	W24X62	3/4"	1/2"	2486
27	W21X57	W24X62	3/4"	1/2"	2486
28	W21X57	W24X62	3/4"	1/2"	2486
29	W21X57	W24X62	3/4"	1/2"	2486
30	W24X55	W21X68	5/8"	1/2"	2516
31	W24X55	W21X68	5/8"	1/2"	2516
32	W24X55	W21X73	5/8"	1/2"	2591
33	W24X55	W24X76	5/8"	3/8"	2640
34	W24X55	W24X76	5/8"	3/8"	2640
35	W24X55	W24X84	5/8"	3/8"	2760
36	W24X62	W24X76	5/8"	1/2"	2834
37	W24X62	W24X76	5/8"	1/2"	2834
38	W24X62	W24X76	5/8"	1/2"	2834
39	W24X62	W24X84	5/8"	3/8"	2935
40	W24X62	W24X94	5/8"	3/8"	3085
41	W24X62	W27X94	5/8"	3/8"	3110
42	W24X62	W27X94	5/8"	3/8"	3110
43	W24X62	W30X108	5/8"	3/16"	3305
44	W24X62	W30X108	5/8"	3/16"	3305
45	W24X62	W30X116	5/8"	3/16"	3425
46	W24X76	W24X94	3/4"	5/8"	3488
47	W24X76	W24X94	3/4"	5/8"	3488
48	W24X76	W24X94	3/4"	5/8"	3488
49	W24X76	W24X94	3/4"	5/8"	3488
50	W24X76	W24X94	3/4"	5/8"	3488
51	W24X76	W24X94	3/4"	5/8"	3488
52	W24X76	W27X94	3/4"	1/2"	3499

53	W24X76	W27X94	3/4"	1/2"	3499
54	W24X76	W27X102	3/4"	1/2"	3619
55	W24X76	W30X108	3/4"	3/8"	3712
56	W24X76	W30X108	3/4"	3/8"	3712
57	W24X76	W30X108	3/4"	3/8"	3712
58	W24X84	W27X94	7/8"	5/8"	3738
59	W24X84	W27X94	7/8"	5/8"	3738
60	W24X84	W27X102	7/8"	5/8"	3858
61	W24X84	W30X108	7/8"	1/2"	3956
62	W24X84	W30X108	7/8"	1/2"	3956
63	W24X84	W30X108	7/8"	1/2"	3956
64	W24X84	W30X116	7/8"	1/2"	4076
65	W24X84	W30X116	7/8"	1/2"	4076
66	W24X94	W27X102	7/8"	3/4"	4131
67	W24X94	W27X102	7/8"	3/4"	4131
68	W24X94	W30X108	7/8"	5/8"	4231
69	W24X94	W30X108	7/8"	5/8"	4231
70	W24X94	W30X108	7/8"	5/8"	4231
71	W24X94	W30X108	7/8"	5/8"	4231
72	W27X94	W30X108	3/4"	5/8"	4225
73	W27X94	W30X108	3/4"	5/8"	4225
74	W27X94	W30X108	3/4"	5/8"	4225
75	W27X94	W30X108	3/4"	5/8"	4225
76	W27X94	W30X108	3/4"	5/8"	4225
77	W27X94	W30X108	3/4"	5/8"	4225
78	W27X94	W30X108	3/4"	5/8"	4225
79	W27X94	W30X108	3/4"	5/8"	4225
80	W27X94	W30X108	3/4"	5/8"	4225
81	W27X94	W30X108	3/4"	5/8"	4225
82	W27X94	W30X108	3/4"	5/8"	4225
83	W27X94	W30X116	3/4"	5/8"	4345
84	W27X94	W30X116	3/4"	5/8"	4345
85	W27X102	W30X108	7/8"	3/4"	4473
86	W27X102	W30X108	7/8"	3/4"	4473
87	W27X102	W30X108	7/8"	3/4"	4473
88	W27X102	W30X108	7/8"	3/4"	4473
89	W27X102	W30X108	7/8"	3/4"	4473
90	W27X102	W30X108	7/8"	3/4"	4473
91	W27X102	W30X124	7/8"	5/8"	4686
92	W27X102	W30X124	7/8"	5/8"	4686
93	W27X102	W33X130	7/8"	1/2"	4791
94	W27X102	W33X130	7/8"	1/2"	4791
95	W27X102	W33X130	7/8"	1/2"	4791
96	W27X102	W33X130	7/8"	1/2"	4791
97	W27X102	W33X141	7/8"	1/2"	4955
98	W27X102	W33X141	7/8"	1/2"	4955
99	W27X114	W30X124	1"	3/4"	5034
100	W27X114	W30X124	1"	3/4"	5034
101	W27X114	W30X124	1"	3/4"	5034
102	W27X102	W36X150	7/8"	3/8"	5090
103	W27X114	W33X130	1"	5/8"	5146
104	W27X114	W33X130	1"	5/8"	5146
105	W27X114	W33X130	1"	5/8"	5146
106	W27X114	W33X130	1"	5/8"	5146
107	W27X114	W33X130	1"	5/8"	5146

108	W30X116	W30X132	7/8"	3/4"	5199
109	W30X116	W30X132	7/8"	3/4"	5199
110	W30X116	W30X132	7/8"	3/4"	5199
111	W30X116	W30X132	7/8"	3/4"	5199
112	W30X116	W30X132	7/8"	3/4"	5199
113	W30X116	W30X132	7/8"	3/4"	5199
114	W30X116	W30X132	7/8"	3/4"	5199
115	W30X116	W30X132	7/8"	3/4"	5199
116	W30X116	W30X132	7/8"	3/4"	5199
117	W30X116	W30X132	7/8"	3/4"	5199
118	W30X116	W30X132	7/8"	3/4"	5199
119	W30X116	W30X132	7/8"	3/4"	5199
120	W30X116	W30X132	7/8"	3/4"	5199
121	W30X116	W30X148	7/8"	5/8"	5409
122	W30X116	W30X148	7/8"	5/8"	5409
123	W30X124	W33X130	1"	3/4"	5446
124	W30X124	W33X130	1"	3/4"	5446
125	W30X124	W33X130	1"	3/4"	5446
126	W30X124	W33X130	1"	3/4"	5446
127	W30X124	W33X130	1"	3/4"	5446
128	W30X124	W33X130	1"	3/4"	5446
129	W30X124	W33X130	1"	3/4"	5446
130	W30X124	W33X130	1"	3/4"	5446
131	W30X124	W33X130	1"	3/4"	5446
132	W30X124	W33X130	1"	3/4"	5446
133	W30X124	W33X130	1"	3/4"	5446
134	W30X124	W33X130	1"	3/4"	5446
135	W30X124	W33X141	1"	3/4"	5610
136	W30X124	W33X141	1"	3/4"	5610
137	W30X124	W33X141	1"	3/4"	5610
138	W30X124	W36X150	1"	5/8"	5752
139	W30X124	W36X150	1"	5/8"	5752
140	W30X124	W36X150	1"	5/8"	5752
141	W30X124	W36X150	1"	5/8"	5752
142	W30X124	W36X150	1"	5/8"	5752
143	W30X124	W36X150	1"	5/8"	5752
144	W30X124	W36X160	1"	5/8"	5900
145	W30X124	W36X160	1"	5/8"	5900
146	W30X132	W36X150	1"	5/8"	5952
147	W30X132	W36X150	1"	5/8"	5952
148	W30X132	W36X150	1"	5/8"	5952
149	W30X132	W36X150	1"	5/8"	5952
150	W30X132	W36X150	1"	5/8"	5952
151	W30X132	W36X160	1"	5/8"	6101
152	W30X132	W36X160	1"	5/8"	6101
153	W30X132	W36X170	1"	5/8"	6251
154	W30X132	W36X170	1"	5/8"	6251
155	W30X132	W36X170	1"	5/8"	6251
156	W30X148	W36X150	1-1/4"	7/8"	6483
157	W30X148	W36X150	1-1/4"	7/8"	6483
158	W30X148	W36X150	1-1/4"	7/8"	6483
159	W30X148	W36X150	1-1/4"	7/8"	6483
160	W30X148	W36X150	1-1/4"	7/8"	6483
161	W30X148	W36X150	1-1/4"	7/8"	6483
162	W30X148	W36X150	1-1/4"	7/8"	6483

163	W30X148	W36X150	1-1/4"	7/8"	6483
164	W30X148	W36X150	1-1/4"	7/8"	6483
165	W30X148	W36X150	1-1/4"	7/8"	6483
166	W30X148	W36X150	1-1/4"	7/8"	6483
167	W30X148	W36X150	1-1/4"	7/8"	6483
168	W30X148	W36X150	1-1/4"	7/8"	6483
169	W30X148	W36X150	1-1/4"	7/8"	6483
170	W30X148	W36X150	1-1/4"	7/8"	6483
171	W30X148	W36X150	1-1/4"	7/8"	6483
172	W30X148	W36X150	1-1/4"	7/8"	6483
173	W30X148	W36X170	1-1/4"	3/4"	6745
174	W30X148	W36X170	1-1/4"	3/4"	6745
175	W30X148	W36X170	1-1/4"	3/4"	6745
176	W30X148	W36X182	1-1/4"	3/4"	6925
177	W30X148	W36X182	1-1/4"	3/4"	6925
178	W30X148	W36X182	1-1/4"	3/4"	6925
179	W30X148	W36X182	1-1/4"	3/4"	6925
180	W30X148	W36X210	1-1/4"	5/8"	7309
181	W30X148	W36X210	1-1/4"	5/8"	7309
182	W30X148	W36X210	1-1/4"	5/8"	7309
183	W30X148	W36X210	1-1/4"	5/8"	7309
184	W30X173	W36X182	1-1/8"	1"	7594
185	W30X173	W36X182	1-1/8"	1"	7594
186	W30X173	W36X182	1-1/8"	1"	7594
187	W30X173	W36X182	1-1/8"	1"	7594
188	W30X173	W36X182	1-1/8"	1"	7594
189	W30X173	W36X182	1-1/8"	1"	7594
190	W30X173	W36X182	1-1/8"	1"	7594
191	W30X173	W36X182	1-1/8"	1"	7594
192	W30X173	W36X182	1-1/8"	1"	7594
193	W30X173	W36X182	1-1/8"	1"	7594
194	W30X173	W36X182	1-1/8"	1"	7594
195	W30X173	W36X182	1-1/8"	1"	7594
196	W30X173	W36X182	1-1/8"	1"	7594
197	W30X173	W36X182	1-1/8"	1"	7594
198	W30X173	W36X182	1-1/8"	1"	7594
199	W30X173	W36X182	1-1/8"	1"	7594
200	W30X173	W36X182	1-1/8"	1"	7594
201	W30X173	W36X182	1-1/8"	1"	7594
202	W30X173	W36X182	1-1/8"	1"	7594
203	W30X173	W36X182	1-1/8"	1"	7594
204	W30X173	W36X182	1-1/8"	1"	7594
205	W30X173	W36X182	1-1/8"	1"	7594
206	W30X173	W36X182	1-1/8"	1"	7594
207	W30X173	W36X182	1-1/8"	1"	7594
208	W30X173	W36X182	1-1/8"	1"	7594
209	W30X173	W36X182	1-1/8"	1"	7594
210	W30X173	W36X194	1-1/8"	1"	7774
211	W30X173	W36X194	1-1/8"	1"	7774
212	W30X173	W36X194	1-1/8"	1"	7774
213	W30X173	W36X194	1-1/8"	1"	7774
214	W30X173	W36X210	1-1/8"	7/8"	7978
215	W30X173	W36X210	1-1/8"	7/8"	7978
216	W30X173	W36X231	1-1/8"	1"	8424
217	W30X173	W36X231	1-1/8"	1"	8424

218	W30X173	W36X231	1-1/8"	1"	8424
219	W30X173	W36X231	1-1/8"	1"	8424
220	W30X173	W36X231	1-1/8"	1"	8424
221	W30X173	W36X231	1-1/8"	1"	8424
222	W30X191	W33X201	1-1/4"	1-3/8"	8499
223	W30X191	W33X201	1-1/4"	1-3/8"	8499
224	W30X191	W33X201	1-1/4"	1-3/8"	8499
225	W30X191	W33X201	1-1/4"	1-3/8"	8499
226	W30X191	W33X201	1-1/4"	1-3/8"	8499
227	W30X191	W33X201	1-1/4"	1-3/8"	8499
228	W30X191	W33X201	1-1/4"	1-3/8"	8499
229	W30X191	W33X201	1-1/4"	1-3/8"	8499
230	W30X191	W36X210	1-1/4"	1-1/8"	8532
231	W30X191	W36X210	1-1/4"	1-1/8"	8532
232	W30X191	W36X210	1-1/4"	1-1/8"	8532
233	W30X191	W36X210	1-1/4"	1-1/8"	8532
234	W30X191	W36X210	1-1/4"	1-1/8"	8532
235	W30X191	W36X210	1-1/4"	1-1/8"	8532
236	W30X191	W36X210	1-1/4"	1-1/8"	8532
237	W30X191	W36X210	1-1/4"	1-1/8"	8532
238	W30X191	W36X210	1-1/4"	1-1/8"	8532
239	W30X191	W36X231	1-1/4"	1-1/8"	8952
240	W30X191	W36X231	1-1/4"	1-1/8"	8952
241	W30X191	W36X231	1-1/4"	1-1/8"	8952
242	W30X191	W36X231	1-1/4"	1-1/8"	8952
243	W30X191	W36X247	1-1/4"	1-1/8"	9191
244	W30X191	W36X247	1-1/4"	1-1/8"	9191
245	W30X191	W36X247	1-1/4"	1-1/8"	9191
246	W30X191	W36X247	1-1/4"	1-1/8"	9191
247	W30X191	W36X247	1-1/4"	1-1/8"	9191
248	W30X211	W33X221	1-3/8"	1-1/2"	9369
249	W30X211	W33X221	1-3/8"	1-1/2"	9369
250	W30X211	W33X221	1-3/8"	1-1/2"	9369
251	W30X211	W33X221	1-3/8"	1-1/2"	9369
252	W30X211	W33X221	1-3/8"	1-1/2"	9369
253	W30X211	W33X221	1-3/8"	1-1/2"	9369
254	W30X211	W33X221	1-3/8"	1-1/2"	9369
255	W30X211	W36X231	1-3/8"	1-3/8"	9566
256	W30X211	W36X231	1-3/8"	1-3/8"	9566
257	W30X211	W36X231	1-3/8"	1-3/8"	9566
258	W30X211	W36X231	1-3/8"	1-3/8"	9566
259	W30X211	W36X231	1-3/8"	1-3/8"	9566
260	W30X211	W36X231	1-3/8"	1-3/8"	9566
261	W30X211	W36X231	1-3/8"	1-3/8"	9566
262	W30X211	W36X231	1-3/8"	1-3/8"	9566
263	W30X211	W36X231	1-3/8"	1-3/8"	9566
264	W30X211	W36X231	1-3/8"	1-3/8"	9566
265	W30X211	W36X231	1-3/8"	1-3/8"	9566
266	W30X211	W36X231	1-3/8"	1-3/8"	9566
267	W30X211	W36X231	1-3/8"	1-3/8"	9566
268	W30X211	W36X247	1-3/8"	1-1/4"	9769
269	W30X211	W36X262	1-3/8"	1-1/4"	9996
270	W30X211	W36X262	1-3/8"	1-1/4"	9996
271	W30X211	W36X262	1-3/8"	1-1/4"	9996
272	W30X211	W36X262	1-3/8"	1-1/4"	9996

273	W30X235	W36X231	1-1/2"	1-1/2"	10247
274	W30X235	W36X231	1-1/2"	1-1/2"	10247
275	W30X235	W36X231	1-1/2"	1-1/2"	10247
276	W30X235	W36X231	1-1/2"	1-1/2"	10247
277	W30X235	W36X231	1-1/2"	1-1/2"	10247
278	W30X235	W36X231	1-1/2"	1-1/2"	10247
279	W30X235	W36X231	1-1/2"	1-1/2"	10247
280	W30X235	W36X231	1-1/2"	1-1/2"	10247
281	W30X235	W36X231	1-1/2"	1-1/2"	10247
282	W30X235	W36X231	1-1/2"	1-1/2"	10247
283	W30X235	W36X231	1-1/2"	1-1/2"	10247
284	W30X235	W36X231	1-1/2"	1-1/2"	10247
285	W30X235	W36X231	1-1/2"	1-1/2"	10247
286	W30X235	W36X231	1-1/2"	1-1/2"	10247
287	W30X235	W36X231	1-1/2"	1-1/2"	10247
288	W30X235	W36X231	1-1/2"	1-1/2"	10247
289	W30X235	W36X231	1-1/2"	1-1/2"	10247
290	W30X235	W36X231	1-1/2"	1-1/2"	10247
291	W30X235	W36X231	1-1/2"	1-1/2"	10247
292	W30X235	W36X231	1-1/2"	1-1/2"	10247
293	W30X235	W36X231	1-1/2"	1-1/2"	10247
294	W30X235	W36X231	1-1/2"	1-1/2"	10247
295	W30X235	W36X247	1-1/2"	1-1/2"	10487
296	W30X235	W36X247	1-1/2"	1-1/2"	10487
297	W30X235	W36X247	1-1/2"	1-1/2"	10487
298	W30X235	W36X247	1-1/2"	1-1/2"	10487
299	W30X235	W36X247	1-1/2"	1-1/2"	10487
300	W30X235	W36X262	1-1/2"	1-3/8"	10676

Table 6: Lightest RBS Design Table for 15 ft Story Height

25 ft Bay Width, Continuity Plates Allowed

Stiffness (k/in)	Beam	Column	Continuity Plate	Doubler Plate	Molecule Weight (lb)
10	W16X31	W24X76	1/2"	None	1970
11	W16X31	W24X76	1/2"	None	1970
12	W18X35	W21X83	1/2"	None	2164
13	W18X35	W21X83	1/2"	None	2164
14	W18X35	W21X83	1/2"	None	2164
15	W18X35	W24X94	1/2"	None	2340
16	W18X40	W21X93	5/8"	None	2450
17	W18X40	W21X93	5/8"	None	2450
18	W18X40	W27X94	5/8"	None	2496
19	W18X40	W30X108	5/8"	None	2720
20	W21X44	W30X108	1/2"	None	2800
21	W21X44	W30X108	1/2"	None	2800
22	W21X44	W30X108	1/2"	None	2800
23	W21X44	W30X108	1/2"	None	2800
24	W21X44	W30X108	1/2"	None	2800
25	W21X44	W30X108	1/2"	None	2800
26	W21X44	W30X108	1/2"	None	2800

27	W21X50	W30X116	5/8"	None	3090
28	W21X50	W30X116	5/8"	None	3090
29	W21X50	W30X116	5/8"	None	3090
30	W21X50	W30X124	5/8"	None	3210
31	W21X50	W33X130	5/8"	None	3322
32	W24X55	W30X124	5/8"	None	3335
33	W24X55	W30X124	5/8"	None	3335
34	W24X55	W30X124	5/8"	None	3335
35	W24X55	W30X124	5/8"	None	3335
36	W24X55	W30X124	5/8"	None	3335
37	W24X55	W30X124	5/8"	None	3335
38	W24X55	W30X124	5/8"	None	3335
39	W24X55	W30X124	5/8"	None	3335
40	W24X55	W30X132	5/8"	None	3454
41	W24X55	W30X148	None	None	3595
42	W24X62	W30X148	None	None	3770
43	W24X62	W30X148	None	None	3770
44	W24X62	W30X148	None	None	3770
45	W24X62	W30X148	None	None	3770
46	W24X62	W33X141	5/8"	None	3786
47	W24X62	W33X152	5/8"	None	3952
48	W24X62	W33X169	None	None	4085
49	W24X62	W36X160	5/8"	None	4087
50	W24X62	W36X170	5/8"	None	4236
51	W24X62	W36X182	None	None	4280
52	W24X76	W36X182	3/4"	None	4794
53	W24X76	W36X182	3/4"	None	4794
54	W24X76	W36X182	3/4"	None	4794
55	W24X76	W36X182	3/4"	None	4794
56	W24X76	W36X182	3/4"	None	4794
57	W24X76	W36X182	3/4"	None	4794
58	W24X76	W36X182	3/4"	None	4794
59	W24X76	W36X182	3/4"	None	4794
60	W24X76	W36X182	3/4"	None	4794
61	W24X76	W36X182	3/4"	None	4794
62	W24X76	W36X182	3/4"	None	4794
63	W24X76	W36X182	3/4"	None	4794
64	W24X76	W36X182	3/4"	None	4794
65	W24X76	W36X194	3/4"	None	4974
66	W24X84	W36X194	7/8"	None	5201
67	W24X84	W36X194	7/8"	None	5201
68	W24X84	W36X194	7/8"	None	5201
69	W24X84	W36X194	7/8"	None	5201
70	W24X84	W36X194	7/8"	None	5201
71	W24X84	W36X194	7/8"	None	5201
72	W24X84	W36X210	7/8"	None	5442
73	W24X84	W36X210	7/8"	None	5442
74	W24X94	W36X210	7/8"	None	5692
75	W24X94	W36X210	7/8"	None	5692
76	W24X94	W36X210	7/8"	None	5692
77	W24X94	W36X210	7/8"	None	5692
78	W24X94	W36X210	7/8"	None	5692
79	W24X94	W36X210	7/8"	None	5692
80	W24X94	W36X210	7/8"	None	5692
81	W24X94	W36X232	None	None	5830

82	W24X94	W36X232	None	None	5830
83	W27X94	W36X232	3/4"	None	5992
84	W27X94	W36X232	3/4"	None	5992
85	W27X94	W36X232	3/4"	None	5992
86	W27X94	W36X232	3/4"	None	5992
87	W27X94	W36X232	3/4"	None	5992
88	W27X94	W36X232	3/4"	None	5992
89	W27X94	W36X232	3/4"	None	5992
90	W27X94	W36X232	3/4"	None	5992
91	W27X94	W36X232	3/4"	None	5992
92	W27X94	W36X232	3/4"	None	5992
93	W27X94	W36X232	3/4"	None	5992
94	W27X94	W36X232	3/4"	None	5992
95	W27X94	W36X232	3/4"	None	5992
96	W27X94	W36X232	3/4"	None	5992
97	W27X94	W36X232	3/4"	None	5992
98	W27X94	W36X256	None	None	6190
99	W27X94	W36X256	None	None	6190
100	W27X94	W36X256	None	None	6190
101	W27X102	W36X256	None	None	6390
102	W27X102	W36X256	None	None	6390
103	W27X102	W36X256	None	None	6390
104	W27X102	W36X256	None	None	6390
105	W27X102	W36X256	None	None	6390
106	W27X102	W36X256	None	None	6390
107	W27X102	W36X256	None	None	6390
108	W27X102	W36X256	None	None	6390
109	W27X114	W36X256	None	None	6690
110	W27X114	W36X256	None	None	6690
111	W27X114	W36X256	None	None	6690
112	W27X114	W36X256	None	None	6690
113	W27X114	W36X256	None	None	6690
114	W27X114	W36X256	None	None	6690
115	W27X114	W36X256	None	None	6690
116	W27X114	W36X256	None	None	6690
117	W27X114	W36X256	None	None	6690
118	W27X114	W36X256	None	None	6690
119	W30X116	W24X306	None	None	7490
120	W30X116	W24X306	None	None	7490
121	W30X116	W24X306	None	None	7490
122	W30X116	W24X306	None	None	7490
123	W30X116	W24X306	None	None	7490
124	W30X116	W24X306	None	None	7490
125	W30X116	W24X306	None	None	7490
126	W30X116	W27X307	None	None	7505
127	W30X116	W27X307	None	None	7505
128	W30X116	W27X307	None	None	7505
129	W30X116	W27X307	None	None	7505
130	W30X116	W30X326	None	None	7790
131	W30X116	W30X326	None	None	7790
132	W30X116	W30X326	None	None	7790
133	W30X116	W30X326	None	None	7790
134	W30X116	W30X326	None	None	7790
135	W30X116	W30X326	None	None	7790
136	W30X116	W30X326	None	None	7790

137	W30X124	W30X326	None	None	7990
138	W30X124	W30X326	None	None	7990
139	W30X124	W30X326	None	None	7990
140	W30X124	W30X326	None	None	7990
141	W30X124	W30X326	None	None	7990
142	W30X124	W30X326	None	None	7990
143	W30X124	W30X326	None	None	7990
144	W30X124	W30X326	None	None	7990
145	W30X124	W36X330	None	None	8050
146	W30X124	W36X330	None	None	8050
147	W30X124	W36X330	None	None	8050
148	W30X124	W36X330	None	None	8050
149	W30X124	W36X330	None	None	8050
150	W30X124	W36X330	None	None	8050
151	W30X124	W36X330	None	None	8050
152	W30X124	W36X330	None	None	8050
153	W30X124	W36X330	None	None	8050
154	W30X124	W36X330	None	None	8050
155	W30X124	W36X361	None	None	8515
156	W30X124	W36X361	None	None	8515
157	W30X124	W36X361	None	None	8515
158	W30X124	W36X361	None	None	8515
159	W30X124	W36X361	None	None	8515
160	W30X132	W33X354	None	None	8610
161	W30X132	W33X354	None	None	8610
162	W30X132	W33X354	None	None	8610
163	W30X132	W36X361	None	None	8715
164	W30X132	W36X361	None	None	8715
165	W30X132	W36X361	None	None	8715
166	W30X132	W36X361	None	None	8715
167	W30X132	W36X361	None	None	8715
168	W30X132	W36X395	None	None	9225
169	W30X132	W36X395	None	None	9225
170	W30X132	W36X395	None	None	9225
171	W30X132	W36X395	None	None	9225
172	W30X132	W36X395	None	None	9225
173	W30X148	W33X387	None	None	9505
174	W30X148	W33X387	None	None	9505
175	W30X148	W33X387	None	None	9505
176	W30X148	W33X387	None	None	9505
177	W30X148	W33X387	None	None	9505
178	W30X148	W33X387	None	None	9505
179	W30X148	W33X387	None	None	9505
180	W30X148	W33X387	None	None	9505
181	W30X148	W33X387	None	None	9505
182	W30X148	W33X387	None	None	9505
183	W30X148	W33X387	None	None	9505
184	W30X148	W33X387	None	None	9505
185	W30X148	W33X387	None	None	9505
186	W30X148	W33X387	None	None	9505
187	W30X148	W36X395	None	None	9625
188	W30X148	W36X395	None	None	9625
189	W30X148	W36X395	None	None	9625
190	W30X148	W36X395	None	None	9625
191	W30X148	W36X395	None	None	9625

192	W30X148	W36X395	None	None	9625
193	W30X148	W36X441	None	None	10315
194	W30X148	W36X441	None	None	10315
195	W30X148	W36X441	None	None	10315
196	W30X148	W36X441	None	None	10315
197	W30X148	W36X441	None	None	10315
198	W30X148	W36X441	None	None	10315
199	W30X148	W36X441	None	None	10315
200	W30X148	W36X441	None	None	10315
201	W30X148	W36X487	None	None	11005
202	W30X148	W36X487	None	None	11005
203	W30X148	W36X487	None	None	11005
204	W30X148	W36X487	None	None	11005
205	W30X148	W36X487	None	None	11005
206	W30X148	W36X487	None	None	11005
207	W30X148	W36X487	None	None	11005
208	W30X173	W36X487	None	None	11630
209	W30X173	W36X487	None	None	11630
210	W30X173	W36X487	None	None	11630
211	W30X173	W36X487	None	None	11630
212	W30X173	W36X487	None	None	11630
213	W30X173	W36X487	None	None	11630
214	W30X173	W36X487	None	None	11630
215	W30X173	W36X487	None	None	11630
216	W30X173	W36X487	None	None	11630
217	W30X173	W36X487	None	None	11630
218	W30X173	W36X487	None	None	11630
219	W30X173	W36X487	None	None	11630
220	W30X173	W36X487	None	None	11630
221	W30X173	W36X487	None	None	11630
222	W30X173	W36X487	None	None	11630
223	W30X173	W36X487	None	None	11630
224	W30X173	W36X487	None	None	11630
225	W30X173	W36X487	None	None	11630
226	W30X173	W36X487	None	None	11630
227	W30X173	W36X487	None	None	11630
228	W30X173	W36X487	None	None	11630
229	W30X173	W36X487	None	None	11630
230	W30X173	W36X487	None	None	11630
231	W30X173	W36X487	None	None	11630
232	W30X173	W36X487	None	None	11630
233	W30X173	W36X487	None	None	11630
234	W30X173	W36X487	None	None	11630
235	W30X173	W36X487	None	None	11630
236	W30X173	W36X487	None	None	11630
237	W30X173	W36X487	None	None	11630
238	W30X173	W36X487	None	None	11630
239	W30X191	W36X487	None	None	12080
240	W30X191	W36X487	None	None	12080
241	W30X191	W36X487	None	None	12080
242	W30X191	W36X487	None	None	12080
243	W30X191	W36X487	None	None	12080
244	W30X191	W36X487	None	None	12080
245	W30X191	W36X487	None	None	12080
246	W30X191	W36X487	None	None	12080

247	W30X191	W36X487	None	None	12080
248	W30X191	W36X487	None	None	12080
249	W30X191	W36X487	None	None	12080
250	W30X191	W36X487	None	None	12080
251	W30X191	W36X487	None	None	12080
252	W30X191	W36X487	None	None	12080
253	W30X191	W36X487	None	None	12080
254	W30X191	W36X487	None	None	12080
255	W30X191	W36X487	None	None	12080
256	W30X191	W36X487	None	None	12080
257	W30X191	W36X487	None	None	12080
258	W30X191	W36X487	None	None	12080
259	W30X191	W36X529	None	None	12710
260	W30X191	W36X529	None	None	12710
261	W30X191	W36X529	None	None	12710
262	W30X191	W36X529	None	None	12710
263	W30X191	W36X529	None	None	12710
264	W30X191	W36X529	None	None	12710
265	W30X191	W36X529	None	None	12710
266	W30X191	W36X529	None	None	12710
267	W30X211	W36X529	None	None	13210
268	W30X211	W36X529	None	None	13210
269	W30X211	W36X529	None	None	13210
270	W30X211	W36X529	None	None	13210
271	W30X211	W36X529	None	None	13210
272	W30X211	W36X529	None	None	13210
273	W30X211	W36X529	None	None	13210
274	W30X211	W36X529	None	None	13210
275	W30X211	W36X529	None	None	13210
276	W30X211	W36X529	None	None	13210
277	W30X211	W36X529	None	None	13210
278	W30X211	W36X529	None	None	13210
279	W30X211	W36X529	None	None	13210
280	W30X211	W36X529	None	None	13210
281	W30X211	W36X529	None	None	13210
282	W30X211	W36X529	None	None	13210
283	W30X211	W36X529	None	None	13210
284	W30X211	W36X529	None	None	13210
285	W30X211	W36X529	None	None	13210
286	W30X211	W36X529	None	None	13210
287	W30X191	W36X652	None	None	14555
288	W30X191	W36X652	None	None	14555
289	W30X211	W36X652	None	None	15055
290	W30X211	W36X652	None	None	15055
291	W30X211	W36X652	None	None	15055
292	W30X211	W36X652	None	None	15055
293	W30X211	W36X652	None	None	15055
294	W30X211	W36X652	None	None	15055
295	W30X211	W36X652	None	None	15055
296	W30X211	W36X652	None	None	15055
297	W30X211	W36X652	None	None	15055
298	W30X211	W36X652	None	None	15055
299	W30X211	W36X652	None	None	15055
300	W30X211	W36X652	None	None	15055

Table 7: Lightest RBS Design Table for 15 ft Story Height

25 ft Bay Width, Doubler Plates Allowed

Stiffness (k/in)	Beam	Column	Continuity Plate	Doubler Plate	Molecule Weight (lb)
10	W16X31	W21X93	None	None	2170
11	W16X31	W21X93	None	None	2170
12	W16X31	W24X103	None	None	2320
13	W16X31	W30X124	None	None	2635
14	W18X35	W18X119	None	None	2660
15	W18X40	W18X119	None	None	2785
16	W18X40	W18X119	None	None	2785
17	W21X44	W12X120	None	3/8"	2924
18	W21X44	W12X120	None	3/8"	2924
19	W21X44	W12X120	None	3/8"	2924
20	W21X44	W27X129	None	None	3035
21	W21X44	W27X129	None	None	3035
22	W21X44	W27X129	None	None	3035
23	W21X44	W27X129	None	None	3035
24	W21X44	W27X129	None	None	3035
25	W21X44	W27X129	None	None	3035
26	W21X44	W27X129	None	None	3035
27	W21X50	W27X129	None	None	3185
28	W21X50	W27X129	None	None	3185
29	W21X50	W27X129	None	None	3185
30	W24X55	W18X130	None	3/16"	3346
31	W24X55	W18X130	None	3/16"	3346
32	W24X55	W18X130	None	3/16"	3346
33	W24X55	W18X130	None	3/16"	3346
34	W24X62	W18X130	None	3/8"	3543
35	W24X62	W18X130	None	3/8"	3543
36	W24X62	W18X130	None	3/8"	3543
37	W24X62	W18X130	None	3/8"	3543
38	W24X62	W18X130	None	3/8"	3543
39	W24X55	W30X148	None	None	3595
40	W24X55	W30X148	None	None	3595
41	W24X55	W30X148	None	None	3595
42	W24X62	W30X148	None	None	3770
43	W24X62	W30X148	None	None	3770
44	W24X62	W30X148	None	None	3770
45	W24X62	W30X148	None	None	3770
46	W24X62	W33X169	None	None	4085
47	W24X62	W33X169	None	None	4085
48	W24X62	W33X169	None	None	4085
49	W24X62	W36X182	None	None	4280
50	W24X62	W36X182	None	None	4280
51	W24X62	W36X182	None	None	4280
52	W24X62	W36X210	None	None	4700
53	W24X84	W18X175	None	1/2"	4782
54	W24X84	W18X175	None	1/2"	4782
55	W24X84	W18X175	None	1/2"	4782
56	W24X84	W18X175	None	1/2"	4782
57	W24X84	W18X175	None	1/2"	4782

58	W24X76	W24X207	None	3/16"	5034
59	W24X76	W24X207	None	3/16"	5034
60	W24X94	W18X175	None	5/8"	5047
61	W24X94	W18X175	None	5/8"	5047
62	W24X94	W18X175	None	5/8"	5047
63	W24X94	W18X175	None	5/8"	5047
64	W24X84	W24X207	None	3/16"	5234
65	W27X94	W18X192	None	1/2"	5294
66	W27X94	W18X192	None	1/2"	5294
67	W27X94	W18X192	None	1/2"	5294
68	W27X94	W18X192	None	1/2"	5294
69	W27X94	W18X192	None	1/2"	5294
70	W27X94	W18X192	None	1/2"	5294
71	W27X94	W18X192	None	1/2"	5294
72	W27X94	W18X192	None	1/2"	5294
73	W27X94	W18X192	None	1/2"	5294
74	W27X94	W18X192	None	1/2"	5294
75	W27X102	W18X192	None	5/8"	5511
76	W27X102	W18X192	None	5/8"	5511
77	W27X102	W18X192	None	5/8"	5511
78	W27X102	W18X192	None	5/8"	5511
79	W27X102	W18X192	None	5/8"	5511
80	W27X102	W18X192	None	5/8"	5511
81	W27X102	W18X192	None	5/8"	5511
82	W27X102	W18X211	None	1/2"	5780
83	W27X102	W18X211	None	1/2"	5780
84	W27X94	W24X229	None	3/16"	5817
85	W27X94	W24X229	None	3/16"	5817
86	W27X114	W18X192	None	7/8"	5844
87	W27X114	W18X192	None	7/8"	5844
88	W27X114	W18X192	None	7/8"	5844
89	W27X114	W18X192	None	7/8"	5844
90	W27X102	W24X229	None	1/4"	6028
91	W27X102	W24X229	None	1/4"	6028
92	W27X102	W24X229	None	1/4"	6028
93	W30X116	W18X211	None	3/4"	6173
94	W30X116	W18X211	None	3/4"	6173
95	W30X116	W18X211	None	3/4"	6173
96	W30X116	W18X211	None	3/4"	6173
97	W30X116	W18X211	None	3/4"	6173
98	W30X116	W18X211	None	3/4"	6173
99	W30X116	W18X211	None	3/4"	6173
100	W30X116	W18X211	None	3/4"	6173
101	W30X116	W18X211	None	3/4"	6173
102	W30X116	W18X211	None	3/4"	6173
103	W30X116	W18X211	None	3/4"	6173
104	W30X116	W18X211	None	3/4"	6173
105	W30X116	W18X211	None	3/4"	6173
106	W30X116	W18X211	None	3/4"	6173
107	W27X102	W36X256	None	None	6390
108	W27X102	W36X256	None	None	6390
109	W30X124	W18X211	None	7/8"	6391
110	W30X124	W18X211	None	7/8"	6391
111	W30X124	W18X211	None	7/8"	6391
112	W30X124	W18X211	None	7/8"	6391

113	W30X124	W18X211	None	7/8"	6391
114	W30X132	W18X211	None	1"	6610
115	W30X132	W18X211	None	1"	6610
116	W30X132	W18X211	None	1"	6610
117	W30X132	W18X211	None	1"	6610
118	W30X132	W18X211	None	1"	6610
119	W30X132	W18X211	None	1"	6610
120	W30X116	W24X250	None	3/8"	6722
121	W30X116	W24X250	None	3/8"	6722
122	W30X116	W24X250	None	3/8"	6722
123	W30X116	W24X250	None	3/8"	6722
124	W30X116	W27X258	None	1/4"	6824
125	W30X116	W27X258	None	1/4"	6824
126	W30X116	W27X258	None	1/4"	6824
127	W30X116	W27X258	None	1/4"	6824
128	W30X124	W24X250	None	1/2"	6946
129	W30X124	W24X250	None	1/2"	6946
130	W30X124	W24X250	None	1/2"	6946
131	W30X124	W24X250	None	1/2"	6946
132	W30X124	W24X250	None	1/2"	6946
133	W30X124	W27X258	None	3/8"	7052
134	W30X124	W27X258	None	3/8"	7052
135	W30X124	W27X258	None	3/8"	7052
136	W30X124	W27X258	None	3/8"	7052
137	W30X124	W27X258	None	3/8"	7052
138	W30X124	W27X258	None	3/8"	7052
139	W30X132	W24X250	None	5/8"	7171
140	W30X132	W24X250	None	5/8"	7171
141	W30X132	W24X250	None	5/8"	7171
142	W30X132	W27X258	None	1/2"	7279
143	W30X132	W27X258	None	1/2"	7279
144	W30X132	W27X258	None	1/2"	7279
145	W30X132	W27X258	None	1/2"	7279
146	W30X132	W27X258	None	1/2"	7279
147	W30X132	W27X258	None	1/2"	7279
148	W30X132	W27X281	None	3/8"	7597
149	W30X148	W24X250	None	3/4"	7597
150	W30X148	W24X250	None	3/4"	7597
151	W30X148	W24X250	None	3/4"	7597
152	W30X148	W24X250	None	3/4"	7597
153	W30X148	W24X250	None	3/4"	7597
154	W30X148	W24X250	None	3/4"	7597
155	W30X148	W24X250	None	3/4"	7597
156	W30X148	W24X250	None	3/4"	7597
157	W30X148	W24X250	None	3/4"	7597
158	W30X148	W24X250	None	3/4"	7597
159	W30X148	W24X279	None	5/8"	8008
160	W30X148	W24X279	None	5/8"	8008
161	W30X148	W24X279	None	5/8"	8008
162	W30X148	W24X279	None	5/8"	8008
163	W30X148	W27X281	None	1/2"	8026
164	W30X148	W27X281	None	1/2"	8026
165	W30X148	W27X281	None	1/2"	8026
166	W30X148	W27X281	None	1/2"	8026
167	W30X148	W27X281	None	1/2"	8026

168	W30X148	W27X281	None	1/2"	8026
169	W30X148	W27X307	None	3/8"	8388
170	W30X148	W27X307	None	3/8"	8388
171	W30X148	W33X318	None	3/8"	8573
172	W30X148	W33X318	None	3/8"	8573
173	W30X148	W33X318	None	3/8"	8573
174	W30X148	W33X318	None	3/8"	8573
175	W30X148	W33X318	None	3/8"	8573
176	W30X148	W33X318	None	3/8"	8573
177	W30X148	W33X318	None	3/8"	8573
178	W30X148	W33X318	None	3/8"	8573
179	W30X148	W33X318	None	3/8"	8573
180	W30X148	W33X318	None	3/8"	8573
181	W30X148	W33X318	None	3/8"	8573
182	W30X148	W33X318	None	3/8"	8573
183	W30X148	W33X318	None	3/8"	8573
184	W30X148	W33X318	None	3/8"	8573
185	W30X148	W33X318	None	3/8"	8573
186	W30X148	W33X318	None	3/8"	8573
187	W30X148	W33X354	None	3/16"	9061
188	W30X148	W36X361	None	3/16"	9170
189	W30X148	W36X361	None	3/16"	9170
190	W30X148	W36X361	None	3/16"	9170
191	W30X148	W36X361	None	3/16"	9170
192	W30X148	W36X361	None	3/16"	9170
193	W30X148	W36X361	None	3/16"	9170
194	W30X173	W24X370	None	3/8"	9948
195	W30X173	W24X370	None	3/8"	9948
196	W30X173	W24X370	None	3/8"	9948
197	W30X173	W24X370	None	3/8"	9948
198	W30X173	W24X370	None	3/8"	9948
199	W30X173	W24X370	None	3/8"	9948
200	W30X148	W36X441	None	None	10315
201	W30X191	W24X370	None	5/8"	10448
202	W30X191	W24X370	None	5/8"	10448
203	W30X191	W24X370	None	5/8"	10448
204	W30X191	W24X370	None	5/8"	10448
205	W30X191	W24X370	None	5/8"	10448
206	W30X191	W24X370	None	5/8"	10448
207	W30X191	W24X370	None	5/8"	10448
208	W30X191	W24X370	None	5/8"	10448
209	W30X191	W24X370	None	5/8"	10448
210	W30X191	W24X370	None	5/8"	10448
211	W30X191	W24X370	None	5/8"	10448
212	W30X191	W24X370	None	5/8"	10448
213	W30X191	W24X370	None	5/8"	10448
214	W30X191	W24X370	None	5/8"	10448
215	W30X191	W24X370	None	5/8"	10448
216	W30X191	W24X370	None	5/8"	10448
217	W30X191	W24X370	None	5/8"	10448
218	W30X191	W24X370	None	5/8"	10448
219	W30X191	W24X370	None	5/8"	10448
220	W30X191	W24X370	None	5/8"	10448
221	W30X191	W24X370	None	5/8"	10448
222	W30X211	W24X370	None	7/8"	10998

223	W30X211	W24X370	None	7/8"	10998
224	W30X211	W24X370	None	7/8"	10998
225	W30X211	W24X370	None	7/8"	10998
226	W30X211	W24X370	None	7/8"	10998
227	W30X211	W24X370	None	7/8"	10998
228	W30X211	W24X370	None	7/8"	10998
229	W30X211	W24X370	None	7/8"	10998
230	W30X211	W24X370	None	7/8"	10998
231	W30X211	W24X370	None	7/8"	10998
232	W30X211	W24X370	None	7/8"	10998
233	W30X211	W24X370	None	7/8"	10998
234	W30X211	W24X370	None	7/8"	10998
235	W30X211	W24X370	None	7/8"	10998
236	W30X211	W24X370	None	7/8"	10998
237	W30X211	W24X370	None	7/8"	10998
238	W30X211	W24X370	None	7/8"	10998
239	W30X211	W24X370	None	7/8"	10998
240	W30X211	W24X370	None	7/8"	10998
241	W30X211	W24X370	None	7/8"	10998
242	W30X211	W24X370	None	7/8"	10998
243	W30X235	W24X370	None	1-1/4"	11675
244	W30X235	W24X370	None	1-1/4"	11675
245	W30X235	W24X370	None	1-1/4"	11675
246	W30X235	W24X370	None	1-1/4"	11675
247	W30X235	W24X370	None	1-1/4"	11675
248	W30X235	W24X370	None	1-1/4"	11675
249	W30X235	W24X370	None	1-1/4"	11675
250	W30X235	W24X370	None	1-1/4"	11675
251	W30X235	W24X370	None	1-1/4"	11675
252	W30X235	W24X370	None	1-1/4"	11675
253	W30X235	W24X370	None	1-1/4"	11675
254	W30X235	W24X370	None	1-1/4"	11675
255	W30X235	W24X370	None	1-1/4"	11675
256	W30X235	W24X370	None	1-1/4"	11675
257	W30X235	W24X370	None	1-1/4"	11675
258	W30X235	W24X370	None	1-1/4"	11675
259	W30X235	W24X370	None	1-1/4"	11675
260	W30X235	W24X370	None	1-1/4"	11675
261	W30X235	W24X370	None	1-1/4"	11675
262	W30X235	W24X370	None	1-1/4"	11675
263	W30X235	W24X370	None	1-1/4"	11675
264	W30X235	W24X370	None	1-1/4"	11675
265	W30X235	W24X370	None	1-1/4"	11675
266	W30X235	W24X370	None	1-1/4"	11675
267	W30X235	W24X370	None	1-1/4"	11675
268	W30X235	W24X370	None	1-1/4"	11675
269	W30X235	W24X370	None	1-1/4"	11675
270	W30X235	W24X370	None	1-1/4"	11675
271	W30X235	W24X370	None	1-1/4"	11675
272	W30X235	W24X370	None	1-1/4"	11675
273	W30X261	W24X370	None	1-1/2"	12378
274	W30X261	W24X370	None	1-1/2"	12378
275	W30X261	W24X370	None	1-1/2"	12378
276	W30X261	W24X370	None	1-1/2"	12378
277	W30X261	W24X370	None	1-1/2"	12378

278	W30X261	W24X370	None	1-1/2"	12378
279	W30X261	W24X370	None	1-1/2"	12378
280	W30X261	W24X370	None	1-1/2"	12378
281	W30X261	W24X370	None	1-1/2"	12378
282	W30X261	W24X370	None	1-1/2"	12378
283	W30X261	W24X370	None	1-1/2"	12378
284	W30X261	W24X370	None	1-1/2"	12378
285	W30X261	W24X370	None	1-1/2"	12378
286	W30X261	W24X370	None	1-1/2"	12378
287	W30X261	W24X370	None	1-1/2"	12378
288	W30X261	W24X370	None	1-1/2"	12378
289	W30X261	W24X370	None	1-1/2"	12378
290	W30X261	W24X370	None	1-1/2"	12378
291	W30X261	W24X370	None	1-1/2"	12378
292	W30X261	W24X370	None	1-1/2"	12378
293	W30X261	W24X370	None	1-1/2"	12378
294	W30X261	W24X370	None	1-1/2"	12378
295	W30X261	W24X370	None	1-1/2"	12378
296	W30X261	W24X370	None	1-1/2"	12378
297	W30X261	W24X370	None	1-1/2"	12378
298	W30X235	W36X487	None	3/8"	13293
299	W30X235	W36X487	None	3/8"	13293
300	W30X235	W36X487	None	3/8"	13293

Table 8: Lightest RBS Design Table for 15 ft Story Height

25 ft Bay Width, Both Plates Not Allowed

Stiffness (k/in)	Beam	Column	Continuity Plate	Doubler Plate	Molecule Weight (lb)
10	W16X31	W21X93	None	None	2170
11	W16X31	W21X93	None	None	2170
12	W16X31	W24X103	None	None	2320
13	W16X31	W30X124	None	None	2635
14	W18X35	W18X119	None	None	2660
15	W18X40	W18X119	None	None	2785
16	W18X40	W18X119	None	None	2785
17	W18X40	W27X129	None	None	2935
18	W18X40	W27X129	None	None	2935
19	W18X40	W27X129	None	None	2935
20	W21X44	W27X129	None	None	3035
21	W21X44	W27X129	None	None	3035
22	W21X44	W27X129	None	None	3035
23	W21X44	W27X129	None	None	3035
24	W21X44	W27X129	None	None	3035
25	W21X44	W27X129	None	None	3035
26	W21X44	W27X129	None	None	3035
27	W21X50	W27X129	None	None	3185
28	W21X50	W27X129	None	None	3185
29	W21X50	W27X129	None	None	3185
30	W21X50	W30X148	None	None	3470
31	W21X50	W30X148	None	None	3470

32	W24X55	W30X148	None	None	3595
33	W24X55	W30X148	None	None	3595
34	W24X55	W30X148	None	None	3595
35	W24X55	W30X148	None	None	3595
36	W24X55	W30X148	None	None	3595
37	W24X55	W30X148	None	None	3595
38	W24X55	W30X148	None	None	3595
39	W24X55	W30X148	None	None	3595
40	W24X55	W30X148	None	None	3595
41	W24X55	W30X148	None	None	3595
42	W24X62	W30X148	None	None	3770
43	W24X62	W30X148	None	None	3770
44	W24X62	W30X148	None	None	3770
45	W24X62	W30X148	None	None	3770
46	W24X62	W33X169	None	None	4085
47	W24X62	W33X169	None	None	4085
48	W24X62	W33X169	None	None	4085
49	W24X62	W36X182	None	None	4280
50	W24X62	W36X182	None	None	4280
51	W24X62	W36X182	None	None	4280
52	W24X62	W36X210	None	None	4700
53	W24X62	W36X232	None	None	5030
54	W24X76	W27X217	None	None	5155
55	W24X76	W27X217	None	None	5155
56	W24X76	W27X217	None	None	5155
57	W24X76	W27X217	None	None	5155
58	W24X76	W27X217	None	None	5155
59	W24X76	W27X217	None	None	5155
60	W24X76	W36X232	None	None	5380
61	W24X76	W36X232	None	None	5380
62	W24X76	W36X232	None	None	5380
63	W24X76	W36X232	None	None	5380
64	W24X76	W36X232	None	None	5380
65	W24X76	W36X232	None	None	5380
66	W24X76	W36X232	None	None	5380
67	W24X76	W36X232	None	None	5380
68	W24X76	W36X232	None	None	5380
69	W24X84	W36X232	None	None	5580
70	W24X84	W36X232	None	None	5580
71	W24X84	W36X232	None	None	5580
72	W24X84	W36X232	None	None	5580
73	W24X84	W36X232	None	None	5580
74	W24X84	W36X232	None	None	5580
75	W24X84	W36X232	None	None	5580
76	W24X94	W36X232	None	None	5830
77	W24X94	W36X232	None	None	5830
78	W24X94	W36X232	None	None	5830
79	W24X94	W36X232	None	None	5830
80	W24X94	W36X232	None	None	5830
81	W24X94	W36X232	None	None	5830
82	W24X94	W36X232	None	None	5830
83	W24X94	W36X256	None	None	6190
84	W24X94	W36X256	None	None	6190
85	W24X94	W36X256	None	None	6190
86	W27X94	W36X256	None	None	6190

87	W27X94	W36X256	None	None	6190
88	W27X94	W36X256	None	None	6190
89	W27X94	W36X256	None	None	6190
90	W27X94	W36X256	None	None	6190
91	W27X94	W36X256	None	None	6190
92	W27X94	W36X256	None	None	6190
93	W27X94	W36X256	None	None	6190
94	W27X94	W36X256	None	None	6190
95	W27X94	W36X256	None	None	6190
96	W27X94	W36X256	None	None	6190
97	W27X94	W36X256	None	None	6190
98	W27X94	W36X256	None	None	6190
99	W27X94	W36X256	None	None	6190
100	W27X94	W36X256	None	None	6190
101	W27X102	W36X256	None	None	6390
102	W27X102	W36X256	None	None	6390
103	W27X102	W36X256	None	None	6390
104	W27X102	W36X256	None	None	6390
105	W27X102	W36X256	None	None	6390
106	W27X102	W36X256	None	None	6390
107	W27X102	W36X256	None	None	6390
108	W27X102	W36X256	None	None	6390
109	W27X114	W36X256	None	None	6690
110	W27X114	W36X256	None	None	6690
111	W27X114	W36X256	None	None	6690
112	W27X114	W36X256	None	None	6690
113	W27X114	W36X256	None	None	6690
114	W27X114	W36X256	None	None	6690
115	W27X114	W36X256	None	None	6690
116	W27X114	W36X256	None	None	6690
117	W27X114	W36X256	None	None	6690
118	W27X114	W36X256	None	None	6690
119	W30X116	W24X306	None	None	7490
120	W30X116	W24X306	None	None	7490
121	W30X116	W24X306	None	None	7490
122	W30X116	W24X306	None	None	7490
123	W30X116	W24X306	None	None	7490
124	W30X116	W24X306	None	None	7490
125	W30X116	W24X306	None	None	7490
126	W30X116	W27X307	None	None	7505
127	W30X116	W27X307	None	None	7505
128	W30X116	W27X307	None	None	7505
129	W30X116	W27X307	None	None	7505
130	W30X116	W30X326	None	None	7790
131	W30X116	W30X326	None	None	7790
132	W30X116	W30X326	None	None	7790
133	W30X116	W30X326	None	None	7790
134	W30X116	W30X326	None	None	7790
135	W30X116	W30X326	None	None	7790
136	W30X116	W30X326	None	None	7790
137	W30X124	W30X326	None	None	7990
138	W30X124	W30X326	None	None	7990
139	W30X124	W30X326	None	None	7990
140	W30X124	W30X326	None	None	7990
141	W30X124	W30X326	None	None	7990

142	W30X124	W30X326	None	None	7990
143	W30X124	W30X326	None	None	7990
144	W30X124	W30X326	None	None	7990
145	W30X124	W36X330	None	None	8050
146	W30X124	W36X330	None	None	8050
147	W30X124	W36X330	None	None	8050
148	W30X124	W36X330	None	None	8050
149	W30X124	W36X330	None	None	8050
150	W30X124	W36X330	None	None	8050
151	W30X124	W36X330	None	None	8050
152	W30X124	W36X330	None	None	8050
153	W30X124	W36X330	None	None	8050
154	W30X124	W36X330	None	None	8050
155	W30X124	W36X361	None	None	8515
156	W30X124	W36X361	None	None	8515
157	W30X124	W36X361	None	None	8515
158	W30X124	W36X361	None	None	8515
159	W30X124	W36X361	None	None	8515
160	W30X132	W33X354	None	None	8610
161	W30X132	W33X354	None	None	8610
162	W30X132	W33X354	None	None	8610
163	W30X132	W36X361	None	None	8715
164	W30X132	W36X361	None	None	8715
165	W30X132	W36X361	None	None	8715
166	W30X132	W36X361	None	None	8715
167	W30X132	W36X361	None	None	8715
168	W30X132	W36X395	None	None	9225
169	W30X132	W36X395	None	None	9225
170	W30X132	W36X395	None	None	9225
171	W30X132	W36X395	None	None	9225
172	W30X132	W36X395	None	None	9225
173	W30X148	W33X387	None	None	9505
174	W30X148	W33X387	None	None	9505
175	W30X148	W33X387	None	None	9505
176	W30X148	W33X387	None	None	9505
177	W30X148	W33X387	None	None	9505
178	W30X148	W33X387	None	None	9505
179	W30X148	W33X387	None	None	9505
180	W30X148	W33X387	None	None	9505
181	W30X148	W33X387	None	None	9505
182	W30X148	W33X387	None	None	9505
183	W30X148	W33X387	None	None	9505
184	W30X148	W33X387	None	None	9505
185	W30X148	W33X387	None	None	9505
186	W30X148	W33X387	None	None	9505
187	W30X148	W36X395	None	None	9625
188	W30X148	W36X395	None	None	9625
189	W30X148	W36X395	None	None	9625
190	W30X148	W36X395	None	None	9625
191	W30X148	W36X395	None	None	9625
192	W30X148	W36X395	None	None	9625
193	W30X148	W36X441	None	None	10315
194	W30X148	W36X441	None	None	10315
195	W30X148	W36X441	None	None	10315
196	W30X148	W36X441	None	None	10315

197	W30X148	W36X441	None	None	10315
198	W30X148	W36X441	None	None	10315
199	W30X148	W36X441	None	None	10315
200	W30X148	W36X441	None	None	10315
201	W30X148	W36X487	None	None	11005
202	W30X148	W36X487	None	None	11005
203	W30X148	W36X487	None	None	11005
204	W30X148	W36X487	None	None	11005
205	W30X148	W36X487	None	None	11005
206	W30X148	W36X487	None	None	11005
207	W30X148	W36X487	None	None	11005
208	W30X173	W36X487	None	None	11630
209	W30X173	W36X487	None	None	11630
210	W30X173	W36X487	None	None	11630
211	W30X173	W36X487	None	None	11630
212	W30X173	W36X487	None	None	11630
213	W30X173	W36X487	None	None	11630
214	W30X173	W36X487	None	None	11630
215	W30X173	W36X487	None	None	11630
216	W30X173	W36X487	None	None	11630
217	W30X173	W36X487	None	None	11630
218	W30X173	W36X487	None	None	11630
219	W30X173	W36X487	None	None	11630
220	W30X173	W36X487	None	None	11630
221	W30X173	W36X487	None	None	11630
222	W30X173	W36X487	None	None	11630
223	W30X173	W36X487	None	None	11630
224	W30X173	W36X487	None	None	11630
225	W30X173	W36X487	None	None	11630
226	W30X173	W36X487	None	None	11630
227	W30X173	W36X487	None	None	11630
228	W30X173	W36X487	None	None	11630
229	W30X173	W36X487	None	None	11630
230	W30X173	W36X487	None	None	11630
231	W30X173	W36X487	None	None	11630
232	W30X173	W36X487	None	None	11630
233	W30X173	W36X487	None	None	11630
234	W30X173	W36X487	None	None	11630
235	W30X173	W36X487	None	None	11630
236	W30X173	W36X487	None	None	11630
237	W30X173	W36X487	None	None	11630
238	W30X173	W36X487	None	None	11630
239	W30X191	W36X487	None	None	12080
240	W30X191	W36X487	None	None	12080
241	W30X191	W36X487	None	None	12080
242	W30X191	W36X487	None	None	12080
243	W30X191	W36X487	None	None	12080
244	W30X191	W36X487	None	None	12080
245	W30X191	W36X487	None	None	12080
246	W30X191	W36X487	None	None	12080
247	W30X191	W36X487	None	None	12080
248	W30X191	W36X487	None	None	12080
249	W30X191	W36X487	None	None	12080
250	W30X191	W36X487	None	None	12080
251	W30X191	W36X487	None	None	12080

252	W30X191	W36X487	None	None	12080
253	W30X191	W36X487	None	None	12080
254	W30X191	W36X487	None	None	12080
255	W30X191	W36X487	None	None	12080
256	W30X191	W36X487	None	None	12080
257	W30X191	W36X487	None	None	12080
258	W30X191	W36X487	None	None	12080
259	W30X191	W36X529	None	None	12710
260	W30X191	W36X529	None	None	12710
261	W30X191	W36X529	None	None	12710
262	W30X191	W36X529	None	None	12710
263	W30X191	W36X529	None	None	12710
264	W30X191	W36X529	None	None	12710
265	W30X191	W36X529	None	None	12710
266	W30X191	W36X529	None	None	12710
267	W30X211	W36X529	None	None	13210
268	W30X211	W36X529	None	None	13210
269	W30X211	W36X529	None	None	13210
270	W30X211	W36X529	None	None	13210
271	W30X211	W36X529	None	None	13210
272	W30X211	W36X529	None	None	13210
273	W30X211	W36X529	None	None	13210
274	W30X211	W36X529	None	None	13210
275	W30X211	W36X529	None	None	13210
276	W30X211	W36X529	None	None	13210
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278	W30X211	W36X529	None	None	13210
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283	W30X211	W36X529	None	None	13210
284	W30X211	W36X529	None	None	13210
285	W30X211	W36X529	None	None	13210
286	W30X211	W36X529	None	None	13210
287	W30X191	W36X652	None	None	14555
288	W30X191	W36X652	None	None	14555
289	W30X211	W36X652	None	None	15055
290	W30X211	W36X652	None	None	15055
291	W30X211	W36X652	None	None	15055
292	W30X211	W36X652	None	None	15055
293	W30X211	W36X652	None	None	15055
294	W30X211	W36X652	None	None	15055
295	W30X211	W36X652	None	None	15055
296	W30X211	W36X652	None	None	15055
297	W30X211	W36X652	None	None	15055
298	W30X211	W36X652	None	None	15055
299	W30X211	W36X652	None	None	15055
300	W30X211	W36X652	None	None	15055